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Environmental Assessment of the Alaskan Continental Shelf

Volume 5. Fish, Plankton, Benthos, Littoral

Fourth quarter and annual reports for the reporting period ending March 1976, from Principal Investigators participating in a multi-year program of environmental assessment related to petroleum development on the Alaskan Continental Shelf. The program is directed by the National Oceanic and Atmospheric Administration under the sponsorship of the Bureau of Land Management.

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ENVIRONMENTAL ASSESSMENT OF THE BERING SEA:

BENTHIC BIOLOGY

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March 31, 1976

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A total of 77 widely dispersed permanent stations for quantitative grab sampling have been established in the Bering Sea; these stations represent a reasonable nucleus around which a monitoring program can be developed. Twenty seven (27) of these permanent stations have been processed and the data is now available.

The general patchiness of many components of the fauna of the Bering Sea suggests that the five to six replicate samples taken per station are the minimum number that should be taken. Analysis of grab data by the end of the project period should enable us to suggest the optimum number needed for a monitoring program.

Four hundred and twenty six (426) species have been isolated from the grab-sampling program and 121 from the trawl program. It is probable that all species with numerical and biomass importance have been collected over the sampling year, and that only rare species will be added in future sampling.

No seasonal information is currently available for the Bering Sea benthos from the current sampling program, but a continuing series of cruises during the first year of the investigation made available data (now being processed or temporarily archived) from the spring, summer and early fall. Some indications of seasonal data are avialable in the literature.

Basic information on diversity (Simpson, Shannon-Wiener indices) is now available for 27 of the permanent stations. Caution is indicated in the interpretation of these values until further data is available for additional stations and over a longer time base.

Criteria established for Biologically Important Taxa (BIT) have delineated 89 species. These species will form the basis of cluster analysis that will be used to understand species aggregations.

Preliminary information on feeding biology of species collected by grab is available from literature analysis and unpublished data. A very preliminary examination of the distribution of feeding types with sediment at various stations has been presented. A more intensive analysis will take place after detailed sediment analyses are available at the end of the project period.

The joint National Marine Fisheries Service trawl survey on the R/V *Miller Freeman* for investigation of demersal fishes and epifaunal benthos was effective, and excellent coverage was achieved in the areas examined.

Initial assessment of the data suggests that 1) Sufficient station uniqueness exists to permit development of a monitoring program based on species composition at selected stations utilizing both grab and trawl sampling techniques, and that 2) Adequate numbers of unique, abundant, and/or large species are available to ultimately permit nomination of likely monitoring candidates for the area once industrial activity is initiated.

II. INTRODUCTION

A. General nature and scope of study.

The operations connected with oil exploration, production, and transportation in the Bering Sea present a wide spectrum of potential dangers to the marine environment (see Olson and Burgess, 1967, for general discussion of marine pollution problems). Adverse effects on the environment of the Bering Sea cannot be quantitatively assessed, or even predicted, unless background data pertaining to the area are recorded prior to industrial development.

Insufficient long-term information about an environment, and the basic biology and recruitment of species in that environment can lead to erroneous interpretations of changes in types and density of species that might occur if the area becomes altered (see Nelson-Smith, 1973; Pearson, 1971, 1972; Rosenberg, 1973, for general discussions on benthic biological investigations in industrialized marine areas). Populations of marine species fluctuate over a time span of a few to 30 years (Lewis, 1970, and personal communication). Such fluctuations are typically unexplainable because of absence of long-term data on physical and chemical environmental parameters in association with biological information on the species involved (Lewis, 1970 and personal communication).

Benthic organisms (primarily the infauna, sessile and slow-moving epifauna) are particularly useful as indicator species for a disturbed area because they tend to remain in place, typically react to long-range environmental changes, and by their presence, generally reflect the nature of the substratum. Consequently, the organisms of the infaunal benthos have frequently been chosen to monitor long-term pollution effects, and are believed to accurately reflect the biological health of a marine area (see Pearson, 1971, 1972; and Rosenberg, 1973 for discussion on long-term usage of benthic organisms for monitoring pollution).

The presence of large numbers of benthic epifaunal species of actual or potential commercial importance (crabs, shrimps, snails, fin fishes) in the Bering Sea further dictates the necessity of understanding benthic communities since many commercial species feed on infaunal and small epifaunal residents of the benthos (see Zenkevitch, 1963, for a discussion of the interaction of commercial species and the benthos). Any drastic changes in density of the food benthos could affect the health and numbers of these fisheries organisms.

Experience in pollution-prone areas of England (Smith, 1968), Scotland (Pearson, 1972), and California (Straughan, 1971) suggests that at the completion of an initial exploratory study, selected stations should be examined regularly on a long-term basis to determine any changes in species content, diversity, abundance and biomass. Such long-term data acquisition should make it possible to differentiate between normal ecosystem variation and pollutant-induced biological alteration. An intensive investigation of the benthos of the Bering Sea is also essential to an understanding of the trophic interactions involved there and the potential changes that may take place once oil-related activities are initiated.

Benthic macrofauna of the Bering Sea is relatively well known taxonomically, and some data on distribution, abundance, and feeding mechanisms are reported in the literature. The relationship of specific infaunal feeding types to certain substrate conditions has limited documentation as well. However, detailed information on the temporal and spatial variability of the benthic fauna is sparse, and the relationship of benthic species to the overlying seasonal ice cover is not known. Many of the macrofaunal benthic species may be impacted by oil-related activities. An understanding of these species and their interactions with each other and various aspects of the abiotic features of their environment is essential to the development of environmental predictive capabilities required for the Bering Sea.

The benthic biological program in the Bering Sea during its first year of emphasized the development of a qualitative and quantitative inventory of species as part of the overall examination of the biological, physical and chemical components of those portions of the shelf slated for oil exploration and drilling activity. In addition, development of computer programs in the Gulf of Alaska, designed to quantitatively assess assemblages of benthic species on the shelf there, are applicable to the Bering Sea. The resultant computer analysis will expand the understanding of distribution patterns of species in the latter area.

The study program as designed will survey and define variability of the benthic fauna on the eastern Bering Sea continental shelf in regions of offshore oil and gas concentrations. During the first phases of research, emphasis has been placed on studies of the southeastern Bering Sea shelf. Data have been obtained on the faunal composition and abundance to form baselines to which potential future changes can be compared. Long-term studies on biological rates, life histories, and species should define aspects of the functioning of communities and ecosystems potentially vulnerable to environmental damage, and can determine the rates at which damaged environments and benthic faunal communities may recover.

B. Specific Objectives.

A. Qualitative and quantitative census of dominant species within the identified oil lease sites.

B. Description of spatial distribution patterns with emphasis on assessing patchiness and correlation with microhabitat.

C. Comparison of species distribution with physical, chemical, and geological factors.

D. Observations of biological interrelationships of the benthic biota of the study area.

C. Relevance to problems of petroleum development

The effects of oil pollution on subtidal benthic organisms have been seriously neglected, although a few studies, conducted after serious oil spills, have been published (see Boesch *et al*, 1974 for review of these papers). Thus, lack of a broad data base elsewhere makes it difficult at present to predict the effects of oil-related activity on the subtidal benthos of the Bering Sea. However, the rapid expansion of research activities here should ultimately enable us to point with some confidence at certain species or areas that might bear closer scrutiny once industrial activity becomes a reality. It must be emphasized that a considerable time frame is needed to understand long-term fluctuations in density of many marine benthic species, and it cannot be expected that a short-term research program will result in total predictive capabilities. Assessment of the environment must be conducted on a continuing long-term basis.

As indicated previously, infaunal benthic organisms tend to remain in place and consequently can be useful as an indicator species for disturbed areas. Thus, close examination of stations with substantial complements of infaunal species is warranted (see Appendix Table 1, and data on magnetic tape). Changes in the environment at these stations might be reflected by a decrease in diversity of species with increased dominance of a few (see Nelson-Smith, 1973 for further discussion of oil-related changes in diversity). Likewise, stations with substantial numbers of epifaunal species should be assessed on a continuing basis (see Appendix Table 2, for references to some relevant stations occupied by trawl). The potential effects of loss of specific species to the overall trophic structure in the Bering Sea cannot be assessed at this time, but the problem can probably at least be addressed once data from benthic food studies are available (see project by Smith, 1975).

Data indicating the effects of oils on most subtidal benthic invertebrates are fragmentary, but echinoderms are "notoriously sensitive to any reduction in water quality" (Nelson-Smith, 1973). Echinoderms (primarily asteroids but also holothvroids and echinoids at some stations) are conspicuous members of the benthos of the Bering Sea (see Appendix Table 2, for references to some relevant stations), and could be affected by oil activities there. Asteroids (sea stars), ophiuroids (brittle stars), and echinoids (sand dollars) are often important components of the diet of large crabs (for example king crab feed on sea stars and sand dollars) and demersal fishes. The tanner or snow crab (*Chionoecetes* spp.) is a conspicuous member of the shallow shelf of the Bering Sea (see Appendix Table 2), and supports a commercial fishery there. Laboratory experiments with one species (*C. bairdi*) have shown that postmolt individuals lose most of their legs after exposure to Prudhoe Bay crude oil; obviously this aspect of the biology of the snow crab must be considered in the continuing assessment of this benthic species in the Bering Sea (J. Karinen and S. Rice, in press: cited in Evans and Rice 1974). Little other direct data based on laboratory experiments is available for subtidal benthic species (see Nelson-Smith, 1973). Experimentation on toxic effects of oil on other common members of the subtidal benthos should be strongly encouraged for the near future in the overall OCS program.

A direct relationship between trophic structure (feeding type) and bottom stability has been demonstrated by Rhoads (see Rhoads, 1974 for review). A diesel-fuel oil spill resulted in oil becoming adsorbed on sediment particles with the resultant mortality of many deposit feeders living on sublittoral muds. Bottom stability was altered with the death of these organisms, and a new complex of species became established in the altered substratum. Many members of the infauna of the Bering Sea are deposit feeders; thus, oil-related mortality of these species could result in a changed near-bottom sedimentary regime with alteration of species.

III. CURRENT STATE OF KNOWLEDGE

The macrofauna of the Bering Sea is well known taxonomically, and data on distribution, abundance, and feeding mechanisms for infaunal species are reported in the literature (Filatova and Barsanova 1964; Kuznetsov 1964; Neyman 1960; Stoker 1973). The relationship of specific infaunal feeding types to certain hydrographic and sediment conditions has been documented (Neyman 1960; Stoker 1973). However, the relationship of these feeding types to the overlying winter ice cover and its contained algal material is not known.

Epifauna of the eastern Bering Sea has been studied little since the trawling activities of the Harriman Alaska Expedition and *Albatross* expedition in the late 1900's. Limited information can be obtained from the report of the pre-World War II king crab investigations (Fishery Market News, 1942) and from the report of the *Pacific Explorer's*, fishing and processing operations in 1948 (Wigutoff and Carlson, 1950). Some information on species found in the area is included in reports of the U. S. Fish and Wildlife Services, Alaska exploratory fishing expedition in 1948 (Ellson, Knake, and Dassow, 1949) and the exploratory fishing expedition to the northern Bering Sea in 1949 (Ellson, Powell, and Hildebrand, 1950). Neuman (1960) has published a quantitative report, in Russian, on the molluscan communities in the eastern Bering Sea. A phase of the research program conducted by the King Crab Investigation of the Bureau of Commercial Fisheries for the International North Pacific Fisheries Commission included an ecological study of the eastern Bering Sea during the summers of 1958 and 1959 (McLaughlin, 1963). Sparks and Pereyra (1966) have presented a partial checklist and general discussion of the benthic fauna encountered during a marine survey of the southeastern Chukchi Sea during the summer of 1959. Their marine survey was carried out in the southeastern Chuckchi Sea from Bering Strait to just north of Cape Lisburne and west to 169° W. Some species described by them in the Chukchi extend into the Bering Sea and are important there.

The biomass and productivity of microscopic sediment-dwelling bacteria, diatoms, microfauna and meiofauna have not been determined, and it is important that their roles be clarified. It is possible that these organisms are vital biological agents for recycling nutrients and energy from sediment to the overlying water mass (see Fenchel 1969 for review). Of unique interest is the potential relationship of the ice edge and underice primary productivity blooms to the underlying benthi-biotic-chemical system.

Crabs and bottom-feeding fishes of the Bering Sea exploit a variety of food types, benthic invertebrate species being most important. Most of these predators feed on the nutrient-enriched upper slope during the winter, but they move into the shallower and warmer waters of the shelf of the southeastern Bering Sea for intensive feeding and spawning during the summer. Occasionally they exploit the colder northern portions of the shelf. This differential distribution is reflected by catch statistics which demonstrate that the southeastern shelf area is a major fishing area for crabs and bottom fishes. The effect of intensive predatory activity in the southern versus the northern part of the shelf appears to be partially responsible for a difference in standing stock of the food benthos in both regions (Neyman 1960, 1963). It is apparent that bottom-feeding species of fisheries importance are significantly exploiting a restricted portion of the Bering Sea shelf and are cropping generally slow-growing species such as polychaetous annelids, snails, and clams. Thus, the carrying capacity of the shelf for benthic fisheries organisms appears to be related to the level of the standing crop of important slow-growing species in the Bering Sea; however, nektobenthic and pelagic Crustacea such as amphipods and euphausids may grow more rapidly in the nutrient-rich water at the shelf edge and may provide important food resources.

Some marine mammals of the Bering Sea feed on benthic species. Walrus feed predominantly on slow-growing species of molluscs, but seals prefer the more rapidly growing crustaceans and fishes in their diets. Although showing food preferences, marine mammals are opportunistic feeders. As a consequence of their broad food spectrum and their exploitation of secondary and tertiary consumers, marine mammals are difficult to place in a food web and to assess in terms of energy cycling. Intensive trawling and oil-related activities on the Bering Sea shelf will ultimately have important ecological effects on benthic organisms used as food by marine mammals. If benthic trophic relationships are altered by these activities, marine mammals may have their food regimes altered.

IV. STUDY AREA

A series of van Veen grab stations were occupied on a grid established in conjunction with the chemical, hydrocarbon, geological and trace metal program, (Fig. 1 and Table 1). Seventy seven (77) stations were sampled; these stations extended from inshore to a maximum depth of approximately 1000 meters. A few deep stations along the slope were occupied.

Stations were occupied in conjunction with the Resource Assessment trawl survey which sampled an area encompassed by an outer boundary that extended along the shelf edge from Unimak Pass to the vicinity of St. Matthew Island and from St. Matthew Island to the coast, and along the coast to Bristol Bay (see Resource Assessment Program for map of study area). A portion of this study area was sampled on the R/V *Miller Freeman*, and is reported here. Leg I of the *Miller Freeman* was east of an imaginary line between St. Matthew Island and Unimak Pass at depths from 27 to 360 meters (15 to 198 fathoms); this is the data processed and analyzed at the time of this report.

V. SOURCES, METHODS AND RATIONALE OF DATA COLLECTION

Benthic infauna was collected on two legs of a cruise on the R/V *Discoverer* (May-June 1975) and three legs of a cruise on the R/V *Miller Freeman* (Leg I-16 August - 3 September, Leg II - 12 September - 26 September; Leg III - 3 October - 24 October). To satisfy the objectives of the project, stations were selected over the entire study area, and these stations were occupied whenever a vessel was available (Fig. 1).

Samples were taken with a 0.1m^2 van Veen grab with bottom penetration facilitated by addition of 31.7 kg (70 pounds) of lead weight to each grab. Two 1.0 mm mesh screen doors on top of the grab permitted removal of undisturbed sediment samples by members of the hydrocarbon and heavy metals study groups. In addition, the screen doors seved to decrease shock waves produced by bottom grabs (see Feder *et al*, 1973 discussion of grab operation and effectiveness of the van Veen grab in sediment of the type found in the Gulf of Alaska). Five to six replicate were occasionally obtained

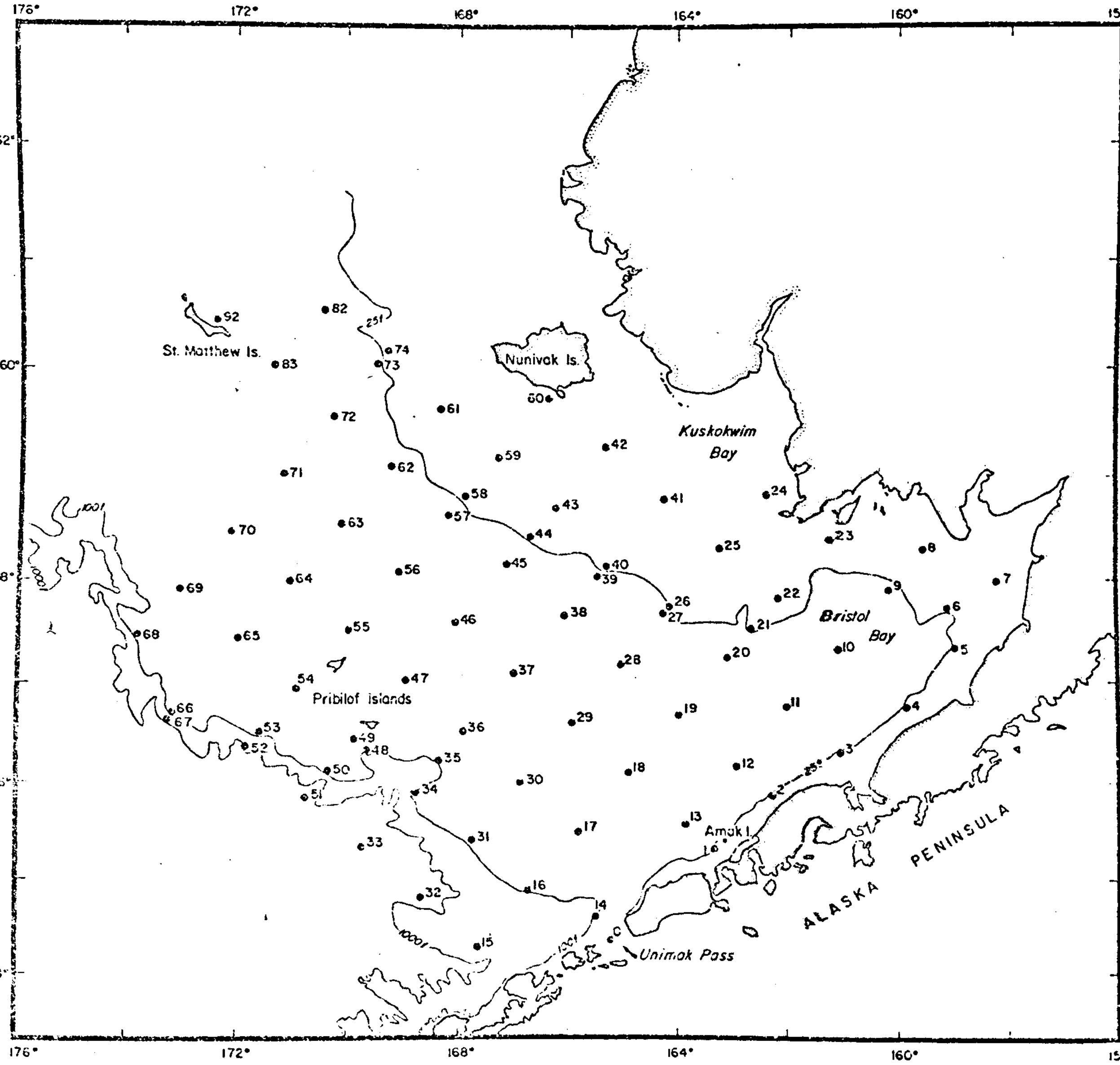


Figure 1. The station grid occupied for the grab - station program in the Bering Sea from May - September (?) 1975.

at some stations. Ten (10) replicates (for a analysis of the optimum number of replicates needed per station in the Bering Sea) were taken at selected stations. Sediment samples were, removed from extra replicate sample taken for this purpose. Sediment for trace metal analysis was taken at selected stations; generally an extra replicate was taken for the latter samples. Material (used for biological sampling) from each grab was washed on a 1.0 mm stainless steel screen and preserved in 10% formalin buffered with hexamine. Samples were stored in plastic bags.

In the laboratory (Marine Sorting Center, University of Alaska, Fairbanks) all grab samples were rinsed to remove the last traces of sediment, spread on a gridded tray, covered with water and rough-sorted by hand. The material was then transferred to fresh preservative (buffered 10% formalin), and identifications made. All organisms were counted and wet-weighted after excess moisture was removed with absorbent towel.

Criteria developed by Feder *et al*, (1973) to recognize Biologically Important Taxa (BIT) were applied to the data collected. By use of these criteria, each species was considered independently (items 1, 2 and 3 below) as well as in combination with other benthic species (items 4 and 5; adopted from Ellis 1969). Each taxon classified as BIT in this study met at least one of the four conditions below.

1. It was distributed in 50 percent or more of the total stations sampled.

2&3. It comprised over 10 percent of either the composite population density or biomass collected at any one station.

4. Its population density was significant at any given station. The significance was determined by the following test:

   a. A percentage was calculated for each taxon with the sum of the population density of all taxa equalling 100 percent.

b. These percentages were then ranked in descending order.

c. The percentages of the taxa were summed in descending order until a cut-off point of 50 percent was reached. The BIT were those taxa whose percentages were used to reach the 50 percent cut-off point. When the cut-off point of 50 percent was exceeded by the percentage of the last taxon added, this taxon was also included.

5. Its biomass was significant at any given station. This significance was determined by the following test:

a. A percentage was calculated for each taxon with the sum of all taxa equalling 100 percent.

b. These percentages were then ranked in descending order.

c. The percentages of the taxa were summed in descending order until a cut-off point of 50 percent was reached. The BIT were those taxa whose percentages were used to reach the 50 percent cut-off point. When the cut-off point of 50 percent was exceeded by the percentage of the last taxon added, this taxon was also included.

Species diversity were examined by way of two Indices of Diversity:

1. Shannon-Wiener Index

$$H = -\Sigma\ p_i \log_e p_i \qquad \text{where } p_i = \frac{n_i}{N}$$

n_i = number of individuals of species $i_1, i_2, i_3 \ldots i_x$

N = total number of individuals

s = total number of species

2. Simpson Index

$$s = \Sigma \frac{n_i}{n} \quad \frac{n_i - 1}{N - 1}$$

These indices were calculated for all stations sampled.

The Simpson index is an index of dominance since the maximum value, 1, is obtained when there is a single species (complete dominance), and values approaching zero are obtained when there are numerous species, each a very small fraction of the total (no dominance). The Shannon index is an index of diversity in that the higher the value, the greater the diversity and the less the community is dominated by one or a few kinds of species (see Odum, 1975 for further discussion and additional references).

All species taken by grab were coded according to the 10 digit VIMS system used for fauna collected in a benthic study in Chesapeake Bay (Swartz *et al*, 1972); coding was suitably modified to conform to species collected in the Gulf of Alaska (Mueller, 1975). Data was recorded on computer cards, and will be converted to magnetic tape. Data printout was accomplished by means of special program written by Mr. James Dryden (Data Processing Services, Institute of Marine Science, University of Alaska). Data output consisted of a listing of stations occupied and replicates (samples) taken, a species-coding number list associated with a printout of Biologically Important Taxa (BIT) for all grab stations, and a series of station printouts [species collected, number of individuals, percentage of each species (number), biomass of individuals (per m^2 for all replicates per station), percentage of each species (biomass), Simpson Index, Shannon Diversity Index].

Trawl material was collected with commercial gear on board the NOAA vessel *Miller Freeman*. Data collection was made during three legs of the *Miller Freeman* cruise in 1975 (Leg I--16 August - 3 September; Leg II--12 September - 26 September; Leg III--3 October - 24 October).

One-half hour and one hour tows were made at predeteramined stations using a 400 mesh Eastern otter trawl. All invertebrates of non-commercial importance were sorted out on shipboard, given tentative identifications, counted, weighed when time permitted and aliquot samples of individual species preserved and labeled for final identification at the Institute of Marine Science, University of Alaska. Counts and weights of commercially important invertebrate species were recorded by the National Marine Fisheries Service biologists, and the data was made available to the benthic invertebrate program.

For obvious logistic reasons all invertebrates could not be returned to the laboratory for verification. Therefore a subsample of each field identification was returned to the University. Closer laboratory examination often revealed more than one species of what was designated in the field as one species (e.g. field identifications of *Pandalus borealis* was later found to also contain *P. montagui tridens*. The difficulty is apparent in assessing total counts and weights of each taxon. In such cases, the counts and weights of the species in question were expanded from the laboratory species ratio to the entire catch of the trawl.

A selected series of fish species were collected or their stomachs removed and preserved; this material was given to Dr. Ron Smith for further intensive analysis.

To date identifications have been made on specimens collected on Leg I only, and these results are included in this report. All taxonomic determinations are complete with the exception of the polychaetous annelids; final identification of this material will be available in the Final Report. Confirmations of the molluscan identifications were made by Rae Baxter (Alaska Department of Fish and Game, Bethel, Alaska). All species were

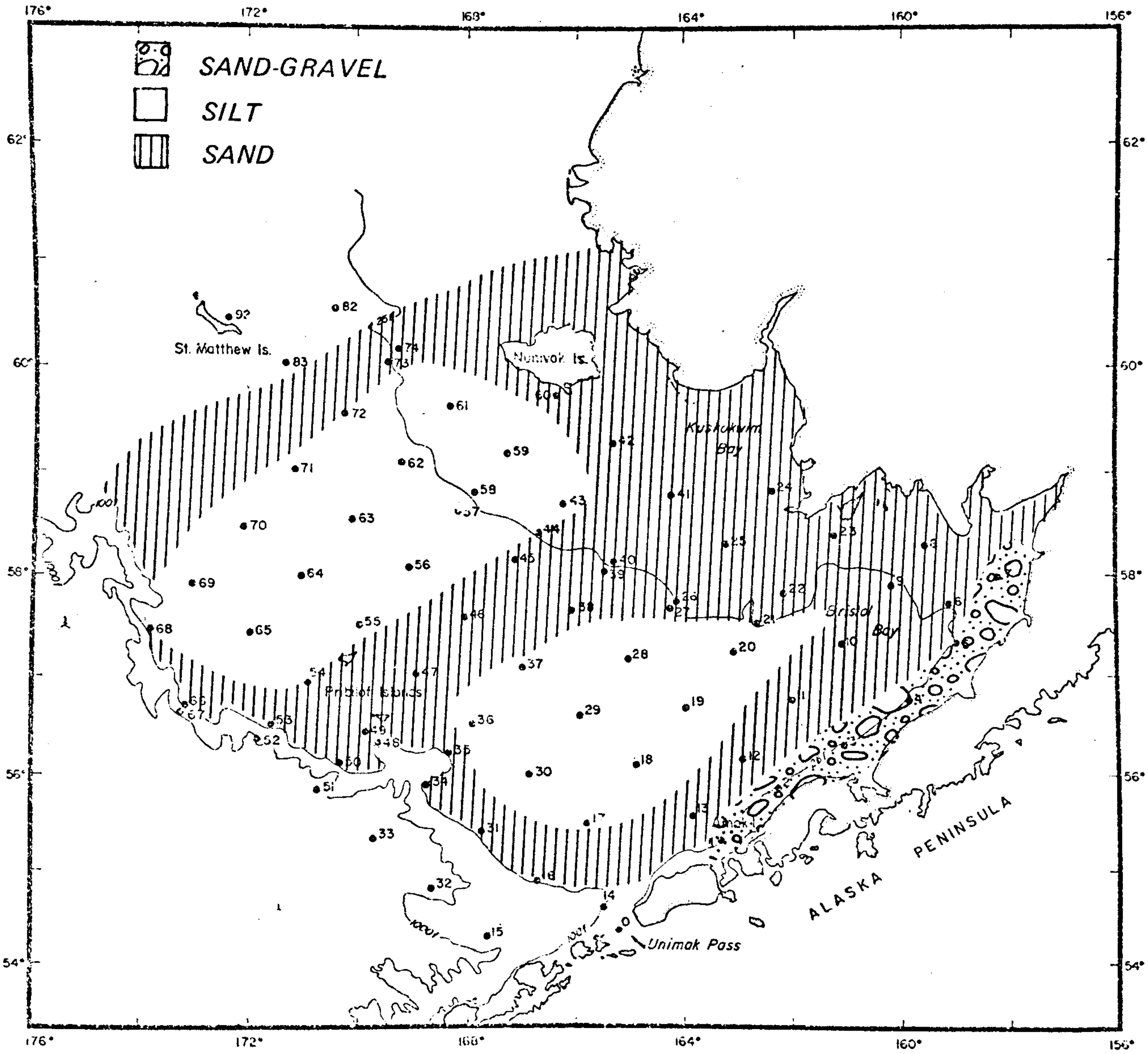


Figure 2. A preliminary map of sediment distribution on the Bering Sea shelf. Based on field notes only; final sediment map will be available in the Final Project Report for the year.

assigned code numbers after final identifications in the laboratory in Fairbanks.

Hermit crab weights as recorded on the data sheets do not include shell weights.

VI. RESULTS

A. Benthic Infaunal Grab Program

The basic plan of operation suggested in the initial proposal was completed with little alteration. A systematic station grid was established in cooperation with other programs (physical and chemical oceanography, trace metal chemistry, hydrocarbon analysis, zooplankton), and a total of 77 stations were located on the established grid (Fig. 1; Table 1). These stations will represent the basic ones to be occupied for the balance of the study. Additional stations of opportunity were occupied in conjunction with the ice-edge studies on Leg I of the cruise of the R/V *Discoverer*; these will be occupied again in the future if they are of scientific interest. Although vessel time contraints did not permit sampling of the basic stations on a quarterly (seasonal) basis, it was possible to accumulate some seasonal information from two time blocks - May through June; August through September.

The van Veen grab functioned effectively in the fine sediments of the Bering Sea (see Fig. 2 for preliminary map of sediment distribution), and typically delivered sample volumes of 10-14 liters. In stations that were sand or sand-gravel dominated, penetration was greatly reduced. The surface of all samples, examined through the top door of the grab, was undisturbed as evidenced by the smooth detrital cover. (see Feder *et al*, 1973 for a review on use of the van Veen grab in soft sediments of the type found in the Gulf of Alaska). The five to six replicates typically

Table 1. Location and depths of the Twenty-seven (27) stations sampled in the Bering Sea, May-June 1975. These stations are the ones considered in detail in this Annual Report[1].

Station	Latitude (N)	Longitude (W)	Approx. Depth (m)
MB5[2]	59° 21'	158° 58'	46
MB7	57° 58'	158° 15'	35
MB9	57° 55'	160° 08'	53
MB13	55° 33'	163° 49'	87
MB14	54° 39'	165° 25'	164
MB15	54° 18'	167° 36'	1006
MB16	54° 53'	166° 44'	205
MB17	55° 29'	165° 50'	121
MB18	56° 06'	164° 54'	95
MB22	57° 50'	162° 11'	44
9-24[3]	57° 28'	167° 28'	73
MB29	56° 35'	165° 57'	84
MB25	58° 19'	163° 13'	36
MB30	56° 00'	166° 51'	133
9-32	57°·48'	167° 44'	70
9-35	58° 50'	169° 19'	68
MB36	56° 31'	167° 55'	117
9-37	58° 41'	169° 18'	65
9-39	58° 29'	169° 19'	71
9-41	58° 20'	169° 19'	70
MB42	59° 16'	165° 20'	22
MB45	58° 10'	167° 10'	62
MB49	56° 25'	169° 56'	106
9-53	57° 50'	169° 40'	68
MB57	58° 36'	168° 13'	53
MB59	59° 12'	167° 18'	38
MB60	59° 43'	166° 24'	29

[1]Additional stations on the MB grid are available and will be presented in the Final Report.

[2]Prefix MB refers to permanent stations on the grab-sampling grid.

[3]Prefix 9 refers to stations of opportunity.

taken at each station appeared to be a minimal number as evidenced by qualitative examination of the station data (see Appendix Table 1); fauna was obviously very patchy. The optimum number of replicates needed to properly sample the infauna of the Bering Sea is to be tested by way of the 10 replicate samples taken at selected stations; these samples are in hand and will be analyzed by the end of the project period (see Feder *et al*, 1973 for discussion on the optimum number of replicate samples needed in a grab-sampling program).

The size of screen chosen for the onboard washing process, 1.0 mm, was appropriate for the sediments sampled, and was the minimal size that could efficiently be used at most stations. A smaller size mesh would greatly increase the overall shipboard washing time which in turn would reduce the overall station coverage possible on each cruise.

Seventy seven (77) stations have been sampled on the permanent grid (Fig. 1). Twenty six (26) stations of opportunity were occupied.

Data from 27 stations taken on the May-June cruise of the R/V *Discoverer* have been processed and tabulated for this report (see Appendix Table I for selected stations). Twenty (20) of these stations are permanent stations on the grid; the other seven stations were ones of opportunity. The majority of the samples archived at the Marine Sorting Center from the R/V *Discoverer* and R/V *Miller Freeman* should be processed by the end of the project year.

A total of 426 species isolated from the grab samples were delineated with 304 of these positively identified. Members of 13 phyla were collected with the Annelida comprising the most important group with 180 species. Arthropoda were next in importance with 120 species, and Mollusca next with 93 species. Other groups were less important (Tables 2 and 3; Appendix Table 3).

Table 2. The invertebrate phyla and the number and percentage of species of each phylum collected by van Veen grab in the Bering Sea in May and June 1975. Species have not been determined for all groups. This list only cludes the 27 stations discussed in this Annual Report.

Phylum	Number of species	% of species
Annelida	180	42.3
Arthropoda (Crustacea)	120	28.2
Mollusca	93	21.8
Echinodermata	17	4.0
Sipunculida	3	0.7
Cnidaria	3	0.7
Nemertinea	2	0.5
Priapulida	2	0.5
Echinroidea	1	0.2
Ectoprocta (=Bryozoa)	1	0.2
Chordata (Tunicata)	2	0.5
Porifera	1	0.2
Nematoda	1	0.2
TOTAL	426	100.0

Table 3. The number and percentages of species of subgroups of Mollusca, Echinodermata and Crustacea collected by van Veen grab in the Bering Sea in May and June 1975. All groups but all data entries are included here. The list only includes the 27 stations discussed in this Annual Report.

Phylum	Subgroup	Number of species	% of species
Mollusca	Pelecypoda	61	66.3
	Gastropoda	26	28.3
	Polyplacophora	1	1.1
	Scaphopoda	3	3.2
	Aplacophora	1	1.1
	TOTAL	92	100.0%
Arthropoda (Crustacea)	Amphipoda	186	71.7
	Cumacea	16	13.3
	Mysidacea	2	1.7
	Tanaidacea	2	1.7
	Thoracica	4	3.3
	Decapoda	3	2.5
	Isopoda	3	2.5
	Euphausiacea	2	1.7
	Nebaliacea	1	.8
	Ostracoda	1	.8
	TOTAL	120	100.0%
Echinodermata	Ophiuroidea	8	47.0
	Asteroidea	2	11.8
	Holothuroidea	5	24.4
	Echinoidea	2	11.8
	TOTAL	17	100.0%

The two diversity indices, Simpson and Shannon, calculated for all species, and summarized in Table 4, will ultimately be included in the computer printout for all grab station data, and will be submitted on magnetic tape to the National Environmental Data Center. No assessment can be made at this time concerning the importance of these indices; when data for all stations over the entire grid are available some overall generalizations may be possible.

Utilization of the criteria for Biologically Important Taxa has delineated 89 species (see Appendix Table 3 and data on magnetic tape). Thirty eight (38) of the BIT were identified as important by way of biomass at one or more stations. The distribution of nine or the BIT are shown in Figures 3-11. Some of the latter species were well distributed throughout the study area, for example - *Macoma moesta alaskana* (clam), *Diamphiodia craterdometa* (brittle star), *Yoldia hyperborea* (clam), *Echinarachnius parma* (sand dollar), *Clinocardium ciliatum* (cockle). See Table 5 for examples of the major species dominating by biomass. These species may be ones with great influence on the trophic interactions in their particular localities, and some of them will be followed in succeeding years (species data will be available on magnetic tape).

The feeding methods for many of the species collected are included in Appendix Table VI in Feder and Mueller (1975). The data are compiled from the literature and from personal observations (see Feder *et al.*, 1973; Feder and Mueller, unpublished data and interpretations). Some of the species probably utilize two feeding methods, and such dual feeding methods where known, are included in the table. The predominant feeding methods utilized by species at each station have not been determined as yet. It is presumed that the methods used will tend to vary with local currents and be reflected to a certain extent by the substrate type at each station.

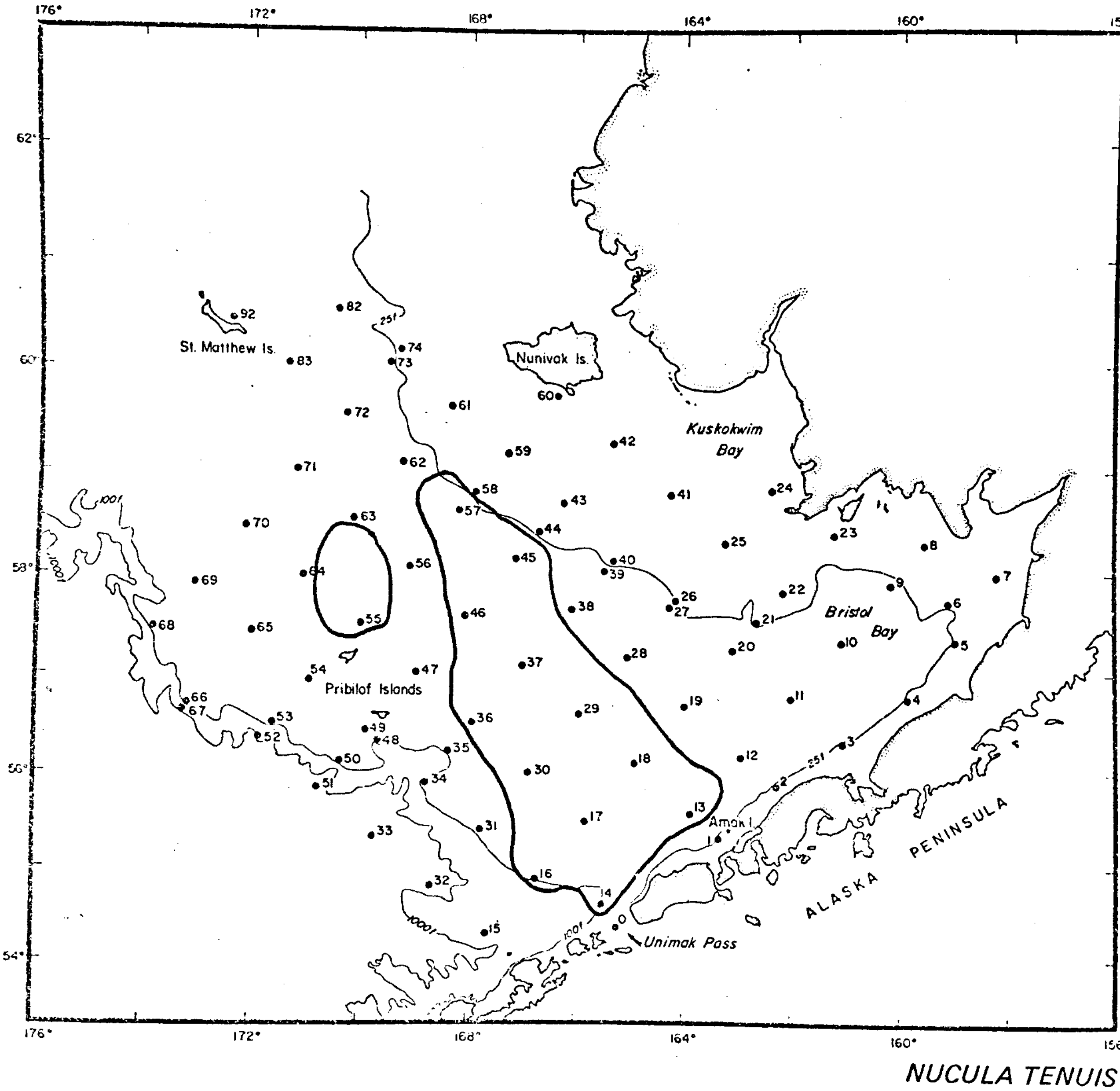


Figure 11. The distribution of the clam *Nucula tenuis* on the shelf of the southeastern Bering Sea. Distribution based on data from May-June 1975. The distribution may be modified when all station data is available at the end of the project year.

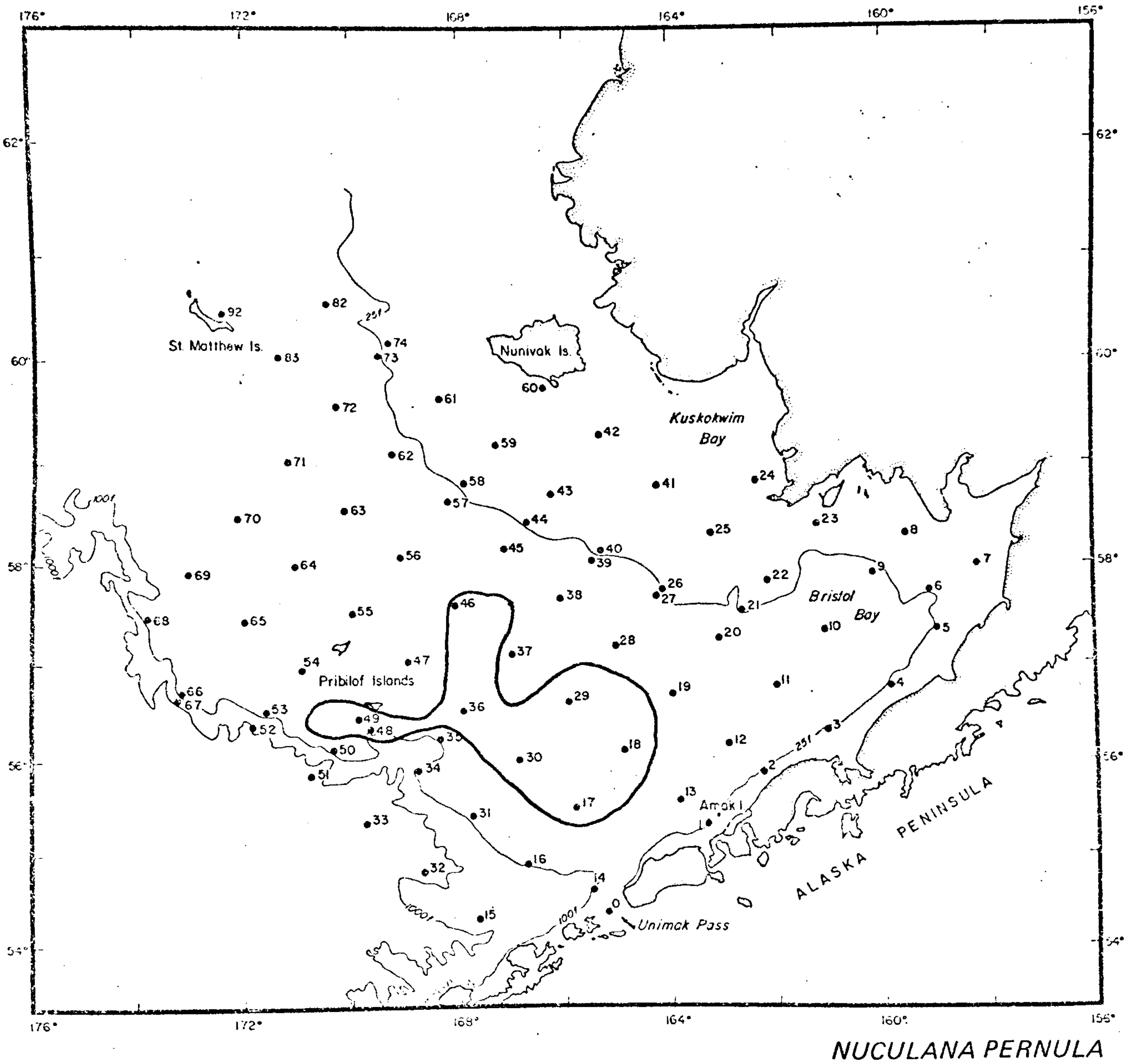


Figure 10. The distribution of the clam *Nuculana pernula* on the shelf of the southeastern Bering Sea. Distribution based on data from May-June 1975. The distribution may be modified when all station data is available at the end of the project year.

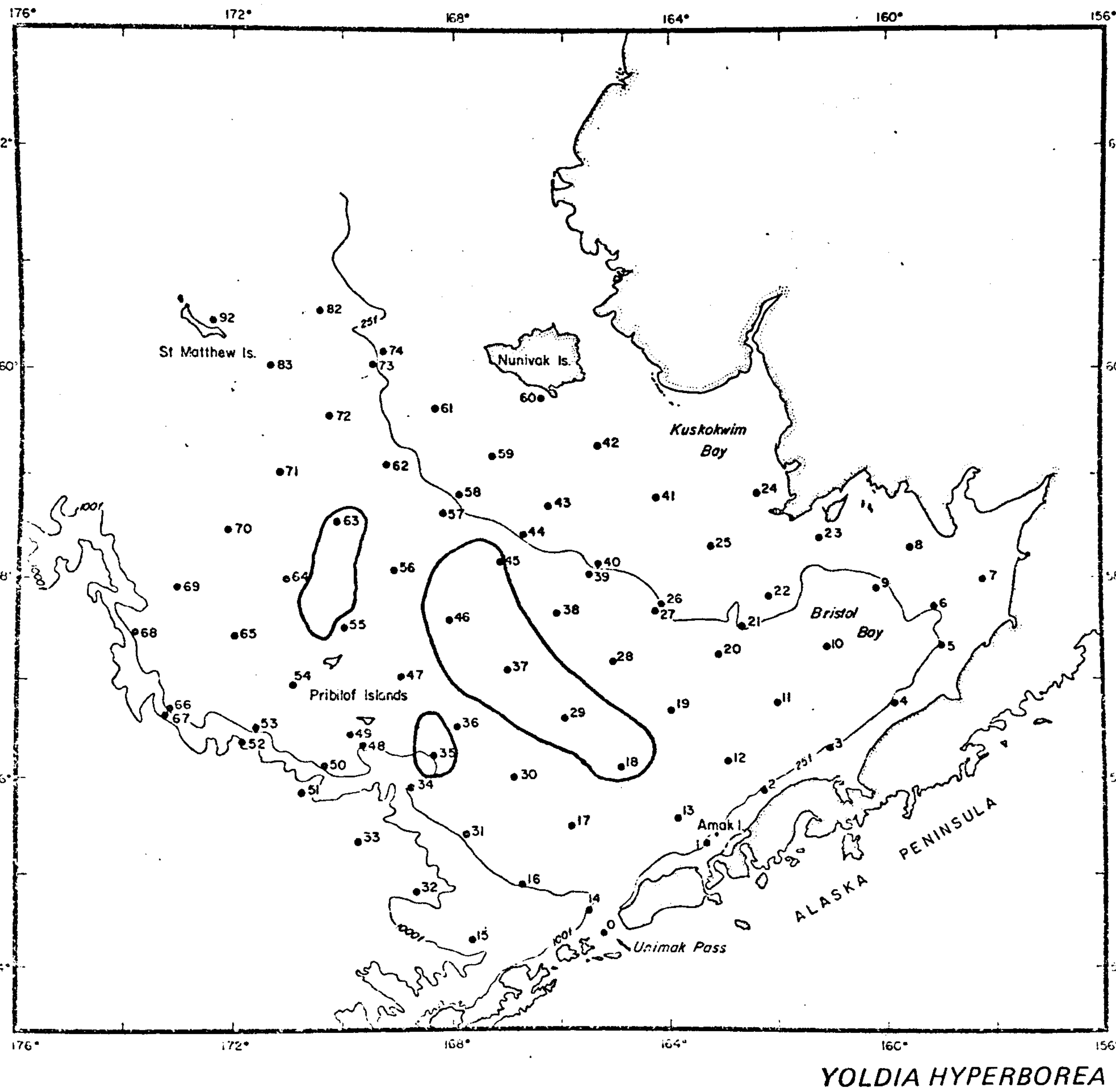


Figure 9. The distribution of the clam *Yoldia hyperborea* on the shelf of the southeastern Bering Sea. Distribution based on data from May-June 1975. The distribution may be modified when all station data is available at the end of the project year.

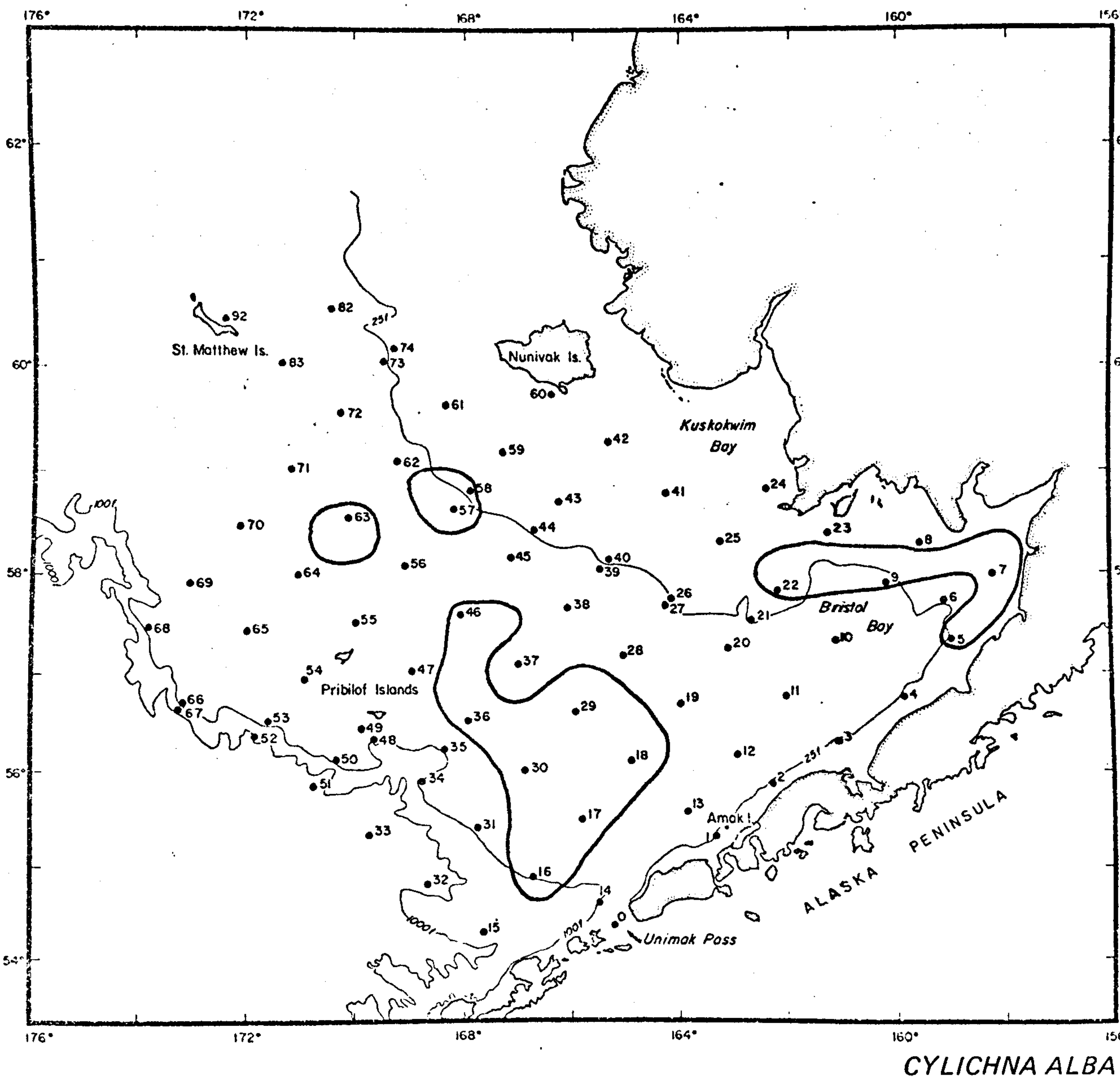


Figure 8. The distribution of the gastropod *Cylichna alba* on the shelf of the southeastern Bering Sea. Distribution based on data from May-June 1975. The distribution may be modified when all station data is available at the end of the project year.

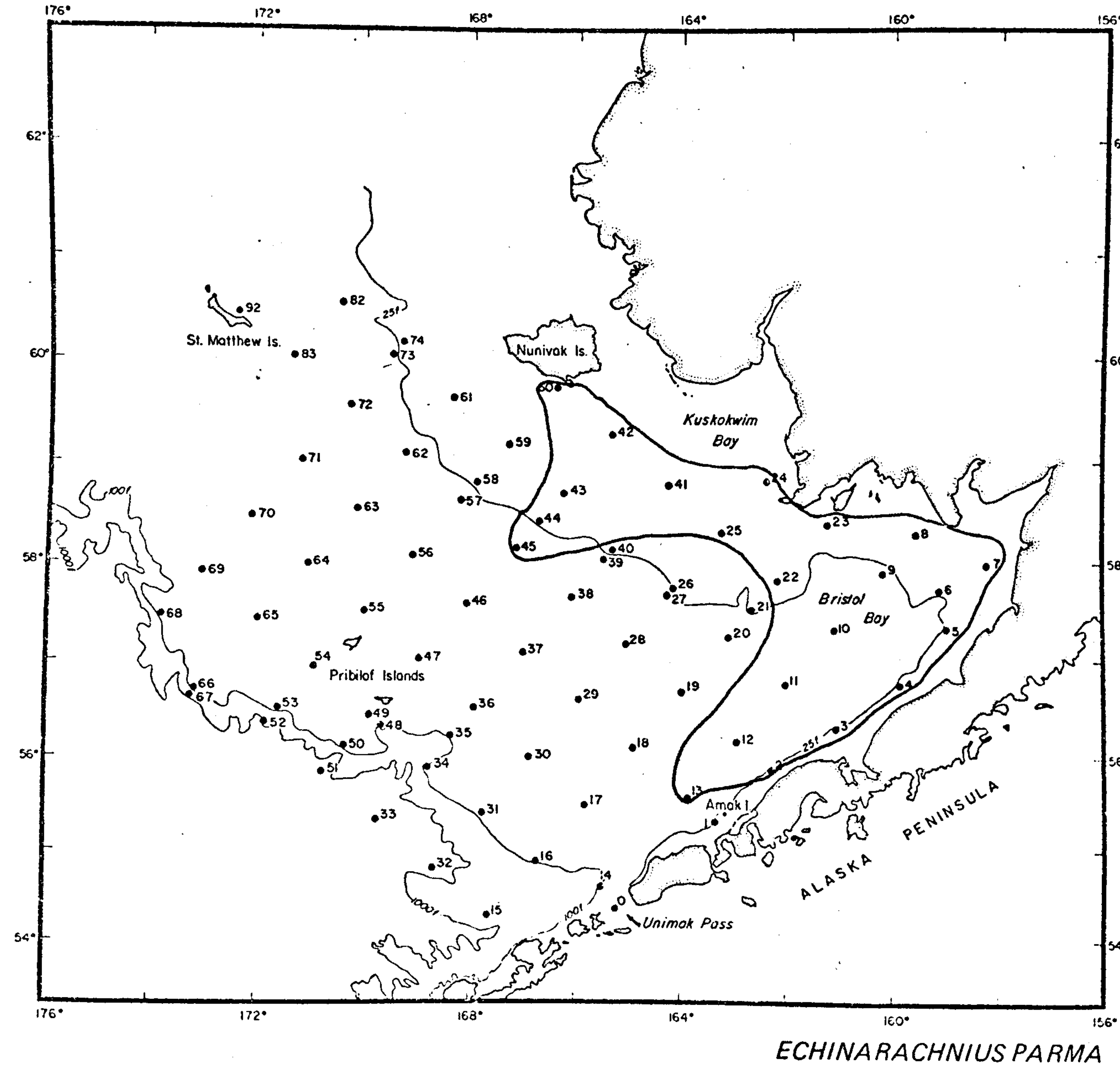
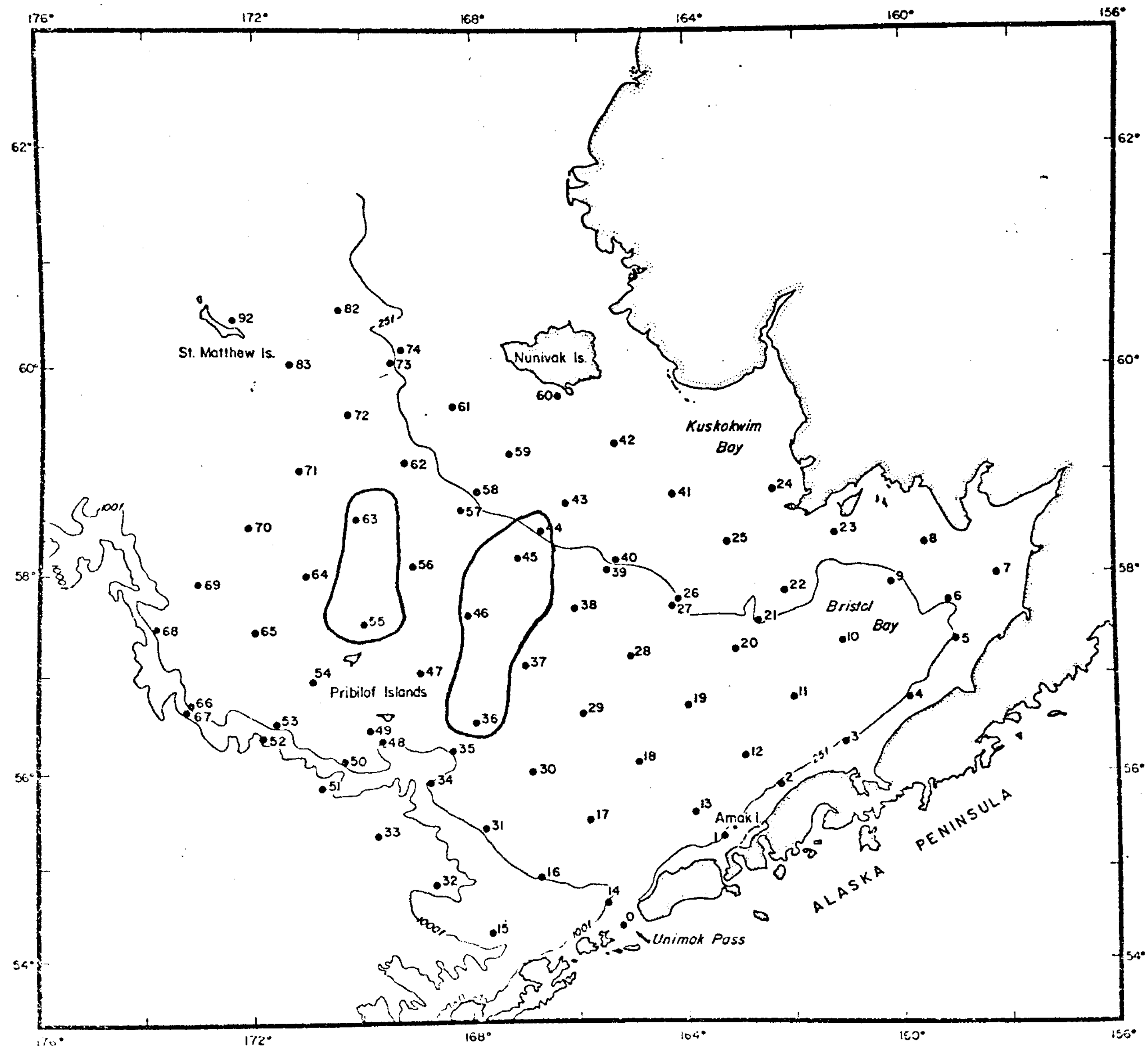


Figure 7. The distribution of the sand dollar *Echinarachnius parma* on the shelf of the southeastern Bering Sea. Distribution based on data from May-June 1975. The distribution may be modified when all station data is available at the end of the project year.



PRAXILLELLA PRAETERMISSA

Figure 6. The distribution of the polychaetous annelid *Praxillella praetermissa* on the shelf of the southeastern Bering Sea. Distribution based on data from May-June 1975. The distribution may be modified when all station data is available at the end of the project year.

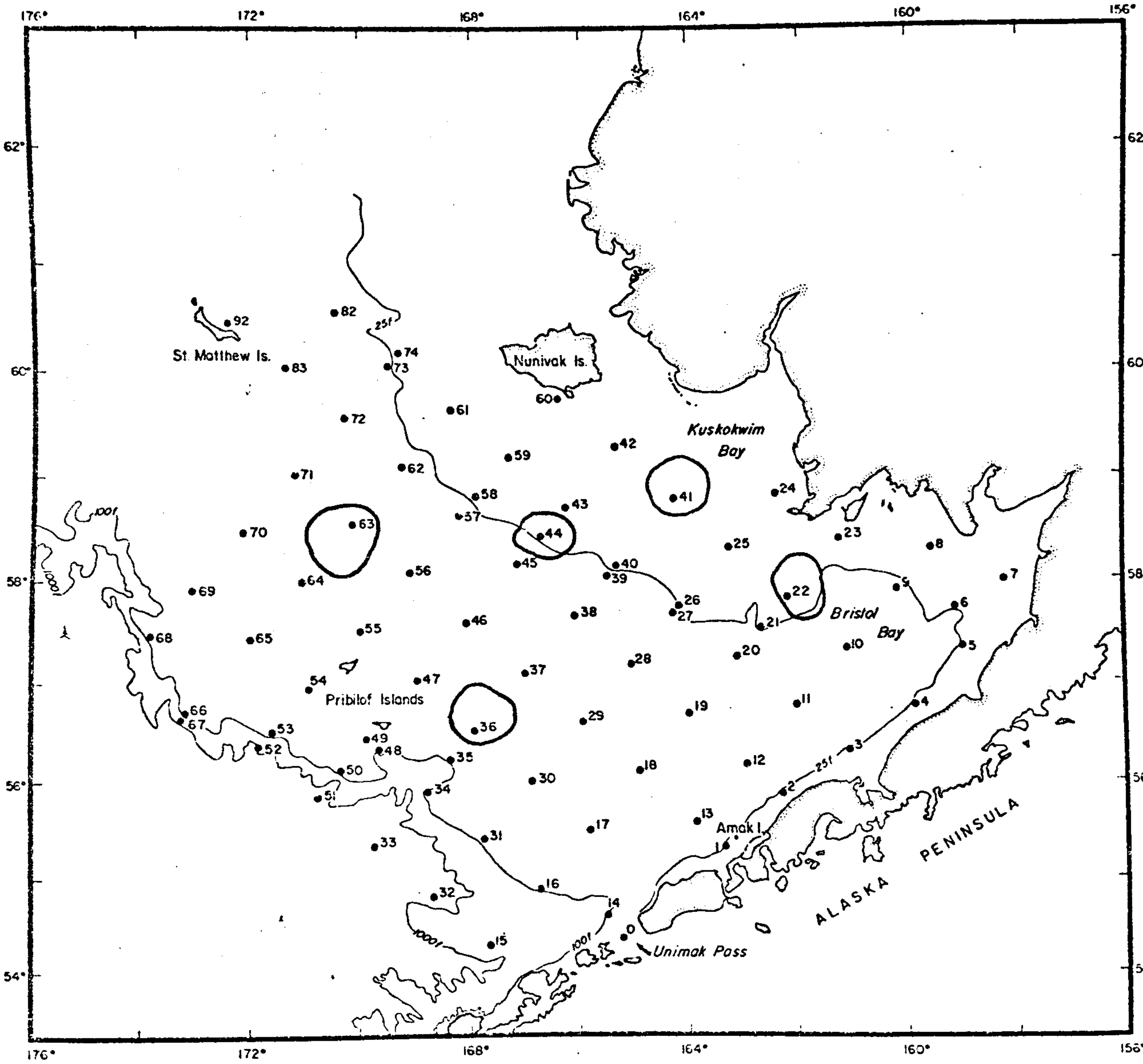


Figure 5. The distribution of the polychaetous annelid *Chone infundibuliformis* on the shelf of the southeastern Bering Sea. Distribution based on data from May-June 1975. The distribution may be modified when all station data is available at the end of the project year.

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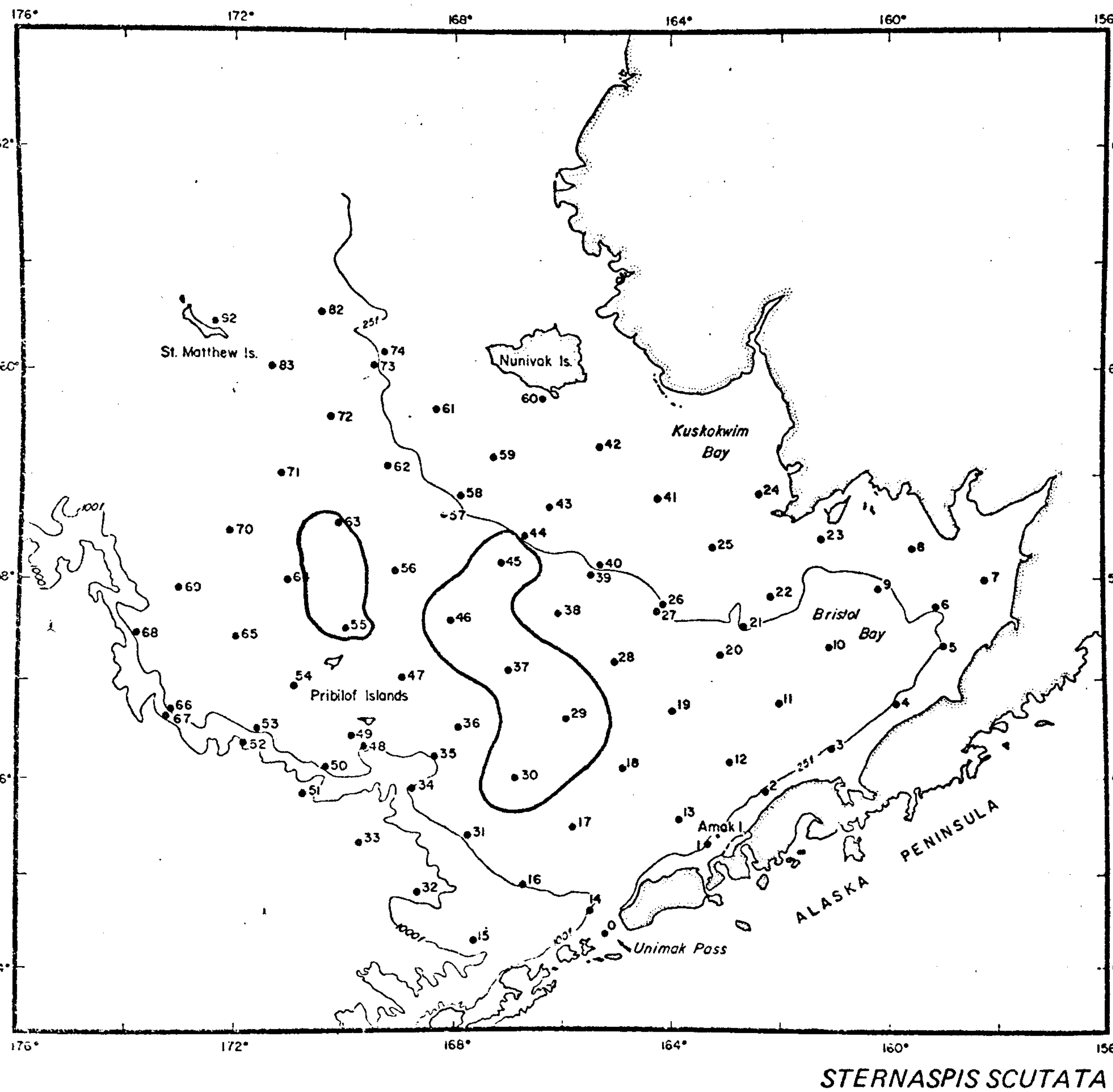
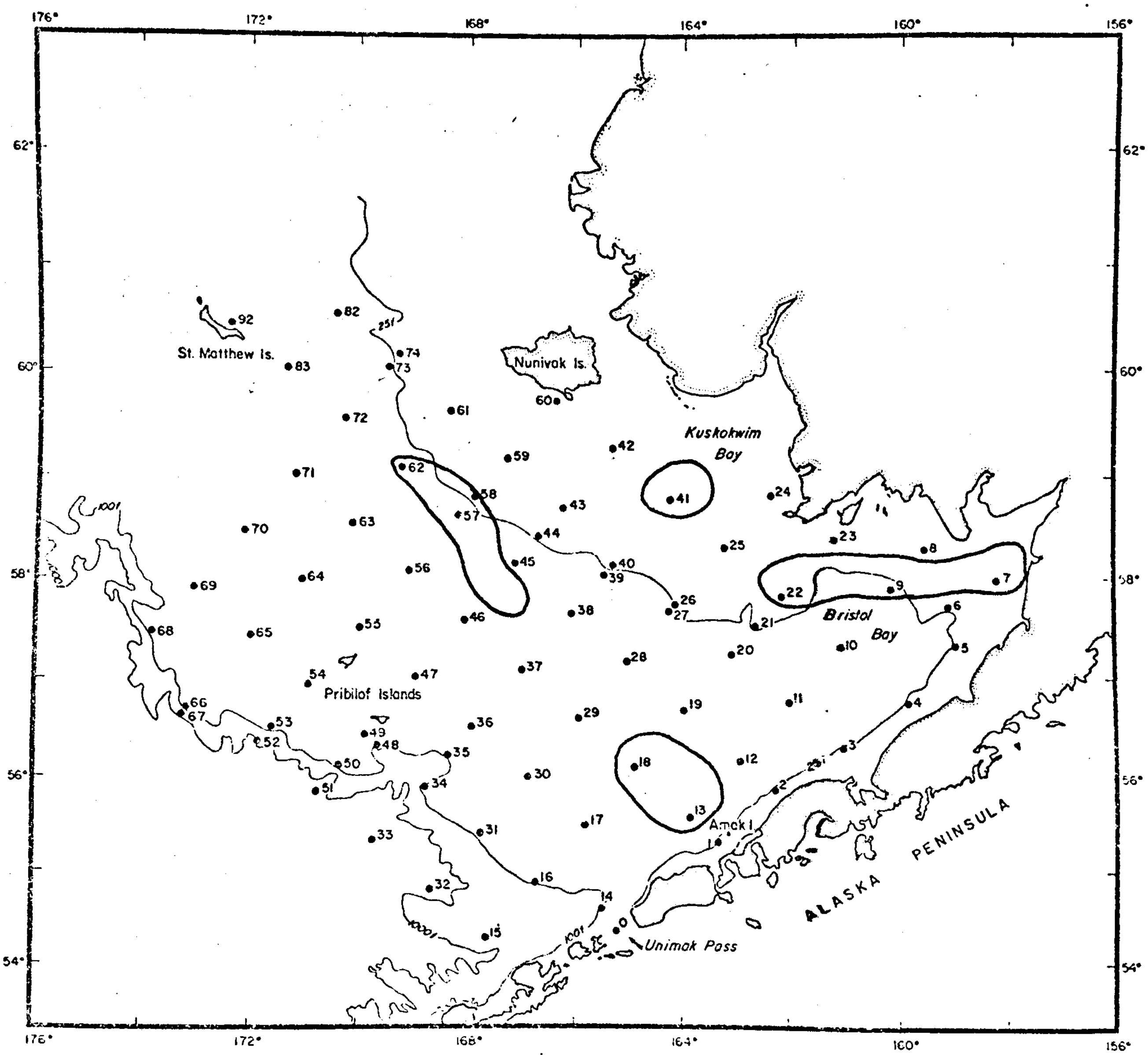


Figure 4. The distribution of the polychaetous annelid *Sternaspis scutata* on the shelf of the southeastern Bering Sea. Distribution based on data from May-June 1975. The distribution may be modified when all station data is available at the end of the project year.



HAPLOSCOLOPLOS PANAMENSIS

Figure 3. The distribution of the polychaetous annelid *Haploscoloplos panamensis* on the shelf of the southeastern Bering Sea. Distribution based on data from May-June 1975. The distribution may be modified when all station data is available at the end of the project year.

Table 4. Simpson and Shannon Diversity Indices for benthic stations in the Bering Sea from May and June 1975 (see Methods and Sources of Data section for calculation methodology and Appendix Table for station data and printout of indices for some stations.

Station	Simpson	Shannon
MB5[1]	.0929	2.699
MB7	.164	2.460
MB9	.130	2.922
MB13	.029	3.918
MB14	.170	2.920
MB15	.150	2.769
MB16	.073	3.341
MB17	.046	3.521
MB18	.066	3.443
MB22	.044	3.661
9-24[2]	.061	3.301
MB29	.014	2.788
MB25	.209	1.842
MB30	.221	2.178
9-32	.071	2.936
9-35	.086	3.035
MB36	.044	3.683
9-37	.096	2.874
9-39	.082	2.878
9-41	.159	2.885
MB-42	.068	2.987
MB45	.099	2.893
MB49	.090	3.021
9-53	.155	2.357
MB57	.126	2.560
MB59	.168	2.258
MB60	.107	2.987

1 Prefix MB refers to permanent stations on the grab - sampling grid

2 Prefix 9 - refers to stations of opportunity

Table 5. A selection of Biologically Important Taxa (BIT) in the Bering Sea dominating at stations by biomass from 27 stations discussed in this Annual Report. Species collected by grab in May and June 1975.

Major Taxa	Species	BIT[1] Criteria	Occurrences at stations
Nemertean Rhynchocoela	Not identified to species	3.5	
Nemertean Rhynchocoela	*Cerebratulis albifrons*	3.5	21
Polychaeta		3.5	1
Polychaeta	*Phloe minuta*	3.5	24
	Nephtys ciliata	3.5	16
	Nephtys coeca	3.5	12
	Eunice biannulata	3.5	2
	Lumbrineris similabris	3.5	8
	Lumbrineris zonata	3.5	7
	Laonice Ocirrata	3.5	2
	Scalibregma inflatum	3.5	12
	Travisia forbesii	3.5	12
	Sternaspis scutata	3.5	11
	Maldanidae	3.5	18
	Maldane sp.	5	1
	Maldane sarsi	5	6
	Nicomacho sp.	3.5	3
	Praxillella gracilus	5	11
	Praxillella praetermissa	3.5	15
	Cistenides granulata	3.5	6
	Pista maculata	5	1
	Artacama probascidea	3.5	9
	Terebellides stroemi	3.5	10
	Chone infundibuliformis	5	5
Mollusca Pelecypoda	*Acila castrensis*	3.5	1

Major Taxa	Species	BIT[1] Criteria	Occurrences at stations
Mollusca Pelecypoda	*Nucula tenuis*	3.5	22
	Nuculana pernula	5	9
	Yoldia amygdaiea	3.5	2
Mollusca Pelecypoda	*Yoldia hyperborea*	3.5	10
	Yoldia scissurata	5	5
	Yoldia secunda	3.5	3
	Cyclocardia crebricostata	3	3
Mollusca Pelecypoda	*Clinocardium ciliatum*	3.5	7
Mollusca Pelecypoda	*Spisula polynyna*	3.5	6
Mollusca Pelecypoda	*Macoma calcarea*	3.5	3
Mollusca Pelecypoda	*Macoma moesta alaskana*	3.5	13
Mollusca Pelecypoda	*Tellina lutea alternidentata*	3.5	6
Gastropoda	*Tachyrynchus erosus*	5	7
Gastropoda	*Neptunea ventricosa*	3.5	2
Scaphopoda; Dentalidue	Not identified to species	5	1
Arthropoda Crustacea			
Thoracica	*Balanus rostratus*	3.5	1
Crustacea Cumacea	*Diastylis tetradon*	5	1
Decapoda	*Pagurus ochotensis*	3.5	1
Sipunculida		3.5	5
Echinodermata Asteroidea	*Leptasterias polaris*	3.5	1
Echinoidea	*Echinarachnius parma*	3.5	8
Ophiuroidea	*Diamphiodia craterdometa*	5	11
Holothuroidea	*Unidentified species*	3.5	4
Holothuroidea	*Psolus phantapus*	3.5	1

[1]See Appendix Table 1 and data on magnetic tape at National Environmental Data Center for appropriate biomass categories for these taxa.

B. Trawl Program

During Leg I of the *Miller Freeman* Cruise 87 trawls were made and 86 were successful. Since the plotting of distribution and abundance data from the present study are not available at this time, statements in reference to these data are generalizations drawn from Appendix Table 2.

Epibenthic invertebrates consisted of eight (8) phyla, 20 classes, 60 families and 121 species (Tables 6, 7, 8). The leading phyla in species representation were Mollusca, Arthropoda and Echinodermata with 56, 37 and 19 species respectively. The Class Gastropoda consisted of nearly 70% of the Molluscan species. The majority of these snails belonged to the Families Buccinidae (six species) and Neptuneidae (18 species). Fifteen (15) species of pelecypod Molluscs were identified. Commonly found bivalves were *Nuculana fossa,*[1] Clinocardium ciliatum, and *Serripes groenlandicus*.

The phylum Arthropoda was dominated by 28 species of decapod crustaceans (Table 7). Among this group the hermit crabs, family Paguridae, were represented by nine (9) species. *Pagurus trigonocheirus* was the most abundant species. At stations H-18 and H-19 *P. trigonocheirus* was found at 42.4 kg (93.4 pound) per one-half hour tow and 38.2 kg (84.2 pounds) per one-half hour tow respectively. *Chionoecetes* species specifically *C. opilio* was the most abundant invertebrate in both number and biomass. As much as 370.5 kg (816.7 pounds) per one-half hour tow were caught at station L-21. Of the 6534 *C. opilio* collected at this station, 44% were males and 56% were females. Other common decapods were the crabs *Hyas coarctatus aleutaceus, Telmessus cheiragonus, Erimacrus isenbeckii, Paralithodes platypus* and *P. camtschatica*. The dominant king

[1]The protobranch listed in the grab station data (Appendix Table 1, 3) as *Nuclulana pernula* is probably *Nuculana fossa*. This correction will be included in the final report.

crab was the blue king crab, *P. platypus*. *Paralithodes camtschatica* accounted for 907.2 kg (2000 pounds) (708 crab) per one-half hour two at station C-6. The average weight of these crab was 0.780 kg (1.7 pounds). Females comprised 95% of this catch. *Paralithodes camtschatica* was mainly found along the southeast edge of the first leg sampling area i.e. from Unimak Pass northeast, parallel to the Alaska peninsula. *Paralithodes platypus* was confined to an area of convection (Dr. Robin Muench, personal communication) east of the Pribilof Islands (station H-19).

Of the 19 species of Echinodermata, 11 were of the class Asteroidea and *Asterias amurensis* was by far the most abundant sea star covering nearly all of the sampled area. With only a few exceptions all the stations north of 58° latitude contained this asteroid. It was the main invertebrate in those shallow water stations off Kuskokwim Bay. At station L-19, *A. amurensis*, which averages 100 g., was found at 148.7 kg (328 pounds) per one-half hour tow.

The ascidians, (Subphylum Urochordata) also formed one of the dominant invertebrate groups.

VII. DISCUSSION

A. Performance Of The 0.1 m^2 van Veen Grab

The van Veen grab was a suitable instrument for sampling the soft sediment stations of the shallow shelf of the Bering Sea; the grab typically collected moderate volumes of sediment (10-14 liters). However, considerably smaller volumes were found at sandy stations. Volumes of 12-18 liters are indicative that the instrument is penetrating the surface sufficiently to obtain a good proportion of the infauna. Lie (1968) indicates that 1 cm penetration of the 0.1 m^2 van Veen grab will collect 1 liter of sediment, and states that a digging depth of at least 4 cm should be attained to assure a good representation of the fauna. He was able to

Table 6. The invertebrate phyla and the number and percent of species of each phylum collected by commercial trawl in the Bering Sea on the NOAA vessel MILLER FREEMAN. Collections made 16 August - 3 September 1975. Identifications of the Annelida are not complete.

Phylum	Number of species	% of species
Mollusca	56	46.2
Arthropoda (Crustacea)	37	30.6
Echinodermata	19	15.7
Chordata	3	2.5
Cnidaria	2	1.7
Annelida	2	1.7
Ectoprocta	1	0.8
Porifera	1	0.8
TOTAL	121	100.0%

Table 7. The number and percentage of species of subgroups of Mollusca, Arthropoda and Echinodermata collected by commercial trawl in the Bering Sea on the NOAA vessel MILLER FREEMAN. Collections made 16 August - 3 September.

Phylum	Subgroup	Number of Species	% of Species
Mollusca	Gastropoda (snails, nudibranchs)	39	69.7
	Pelecypoda (clams, scallops)	15	26.7
	Cephalopoda (octopus, squid)	2	3.6
	TOTAL	56	100.0%
Arthropoda	Decapoda (crabs, shrimp)	28	75.7
	Isopoda	4	10.8
	Thoracica (Barnacles)	2	5.4
	Amphipoda (sand fleas)	2	5.4
	Cumacea	1	2.7
	TOTAL	37	100.0%
Echinodermata	Asteroidea (sea stars)	11	57.9
	Ophiuroidea (brittle stars)	4	21.1
	Echinoidea (sea urchins)	3	15.8
	Holothuroidea (sea cucumbers)	1	5.2
	TOTAL	19	100.0%

Table 8. A list of species taken by trawl from the Bering Sea on the NOAA vessel *Miller Freeman*, 16 August - 3 September 1975.

Phylum Porifera

Phylum cnidaria
- Class Hydrozoa
- Class Scyphozoa
- Class Anthozoa
  - Subclass Alcyonaria
    - *Eunephthya rubiformis* (Pallas)
    - Family Virgulariidae
      - *Stylatula gracile* (Gabb)
    - Family Actiniidae

Phylum Annelida
- Class Polychaeta
  - Family Polynoidae
  - Family Aphroditidae
    - *Aphrodita japonica* Marenzeller
- Class Hirudinae
  - *Notostomobdella* sp.

Phylum Mollusca
- Class Pelecypoda
  - Family Nuculanidae
    - *Nuculana fossa* Baird
    - *Yoldia hyperborea* Torrell
    - *Yoldia seminuda* Dall
  - Family Mytilidae
    - *Musculus niger* (Gray)
    - *Musculus discors* (Linnaeus)
  - Family Pectinidae
    - *Chlamys rubida* (Hinds)
  - Family Carditidae
    - *Cyclocardia crebricostata* Krase

Family Cardiidae

Clinocardium ciliatum (Fabricius)

Clinocardium fucanum (Dall)

Serripes groenlandicus (Bruguière)

Family Mactridae

Spisula polynyma (Stimpson)

Family Tellinidae

Macoma calcarea (Gmelin)

Tellina lutea Wood

Family Solenidae

Siliqua alta (Broderip and Sowerby)

Family Hiatellidae

Hiatella arctica (Linnaeus)

Class Gastropoda

Family Trochidae

Margarites giganteus (Leche)

Margarites costalis (Gould)

Solariella varicosa (Mig. & C. B. Adams)

Family Turritellidae

Tachyrynchus erosum (Couthouyi)

Family Calyptraeidae

Crepidula grandis Middendorff

Family Naticidae

Natica clausa (Broderip and Sowerby)

Natica aleutica (Dall)

Polinices pallida (Broderip and Sowerby)

Family Velutinidae

Velutina velutina (Müller)

Family Cymatiidae

Fusitriton oregonensis Redfield

Family Muricidae

Trophonopsis dalli (Kobelt)

Family Buccinidae

Buccinum angulosum Gray

Buccinum scalariforme (Möller)

Buccinum glaciale Linnaeus

Buccinum solenum (Dall)

Buccinum polare Gray

Buccinum plectrum Stimpson

Family Neptuneidae

Ancistrolepis magna Dall

Beringius kennicotti (Dall)

Beringius beringi (Middendorff)

Beringius frielei (Middendorff)

Beringius sp.

Colus spitzbergensis (Reeve)

Colus halli (Dall)

Colus aphelus (Dall)

Colus dautzenbergi (Dall)

Neptunea lyrata (Gmelin)

Neptunea ventricosa (Gmelin)

Neptunea pribiloffensis (Dall)

Neptunea heros (Gray)

Neptunea borealis (Philippi)

Plicifusus kroyeri (Möller)

Volutopsius fragilis (Dall)

Volutopsius melonis (Dall)

Volutopsius castanees (Dall)

Family Cancellariidae

Admete couthouyi (Jay)

Leucosyrinx circinata (Dall)

Family Dorididae

Family Tritoniidae

Tochuina tetraquetra (Pallas)

Class Cephalopoda

Family Gonatidae

Family Octopodidae

Octopus sp.

Phylum Arthropoda

Class Thoracica

Family Balanidae

Balanus balanus (Linnaeus)

Balanus sp.

Class Cumacea

Family Diastylidae

Diastylis bidentata (Dall)

Class Isopoda

Family Idoteidae

Synidotea bicuspida (Owen)

Family Sphaeromatidae

Tecticeps alascensis (Richardson)

Family Aegidae

Rocinela augustata Richardson

Family Bopyridae

Argeia pugettensis Dana

Class Amphipoda

Family Lysianassidae

Anonyx nugax pacifica (Krøyer)

Family Caprellidae

Class Decapoda

Family Pandalidae

Pandalus borealis Krøyer

Pandalus goniurus Stimpson

Pandalus montagui tridens Rathbun

Family Hippolytidae

Spirontocaris lamellicornis (Dana)

Spirontocaris ochotensis (Brandt)

Spirontocaris sp.

Eualus macilenta (Krøyer)

Family Crangonidae

Crangon dalli Rathbun

Crangon communis Rathbun

Argis dentata (Rathbun)

Family Paguridae

Pagurus ochotensis (Benedict)

Pagurus aleuticus (Benedict)

Pagurus capillatus (Benedict)

Pagurus confragosus (Benedict)

Pagurus cornutus (Benedict)

Pagurus trigonocheirus (Stimpson)

Pagurus sp.

Elassochirus cavimanus (Miers)

Labidochirus splendescens Owen

Family Lithodidae

Paralithodes camtschatica (Tilesius)

Paralithodes platypus Brandt

Family Majiidae

Hyas lyratus Dana

Hyas coarctatus alutaceus Brandt

Chionoecetes opilio (Fabricius)

Chionoecetes bairdi Rathbun

Chionoecetes sp.

Family Atelecyclidae

Telmessus cheiragonus (Tilesius)

Erimacrus isenbeckii (Brandt)

Phylum Ectoprocta

Phylum Echinodermata

Class Asteroidea

Family Astropectinidae

Dipsacaster borealis Fisher

Family Goniasteridae

Ceramaster patagonicus Sladen

Family Echinasteridae

Henricia aspera Fisher

Henricia sp.

Family Pterasteridae

Pteraster obscura (Perrier)

Family Solasteridae

Crossaster borealis (Fisher)

Crossaster papposus (Linnaeus)

Family Asteridae

Asterias amurensis Lutkin

Leptasterias polaris acervata (Stimpson)

Leptasterias sp.

Lethasterias nanimensis (Verrill)

Class Echinoidea

Family Echinarachniidae

Echinarachnius parma

Family Schizasteridae

Brisaster townsendi

Family Strongylocentrotidae

Strongylocentrotus droebachiensis (O.F. Müller)

Class Ophiuroidea

Family Gorgonocephalidae

Gorgonocephalus caryi (Lyman)

Family Ophiactidae

Ophiopholis aculeata (Linnaeus)

Family Ophiuridae

Ophiura sarsi Lütkin

Stegophiura nodosa (Lütkin)

Class Holothuroidea

Phylum Chordata

Class Stolidobranchia

Family Pyuridae

Boltenia ovifera (Linnaeus)

Halocynthia aurantium (Pallas)

Halocynthia igaboja (Oka)

Class Osteichthyes

Subclass Teleostei

Order Clupeiformes

Family Clupeidae

Clupea harengus pallas (Valenciennes)

Order Salmoniformes

Family Osmeridae

Osmerus mordax dentex (Steindachner)

Mallotus villosus (Müller)

Order Gadiformes

Family Gadidae

Eleginus gracilis (Tilesius)

Gadus macrocephalus Tilesius

Theragra chalcogramma (Pallas)

Family Zoarcidae

Lycodes palaeris Gilbert

Lycodes brevipes Bean

Order Scorpaeniformes

Family Scorpaenidae

Sebastes alutus (Gilbert)

Family Cottidae

Myoxocephalus polyacanthocephalus (Pallas)

Family Agonidae

Agonus acipenserinus Tilesius

Family Cyclopteridae

Order Pleuronectiformes

Family Pleuronectidae

Atherasthes stomias (Jordan and Gilbert)

Hippoglossoides elassodon Jordan and Gilbert

Hippoglossoides robustus Gill and Townsend

Hippoglossus stenolepis Schmidt

Lepidopsetta bilineata (Ayres)

Limanda aspera (Pallas)

Limanda proboscidea (Gilbert)

Pleuronectes quadrituberculatus Pallas

Reinhardtius hippoglossoides (Walbaum) accomplish this on all muddy bottoms; a situation that was also true for our grab sampling activities in the Bering Sea at mud stations.

B. Number of Grab Samples Per Station

One of the primary objectives of the first year of study concerned a qualitative inventory and census of dominant species. In view of sufficient ship time available to cover the station grid, it was decided to take five to six replicate samples per station to ensure adequate quantification per station. Three replicates were adequate to sample the most abundant species in the soft sediments of Port Valdez, Prince William Sound, Alaska.

Recruitment of numbers of individuals in subsequent samples represented members of less abundant species (Feder *et al*, 1973). The general applicability of the Port Valdez analysis to the Bering Sea are being tested by way of 8-10 replicates at a variable number of selected stations. This data will be analyzed by the grab-sampling simulation program developed by Feder *et al* (1973), and will be reported at the end of the contract year. In addition, replicates at each station will be examined for the variance about mean values (numbers of individuals of each species) as a further check on the number of replicates needed to describe a station. The latter check is essential in view of the patchiness of the fauna detected at most stations.

Five replicate samples per station have been suggested by Longhurst (1964) and Lie (1968) and further corroborated by the investigations of Feder *et al* (1973). Thus, the five-six grabs per station begun on the cruise of May 1975 on the R/V *Discoverer* should be adequate. Analysis of optimum replicate values to be completed later in the year should fully clarify the number of replicates needed per station.

C. Station Coverage

The intensive grab-sampling program now in progress over the Bering Sea shelf is the most comprehensive one carried out by an American research group to date. A somewhat parallel study by the Soviet Union is available from an earlier period for comparative purposes (see Alton, 1974 for review of Soviet literature; also Hood, 1973). Although the latter studies were broad, the bases for calculations used by them (i.e. the station data - number of replicate samples per station, the species taken per replicate, the number of individuals of each species taken per replicate, and the biomass for each species per replicate) are lacking. Thus, precise quantitative comparisons will not be possible.

Since grab station coverage was only as intensive as allotted ship time and weather conditions would permit, it is recognized that vast unsampled areas exist in the projected lease area. It is possible that some unsampled regions support significant populations of hitherto uncollected benthic species. Additional stations should be occupied whenever ship time and weather permit.

The trawl program permitted further coverage of the lease area, and made it possible to collect the more motile, as well as the larger, epifaunal species. Thus, the integrated trawl program (demersal fish, benthic invertebrates, fish stomach analysis, meristic analysis of fish species, trace metal, and hydrocarbon programs) represent a significant supplement to the data collected by grab - sampling activities.

Counterclockwise water circulation exists in the surveyed region, with an increase in average current velocity with an increase in depth (Hebard, 1959). Bottom sediments have been found to vary from fine mud in the western part to dark and coarse sand inshore (McLaughlin, 1963). These environmental parameters may make it possible to understand larval dispersion and settlement as well as adult distribution of epifaunal species.

Major limitations of the survey are those imposed by the selectivity of the otter trawl used and the seasonal movements of certain species. Otter trawls of the type used can be fished only on relatively smooth bottom that are free of obstructions. In addition, it is impossible to return all invertebrates to the laboratory for verification, therefore it is difficult to get total numbers and weights of every species found, especially those species that are very similar. However, by careful development of conversion factors in the laboratory, it has been possible to make total numbers and weights available for all stations occupied.

The intensity of the demersal fish program, the necessary on-board lower priority given to invertebrate weighing and counting activities, and the multiple role occupied by the benthic biologist on the vessel (i.e. identify, count, weigh as many invertebrates as possible per station, collect - in cooperation with the biologists of the demersal fish program - many species of fishes for stomach and meristic analyses, sample specific species for both the hydrocarbon and trace metal programs) made it difficult for him to do much more than collect species distribution and density data. Some weight data was obtained, but this was generally spotty and only accomplished on a time-as-available basis. Little effort (in fact little time was available) was devoted to collection of sizable invertebrate samples for recruitment, growth, age and feeding studies. It should be emphasized that support of the demersal fish trawling program is essential if a total, integrated understanding of the trophic-dynamics of the benthos is to be gained. Lack of additional trawl time will distinctly narrow the scope of the overall benthic program.

D. Species Composition of the Stations

The general distribution of benthic infaunal species in the projected lease areas is now well documented (present investigation and Soviet surveys:

see Alton, for review) (see Appendix Table 1 and data on magnetic tape in National Environmental Data Center). Members of the major marine phyla were collected in both investigations. Polychaetous annelids were the most important infaunal group in terms of numbers of species collected by the grab-sampling program (Table 2 and Appendix Table 1; data on magnetic tape to be filed with the National Environmental Data Center). A variety of infaunal groups contributed noticeably to the biomass at the grab stations (Table 5 and Appendix 1).

The molluscs and crustaceans were the major epifaunal invertebrate groups taken by trawl in our investigations. In general, distribution of the commonest species were similar to those found by McLaughlin (1963), i.e. *Pagurus ochotensis, Paralithodes camtschatica, Chionoecetes* spp., *Hyas coarctatus alutaceus, Erimacrus isenbeckii, Neptunea* spp., *Asterias amurensis* and *Gorgonocephalus caryi*. McLaughlin (1963) also listed *Pandalus borealis* and the tunicate *Boltenia ovifera* as common species. These two species were present in the study area but they were not commonly found. Additional species which were commonly found were the hermit crab *Pagurus trigonocheirus* and the tunicates *Halocynthia aurantium* and *H. igaboja*.

Most of the peleypod molluscs (clams) were small and not abundant. The low densities of less frequently occurring species may be attributable to inadequate sampling and gear selectivity, rather than to real changes in distribution.

Although McLaughlin (1963) found *Neptunea lyrata* as the most widely distributed gastropod, it was not true in the present study. *Neptunea lyrata* was present, however, it was not as widely distributed as *N. heros* and *N. ventricosa*.

The genus *Pagurus* was the decapod representative which was most outstanding in its specific representation. Two dominant members were *P. ochotensis* and as already mentioned *P. trigonocheirus*. The hermit crab

Labidochirus splendescens, a small, rapidly moving crab, had a unique habitat arrangement. This crab was normally found to use the shells of the small gastropods such as *Natica* or *Polinices*. These portable shelters were too small to allow the crab to withdraw in the event of danger, but they were uniquely equipped with a heavily calcified exoskeleton for protection. When this crab was found, the shell had been replaced by what appeared to be a hard sponge that had assumed the same shape of the original shell by completely dissolving the shell. An advantage to this habitat, which is much lighter than the normal *Natica* or *Polinices*, may be a clue to ability of this crab to move so rapidly, perhaps for avoiding predators. Another advantage may also be for predator avoidance as sponges are seldom prey organisms.

The anomurans, *Paralithodes camtschatica* and *P. platypus* and the brachyurans *Chionoecetes bairdi* and *C. opilio* are common, widely distributed, and are the only invertebrate species of significant commercial importance in the Bering Sea. *Paralithodes camtschatica*, the red king crab, is the target species fished primarily just north of the Alaska Peninsula extending west to Adak Island.

Chionoecetes opilio, a slightly smaller crab than *C. bairdi*, was the most widely distributed and most dominant invertebrate specie encountered. Distinction between these two species was not difficult, but hybrids were occasionally found showing characteristics of both species.

Asteroids (sea stars) were much less diverse (11 species) when compared to Gulf of Alaska trawling operations (24 species) (Feder *et al.*, 1976), but were common at many stations. The forcipulate *Asterias amurensis* was abundant in most of the stations sampled.

Tunicates were common at a few stations. McLaughlin (1963) found

Boltenia ovifera as the most widely distributed tunicate. During Leg I of our study, less than 6% of the stations yielded *B. ovifera* and these stations were located above McLaughlin's sampling area, mostly between St. Matthew and Nunivak Island.

Qualitative examination of the species composition at various grab stations by way of such listings as are included in Appendix 1 and data on magnetic tape suggests distinct regional differences in species and biomass. However, widely dispersed or ubiquitous species are also apparent. Perhaps one of the obvious features of most stations is the patchiness of the infauna. Utilization of quantitative techniques to demonstrate the presence of species aggregates are essential to clarify station differences; such an approach will be pursued in the coming year (see Feder *et al*, 1973 for use of a Cluster Analysis technique to delineate groups of benthic species in the Gulf of Alaska.

E. Diversity Indices

It is generally accepted that an altered environment will result in changes in numbers of species and the population densities of these species (Pearson *et al*, 1967). Thus, examination of species diversity can often serve as a basis for comparison in the future. In order to avoid subjective appraisal, a quantitative measure of diversity must be used. Such a measure should typically consider the number of species present, as well as the density of each species. Various diversity indices are available and at least two different types should be used to give the greatest insight into the faunal conditions present (Lloyd *et al*, 1968). The indices included in this report, Simpson, Shannon, and Brillouin are complementary to each other since the former reflects dominance of a few species and the latter two are weighed in favor of rare species. The calculated indices (Table 4; Appendix Table 1) should be interpreted with caution, and no comparisons made until more data is available for each station.

The trawl stations deeper than 91 meters (50 fathoms), located immediately north and northeast of Unimak Pass, were the most diverse of the area examined to date. Some species limited to this area were the sea stars *Dipsacaster borealis*, *Ceramaster patagonicus*, *Solaster borealis* and *S. endeca*; the brittle star *Ophiura sarsi*; the heart urchin *Brisaster townsendi* and the gastropod *Fusitriton oregonensis*. Species which were most abundant in the shallow area were less abundant or absent in deeper water. *Chionoecetes bairdi* i.e. *Asterias amurensis*, *Halocynthia* spp. and *Chionoecetes opilio* was the dominant member of the genus in the deeper stations.

F. Biologically Important Taxa

As suggested by Lie (1968), "Most animal communities are so complex and rich in species that it is necessary to make a choice of the species that supposedly are most important to the communities and subject them to detailed analysis." Such species have been variously termed "characterizing species" (Thorson, 1957), and "ecologically significant species" (Ellis, 1969). The criteria used for selection of such species vary; criteria used in this investigation for distinguishing infaunal taxa of biological importance are listed in the section on Methods. See Appendix Table 1 (also data on magnetic tape submitted to National Environmental Data Center) for compilation of all of the species designated as Biologically important, and Feder *et al* (1973) for further discussion on the application of this concept to species in Port Valdez.

The initial printout of taxa of biological importance is a large one. Additional assessment of this list may be necessary in order to pare the number of taxa to a size that will be workable in computations essential to quantitative assessment of species groupings at benthic stations. Nevertheless, it is apparent that a large number of species occupying diverse ecological niches are available to monitor once industrial activity in the Gulf becomes a reality.

G. Feeding Methods

Initial information is presented for the feeding methods used by many of the infaunal species collected. This information is basically a literature compilation, but some unpublished data is included as well. The fact that most of the food data presented in Appendix Table VI in Feder and Mueller, 1975 is based on literature extrapolations from related species or the same species from other areas emphasizes the paucity of data on the feeding biology of Bering Sea fauna. This lack of basic data also dictates the urgency of immediate support of experimental work on selected species from the benthos and elsewhere in the waters of the Bering Sea.

Some further insights into feeding biology will also be gleaned from food analyses to be performed on collected and presently archived material. Particular attention will be paid to brittle stars and sea stars, two taxa occurring in great density in some areas.

The sea stars, along with such organisms as sea urchins, sea anemones and jellyfish, are usually terminal members in food webs in the marine ecosystem. The high abundance and wide distribution of the moderately sized (100 g) sea star, *Asterias amurensis*, implies a great availability of food. It was estimated by Hatanaka and Kosaka (1958) in Sendai Bay, Japan that food consumed by bottom fish population does not exceed 10,000 tons annually, yet food consumed by *A. amurensis* amounted to approximately 8,000 tons. If the food is similar for both bottom fish and sea star, the star fish population clearly has an important bearing upon the production of useful fish.

Ascidians are sessile, benthic chordates that feed by filtering small plankters and suspended particles of organic detritus from the water. It is a fairly successful group in some parts of the Bering Sea.

It is possible that the reason for the success of these filter feeders in the Bering Sea is the counterclockwise water circulation which plays an important role in delivering their necessary food. Reduced sedimentation may also contribute to their success. Trawling activities in the Gulf of Alaska revealed few ascidians, presumably due to the high sedimentation rate extent there. The only known predator on tunicates in the Bering Sea is the walrus (Stoker, 1973).

H. Computerized Data Output

The major goals set for data management were achieved. All infaunal taxa were given a code number according to the 10 digit VIMS code (Mueller, 1975; Swartz *et al*, 1972), data for all species from 27 stations have been key punched, and a preliminary printout has been generated that lists all species and an additional preliminary printout with all available data on numbers and weights of collected species has been generated. The speed necessary to complete the OCS report deadline resulted in some minor errors in the final computer printout, but these errors do not retract from the value of the printout as a preliminary document. Several minor problems occurred; these were primarily due to errors during transference of data from coding forms to key punch recording. A number of minor problems also have appeared that have been traced to interfacing a program developed for Gulf of Alaska with an increased number of species in stations from the Bering Sea. Additional problems concern the many new species collected in the Bering Sea; numbers for some of these new taxa were not available at the time the first computer printouts were generated.

Taxa taken by trawl will also be given code numbers, and the data key punched.

The key punched data will be used in the next project year with various programs now on file at the University of Alaska Computer Center. The primary programs that will be tried will be a Cluster Analysis initially used in the Port Valdez benthic study (Feder *et al*, 1973), and the cluster techniques used for grab data of the Bering Sea (Feder *et al*, 1976).

I. General Comments on Status of Grab Data

Time constraints permitted no numerical analysis of the qualitative and quantitative data available at this time (from 27 stations). We are presently engaged in the task of altering several of the computer programs used in the analysis of the Gulf of Alaska data to accommodate the larger number of samples and species found in the Bering Sea study area. No difficulties are anticipated in handling larger data matrices, although it will probably be necessary to divide the study area into several strata for final analysis.

Inspection of field notes and species-abundance data from the first 27 stations do suggest some hypotheses concerning the structure of benthic communities over the entire shelf. Inspection of Fig. 2 shows the general sediment distribution as observed in the field. It should be noted that coarse sediments (hard sand, sand and gravel) underlie the nearshore waters (inside the 50 m contour and up the Alaska Peninsula), and are also found near the shelf edge. The broad offshore shelf from approximately 50 m contour to the shelf edge is comprised of finer sediment types. Distributions of several organisms were found to coincide somewhat with the sediment regimes described (see Figs. 3-11). A general and preliminary review of the distribution of these organisms follows.

Haploscoloplos panamensis (polychaete): This is detritus feeder found to be most abundant in sandy areas in fairly shallow or nearshore waters. It is one of the dominant detritus feeders in sand/gravel areas.

Chone infundibuliformis (polychaete): A suspension feeder found in nearshore sand environments, and occasionally in offshore silty areas.

Cylichna alba: A predatory gastropod found particularly in offshore areas with fine sediments; also found in several of the sand/gravel stations along the Alaska Peninsula.

Yoldia hyperborea (clam): A combination detritus and filter feeder preferring silty sediments offshore, with a patchy distribution over inshore sand/gravel stations.

Sternaspis scutata (polychaete): A detritus feeder found thus far only below 50 m in silty environments with a limited distribution on mixed sand/silt bottoms.

Nuculana pernula (clam): A detritus and suspension feeder found only on offshore sands and silty areas with a preference for finer particle size sediments.

Praxillella praetermissa (polychaete): A detritus feeder found in offshore areas with finer sediments and some limited distribution in offshore sands.

Nucula tenuis (clam): A combination detritus and filter feeder found in generally the same areas as *Praxillella praetermissa*.

Echinarachnius parma (sand dollar): A detrital feeder found in nearshore sand/gravel and sand sediments only.

The distributions described above, with special emphasis on the last five, seem to indicate the existence of both inshore and offshore sandy bottom communities grading into fine-sediment communities. The type of analysis outlined (i.e. based on distributions of dominant individuals) will be continued to a limited degree; thus qualitative analysis will be accompanied by a more objective numerical analysis that will take into consideration a more diverse range of species abundance. Results from the two methods of analysis will be compared for differences in interpretation, and hopefully fused to suggest specific organisms and areas for further study.

Ultimately a comparison of community structure must be made, and this should incorporate both grab and trawl programs. Since a wide range of bottom conditions was noted during the course of our field work, it is not unreasonable to hypothesize the carbon flow through the entire system might vary as well. Carbon input and substrate type have been found to significantly affect the structure of both the meio- and macrobenthic communities in several areas of the world. The program underway should detect any such differences in the structure of the 1 mm. and larger category. In particular, sediment particle size has been found unimportant in determining structure of interstitial communities (see Fenchel 1969). While sediments in the Gulf of Alaska study area are predominantly of fine particle size, the Bering Sea shelf includes extensive sandy areas in which one would expect much more extensive interstitial communities. While meiofaunal-macrofaunal trophic interactions are not being studied at this point, the existence of an interstitial community will undoubtedly be a factor influencing both feeding and reproductive habits of many of the larger benthic organisms.

Production over the Bering Sea shelf is known to be variable and often associated with the retreat of the ice edge; some degree of productivity no more than several meters from the bottom has also been noted (Dr. Vera Alexander, pers. commun.). Seasonal upwelling has been documented in Bristol Bay, (Dr. R. Muench and R. Myers, Pers. Commun. Institute of Marine Science, University of Alaska), and since, in general, depths at most of our stations are less than 75 meters. We may expect fairly thorough mixing of the overtying water column on the shelf (in contrast with the Gulf of Alaska study area). These conditions indicate that carbon directly available to the benthic communities may be very different in form (ranging from copepod feces to plant matter) and quantity from that found in the Gulf. Such variance could also provide a basis for the appearance of differing community structures in the Bering Sea (See Hood, 1973 for review).

The approach to be taken as the project progresses will be to determine, primarily through cluster analysis, areas of differing structure on the basis of species representation. Programs similar to those used in the Gulf of Alaska study will be employed, with preliminary results available by the end of the project period. Following this, community structure, will be studied with emphasis on determining possible trophic interactions of feeding types to relate benthic biomass to surface productivity. These studies will consider grab and trawl data simultaneously to better reflect overall community interactions.

VIII. CONCLUSIONS

Seventy seven widely dispersed permanent stations and seven stations of opportunity have been established in conjunction with the chemical, hydrocarbon, heavy metals, geological and fish food analysis programs. These stations represent a reasonable nucleus around which a monitoring program can be developed. Twenty seven (27) stations have been processed and analyzed to date.

The sampling device chosen, the van Veen grab, functioned effectively in all weather, and adequately sampled the infauna at sandy-mud and mud stations. Poor penetration occurred at the stations where the substratum was sandy or gravelly. Since coarse sediments are more characteristic of the Bering Sea than the Gulf of Alaska, reduced volumes were found in most grabs throughout the station grid. However, an initial qualitative assessment of grab volumes obtained on most of the stations on the MB grid indicate that the majority of the stations can be considered quantitative (i.e. grab volumes greater than 5 liters).

The general patchiness of many components of the fauna of the Bering Sea suggests that the five to six replicate samples taken per station are the minimum number that should be taken. Quantitative field testing for the optimum number of replicates has been completed, and analysis of the data by the end of the project period should enable us to suggest the number of replicates for a monitoring program in the Bering Sea.

There is now a satisfactory feeling, on a station basis for grab data for invertebrate species (infauna and epifauna) present and general species distribution for that portion of the Bering Sea shelf grid processed to date (i.e. 27 stations). Four hundred twenty-six (426) species have been isolated. Thirteen (13) marine phyla are represented in the collections. The important groups, in terms of number of species, in descending order of importance are the Annilida (180 species), Arthropoda (120 species), Mollusca (93 species), and Echinodermata (17 species). It is probable that all infaunal and slow moving epifaunal species with numerical and biomass importance have been collected by way of the intensive sampling program of the spring, summer, and early Fall of 1975. It is assumed that mainly rare species will be added to the list in the future.

No information from the R/V *Miller Freeman* and R/V *Discoverer* Cruise is currently available to test for seasonal fluctuations in species by station. The continuing series of cruises of these vessels in the spring, summer and early Fall of 1975 have made available some seasonal station data; however, limited funding for processing of all samples collected on these cruises suggests that much of this information may not be available to this year's Final Report. Some midwinter quantitative grab data is available from stations within the study area by way of investigations of Fay *et al*, (1975) and Stoker (1973). Additional qualitative information on distributions of infaunal species in the study area at various periods can be found in the Soviet literature (see Alton, 1974 for review).

The two diversity indices included in this report, Simpson and Shannon-Wiener, are complementary to each other since the former reflects dominance of a few species and the Shannon index is weighted in favor of rare species. No interpretions can be made at present on the available station data. These indices should be interpreted with caution until more data is available.

Criteria established for Biologically Important Taxa (BIT) have delineated species. These species will be ranked, and most of those of high rank subjected to detailed analysis in an attempt to comprehend species aggregations. Representative members of the BIT will be the organisms most intensively studied for their general biology.

Information on feeding biology of most species collected by grab has been compiled. Most of this information is from literature source material; it is suggested that experimental work on feeding biology for selected species be encouraged. Some qualitative assessment of the distribution of some infaunal species, their feeding methods, and the type of sediment found where they live has been included in this report. As analysis of sediments collected at each benthic station is completed, further integration of sediment parameters and resident biota will be made (see Hoskin, 1976 for preliminary comments on the relationship of sediments to biota).

The seasonal ice cover over much of the Bering Sea shelf, some indication of primary productivity several meters over the bottom, and seasonal upwelling in Bristol Bay suggests unique variations in energy flux and nutrient cycling. Explanations for benthic community structure in the Bering Sea should be sought, in part, in the unique variations of the ecosystem there. "A description of the structural components of that ecosystem and estimates of the rates at which the underlying processes operate will lead . . . to increased knowledge of such systems in general, . . ." (Hood, 1973). The shallow shelf benthic system will be examined initially by way of multivariate statistical techniques applied to species present in an attempt to cluster or aggregate groups of stations and species. Once this is accomplished, community structure will be examined by examining trophic interactions of resident species within clusters.

The joint National Marine Fisheries Service trawl charter for investigation of epifaunal benthos and demersal fishes was effective, and maximum spatial coverage was achieved. Integration of this information with the infaunal benthic data will enhance our understanding of the shelf ecosystem.

Although other epifaunal benthic investigations have been accomplished in the Bering Sea, our work does result in more thorough and more complete numerical and weight determinations. The invertebrate species most commonly found at the trawling stations of the *Miller Freeman* cruise reported here were *Asterias amurensis, Chionoecetes opilio, Neptunea* spp., *Buccinum* spp., *Gorgonocephalus caryi, Pagurus ochotensis, P. trigonocheirus, Halocynthia aurantium* and *H. igoboja*. The area sampled was generally not deeper than 73 meters (40 fathoms). Depths greater than 73 meters were only sampled immediately north and northeast of Unimak Pass. Obvious differences in species representation was noted in each of these two depth areas. The list of the invertebrate species from this Bering Sea trawl study will obviously be expanded when the polychaetous annelids are identified from Leg I and the two remaining Legs (II and III) of the cruise are examined.

In conclusion, it can be generally stated that sampling by means of grabs and trawls as well as stomach analysis of demersal fishes is essential if we are to fully comprehend trophic interactions in the benthic environment of the Bering Sea.

IX. NEEDS FOR FURTHER STUDY

1. Although the van Veen grab is satisfactory for use in the Bering Sea at stations with soft sediments, it is less satisfactory at stations with coarse fractions. Penetration of the grab was often not sufficient at the latter stations, and large infaunal species may have been missed by the grab. Box core samples at some of these stations is indicated, and is suggested for the near future.

2. The number of grab stations occupied was dictated by available ship time and funding essential to complete processing of the samples.

Thus, a relatively small number of stations were occupied in the future to develop some baseline data for the unsampled areas.

3. Seasonal data on an approximately quarterly basis would be useful. It is especially recommended that underice samples be obtained when Coast-guard icebreaker capabilities are increased.

4. Selected members of the Biologically Important Taxa (BIT) should be chosen for intensive study as soon as possible so that basic information will be available to a monitoring program. Specific biological parameters that should be examined are reproduction, recruitment, growth, age, feeding biology, and trophic interactions with other invertebrates and vertebrates.

5. The advantage of the cluster analysis technique is that it provides a method for delineating station groups that can be used as a basis for developing monitoring schemes and delimiting areas that can be used for intensive studies of food-web interactions. It is obvious that food webs will vary in areas encompassing differing species assemblages. An inaccurate or even erroneous description of the shelf ecosystem could occur if trophic data collected on species from one station cluster (with its complement of species) is loosely applied to another area encompassing a totally different station cluster (with its differing complement of species). Thus, development of clustering and other multivariate techniques should be pursued to refine methods to be certain the best methodology is available to the projected offshore monitoring program.

6. A closer integration with the geological program is essential to better comprehend faunal - sediment interactions. It is recommended that our studies be more closely interconnected scientifically with the

geological program with Final Reports of the two disciplines issued as one volume.

7. The extensive trawl program in conjunction with the National Marine Fisheries Service permitted complete coverage of the benthos for invertebrate organisms. Considerable effort is still needed to complete this program in the current contract period, and the following is needed: identification of specimens collected on Legs II and III of the R/V *Miller Freeman* maps of distribution and abundance for selected species, calculations of Diversity Indices, derivation of a list of Biologically Important Taxa, and application of cluster analysis techniques to groups of species and stations. The needs for the future in trawling activity are development of a monitoring plan as well as additional trawl data on a seasonal basis.

X. SUMMARY OF 4th QUARTER OPERATIONS

A. Ship or Laboratory Activities

1. No ship activity

2. Scientific party not applicable

3. Methods

   a. Sediment samples from each stations are being analyzed by Dr. C. Hoskin.

   b. Laboratory analysis of grab samples from previous cruises are in progress at the Marine Sorting Center. Forty-five (45) samples were completed in this quarter.

   c. Programs were develcped for data output for grabe material.

   d. Cluster analysis techniques are being developed

   e. Trawl material from Leg I of R/V *Miller Freeman* was completed and other material is in progress

4. Sample Localities - not applicable.

5. Data collected - not applicable.

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APPENDIX TABLE 2.

Trawl data from all stations occupied by the R/V *Miller Freeman*, in the Bering Sea, on Leg I of cruise, 16 August to 3 September.

75

72

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	F62	1	OTB	75	09	18		56°	37.0'	163°	58.5'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	09	18		56°	39.2'	166°	56.4'		10	3.33	91.0 95.0	100		H

Comments: Snail eggs found here.

Chionoecetes bairdi - 32 males
C. opilio - 69 males & 2 females
C. (hybrid) 13 males

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Notostomobdella sp.			20	.040			A		P
2	Pandalus borealis			25	.150					P
3	Argis dentata			1	.008					P
4	Crangon communis			2	.006					P
5	Hyas coarctatus alutaceus			1	.029					P
6	Chionoecetes bairdi			32	28.123					P
7	Chionoecetes opilio			71	55.339					P
8	Chionoecetes (hybrid)			13	1.130					P
9	Pagurus aleuticus			75	8.325					P
10	Pagurus confragosus			25	.800					P
11	Pagurus sp.			1	.003					P
12	Pagurus capillatus			50	.600					P
13	Neptunea lyrata			40	3.560					P
14	Neptunea ventricosa			40	5.920					P
15	Clinocardium fucanum			1	.001					P
16	Nuculana fossa			10	.003					P
17	Asterias amurensis			599	59.870					P
18	Lethasterias nanimensis			6	3.192					P
19	Gorgonocephalus caryi			3	1.170					P
20	Scyphozoa				4.536					P
21	Neptunea heros			1	.178			A		P

(Record additional comments on reverse side)

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(continued)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	FØ2	1						°	'	°	'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
				°	'	°	'							H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Actiniidae			250	94.576			A		P
2	'							Δ		P
3										P
4	Limanda aspera				64.864			B		P
5	Hippoglossoides elassodon				39.463					P
6	Glyptocephalus zachirus				10.432					P
7	Lycodes palearis				7.712					P
8	Reinhardtius hippoglossoides				6.123					P
9	Gadus macrocephalus				2.721			B		P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	G62	2	0+B	75	08	18		57°	00.0′	167°	02.9′
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	18		57°	58.0′	167°	05.2′		10	3.88	72.8 72.8	29		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:
Chionoecetes bairdi - 5 males
C. opilio - 107 males & 341 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Gorgonocephalus caryi			4	1.560			A		P
2	Asterias amurensis			70	7.000					P
3	Hyas coarctatus alutaceus			1	.041					P
4	Pagurus trigonocheirus			150	5.745					P
5	Elassochirus cavimanus			20	.320					P
6	Chionoecetes bairdi			5	.453					P
7	Chionoecetes opilio			448	40.642					P
8	Chionoecetes (hybrid)			4	.453					P
9	Neptunea ventricosa			65	8.928					P
10	Crepidula grandis			1	.004					P
11	Actiniidae			100	45.360					P
12	Polynoidae			2	.001					P
13	Polychaeta			1	.002			A		P
14	Volutopsius castoneus			1	.197					P
15	Theragra chalcogramma				907.653			B		P
16	Limanda aspera				13.608					P
17	Lepidopsetta bilineata				7.711					P
18	Hippoglossoides elassodon				6.350					P
19	Reinhardtius hippoglossoides				2.268					P
20	Pleuronectes quadrituberculatus				1.814			B		P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	651	3	078	75	08	12		57°	01.0	167°	36.3

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	13		57°	02.0	167°	41.5		10	5.18	75.0 76.4	100		H

Comments: Chionoecetes opilio – 141 males and 607 females. C. bairdi – 1 male and 4 females. Snail eggs found here.

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Gorgonocephalus caryi			4	1.560	.		A		P
2	Asterias amurensis			1	.100	.				P
3	Lethasterias nanamensis			1	.613	.				P
4	Colus halli			1	.011	.				P
5	Porifora				.080	.				P
6	Hyas coarctatus alutaceus			4	.116	.				P
7	Chionoecetes bairdi			5	.453	.				P
8	Chionoecetes opilio			745	68.040	.				P
9	Pagurus trigonocheirus			8	.240	.				P
10	Pandalus borealis			1	.006	.				P
11	Argis dentata			1	.008	.				P
12	Neptunea lyrata			20	1.780	.				P
13	Neptunea ventricosa			48	7.104	.				P
14	Notostomobdella sp.			1	.001	.				P
15	Polynoidae			3	.012	.				P
16	Actiniidae			1	.042	.				P
17	Hiatella arctica			1	.001	.				P
18	Tachyrhyochus erosus			1	.001	.				P
19	Ophiura sarsi			5	.005	.				P
20	Echinarchnius parma			1	.001	.				P
21	Henricia sp.			2	.006	.		A		P

(Record additional comments on reverse side)

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(Continued)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	601	3									

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
														H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Actiniidae			100	45.360			A		P
2	Scyphozoa				5.443			A		P
3	Halocynthia aurantium			1	.205			A		P
4	Crangon communis			1	.003			A		P
5										P
6	Theragra chalcogramma				19.504			B		P
7	Lepidopsetta bilineata				7.711					P
8	Limanda aspera				201.852					P
9	Hippoglossoides elassodon				4.082					P
10	Reinhardtius hippoglossoides				5.443					P
11	Myoxocephalus polyacanthocephalus				2.721					P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	G18	4	0T3	75	02	18		57°	01.0'	165°	14.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	03	18		57°	00.5'	163°	15.0'		10	1.66	80.1	80.1	100		H

Comments: Snail eggs on Neptunea spp.

All Chionoecetes are males

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)	Code	Last	Card
1	Hyas coarctatus alutaceus			1	.030		A		P
2	Neptunea lyrata			18	1.602				P
3	Neptunea ventricosa			58	8.584				P
4	Asterias amurensis			25	2.500				P
5	Henricia sp.			1	.003				P
6	Crepidula glandis			2	.003				P
7	Notostomobdella sp.			2	.002				P
8	Elassochirus cavimanus			2	.036				P
9	Pagurus aleuticus			10	.930				P
10	Chionoecetes opilio			560	24.040				P
11	Chionoecetes bairdi			7	.680				P
12	Chionoecetes (hybrid)			20	1.814				P
13	Gorgonocephalus caryi			6	2.340				P
14	Lethasterias nanimensis			6	3.192				P
15	Pagurus trigonocheirus			140	4.200				P
16	Paralithodes platypus			1	1.814				P
17	Scyphozoa			6	4.536				P
18	Polynoidae			1	.002				P
19	Hiatella arctica			1	.001		A		P
20									P
21	Theragra chalcogramma				96.163		B		P

(Continued)

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA (continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Mo	Day	Start Time:	Start Lat Deg	Min	Start Long Deg	Min
	G18	4									
1 2 3 4 5 6	7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Mo	Day	Finish Time	Finish Lat Deg	Min	Finish Long Deg	Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
														H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Limanda aspera				53.071			B		P
2	Lepidopsetta bilineata				34.927			B		P
3	Reinhardtius hippoglossoides				2.268			B		P
4	Myoxocephalus polyacanthocephalus				6.804			B		P
5										P
6										P
7										P
8										P
9										P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	H18		50T9	75	08	19		57°	21.2'	168°	18.0'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	18		57°	22.5'	165°	21.0'		10	3.88	71.0 71.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:
Chionoecetes opilio - 266 males & 2262 females
C. (hybrid) - 9 males

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Erimacrus isenbeckii			1	.393			A		P
2	Neptunea ventricosa			102	15.076					P
3	Neptunea borealis			102	13.464					P
4	Polynoidae			20	.080					P
5	Polychaeta			1	.002					P
6	Eunephthya rubiformis				.020					P
7	Pandalus borealis			2	.013					P
8	Pagurus sp.			1	.001					P
9	Velutina velutina			2	.002					P
10	Tritoniidae			2	.036					P
11	Hyas coarctatus alutaceus			40	1.160					P
12	Urochordata			2	.283					P
13	Actiniidae			100	45.360					P
14	Pagurus trigonocheirus			1415	42.450					P
15	Chionoecetes opilio			2928	73.483					P
16	Chionoecetes (hybrid)			9	.907					P
17	Gorgonocephalus caryi			4	2.120					P
18	Lethasterias nanimensis			20	8.500					P
19	Asterias amurensis			110	20.570					P
20	Colus halli			4	.028			A		P
21										P

(Record additional comments on reverse side)

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(continued)

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(Continued)

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Mo	Day	Start Time:	Start Lat Deg	Min	Start Long Deg	Min
	H 1 8	5						°	'	°	'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Mo	Day	Finish Time	Finish Lat Deg	Min	Finish Long Deg	Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
				°	'	°	'							H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Theragra chalcogramma				2.268			6		P
2	Gadus macrocephalus				1.360			"		P
3	Lepidopsetta bilineata				34.927			"		P
4	Reinhardtius hippoglossoides				4.536			"		P
5	Myoxocephalus polyacanthocephalus				16.329			"		P
6	Pleuronectes quadrituberculatus				21.772			"		P
7	Agonus acipenserinus				6.804			6		P
8										P
9										P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

80

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	H19	6	0-B	75	08	19		57°	19.5'	168°	53.0'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	05	19		57°	20.0'	163°	57.2'		10	3.88	69.2 71.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Erimacrus isenbeckii			7	1.750			A		P
2	Asterias amurensis			235	23.500					P
3	Hyas coarctatus alutaceus			50	9.120					P
4	Pagurus trigonocheirus			1275	38.250					P
5	Actiniidae	Type 7 & 10		7	.2190					P
6	Fusitriton oregonensis			3	.042					P
7	Chlamys rubida			1	.036					P
8	Neptunea borealis			176	32.384					P
9	Plicifusus kroyeri			2	.100					P
10	Polynoidae			10	.070					P
11	Polychaeta			4	.012					P
12	Notoslomobdella sp.			1	.001					P
13	Eunephthya rubiformis				.008					P
14	Clinocardium ciliatum			3	.027					P
15	Melita dentata			1	.001					P
16	Boreotrophon pacificus			1	.001					P
17	Boltenia ovifera			10	.490					P
18	Hydrozoa				.004					P
19	Pandalus montagui tridens			1	.001					P
20	Pandalus goniurus			1	.006					P
21	Ophiopholis aculeata			5	.010			A		P

(Record additional comments on reverse side)

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IMSUAWBK

(Continued)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	H 1 9	6						°	. ′	°	. ′

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
				°	. ′	°	. ′			.	. + .			H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments: Chionoecetes opilio – 564 males and 96 females. C. bairdi – 52 males and 4 females C. (hydrid) – 13 males and 4 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)	Code (78)	Last (79)	Card (80)
1	Porifera				54.432	.	A		P
2	Argis dentata			1	.008	.			P
3	Lethasterias nanimensis			25	13.300	.			P
4	Paralithodes platypus			72	97.524	.			P
5	Chionoecetes opilio			660	59.875	.			P
6	Chionoecetes bairdi			56	4.989	.			P
7	Chionoecetes (hybrid)			17	1.360	.			P
8	Gorgonocephalus caryi			3	1.170	.	A		P
9					.	.			P
10	Limanda aspera				72.576	.	B		P
11	Gadus macrocephalus				7.711	.			P
12	Lepidopsetta bilineata				34.020	.			P
13	Reinhardtius hippoglossoides				2.268	.			P
14	Cottidae				71.668	.			P
15	Pleuronectes quadrituberculatus				3.175	.	B		P
16					.	.			P
17					.	.			P
18					.	.			P
19					.	.			P
20					.	.			P
21					.	.			P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	I19	7	0TB	75	08	19		°	. '	°	. '

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	02	19		°	. '	°	. '		10	3.14	67.3 - 69.2	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Asterias amurensis			200	18.144			A		P
2	Lethasterias nanimensis			20	10.640					P
3	Halocynthia igoboja				520.732					P
4	Erimacrus isenbeckii			2	.642					P
5	Hyas coarctatus alutaceus			2	.058					P
6	Crossaster papposus			1	.027					P
7	Urochordata				4.000					P
8	Pagurus trigonocheirus			250	7.500					P
9	Eunephthya rubiformis				.067					P
10	Actiniidae				.453					P
11	Neptunea heros			184	32.752					P
12	Neptunea ventricosa			184	27.232					P
13	Clinocardium ciliatum			2	.054					P
14	Serripes groenlandicus			1	.129					P
15	Tritoniidae			1	.152					P
16	Hiatella arctica			1	.001					P
17	Hydrozoa				.001					P
18	Polynoidae			1	.004					P
19	Mitela dentata			4	.004					P
20	Pandalus goniurus			4	.032					P
21	Scyphozoa			2	.453			A		P

(Record additional comments on reverse side)

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IMSUAWBK

(Continued)

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86

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	I19	7						°	'	°	'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
				°		°								H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments: Chionoecetes opilio – 156 males and 318 females. C. bairdi – 4 males and 1 female. C. (hybrid) – 2 males.

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–28)	Count	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Gorgonocephalus caryi			120	46.800			A		P
2	Paralithodes platypus			3	5.443					P
3	Chionoecetes opilio			474	43.092					P
4	Chionoecetes bairdi			5	.453					P
5	Chionoecetes (hybrid)			2	.226			A		P
6										P
7	Limanda aspera				7.257			B		P
8	Cottidae				19.958					P
9	Pleuronectes quadrituberculatus				3.628					P
10	Cyclopteridae				7.711					P
11	Reinhardtius hippoglossoides				.907			B		P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	J26	8	073	75	09	19		57°	40.4'	169°	35.1'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	19		57°	42.2'	169°	34.8'		10	3.33	67.3 69.2	100		H

Comments:
Chionoecetes opilio - 259 males & 1505 females
C. bairdi - 3 males
C. (hybrid) - 4 males

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Pandalus goniurus			7	.063	.		A		P
2	Halocynthia aurantium			20	6.440	.				P
3	Erimacrus isenbeckii			2	.442	.				P
4	Asterias amurensis			80	7.257	.				P
5	Clinocardium ciliatum			1	.039	.				P
6	Pagurus trigonocheirus			475	14.250	.				P
7	Actiniidae			8	.420	.				P
8	Polynoidae			10	.050	.				P
9	Hyas coarctatus alutaceus			1	.029	.				P
10	Boltenia ovifera			1	.052	.				P
11	Neptunea heros			180	20.412	.				P
12	Eunephthya rubiformis				.014	.				P
13	Gorgonocephalus caryi			58	22.620	.				P
14	Lethasterias nanimensis			10	5.320	.				P
15	Chionoecetes opilio			1767	134.265	.				P
16	Chionoecetes bairdi			3	.453	.				P
17	Chionoecetes (hybrid)			4	.453	.		A		P
18	Limanda aspera				3.855	.		B		P
19	Reinhardtius hippoglossoides				1.360	.		B		P
20	Cottidae				9.979	.		B		P
21	Cyclopteridae				2.721	.		B		P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	J20	9	0TB	75	08	19		59°	59.0'	169°	59.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	02	19		58°	01.0'	169°	36.6'		10	3.33	69.2 — 69.2	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Actiniidae			82	2.870			A		P
2	Pagurus trigonocheirus			315	9.450					P
3	Pandalus goniurus			4	.028					P
4	Hiatella arctica			1	.004					P
5	Neptunea borealis			452	63.250					P
6	Halocynthia aurantium			1	.225					P
7	Serripes groenlandicus			1	.140					P
8	Tritoniidae			7	.140					P
9	Polinices pallida			2	.012					P
10	Asterias amurensis			1	.100					P
11	Urochordata				.100					P
12	Eunephthya rubiformis				.100					P
13	Ectoprocta				.068					P
14	Colus halli			1	.007					P
15	Ancistrolepis magna			2	.065					P
16	Buccinum polare			8	.280					P
17	Pteraster obscura			1	.091					P
18	Tochuina tetraquetra			1	.137					P
19	Leptosterias polaris ocervata			1	.204					P
20	Clinocardium ciliatum			2	.087					P
21	Gorgonocephalus caryi			130	29.484			A		P

(Record additional comments on reverse side)

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IMSUAWBK

(Continued)

(continued)

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	526	9						°	'	°	'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
				°	'	°	'							H

Comments:
Chionoecetes opilio – 1067 males & 1566 females
C. bairdi – 3 males & 29 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Chionoecetes opilio			2633	239.047			A		P
2	Chionoecetes bairdi			32	3.628			A		P
3										P
4	Cyclopteridae				3.628			B		P
5	Pleuronectes quadrituberculatus				2.268			B		P
6	Limanda aspera				1.587			B		P
7	Reinhardtius hippoglossoides				1.587			B		P
8										P
9										P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	J21	10	0TB	75	08	20		58°	01.3'	170°	16.0'

Columns 1–37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	20		52°	00.0'	170°	16.8'		10	2.59	72.8 72.8	100		H

Columns 38–80

Comments: 1 Plastic bag found
Chionoecetes opilio - 508 males & 707 females
C. bairdi - 3 males
C. (hybrid) - 8 males

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Pteraster obscura			2	.094			A		P
2	Leptasterias polaris acervata			1	.238					P
3	Eunephthya rubiformis				.100					P
4	Tochuina tetraquetra			1	.052					P
5	Tritoniidae			20	.640					P
6	Notostomobdella sp.			20	.040					P
7	Actiniidae			1	.037					P
8	Pagurus trigonocheirus			375	11.250					P
9	Ophiura sarsi			20	.080					P
10	Leptastarias sp.			2	.022					P
11	Pandalus goniurus			10	.100					P
12	Argis dentata			3	.021					P
13	Halocynthia igoboja			18	5.443					P
14	Erimacrus isenbeckii			3	.963					P
15	Asterias amurensis			43	38.556					P
16	Buccinum polare			40	1.200					P
17	Buccinum scalariforme			1	.023					P
18	Volutopsius fragilis			13	1.495					P
19	Polynoidae			1	.002					P
20	Neptunea heros			26	4.628					P
21	Gorgonocephalus cargi			128	29.030			A		P

(Record additional comments on reverse side)

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IMSUAWBK

(Continued)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	J21	10									

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
														H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last Card (79)	Card (80)
1								A		P
2	Porifera				.272					P
3	Chionoecetes opilio			1215	85.730					P
4	C. bairdi			3	1.360					P
5	C. (hybrid)			10	3.628			A		P
6										P
7	Lycodes palearis				4.536			B		P
8	Reinhardtius hippoglossoides				6.577			B		P
9	Lepidopsetta bilineata				12.700			B		P
10	Limanda aspera				6.123			B		P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	K21	11	0T3	75	08	25		58°	18.2'	170°	20.5'

Columns 1–37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	20		58°	20.1'	170°	12.0'		10	3.14	72.8 – 72.8	100		H

Columns 38–80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last Card (79)	(80)
1	Argis dentata			1	.007	.		A		P
2	Pandalus goniurus			10	.070	.				P
3	Eualus macilenta			3	.006	.				P
4	Asterias amurensis			7	.640	.				P
5	Leptasterias sp.			2	.050	.				P
6	Clinocardium ciliatum			1	.027	.				P
7	Pagurus trigonocheirus			19	.570	.				P
8	Notostomobdella sp.			1	.002	.				P
9	Tritoniidae			10	.180	.				P
10	Pteraster obscura			2	.126	.				P
11	Hyas coarctatus alutaceus			1	.029	.				P
12	Actiniidae			31	1.360	.				P
13	Ophiura sarsi			1	.002	.				P
14	Colus halli			2	.014	.				P
15	Hydrozoa				.040	.				P
16	Eunephthya rubiformis				.100	.				P
17	Neptunea ventricosa			28	2.940	.				P
18	Neptunea heros			28	4.626	.				P
19	Leptasterias polaris acervata			2	.300	.				P
20	Buccinum polare			20	.500	.				P
21	Gorgonocephalus caryi			428	16.556	.		A		P

(Record additional comments on reverse side)

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(continued)

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BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Mo	Day	Start Time	Start Lat Deg	Min	Start Long Deg	Min
	K21	11									

Date Finish Year	Mo	Day	Finish Time	Finish Lat Deg	Min	Finish Long Deg	Min	C L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
														H

Comments:
Chionoecetes opilio - 379 males & 1082 females
C. (hybrid) - 2 males

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Halocynthia igaboja			2	.160			A		P
2	Eriwacrus isenbeckii			1	.321					P
3	Chionoecetes opilio			1461	93.895					P
4	C. (hybrid)			2	.680					P
5	Scyphozoa				6.204			A		P
6										P
7	Pleuronectes quadrituberculatus				3.628			B		P
8	Zoarchidae				3.628			B		P
9										P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comment on reverse side)

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IMSUAWBK

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	L21	12	0TB	75	08	20		58°	39.4'	170°	14.9'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	20		58°	10.7'	170°	14.1'		10	2.22	69.2	71.0	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)	Code	Last Card
1	Halocynthia igoboja			10	.800		A	P
2	Urochordata				.205			P
3	Halocynthia aurantium				.225			P
4	Leptosterias polaris acervata			2	.512			P
5	Leptosterias sp.			1	.018			P
6	Asterias nonimensis			25	2.500			P
7	Tritoniidae			3	.054			P
8	Hyas coarctatus alutaceus			1	.029			P
9	Pagurus trigonocheirus			30	.900			P
10	Neptunea heros			583	66.679			P
11	Polynoidae			1	.002			P
12	Notostombodella sp.			4	.003			P
13	Labidochirus splendescens			1	.011			P
14	Hydrozoa				.045			P
15	Neptunea lyrata			1	.089			P
16	Strongylocentrotus drobachiensis			1	.026			P
17	Eualus macilenta			3	.006			P
18	Buccinum scalariforme			30	.495			P
19	B. angulosum			30	.315			P
20	Scyphozoa				6.804			P
21	Gorgonocephalus caryi			35	7.938		A	P

(Continued)

(Record additional comments on reverse side)

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IMSUAWBK

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Mo	Day	Start Time:	Start Lat Deg	Min	Start Long Deg	Min
	L21	12									

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Mo	Day	Finish Time	Finish Lat Deg	Min	Finish Long Deg	Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
														H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:
Chionoecetes opilio - 2864 males & 3670 females
C. (hybrid) - 1 male

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last Card (79)	Card (80)
1	Eriwacrus isenbeckii			3	.963			A		P
2	Chionoecetes opilio			6534	370.591					P
3	C. (hybrid)			1	.045					P
4	Buccinum plectrum			1	.002			A		P
5										P
6	Pleuronectes quadrituberculatus				16.329			B		P
7	Zoarchidae				4.989			B		P
8	Lycodes palearis				2.494			B		P
9	Reinhardtius hippoglossoides				3.175			B		P
10	Limanda aspera				3.402			B		P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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IMSUAWBK

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	L22	13	OT3	75	09	20		59°	39.6′	170°	57.0′

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished Km	Depth Fished (M)	% Samp	Card
75	08	20		58°	42.0′	171°	02.8′		10	4.25	80.1 – 82.0	100	H

Comments:
Chionoecetes opilio – 1747 males & 2784 females
C. (hybrid) 1 male

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Pandalus goniurus			1	.007			A		P
2	Ophiura sarsi			454	.907					P
3	Gorgonocephalus caryi			1	.396					P
4	Pteraster obscura			1	.047					P
5	Polynoidae			1	.004					P
6	Notostomobdella sp.			20	.040					P
7	Asterias amurensis			40	43.545					P
8	Pagurus trigonocheirus			50	1.500					P
9	Nuculana fossa			3	.003					P
10	Halocynthia igaboja			2	.051					P
11	Clinocardium ciliatum			1	.027					P
12	Polinices pallida			1	.025					P
13	Neptunea heros			29	5.162					P
14	Ancistrolepis magna			2	.100					P
15	Buccinum plectrum			6	.018					P
16	Erimacrus isenbeckii			1	.321					P
17	Buccinum scalariforme			6	.162					P
18	Buccinum polare			6	.096					P
19	Scyphozoa				3.175					P
20	Chionoecetes opilio			4531	256.919					P
21	Chionoecetes (hybrid)			1	.045			A		P

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(Continued)

(Record additional comments on reverse side)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	422	13									

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
														H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Euolus macilenta			5	.005			A		P
2	Neptunea borealis			29	.580			A		P
3	Lycodes palearis				6.123			B		P
4	Reinhardtius hippoglossoides				8.981			B		P
5	Limanda aspera				5.806			B		P
6										P
7										P
8										P
9										P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	M18	14	07B	75	08	21		58°	58.3'	171°	04.6'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	20		59°	00.5	171°	04.3'		10	4.07	75.0 76.1	100		H

Comments:
Chionoecetes opilio - 1260 males & 1348 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Pagurus Trigonocheirus			10	.300			A		P
2	Ophiura sarsi			500	1.000					P
3	Nuculana fossa			200	.200					P
4	Spirontocaris sp.			1	.001					P
5	Halocynthia igoboja			2	1.160					P
6	Neptunea heros			4	.712					P
7	Polinices pallida			2	.040					P
8	Buccinum angulosum			10	.250					P
9	Buccinum scalariforme			10	.280					P
10	Leptasterias polaris acervata			1	.185					P
11	Buccinum polare			2	.032					P
12	Gorgonocephalus caryi			44	9.979					P
13	Chionoecetes opilio			2608	147.873					P
14	C. (hybrid)			1	.045					P
15	Neptunea borealis			1	.021					P
16	Asterias amurensis			30	5.896			A		P
17	Neptunea borealis			1	.020					P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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100

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Mo	Day	Start Time	Start Lat Deg	Min	Start Long Deg	Min
FN817	N22	15	0T3	75	08	21		59°	19.6	171°	07.4

Date Finish Year	Mo	Day	Finish Time	Finish Lat Deg	Min	Finish Long Deg	Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp	Card
75	08	21		59°	21.6	171°	07.2		10	3.70	73.0 73.2	100	H

Comments: Chionoecetes opilio - 1411 males & 1665 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)	Code	Last Card
1	Eualus macilenta			2	.004		A	P
2	Leptasterias polaris acervata			7	2.674			P
3	Pagurus trigonocheirus			8	.240			P
4	Nuculana fossa			100	.200			P
5	Halocynthia igoboja			2	.060			P
6	Tritoniidae			1	.008			P
7	Neptunea heros			15	2.670			P
8	Pandalus goniurus			1	.007			P
9	Buccinum scalariforme			3	.099			P
10	B. angulosum			3	.063			P
11	Buccinum polare			3	.075			P
12	Asterias omurensis			11	9.979			P
13	Gorgonocephalus caryi			22	4.989			P
14	Scyphozoa				2.721			P
15	Chionoecetes opilio			3076	174.636		A	P
16								P
17	Limanda aspera				12.020		B	P
18	Lycodes palearis				7.711		B	P
19								P
20								P
21								P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	N23	16	OTB	75	08	21		59°	20.0'	171°	46.8'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	21		59°	19.9'	171°	50.5'		10	3.33	80.1 80.1	100		H

Comments:
Chionoecetes opilio - 215 males & 281 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Halocynthia igoboja			1	.080			A		P
2	Nuculana fossa			50	.050					P
3	Neptunea heros			5	.890					P
4	Tritoniidae			1	.013					P
5	Leptasterias polaris acervata			4	.300					P
6	Ophiura sarsi			50	.100					P
7	Buccinum angulosum			4	.129					P
8	Ancistrolepis magna			4	.140					P
9	Pagurus trigonocheirus			2	.060					P
10	Polynoidae			1	.004					P
11	Margarites giganteus			1	.001					P
12	Asterias amurensis			41	4.082					P
13	Gorgonocephalus caryi			6	1.134					P
14	Chionoecetes opilio			492	27.896					P
15	Polychaeta			1	.002			A		P
16										P
17	Limanda aspera				.317			B		P
18	Lycodes palearis				11.340			B		P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	023	17	0TB	75	08	21		59°	40.4'	171°	52.7'

Columns 1–37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	21		59°	41.3'	171°	50.3'		10	3.14	75.0 76.4	100		H

Columns 38–80

Comments:
Chionoecetes opilio – 520 males & 794 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Asterias amurensis			25	4.989			A		P
2	Hyas coorctatus alutaceus			1	.029					P
3	Eualus macilenta			2	.002					P
4	Buccinum scalariforme			3	.099					P
5	B. Plectrum			3	.009					P
6	B. angulosum			3	.063					P
7	Leptasterias polaris acervata			4	.816					P
8	Neptunea heros			7	1.246					P
9	Tritoniidae			1	.018					P
10	Scyphozoa			1	.022					P
11	Buccinum polare			1	.025					P
12	Pagurus trigonocheirus			10	.300					P
13	Polinices pallida			2	.024					P
14	Chionoecetes opilio			1314	74.390					P
15	Gorgonocephalus caryi			22	4.989					P
16	Polynoidae			1	.004			A		P
17										P
18	Limanda aspera				1.360			B		P
19	Reinhardtius hippoglossoides				4.536			B		P
20	Lycode palearis				68.493			B		P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	P25	18	0T8	75	08	21		59°	57.7'	171°	56.1'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	21		60°	01.7'	171°	56.1'		10	3.70	64.0 66.0	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Asterias amurensis			2	.200			A		P
2	Halocynthia Igoboja			2	.160					P
3	Boltenia ovifera			20	.740					P
4	Clinocardium ciliatum			1	.027					P
5	Pagurus trigonocheirus			37	1.110					P
6	Leptasterias polaris acervata			4	.816					P
7	Tritoniidae			1	.018					P
8	Hydrozoa				.362					P
9	Neptunea heros			39	6.942					P
10	Buccinum scalariforme			7	.230					P
11	B. angulosum			8	.168					P
12	Hyas coarctatus alutaceus			1	.029					P
13	Polinices pallida			2	.025					P
14	Polynoidae			3	.012					P
15	Solariella varicosa			1	.001					P
16	Margarites costalis			1	.001					P
17	Melita dentata			1	.001					P
18	Anonyx nugax pacifica			22	.022					P
19	Diastylis bidentata			5	.005					P
20	Solaster endeca			1	.038					P
21	Crangon dalli			1	.001			A		P

(Record additional comments on reverse side)

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IMSUAWBK

(Continued)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	P23	18									

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp	Card
													H

Comments:
Chionoecetes opilio - 300 males & 323 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg)	Wet "Weight" (lbs)	Code	Last	Card
1	Eualus macilenta			1	.006		A		P
2	Neptunea borealis			1	.017				P
3	Hiatella arctica			1	.001				P
4	Spirontocaris lamellicornis			16	.034				P
5	Synidotea bicuspida			1	.004				P
6	Chionoecetes opilio			623	35.834				P
7	Scyphozoa				4.536				P
8	Gorgonocephalus caryi			4	.396		A		P
9									P
10									P
11									P
12									P
13									P
14									P
15									P
16									P
17									P
18									P
19									P
20									P
21									P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Mo	Day	Start Time	Start Lat Deg	Min	Start Long Deg	Min
FN817	Q23	1	90TB	75	08	21		60°	20.1	171°	21.4

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Mo	Day	Finish Time	Finish Lat Deg	Min	Finish Long Deg	Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	21		60°	19.7	171°	15.2		10	2.77	66.0	66.0	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:
Chionoecetes opilio - 118 males & 217 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg) (29–34)	Wet "Weight" (lbs) (35–39)	Code (78)	Last (79)	Card (80)
1	Leptasterias polaris acervata			10	2.040				P
2	Pagurus trigonocheirus			42	1.260				P
3	Neptunea heros			48	5.443				P
4	Buccinum angulosum			9	.189				P
5	B. scalariforme			10	.330				P
6	B. glaciale			1	.031				P
7	Hyas coarctatus alutaceus			5	.145				P
8	Halocynthia igoboja			2	.160				P
9	Boltenia ovifera			2	.068				P
10	Scyphozoa			8	.453				P
11	Actiniidae			1	.018				P
12	Tritoniidae			3	.054				P
13	Polinices pallida			3	.036				P
14	Polynoidae			1	.004				P
15	Synidotea bicuspida			2	.002				P
16	Anonyx nugax pacifica			2	.002				P
17	Diastylis bidentata			1	.001				P
18	Eualis mocilenta			5	.010				P
19	Crossaster papposus			1	.027				P
20	Gorgonocephalus caryi			2	.780				P
21	Chionoecetes opilio			335	18.960		X		P

(Record additional comments on reverse side)

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(Continued)

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BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	G23	19						°	'	°	'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
				°	'	°	'							H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Nuculana fossa			7	.014			A		P
2										P
3	Lycodes palearis				2.721			B		P
4										P
5										P
6										P
7										P
8										P
9										P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	021	20	0-3	75	08	21		60°	20.1'	171°	21.4'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	21		60°	19.7'	171°	18.2'		10	2.77	66.5 66.0	100		H

Comments:
Chionoecetes opilio - 205 males & 107 females
C. (hybrid) 1 male & 5 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Asterias amurensis			2	.200			A		P
2	Leptasterias polaris acervata			30	6.120					P
3	Boltenia ovifera			1	.043					P
4	Neptunea heros			3	.534					P
5	Polinices pallida			1	.012					P
6	Neptunea borealis			2	.356					P
7	Buccinum angulosum			3	.063					P
8	B. glaciale			1	.030					P
9	B. scalariforme			4	.132					P
10	Gorgonocephalus caryi			2	.780					P
11	Paralithodes platypus			1	.907					P
12	Chionoecetes opilio			312	17.690					P
13	C. (hybrid)			6	.362					P
14	Eualus macilenta			10	.020					P
15	Musculus niger			1	.023			A		P
16										P
17	Limanda aspera				9.072			B		P
18	Lycodes palearis				9.072			B		P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	020	21	0TB	75	08	22		60°	20.0'	170°	01.5'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	22		60°	20.9'	169°	59.0'		10	3.88	49.1 51.0	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:
Chionoecetes opilio - 363 males & 215 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–27)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Pagurus trigonocheirus			5	.150			A		P
2	Asterias amurensis			5	.500					P
3	Leptasterias polaris acervata			10	2.040					P
4	Erimacrus isenbeckii			1	.321					P
5	Hyas coarctatus alutaceus			1	.029					P
6	Boltenia ovifera			2	.086					P
7	Musculus niger			2	.041					P
8	Halocynthia igoboja			5	.400					P
9	Neptunea heros			60	6.804					P
10	Neptunea borealis			5	.890					P
11	Scyphozoa			3	4.536					P
12	Argis dentata			3	.009					P
13	Polynoidae			1	.004					P
14	Leptasterias sp.			1	.024					P
15	Gorgonocephalus caryi			1	.390					P
16	Chionoecetes opilio			578	131.090					P
17	Eunephthya rubiformis			2	.073			A		P
18										P
19	Limanda aspera				33.566			B		P
20	Reinhardtius hippoglossoides				4.536			B		P
21	Lycodes palearis				2.268			B		P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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IMSUAWBK

(Continued)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	Ø2Ø	21						°	. '	°	. '
1 2 3 4 5 6	7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
				°	. '	°	. '			.	. – .			H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Myoxocephalus polyacanthocephalus				5.443	.		B		P
2	Pleuronectes quadrituberculatus				89.812	.		B		P
3	Clupea harengus pallasi				7.030	.		B		P
4					.	.				P
5					.	.				P
6					.	.				P
7					.	.				P
8					.	.				P
9					.	.				P
10					.	.				P
11					.	.				P
12					.	.				P
13					.	.				P
14					.	.				P
15					.	.				P
16					.	.				P
17					.	.				P
18					.	.				P
19					.	.				P
20					.	.				P
21					.	.				P

(Record additional comments on reverse side)

060176
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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Mo	Day	Start Time	Start Lat Deg	Min	Start Long Deg	Min
FN917	Q19	22	0T8	75	08	22		60°	20.6'	169°	24.0'

Date Finish Year	Mo	Day	Finish Time	Finish Lat Deg	Min	Finish Long Deg	Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp	Card
75	08	22		60°	20.3'	169°	20.5'		10	3.33	42.0	44.0	100	H

Comments: Chionoecetes opilio - 102 males & 53 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg)	Wet "Weight" (lbs)	Code	Last	Card
1	Serripes groenlandicus			4	2.500		A		P
2	Hyas coarctatus alutaceus			20	1.814				P
3	Asterias amurensis			192	21.772				P
4	Leptasterias sp.			1	.024				P
5	Melita dentata			1	.001				P
6	Pagurus trigonocheirus			70	.420				P
7	Labidochirus splendescens			20	.360				P
8	Pagurus ochotensis			20	1.160				P
9	Pagurus capillatus			10	.120				P
10	Neptunea heros			30	15.762				P
11	Neptunea borealis			30	15.762				P
12	Buccinum scalariforme			15	.495				P
13	Urochordata			1	.767				P
14	Buccinum glaciale			15	.450				P
15	Musculus discors			400	3.628				P
16	Polynoidae			21	.084				P
17	Hiatella arctica			400	.400				P
18	Argis dentata			80	.640				P
19	Cyclocardia crebricostata			400	1.200				P
20	Chionoecetes opilio			155	8.618				P
21	Gorgonocephalus caryi			1	.390		A		P

(Record additional comments on reverse side)

060176
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(continued)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	111	22									

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	O L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
														H

Columns: 1–37; 38–80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–28)	Count	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Crangon dalli			2	.002			A		P
2										P
3	Theragra chalcogramma				3.628			B		P
4	Lepidopsetta bilineata				5.760					P
5	Reinhardtius hippoglossoides				5.216					P
6	Myoxocephalus polyacanthocephalus				19.504					P
7	Pleuronectes quadrituberculatus				122.472					P
8	Agonus acipenserinus				5.670					P
9	Eleginus gracilis				5.670			B		P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	018	23	379	75	08	22		60°	20.0'	168°	42.2'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	O L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	22		60°	21.0'	168°	39.0'		10	3.33	31.0 – 33.0	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Asterias amurensis			732	83.008			A		P
2	Pagurus capillatus			50	.600					P
3	Labidocheirus splendescens			30	.540					P
4	Pagurus ochotensis			10	.585					P
5	P. trigonocheirus			10	.305					P
6	Actiniidae			1	.136					P
7	Notostomobdella sp.			1	.001					P
8	Hiatella arctica			40	.040					P
9	Polynoidae			6	.024					P
10	Musculus discors			60	.300					P
11	Halocynthia igaboja			50	6.904					P
12	Ectoprocta				.050					P
13	Neptunea heros			20	3.560					P
14	Hydrozoa				.050					P
15	Urochordata				.767					P
16	Serripes groenlandicus			2	.140					P
17	Crangon dalli			2	.002			A		P
18	Eleginus gracilis				34.700			B		P
19	Limanda aspera				70.308			B		P
20	Myoxocephalus polyacanthocephalus				24.948			B		P
21	Pleuronectes quadrituberculatus				22.680			B		P

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(Continued)

(Record additional comments on reverse side)

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	001	24	0TB	75	08	22		60°	20.8'	168°	03.3'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	22		60°	20.8'	168°	01.0'		10	2.22	27.3 – 29.1	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Urochordata				.767			A		P
2	Asterias amurensis			584	66.225					P
3	Hyas coarctatus alutaceus			1	.029					P
4	Neptunea ventricosa			10	1.480					P
5	Halocynthia igaboja			4	.326					P
6	Musculus discors			5	.030					P
7	Actiniidae			1	.200					P
8	Hiatella arctica			3	.003					P
9	Pagurus capillatus			50	.600					P
10	P. ochotensis			10	.580					P
11	Crangon dalli			1	.002					P
12	Eunephthya rubiformis			2	.100					P
13	Polynoidae			1	.004			A		P
14										P
15	Eleginus gracilis				20.412			B		P
16	Clupea harengus pallasi				14.061			B		P
17	Pleuronectes quadrituberculatus				3.628			B		P
18	Gymnocanthus pistilliger				5.443			B		P
19	Limanda aspera				66.452			B		P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	002	25	0TB	75	08	22		60°	21.5'	167°	22.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp	Card
75	02	22		60°	22.2'	167°	19.9'		10	2.22	26.0 26.4	100	H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)	Code	Last	Card
1	Asterias amurensis			15	2.041		A		P
2	Actiniidae			7	.453				P
3	Pagurus capillatus			10	.120				P
4	Neptunea ventricosa			2	.296				P
5	Hyas coarctatus alutaceus			1	.029				P
6	Anonyx nugax pacifica			1	.001				P
7	Polynoidae			2	.008				P
8	Solariella obscura			1	.001				P
9	Crangon dalli			28	.056				P
10	Tritoniidae			4	.004				P
11	siliqua alta			1	.002				P
12	Tecticeps alascensis			7	.007				P
13	Admete couthouyi			1	.001				P
14	Spirontocaris ochotensis			1	.002		A		P
15									P
16	Eleginus gracilis				6.350		B		P
17									P
18									P
19									P
20									P
21									P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN317	P61	26	0TB	76	08	22		60°	00.8'	167°	59.5'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp	Card
75	08	22		59°	59.0'	165°	00.1'		10	2.22	22.0 – 26.0	100	H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
			14 15 16 17 18 19 20 21 22 23	24 25 26 27 28	29 30 31 32 33 34	35 36 37 38 39		78	79	80
1	Halocynthia igaboja			3	.240	.		A		P
2	Asterias amurensis			66	7.484	.				P
3	Actiniidae			3	.136	.				P
4	Pagurus capillatus			7	.084	.				P
5	Labidocheirus splendescens			1	.018	.				P
6	Pagurus ochotensis			12	.696	.				P
7	Spisula polynyma			4	.336	.		A		P
8					.	.				P
9	Eleginus gracilis				4.762	.		B		P
10	Limanda aspera				47.628	.		B		P
11					.	.				P
12					.	.				P
13					.	.				P
14					.	.				P
15					.	.				P
16					.	.				P
17					.	.				P
18					.	.				P
19					.	.				P
20					.	.				P
21					.	.				P
			14 15 16 17 18 19 20 21 22 23	24 25 26 27 28	29 30 31 32 33 34	35 36 37 38 39		78	79	80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	P18	27	078	75	08	23		60°	00.2'	162°	46.4'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	23		60°	00.1'	162°	37.0'		10	3.70	36.4	36.4	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69	70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Erimacrus isenbeckii			1	.321	.		A		P
2	Pagurus ochotensis			65	5.720	.				P
3	P. capillatus			100	1.200	.				P
4	Labidocheirus splendescens			2	.052	.				P
5	Hyas coarctatus alutaceus			1	.029	.				P
6	Asterias amurensis			184	20.565	.				P
7	Actiniidae			1	.160	.				P
8	Halocynthia igoboja			1	.080	.				P
9	Urocrordata				.065	.				P
10	Neptunea heros			11	1.958	.				P
11	N. ventricosa			11	1.628	.				P
12	Hirudinae			1	.001	.				P
13	Polynoidae			1	.004	.		A		P
14					.	.				P
15	Therorra chalcogramma				4.536	.		B		P
16	Lepidopsetta bilineata				13.608	.				P
17	Oncorhynchus tshawytscha				6.804	.				P
18	Myoxocephalus polyacanthocephalus				50.803	.				P
19	Pleuronectes quadrituberculatus				71.215	.				P
20	Eleginus gracilis				127.008	.				P
21	Limanda aspera				145.152	.		B		P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN317	P19	28	07B	75	07	23		59°	59.8'	169°	15.2'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	23		60°	00.8'	169°	19.0'		10	3.33	44.0	44.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70	71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Melita dentata			1	.001			A		P
2	Hirudinae			1	.001					P
3	Hyas lyratus			1	.003					P
4	Hyas coarctatus alutaceus			7	.203					P
5	Pagurus ochotensis			10	.580					P
6	P. capillatus			20	.240					P
7	Asterias amurensis			152	17.236					P
8	Neptunea heros			62	11.036					P
9	N. ventricosa			62	9.176					P
10	Polynoidae			2	.008					P
11	Halocynthia igoboja			300	15.649					P
12	Argis dentata			1	.008					P
13	Crangon dalli			15	.030			A		P
14										P
15	Pleuronectes quadrituberculatus				20.185			B		P
16	Eleginus gracilis				3.402			B		P
17	Myoxocephalus polyacanthocephalus				12.700			B		P
18	Limanda aspera				53.751			B		P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	P26	29	OTB	75	03	23		60°	00.1'	159°	58.5'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	03	23		59°	59.1'	169°	54.5'		10	4.07	51.0 53.0	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:
Chionoecetes opilio - 506 males & 578 females
C. (hybrid) 1 Males & 5 females

One piece of plastic strapping found.

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Asterias amurensis			80	8.618			A		P
2	Tochuina tetraquetra			1	.094					P
3	Tritoniidae			1	.018					P
4	Polynoidae			2	.008					P
5	Halocynthia igoboja			800	50.349					P
6	Neptunea heros			48	8.544					P
7	N. ventricosa			48	7.104					P
8	Pagurus ochotensis			50	2.900					P
9	P. trigonocheirus			125	3.750					P
10	Lobidocheirus splendescens			125	2.250					P
11	Polinices pallida			1	.012					P
12	Argis dentata			5	.040					P
13	Gorgonocephalus caryi			4	1.360					P
14	Chionoecetes opilio			1084	15.422					P
15	C. (hybrid)			6	.226					P
16	Buccinum polare			50	1.250					P
17	B. scalariforme			50	1.650			A		P
18										P
19	Agonus acipenserinus				6.123			B		P
20	Pleuronectes quadrituberculus				110.224			B		P
21	Reinhardtius hippoglossoides				9.979			B		P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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(Continued)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Mo	Day	Start Time:	Start Lat Deg	Min	Start Long Deg	Min
	P2Ø	29									

Date Finish Year	Mo	Day	Finish Time	Finish Lat Deg	Min	Finish Long Deg	Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
														H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Limanda aspera				109.317			B		P
2	Myoxocephalus polyacanthocephalus				12.700			B		P
3										P
4										P
5										P
6										P
7										P
8										P
9										P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	P21	30	07B	75	08	23		59°	59.8′	170°	34.0′

Columns: 1–37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	23		59°	59.9′	170°	36.7′		10	3.51	58.2 – 60.1	100		H

Columns: 38–80

Comments:
Chionoecetes opilio - 175 males & 156 females
C. (hybrid) - 1 male & 1 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)	Code (78)	Last (79)	Card (80)
1	Pagurus trigonocheirus			12	.360		A		P
2	Neptunea heros			30	4.762				P
3	Asterias amurensis			52	5.896				P
4	Leptasterias polaris acervata			1	.204				P
5	Leptasterias sp.			1	.024				P
6	Nuculana fossa			2	.002				P
7	Eualus macilenta			1	.003				P
8	Buccinum Polare			2	.050				P
9	B. angulosum			1	.021				P
10	Gorgonocephalus caryi			4	.907				P
11	Chionoecetes opilio			331	9.752				P
12	C. (hybrid)			2	.136				P
13	Scyphozoa				3.175				P
14	Colus dautzenbergi			1	.007				P
15	Eunepthya rubiformis				.050		A		P
16									P
17	Limanda aspera				10.432		B		P
18	Lycodes palearis				20.412		B		P
19	Pleuronectes quadrituberculatus				11.340		B		P
20									P
21									P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Mo	Day	Start Time:	Start Lat Deg	Min	Start Long Deg	Min
FN817	P22	31	OTB	75	08	23		59°	59.9	171°	15.5

Date Finish Year	Mo	Day	Finish Time	Finish Lat Deg	Min	Finish Long Deg	Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	23		59°	59.6	171°	19.7		10	3.70	67.3 69.2	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Nuculona fossa			3	.003			A		P
2	Chionoecetes opilio			232	11.521					P
3	Gorgonocephalus caryi			1	.090					P
4	Buccinum angulosum			7	.147					P
5	B. scalariforme			8	.024					P
6	Polinices pallida			3	.036					P
7	Neptunea borealis			1	.150					P
8	Leptasterias polaris acervata			2	.408					P
9	Leptasterias sp.			1	.024					P
10	Pagurus trigonocheirus			10	.300					P
11	Scyphozoa			1	.036					P
12	Argis dentata			1	.006					P
13	Neptunea heros			10	1.780					P
14	N. ventricosa			10	1.480					P
15	Eualus macilenta			9	.018					P
16	Tritoniidae			7	.147					P
17	Doridocea			1	.005					P
18	Asterias amurensis			20	2.767					P
19	Melita dentata			1	.001			A		P
20	Limanda aspera				7.257			B		P
21	Lycodes palearis				5.125			B		P

(Record additional comments on reverse side)

060176
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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	022	32	078	75	08	23		59°	41.0'	171°	14.5'

Columns 1–37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	23		59°	39.8'	171°	12.4'		10	2.77	71.0 71.0	100		H

Columns 38–80

Comments: Chionoecetes opilio - 993 males & 2369 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
			14–23	24–28	29–34	35–39		78	79	80
1	Asterias amurensis			1	.100			A		P
2	Leptasterias poloris acervata			13	2.721					P
3	Pandalus goniurus			1	.007					P
4	Neptunea heros			30	2.721					P
5	Buccinum polore			12	.3[illegible]					P
6	B. anaulosum			13	.273					P
7	colus aphelus			1	.007					P
8	Doridacea			2	.016					P
9	Tritoniidae			1	.001					P
10	Polinices pallida			2	.024					P
11	Hydrozoa				.004					P
12	Pagurus trigonocheirus			10	.300					P
13	Scyphozoa				18.144					P
14	Chionoecetes opilio			3362	75.751					P
15	Paralithodes platypus			1	.907					P
16	Eualus dentata			1	.008			A		P
17										P
18	Limanda aspera				8.618			B		P
19	Lycodes palearis				33.112			B		P
20	Pleuronectes quadrituberculatus				5.896			B		P
21										P

(Record additional comments on reverse side)

060176
IMSUAWBK

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	021	33	OTB	75	08	23		59°	39.9'	170°	35.1'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	O L	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	23		59°	40.1'	170°	31.5'		10	3.51	66.0	66.0	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Chionoecetes opilio – 276 males & 364 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Asterias amurensis			2	.226			A		P
2	Leptasterias polaris acervata			4	.816					P
3	Neptunea borealis			1	.150					P
4	N. heros			1	.178					P
5	Buccinum polare			3	.075					P
6	B. angulosum			4	.132					P
7	Colus halli			1	.007					P
8	Pagurus trigonocheirus			6	.180					P
9	Scyphozoa				.045					P
10	Tritoniidae			3	.003					P
11	Chionoecetes opilio			640	19.958			A		P
12										P
13	Limanda aspera				28.350			B		P
14	Reinhardtius hippoglossoides				3.402			B		P
15	Lycodes palearis				21.999			B		P
16	Pleuronectes quadrituberculatus				26.082			B		P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	026	34	0T8	75	02	24		59°	36.9'	169°	50.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp	Card
75	08	24		59°	40.4'	169°	52.8'		10	3.50	55.0 55.0	100	H

Comments:
Chionoecetes opilio - 88 males & 38 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)	Code	Last	Card
1	Tritoniidae			1	.018		A		P
2	Nereis sp.			1	.003				P
3	Halocynthia igoboja			150	11.340				P
4	Neptunea heros			100	10.432				P
5	Leptosterias polaris acervata			20	1.360				P
6	Asterias amurensis			10	1.360				P
7	Pandalus goniurus			1	.008				P
8	Argis dentata			2	.012				P
9	Hyas lyratus			1	.003				P
10	Hyas coarctatus alutaceus			1	.029				P
11	Eunephthya rubiformis				.050				P
12	Gorgonocephalus caryi			11	2.494				P
13	Chionoecetes opilio			126	3.175				P
14	Pagurus trigonocheirus			50	1.500		A		P
15									P
16	Pleuronectes quadrituberculatus				58.968		B		P
17	Reinhardtius hippoglossoides				14.515		B		P
18	Myoxocephalus polyacanthocephalus				4.536		B		P
19	Limanda aspera				73.710		B		P
20									P
21									P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	019	35	0T8	75	02	24		59°	40.2'	169°	16.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	02	24		59°	40.1'	169°	12.5'		10	3.88	46.0	46.0	100		H

Comments: Chionoecetes opilio 57 males & 25 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Asterias amurensis			476	53.978			A		P
2	Hyas lyratus			5	.015					P
3	Hyas coarctatus alutaceus			5	.145					P
4	Serripes groenlandicus			1	.070					P
5	Pagurus trigonocheirus			900	27.006					P
6	P. capillatus			500	6.000					P
7	Hiatella arctica			500	.500					P
8	Buccinum scalariforme			5	.181					P
9	Neptunea ventricosa			132	17.781					P
10	Polynoidae			10	.040					P
11	Halocynthia igoboja			2000	114.760					P
12	Musculus discors			1000	6.000					P
13	Melita dentata			1	.001					P
14	Polinices pallida			1	.012					P
15	Argis dentata			10	.080					P
16	Yoldia seminuda			1	.006					P
17	Gorgonocephalus caryi			6	1.360					P
18	Chionoecetes opilio			82	2.268					P
19	Eunophthya rubiformis				.050			A		P
20										P
21	Lepidopsetta bilineata				3.628			B		P

(Record additional comments on reverse side)

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(Continued)

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BENTHIC TRAWL DATA

(Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	019	35									
1–5	6–9	10–13	14–16	17–18	19–20	21–22	23–26	27–28	29–31	32–34	35–37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
														H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)	Code (78)	Last (79)	Card (80)
1	Reinhardtius hippoglossoides				10.296		B		P
2	Myoxocephalus polyacanthocephalus				19.051		B		P
3	Agonus acipenserinus				3.191		B		P
4	Pleuronectes quadrituberculatus				179.172		B		P
5	Limanda aspera				250.160		B		P
6									P
7									P
8									P
9									P
10									P
11									P
12									P
13									P
14									P
15									P
16									P
17									P
18									P
19									P
20									P
21									P

(Record additional comments on reverse side)

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IMSUAWBK

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	018	36	OTB	75	08	24		59°	40.1'	168°	38.2'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	24		59°	40.0'	168°	34.0'		10	3.88	36.4	36.4	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Erimocrus isenbeckii			1	.321			A		P
2	Serripes groenlandicus			3	.210					P
3	Halocynthia igoboja			1000	45.360					P
4	Asterias amurensis			766	86.864					P
5	Ectoprocta				.001					P
6	Pagurus ochotensis			30	1.740					P
7	P. capillatus			30	.360					P
8	Neptunea ventricosa			25	3.700					P
9	Leptasterias polaris acervata			1	.204					P
10	Hyas coarctatus alutaceus			1	.029					P
11	Argis dentata			2	.016					P
12	Polynoidae			2	.008					P
13	Tellina lutea			1	.010			A		P
14										P
15	Hippoglossoides robustus				4.536			B		P
16	Pleuronectes quadrituberculatus				48.988			B		P
17	Myoxocephalus polyacanthocephalus				9.979			B		P
18	Limanda aspera				108.864			B		P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	061	37	OTB	75	08	24		59°	40.2'	167°	59.1'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	24		59°	40.0'	167°	55.1'		10	3.70	31.0 36.4	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Asterias amurensis			150	16.783			A		P
2	Urochordata				.050					P
3	Eunephthya rubiformis				.136					P
4	Neptunea ventricosa			25	3.175					P
5	Crangon dalli			5	.010					P
6	Anonyx nugax pacifica			1	.001					P
7	Labidochirus splendescens			1	.018					P
8	Pagurus capillatus			15	.180					P
9	P. ochotensis			15	.870					P
10	Serripes groenlandicus			1	.070					P
11	Polynoidae			1	.004			A		P
12										P
13	Limanda aspera				26.082			B		P
14	Lepidopsetta bilineata				3.628			B		P
15	Myoxocephalus polyacanthocephalus				2.268			B		P
16	Pleuronectes quadrituberculatus				3.855			B		P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

060176
IMSUAWBK

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	062	38	0TB	75	08	24		59°	40.0'	167°	19.9'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	24		59°	39.8'	167°	16.3'		10	3.50	31.0	33.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70	71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Hyas lyratus			1	.045	.		A		P
2	Crangon dalli			2	.004	.				P
3	Serripes groenlandicus			1	.070	.				P
4	Siliqua alta			1	.002	.				P
5	Asterias amurensis			450	50.803	.				P
6	Labidochirus splendescens			3	.054	.				P
7	Pagurus ochotensis			6	.348	.				P
8	Neptunea heros			2	.356	.				P
9	Telmessus cheiragonus			5	1.605	.				P
10	Paralithodes camtschatica			2	.967	.				P
11	Neptunea ventricosa			2	.296	.		A		P
12					.	.				P
13	Hippoglossoides robustus				4.536	.		B		P
14	Agonus acipenserinus				2.268	.		B		P
15	Pleuronectes quadrituberculatus				3.402	.		B		P
16	Myoxocephalus polyacanthocephalus				2.948	.		B		P
17					.	.				P
18					.	.				P
19					.	.				P
20					.	.				P
21					.	.				P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	003	39	0TB	75	08	24		59°	40.0'	166°	39.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	24		59°	40.1'	166°	36.0'		10	3.14	24.5	26.0	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Tellina lutea			2	.020			A		P
2	Siliqua alta			1	.010					P
3	Crangon dalli			1	.004					P
4	Asterias amurensis			520	58.514					P
5	Neptunea ventricosa			6	.680					P
6	Eunephthya rubiformis				.136					P
7	Pagurus ochotensis			14	.812					P
8	P. capillatus			2	.024					P
9	Serripes groenlandicus			2	.140					P
10	Spisula polynyma			7	.679					P
11	Telmessius cheiragonus			2	.182					P
12	Stegophiura nodosa			3	.004			A		P
13										P
14	Limanda aspera				39.236			B		P
15	Hippoglossoides robustus				5.216			B		P
16	Eleginus gracilis				149.688			B		P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

060176
IMSUAW8K

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	064	40	0T3	75	08	24		59°	40.2	165°	58.1

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	24		59°	38.3	165°	57.6		10	3.33	20.0	23.0	0		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments: TRAWL RIPPED

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last Card (79)	Card (80)
1										P
2										P
3										P
4										P
5										P
6										P
7										P
8										P
9										P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

060176
IMSUAWBK

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	N34	41	073	75	08	25		57°	19.7'	165°	55.9'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	25		59°	20.0'	165°	52.3'		10	3.50	20.0 21.0	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Spisula polynyma			3	.252			A		P
2	Asterias amurensis			780	8.845					P
3	Telmessius cheiragonus			5	1.605					P
4	Pagurus ochotensis			2	.116					P
5	Crangon dalli			2	.004					P
6	Neptunea heros			1	.178					P
7	N. ventricosa			2	.296			A		P
8										P
9	Limanda aspera				36.661			B		P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

060176
IMSUAWBK

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	N05	42	OTB	75	08	25		59°	19.6'	165°	19.0'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	25		59°	21.1'	165°	16.5'		10	3.88	22.0	22.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69	70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Asterias amurensis			280	31.752			A		P
2	Telmessius cheiragonus			7	2.268					P
3	Stegophiura nodosa			6	.012					P
4	Neptunea ventricosa			1	.148					P
5	Siliqua alta			1	.010					P
6	Labidochirus splendescens			1	.018					P
7	Polychaeta			9	.018					P
8	Crangon dalli			100	.200					P
9	Anonyx nugax pacifica			1	.001					P
10	Polynoidae			1	.004					P
11	Echinarachnius parma			42	.336					P
12	Caprillidae			50	.001			A		P
13										P
14	Eleginus gracilis				3.402			B		P
15	Limanda aspera				7.257			B		P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	N06	43	0TB	75	08	25		59°	20.0'	164°	39.5'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	25		59°	20.0'	164°	35.0'		10	4.07	24.0	24.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70	71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Siliqua alta			1	.010			A		P
2	Pagurus ochotensis			1	.058					P
3	Asterias amurensis			50	4.536					P
4	Echinarachnius parma			1	.008					P
5	Cyclocardia crebicostata			1	.003					P
6	Natica clausa			1	.012					P
7	Crangon dalli			14	.028					P
8	Argis dentata			1	.008			A		P
9										P
10	Limanda aspera				21.092			B		P
11	Eleginus gracilis				12.700			B		P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	N67	44	OTB	75	08	25		59°	17.4'	164°	01.7'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	25		59°	19.3'	164°	00.8'		10	3.70	22.0 26.0	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Telmessius cheiragonus			5	1.360			A		P
2	Asterias amurensis			306	30.618					P
3	Actiniidae			2	.680					P
4	Siliqua alta			4	.040					P
5	Cyclocardia crebricostata			2	.006					P
6	Pagurus ochotensis			9	.522			A		P
7										P
8	Limanda aspera				32.659			B		P
9	Eleginus gracilis				17.236			B		P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	M02	45	07B	75	09	25		58°	59.2'	163°	22.2'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	25		58°	57.9'	163°	24.3'		10	2.59	22.0	26.0	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Siliqua alta			1	.036			A		P
2	Polynoidae			1	.204					P
3	Pagurus ochotensis			2	.116					P
4	Actiniidae			8	.045					P
5	Crangon dalli			30	.030					P
6	Argis dentata			1	.008					P
7	Asterias amurensis			224	25.401					P
8	Buccinum polare			1	.025					P
9	Telmessus cheiragonus			1	.140			A		P
10										P
11	Limanda aspera				295.747			B		P
12	Hippoglossoides elassodon				18.144			B		P
13	Eleginus gracilis				12.474			B		P
14	Pleuronectes quadrituberculatus				5.896			B		P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	MØ7	46	0TB	75	08	26		59°	00.7'	163°	59.2'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	O L	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	26		58°	59.5'	164°	01.7'		10	3.70	27.3	29.1	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69	70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Polynoidae			1	.004			A		P
2	Natica aleutica			1	.004					P
3	Asterias amurensis			812	92.080					P
4	Siliqua alta			1	.010					P
5	Telemessus cheiragonus			20	7.257					P
6	Pagurus ochotensis			6	.348					P
7	Balanus balanus			5	.015					P
8	Crangon dalli			30	.060					P
9	Argis dentata			1	.008					P
10	Porifera				.004			A		P
11										P
12	Eleginus gracilus				29.710			B		P
13	Hippoglossoides robustus				9.525					P
14	Plouronectes quadrituberculatus				27.216					P
15	Hippoglossus stenolepis				26.308					P
16	Limanda aspera				11.113			B		P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	MØ6	47	OTB	75	08	26		59°	00.5	164°	37.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	26		59°	01.1'	164°	40.1'		10	3.70	27.3 29.1	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Asterias omurensis			132	14.963			A		P
2	Telmessus cheiragonus			15	5.670					P
3	Cyclocardia crebricostata			2	.006					P
4	Natica aleutica			1	.004					P
5	Neptunea ventricosa			1	.148					P
6	Crangon dalli			20	.020					P
7	Ectoprocta				.453					P
8	Hyas coarctatus alutaceus			1	.029					P
9	Pagurus ochotensis			14	.812					P
10	Polynoidae			1	.004			A		P
11										P
12	Eleginus gracilus				19.958			B		P
13	Hippoglossoides robustus				14.061			B		P
14	Limanda aspera				173.728			B		P
15	Osmerus mordax dentex				43.092					P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	M05	48	043	75	02	26		59°	00.0'	165°	16.5'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	02	26		59°	00.0'	165°	19.0'		10	2.96	29.0	29.1	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70	71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1										
2	Telmessus cheiragonus			18	5.896			A		P
3	Asterias amurensis			290	31.752					P
4	Neptunea ventricosa			6	.828					P
5	Natica aleutica			1	.004					P
6	Cyclocardia crebricostata			1	.003					P
7	Pagurus ochotensis			17	.986			A		P
8										P
9	Limanda aspera				133.212			B		P
10	Eleginus gracilus				18.144			B		P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P
										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN?17	M04	49	07B	75	08	26		58°	59.9'	165°	54.0'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	02	26		58°	59.2'	165°	55.0'		10	3.14	31.0	33.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69	70 71 72 73	74 75 76	77 78 79	80

Comments: Plastic was found in this Trawl.

Juvenile Pollock

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Asterias amurensis			430	39.009			A		P
2	Labidochirus splendescens			200	3.600					P
3	Pagurus ochotensis			200	11.600					P
4	Hyas coarctatus alutaceus			2	.058					P
5	Crangon dalli			500	2.721					P
6	Telmessus cheiragonus			37	6.577					P
7	Neptunea heros			3	.534					P
8	N. ventricosa			3	.444					P
9	Melita dentata			2	.001					P
10	Tellina lutea			1	.011					P
11	Polynoidae			1	.004					P
12	Argis dentata			50	.400					P
13	Paralithodes camtschatica			1	.181					P
14	Argeia pugettensis			1	.001			A		P
15										P
16	Theragra chalcogramma				9.525			B		P
17	Limanda aspera				36.741			B		P
18	Myoxocephalus polyacanthocephalus				11.340			B		P
19	Osmerus mordax dentex				7.030			B		P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	M33	50	072	75	08	27		59°	01.1'	166°	36.9'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	02	27		59°	17.0'	166°	40.0'		10	3.33	35.0 T 36.4	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)	Code (78)	Last (79)	Card (80)
1	Actiniidae			1	.160		A		P
2	Spisula polynyma			1	.084				P
3	Serripes groenlandicus			3	.453				P
4	Tellina lutea			1	.011				P
5	Asterias amurensis			748	84.823				P
6	Telmessus cheiragonus			9	1.360				P
7	Neptunea ventricosa			6	.888				P
8	Buccinum polare			2	.050				P
9	Hyas coarctatus alutaceus			3	.087				P
10	Pagurus ochotensis			25	.580				P
11	Labidochirus splendescens			5	.090				P
12	Argis dentata			2	.016				P
13	Crangon dalli			17	.017		A		P
14	Eleginus gracilus				39.916		B		P
15	Theragra chalcogramma				10.206				P
16	Limanda aspera				37.784				P
17	Lepidopsetta bilineata				19.731				P
18	Hippoglossus stenolepis				29.484				P
19	Myoxocephalus polyacanthocephalus				11.793				P
20	Pleuronectes quadrituberculatus				19.051				P
21	Hippoglossoides robustus				8.164		B		P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	125	51	03	75	02	27		59°	20.8'	166°	39.0'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	02	27		56°	20.8'	166°	41.6'		10	3.33	29.1T 31.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)	Code (78)	Last (79)	Card (80)
1	Polynoidae			2	.008	.	A		P
2	Echiurus echiurus			1	.009	.			P
3	Asterias amurensis			560	64.504	.			P
4	Pagurus capillatus			1	.012	.			P
5	P. ochotensis			25	1.450	.			P
6	Labidochirus splendescens			25	.450	.			P
7	Crangon dalli			20	.040	.			P
8	Neptunea ventricosa			12	.177	.			P
9	Telmessus cheiragonus			15	2.100	.			P
10	Paralithodes camtschatica			2	.907	.	A		P
11					.	.			P
12	Limanda aspera				72.802	.	B		P
13	Hippoglossus stenolepis				20.412	.	B		P
14	Osmerus mordax dentex				4.536	.	B		P
15	Pleuronectes quadrituberculatus				4.989	.	B		P
16	Eleginus gracilus				69.174	.	B		P
17					.	.			P
18					.	.			P
19					.	.			P
20					.	.			P
21					.	.			P
			14 15 16 17 18 19 20 21 22 23	24 25 26 27 28	29 30 31 32 33 34	35 36 37 38 39	78	79	80

(Record additional comments on reverse side)

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IMSUAWBK

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	N02	52	0TB	75	08	27		59°	20.2′	167°	15.8′
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	27		59°	20.8′	167°	19.0′		10	3.14	35.0	35.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69	70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code	Last	Card (80)
1	Asterias amurensis			1072	121.564					P
2	Telmessus cheiragonus			13	2.041					P
3	Tellina lutea			1	.011					P
4	Serripes groenlandicus			4	.280					P
5	Neptunea ventricosa			15	2.041					P
6	Pagurus ochotensis			40	2.320					P
7	Labidochirus splendescens			40	.720					P
8	Argis dentata			20	.160					P
9	Crangon dalli			100	.453					P
10	Erimacrus isenbeckii			1	.907					P
11										P
12	Limanda aspera				65.318					P
13	Hippoglossus stenolepis				45.360					P
14	Myoxocephalus polyacanthocephalus				8.845					P
15	Pleuronectes quadrituberculatus				8.845					P
16	Hippoglossoides robustus				8.845					P
17	Eleginus gracilis				39.009					P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	NØ1	53	0TB	75	08	27		59°	20.5'	167°	52.5'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	27		59°	20.5'	167°	56.0'		10	3.33	38.2	38.2	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–25)	Count (26–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Asterias amurensis			558	63.277	.		A		P
2	Serripes groenlandicus			1	.570	.		|		P
3	Tellina lutea			1	.011	.		|		P
4	Neptunea ventricosa			40	.592	.		|		P
5	Hyas coarctatus alutaceus			40	1.160	.		|		P
6	Pagurus ochotensis			50	2.900	.		|		P
7	Labidochirus splendescens			50	.900	.		|		P
8	Pagurus capillatus			20	.240	.		|		P
9	Argis dentata			100	.800	.		|		P
10	Crangon dalli			200	.200	.		↓		P
11	Echiurus echiurus			2	.018	.		A		P
12					.	.				P
13	Limanda aspera				31.298	.		B		P
14	Lepidopsetta bilineata				41.277	.		B		P
15	Myoxocephalus polyacanthocephalus				41.277	.		B		P
16	Pleuronectes quadrituberculatus				7.575	.		B		P
17					.	.				P
18					.	.				P
19					.	.				P
20					.	.				P
21					.	.				P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	N1S	54	0T2	75	02	27		59°	19.9'	162°	32.5'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	02	27		59°	19.9	162°	36.1'		10	3.50	40.0 40.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:

Chionoecetes opilio - 10 males & 14 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Pagurus capillatus			40	.480			A		P
2	P. ochotensis			20	1.160					P
3	Labidochirus splendescens			40	.720					P
4	Hyas coarctatus alutaceus			20	.520					P
5	Polinices pallida			1	.012					P
6	Neptunea heros			40	7.120					P
7	N. ventricosa			40	5.920					P
8	Asterias amurensis			776	87.998					P
9	Halocynthia igaboja			1	.080					P
10	Crangon dalli			10	.010					P
11	Erimacrus isenbecki			3	2.04					P
12	Chionoecetes opilio			24	.453					P
13	Polynoidae			2	.008			A		P
14										P
15	Limanda aspera				77.338			B		P
16	Myoxocephalus polyacanthocephalus				13.608			B		P
17	Pleuronectes quadrituberculatus				16.329			B		P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	N19	55	0TB	75	08	27		59°	20.1'	169°	10.1'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	27		59°	20.3'	165°	13.8'		10	3.33	51.0 – 53.0	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments: 40% of Argis dentata are ovigerous.
Chionoecetes opilio - 9 males & 1 female

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Asterias amurensis			412	46.720			A		P
2	Halocynthia igaboja			2816	154.667					P
3	Argis dentata			40	.320					P
4	Pagurus trigonocheirus			40	1.200					P
5	P. capillatus			25	.300					P
6	Hyas coarctatus alutaceus			5	.145					P
7	Neptunea heros			15	2.670					P
8	N. ventricosa			15	2.220					P
9	Chionoecetes opilio			10	.453					P
10	C. (hybrid)			1	.045			A		P
11										P
12	Pleuronectes quadrituberculatus				126.554			B		P
13	Myoxocephalus polyacanthocephalus				16.329			B		P
14	Limanda aspera				44.906			B		P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN517	N20	56	0TB	75	07	28		59°	19.7'	169°	51.6'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	28		59°	21.2'	169°	54.0'		10	3.50	62.0 64.0	100		H

Comments:
Chionoecetes opilio - 603 males & 344 females
C. (hybrid) - 9 males

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code 78	Last 79	Card 80
1	Musculus discors			100	1.214			A		P
2	Asterias amurensis			140	15.876					P
3	Halocynthia igaboja			50	3.628					P
4	Buccinum polare			25	.625					P
5	B. angulosum			25	.525					P
6	Neptunea heros			60	10.680					P
7	Argis dentata			2	.016					P
8	Crangon dalli			1	.001					P
9	Lebbidachirus splendescens			10	.180					P
10	Pagurus trigonocheirus			20	.600					P
11	Pandalus goniurus			1	.007					P
12	Eunephthya rubiformis				.045					P
13	Actiniidae			1	.045					P
14	Chionoecetes opilio			947	31.752					P
15	C. (hybrid)			9	.688			A		P
16										P
17	Pleuronectes quadrituberculatus				32.659			B		P
18	Limanda aspera				40.824			B		P
19										P
20										P
21										P

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN317	N21	57	GT9	75	08	28		59°	20.0'	170°	30.0'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	28		59°	20.1'	170°	34.0'		10	3.70	70.1 73.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:
Chionoecetes opilio - 290 males & 300 females
C. (hybrid) - 11 males & 6 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Pagurus trigonocheirus			4	.120			A		P
2	Labidochirus splendosceus			1	.018					P
3	Asterias amurensis			96	10.826					P
4	Neptunea heros			5	.590					P
5	N. borealis			5	.100					P
6	Buccinum angulosum			4	.084					P
7	B. solenum			4	.048					P
8	Tritoniidae			1	.013					P
9	Halocynthia igoboja			2	.160					P
10	Clinocardium ciliatum			1	.027					P
11	Nuculana fossa			3	.001					P
12	Chionoecetes opilio			590						P
13	C. (hybrid)			17				A		P
14										P
15	Lycodes palearis				11.793			B		P
16	Pleuronectes quadrituberculatus				11.113			B		P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	M21	58	OTB	75	08	28		59°	00.3'	170°	28.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	28		59°	00.5'	170°	24.0'		10	3.70	73.0 75.0	100		H

Comments:
Chionoecetes opilio - 203 males & 122 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Tritoniidae			1	.045					P
2	Nuculana fossa			56	.013					P
3	Neptunea heros			10	2.812					P
4	Buccinum polare			4	.050					P
5	Pagurus trigonocheirus			2	.060					P
6	Notostomobdella sp.			1	.001					P
7	Eualus macilenta			1	.002					P
8	Scyphozoa			2	1.360					P
9	Asterias amurensis			28	3.402					P
10	Chionoecetes opilio			325	10.432					P
11	Argis dentata			1	.008					P
12										P
13	Lycodes palearis				16.556					P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	M26	59	OTB	75	08	22		59°	01.0'	169°	44.7'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	22		59°	01.1'	169°	41.1'		10	3.70	64.0	66.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70	71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Pandalus goniurus			5	.025			A		P
2	Crangon dentata			1	.007					P
3	Neptunea heros			280	31.752					P
4	Buccinum polare			40	1.814					P
5	Tochuina tetraquetra			2	.136					P
6	Pagurus capillatus			2	.024					P
7	P. trigonochcirus			50	1.500					P
8	Labidochirus splendescens			2	.036					P
9	Hyas lyratus			5	.181					P
10	Leptasterias sp.			1	.022					P
11	Eunephthya rubiformis				2.268					P
12	Polynoidae			2	.031					P
13	Eualus macilenta			1	.004					P
14	Gorgonocephalus caryi			5	.952					P
15	Asterias amurensis			210	23.814					P
16	Halocynthia igaboja			100	2.268					P
17	Chionoecetes opilio			346	11.793					P
18	C. (hybrid)			3	.226			A		P
19	Limanda aspera				16.783			B		P
20	Reinhardtius hippoglossoides				15.422			B		P
21	Pleuronectes quadrituberculatus				16.556			B		P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	119	60	073	75	08	28		58°	59.7'	169°	09.4'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	28		58°	59.1'	169°	05.9'		10	3.70	59.0 – 58.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:
Chionoecetes opilio – 22 males & 10 females.
C. (hybrid) – 2 males

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)	Code (78)	Last (79)	Card (80)
1	Tochuina tetraquetra			2	.907		A		P
2	Holocynthia Roboja			42000	374.900				P
3	Leptasterias sp.			6	.144				P
4	Hyas coarctatus alutaceus			10	.290				P
5	Polynoidae			5	.020				P
6	Pagurus capillatus			16	.120				P
7	P. trigonocheirus			20	.600				P
8	Notostomobdella sp.			1	.001				P
9	Neptunea heros			56	9.968				P
10	Argis dentata			10	.080				P
11	Crangon dalli			2	.004				P
12	Melita dentata			1	.001				P
13	Eunephthya rubiformis				1.814				P
14	Actiniidae			1	.013				P
15	Gorgonocephalus caryi			3	.907				P
16	Asterias amurensis			468	53.071				P
17	Chionoecetes opilio			32	2.041				P
18	C. (hybrid)			2	.096		A		P
19	Limanda aspera				69.174		B		P
20	Myoxocephalus polyacanthocephalus				18.144		B		P
21	Reinhardtius hippoglossoides				6.804		B		P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	M18	61	072	75	08	22		59°	00.2′	168°	34.0′

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp	Card
75	08	23		58°	59.9′	168°	29.9′		10	3.14	47.0 – 49.0	100	H

Comments:
Juvenile Pollock

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)	Code	Last	Card
1	Pagurus ochotensis			125	1.450		A		P
2	P. capillatus			52	.060				P
3	Hyas coarctatus alutaceus			5	.145				P
4	Asterias amurensis			308	34.927				P
5	Hirudinae			2	.001				P
6	Halocynthia igaboja			20	.907				P
7	Neptunea ventricosa			56	6.350				P
8	Argis dentata			20	.160				P
9	Crangon dalli			10	.020				P
10	Gorgonocephalus caryi			1	.453				P
11	Erimacrus isenbeckii			2	1.360				P
12	Leptasterias sp.			1	.024		A		P
13									P
14	Pleuronectes quadrituberculatus				49.896		B		P
15	Myoxocephalus polyacanthocephalus				18.144				P
16	Lepidopsetta bilineata				11.340				P
17	Theragra chalcogramma				18.144				P
18	Limanda aspera				179.625		B		P
19									P
20									P
21									P

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Mo	Day	Start Time	Start Lat Deg	Min	Start Long Deg	Min
FN817	M61	62	073	75	08	28		59°	00.1	167°	54.3

Date Finish Year	Mo	Day	Finish Time	Finish Lat Deg	Min	Finish Long Deg	Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	28		59°	02.2	167°	51.0		10	3.33	44.0	44.0	100		H

Comments:
Juvenile Pollock

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Serripes groenlandicus			3	.453			A		P
2	Asterias amurensis			368	41.731					P
3	Spisula polynyma			1	.084					P
4	Hyas lyratus			4	.453					P
5	Pagurus capillatus			10	.120					P
6	P. ochotensis			10	.580					P
7	Labidochirus splendescens			20	.360					P
8	Argis dentata			15	.120					P
9	Crangon dalli			15	.030					P
10	Neptunea heros			1	.178					P
11	Gorgonocephalus caryi			1	.453			A		P
12										P
13	Eleginus gracilis				43.092			B		P
14	Agonus acipenserinus				9.752					P
15	Pleuronectes quadrituberculatus				51.483					P
16	Cottidae				19.278					P
17	~~Lepidopsetta bilineata~~				12.937					P
18	Limanda aspera				130.183			B		P
19										P
20										P
21										P

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	M02	63	OTB	75	08	29		59°	00.3'	167°	14.1'

Columns: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	29		58°	59.4'	167°	13.7'		10	3.14	42.0 42.0	100		H

Columns: 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–27)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Serripes groenlandicus			1	.070			A		P
2	Neptunea borealis			2	.040					P
3	Eunephthya rubiformis				.090					P
4	Asterias amurensis			2	2.00					P
5	Labidochirus splendescens			8	.144					P
6	Argis dentata			5	.040					P
7	Crangon dalli			4	.008					P
8	Pagurus capillatus			2	.024			A		P
9										P
10	Pleuronectes quadrituberculatus				13.608			B		P
11	Limanda aspera				25.537			B		P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	L21	64	072	75	02	29		58°	40.3	167°	42.3

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	29		58°	40.8	167°	51.5		10	3.70	47.3 49.1	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)	Code	Last	Card
1	Hyas coarctatus alutaceus			6	1.360		A		P
2	Erimacrus isenbeckii			1	.907				P
3	Spisula polynyma			1	.084				P
4	Pagurus capillatus			50	.600				P
5	P. trigonocheirus			10	.300				P
6	P. ochotensis			10	.580				P
7	Labidochirus splendescens			20	.360				P
8	Asterias amurensis			314	35.607				P
9	Leptasterias sp.			8	.192				P
10	Argis dentata			1	.008				P
11	Halocynthia igaboja			100	4.536				P
12	Neptunea heros			80	9.525				P
13	Buccinum scalariforme			1	.033		A		P
14									P
15	Pleuronectes quadrituberculatus				50.349		B		P
16	Limanda aspera				84.823				P
17	Lepidopsetta bilineata				11.340				P
18	Eleginus gracilis				11.340				P
19	Hippoglossus stenolepis				27.216				P
20	Myoxocephalus polyacanthocephalus				39.916		B		P
21									P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	L18	65	OT2	75	09	29		58°	40.0'	167°	24.5'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	02	29		58°	40.5'	167°	27.0'		10	2.16	55.0 55.0	100		H

Comments:
Chionoecetes opilio – 91 males and 10 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Pagurus trigonocheirus			20	.600			A		P
2	Hyas coarctatus alutaceus			10	.290					P
3	Pagurus capillatus			20	.240					P
4	Lopidochirus splendescens			20	.360					P
5	Gorgonocephalus caryi			1	.390					P
6	Asterias amurensis			240	27.216					P
7	Leptasterias sp.			6	2.268					P
8	Neptunea borealis			26	.520					P
9	N. heros			26	4.628					P
10	Tochuina tetraquetra			30	4.989					P
11	Halocynthia igaboja			3000	131.997					P
12	Argis dentata			5	.040					P
13	Buccinum angulosum			2	.042					P
14	Hirudinae			1	.001					P
15	Synidotea bicuspida			2	.001					P
16	Tachyrhynchus erosum			5	.005					P
17	Chionoecetes opilio			101	6.123					P
18	C. (hybrid)			2	.226					P
19	Scyphozoa			2	4.536			A		P
20										P
21	Pleuronectes quadrituberculatus				33.339			B		P

(Record additional comments on reverse side)

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(Continued)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	418	65									

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
														H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Cottidae				7.711					P
2	Myoxocephalus polyacanthocephalus				31.298					P
3	Lepidopsetta bilineata				14.968					P
4	Limanda aspera				52.164					P
5										P
6										P
7										P
8										P
9										P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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Comments: Plastic found here.
Chionoecetes opilio - 473 males & 755 females
C. (hybrid) - 13 males & 12 females

Collector:

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	L19	66	0T3	75	08	29		58°	39.9'	169°	05.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	29		58°	40.2'	169°	07.1'		10	2.22	66.0 66.0	100		H

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Eramocrus isenbeckii			1	.321			A		P
2	Hyas coarctatus alutaceus			20	.580					P
3	Pagurus capillatus			60	.726					P
4	P. trigonocheirus			60	1.800					P
5	Tochuina tetraquetra			3	.282					P
6	Halocynthia igaboja			870	39.463					P
7	Neptunea heros			152	17.236					P
8	Leptasterias sp.			8	.453					P
9	Ectoprocta				.022					P
10	Asterias amurensis			328	148.780					P
11	Scyphozoa				11.340					P
12	Chionoecetes opilio			1228	44.452					P
13	C. (hybrid)			25	2.041			A		P
14										P
15	Pleuronectes quadrituberculatus				27.216			B		P
16	Myoxocephalus polyacanthocephalus				24.948			B		P
17	Mallotus villosus				17.236			B		P
18	Limanda aspera				24.267			B		P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	L24	67	973	75	08	29		58°	40.3'	169°	42.5'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	29		58°	44.7'	169°	44.8'		10	2.77	71.0 71.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:
Chionoecetes opilio - 607 males & 1025 females
C. (hybrid) - 19 males

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Halocynthia aurantium			48	11.113			A		P
2	Pagurus trigonocheirus			10	.300					P
3	Tochuina tetraquetra			1	.094					P
4	Asterias amurensis			90	10.206					P
5	Leptasterias sp.			1	.024					P
6	Neptunea heros			70	15.876					P
7	Erimacrus isenbeckii			1	.453					P
8	Gorgonocephalus caryi			8	1.814					P
9	Chionoecetes opilio			1632	54.432					P
10	C. (hybrid)			19	2.041			A		P
11										P
12	Reinhardtius hippoglossoides				38.556			B		P
13	Pleuronectes quadrituberculatus				18.597			B		P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	K20	68	OTB	75	08	29		58°	20.1	169°	40.6

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	29		58°	20.5	169°	37.0		10	3.33	73.0	73.0	100		H

Comments:
Chionoecetes opilio - 280 males & 455 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Asterias amurensis			24	9.525			A		P
2	Halocynthia igoboja			200	76.204					P
3	Actiniidae			2	.090					P
4	Pagurus trigonocheirus			20	.600					P
5	Tritoniidae			2	.264					P
6	Neptunea heros			112	12.700					P
7	Clinocardium ciliatum			1	.027					P
8	Yoldia hyperborea			1	.004					P
9	Polychaeta			2	.002					P
10	Scyphozoa				6.804					P
11	Gorgonocephalus caryi			36	8.164					P
12	Chionoecetes opilio			735	34.020					P
13	Henricia sp.			1	.016			A		P
14										P
15	Pleuronectes quadrituberculatus				9.298			B		P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	X19	69	07	75	08	30		58°	19.5'	169°	05.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp		Card
75	08	30		58°	20.2'	169°	02.1'		10	3.14	71.0	71.0	100		H

Comments:
Chionoecetes opilio – 275 males & 516 females
C. (hybrid) - 6 males

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Musculus discors			2	.012			A		P
2	Halocynthia aurantium			100	18.144					P
3	Pagurus trigonocheirus			50	1.500					P
4	Tochuina tetraquetra			1	.094					P
5	Pandalus goniurus			6	.048					P
6	Eualus macilenta			2	.004					P
7	Neptunea heros			6	.120					P
8	N. borealis			6	1.068					P
9	Tritoniidae			5	1.360					P
10	Asterias amurensis			20	18.144					P
11	Erimacrus isenbeckii			1	.453					P
12	Gorgonocephalus caryi			6	1.360					P
13	Leptasterias polaris acervata			2	.408					P
14	Scyphozoa			3	4.536					P
15	Chionoecetes opilio			791	33.566					P
16	C. (hybrid)			6	.907					P
17	Balanus balanus			1	.003			A		P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	818	70	0TB	75	08	30		58°	19.9'	168°	27.2'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	30		58°	20.7'	168°	24.5'		10	3.14	71.0 730	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:
Chionoecetes opilio - 291 males - 421 Females
C. (hybrid) - 3 males

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Tritoniidae			2	.246			A		P
2	Leptasterias sp.			2	.048					P
3	Synidotea bicuspida			1	.001					P
4	Hyas coarctatus alutaceus			1	.029					P
5	Pagurus trigonocheirus			100	3.000					P
6	Neptunea borealis			34	7.711					P
7	Pandalus goniurus			5	.040					P
8	Halocynthia igaboja			30	4.536					P
9	Asterias amurensis			148	16.783					P
10	Gorgonocephalus caryi			12	5.443					P
11	Scyphozoa			3	2.268					P
12	Erimacrus isenbeckii			2	.907					P
13	Chionoecetes opilio			712	28.123					P
14	C. (hybrid)			3	.226			A		P
15										P
16	Limanda aspera				8.391			B		P
17	Pleuronectes quadrituberculatus				12.700			B		P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	K01	71	0T3	75	09	20		58°	19.5'	167°	50.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	09	20		58°	20.7'	167°	47.0'		10	3.70	66.0 67.3	100		H

Comments: Chionoecetes opilio- 105 males & 62 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Melita dentata			2	.001			A		P
2	Labidochirus splendescens			1	.018					P
3	Neptunea heros			25	4.536					P
4	Pagurus capillatus			60	.720					P
5	P. trigonocheirus			50	.300					P
6	Pandalus goniurus			1	.002					P
7	Halocynthia igaboja			200	22.680					P
8	Macoma calcarea			1	.010					P
9	Chionoecetes opilio			167	7.484					P
10	Erimacrus isenbeckii			1	1.134					P
11	Asterias amurensis			94	10.659					P
12	Gymnocephalus caryi			2	.453					P
13	Scyphozoa			5	4.536			A		P
14										P
15	Limanda aspera				15.422			B		P
16	Myoxocephalus Polyacanthocephalus				7.711			B		P
17	Pleuronectes quadrituberculatus				7.484			B		P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FH817	J61	72	OT8	75	08	30		52°	01.4'	167°	43.0'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	30		52°	00.2'	167°	43.8'		10	2.59	69.2 71.0	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

chionoecetes opilio – 171 males & 195 Females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Hyas coarctatus alutaceus			15	1.360			A		P
2	Melita dentata			2	.001					P
3	Polynoidae			2	.008					P
4	Pagurus trigonocheirus			60	1.800					P
5	Neptunea heros			22	2.494					P
6	Halocynthia igaboja			120	5.443					P
7	Chionoecetes opilio			366	16.556					P
8	Asterias amurensis			26	2.721					P
9	Gorgonocephalus caryi			2	.453					P
10	Scyphozoa			10	4.536			A		P
11										P
12	Limanda aspera				17.016			B		P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	519	73	OTB	75	08	30		57°	59.7'	168°	57.8'

(1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37)

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	30		58°	00.2'	169°	01.2'		10	3.33	73.0 75.0	100		H

(38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80)

Comments:
Chionoecetes opilio - 94 males and 127 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)	Code (78)	Last (79)	Card (80)
1	Pagurus trigonocheirus			20	.600		A		P
2	Halocynthia aurantium			50	19.504				P
3	Actiniidae			1	.045				P
4	Leptasterias sp.			1	.024				P
5	Clinocardium ciliatum			1	.027				P
6	Polychaeta			5	.010				P
7	Neptunea heros			38	3.628				P
8	Scyphozoa			10	13.608				P
9	Gorgonocephalus caryi			22	4.989				P
10	Asterias amurensis			4	.453				P
11	Erimacrus isenbeckii			1	.907				P
12	Chionoecetes opilio			221	17.010				P
13	C. bairdi			1	.090				P
14	C. (hybrid)			2	.136		A		P
15									P
16									P
17									P
18									P
19									P
20									P
21									P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	J18	74	078	75	08	31		58°	30.0'	168°	23.2'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	08	31		57°	59.9'	168°	20.0'		10	3.33	73.5 75.0	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:
Chionoecetes opilio - 367 males & 417 females
C. (hybrid) - 55 males & 18 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code	Last	Card (78 79 80)
1	Buccinum solenum			1	.012			A		P
2	Neptunea borealis			46	5.216					P
3	Tochuina tetraquetra			1	.094					P
4	Pagurus trigonocheirus			200	6.000					P
5	Leptasterias sp.			2	.048					P
6	Halocynthia igaboja			60	9.072					P
7	Musculus discors			100	.450					P
8	Hiatella arctica			20	.020					P
9	Melita dentata			5	.005					P
10	Eualus macilenta			2	.004					P
11	Pandalus goniurus			2	.016					P
12	Eunephthya rubiformis				.907					P
13	Asterias amurensis			20	2.041					P
14	Porifera				.226					P
15	Gorgonocephalus caryi			4	1.134					P
16	Scyphozoa				2.268					P
17	Chionoecetes opilio			784	36.288					P
18	C (hybrid)			73	5.216					P
19	Hyas coarctatus alutaceus			2	.058					P
20										P
21										P

(Record additional comments on reverse side)

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IMSUAWBK

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	I18	75	073	75	02	21		57°	40.7'	168°	22.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	03	31		57°	40.5'	168°	19.0'		10	3.14	73.0 75.0	100		H

Comments:
Chionoecetes opilio - 372 males & 220 females
C. (hybrid) - 20 males & 8 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Polynoidae			3	.012			A		P
2	Actiniidae			130	52.617					P
3	Hiatella arctica			40	.453					P
4	Musculus discors			100	1.360					P
5	Hyas coarctatus alutaceus			10	.453					P
6	Pagurus trigonocheirus			20	.600					P
7	Leptasterias sp.			2	.048					P
8	Buccinum angulosum			3	.136					P
9	Melita dentata			20	.020					P
10	Argis dentata			1	.004					P
11	Polychaeta			600	.907					P
12	Neptunea borealis			208	23.587					P
13	Erimacrus isenbeckii			2	1.814					P
14	Halocynthia igaboja			500	240.634					P
15	Leptasterias polaris acervata			2	1.814					P
16	Gorgonocephalus caryi			4	1.314					P
17	Paralithodes camtschatica			1	.181					P
18	Asterias amurensis			88	9.752					P
19	Chionoecetes bairdi			4	.680					P
20	C. opilio			592	85.276					P
21	C. (hybrid)			28	2.721			A		P

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IMSUAWBK

(Continued)

(Record additional comments on reverse side)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	I18	75									

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp	Card
													H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)	Code	Last	Card
1									P
2	Colus dautzenbergi			1	.007		A		P
3									P
4	Limanda aspera				92.307		B		P
5	Lepidopsetta bilineata				21.772		B		P
6	Myoxocephalus Polyacanthocephalus				28.576		B		P
7	Pleuronectes quadrituberculatus				17.463		B		P
8									P
9									P
10									P
11									P
12									P
13									P
14									P
15									P
16									P
17									P
18									P
19									P
20									P
21									P

(Record additional comments on reverse side)

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IMSUAWBK

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	I01	76	OTB	75	08	31		57°	40.7'	167°	45.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp	Card
75	08	31		57°	40.9'	167°	42.0'		10	3.50	73.5 73.0	100	H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Ectoprocta				.010			A		P
2	Leptasterias polaris acervata			25	6.204					P
3	Leptasterias sp.			20	1.134					P
4	Neptunea ventricosa			25	2.948					P
5	Buccinum scalariforme			2	.066					P
6	Actiniidae			55	11.793					P
7	Musculus discors			12	.072					P
8	Polychaeta			8	.022					P
9	Porifera				.907					P
10	Halocynthia aurantium			100	40.824					P
11	Henricia sp.			1	.003					P
12	Synidotea bicuspida			1	.001					P
13	Polynoidae			1	.004					P
14	Pagurus trigonocheirus			3	.090					P
15	Pandalus goniurus			2	.016					P
16	Hyas coarctatus alutaceus			2	.058					P
17	Gorgonocephalus caryi			2	.453					P
18	Asterias amurensis			130	13.608					P
19	Tochuina tetraquetra			8	1.814					P
20	Octopus sp.			1	.090					P
21	Chionoecetes bairdi			5	.226			A		P

(Record additional comments on reverse side)

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IMSUAW8K

(continued)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	JØ1	76						°	'	°	'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
				°	'	°	'							H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:
Chionoecetes opilio - 680 males & 290 females
C. (hybrid) 25 males & 10 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Chionoecetes opilio			970	97.070			A		P
2	C. (hybrid)			35	4.536			A		P
3	Polinices pallida			1	.012			A		P
4	Soloriella voricosa			1	.001			A		P
5										P
6	Pleuronectes quadrituberculatus				44.906			B		P
7	Myoxocephalus polyacanthocephalus				21.772			B		P
8	Lepidopsetta bilineata				31.525			B		P
9	Limanda aspera				183.481			B		P
10										P
11										P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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IMSUAWBK

167 170

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	H01	77	0TB	75	08	31		57°	19.6'	167°	40.9'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)		% Samp	Card
75	08	31		57°	20.2'	167°	37.2'		10	3.70	76.4	76.4	100	H

Comments:
Chionoecetes opilio - 168 males & 291 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)	Code	Last	Card
1	Pteraster obscura			1	.063		A		P
2	Leptasterias polaris acervata			20	5.443				P
3	Pagurus capillatus			1	.012				P
4	Neptunea borealis			88	9.979				P
5	N. ventricosa			24	2.721				P
6	Halocynthia igoboja			40	18.144				P
7	Actiniidae			10	3.628				P
8	Polynoidae			1	.004				P
9	Leptasterias sp.			3	.072				P
10	Ectoprocta				.090				P
11	Melita dentata			1	.001				P
12	Hiatella arctica			2	.001				P
13	Polychaeta			1	.072				P
14	Crepidula grandis			3	.012				P
15	Asterias amurensis			20	2.260				P
16	Pagurus trigonocheirus			200	6.000				P
17	Gorgonocephalus caryi			18	4.082				P
18	Paralithodes platypus			2	5.443				P
19	Chionoecetes opilio			459	29.710				P
20	C. (hybrid)			12	.181				P
21	Lethasterias nanimensis			10	2.260		A		P

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IMSUAWBK

(Continued)

(Record additional comments on reverse side)

BENTHIC TRAWL DATA (Continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	HØ1	77									

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp	Card
													H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)	Code	Last	Card
1	Erimacrus isenbeckii			5	4.536		A		P
2									P
3	Lepidopsella bilineata				43.999		B		P
4	Limanda aspera				100.472		B		P
5	Pleuronectes quadrituberculatus				20.412		B		P
6									P
7									P
8									P
9									P
10									P
11									P
12									P
13									P
14									P
15									P
16									P
17									P
18									P
19									P
20									P
21									P

(Record additional comments on reverse side)

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IMSUAWBK

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	D07	78	0TB	75	09	01		56°	00.1'	164°	00.8'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	09	01		55°	59.7'	163°	58.0'		10	2.96	930 950	100		H

Comments:
Chionoecetes opilio - 34 males & 71 females
C. bairdi - 82 males & 18 females
C. (hybrid) - 3 males & 1 female

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Leptasterias polaris acervata			2	.907			A		P
2	Pagurus aleuticus			160	17.760					P
3	P. capillatus			60	.720					P
4	Polynoidae			6	.024					P
5	Fusitriton oregonensis			4	.056					P
6	Neptunea lyrata			12	1.360					P
7	N. pribiloffensis			8	.907					P
8	Plicifusus kroyeri			1	.045					P
9	Macoma calcarea			2	.020					P
10	Paralithodes camtschatica			5	14.061					P
11	Scyphozoa				11.340					P
12	Chionoecetes bairdi			100	23.042					P
13	C. opilio			105	67.541					P
14	C. (hybrid)			3	1.134			A		P
15										P
16	Lycodes palearis				15.422			B		P
17	Lepidopsetta bilineata				29.937			B		P
18	Limanda aspera				80.740			B		P
19	Theragra chalcogramma				617.576			B		P
20										P
21										P

(Record additional comments on reverse side)

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IMSUAWBK

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	CØ6	29	0TB	75	09	01		55°	21.3'	165°	07.5'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	09	01		55°	20.3'	165°	10.9'		10	2.59	115.0 115.0	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:

Chionoecetes opilio - 11 males & 2 females.
C. bairdi - 37 males & 5 females.

Paralithodes camtschatica - 32 males and 676 females.

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Hyas lyratus			2	.045			A		P
2	Neptunea lyrata			16	7.257					P
3	Pagurus aleuticus			50	5.550					P
4	Fusitriton oregonensis			30	2.268					P
5	Macoma calcarea			4	.040					P
6	Paralithodes camtschatica			708	907.200					P
7	Chionoecetes opilio			13	8.255					P
8	C. bairdi			42	28.123					P
9	C. (hybrid)			2	.453			A		P
10										P
11	Limanda aspera				22.680			B		P
12	Lepidopsetta bilineata				79.380					P
13	Atheresthes stomias				22.680					P
14	Hippoglossoides elassodon				20.412					P
15	Mallotus villosus				9.072					P
16	Clupea harengus pallasi				27.216					P
17	Theragra chalcogramma				181.440			B		P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	8⌀5	80	079	75	09	01		55°	40.5′	164°	34.-
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	09	01		55°	39.0′	164°	36.2′		10	3.50	98.0 – 99.2	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments: Plastic found here.

Chionoecetes bairdi - 23 males & 1 female.
Paralithodes camtschatica - 11 males &
12 females.

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Polynoidae			1	.004			A		P
2	Pagurus aleuticus			12	1.332					P
3	Fusitriton oregonensis			1	.014					P
4	Volutopsius melonis			1	.197					P
5	Pandalus goniurus			4	.032					P
6	Pagurus confragosus			2	.064					P
7	Paralithodes camtschatica			23	33.885					P
8	Scyphozoa			10	.181					P
9	Chionoecetes opilio			1	.453					P
10	C. bairdi			24	17.554					P
11	Pandalus borealis			4	.032			A		P
12										P
13	Lycodes brevipes				61.236			B		P
14	Hippoglossoides elassodo[n]				22.680			B		P
15	Theragra chalcogramma				127.008			B		P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

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IMSUAWBK

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
F1217	A24	81	073	75	09	01		59°	09.0'	165°	44.0'

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished Km	Depth Fished (M)	% Samp		Card
75	09	01		52°	09.0'	165°	46.6'		10	3.14	133.0 / 135.0	100		H

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Comments:
Paralithodes camtschatica – 40 males & 3 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Neptunea pribiloffensis			1	.136			A		P
2	Pagurus aleuticus			1	.111					P
3	Notostomobdella sp.			3	.003					P
4	Pandalus borealis			7	.049					P
5	Paralithodes camtschatica			43	82.555					P
6	Chionoecetes opilio			1	.807					P
7	C. bairdi			36	24.131					P
8	C. (hybrid)			2	2.041					P
9	Actiniidae			1	.707			A		P
10										P
11	Theragra chalcogramma				294.159			B		P
12	Gadus macrocephalus				7.257					P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	CHA	83	0TB	75	09	01		55°	30.9'	166°	03.9'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	09	01		55°	29.7'	166°	06.5'		10	3.14	126.0 127.4	100		H

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Actiniidae			60	2.268			A		P
2	Pagurus aleuticus			2	1.814					P
3	Leucosyrinx circinata			3	.018					P
4	Trophonopsis dalli			3	.033					P
5	Pandalus borealis			5	.035					P
6	Beringius beringi			1	.024					P
7	Neptunea pribiloffensis			20	2.268					P
8	Yoldia seminuda			1	.002					P
9	Paralithodes camtschatica			4	7.938					P
10	Chionoecetes bairdi			79	28.123					P
11	C. opilio			3	2.041					P
12	C. (hybrid)			1	.907					P
13	Stylatula gracile			1	.136			A		P
14										P
15	Cottidae				9.072			B		P
16	Lycodes brevipes				173.048					P
17	Atheresthes stomias				7.711					P
18	Hippoglossoides elassodon				40.370					P
19	Gadus macrocephalus				92.534					P
20	Theragra chalcogramma				248.572			B		P
21										P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN317	8?3	?3	073	75	09	02		55°	20.4	166°	17.?

(1–37)

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	Q L	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	09	02		19°	00.0	166°	19.9		10	3.70	131.-7/133	100		H

(38–80)

Comments:
Chionoecetes bairdi - 19 males & 19 females
C. opilio - 8 males
C (hybrid) 1 male & 3 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Actiniidae			50	1.360			A		P
2	Scyphozoa			20	.453					P
3	Pagurus aleuticus			2	.222					P
4	Neptunea pribiloffensis			2	.178					P
5	Pandalus borealis			100	.800					P
6	Chionoecetes bairdi			38	8.164					P
7	C. opilio			8	1.814					P
8	C. (hybrid)			4	.907			A		P
9										P
10	Hippoglossoides elassodon				41.731			B		P
11	Reinhardtius hippoglossoides				11.793					P
12	Lycodes brevipes				73.710					P
13	Gadus macrocephalus				21.319					P
14	Theragra chalcogramma				213.418			B		P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

(Record additional comments on reverse side)

175

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IMSUAWBK

BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	A2A	84	0T3	75	09	02		55°	09.2'	166°	39.0'
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	09	02		55°	09.5'	166°	41.5'		10	2.96	146. – 146.	100		H
38 39	40 41	42 43	44 45 46 47	48 49	50 51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:
Chionoecetes bairdi – 33 males & 88 females
C. opilio – 1 males & 2 females
C. (hybrid) – 5 males & 17 females

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–28)	Count	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Pandalus borealis			3	.024			A		P
2	Neptunea pribiloffensis			3	.317					P
3	Pagurus confragosus			1	.032					P
4	Actiniidae			100	4.536					P
5	Chionoecetes bairdi			121	49.896					P
6	C. opilio			3	.453					P
7	C. (hybrid)			22	3.175			A		P
8										P
9	Lycodes breveges				31.752			B		P
10	Hippoglossoides elassodon				36.741			B		P
11	Theragra chalcogramma				714.193			B		P
12										P
13										P
14										P
15										P
16										P
17										P
18										P
19										P
20										P
21										P

14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 78 79 80

(Record additional comments on reverse side)

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IMSUAWBK

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN817	Z1A	25	0T3	75	09	02		54°	49.0'	169°	06.0'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp	Card
75	09	02		54°	47.9'	167°	03.2'		10	3.50	333.1 357.0	100	H

Comments:
Chionoecetes bairdi - 1 male & 1 female.
C. (hybrid) - 1 male & 3 females.

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)	Code (78)	Last (79)	Card (80)
1	Actiniidae				4.929		A		P
2	Dipsacaster borealis			6	.318				P
3	Ceramaster patagonicus			2	.142				P
4	Pandalus borealis			100	.800				P
5	Fusitriton oregonensis			3	.042				P
6	Aphrodita japonica			10	.100				P
7	Brisaster townsendi			1	.004				P
8	Buccinum plectrum			1	.020				P
9	Pagurus cornatus			6	.102				P
10	Solaster borealis			1	.107				P
11	Volutopsius melonis			3	.483				P
12	Beringius frielei			1	.110				P
13	Neptunea pribiloffensis			3	.657				P
14	Ophiura sarsi			1	.001				P
15	Octopus sp.			2	.453				P
16	Holothuroidea			40	18.144				P
17	Gonatiidae			4	1.644				P
18	Henricia aspera			1	.008				P
19	Chionoecetes bairdi			2	.226				P
20	C. (hybrid)			4	.453				P
21	Polychaeta			3	.006		A		P

(Record additional comments on reverse side)

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(Continued)

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BENTHIC TRAWL DATA (continued)

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time:	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
	Z1A	25						°	. '	°	. '
1 2 3 4 5	6 7 8 9	10 11 12 13	14 15 16	17 18	19 20	21 22	23 24 25 26	27 28	29 30 31	32 33 34	35 36 37

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
				°	. '	°	. '			.	. + .			H
38 39	40 41	42 43	44 45 46 47	48 49 50	51 52	53 54 55	56 57 58	59	60 61	62 63 64 65	66 67 68 69 70 71 72 73	74 75 76	77 78 79	80

Comments:

Collector:

	TAXON	COMMON NAME	SPECIES CODE (14–23)	Count (24–28)	Wet "Weight" (Kg.) (29–34)	Wet "Weight" (lbs) (35–39)		Code (78)	Last (79)	Card (80)
1	Theragra chalcogramma				30.341			B		P
2	Sebastes alutus				22.670			B		P
3	Atheresthes stomias				28.350			B		P
4	Reinhardtius hippoglossoides				46.720			B		P
5					.	.				P
6					.	.				P
7					.	.				P
8					.	.				P
9					.	.				P
10					.	.				P
11					.	.				P
12					.	.				P
13					.	.				P
14					.	.				P
15					.	.				P
16					.	.				P
17					.	.				P
18					.	.				P
19					.	.				P
20					.	.				P
21					.	.				P

(Record additional comments on reverse side)

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BENTHIC TRAWL DATA

Cruise Number	Station Number	Tow Number	Gear Code	Date Start Year	Date Start Mo	Date Start Day	Start Time	Start Lat Deg	Start Lat Min	Start Long Deg	Start Long Min
FN217	A22	86	073	75	09	03		54°	59.7'	166°	52.2'

Date Finish Year	Date Finish Mo	Date Finish Day	Finish Time	Finish Lat Deg	Finish Lat Min	Finish Long Deg	Finish Long Min	QL	Time Zone	Distance Fished (Km)	Depth Fished (M)	% Samp		Card
75	09	03		54°	52.4'	166°	50.0'		10	2.77	157.0 - 162.0	100		H

Comments:
Chionoecetes bairdi - 5 males & 2 females
C. (hybrid) - 1 male & 11 females

Theragra chalcogramma weight - 3878.280 Kg

Collector:

	TAXON	COMMON NAME	SPECIES CODE	Count	Wet "Weight" (Kg.)	Wet "Weight" (lbs)		Code	Last	Card
1	Fusitriton oregonensis			6	.252					P
2	Actiniidae			22	6.804					P
3	Dipsacaster borealis			12	.264					P
4	Ceramaster patagonicus			3	.120					P
5	Solaster endeca			8	.276					P
6	Rocinela angustata			3	.003					P
7	Pandalus borealis			3	.024					P
8	Octopus sp.			1	19.051					P
9	Chionoecetes bairdi			7	.907					P
10	C. opilio			1	.090					P
11	C. (hybrid)			12	1.814					P
12	Gonatidae			2	1.814					P
13										P
14	Hippoglossoides elassodon				7.711					P
15	Atheresthes stomias				6.804					P
16	Reinhardtius hippoglossoides				6.804					P
17	Gadus macrocephalus				38.556					P
18	Theragra chalcogramma									P
19										P
20										P
21										P

(Record additional comments on reverse side)

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APPENDIX TABLE 1.

Selected series of grab stations taken in the Bering Sea in June 1975 on the R/V *Discoverer* cruise 808.

(THIS IS A PRELIMINARY PRINTOUT ONLY, AND IS INCLUDED AS A SAMPLE FOR THIS REPORT. THE ERRORS WILL BE CORRECTED FOR THE FINAL REPORT).

CRUISE 808 STATION 005 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO. WWGT	BIT CRITERIA
40C0C00000	NEMERTEANS RHYNCHOCOELA	06/08/75	0001	1	0.72	0.522	0.37	0.446E-17	X X X
40C0C00000	NEMERTEANS RHYNCHOCOELA	06/08/75	0002	1	0.72	C.156	C.11	0.133E-17	X X X
40C0C00000	NEMERTEANS RHYNCHOCOELA	06/08/75	0001	1	0.72	0.060	0.04	0.512E-18	X X X
		SUBTOTAL		3	2.17	0.738	0.52	0.630E-17	
4801000000	POLYCHAETA	06/08/75	0001	1	0.72	0.049	0.03	0.418E-18	X X X
48C1C00000	POLYCHAETA	06/08/75	0001	1	0.72	0.019	0.01	0.162E-18	X X X
48C1000000	POLYCHAETA	06/08/75	0002	1	0.72	0.050	0.03	0.427E-18	X X X
48C1000000	POLYCHAETA	06/08/75	0002	1	0.72	C.C19	0.01	0.162E-18	X X X
		SUBTOTAL		4	2.90	0.137	0.10	0.117E-17	
4801240103	POLYCHAETA NEPHTYIDAE NEPHTYS COECA	06/08/75	0002	4	2.90	5.816	4.07	0.497E-16	X X X
4801240109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA	06/08/75	0001	2	1.45	2.539	1.78	0.217E-16	X
4801240111	POLYCHAETA NEPHTYIDAE NEPHTYS FERRUGINEA	06/08/75	0001	1	0.72	0.002	0.00	0.171E-19	
48C1421001	POLYCHAETA NERINIDES SPIOPHANES BOMBYX	06/08/75	0001	13	9.42	0.045	0.03	0.384E-18	X X
4801421001	POLYCHAETA NERINIDES SPIOPHANES BOMBYX	06/08/75	0002	6	4.35	0.022	0.02	0.188E-18	X X
		SUBTOTAL		19	13.77	C.C67	0.05	0.572E-18	
4801560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/08/75	0002	4	2.90	0.092	0.06	0.786E-18	X
48C1560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/08/75	0001	7	5.07	C.034	0.02	0.290E-18	X
		SUBTOTAL		11	7.97	0.126	0.09	0.108E-17	
4801560401	**	06/08/75	0001	1	0.72	0.092	0.06	0.786E-18	
48C1560402	POLYCHAETA SCALIBREGMIDAE TRAUESIA FORBESII	06/08/75	0002	8	5.80	0.386	0.27	0.330E-17	X X X X
4801620201	POLYCHAETA OWENIIDAE MYRIOCHELE HEERI	06/08/75	0001	1	0.72	0.021	0.01	0.179E-18	X X X
4801620201	POLYCHAETA OWENIIDAE MYRIOCHELE HEERI	06/08/75	0002	1	0.72	0.002	0.00	0.171E-19	X X X
		SUBTOTAL		2	1.45	0.023	0.02	0.196E-18	
4801650201	POLYCHAETA AMPHARETIDAE AMPHARETE ARCTICA	06/08/75	0002	2	1.45	0.330	0.23	0.282E-17	
4904110100	ASTARTE SP.	06/08/75	0001	1	0.72	0.067	0.05	0.572E-18	
4904110100	ASTARTE SP.	06/08/75	0001	1	0.72	0.129	0.09	0.110E-17	
		SUBTOTAL		2	1.45	0.196	0.14	0.167E-17	
4904120102	MOLLUSCA PELECYPODA CYCLOCARDIA CREBRICOSTATA	06/08/75	0001	1	0.72	0.255	0.18	0.218E-17	X
49C4120102	MOLLUSCA PELECYPODA CYCLOCARDIA CREBRICOSTATA	06/08/75	0002	2	1.45	C.112	0.08	0.956E-18	X
		SUBTOTAL		3	2.17	0.367	0.26	0.313E-17	
49C4240201	MOLLUSCA PELECYPODA TELLINA LUTEA ALTERNIDEN	06/08/75	0002	12	8.70	114.013	79.78	0.973E-15	X X X X
4904240201	MOLLUSCA PELECYPODA TELLINA LUTEA ALTERNIDEN	06/08/75	0001	6	4.35	0.247	0.17	0.211E-17	X X X X
		SUBTOTAL		18	13.04	114.260	79.95	0.976E-15	
4905060301	MOLLUSCA GASTROPODA MARGARITES OLIVACEUS	06/08/75	0001	5	3.62	0.209	0.15	0.178E-17	X
4905060301	MOLLUSCA GASTROPODA MARGARITES OLIVACEUS	06/08/75	0001	6	4.35	0.082	0.06	0.700E-18	X
		SUBTOTAL		11	7.97	0.291	0.20	0.248E-17	

CRUISE 808 STATION 005 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

	TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA
	4905060402	MOLLUSCA GASTROPODA SOLARIELLA OBSCURA	06/08/75	0002	1	0.72	0.029	0.02		0.248E-18	X X
	4905490203	MOLLUSCA GASTROPODA CYLICHNA ALBA	06/08/75	0001	1	0.72	0.008	0.01		0.683E-19	X X X
	5331000000	CRUSTACEA AMPHIPODA	06/08/75	0002	1	0.72	0.005	0.00		0.427E-19	X X X
	5331211002	CRUSTALEA AMPHIPODA MELITA DENTATA	06/08/75	0001	1	0.72	0.003	0.00		0.256E-19	
	5331220501	CURSTACE AMPHIPDA HAUSTORIIDAE EDUS	06/08/75	0002	2	1.45	0.033	0.02		0.282E-18	X
	5331260000	CURSACEA AMPHIPODA ISAEIDA	06/08/75	0001	1	0.72	0.001	0.00		0.854E-20	X X
	5331370500	CRUSTACE AMPHIPODA BATHYMEDON SP.	06/08/75	0001	1	0.72	0.002	0.00		0.171E-19	
	5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/08/75	0001	13	9.42	0.058	0.04		0.495E-18	X X
	5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/08/75	0001	2	1.45	0.014	0.01		0.120E-18	X X
	5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/08/75	0002	13	9.42	0.051	0.04		0.435E-18	X X
			SUBTOTAL		28	20.29	0.123	0.09		0.105E-17	
	5331420800	CRUSTACEA AMPHIPODA PHOXOCEPHALUS SP.	06/08/75	0002	1	0.72	0.079	0.06		0.675E-18	
182	5331500500	CRUSTACEA AMPHIPODA SYNOPIIDAE TIRON	06/08/75	0001	1	0.72	0.005	0.00		0.427E-19	
	5331980000	CRUSTACEA AMPHIPODA CAPRELLIDAE	06/08/75	0002	1	0.72	0.001	0.00		0.854E-20	
	5332020000	CRUSTACEA EUPHAUSIACEA EUPHAUSIIDAE	06/08/75	0002	2	1.45	0.130	0.09		0.111E-17	
185	6802020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/08/75	0002	4	2.90	0.598	0.42		0.511E-17	X X X X
	6802020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/08/75	0001	2	1.45	16.520	11.56		0.141E-15	X X X X
			SUBTOTAL		6	4.35	17.118	11.98		0.146E-15	
			STATION TOTAL		138		142.907			0.122E-14	

SIMPSON INDEX 0.092986 SHANNON DIVERSITY INDEX 2.699628

CRUISE 808 STATION 007 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA
4000000000	NEMERTEANS RHYNCHOCOELA	06/08/75	0003	1	0.38	0.008	0.00	0.683E-19		X X X
4000000000	NEMERTEANS RHYNCHOCOELA	06/09/75	0003	1	0.38	0.042	0.02	0.359E-18		X X X
		SUBTOTAL		2	0.76	0.050	0.02	0.427E-18		
4400000000	NEMATODA	06/08/75	0004	1	0.38	0.008	0.00	0.683E-19		
4801000000	POLYCHAETA	06/08/75	0004	1	0.38	0.024	0.01	0.205E-18		X X X
4801000000	POLYCHAETA	06/09/75	0003	1	0.38	0.002	0.00	0.171E-19		X X X
		SUBTOTAL		2	0.76	0.026	0.01	0.222E-18		
4801050101	POLYCHAETA SIGALIONIDAE PHLOE MINUTA	06/09/75	0003	1	0.38	0.010	0.00	0.854E-19		X X X X X
4801120102	POLYCHAETA PHYLLODOCIDAE PHYLLODOCE GROENLANDICA	06/09/75	0003	1	0.38	0.014	0.01	0.120E-18		
4801120104	POLYCHAETA PHYLLODOCIDAE ARAITIDES MUCOSA	06/08/75	0006	1	0.38	0.093	0.04	0.794E-18		
4801120205	POLYCHAETA PHYLLODOCIDAE ETEONE LONGA	06/08/75	0004	1	0.38	0.004	0.00	0.342E-19		X
4801240103	POLYCHAETA NEPHTYIDAE NEPHTYS COECA	06/08/75	0003	1	0.38	1.457	0.66	0.124E-16		X X X
4801240109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA	06/09/75	0003	2	0.76	0.240	0.11	0.205E-17		X
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/09/75	0003	12	4.55	0.239	0.11	0.204E-17		X X
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/08/75	0004	2	0.76	0.041	0.02	0.350E-18		X X
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/08/75	0003	3	1.14	0.091	0.04	0.777E-18		X X
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/08/75	0002	4	1.52	0.069	0.03	0.589E-18		X X
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/08/75	0006	4	1.52	0.077	0.04	0.657E-18		X X
		SUBTOTAL		25	9.47	0.517	0.24	0.441E-17		
4801421003	POLYCHAETA SPIONIDAE SPIOPHANES CIRRATA	06/08/75	0002	1	0.38	0.001	0.00	0.854E-20		
4801490300	POLYCHAETA CIRRATULIDAE THARYX SP.	06/09/75	0003	1	0.38	0.005	0.00	0.427E-19		X X X
4801560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/09/75	0003	5	1.89	0.148	0.07	0.126E-17		X
4801560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/08/75	0007	1	0.38	0.	0.	0	0.	X
4801560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/08/75	0002	14	5.30	1.705	0.78	0.146E-16		X
4801560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/08/75	0004	1	0.38	0.111	0.05	0.948E-18		X
4801560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/08/75	0003	1	0.38	0.017	0.01	0.145E-18		X
4801560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/08/75	0006	1	0.38	0.016	0.01	0.137E-18		X
4801560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/08/75	0005	2	0.76	0.104	0.05	0.888E-18		X
		SUBTOTAL		25	9.47	2.101	0.96	0.179E-16		
4801560401	***	06/09/75	0003	13	4.92	1.907	0.87	0.163E-16		
4801560402	POLYCHAETA SCALIBREGMIDAE TRAUESIA FORBESII	06/08/75	0006	5	1.89	0.374	0.17	0.319E-17		X X X X
4801560402	POLYCHAETA SCALIBREGMIDAE TRAUESIA FORBESII	06/08/75	0004	1	0.38	0.075	0.03	0.640E-18		X X X X
4801560402	POLYCHAETA SCALIBREGMIDAE TRAUESIA FORBESII	06/08/75	0002	2	0.76	0.353	0.16	0.301E-17		X X X X
		SUBTOTAL		8	3.03	0.802	0.37	0.685E-17		

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CRUISE 808 STATION 007 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO. WWGT	BIT CRITERIA
4801650201	POLYCHAETA AMPHARETIDAE AMPHARETE ARCTICA	06/09/75	0003	2	0.76	0.013	0.01	0.111E-18	
4801660000	POLYCHAETA TEREBELLIDAE	06/09/75	0003	1	0.38	0.012	0.01	0.102E-18	
4801660802	POLYCHAETA TEREBELLIDAE POLYCIRRUS MEDUSA	06/08/75	0003	1	0.38	0.042	0.02	0.359E-18	
4801680800	POLYCHAETA SABELLIDAE SABELLA SP.	06/08/75	0005	1	0.38	0.001	0.00	0.854E-20	
4900000000	MOLLUSCA	06/08/75	0004	1	0.38	0.011	0.01	0.939E-19	
4904230101	MOLLUSCA PELECYPODA SPISULA POLYNUMA	06/09/75	0003	29	10.98	30.774	14.03	0.263E-15	X X X X
4904240117	MOLLUSCA PELECYPODA MACOMA BALTHICA	06/09/75	0003	1	0.38	0.036	0.02	0.307E-18	
4904240117	MOLLUSCA PELECYPODA MACOMA BALTHICA	06/08/75	0004	1	0.38	0.014	0.01	0.120E-18	
4904240117	MOLLUSCA PELECYPODA MACOMA BALTHICA	06/08/75	0005	1	0.38	0.035	0.02	0.299E-18	
		SUBTOTAL		3	1.14	0.085	0.04	0.726E-18	
4904240201	MOLLUSCA PELECYPODA TELLINA LUTEA ALTERNIDEN	06/09/75	0003	1	0.38	0.047	0.02	0.401E-18	X X X X
4904240201	MOLLUSCA PELECYPODA TELLINA LUTEA ALTERNIDEN	06/08/75	0006	1	0.38	11.194	5.10	0.956E-16	X X X X
4904240201	MOLLUSCA PELECYPODA TELLINA LUTEA ALTERNIDEN	06/08/75	0003	2	0.76	29.593	13.49	0.253E-15	X X X X
4904240201	MOLLUSCA PELECYPODA TELLINA LUTEA ALTERNIDEN	06/08/75	0002	1	0.38	2.516	1.15	0.215E-16	X X X X
		SUBTOTAL		5	1.89	43.350	19.76	0.370E-15	
4905060402	MOLLUSCA GASTROPODA SOLARIELLA OBSCURA	06/08/75	0003	1	0.38	0.098	0.04	0.837E-18	X X
4905060402	MOLLUSCA GASTROPODA SOLARIELLA OBSCURA	06/08/75	0006	1	0.38	0.055	0.03	0.470E-18	X X
4905060402	MOLLUSCA GASTROPODA SOLARIELLA OBSCURA	06/09/75	0003	2	0.76	0.169	0.08	0.144E-17	X X
		SUBTOTAL		4	1.52	0.322	0.15	0.275E-17	
4905250401	MOLLUSCA GASTROPODA POLINICES NANUS	06/09/75	0003	2	0.76	0.087	0.04	0.743E-18	
4905410000	MOLLUSCA GASTROPODA TURRIDAE	06/09/75	0003	2	0.76	0.070	0.03	0.598E-18	
4905490203	MOLLUSCA GASTROPODA CYLICHNA ALBA	06/09/75	0003	2	0.76	0.053	0.02	0.453E-18	X X X
5328050101	CRUSTACEA CUMACEA DIASTYLIS ALASKENSIS	06/09/75	0003	5	1.89	0.052	0.02	0.444E-18	
5331220501	CURSTACE AMPHIPDA HAUSTORIIDAE EDUS	06/08/75	0003	1	0.38	0.	0.	0 0.	X
5331340302	CURSTACE AMPHIPODA ANONYX NUGAX	06/08/75	0003	1	0.38	0.653	0.30	0.558E-17	
5331370802	CRUSTACEA AMPHIPODA OEDIC MONCCULOPES ZERNOVI	06/08/75	0002	1	0.38	0.009	0.00	0.768E-19	
5331370802	CRUSTACEA AMPHIPODA OEDIC MONOCULOPES ZERNOVI	06/08/75	0006	1	0.38	0.046	0.02	0.393E-18	
		SUBTOTAL		2	0.76	0.055	0.03	0.470E-18	
5331370909	**	06/08/75	0002	1	0.38	0.005	0.00	0.427E-19	
5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/08/75	0002	2	0.76	0.070	0.03	0.598E-18	X X
5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/08/75	0003	4	1.52	C.	0.	0 0.	X X
5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/08/75	0004	3	1.14	0.064	0.03	0.546E-18	X X
5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/08/75	0006	1	0.38	0.198	0.09	0.169E-17	X X
5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/08/75	0005	1	0.38	0.041	0.02	0.350E-18	X X
5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/09/75	0003	4	1.52	0.009	0.00	0.768E-19	X X
		SUBTOTAL		15	5.68	0.382	0.17	0.326E-17	

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CRUISE 808 STATION 007

PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA
5333C00000	CRUSTACEA DECAPODA	06/08/75	0002	1	0.38	0.002	0.00	0.171E-19		
5333060102	**	06/08/75	0005	1	0.38	0.487	0.22	0.416E-17		
5333060102	**	06/08/75	0004	1	0.38	0.330	0.15	0.282E-17		
5333C60102	**	06/08/75	0006	1	0.38	2.916	1.33	0.249E-16		
		SUBTOTAL		3	1.14	3.733	1.70	0.319E-16		
66C0C00000	ECTORPOCTA	06/08/75	0004	1	0.38	C.C02	0.00	0.171E-19		X X
66CCC00000	ECTORPOCTA	06/08/75	0005	1	0.38	0.127	0.06	0.108E-17		X X
		SUBTOTAL		2	0.76	0.129	0.06	0.110E-17		
68C2020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/08/75	0005	12	4.55	44.034	20.07	0.376E-15		X X X X
68C2020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/08/75	0006	5	1.89	0.215	C.10	0.184E-17		X X X X
68C2C20101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/09/75	0003	17	6.44	0.032	0.01	0.273E-18		X X X X
68C2C20101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/08/75	0007	15	5.68	0.	0.	0	0.	X X X X
68C2C20101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/08/75	0002	12	4.55	10.913	4.97	0.932E-16		X X X X
6802020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/08/75	0001	1	0.38	0.179	0.08	0.153E-17		X X X X
68C2C20101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/08/75	0004	27	10.23	76.174	34.72	0.650E-15		X X X X
6802020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/08/75	0003	6	2.27	0.786	0.36	0.671E-17		X X X X
		SUBTOTAL		95	35.98	132.333	60.32	0.113E-14		
		STATION TOTAL		264		219.399		0.187E-14		

SIMPSON INDEX 0.164852 SHANNON DIVERSITY INDEX 2.460335

CRUISE 808 STATION 009 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA
32C0C00000	SPONGES	06/09/75	0001	1	0.12	0.	0.	0	0.	X
3303C00000	CNIDARIA ANTHOZOA	06/09/75	0004	1	0.12	C.146	0.14		0.125E-17	
40C0C00000	NEMERTEANS RHYNCHOCOELA	06/09/75	0002	1	0.12	0.712	0.66		0.608E-17	X X X
40C0003000	NEMERTEANS RHYNCHOCOELA	06/09/75	0007	1	0.12	0.005	0.00		0.427E-19	X X X
40C0000000	NEMERTEANS RHYNCHOCOELA	06/09/75	0006	1	0.12	0.005	0.00		0.427E-19	X X X
		SUBTOTAL		3	0.37	0.722	0.67		0.616E-17	
44C0000000	NEMATODA	06/09/75	0005	1	0.12	0.001	0.00		0.854E-20	
44C0C00000	NEMATODA	06/09/75	0002	1	0.12	0.001	0.00		0.854E-20	
44C0G00000	NEMATODA	06/09/75	0004	2	0.25	C.001	C.00		0.854E-20	
		SUBTOTAL		4	0.50	C.003	0.00		0.256E-19	
4801000000	POLYCHAETA	06/09/75	0002	1	0.12	0.001	0.00		0.854E-20	X X X
48C1000000	POLYCHAETA	06/09/75	0007	1	0.12	C.002	0.00		0.171E-19	X X X
48C1C00000	POLYCHAETA	06/09/75	0007	1	0.12	C.001	0.00		0.854E-20	X X X
4801C00000	POLYCHAETA	06/09/75	0001	1	0.12	0.403	0.37		0.344E-17	X X X
4801C00000	POLYCHAETA	06/09/75	0001	1	0.12	0.019	0.02		0.162E-18	X X X
		SUBTOTAL		5	0.62	0.426	0.39		0.364E-17	
4801050101	POLYCHAETA SIGALIONIDAE PHLOE MINUTA	06/09/75	0001	1	0.12	0.003	0.00		0.256E-19	X X X X X
4801050101	POLYCHAETA SIGALIONIDAE PHLOE MINUTA	06/09/75	0006	1	0.12	0.007	0.01		0.598E-19	X X X X X
48C1C50101	POLYCHAETA SIGALIONIDAE PHLOE MINUTA	06/09/75	0002	1	0.12	C.C03	0.00		0.256E-19	X X X X X
48C1C50101	POLYCHAETA SIGALIONIDAE PHLOE MINUTA	06/09/75	0004	1	0.12	0.010	0.01		0.854E-19	X X X X X
48C1050101	POLYCHAETA SIGALIONIDAE PHLOE MINUTA	06/09/75	0005	1	0.12	C.C10	0.01		0.854E-19	X X X X X
		SUBTOTAL		5	0.62	C.033	0.03		0.282E-18	
4801120000	POLYCHAETA PHYLLODOCIDAE	06/09/75	0004	1	0.12	0.437	0.40		0.373E-17	
48C1120102	POLYCHAETA PHYLLODOCIDAE PHYLLODOCE GROENLANDICA	06/09/75	0006	1	0.12	1.540	1.43		0.131E-16	
48C1120106	POLYCHAETA PHYLLODOCIDAE ANAITIDES MALULATA	06/09/75	0001	1	0.12	0.010	0.01		0.854E-19	
48C1120205	POLYCHAETA PHYLLODOCIDAE ETEONE LONGA	06/09/75	0001	1	0.12	0.002	0.00		0.171E-19	X
4801120205	POLYCHAETA PHYLLODOCIDAE ETEONE LONGA	06/09/75	0005	1	0.12	0.004	0.00		0.342E-19	X
		SUBTOTAL		2	0.25	0.006	0.01		0.512E-19	
4801220101	POLYCHAETA SYLLIDAE AUTOLYTUS CORNUTUS	06/09/75	0004	1	0.12	0.001	0.00		0.854E-20	
48C1240100	NEPTHYS SP.	06/09/75	0004	1	0.12	1.793	1.66		0.153E-16	
4801240103	POLYCHAETA NEPHTYIDAE NEPHTYS COECA	06/09/75	0001	3	0.37	2.280	2.11		0.195E-16	X X X
48C1240109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA	06/09/75	0002	1	0.12	0.054	0.05		0.461E-18	X
48C124C109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA	06/09/75	0005	3	0.37	0.301	0.28		0.257E-17	X
48C1240109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA	06/09/75	0006	3	0.37	0.117	0.11		0.999E-18	X
		SUBTOTAL		7	0.87	C.472	0.44		0.403E-17	

CRUISE 808 STATION 009 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA
48C1240111	POLYCHAETA NEPHTYIDAE NEPHTYS FERRUGINEA	06/09/75	0007	2	0.25	0.198	0.18		0.169E-17	
48C1260201	POLYCHAETA GLYCERIDAE HEMIPODUS BOREALIS	06/09/75	0007	1	0.12	0.005	0.00		0.427E-19	
48C1270103	POLYCHAETA GONIADIDAE GLYCINDE ARMIGERA	06/09/75	0004	1	0.12	0.056	0.05		0.478E-18	
4801280103	POLYCHAETA ONUPHIDAE ONUPHIS IRIDESCENS	06/09/75	0001	2	0.25	0.052	0.05		0.444E-18	
48C1390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/09/75	0002	8	1.00	0.096	0.09		0.820E-18	X X
48C1390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/09/75	0005	12	1.50	0.152	0.14		0.130E-17	X X
48C1390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/09/75	0004	10	1.25	0.140	0.13		0.120E-17	X X
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/09/75	0007	5	0.62	0.101	0.09		0.862E-18	X X
48C1390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/09/75	0006	7	0.87	0.135	0.12		0.115E-17	X X
		SUBTOTAL		42	5.24	0.624	0.58		0.533E-17	
4801390102	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS ELONGATUS	06/09/75	0001	8	1.00	0.130	0.12		0.111E-17	X X
48C1400200	POLYCHAETA PARAONIDEE ARICIDEA SP	06/09/75	0007	1	0.12	C.C01	0.00		0.854E-20	
4801400300	POLYCHAETA PARAONIDAE PARAONIS SP	06/09/75	0007	1	0.12	0.001	0.00		0.854E-20	
4801420501	POLYCHAETA SPIONIDAE PRIONOSPIO MALMGRENI	06/09/75	0001	3	0.37	0.016	0.01		0.137E-18	
48C1421001	POLYCHAETA NERINIDES SPIOPHANES BOMBYX	06/09/75	0001	2	0.25	0.009	0.01		0.768E-19	X X
48C1421001	POLYCHAETA NERINIDES SPIOPHANES BOMBYX	06/09/75	0002	1	0.12	0.007	0.01		0.598E-19	X X
48C1421001	POLYCHAETA NERINIDES SPIOPHANES BOMBYX	06/09/75	0006	1	0.12	C.CC3	0.00		0.256E-19	X X
		SUBTOTAL		4	0.50	0.019	0.02		0.162E-18	
48C1430101	POLYCHAETA MAGELONIDAE MAGELONA JAPONICA	06/09/75	0005	1	0.12	0.016	0.01		0.137E-18	X
4801490300	POLYCHAETA CIRRATULIDAE THARYX SP.	06/09/75	0004	2	0.25	0.016	0.01		0.137E-18	X X X
48C1490401	POLYCHEATA CIRRATULIDAE CHAETOZONE SETOSA	06/09/75	0001	3	0.37	0.007	0.01		0.598E-19	
48C1560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/09/75	0001	9	1.12	0.690	0.64		0.589E-17	X
4801560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/09/75	0005	5	0.62	0.057	0.05		0.487E-18	X
48C1560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/09/75	0004	8	1.00	0.145	0.13		0.124E-17	X
48C1560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/09/75	0002	1	0.12	C.C02	0.00		0.171E-19	X
48C1560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/09/75	0006	6	0.75	0.046	0.04		0.393E-18	X
48C1560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA	06/09/75	0007	1	0.12	0.004	0.00		0.342E-19	X
		SUBTOTAL		30	3.75	C.944	0.87		0.806E-17	
4801560401	**	06/09/75	0006	2	0.25	0.962	0.89		0.821E-17	
4801560401	**	06/09/75	0005	7	0.87	2.057	1.90		0.176E-16	
4801560401	**	06/09/75	0002	3	0.37	0.030	0.03		0.256E-18	
48C1560401	**	06/09/75	0002	4	0.5C	1.792	1.66		0.153E-16	
48C1560401	**	06/09/75	0004	3	0.37	0.426	0.39		0.364E-17	
		SUBTOTAL		19	2.37	5.267	4.87		0.450E-16	

CRUISE 808 STATION 009 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA
4801560402	POLYCHAETA SCALIBREGMIDAE TRAUESIA FORBESII	06/09/75	0007	2	0.25	0.147	0.14		0.126E-17	X X X X
4801560402	POLYCHAETA SCALIBREGMIDAE TRAUESIA FORBESII	06/09/75	0001	9	1.12	2.197	2.03		0.188E-16	X X X X
		SUBTOTAL		11	1.37	2.344	2.17		0.200E-16	
48C1580101	POLYCHAETA CAPITELLIDAE CAPITELLA CAPITATA	06/09/75	0007	1	0.12	C.C01	C.00		0.854E-20	X X X
48C1580101	POLYCHAETA CAPITELLIDAE CAPITELLA CAPITATA	06/09/75	0006	1	0.12	0.002	0.00		0.171E-19	X X X
		SUBTOTAL		2	0.25	0.003	0.00		0.256E-19	
4801610000	POLYCHAETA MALDANIDAE	06/09/75	0006	1	0.12	0.003	0.00		0.256E-19	X X X
48C1610000	POLYCHAETA MALDANIDAE	06/09/75	0007	1	0.12	0.024	0.02		0.2C5E-18	X X X
48C1610000	POLYCHAETA MALDANIDAE	06/09/75	0002	1	0.12	C.C03	0.00		0.256E-19	X X X
48C1610000	POLYCHAETA MALDANIDAE	06/09/75	0001	1	0.12	C.C63	0.06		0.538E-18	X X X
		SUBTOTAL		4	0.50	0.093	0.09		0.794E-18	
48C1610902	POLYCHAETA MALDANIDAE PRAXILLELLA PRAETERMISSA	06/09/75	0004	4	0.50	0.C11	0.01		0.939E-19	X X X X X
4801620201	POLYCHAETA OWENIIDAE MYRIOCHELE HEERI	06/09/75	0001	1	0.12	0.027	0.02		0.231E-18	X X X
48C1640201	POLYCHAETA PECTINARIIDAE CISTENIDES BREVICOMA	06/09/75	0001	1	0.12	0.108	0.10		0.922E-18	
4801640202	POLYCHAETA PECTINARIIDAE CISTENIDES GRANULATA	06/09/75	0004	1	0.12	0.889	0.82		0.759E-17	X X X X
48C1650201	POLYCHAETA AMPHARETIDAE AMPHARETE ARCTICA	06/09/75	0004	3	0.37	0.017	0.02		0.145E-18	
48C1650201	POLYCHAETA AMPHARETIDAE AMPHARETE ARCTICA	06/09/75	0005	5	0.62	0.043	0.04		0.367E-18	
4801650201	POLYCHAETA AMPHARETIDAE AMPHARETE ARCTICA	06/09/75	0007	1	0.12	0.008	0.01		0.683E-19	
4801650201	POLYCHAETA AMPHARETIDAE AMPHARETE ARCTICA	06/09/75	0002	3	0.37	C.020	0.02		0.171E-18	
4801650201	POLYCHAETA AMPHARETIDAE AMPHARETE ARCTICA	06/09/75	0001	8	1.00	0.047	0.04		0.401E-18	
		SUBTOTAL		20	2.50	0.135	0.12		0.115E-17	
48C1660000	POLYCHAETA TEREBELLIDAE	06/09/75	0007	1	0.12	0.011	0.01		0.939E-19	
4801660800	POLYCHAETA TEREBELLIDAE POLYCIRRUS SP.	06/09/75	0006	1	0.12	0.013	0.01		0.111E-18	
48C1680101	POLYCHAETA SABELLIDAE CHONE GRACILIS	06/09/75	0007	1	0.12	0.008	0.01		0.683E-19	
49C1120205	**	06/09/75	0004	1	0.12	C.CC5	C.00		0.427E-19	
4904000000	MOLLUSCA PELECYPODA	06/09/75	0007	1	0.12	0.005	0.00		0.427E-19	
4904020201	MOLLUSCA PELECYPODA NUCULA TENUIS	06/09/75	0007	1	0.12	0.003	0.00		0.256E-19	X X X X X
4904020201	MOLLUSCA PELECYPODA NUCULA TENUIS	06/09/75	0005	1	0.12	0.083	0.08		0.709E-18	X X X X X
		SUBTOTAL		2	0.25	0.086	0.08		0.734E-18	
49C4030502	MOLLUSCA PELECYPODA YOLDIA HYPERBORIA	06/09/75	0001	2	0.25	1.419	1.31		0.121E-16	X X
4904030504	MOLLUSCA PELECYPODA YOLDIA SCISSURATA	06/09/75	0001	1	0.12	1.183	1.09		0.101E-16	X X
4904120101	MOLLUSCA PELECYPODA CYCLOCARDIA VENTRICOSA	06/09/75	0006	2	0.25	0.106	0.10		0.905E-18	

CRUISE 808 STATION 009 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO. WWGT	BIT CRITERIA
4904120102	MOLLUSCA PELECYPODA CYCLOCARDIA CREBRICOSTATA	06/09/75	0007	1	0.12	0.002	0.00	0.171E-19	X
4904120102	MOLLUSCA PELECYPODA CYCLOCARDIA CREBRICOSTATA	06/09/75	0004	2	0.25	1.473	1.36	0.126E-16	X
4904120102	MOLLUSCA PELECYPODA CYCLOCARDIA CREBRICOSTATA	06/09/75	0002	4	0.50	1.725	1.60	0.147E-16	X
		SUBTOTAL		7	0.87	3.200	2.96	0.273E-16	
4904150201	MOLLUSCA PELECYPODA AXINOPSIDA SERRICATA	06/09/75	0002	2	0.25	0.003	0.00	0.256E-19	X X X
4904180100	MOLLUSCA PELECYPODA MYSELLA SP.	06/09/75	0002	1	0.12	0.001	0.00	0.854E-20	X X X
4904180100	MOLLUSCA PELECYPODA MYSELLA SP.	06/09/75	0001	2	0.25	0.008	0.01	0.683E-19	X X X
4904180100	MOLLUSCA PELECYPODA MYSELLA SP.	06/09/75	0004	2	0.25	0.007	0.01	0.598E-19	X X X
		SUBTOTAL		5	0.62	0.016	0.01	0.137E-18	
4904230101	MOLLUSCA PELECYPODA SPISULA POLYNUMA	06/09/75	0004	8	1.00	7.969	7.37	0.680E-16	X X X X
4904230101	MOLLUSCA PELECYPODA SPISULA POLYNUMA	06/09/75	0005	20	2.50	16.400	15.18	0.140E-15	X X X X
4904230101	MOLLUSCA PELECYPODA SPISULA POLYNUMA	06/09/75	0007	12	1.50	10.008	9.26	0.854E-16	X X X X
4904230101	MOLLUSCA PELECYPODA SPISULA POLYNUMA	06/09/75	0006	16	2.00	8.218	7.60	0.702E-16	X X X X
4904230101	MOLLUSCA PELECYPODA SPISULA POLYNUMA	06/09/75	0001	11	1.37	1.004	0.93	0.857E-17	X X X X
4904230101	MOLLUSCA PELECYPODA SPISULA POLYNUMA	06/09/75	0002	31	3.87	15.488	14.33	0.132E-15	X X X X
		SUBTOTAL		98	12.23	59.087	54.68	0.504E-15	
4904240100	MOLLUSCA PELECYPODA MACOMA SP.	06/09/75	0002	1	0.12	0.004	0.00	0.342E-19	
4904240100	MOLLUSCA PELECYPODA MACOMA SP.	06/09/75	0004	1	0.12	0.052	0.05	0.444E-18	
		SUBTOTAL		2	0.25	0.056	0.05	0.478E-18	
4904240201	MOLLUSCA PELECYPODA TELLINA LUTEA ALTERNIDEN	06/09/75	0005	2	0.25	0.091	0.08	0.777E-18	X X X X
4904240201	MOLLUSCA PELECYPODA TELLINA LUTEA ALTERNIDEN	06/09/75	0007	1	0.12	7.372	6.82	0.629E-16	X X X X
4904240201	MOLLUSCA PELECYPODA TELLINA LUTEA ALTERNIDEN	06/09/75	0002	1	0.12	8.986	8.32	0.767E-16	X X X X
		SUBTOTAL		4	0.50	16.449	15.22	0.140E-15	
4904350101	MOLLUSCA PELECYPODA ASTHENOTHAERUS ADAMSI	06/09/75	0002	1	0.12	0.005	0.00	0.427E-19	
4904350101	MOLLUSCA PELECYPODA ASTHENOTHAERUS ADAMSI	06/09/75	0007	3	0.37	0.012	0.01	0.102E-18	
		SUBTOTAL		4	0.50	0.017	0.02	0.145E-18	
4904350200	MOLLUSCA PELECYPODA THRACIA SP.	06/09/75	0006	1	0.12	0.017	0.02	0.145E-18	X
4905060402	MOLLUSCA GASTROPODA SOLARIELLA OBSCURA	06/09/75	0007	1	0.12	0.134	0.12	0.114E-17	X X
4905060402	MOLLUSCA GASTROPODA SOLARIELLA OBSCURA	06/09/75	0005	2	0.25	0.026	0.02	0.222E-18	X X
4905060402	MOLLUSCA GASTROPODA SOLARIELLA OBSCURA	06/09/75	0004	1	0.12	0.016	0.01	0.137E-18	X X
4905060402	MOLLUSCA GASTROPODA SOLARIELLA OBSCURA	06/09/75	0002	1	0.12	0.185	0.17	0.158E-17	X X
		SUBTOTAL		5	0.62	0.361	0.33	0.308E-17	
4905180101	MOLLUSCA GASTROPODA TACHYRYNCHUS EROSUS	06/09/75	0001	1	0.12	0.104	0.10	0.888E-18	X
4905250200	MOLLUSCA GASTROPODA NATICA SP.	06/09/75	0006	1	0.12	0.188	0.17	0.161E-17	
4905250400	MOLLUSCA GASTROPODA POLINICES SP.	06/09/75	0002	1	0.12	2.763	2.56	0.236E-16	
4905250401	MOLLUSCA GASTROPODA POLINICES NANUS	06/09/75	0005	1	0.12	0.037	0.03	0.316E-18	
4905250401	MOLLUSCA GASTROPODA POLINICES NANUS	06/09/75	0007	1	0.12	0.197	0.18	0.168E-17	
4905250401	MOLLUSCA GASTROPODA POLINICES NANUS	06/09/75	0001	1	0.12	0.028	0.03	0.239E-18	
4905250401	MOLLUSCA GASTROPODA POLINICES NANUS	06/09/75	0002	2	0.25	0.420	0.39	0.359E-17	
		SUBTOTAL		5	0.62	0.682	0.63	0.582E-17	

CRUISE 808 STATION 009 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA
4905410000	MOLLUSCA GASTROPODA TURRIDAE	06/09/75	0002	1	0.12	0.025	0.02	0.213E-18		
4905410000	MOLLUSCA GASTROPODA TURRIDAE	06/09/75	0006	1	0.12	0.040	0.04	0.342E-18		
4905410000	MOLLUSCA GASTROPODA TURRIDAE	06/09/75	0005	1	0.12	0.020	0.02	0.171E-18		
4905410000	MOLLUSCA GASTROPODA TURRIDAE	06/09/75	0004	2	0.25	0.068	0.06	0.581E-18		
		SUBTOTAL		5	0.62	0.153	0.14	0.131E-17		
4905410400	J./KJU/J//MOLLUSCA GASTROPODA OENOPOTA SP.	06/09/75	0007	4	0.50	0.123	0.11	0.105E-17		
4905410400	J./KJU/J//MOLLUSCA GASTROPODA OENOPOTA SP.	06/09/75	0001	2	0.25	0.040	0.04	0.342E-18		
		SUBTOTAL		6	0.75	0.163	0.15	0.139E-17		
4905490203	MOLLUSCA GASTROPODA CYLICHNA ALBA	06/09/75	0001	2	0.25	0.008	0.01	0.683E-19		X X X
4905490203	MOLLUSCA GASTROPODA CYLICHNA ALBA	06/09/75	0004	2	0.25	0.065	0.06	0.555E-18		X X X
4905490203	MOLLUSCA GASTROPODA CYLICHNA ALBA	06/09/75	0005	1	0.12	0.030	0.03	0.256E-18		X X X
		SUBTOTAL		5	0.62	0.103	0.10	0.879E-18		
5318020000	CRUSTACEA THORACICA BALANIDAE	06/09/75	0001	129	16.10	0.	0.	0	0.	X X
5323000100	CRUSTACEA NEBALIACEA NEBALIA SP.	06/09/75	0002	1	0.12	0.001	0.00	0.854E-20		
5323000100	CRUSTACEA NEBALIACEA NEBALIA SP.	06/09/75	0007	1	0.12	0.004	0.00	0.342E-19		
5323000100	CRUSTACEA NEBALIACEA NEBALIA SP.	06/09/75	0005	1	0.12	0.005	0.00	0.427E-19		
		SUBTOTAL		3	0.37	0.010	0.01	0.854E-19		
5327030000	CRUSTACEA MYSIDACEA MYSIDAE	06/09/75	0007	1	0.12	0.001	0.00	0.854E-20		
5328040304	CRUSTACEA CUMACEA EUDORELLOPSIS DEFORMIS	06/09/75	0004	2	0.25	0.002	0.00	0.171E-19		X X
5328050000	CRUSTACEA CUMACEA DIASTYLIDAE	06/09/75	0006	2	0.25	0.015	0.01	0.128E-18		
5328050101	CRUSTACEA CUMACEA DIASTYLIS ALASKENSIS	06/09/75	0007	1	0.12	0.020	0.02	0.171E-18		
5328050101	CRUSTACEA CUMACEA DIASTYLIS ALASKENSIS	06/09/75	0004	1	0.12	0.008	0.01	0.683E-19		
5328050101	CRUSTACEA CUMACEA DIASTYLIS ALASKENSIS	06/09/75	0001	2	0.25	0.034	0.03	0.290E-18		
		SUBTOTAL		4	0.50	0.062	0.06	0.529E-18		
5328050103	CRUSTACEA CUMACEA DIASTYLIDAE DIAS. BIDENTATA	06/09/75	0001	1	0.12	0.017	0.02	0.145E-18		
5331000000	CRUSTACEA AMPHIPODA	06/09/75	0007	1	0.12	0.055	0.05	0.470E-18		X X X
5331000000	CRUSTACEA AMPHIPODA	06/09/75	0005	1	0.12	0.047	0.04	0.401E-18		X X X
		SUBTOTAL		2	0.25	0.102	0.09	0.871E-18		
5331020101	CRUSTACEA AMPHIPODA AMPELISCA MACROECEPHALA	06/09/75	0006	1	0.12	0.066	0.06	0.564E-18		
5331020101	CRUSTACEA AMPHIPODA AMPELISCA MACROECEPHALA	06/09/75	0007	1	0.12	0.030	0.03	0.256E-18		
5331020101	CRUSTACEA AMPHIPODA AMPELISCA MACROECEPHALA	06/09/75	0004	2	0.25	0.001	0.00	0.854E-20		
		SUBTOTAL		4	0.50	0.097	0.09	0.828E-18		
5331020202	CRUSTACEA AMPHIPODA BYBLIS EAIMANDI	06/09/75	0001	1	0.12	0.005	0.00	0.427E-19		X X X
5331150203	CRUSTACEA AMPHIPODA COROPHIUM CRASSIGORNE	06/09/75	0001	1	0.12	0.001	0.00	0.854E-20		
5331150203	CRUSTACEA AMPHIPODA COROPHIUM CRASSIGORNE	06/09/75	0002	3	0.37	0.005	0.00	0.427E-19		
		SUBTOTAL		4	0.50	0.006	0.01	0.512E-19		

CRUISE 808 STATION 009 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA			
5331220501	CURSTACE AMPHIPDA HAUSTORIIDAE EDUS	06/09/75	0002	3	0.37	C.C09	0.01		0.768E-19			X	
5331220501	CURSTACE AMPHIPDA HAUSTORIIDAE EDUS	06/09/75	0007	1	0.12	0.001	0.00		0.854E-20			X	
5331220501	CURSTACE AMPHIPDA HAUSTORIIDAE EDUS	06/09/75	0005	2	0.25	0.011	0.01		0.939E-19			X	
5331220501	CURSTACE AMPHIPDA HAUSTORIIDAE EDUS	06/09/75	0001	1	0.12	C.006	0.01		0.512E-19			X	
		SUBTOTAL		7	0.87	0.027	0.02		0.231E-18				
5331260000	CURSACEA AMPHIPODA ISAEIDA	06/09/75	0005	1	0.12	0.002	C.00		0.171E-19	X		X	
5331260303	CRUSTACEA AMPHIPODA PROTOMEDEIA GRANDIMANA	06/09/75	0002	5	0.62	0.007	0.01		0.598E-19	X		X	
5331340000	CRUSTACEA AMPHIPODA LYSIANASSIDAE	06/09/75	0001	0	0.	0.002	0.00		0.171E-19				
5331341406	CRUSTACEA AMPHIPODA HIPPOMEDON KURILIOUS	06/09/75	0002	2	0.25	0.021	0.02		0.179E-18				
5331341406	CRUSTACEA AMPHIPODA HIPPOMEDON KURILIOUS	06/09/75	0002	1	0.12	0.002	0.00		0.171E-19				
5331341406	CRUSTACEA AMPHIPODA HIPPOMEDON KURILIOUS	06/09/75	0004	1	0.12	0.076	0.07		0.649E-18				
5331341406	CRUSTACEA AMPHIPODA HIPPOMEDON KURILIOUS	06/09/75	0006	1	0.12	C.040	0.04		0.342E-18				
		SUBTOTAL		5	0.62	0.139	0.13		0.119E-17				
533137C000	CRUSTACEA AMPHIPODA OEDICEROTIDAE	06/09/75	0006	2	0.25	C.C13	0.01		0.111E-18				
5331370504	CRUSTACEA AMPHIPODA BATHYMEDON NANSENI	06/09/75	0002	4	0.50	0.008	0.01		0.683E-19				
5331370505	CRUSTACEA AMPHIPODA BATHYMEDON OBTUSIFRONS	06/09/75	0001	1	0.12	0.004	0.00		0.342E-19				
5331371302	CRUSTACEA AMPHIPODA PONTOCRATES ARENARIUS	06/09/75	0005	1	0.12	C.001	0.00		0.854E-20				
5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/09/75	0005	3	0.37	0.C26	C.02		0.222E-18	X		X	
5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/09/75	0004	3	0.37	0.030	0.03		0.256E-18	X		X	
		SUBTOTAL		6	0.75	0.056	0.05		0.478E-18				
5331420704	CRUSTACEA AMPHIPODA PARAPHOXUS MILLERI	06/09/75	0004	3	0.37	0.004	0.00		0.342E-19				
5331420704	CRUSTACEA AMPHIPODA PARAPHOXUS MILLERI	06/09/75	0006	1	0.12	0.004	0.00		0.342E-19				
5331420704	CRUSTACEA AMPHIPODA PARAPHOXUS MILLERI	06/09/75	0001	5	0.62	C.CC4	C.00		0.342E-19				
		SUBTOTAL		9	1.12	0.012	0.01		0.102E-18				
5331420707	CRUSTACEA AMPHIPODA PARAPHOXUS OBTUSIDENS	06/09/75	0006	1	0.12	0.011	0.01		0.939E-19			X	
5331420707	CRUSTACEA AMPHIPODA PARAPHOXUS OBTUSIDENS	06/09/75	0002	3	0.37	0.006	0.01		0.512E-19			X	
		SUBTOTAL		4	0.50	0.017	0.02		0.145E-18				
5331440100	CRUSTACEA AMPHIPODA PODOCERIDAE DULICHIA	06/09/75	0004	1	0.12	0.002	0.00		0.171E-19				
5332C20906	CRUSTACEA EUPHAUS. EUPHAUS. THYSANOESSA RASCHII	06/09/75	0001	4	0.50	0.	0.	0	0.				
5333110203	CRUSTACEA DEC. PAGURIDAE PAGURUS ALEUTICUS	06/09/75	0005	1	0.12	C.081	0.07		0.692E-18				
6802020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/09/75	0006	54	6.74	0.308	0.29		0.263E-17	X	X	X	X
68C2C20101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/09/75	0007	47	5.87	0.234	0.22		0.200E-17	X	X	X	X
68C2020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/09/75	0005	34	4.24	C.758	0.70		0.647E-17	X	X	X	X
6802020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/09/75	0004	21	2.62	0.116	0.11		0.990E-18	X	X	X	X
68C2020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/09/75	0002	20	2.50	0.100	0.09		0.854E-18	X	X	X	X
68C2C20101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/09/75	0001	56	6.99	0.811	0.75		0.692E-17	X	X	X	X
		SUBTOTAL		232	28.96	2.327	2.15		0.199E-16				

CRUISE 808 STATION 009 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA
68C4120200	ECHINODERM PSOLUS SP.	06/09/75	0001	1	0.12	0.020	0.02	0.171E-18		
	STATION TOTAL			801		108.064		0.923E-15		

SIMPSON INDEX 0.130665 SHANNON DIVERSITY INDEX 2.922104

CRUISE 808 STATION 013 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA
00C0000000	***	06/07/75	0005	1	0.30	C.001	0.00		0.854E-20	
CCCCCCC000	***	06/07/75	0001	2	0.61	0.003	0.01		0.256E-19	
		SUBTOTAL		3	0.91	0.004	0.02		0.342E-19	
3301C00000	CNIDARIA HYDROZOA	06/07/75	0001	0	0.	0.	0.	0	0.	
40C0000000	NEMERTEANS RHYNCHOCOELA	06/07/75	0002	1	0.30	0.005	0.02		0.427E-19	X X X
40C0000000	NEMERTEANS RHYNCHOCOELA	06/07/75	0004	1	0.30	C.021	0.10		0.179E-18	X X X
40C0C00000	NEMERTEANS RHYNCHOCOELA	06/07/75	0003	1	0.3C	0.017	0.08		0.145E-18	X X X
40C0C00000	NEMERTEANS RHYNCHOCOELA	06/07/75	0005	1	0.3C	C.019	0.09		0.162E-18	X X X
		SUBTOTAL		4	1.22	0.062	0.29		0.529E-18	
44C0000000	NEMATODA	06/07/75	0001	1	0.30	0.001	0.00		0.854E-20	
48C1000000	POLYCHAETA	06/07/75	0001	1	0.3C	0.075	0.35		0.640E-18	X X X
48C1000000	POLYCHAETA	06/07/75	0003	1	0.30	0.457	2.12		0.390E-17	X X X
4801000000	POLYCHAETA	06/07/75	0004	1	0.30	0.029	0.13		0.248E-18	X X X
		SUBTOTAL		3	0.91	0.561	2.60		0.479E-17	
4801C10806	POLYCHAETA POLYNOIDAE HARMOTHOE IMBRICATA	06/07/75	0004	1	0.30	0.042	0.19		0.359E-18	
4801010806	POLYCHAETA POLYNOIDAE HARMOTHOE IMBRICATA	06/07/75	0003	2	0.61	0.189	0.88		0.161E-17	
48C1010806	POLYCHAETA POLYNOIDAE HARMOTHOE IMBRICATA	06/07/75	0006	1	0.30	0.062	0.29		0.529E-18	
		SUBTOTAL		4	1.22	0.293	1.36		0.250E-17	
48C1C50101	POLYCHAETA SIGALIONIDAE PHLOE MINUTA	06/07/75	0005	1	0.30	0.009	0.04		0.768E-19	X X X X X
48C1C50101	POLYCHAETA SIGALIONIDAE PHLOE MINUTA	06/07/75	0002	2	0.61	0.032	0.15		0.273E-18	X X X X X
		SUBTOTAL		3	0.91	0.041	0.19		0.350E-18	
4801120205	POLYCHAETA PHYLLODOCIDAE ETEONE LONGA	06/07/75	0002	1	0.30	0.003	0.01		0.256E-19	X
4801120205	POLYCHAETA PHYLLODOCIDAE ETEONE LONGA	06/07/75	0003	1	0.30	C.002	0.01		0.171E-19	X
4801120205	POLYCHAETA PHYLLODOCIDAE ETEONE LONGA	06/07/75	0006	1	0.3C	C.002	0.01		0.171E-19	X
		SUBTOTAL		3	0.91	0.007	0.03		0.598E-19	
48C1220501	POLYCHAETA SYLLIDAE TYPOSYLLIS ALTERNATA	06/07/75	0001	2	0.61	0.012	0.06		0.102E-18	
4801230400	NEREIS SP.	06/07/75	0001	5	1.52	0.027	0.13		0.231E-18	
48C1240105	POLYCHAETA NEPHTYIDAE NEPHTYS PUNCTATA	06/07/75	0003	2	0.61	C.C70	0.32		0.598E-18	
48C1240109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA	06/07/75	0003	7	2.13	0.159	0.74		0.136E-17	X
48C1240109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA	06/07/75	0004	1	0.30	0.160	0.74		0.137E-17	X
48C1240109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA	06/07/75	0005	8	2.44	0.336	1.56		0.287E-17	X
4801240109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA	06/07/75	0001	2	0.61	0.065	0.30		0.555E-18	X
48C1240109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA	06/07/75	0002	4	1.22	0.108	0.50		0.922E-18	X
4801240109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA	06/07/75	0006	3	0.91	0.109	0.50		0.931E-18	X
		SUBTOTAL		25	7.62	0.937	4.34		0.800E-17	
4801240111	POLYCHAETA NEPHTYIDAE NEPHTYS FERRUGINEA	06/07/75	0006	1	0.30	0.300	1.39		0.256E-17	

CRUISE 808 STATION 013 PERCENTS REFER TO TOTAL COLLECTIONS AT THIS STATION

TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA
4801260101	POLYCHAETA GLYCERIDAE GLYCERA CAPITATA	06/07/75	0001	1	0.30	0.111	0.51		0.948E-18	
4801270100	POLYCHEATA GONIADIDAE GLYCINDE SP	06/07/75	0005	1	0.30	0.040	0.19		0.342E-18	
4801280102	POLYCHAETA ONUPHIDAE ONUPHIS GEOPHILIFORMIS	06/07/75	0002	1	0.30	0.004	0.02		0.342E-19	
4801290104	POLYCHAETA EUNICIDAE EUNICE KOBIENSIS	06/07/75	0001	7	2.13	0.932	4.32		0.796E-17	
4801300105	POLYCHAETA LUBRINERIDAE LUMBRINERIS SIMILABRIS	06/07/75	0002	1	0.30	0.025	0.12		0.213E-18	X X X X
4801300105	POLYCHAETA LUBRINERIDAE LUMBRINERIS SIMILABRIS	06/07/75	0004	1	0.30	0.132	0.61		0.113E-17	X X X X
4801300105	POLYCHAETA LUBRINERIDAE LUMBRINERIS SIMILABRIS	06/07/75	0003	3	0.91	0.009	0.04		0.768E-19	X X X X
		SUBTOTAL		5	1.52	0.166	0.77		0.142E-17	
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/07/75	0003	4	1.22	0.035	0.16		0.299E-18	X X
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/07/75	0005	7	2.13	0.042	0.19		0.359E-18	X X
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/07/75	0004	4	1.22	0.031	0.14		0.265E-18	X X
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/07/75	0002	3	0.91	0.033	0.15		0.282E-18	X X
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS	06/07/75	0006	6	1.83	0.051	0.24		0.435E-18	X X
		SUBTOTAL		24	7.32	0.192	0.89		0.164E-17	
4801400201	POLYCHAETA PARAONIDAE ARICIDEA SUECICA	06/07/75	0001	2	0.61	0.029	0.13		0.248E-18	
4801420701	POLYCHAETA SPIONIDAE SPIO FILICORNIS	06/07/75	0002	1	0.30	0.045	0.21		0.384E-18	
4801420701	POLYCHAETA SPIONIDAE SPIO FILICORNIS	06/07/75	0005	1	0.30	0.006	0.03		0.512E-19	
		SUBTOTAL		2	0.61	0.051	0.24		0.435E-18	
4801421001	POLYCHAETA NERINIDES SPIOPHANES BOMBYX	06/07/75	0006	1	0.30	0.006	0.03		0.512E-19	X X
4801421003	POLYCHAETA SPIONIDAE SPIOPHANES CIRRATA	06/07/75	0004	3	0.91	0.005	0.02		0.427E-19	
4801430101	POLYCHAETA MAGELONIDAE MAGELONA JAPONICA	06/07/75	0004	1	0.30	0.007	0.03		0.598E-19	
4801430101	POLYCHAETA MAGELONIDAE MAGELONA JAPONICA	06/07/75	0005	3	0.91	0.016	0.07		0.137E-18	X
4801430101	POLYCHAETA MAGELONIDAE MAGELONA JAPONICA	06/07/75	0003	3	0.91	0.020	0.09		0.171E-18	X
4801430101	POLYCHAETA MAGELONIDAE MAGELONA JAPONICA	06/07/75	0006	1	0.30	0.009	0.04		0.768E-19	X
		SUBTOTAL		8	2.44	0.052	0.24		0.444E-18	X
4801490000	POLYCHAETA CIRRATULIDAE	06/07/75	0002	1	0.30	0.006	0.03		0.512E-19	
4801490000	POLYCHAETA CIRRATULIDAE	06/07/75	0001	2	0.61	0.046	0.21		0.393E-18	
		SUBTOTAL		3	0.91	0.052	0.24		0.444E-18	
4801490300	POLYCHAETA CIRRATULIDAE THARYX SP.	06/07/75	0003	1	0.30	0.002	0.01		0.171E-19	X X X
4801490300	POLYCHAETA CIRRATULIDAE THARYX SP.	06/07/75	0004	2	0.61	0.007	0.03		0.598E-19	X X X
4801490300	POLYCHAETA CIRRATULIDAE THARYX SP.	06/07/75	0006	2	0.61	0.006	0.03		0.512E-19	X X X
4801490300	POLYCHAETA CIRRATULIDAE THARYX SP.	06/07/75	0005	1	0.30	0.002	0.01		0.171E-19	X X X
		SUBTOTAL		6	1.83	0.017	0.08		0.145E-18	
4801520300	POLYCHEATA FLABELLIGERIDAE PHERUSA SP.	06/07/75	0001	1	0.30	0.082	0.38		0.700E-18	
4801550101	POLYCHAETA SCALIBREGMIDAE SCALIBREGMA INFLATUM	06/07/75	0006	1	0.30	0.021	0.10		0.179E-18	X X
4801550101	POLYCHAETA SCALIBREGMIDAE SCALIBREGMA INFLATUM	06/07/75	0004	1	0.30	0.009	0.04		0.768E-19	X X
4801550101	POLYCHAETA SCALIBREGMIDAE SCALIBREGMA INFLATUM	06/07/75	0003	1	0.30	0.016	0.07		0.137E-18	X X
		SUBTOTAL		3	0.91	0.046	0.21		0.393E-18	

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TAXON CODE	TAXON NAME	SAMPLE DATE	SAMP NO.	COUNT NO.	COUNT PCT	WET WEIGHT GRAMS	WET WEIGHT PCT	PER SQ METER NO.	PER SQ METER WWGT	BIT CRITERIA
4801560401	**	06/07/75	0002	1	0.30	0.128	0.59		0.109E-17	
4801610000	POLYCHAETA MALDANIDAE	06/07/75	0004	1	0.30	0.070	0.32		0.598E-18	X X X
4801610000	POLYCHAETA MALDANIDAE	06/07/75	0005	1	0.30	0.008	0.04		0.683E-19	X X X
4801610000	POLYCHAETA MALDANIDAE	06/07/75	0006	1	0.30	0.023	0.11		0.196E-18	X X X
		SUBTOTAL		3	0.91	0.101	0.47		0.862E-18	
4801610502	POLYCHAETA MALDANIDAE NICOMACHE PERSONATA	06/07/75	0003	3	0.91	0.561	2.60		0.479E-17	X
4801610502	POLYCHAETA MALDANIDAE NICOMACHE PERSONATA	06/07/75	0002	4	1.22	0.113	0.52		0.965E-18	X
4801610502	POLYCHAETA MALDANIDAE NICOMACHE PERSONATA	06/07/75	0001	6	1.83	0.132	0.61		0.113E-17	X
		SUBTOTAL		13	3.96	0.806	3.73		0.688E-17	
4801610901	POLYCHAETA MALDANIDAE PRAXILLELLA GRACILIS	06/07/75	0003	3	0.91	0.075	0.35		0.640E-18	X
4801620201	POLYCHAETA OWENIIDAE MYRIOCHELE HEERI	06/07/75	0003	1	0.30	0.051	0.24		0.435E-18	X X X
4801620201	POLYCHAETA OWENIIDAE MYRIOCHELE HEERI	06/07/75	0004	1	0.30	0.056	0.26		0.478E-18	X X X
4801620201	POLYCHAETA OWENIIDAE MYRIOCHELE HEERI	06/07/75	0002	1	0.30	0.047	0.22		0.401E-18	X X X
4801620201	POLYCHAETA OWENIIDAE MYRIOCHELE HEERI	06/07/75	0006	1	0.30	0.038	0.18		0.324E-18	X X X
4801620201	POLYCHAETA OWENIIDAE MYRIOCHELE HEERI	06/07/75	0005	1	0.30	0.076	0.35		0.649E-18	X X X
		SUBTOTAL		5	1.52	0.268	1.24		0.229E-17	
4801640201	POLYCHAETA PECTINARIIDAE CISTENIDES BREVICOMA	06/07/75	0004	1	0.30	0.169	0.78		0.144E-17	
4801640300	PECTINARIA SP.	06/07/75	0006	1	0.30	0.044	0.20		0.376E-18	
4801650201	POLYCHAETA AMPHARETIDAE AMPHARETE ARCTICA	06/07/75	0006	2	0.61	0.022	0.10		0.188E-18	
4801650201	POLYCHAETA AMPHARETIDAE AMPHARETE ARCTICA	06/07/75	0003	2	0.61	0.112	0.52		0.956E-18	
4801650201	POLYCHAETA AMPHARETIDAE AMPHARETE ARCTICA	06/07/75	0002	1	0.30	0.023	0.11		0.196E-18	
		SUBTOTAL		5	1.52	0.157	0.73		0.134E-17	
4801660000	POLYCHAETA TEREBELLIDAE	06/07/75	0001	1	0.30	0.032	0.15		0.273E-18	
4801680601	POLYCHAETA SABELLIDAE POTAMILLA NEGLECTA	06/07/75	0003	2	0.61	0.013	0.06		0.111E-18	
4801680601	POLYCHAETA SABELLIDAE POTAMILLA NEGLECTA	06/07/75	0004	1	0.30	0.009	0.04		0.768E-19	
4801680601	POLYCHAETA SABELLIDAE POTAMILLA NEGLECTA	06/07/75	0005	1	0.30	0.002	0.01		0.171E-19	
4801680601	POLYCHAETA SABELLIDAE POTAMILLA NEGLECTA	06/07/75	0006	1	0.30	0.001	0.00		0.854E-20	
		SUBTOTAL		5	1.52	0.025	0.12		0.213E-18	
4903020302	MOLLUSCA POLYPLACOPHRA ISCHNOCHITON ALBUS	06/07/75	0001	1	0.30	0.016	0.07		0.137E-18	
4904020201	MOLLUSCA PELECYPODA NUCULA TENUIS	06/07/75	0003	5	1.52	0.060	0.28		0.512E-18	X X X X X
4904020201	MOLLUSCA PELECYPODA NUCULA TENUIS	06/07/75	0002	8	2.44	0.322	1.49		0.275E-17	X X X X X
4904020201	MOLLUSCA PELECYPODA NUCULA TENUIS	06/07/75	0005	8	2.44	0.146	0.68		0.125E-17	X X X X X
4904020201	MOLLUSCA PELECYPODA NUCULA TENUIS	06/07/75	0004	7	2.13	0.167	0.77		0.143E-17	X X X X X
4904020201	MOLLUSCA PELECYPODA NUCULA TENUIS	06/07/75	0006	3	0.91	0.020	0.09		0.171E-18	X X X X X
		SUBTOTAL		31	9.45	0.715	3.31		0.610E-17	
4904030200	MOLLUSCA PELECYPODA NUCULANA SP.	06/07/75	0001	1	0.30	0.087	0.40		0.743E-18	

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49C4030500	MOLLUSCA PELECYPODA YOLDIA SP.	06/07/75	0003	1	0.30	0.012	0.06		0.102E-18	
49C4030504	MOLLUSCA PELECYPODA YOLDIA SCISSURATA	06/07/75	0004	2	0.61	0.041	0.19		0.350E-18	X X
49C4030504	MOLLUSCA PELECYPODA YOLDIA SCISSURATA	06/07/75	0005	4	1.22	0.158	0.73		0.135E-17	X X
49C4030504	MOLLUSCA PELECYPODA YOLDIA SCISSURATA	06/07/75	0002	1	0.30	0.025	0.12		0.213E-18	X X
49C4C30504	MOLLUSCA PELECYPODA YOLDIA SCISSURATA	06/07/75	0006	2	0.61	0.066	0.31		0.564E-18	X X
		SUBTOTAL		9	2.74	0.290	1.34		0.248E-17	
49C4C70400	CRUSTACEA PELECYPODA MUSCULUS SP.	06/07/75	0002	1	0.30	0.010	0.05		0.854E-19	
4904080500	MOLLUSCA PELECYPODA PROPEAMUSSIUM SP.	06/07/75	0002	1	0.30	0.012	0.06		0.102E-18	
49C4110108	MOLLUSCA PELECYPODA ASTARTE ESQUIMAULTI	06/07/75	0003	1	0.30	0.013	0.06		0.111E-18	X
49C4110108	MOLLUSCA PELECYPODA ASTARTE ESQUIMAULTI	06/07/75	0005	3	0.91	0.151	0.70		0.129E-17	X
49C4110108	MOLLUSCA PELECYPODA ASTARTE ESQUIMAULTI	06/07/75	0004	3	0.91	0.112	0.52		0.956E-18	X
49C4110108	MOLLUSCA PELECYPODA ASTARTE ESQUIMAULTI	06/07/75	0006	1	0.30	0.029	0.13		0.248E-18	X
		SUBTOTAL		8	2.44	0.305	1.41		0.260E-17	
49C4150201	MOLLUSCA PELECYPODA AXINOPSIDA SERRICATA	06/07/75	0006	1	0.30	0.001	0.00		0.854E-20	X X X
49C4150201	MOLLUSCA PELECYPODA AXINOPSIDA SERRICATA	06/07/75	0003	4	1.22	0.067	0.31		0.572E-18	X X X
		SUBTOTAL		5	1.52	0.068	0.31		0.581E-18	
49C4200101	MOLLUSCA PELECYPODA CLINOCARDIUM CILIATUM	06/07/75	0003	1	0.30	0.250	1.16		0.213E-17	X X
4904200101	MOLLUSCA PELECYPODA CLINOCARDIUM CILIATUM	06/07/75	0005	1	0.30	0.069	0.32		0.589E-18	X X
		SUBTOTAL		2	0.61	0.319	1.48		0.272E-17	
49C4210501	MOLLUSCA PELECYPODA PSEPHIDIA LORDI	06/07/75	0006	1	0.30	0.001	0.00		0.854E-20	
49C4240101	MOLLUSCA PELECYPODA MACOMA CALCAREA	06/07/75	0002	1	0.30	1.098	5.08		0.937E-17	X X
4904240108	MOLLUSCA PELECYPODA MACOMA MOESTA ALASKANA	06/07/75	0002	1	0.30	0.056	0.26		0.478E-18	X X X
4904240108	MOLLUSCA PELECYPODA MACOMA MOESTA ALASKANA	06/07/75	0005	4	1.22	2.127	9.85		0.182E-16	X X X
4904240108	MOLLUSCA PELECYPODA MACOMA MOESTA ALASKANA	06/07/75	0004	1	0.30	0.651	3.01		0.556E-17	X X X
49C4240108	MOLLUSCA PELECYPODA MACOMA MOESTA ALASKANA	06/07/75	0006	2	0.61	1.308	6.06		0.112E-16	X X X
		SUBTOTAL		8	2.44	4.142	19.18		0.354E-16	
4904350200	MOLLUSCA PELECYPODA THRACIA SP.	06/07/75	0002	8	2.44	0.043	0.20		0.367E-18	X
4904350202	MOLLUSCA PELECYPODA THRACIA MYOPSIS	06/07/75	0004	1	0.30	0.062	0.29		0.529E-18	
4904350202	MOLLUSCA PELECYPODA THRACIA MYOPSIS	06/07/75	0006	1	0.30	0.228	1.06		0.195E-17	
4904350202	MOLLUSCA PELECYPODA THRACIA MYOPSIS	06/07/75	0005	1	0.30	0.042	0.19		0.359E-18	
		SUBTOTAL		3	0.91	0.332	1.54		0.283E-17	
49C5C60302	MOLLUSCA GASTROPODA MARGARITES HELICINUS	06/07/75	0002	1	0.30	0.009	0.04		0.768E-19	
49C5C60403	MOLLUSCA GASTROPODA SOLARIELLA VARICOSA	06/07/75	0006	1	0.30	0.010	0.05		0.854E-19	
4905180101	MOLLUSCA GASTROPODA TACHYRYNCHUS EROSUS	06/07/75	0006	1	0.30	0.073	0.34		0.623E-18	X
49C5180101	MOLLUSCA GASTROPODA TACHYRYNCHUS EROSUS	06/07/75	0004	1	0.30	0.551	2.55		0.470E-17	X
49C5180101	MOLLUSCA GASTROPODA TACHYRYNCHUS EROSUS	06/07/75	0005	1	0.30	0.509	2.36		0.435E-17	X
		SUBTOTAL		3	0.91	1.133	5.25		0.967E-17	

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49C5300400	MOLLUSCA GASTROPODA TROPONOPSIS SP.	06/07/75	0002	1	0.30	0.020	0.09		0.171E-18	
49C5400101	MOLLUSCA GASTROPODA AOMETE COOTHOUYI	06/07/75	0006	1	0.30	0.050	0.23		0.427E-18	
49C5490203	MOLLUSCA GASTROPODA CYLICHNA ALBA	06/07/75	0006	2	0.61	0.036	0.17		0.307E-18	X X X
49C5490203	MOLLUSCA GASTROPODA CYLICHNA ALBA	06/07/75	0002	1	0.30	0.008	0.04		0.683E-19	X X X
49C5490203	MOLLUSCA GASTROPODA CYLICHNA ALBA	06/07/75	0005	3	0.91	0.068	0.31		0.581E-18	X X X
49C5490203	MOLLUSCA GASTROPODA CYLICHNA ALBA	06/07/75	0004	2	0.61	0.053	0.25		0.453E-18	X X X
49C5490203	MOLLUSCA GASTROPODA CYLICHNA ALBA	06/07/75	0003	2	0.61	0.106	0.49		0.905E-18	X X X
		SUBTOTAL		10	3.05	0.271	1.25		0.231E-17	
5328000000	CRUSTACEA CUMACEA	06/07/75	0002	1	0.30	0.001	0.00		0.854E-20	
5328C40201	CR CUMACEA LEUCONIDAE EUDORELLA EMARGINATA	06/07/75	0004	2	0.61	0.002	0.01		0.171E-19	
5328C40304	CRUSTACEA CUMACEA EUDORELLOPSIS DEFORMIS	06/07/75	0002	1	0.30	0.001	0.00		0.854E-20	X X
5328C50102	CRUSTACEA CUMACEA DIASTYLIDAE DIASTYL. ASPERA	06/07/75	0001	1	0.30	0.004	0.02		0.342E-19	
5331000000	CRUSTACEA AMPHIPODA	06/07/75	0001	2	0.61	0.048	0.22		0.410E-18	X X X
5331000000	CRUSTACEA AMPHIPODA	06/07/75	0001	1	0.30	0.007	0.03		0.598E-19	X X X
		SUBTOTAL		3	0.91	0.055	0.25		0.470E-18	
5331C20101	CRUSTACEA AMPHIPODA AMPELISCA MACROECEPHALA	06/07/75	0002	1	0.30	0.097	0.45		0.828E-18	
5331C20202	CRUSTACEA AMPHIPODA BYBLIS EAIMANDI	06/07/75	0001	2	0.61	0.037	0.17		0.316E-18	X X X
5331C20202	CRUSTACEA AMPHIPODA BYBLIS EAIMANDI	06/07/75	0004	1	0.30	0.087	0.40		0.743E-18	X X X
5331C20202	CRUSTACEA AMPHIPODA BYBLIS EAIMANDI	06/07/75	0005	1	0.30	0.020	0.09		0.171E-18	X X X
		SUBTOTAL		4	1.22	0.144	0.67		0.123E-17	
5331060301	CRUSTACEA AMPHIPODA LEMBOS ARCTICUS	06/07/75	0001	1	0.30	0.009	0.04		0.768E-19	
5331260301	CRUSTACEA AMPHIPODA PROTOMEDEIA FASCATA	06/07/75	0002	1	0.30	0.003	0.01		0.256E-19	
5331270200	CRUSTACEA AMPHIPODA ISCHYROCERUS SP.	06/07/75	0004	1	0.30	0.002	0.01		0.171E-19	
5331341406	CRUSTACEA AMPHIPODA HIPPOMEDON KURILIOUS	06/07/75	0005	1	0.30	0.104	0.48		0.888E-18	
5331342103	CRUSTACEA AMPHIPODA LIPIDEPECREUM KUSTATICA	06/07/75	0003	1	0.30	0.066	0.31		0.564E-18	
5331342905	CRUSTACEA AMPHIPODA ORCHOMENE NUGUX	06/07/75	0001	1	0.30	0.005	0.02		0.427E-19	
5331342906	CRUSTACEA AMPHIPODA ORCHOMENE JAPONICA	06/07/75	0001	6	1.83	0.070	0.32		0.598E-18	
5331344001	CRUSTACEA AMPHIPODA SOCARNES BIDENTICULATUS	06/07/75	0001	1	0.30	0.131	0.61		0.112E-17	
5331370000	CRUSTACEA AMPHIPODA OEDICEROTIDAE	06/07/75	0001	1	0.30	0.008	0.04		0.683E-19	
5331370504	CRUSTACEA AMPHIPODA BATHYMEDON NANSENI	06/07/75	0004	1	0.30	0.001	0.00		0.854E-20	

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5331400301	CRUSTACEA AMPHIPODA PARDALISCA ABYSSI	06/07/75	0001	1	0.30	0.015	0.07	0.128E-18		
5331420105	CRUSTACEA AMPHIPODA HARPINIA GORJANOVAE	06/07/75	0004	1	0.30	0.007	0.03	0.598E-19		X X X
5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/07/75	0001	3	0.91	0.024	0.11	0.205E-18		X X
5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.	06/07/75	0001	2	0.61	0.012	0.06	0.102E-18		X X
		SUBTOTAL		5	1.52	0.036	0.17	0.307E-18		
5331420702	CRUSTACEA AMPHIPODA PARAPHOXUS SIMPLEX	06/07/75	0001	1	0.30	0.003	0.01	0.256E-19		
5331420707	CRUSTACEA AMPHIPODA PARAPHOXUS OBTUSIDENS	06/07/75	0004	3	0.91	0.030	0.14	0.256E-18		X
5331420707	CRUSTACEA AMPHIPODA PARAPHOXUS OBTUSIDENS	06/07/75	0005	1	0.30	0.011	0.05	0.939E-19		X
5331420707	CRUSTACEA AMPHIPODA PARAPHOXUS OBTUSIDENS	06/07/75	0005	1	0.30	0.004	0.02	0.342E-19		X
5331420707	CRUSTACEA AMPHIPODA PARAPHOXUS OBTUSIDENS	06/07/75	0005	1	0.30	C.020	0.09	0.171E-18		X
5331420707	CRUSTACEA AMPHIPODA PARAPHOXUS OBTUSIDENS	06/07/75	0006	1	0.30	0.004	0.02	0.342E-19		X
		SUBTOTAL		7	2.13	0.069	0.32	0.589E-18		
5331480200	CRUSTACEA AMPHIPODA STENOTHOIDAE METOPA	06/07/75	0001	1	0.30	0.001	0.00	0.854E-20		
5900000000	SIPUNCULIDA	06/07/75	0001	8	2.44	0.200	0.93	0.171E-17		X X X
6600000000	ECTORPOCTA	06/07/75	0001	C	0.	0.	0.	0	0.	X X
68C2020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA	06/07/75	0005	1	0.30	0.045	0.21	0.384E-18		X X X X
6803C00000	ECHINODERM OPHIUROIDEA	06/07/75	0002	1	0.30	0.139	0.64	0.119E-17		X
6803000000	ECHINODERM OPHIUROIDEA	06/07/75	0004	1	0.30	0.059	0.27	0.504E-18		X
6803C00000	ECHINODERM OPHIUROIDEA	06/07/75	0003	1	0.30	0.136	0.63	0.116E-17		X
		SUBTOTAL		3	0.91	0.334	1.55	0.285E-17		
6803020801	ECHINODERM AMPHIURIDAE UNIOPLUS MACRASPIS	06/07/75	0006	2	0.61	0.019	0.09	0.162E-18		
68C3C90501	EC OPHIUROIDEA OPHIURIDAE OPHIOPENIA DISACANTHA	06/07/75	0006	2	0.61	0.028	0.13	0.239E-18		
6804000000	HOLOTHUROIDEA	06/07/75	0005	2	0.61	0.990	4.58	0.845E-17		X X X
68C4000000	HOLOTHUROIDEA	06/07/75	0006	2	0.61	2.C42	9.46	0.174E-16		X X X
68C4000000	HOLOTHUROIDEA	06/07/75	0004	2	0.61	1.669	7.73	0.143E-16		X X X
6804000000	HOLOTHUROIDEA	06/07/75	0002	2	0.61	0.587	2.72	0.501E-17		X X X
		SUBTOTAL		8	2.44	5.288	24.49	0.451E-16		
		STATION TOTAL		328		21.596		0.184E-15		

SIMPSON INDEX 0.029369 SHANNON DIVERSITY INDEX 3.918614

APPENDIX TABLE 3.

A list of all taxonomic groups collected by grab from 27 stations in the Bering Sea by R/V *Discoverer* cruise 808, May and June 1975, and a tabulation of the Biologically Important Taxa (BIT) at the 27 stations.

(THIS IS A PRELIMINARY PRINTOUT ONLY, AND IS INCLUDED AS A SAMPLE FOR THIS REPORT. THE ERRORS WILL BE CORRECTED FOR THE FINAL REPORT).

LIST OF ALL TAXONOMIC GROUPS FOUND

CRITERIA 1- TAXON OCCURS IN 50 PCT OR MORE OF STATIONS
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TAXON CODE	TAXON NAME	CRIT1	CRIT2	CRIT3	CRIT4	CRIT5	STA OCC
3200000000	SPONGES				X		3
3301000000	CNIDARIA HYDROZOA						2
3303000000	CNIDARIA ANTHOZOA						4
3303120101	CNIDARIA SCYPHOZOA PHACELLOPHORA CAMTSCHATKA						1
4000000000	NEMERTEANS RHYNCHOCOELA	X		X		X	21
4002020300	RHYNCHOCOELA CEREBRATULUS ALBIFRONS			X		X	1
4400000000	NEMATODA						13
4801000000	POLYCHAETA	X		X		X	25
4801010000	POLYCHAETA POLYNOIDAE						5
4801010300	POLYCHAETA POLYNOIDAE ARCTEOBIA						3
4801010301	POLYCHAETA POLYNOIDAE ARCTEOBIA AUTICOSTIENSIS						2
4801010302	POLYCHAETA POLYNOIDAE ARCTEOBIA SPINELYTRIS						3
4801010606	POLYCHAETA POLYNOIDAE GATTYANA TREADWELLI						4
4801010806	POLYCHAETA POLYNOIDAE HARMOTHOE IMBRICATA						2
4801010811	POLYCHAETA POLYNOIDAE HARMOTHOE LUNULATA						1
4801011501	POLYCHAETA POLYNOIDAE POLYNOF CANADENSIS						6
4801011502	POLYCHAETA POLYNOIDAE POLYNOE GRACILIS						2
4801011503	POLYCHAETA POLYNOIDAE POLYNOE TAMARAE						1
4801011504	POLYCHAETA POLYNOIDAE POLYNOE TORELLI						1
4801011601	POLYCHAETA POLYNOIDAE POLYEUNDA TUTA						1
4801011701	POLYCHAETA POLYNOIDAE HESPERONOE COMPLANATA						1
4801020000	POLYCHAETA POLYNODONTIDAE						1
4801050000	POLYCHAETA SIGALIONIDAE						1
4801050101	POLYCHAETA SIGALIONIDAE PHLOE MINUTA	X	X	X	X	X	24
4801050302	POLYCHAETA SIGALIONIDAE						0
4801120000	POLYCHAETA PHYLLODOCIDAE						4
4801120100	POLYCHAETA PHYLLODOCIDAE ANAITIDES SP.						2
4801120102	POLYCHAETA PHYLLODOCIDAE PHYLLODOCE GROENLANDICA						10
4801120104	POLYCHAETA PHYLLODOCIDAE ARAITIDES MUCOSA						5
4801120106	POLYCHAETA PHYLLODOCIDAE ANAITIDES MALULATA						3
4801120202	POLYCHAETA PHYLLODOCIDAE ETENONE SPETSBERGENSIS						1
4801120205	POLYCHAETA PHYLLODOCIDAE ETEONE LONGA	X					15
4801120301	POLYCHAETA PHYLLODOCIDAE EULALIA VIRIDIS						2
4801200102	POLYCHAETA HESIONIDAE GYPTIS BREVIPALPA						1
4801200401	POLYCHAETA HESIONIDAE OPHIODROMUS PUGENTTENSIS						2
4801210201	POLYCHAETA PILARGIDAE SIGAMBRA TENTACULATA						1
4801220000	POLYCHAETA SYLLIDAE						2
4801220101	POLYCHAETA SYLLIDAE AUTOLYTUS CORNUTUS						1
4801220102	POLYCHAETA SYLLIDAE AUTOLYTUS MAGNUS						1
4801220300	POLYCHAETA SYLLIDAE SYLLIS SP						1
4801220500	POLYCHAETA SYLLIDAE TYPOSYLLIS SP.						1
4801220501	POLYCHAETA SYLLIDAE TYPOSYLLIS ALTERNATA						3
4801220502	POLYCHAETA SYLLIDAE SYLLIS ARMARILLIS						1
4801220504	POLYCHAETA SYLLIDAE SYLLIS ELONGATA						1
4801220704	POLYCHAETA SYLLIDAE EXOGONE MOLESTA						1
4801220706	POLYCHAETA SYLLIDAE EXOGONE VERUGERA						1
4801230000	POLYCHAETA NEREIDAE						2
4801230400	NEREIS SP.						3

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TAXON CODE	TAXON NAME	CRIT1	CRIT2	CRIT3	CRIT4	CRIT5	STA OCC
4801230403	POLYCHAETA NEREIDAE NEREIS PELAGICA						2
4801230601	POLYCHAETA NEREIDAE CERATOCEPHALE LOVENI						1
4801240000	POLYCHAETA NEPHTYIDAE						2
4801240100	NEPTHYS SP.						5
4801240101	POLYCHAETA NEPHTYIDAE NEPHTYS ASSIMILIS						1
4801240102	POLYCHAETA NEPHTYIDAE NEPHTYS CILIATA	X	X	X	X	X	16
4801240103	POLYCHAETA NEPHTYIDAE NEPHTYS COECA			X	X	X	12
4801240105	POLYCHAETA NEPHTYIDAE NEPHTYS PUNCTATA						7
4801240106	POLYCHAETA NEPHTYIDAE NEPHTYS RICKETTSI						1
4801240109	POLYCHAETA NEPTHYIDAE NEPTHYS LONGASETOSA				X		8
4801240111	POLYCHAETA NEPHTYIDAE NEPHTYS FERRUGINEA						3
4801260000	POLYCHAETA GLYCERIDAE						2
4801260100	POLYCHAETA GLYCERIDAE GLYCERA SP.						1
4801260101	POLYCHAETA GLYCERIDAE GLYCERA CAPITATA						5
4801260201	POLYCHAETA GLYCERIDAE HEMIPODUS BOREALIS						3
4801270100	POLYCHEATA GONIADIDAE GLYCINDE SP						2
4801270101	POLYCHAETA GONIADIDAE GLYCINDE PICTA						4
4801270103	POLYCHAETA GONIADIDAE GLYCINDE ARMIGERA						8
4801270201	POLYCHAETA GONIADIDAE GONIADA ANNULATA						3
4801270202	POLYCHAETA GONIADIDAE GONIADA MACULATA						3
4801280102	POLYCHAETA ONUPHIDAE ONUPHIS GEOPHILIFORMIS						5
4801280103	POLYCHAETA ONUPHIDAE ONUPHIS IRIDESCENS						1
4801280205	POLYCHAETA ONUPHIDAE ONUPHIS PARVA						3
4801290102	POLYCHAETA EUNICIDAE EUNICE BIANNULATA			X		X	2
4801290104	POLYCHAETA EUNICIDAE EUNICE KOBIENSIS						1
4801300000	POLYCHAETA LUBRINERIDAE						1
4801300100	LUMBRINERIS SP.						2
4801300102	POLYCHAETA LUMBRINERIDAE L. FRAGILIS						1
4801300105	POLYCHAETA LUBRINERIDAE LUMBRINERIS SIMILABRIS		X	X	X	X	8
4801300106	POLYCHAETA LUMBRINERIDAE LUMBRINEREIS ZONATA		X	X	X	X	7
4801300200	POLYCHEATA LUMBRINERIDAE NINOE SP.						1
4801300202	POLYCHAETA LUMBRINERIDAE NINVE GEMMEA				X		2
4801320000	POLYCHAETA ARABELLIDAE						1
4801320100	POLYCHAETA ARABELLLIDAE DRILONEREIS SP						1
4801320103	POLYCHAETA ARABELLIDAE DRILONEREIS LONGA						1
4801320104	POLY ARABELLIDAE DRILONEREIS FALLATA MINOR						2
4801320200	POLYCHAETA ARABELLIDAE ARABELLA SP.						1
4801390101	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS PANAMENSIS		X		X		10
4801390102	POLYCHAETA ORBINIIDAE HAPLOSCOLOPLOS ELONGATUS		X		X		13
4801400000	POLYCHAETA CIRRATULIDAE CIRRATULUS CIRRATUS						1
4801400100	POLYCHAETA PARAONIDAE AEDICIRA SP.						1
4801400200	POLYCHAETA PARAONIDEE ARICIDEA SP						3
4801400201	POLYCHAETA PARAONIDAE ARICIDEA SUECICA						5
4801400202	POLYCHAETA PARAONIDAE ARICIDEA USHAKOWI						3
4801400300	POLYCHAETA PARAONIDAE PARAONIS SP						1
4801400301	POLYCHAETA PARAONIDAE PARAONIS GRACILIS						3
4801420000	POLYCHAETA SPIONIDAE						4
4801420201	POLYCHAETA SPIONIDAE LAONICE CIRRATA			X		X	2

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TAXON CODE	TAXON NAME	CRIT1	CRIT2	CRIT3	CRIT4	CRIT5	STA OCC
4801420400	POLYCHAETA SPIONIDAE POLYDURA SP						3
48C1420402	POLYCHAETA SPIONIDAE POLYDORA SOCIALIS						1
48C1420501	POLYCHAETA SPIONIDAE PRIONOSPIO MALMGRENI						10
48C1420502	POLYCHAETA SPIONIDAE PRIONOSPIO CIRRIFERA						1
48C1420701	POLYCHAETA SPIONIDAE SPIO FILICORNIS						13
48C1421000	POLYCHAETA SPIONIDAE SPIOPHANES SP.						1
48C1421001	POLYCHAETA NERINIDES SPIOPHANES BOMBYX		X		X		8
48C1421002	POLYCHAETA SPIONIDAE SPIOPHANES KROYERI						3
48C1421003	POLYCHAETA SPIONIDAE SPIOPHANES CIRRATA						8
48C1430101	POLYCHAETA MAGELONIDAE MAGELONA JAPONICA				X		5
48C1430102	POLYCHAETA MAGELONIDAE MAGELONA PACIFICA	X					16
4801480300	POLYCHAETA CHAETOPTERIDAE SPIOCHAETOPTERUS SP.						1
4801490000	POLYCHAETA CIRRATULIDAE						2
48C1490300	POLYCHAETA CIRRATULIDAE THARYX SP.	X	X		X		22
48C1490400	POLYCHAETA CIRRATULIDAE CHAETOZONE SP.						1
48C1490401	POLYCHEATA CIRRATULIDAE CHAETOZONE SETOSA						7
4801520100	POLYCHAETA FLABELLIGERIDAE BRADA SP.						1
48C1520102	POLYCHAETA FLABELLIGERIDAE BRADAVILLOSA						7
48C1520300	POLYCHEATA FLABELLIGERIDAE PHERUSA SP.						2
48C1520302	POLYCHAETA FLABELLIGERIDAE STY. PLUMOSA						2
48C1550101	POLYCHAETA SCALIBREGMIDAE SCALIBREGMA INFLATUM			X		X	12
48C1560101	POLYCHAETA SCALIBREGMIDAE AMMOTRYPANE AULOGASTE						4
48C1560301	POLYCHAETA OPHELIIDAE OPHELIA LAMACINA				X		7
48C1560400	POLYCHAETA SCALIBREGMIDAE TRAVISTA SP						2
48C1560402	POLYCHAETA SCALIBREGMIDAE TRAUESIA FORBESII		X	X	X	X	12
48C1570101	POLYCHAETA STERNASPIDAE STERNASPIS SCUTATA			X	X	X	11
48C1580101	POLYCHAETA CAPITELLIDAE CAPITELLA CAPITATA	X	X		X		19
48C1580201	POLYCHAETA CAPITELLIDAE HETEROMASTUS FILIFORMIS						2
4801610000	POLYCHAETA MALDANIDAE	X		X		X	18
48C1610100	ASYSCHIS SP.						1
4801610102	POLYCHAETA MALDANIDAE ASYCHIS SIMILIS						1
4801610300	POLYCHAETA MALDANIDAE MALANE SP.					X	1
48C1610301	POLYXHAETA MALDANIDAE MALDANE SARSI		X		X	X	6
48C1610500	POLYCHAETA MALDANIDAE NICOMACHE SP			X		X	3
48C1610502	POLYCHAETA MALDANIDAE NICOMACHE PERSONATA				X		3
48C1610601	POLYCHAETA MALDANIDAE NOTOPROCTUS PACIFICUS						1
48C1610900	PRAXILLELLA SP.						1
48C1610901	POLYCHAETA MALDANIDAE PRAXILLELLA GRACILIS					X	11
4801610902	POLYCHAETA MALDANIDAE PRAXILLELLA PRAETERMISSA	X	X	X	X	X	15
48C1611000	POLYCHAETA MALDANIDAE RHODINE SP.						2
48C1611001	POLYCHAETA MALDANIDAE RHODINE BITORQUATA						1
48C1611201	POLYCHAETA MALDANIDAE CLYMENURA BOREALIS						1
48C1620102	POLYCHAETA OWENIIDAE OWENIA FUSIFORMIS						3
48C1620201	POLYCHAETA OWENIIDAE MYRIOCHELE HEERI	X	X		X		18
4801630102	POLYCHAETA SABELLARIIDAE IDANTHYRSUS ARMATUS						1
4801640101	POLYCHAETA PECTINARIIDAE AMPHICTENE AURICOMA						1
4801640200	POLYCHAETA PECTINARIIDAE CISTENIDES SP.						1
4801640201	POLYCHAETA PECTINARIIDAE CISTENIDES BREVICOMA						6

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TAXON CODE	TAXON NAME	CRIT1	CRIT2	CRIT3	CRIT4	CRIT5	STA OCC
4801640202	POLYCHAETA PECTINARIIDAE CISTENIDES GRANULATA		X	X	X	X	6
4801640203	POLY PECTINARIIDAE CISTENIDES HYPERBOREA						2
4801640300	PECTINARIA SP.						1
4801640301	POLYCHAETA PECTINARIIDAE PECTINARIA BELGICA						1
4801650000	POLYCHAETA AMPHARETIDAE						8
4801650200	AMPHARETE SP.						2
4801650201	POLYCHAETA AMPHARETIDAE AMPHARETE ARCTICA						10
4801650207	POLYCHAETA AMPHARETIDAE AMPHARETE GOESI						1
4801650208	POLYCHAETA AMPHARETIDAE AMPHARETE ACUTIFRONS						1
4801650303	POLYCHAETA AMPHARETIDAE AMPHICTEIS GUNNERI						1
4801650401	POLYCHAETA AMPHARETIDAE LYSIPPE LABIATA						4
4801650501	POLYCHAETA AMPHARETIDAE MELINNA CRISTATA						3
4801651001	POLYCHAETA AMPHARETIDAE ASABELLIDES SIBIRICA						1
4801660000	POLYCHAETA TEREBELLIDAE						13
4801660100	POLYCHAETA TEREBELLIDAE AMPHITRITE SP.						1
4801660301	POLYCHAETA TEREBELLIDAE LEAENA ABRANCHIATA						2
4801660700	POLYCHAETA TEREBELLIDAE PISTA SP						1
4801660701	POLYCHAETA TEREBELLIDAE PISTA CRISTATA						2
4801660704	POLYCHAETA TEREBELLIDAE PISTA VINOGRAPOVI						1
4801660705	POLYCHAETA TEREBELLIDAE PISTA MACULATA					X	1
4801660800	POLYCHAETA TEREBELLIDAE POLYCIRRUS SP.						1
4801660802	POLYCHAETA TEREBELLIDAE POLYCIRRUS MEDUSA						1
4801661202	POLYCHAETA TEREBELLIDAE ARTACAMA PROBOSCIDEA			X	X	X	9
4801661701	POLYCHAETA TEREBELLIDAE LAPHANIS BOECKI						3
4801661900	POLYCHAETA TEREBELLIDAE PROCLEA SP.						2
4801661901	POLYCHAETA TEREBELLIDAE PROCLEA EMMI						3
4801661902	POLYCHAETA TEREBELLIDAE PROCLEA GRAFFII						1
4801670000	POLYCHAETA TRICHOBRANCHIDAE						2
4801670101	POLYCHAETA TEREBELLIDAE TEREBELLIDES STROEMI			X	X	X	10
4801680000	POLYCHAETA SABELLIDAE						5
4801680101	POLYCHAETA SABELLIDAE CHONE GRACILIS						1
4801680102	POLYCHAETA SABELLIDAE CHONE INFUNDIBULIFORMIS					X	5
4801680103	POLYCHAETA SABELLIDAE CHONE CINCTA						2
4801680104	POLYCHAETA SABELLIDAE CHONE DUNERI						8
4801680200	POLYCHAETA SABELLIDAE EUCHONE SP.						2
4801680201	POLYCHAETA SABELLIDAE EUCHONE ANALIS						2
4801680601	POLYCHAETA SABELLIDAE POTAMILLA NEGLECTA						2
4801680800	POLYCHAETA SABELLIDAE SABELLA SP.						1
4801740000	POLYCHAETA APHRODITIDAE						1
4801750101	POLYCHAETA COSSURIDE COSSURA LONGOCIRRATA						1
4801760101	POLYCHAETA DISOMIDAE DISOMA CARICA						1
4801760102	POLYCHAETA DISOMDAE DISOMA MULTI SETOSUM						1
4802000000	OLIGICHAETA						4
4900000000	MOLLUSCA						5
4901030101	MOLLUSCA APLACOPHORA CHAETODERMA ROBUSTA						7
4903020302	MOLLUSCA POLYPLACOPHRA ISCHNOCHITON ALBUS						1
4904000000	MOLLUSCA PELECYPODA						7
4904020101	MOLLUSCA PELECYPODA ACILA CASTRENIS			X		X	1

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TAXON CODE	TAXON NAME	CRIT1	CRIT2	CRIT3	CRIT4	CRIT5	STA OCC
49C4C20201	MOLLUSCA PELECYPODA NUCULA TENUIS	X	X	X	X	X	22
4904030200	MOLLUSCA PELECYPODA NUCULANA SP.						1
4904030201	MOLLUSCA PELECYPODA NUCULANA PERNULA				X	X	9
4904030301	MOLLUSCA PELECYPODA PORTLANDIA ARCTICA						2
49C4C30500	MOLLUSCA PELECYPODA YOLDIA SP.						11
49C4030501	MOLLUSCA PELECYPODA YOLDIA AMYGDAIEA			X		X	2
4904030502	MOLLUSCA PELECYPODA YOLDIA HYPERBORIA			X		X	10
4904030504	MOLLUSCA PELECYPODA YOLDIA SCISSURATA				X	X	5
4904030508	MOLLUSCA PELECYPODA YOLDIA SECUNDA			X	X	X	3
49C4C50102	MOLLUSCA PELECYPODA LUMOPSIS AKUTANICA						1
4904070300	MOLLUSCA PELECYPODA MEGACRENELLA SP.						1
49C4C70400	CRUSTACEA PELECYPODA MUSCULUS SP.						5
49C4C70401	MOLLUSCA PELECYPODA MUSCULUS NIGER						1
4904070402	MOLLUSCA PELECYPODA MUSCULUS DISCORS						1
4904070501	MOLLUSCA PELECYPODA DACRYDIUM PACIFICUM						4
49C4C80500	MOLLUSCA PELECYPODA PROPEAMUSSIUM SP.						1
49C4C80502	MOLLUSCA PELECYPODA PROPEAMUSSIUM ALASKENSE						1
49C4C90101	MOLLUSCA PELECYPODA LUMA SABAURICULATA						1
49C4110100	ASTARTE SP.						4
4904110101	MOLLUSCA PELECYPODA ASTARTE BOREALIS						1
4904110108	MOLLUSCA PELECYPODA ASTARTE ESQUIMAULTI				X		1
4904120100	MOLLUSCA PELECYPODA CYCLOCARDIA SP.						1
49C4120101	MOLLUSCA PELECYPODA CYCLOCARDIA VENTRICOSA						2
49C4120102	MOLLUSCA PELECYPODA CYCLOCARDIA CREBRICOSTATA			X			3
49C4150100	MOLLUSCA PELECYPODA ADONTORHINA SP.						1
49C4150101	MOLLUSCA PELECYPODA ADONTORHINA FERRUGWEA						1
49C4150201	MOLLUSCA PELECYPODA AXINOPSIDA SERRICATA	X	X		X		20
4904150301	MOLLUSCA PELECYPODA THYASIRA FLEXUOSA		X		X		10
4904160100	MOLLUSCA PELECYPODA DIPLODONTA SP.						1
49C4170100	MOLLUSCA PELECYPODA KELLIA SP.						1
49C4180100	MOLLUSCA PELECYPODA MYSELLA SP.	X	X		X		16
49C4180101	MOLLUSCA PELECYPODA MYSELLA COMPRESSA						1
4904180103	MOLLUSCA PELECYPODA MYSELLA ALEUTICA						4
49C4180201	MOLLUSCA PELECYPODA ODONTOGENIA BOREALIS				X		3
49C4200100	MOLLOSCA PELECYPODA CLINOCARDIUM SP.						1
49C4200101	MOLLUSCA PELECYPODA CLINOCARDIUM CILIATUM			X		X	7
4904200102	MOLLUSCA PELECYPODA CLINOCARDIUM NUTTALLII						1
49C4200201	MOLLUSCA PELECYPODA SERRIPES GROENLANDICUS						5
49C4210301	MOLLUSCA PELECYPODA COMPSOMYAX SUBDIAPHANA						1
49C4210501	MOLLUSCA PELECYPODA PSEPHIDIA LORDI						4
4904230101	MOLLUSCA PELECYPODA SPISULA POLYNUMA		X	X	X	X	6
4904240100	MOLLUSCA PELECYPODA MACOMA SP.						5
4904240101	MOLLUSCA PELECYPODA MACOMA CALCAREA			X		X	3
49C4240108	MOLLUSCA PELECYPODA MACOMA MOESTA ALASKANA			X	X	X	13
49C4240109	MOLLUSCA PELECYPODA MACOMA CRASSULA						1
49C4240117	MOLLUSCA PELECYPODA MACOMA BALTHICA						1
4904240201	MOLLUSCA PELECYPODA TELLINA LUTEA ALTERNIDEN		X	X	X	X	6
4904[illegible]0102	MOLLUSCA PELECYPODA SILIQUA ALTA						1

LIST OF ALL TAXONOMIC GROUPS FOUND

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CRITERIA 5- ABUNDANT WRT TOTAL BIOMASS AT SOME STATION

TAXON CODE	TAXON NAME	CRIT1	CRIT2	CRIT3	CRIT4	CRIT5	STA OCC
49C4280205	MOLLUSCA PELECYPODA MYA ELEGANS						1
49C4290201	MOLLUSCA PELECYPODA HIATELLA ARCTICA						2
49C4330000	MOLLUSCA PELECYPODA LYONSIIDAE						1
49C4330200	MOLLUSCA PELECYPODA LYONSIA SP.						2
49C4330201	MOLLUSCA PELECYPODA LYONSIA ARENOSA						1
49C4330204	MOLLUSCA PELECYPODA LYONSIA STRIATA						1
49C4350100	MOLLUSCA PELECYPODA ASTHENOTHAEZUS SP.						1
4904350101	MOLLUSCA PELECYPODA ASTHENOTHAERUS ADAMSI						2
49C4350200	MOLLUSCA PELECYPODA THRACIA SP.				X		4
49C4350202	MOLLUSCA PELECYPODA THRACIA MYOPSIS						1
49C4370102	MOLLUSCA PELECYPODA CARDIOMYA PLANEDCA						1
49C5000000	MOLLUSCA GASTROPODA						10
49C5C60301	MOLUSCA GASTROPODA MARGARITES OLIVACEUS				X		2
49C5060302	MOLLUSCA GASTROPODA MARGARITES HELICINUS						1
49C5060400	MOLLUSCA GASTROPODA SOLARIELLA SP.						2
49C5C60402	MOLLUSCA GASTROPODA SOLARIELLA OBSCURA	X			X		14
49C5C60403	MOLLUSCA GASTROPODA SOLARIELLA VARICOSA						9
49C5180101	MOLLUSCA GASTROPODA TACHYRYNCHUS EROSUS					X	7
49C5240203	MOLLUSCA GASTROPODA TRICHOTROPIS BOREALIS						1
49C5250200	MOLLUSCA GASTROPODA NATICA SP.						2
49C5250201	MOLLUSCA GASTROPODA NATICA CLAUSA						2
49C5250400	MOLLUSCA GASTROPODA POLINICES SP.						5
4905250401	MOLLUSCA GASTROPODA POLINICES NANUS						5
49C5250402	MOLLUSCA GASTROPODA POLINICES PALLIDA						5
49C5300400	MOLLUSCA GASTROPODA TROPONOPSIS SP.						1
49C5330503	MOLLUSCA GASTROPODA LIOMESUS NUX						1
49C5330802	MOLLUSCA GASTROPODA NEPTUNEA VENTRICOSA			X		X	2
49C5400100	MOLLUSCA GASTROPODA ADMETE SP.						1
49C5400101	MOLLUSCA GASTROPODA AOMETE COOTHOUYI						2
49C5410000	MOLLUSCA GASTROPODA TURRIDAE						4
49C5410101	MOLLUSCA GASTROPODA SUAVODRILLIA KENNICOTTII						1
49C5410400	J./KJU/J//MOLLUSCA GASTROPODA OENOPOTA SP.						1
49C5410711	MOLLUSCA GASTROPODA LORA RASSINA						1
49C5420100	MOLLUSCA GASTROPODA ODOSTOMIA SP.						1
49C5450101	MOLLUSCA GASTROPODA RETUSA OBTUSA						8
49C5450102	MOLLUSCA GASTROPODA RETUSA UMBILICATA						1
49C5490203	MOLLUSCA GASTROPODA CYLICHNA ALBA	X	X		X		18
49C6010000	MOLLUSCA SCAPHOPODA DENTALIIDAE					X	1
4906010100	MOLLUSCA SCAPHOPODA DENTALIUM SP						5
49C6C20100	MOLLUSCA SCAPHOPODA CADALUS SP						1
5307000000	CRUSTACEA PODACOPA						1
5311130207	CRUSTACEA CALANOIDA METRIDIA IGNOTA						1
5318C20000	CRUSTACEA THORACICA BALANIDAE		X		X		1
5318C20108	CRUSTACEA THORACKA BALANUS HESPERIUS						1
5318020111	CRUSTACEA THORACICA LEPADIDAE BALANUS ROSTRATUS			X		X	1
5323000100	CRUSTACEA NEBALIACEA NEBALIA SP.						3
5327C30000	CRUSTACEA MYSIDACEA MYSIDAE						2
5328C00000	CRUSTACEA CUMACEA						12

LIST OF ALL TAXONOMIC GROUPS FOUND

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TAXON CODE	TAXON NAME	CRIT1	CRIT2	CRIT3	CRIT4	CRIT5	STA OCC
5328020100	CRUSTACEA CUMACEA LAMPROPS SP.						1
5328020105	CRUSTACEA COMACEA LAMPROPS QUADRIPLICATA						1
5328040100	CRUSTACEA CUMACEA LEVCON SP.						10
5328040101	CRUSTACEA CUMACEA LEUCONIDAE LEUCON NASICA						5
5328040200	CRUSTACEA MYSIDACEA EUDORELLA SP.						3
5328040201	CR CUMACEA LEUCONIDAE EUDORELLA EMARGINATA						9
5328040202	CRUSTACEA CUMACEA LEUCONIDAE EUDORELLA PACIFICA				X		10
5328040301	CR CUMACEA LEUCONIDAE EUDORELLOPSIS INTEGRA						5
5328040304	CRUSTACEA CUMACEA EUDORELLOPSIS DEFORMIS		X		X		12
5328050000	CRUSTACEA CUMACEA DIASTYLIDAE						2
5328050100	CRUSTACEA CUMACEA DIASTYLIDAE DIASTYLIS SP						3
5328050101	CRUSTACEA CUMACEA DIASTYLIS ALASKENSIS						4
5328050102	CRUSTACEA CUMACEA DIASTYLIDAE DIASTYL. ASPERA						1
5328050103	CRUSTACEA CUMACEA DIASTYLIDAE DIAS. BIDENTATA						2
5328050125	CRUSTACEA CUMACEA DIASTYLIS CF. TETRADON					X	1
5328080101	CURSTACEA CUMACEA CUMELLA CARINATA						1
5329000000	CRUSTACEA TANAIDACE						1
5329010000	CRUSTACEA TANAIDACEA TANAIDAE		X		X		1
5330000000	CRUSTACEA ISOPODA						2
5330010301	CRUSTACEA ISOPODA ANTHURIDAE CALATHURA BRANCHIAT						2
5330060100	CURSTACEA ISOPODA MICROPROCTUS SP.						1
5331000000	CRUSTACEA AMPHIPODA	X	X		X		24
5331020000	AMPELISCIDAE						1
5331020100	CRUSTACEA AMPHIPODA AMPELISCIDA SP.						5
5331020101	CRUSTACEA AMPHIPODA AMPELISCA MACROECEPHALA						12
5331020102	CRUSTACEA AMPHIPODA AMPELISCIDA BIRULAI						1
5331020103	CRUSTACEA AMPHIPODA AMPELISCIDA DERJUGINI						1
5331020105	CRUSTACEA AMPHIPODA AMPELISCIDA ESCHRICHTI						3
5331020106	CRUSTACEA AMPHIPODA AMPELISCA SP.						4
5331020202	CRUSTACEA AMPHIPODA BYBLIS EAIMANDI	X	X		X		16
5331020301	CRUSTACEA AMPHIPODA HAPLOOPS TUBICULA						1
5331060301	CRUSTACEA AMPHIPODA LEMBOS ARCTICUS						1
5331070101	CRUSTACE AMPHIPODA ARGISSA HAMATIPES						1
5331150200	CRUSTAEA AMPHIPODA COROPHIUM SP.						1
5331150203	CRUSTACEA AMPHIPODA COROPHIUM CRASSIGORNE						3
5331150701	CRUSTACEA AMPHIPODA UNCIOLA LEVCOPIS						1
5331210000	CRUSTACEA AMPHIPODA GAMMARIDAE						3
5331210801	CRUSTACEA AMPHIPODA GAMMARUS MAERA DANAE						1
5331210802	CRUSTALEA AMPHIPODA MAERA LOVENI						2
5331211000	CRUSTACE AMPHIPODA MELITA SP.						1
5331211002	CRUSTALEA AMPHIPODA MELITA DENTATA						4
5331211004	CURSTACEA AMPHIPODA MELITA QUADRISPINOSA						1
5331220000	CRUSTACEA AMPHIPODA HAUSTORIIDAE						1
5331220200	CRUSTACEA AMPHIPODA ISCHYROCERUS SP.						1
5331220201	CRUSTACEA AMPHIPODA PONTOPOREIA FEMORATA				X		5
5331220400	CRUSTACEA AMPHIPODA UROCHOE SP						1
5331220401	CRUSTACEA AMPHIPODA UROTHOE ELEGANS						1
5331220402	CRUSTACEA AMPHIPODA UROTHOE PENTICULATA						1

BERING SEA BENTHOS - GRABS TAKEN DISCOVERER CRUISE 808 03/23/76 PAGE 9

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TAXON CODE	TAXON NAME	CRIT1	CRIT2	CRIT3	CRIT4	CRIT5	STA OCC
5331220501	CURSTACE AMPHIPDA HAUSTORIIDAE EDUS				X		9
5331260000	CURSACEA AMPHIPODA ISAEIDA		X		X		6
5331260200	CRUSTACEA AMPHIPODA PHOTIS SP.						5
5331260203	CRUSTACE AMPHIPODA PHOTIS SPASKII						3
5331260205	CRUSTACEA AMPHIPODA PHOTIS FISCHMANNI						1
5331260300	CRUSTACEA AMPHIPODA PROTOMEOEIA SP.		X		X		11
5331260301	CRUSTACEA AMPHIPODA PROTOMEDEIA FASCATA						6
5331260303	CRUSTACEA AMPHIPODA PROTOMEDEIA GRANDIMANA		X		X		8
5331260500	CRUSTACEA AMPHIPODA PODOCEROPSIS SP.						1
5331260501	CRUSTACEA AMPHIPODA HARPCOIA KOBJAKOVAE						1
5331270200	CRUSTACEA AMPHIPODA ISCHYROCERUS SP.						7
5331270202	CRUSTACE AMPHIPODA ISCHYROCEROS ANGUIPES						1
5331270205	CRUSTACE AMPHIPODA ISCHYROCERUS COMMENSALIS						2
5331340000	CRUSTACEA AMPHIPODA LYSIANASSIDAE						1
5331340300	CRUSTACEA AMPHIPODA ANONYX OCHOTICUS						5
5331340301	CRUSTACEA AMPHIPODA ANONYX OCHOTICUS						1
5331340302	CURSTACE AMPHIPODA ANONYX NUGAX						5
5331340306	CRUSTACEA AMPHIPODA ANONYX PAVLOV>KI						1
5331341406	CRUSTACEA AMPHIPODA HIPPOMEDON KURILIOUS						9
5331342103	CRUSTACEA AMPHIPODA LIPIDEPECREUM KUSTATICA						1
5331342104	CRUSTACEA AMPHIPODA LEPIDEPELREUM COMATUM						1
5331342900	CRUSTACEA AMPHIPODA ARCHOMENE SP.						6
5331342903	CRUSTACEA AMPHIPODA ORCHOMENE PACIFICA						1
5331342905	CRUSTACEA AMPHIPODA ORCHOMENE NUGUX						6
5331342906	CRUSTACEA AMPHIPODA ORCHOMENE JAPONICA						1
5331342907	CRUSTACEA AMPHIPODA ORCHOMENE LEPIDULA						6
5331344001	CRUSTACEA AMPHIPODA SOCARNES BIDENTICULATUS						2
5331370000	CRUSTACEA AMPHIPODA OEDICEROTIDAE						4
5331370500	CRUSTACE AMPHIPODA BATHYMEDON SP.						6
5331370504	CRUSTACEA AMPHIPODA BATHYMEDON NANSENI						9
5331370505	CRUSTACEA AMPHIPODA BATHYMEDON OBTUSIFRONS						2
5331370600	CRUSTACEA AMPHIPODA MONOCULODES SP.						2
5331370802	CRUSTACEA AMPHIPODA OEDIC MONOCULOPES ZERNOVI						4
5331370907	CRUSTACEA AMPHIPODA MONOCULOPSIS LONGICORNIS						1
5331371302	CRUSTACEA AMPHIPODA PONTOCRATES ARENARIUS						1
5331371502	CRUSTACEA AMPHIPODA WESTWOODILLA CAECULA						4
5331400000	CRUSTACEA AMPHIPODA PARCALISCIDAE						2
5331400201	CRUSTACEA AMPHIPODA NICIPPE TUMIDA						1
5331400301	CRUSTACEA AMPHIPODA PARDALISCA ABYSSI						1
5331420000	CRUSTACEA AMPHIPODA PHOXOCEPHALIDAE						2
5331420100	HARPINIA SP.						5
5331420102	CRUSTACEA AMPHIPODA HARPINIA KOBJAKOVAE						4
5331420105	CRUSTACEA AMPHIPODA HARPINIA GORJANOVAE	X	X		X		14
5331420113	CRUSTACEA AMPHIPODA HARPINIA TARASOVI				X		8
5331420200	CRUSTACEA AMPHIPODA PARAPHOXUS SP.						0
5331420700	CRUSTACEA AMPHIPODA PARAPHOXUS SP.		X		X		13
5331420702	CRUSTACEA AMPHIPODA PARAPHOXUS SIMPLEX						5
5331420704	CRUSTACEA AMPHIPODA PARAPHOXUS MILLERI						6

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5331420707	CRUSTACEA AMPHIPODA PARAPHOXUS OBTUSIDENS				X		5
5331420800	CRUSTACEA AMPHIPODA PHOXOCEPHALUS SP.						1
5331430600	CRUSTACEA AMPHIPODA PLEUSTIDAE STENOPLEUSTES						1
5331430602	CRUSTACEA AMPHIPODA STENOPLEUSTES GLABER						1
5331430606	CRUSTACEA AMPHIPODA STENOPLEUSTES KARIANA						1
5331440100	CRUSTACEA AMPHIPODA PODOCERIDAE DULICHIA						3
5331480200	CRUSTACEA AMPHIPODA STENOTHOIDAE METOPA						1
5331480217	CRUSTACEA AMPHIPODA PARAPHOXUS GLACIALIS						1
5331481100	CRUSTACEA AMPHIPODA STENOTHOIDES SP.						1
5331500500	CRUSTACEA AMPHIPODA SYNOPIIDAE TIRON						1
5331980000	CRUSTACEA AMPHIPODA CAPRELLIDAE						2
5332020000	CRUSTACEA EUPHAUSIACEA EUPHAUSIIDAE						2
5332020906	CRUSTACEA EUPHAUS. EUPHAUS. THYSANOESSA RASCHII						4
5333000000	CRUSTACEA DECAPODA						2
5333110202	CRUSTACEA DECAPODA PAGURUS OCHOTENSIS			X		X	1
5333110203	CRUSTACEA DEC. PAGURIDAE PAGURUS ALEUTICUS						1
5900000000	SIPUNCULIDA			X	X	X	5
5901010101	SIPUNCULIDA GOLFINGIA MARGARITACEA						1
5901010201	SIPONCULIDA PHASCOLION STROMBI						2
6001020101	ECHIUROIDEA ECHIURUS ECHIURUS ALASKANA						1
6100000000	PHYLUM PRIAPULIDA						8
6101010202	PRIAPULIDA PRIAPULUS CAUDATUS						6
6600000000	ECTORPOCTA		X		X		7
6801060101	EC AS PORCELLANASTERIDAE CTENODISCUS CRISPATUS						1
6801120412	ECHID. ASTEROIDEA LEPTASTERIAS POLARIS			X		X	1
6802000000	ECHINODERM ECHINOIDEA						1
6802020101	ECHIN. ECHINOIDEA ECHINARACHNIUS PARMA		X	X	X	X	8
6803000000	ECHINODERM OPHIUROIDEA				X		10
6803020201	ECHINODERM AMPHIURIDAE AMPHIPHOLUS PUGETANA		X		X		1
6803020300	ECHINODERMATA OPHIUROIDEA DIAMPHIODA SP.						1
6803020301	ECHINODERM AMPHIURIDAE DIAMPHIODIA CRATERODMETA		X		X	X	11
6803020801	ECHINODERM AMPHIURIDAE UNIOPLUS MACRASPIS						3
6803090000	ECHINODERM OPHIUROIDEA OPHIURIDAE						1
6803090501	EC OPHIUROIDEA OPHIURIDAE OPHIOPENIA DISACANTHA						1
6803090611	ECHINODERM OPHIUROIDEA OPHIURIDAE OPHIURA SARSI						4
6804000000	HOLOTHUROIDEA			X	X	X	4
6804030201	ECHIN. HOLOTHUR. LEPTOSYNAPTA INHAERENS						1
6804100101	ECHIDOPERMATA HOLOTH CUCUMARIA CALCIGERA						1
6804120200	ECHINODERM PSOLUS SP.						2
6804120205	ECHIN. HOLOTHUR. PSOLUS PHANTAPUS			X		X	1
7200000000	TUNICATA						1
7203030203	UROCHORDATA BOLTENIA VILLOSA						1
7916060501	TELEOSTEI PHANERODON FURCATUS						1
7916170101	TELEOSTEI AMMODYTES HERAPTERUS						1

TOTAL NUMBER OF TAXONS = 426

OCS COORDINATION OFFICE

University of Alaska

ESTIMATE OF FUNDS EXPENDED

DATE: March 31, 1976

CONTRACT NUMBER: 03-5-022-56

TASK ORDER NUMBER: 15

PRINCIPAL INVESTIGATOR: Dr. Howard M. Feder

Period April 1, 1975 - March 31, 1976* (12 mos)

	Total Budget	Expended	Remaining
Salaries & Wages	46,516.00	40,984.91	5,531.09
Staff Benefits	7,854.00	7,078.26	775.74
Equipment	3,500.00	2,100.00	1,400.00
Travel	3,500.00	5,115.87	(1,615.87)
Other	68,300.00	39,970.67	28,329.33
Total Direct	129,670.00	95,249.71	34,420.29
Indirect	26,608.00	23,443.37	3,164.63
Task Order Total	156,278.00	118,693.08	37,584.92

* Preliminary cost data, not yet fully processed.

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ENVIRONMENTAL DATA SUBMISSION SCHEDULE

DATE: March 31, 1976

CONTRACT NUMBER: 03-5-022-56 T/O NUMBER: 15 R.U. NUMBER: 5/303

PRINCIPAL INVESTIGATOR: Dr. H. M. Feder

Submission dates are estimated only and will be updated, if necessary, each quarter. Data batches refer to date as identified in the data management plan.

Cruise/Field Operation	Collection Dates		Estimated Submission Dates[1]			
	From	To	Batch 1	2		
Discoverer Leg I #808	5/15/75	5/30/75	5/20/76	None		
Discoverer Leg II #808	6/2/75	6/19/75	5/20/76	None		
Miller Freeman	8/16/75	10/20/75	6/30/76	6/30/76		

Note: [1] Data Management Plan and Data Format have been approved and are considered contractual.

Following is part 2 of the quarterly report R.U.# 5/303 for the period ending December 31, 1975. This was received after the printing of the Quarterly Reports, July - September 1975, therefore is included here.

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Quarterly Report for Quarter Ending December 31, 1975

Fish R.U. 303

Project Title: The Distribution, Abundance, Diversity and Productivity of Benthic Organisms in the Bering Sea

Contract Number: 03-5-022-56

Task Order Number: 15

Principal Investigator: Dr. Howard M. Feder

I. Task Objectives

A. Qualitative and quantitative census of dominant species within oil lease sites.
B. Description of seasonal and spatial distribution patterns, with emphasis on assessing patchiness and correlation with microhabitat.
C. Comparison of species distribution with physical, chemical, and geological factors.
D. Observations of biological interrelationships in benthic biota of the study area.

II. Field (Grab and Trawl Sampling) and Laboratory Activities

A. Ship schedule and name of vessel

8/16/75 - 10/24/75; R/V Miller Freeman

B. Scientific Party

R/V Miller Freeman
Mr. Max Hoberg - Legs I, III; Technician, U of A
Mr. Robert Roark - Legs I, II; Technician (temp.) U of A

C. Methods

1. One hour tows were made at predetermined station locations using an otter trawl. Non-commercially important invertebrate species were sorted, weighed and counted, identified or assigned a type number and an aliquot sample of most species preserved in 10% buffered formalin for later detailed examination. Selected species were collected and frozen for the Hydrocarbon and Heavy Metal Programs. Black and white photographs were taken of the common species primarily for field identification usage.

2. Laboratory analysis: Samples were taken to the Marine Sorting Center at the University of Alaska for examination.

D. Sample Location

Precise station locations for the R/V Miller Freeman are available but have not yet been plotted.

E. Data Collected or Analyzed

1. R/V Discoverer (5-15-75 to 6-20-75) 67 grab stations were occupied with 428 samples collected.

2. R/V Miller Freeman (8-16-75 to 10-24-75) 54 grab stations (312 replicates) were occupied. Two hundred and nineteen trawl stations were occupied.

III. Results

At present, analysis of about 104 grab samples has been completed in the Marine Sorting Center. Invertebrates taken by trawl have been identified and code numbers are being assigned. Maps to show species distribution in the study area are in the planning stage.

IV. Preliminary Interpretation

None at this time.

V. Problems Encountered, Recommended Changes

Serious problems of priority have arisen relative to the use of the Miller Freeman. The Benthic-Invertebrate grab program was apparently relegated to a minor role in the general scientific program. The original understanding involved a 50/50 use of shiptime with the National Marine Fisheries Service. This should be resolved for next field season. The cooperative effort with the National Marine Fisheries Service trawl program was most satisfactory. It was possible, as a result of this cooperation, to collect much more data than was originally anticipated. I would recommend a continuation of this cooperative effort, but suggest that more integrated planning be attempted next year in order to have a broader coverage of the OCS lease area.

OCS COORDINATION OFFICE

University of Alaska

ENVIRONMENTAL DATA SUBMISSION SCHEDULE

DATE: December 31, 1975

CONTRACT NUMBER: 03-5-022-56   T/O NUMBER: 15   R.U. NUMBER: 5/303

PRINCIPAL INVESTIGATOR: Dr. H. M. Feder

Submission dates are estimated only and will be updated, if necessary, each quarter. Data batches refer to data as identified in the data management plan.

Cruise/Field Operation	Collection Dates		Estimated Submission Dates[1]			
	From	To	Batch 1	2		
Discoverer Leg I #808	5/15/75	5/30/75	3/31/76	None		
Discoverer Leg II #808	6/2/75	6/19/75	3/31/76	None		
Miller Freeman	8/16/75	10/20/75	6/30/76	Unknown		

Note: [1] Estimated submission dates are contingent upon final approval of data management plan submitted in draft form Oct. 9, 1975 and University of Alaska approved form November 20, 1975 to NOAA. Also, final agreement by all parties on the data format is necessary.

OCS COORDINATION OFFICE

University of Alaska

ESTIMATE OF FUNDS EXPENDED

DATE: December 31, 1975

CONTRACT NUMBER: 03-5-022-56

TASK ORDER NUMBER: 15

PRINCIPAL INVESTIGATOR: Dr. Howard M. Feder

Period April 1 - December 31, 1975* (9 mos)

	Total Budget	Expended	Remaining
Salaries & Wages	46,516.00	31,730.27	14,785.73
Staff Benefits	7,854.00	5,258.04	2,595.96
Equipment	3,500.00	2,100.00	1,400.00
Travel	3,500.00	3,455.61	44.39
Other	68,300.00	24,503.74	43,796.26
Total Direct	129,670.00	67,047.66	62,622.34
Indirect	26,608.00	18,149.71	8,458.29
Task Order Total	156,278.00	85,197.37	71,080.63

* Preliminary cost data, not yet fully processed.

RU #6

FIRST YEARLY REPORT

Contract No. 03-5-022-68
Task Order No. 5
April 1, 1975 - March 31, 1976
Pages 1 - 33

The distribution, abundance, diversity, and productivity of the western Beaufort Sea benthos

Andrew G. Carey, Jr., Principal Investigator
School of Oceanography
Oregon State University
Corvallis, Oregon 97331

March 22, 1976

This is an interim report whic: presents preliminary information for the use of the uter Continental Shelf Energy Program (OCSEP). No ma erial contained may be quoted in external reports with written permission from the OCSEP Project Office an he principal investigator.

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FIRST ANNUAL REPORT

I. Summary of objectives, conclusions and implications with respect to Outer Continental Shelf (OCS) oil and gas development

The objectives of this benthic ecological study concern the description of the distribution and abundance of benthic species and species groups with valid estimates of the degree of variability in space and time. Enough samples are necessary to define the patterns and to determine the degree of variability.

Species groups will be determined by statistical analyses and the environmental features most likely to determine the distribution and abundance of species will be determined.

Life history information including reproductive activity of the dominant species will be obtained from seasonal samples.

These objectives will provide the OCS program with baseline information including natural variability in space and time. The distribution and abundance of species and species groups will be related to the environment, particularly to the inner shelf that is physically stressed. Life history information will provide data for estimating repopulation rates.

II. Introduction

A. General nature and scope of the problem

The distribution, abundance, and natural variability of benthic macro-infauna and mega-epifauna will be defined on the southwestern Beaufort Sea continental shelf. Patterns of faunal distributions will be determined and related to features of the benthic environment. Assemblages will be characterized by suitable bio-indices and trends in the data determined. Species groupings will be determined by statistical analyses, and their patterns of distribution defined. Reproductive activity and possible seasonal changes in dominant species population size structure will be studied by sampling four times per year to obtain basic life history information.

B. Specific objectives

We propose to survey and define the variability of the benthic fauna of the western Beaufort Sea continental shelf from Point Barrow to the Canadian border and to undertake time series studies when appropriate and feasible. Data are to be obtained on the faunal composition and abundance to form baselines to which potential future changes can be compared. Biological rates, life histories, and species can define aspects of the functioning of communities and ecosystems potentially vulnerable to environmental damage by man and can determine the rates at which damaged environments and benthic faunal communities may recover.

Specific objectives include the initiation of studies and analysis to:

(1) Determine the distribution, species composition, numerical density, and biomass of the benthos in the area(s) of interest.

(2) Determine if benthic communities are present and to delimit their geographical and environmental extent.

(3) To determine the degree of correlation of various bio-indices with various aspects of the benthic environment and the oceanography of the region.

(4) To determine the degree of species interaction through the food web, ect.

C. Relevance to problems of petroleum development

Extensive drilling for oil and gas on the Alaskan and Canadian North Slope creates the potential for high environmental pollution and degradation in the coastal area.

The basic structure of the coastal ecosystem could be adversely affected in local areas, and the food web disrupted by oil spills toxic to phytoplankton, the primary producers, and to zooplankton (including larvae of benthic invertebrates). In the inner shelf environment, the bottom could be a sink for heavier oils, and perhaps include large amounts of toxic volatiles because of the colder temperatures found in the Beaufort Sea. Coastal benthic fauna could have high mortalities caused by a spill so carnivores, including fish, whales, seals, and polar bears, would find less to feed on.

It is evident, however, after a year of gathering data that our basic knowledge of the Beaufort Sea fauna is very poor. Information concerning species composition, variability in space and time, reproduction, growth, and physiology is virtually nil. This lack of knowledge makes it very difficult to predict or to assess the degree and extent of environmental degradation. To understand what effect an oil spill or well blow-out might have on the functioning of the coastal and inner shelf ecosystem, we need to know more about the biota especially the critical species in the benthic communities.

Summaries and data analyses of the present and future assembled material on the benthos in the Beaufort Sea will provide a basis for evaluating the potential effects of possible oil spills and general environmental pollution caused by the necessary supportive activities by man in this relatively unspoiled environment. Areas for additional study will be identified.

III. CURRENT STATE OF KNOWLEDGE

Except for a few early scattered samples collected in 1880's extensive sampling of the benthos in the Beaufort Sea did not begin until the early 1950's when MacGinitie began sampling from the Naval Arctic Research Laboratory at Barrow, Alaska (MacGinitie, 1955). This slow start in oceanographic research in the Beaufort Sea is concerned with: lack of accesibility, lack of early commercial interest, e.g. fisheries, and scientific tradition (Curtis, 1975). Until the advent and availability of modern icebreakers, routine research in the area was not practical because of the generally heavy sea ice conditions and the very short summer season of variable open water. The dominant factor behind the recent rapid expansion of oceanographic research, including benthic ecological research has been the potential oil and gas production on the Beaufort Sea continental shelf.

The few early benthic samples in the Beaufort Sea were collected during the cruises of the YUKON (1880) and CORWIN (1884). Some benthic samples were also collected in the area during the International Polar Year Expedition to Point Barrow (1881-83), (Curtis, 1975).

Qualitative but fairly extensive benthic collections were obtained by MacGinitie (1955) during his tenure as director of the Naval Arctic Research Laboratory (NARL). The Naval camp at Point Barrow was established for early oil explorations in the 1940's, but later became the site of the Naval Arctic Research Laboratory, a development which made the Beaufort Sea more accessible for oceanographic research. MacGinitie's samples provide us with the first extensive benthic species lists and scattered natural history notes. The collection locations were mainly west of Point Barrow in the Chukchi Sea. NARL has been used as a base for isolated studies since that time (Mohr, 1969).

During the 1960's, benthic sampling was undertaken in the eastern Beaufort Sea by the Canadians aboard the Fisheries Research Board of Canada vessel, SALVELINUS. This field program was part of the Canadian investigations in the western Canadian Arctic during 1960-65(Curtis, 1975). Deepwater benthic collections by Menzies (1963) and Paul and Menzies (1974) were made in the northern sector of the Beaufort from U.S. ice stations Bravo and T-3 as they drifted through the region.

The 1970's has been a period of rapid development in Beaufort Sea oceanographic investigations especially in benthic ecology and systematics. The development of oil and gas fields on United States and Canadian coastal lands stimulated scientific investigations of the environment, biota, and ecosystem. Offshore explorations of potentially large oil and gas fields underneath the continental shelf have directly stimulated marine research. The Canadian oceanographic vessel HUDSON obtained quantitative benthic samples from the Beaufort Sea in 1970. The U.S. Coast Guard sponsored a series of ecological baseline cruises (WEBSEC) to the area soon after the discovery of the extensive oil and gas fields on the Alaskan North Slope. Benthic sampling and photography was undertaken by Carey in 1971-72 (Carey, et al. 1974; Carey and Ruff, unpublished ms.).

Extensive environmental research programs were initiated by the Canadians in the southeastern Beaufort Sea and by the United States in the southwestern sector. The Canadian quantitative benthic sampling concerned the Mackenzie River delta region, the Eskimo Lakes, and much of the Southeastern continental shelf (Wacasey, 1974). The U.S. Outer Continental Shelf Energy Program (OCSEP) environmental assessment research includes work by Carey (this report) on the benthos.

Wacasey (1974) reported that the diversity and biomass of the benthic in infauna in the southeastern Beaufort Sea increased with depth and distance away from the Mackenzie River delta between depths of 3 to 94 meters. The number of species ranged from 1 to 51; the numerical density from 52 to $12{,}444/m^2$; and the biomass from 0.1 - 67.7 g (dry wt)/m^2. Seventeen stations were occupied between Cape Dalhousie and Herschel Island during July, 1973.

The Mackenzie River outflow significantly influences the surrounding area, creating estuarine conditions down to 15 meters depth. The freshwater dilution, however, is more marked to the east near Tuktoyaktuk Peninsula. Salinities at the stations ranged from 0.0 ‰ at 3 meters depth to 32.8 ‰ at 42 meters depth.

Sixteen additional stations have subsequently been sampled by Wasasey on the southeastern Beaufort shelf (Wacasey, 1974a). The Eskimo Lakes to the east of Tuktoyaktuk Peninsula have also been sampled and preliminary data reported in a Technical Report (Wecasey, 1974b).

In the western segment of the Beaufort Sea, the maximum macro-infaunal biomass is at 140 meters depth on the upper continental slope (Carey et al, 1974). The maximum numerical density, however, occurs at a depth of 700 meters; this is considerably deeper than the numerical maxima found in more temperate waters. The standing stocks of inshore fauna at depths of 20 meters are depressed in numbers and biomass, perhaps implicating ice scour as a major environmental disturbance (Carey and Ruff, unpublished manuscript).

The numerical densities of the western Beaufort Sea macrofauna are similar to those from temperate waters, but the biomass reaches higher levels in the Beaufort. The benthic environment near the Mackenzie river but deep enough ($\geq$ 33 meters) to be below the effect of freshwater dilution, supports considerably larger amounts of benthos than at similar depths in the western portion.

IV. STUDY AREA

The Beaufort Sea

The Beaufort Sea extends along the northern coast of Alaska from the Pt. Barrow area eastward to the western boundary of the Canadian Archipelago (Fig. 1). In contrast to the other shallow satellite seas bordering the arctic rim, the Beaufort is physically and oceanographically considered a part of the Arctic Ocean (Coachman, 1963). The continental shelf in this region is very narrow and in general is covered with muds and gravels (Carsola, 1954; Barnes and Reimnitz, 1975). The shallow shelf break averages only 70 meters in depth, and the continental slope decends steeply to meet the floor of the Canada Basin at approximately 3500 meters (Carsola et al., 1961). The hydrography of the Beaufort Sea is characteristic of the Arctic Ocean, exhibiting (1) a mixed Arctic surface layer, (2) an intermediate Atlantic water layer, and (3) a lower layer of Arctic bottom water (Coachman and Barnes, 1961; Coachman, 1963). The surface layer is a mixture of continental runoff, seasonal ice melt, and intrusions of water to an unknown extent from the Bering and Chukchi Seas. In certain areas the surface water may occasionally be enriched with underlying waters by coastal upwelling. This phenomenon has been detected during one summer cruise at the shelf ecge north of the Barter Island region during unusually light sea ice conditions (Hufford, 1975; Mountain, 1975).

Ice forms across the surface of the southern Beaufort Sea in the early fall and completely covers the continental shelf until the following summer. Shorefast ice extends seaward to a water depth of 1-20 meters where it impinges on the main polar ice pack. During the short arctic summer this ice breaks up and edge of the pack usually recedes beyond the shelf break, although its exact location is highly variable from year to year (U.S. Navy Hydrographic Office, 1958). Drifting and grounded ice floes are often present on the continental shelf throughout the summer. Recent evidence has indicated that grounded pressure ridge keels and ice islands plow along the shelf at random intervals, reworking the sediments to a significant extent (Kovacs and Mellor, 1975; Reimnitz and Barnes, 1975; Barnes and Reimnitz, 1975).

The Beaufort Sea ecosystem is controlled to a large degree by the stability of the water column, the marked seasonality, and the presence of seasonal and permanent sea ice. These features produce an environment in which oceanic waters beyond the continental shelf are extremely low in biological productivity (English, 1961; Meguro et al., 1966). Recent work has demonstrated significant populations of shade adapted under-ice diatoms in neritic waters (Meguro et al., 1966; Bunt and Lee, 1970; Horner and Alexander, 1972; Horner, In Press). Although the geographical and temporal extent of these algae is unknown, the strongly stratified water column beneath the ice curtails nutrient renewal: overall production from these species is probably limited. The degree of primary production in coastal waters remains relatively unknown. Occasional large standing stocks of phytoplankton with high chlorophyll concentrations have been noted during summers with open water (Horner, personal communication), but in general, evidence indicates that nearshore production is variable from year to year, and very low on the average (Appollonio, 1965; McRoy, et al., 1972).

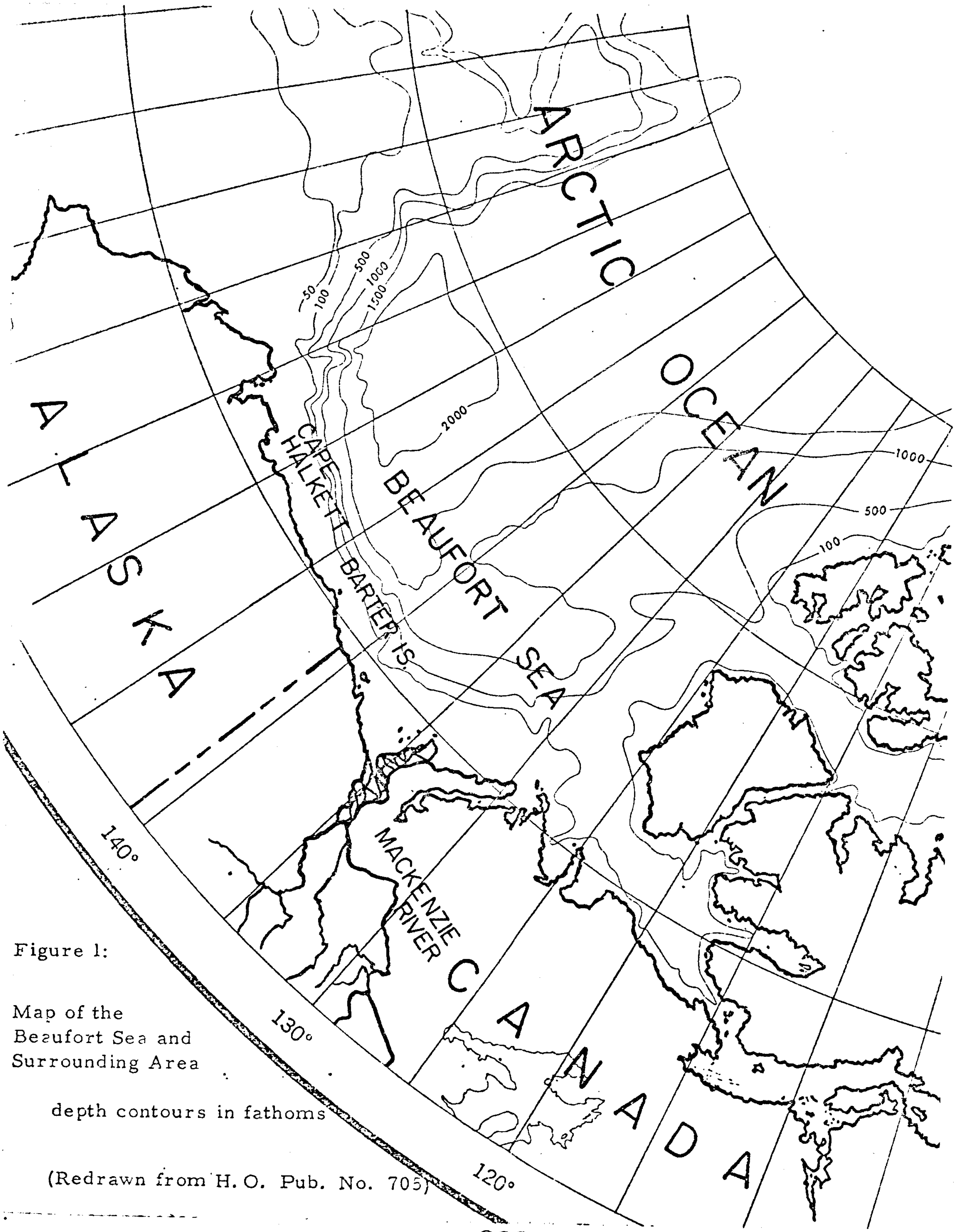


Figure 1:

Map of the Beaufort Sea and Surrounding Area

depth contours in fathoms

(Redrawn from H. O. Pub. No. 705)

V. Methods

A. General Methods

The goals of our benthic sampling during the next phase of research in the Beaufort Sea are: (1) to quantitatively sample a broad size range of infauna and epifauna over an extended depth range and geographic area, and (2) to photograph large epibenthic organisms for quantitative analysis of abundance and micro- and meso-scale faunal distribution. Analysis of the photographic and faunal samples will proceed using quantitative laboratory methodology, and the organisms will be identified as far as possible. The relationship of the species with the environmental parameters will then be examined statistically to determine causal relationships. We can then map species and community (species associations) distributions and determine the numerical abundance and biomass of the fauna across the study area.

Sampling Gear

Several different pieces of equipment are necessary to adequately sample the benthic fauna in the Beaufort Sea. The samplers elected have been used previously under arctic conditions and have been shown to be effective in pack ice.

The Smith-McIntyre grab will be used to sample the infauna in shallow to moderate depths. The reasons for its choice has been listed in an earlier section of this proposal. For normal routine sampling, this instrument has proven both efficient and effective. For sampling in very dense sediments at great depths, a 0.25 m^2 NEL spade corer will be utilized. This sampler collects large volume, high quality samples that yield accurate estimates of infaunal population densities and species composition (Smith and Howard, 1972; Hessler and Jumars, 1974). Although more difficult to handle routinely aboard the icebreaker, this piece of gear will efficiently cut the sampling at the deep stations, and will permit quantitative representation in substrates too dense for adequate grab penetration.

The grab and box corer samples will be washed by a gentle flotation method through a 0.42 mm screen on board ship. The material retained on the sieve will be fixed in 10% neutralized formalin-sea water and then transferred to 70% neutralized ethanol after 2 days. This preservation technique will minimize damage to the fauna from acidification of the formaldehyde.

The larger eipfauna (>1.3 cm) will be sampled when ice conditions permit with a four meter otter trawl modified with large mud rollers. Organisms will also be obtained when possible by trapping, and by dives at shallow stations. Selected specimens will be frozen for later analysis of heavy metals, pesticides and petroleum hydrocarbons. The balance of the organisms will be preserved in neutralized formalin. Although qualitative in nature, these hauls effectively capture the rarer organisms, and greatly aid in elucidating the overall species distributions.

Quantitative estimates of the larger epifauna will be accomplished through photography with an E G & G model 205 deep-sea camera system. This piece of gear can be used in heavy pack ice conditions where trawling would not be feasible. Large organisms can be easily counted from the photographs, and the otter trawl and quantitative beam trawl collections will aid or confirm identifications at appropriate depths.

Laboratory Processing

At the Oregon State University benthic laboratory, the infaunal samples will be separated into the larger meio-fauna (0.42 to 1.00 mm) and the macrofauna (1.00 mm). Both fractions will be stained with a protein specific dye,and sorted into taxonomic categories with the aid of a dissecting microscope. The organisms will then be counted and wet-weighed on a semi-micro balance for determination of the numerical density and biomass of each group across the study area.

The essential step of identification is a long one that requires expertise and much time. The OSU benthic ecology laboratory is working up much of the material, and we are utilizing specialists to confirm identifications or to work up entire taxonomic groups. Graduate students with taxonomic expertise and skill form an integral part of my research program. A Ph.D. candidate, Gordon Bilyard, will undertake polychaete systematics as a basis for his dissertation. Progress to data has been good, and we are achieving a working familiarity with much of the fauna.

A number of taxonomic specialists will continue to aid our research program. Cooperating systematists have confirmed many range extensions, noting the taxonomic and zoogeographic value of our collections. In addition, to the general taxonomic skill of fulltime laboratory assistants, the following specialists have been working on our Arctic collections:

Cnidaria	Charles E. Cutress	University of Peurto Rico
Polychaeta	Gordon R. Bilyard Kristian Fauchild	OSU Oceanography Allan Hancock Foundation USC
Echinodermata		
Ophuiroidea	Michael A. Kyte	Maine Dept. of Marine Resources
Holothuroidea	Robert Carney David Pawson	OSU Oceanography Natural History Museum Smithsonian Institution
Chordata-Vertebrate		
Teleostomi	Don E. McAllister	Museum of Natural Sciences, Ottawa

Arthropoda-Crustacea		
Amphipoda	Jean Just	University of Copenhagen
	Diana Laubitz	Toronto National Museum
Mollusca		
Pelecypoda	Frank Bernard	Fisheries Research Board of Canada, Nanaimo
Prosobranchia	James McClean	Natural History Museum Los Angeles County
Aplacophora	Amelie Scheltema	Woods Hole Oceanographic Institution

Bottom Photography

Film from the deep-sea camera system will be processed and printed in an 8 X 10 format. Image parallax can then be used to quantify the area covered within the stereo photographs (Pollio, 1969). Using marking and recording methods developed at OSU, the prints will be assessed for the distribution and abundance of selected mega-epifauna (Carey, Rucker and Tipper, 1974). Previously studies in other areas using bottom photography have shown that this technique can be used to advantage for the larger epifauna (Rowe and Menzies, 1969; Wigley and Emery, 1967; Owen, Sanders and Hessler, 1969). We have found close correlations between estimates of abundance for epifaunal echinoderms from quantitative beam trawl, bottom grab, and bottom camera stations at a depth of 2300 m (Carey, Rucker, and Tipper, unpublished data). Final species identifications made from the photographs will be confirmed by the otter trawl collections taken at similar depths.

B. Sampling

1. Through-the-ice sampling
   a. Development of new through-the-ice benthic infaunal sampling techniques

Techniques and gear have been developed for sampling benthic infauna at standard seasonal stations from the sea ice in the Beaufort Sea. Because the sampling plan is based on seasonal samples from standard stations on 1-3 transect lines, the field strategy is based on mobile logistic support with daily field trips out on the ice via helicopter. Techniques and equipment, therefore, have to be oriented toward maneuverability and speed. On the other hand, benthic sampling gear is large and heavy; therefore gear handling requires a substantial winch and wire support and a large hole cut through the ice. We have been able to develop techniques and handling gear that function as a workable compromise between these criteria!

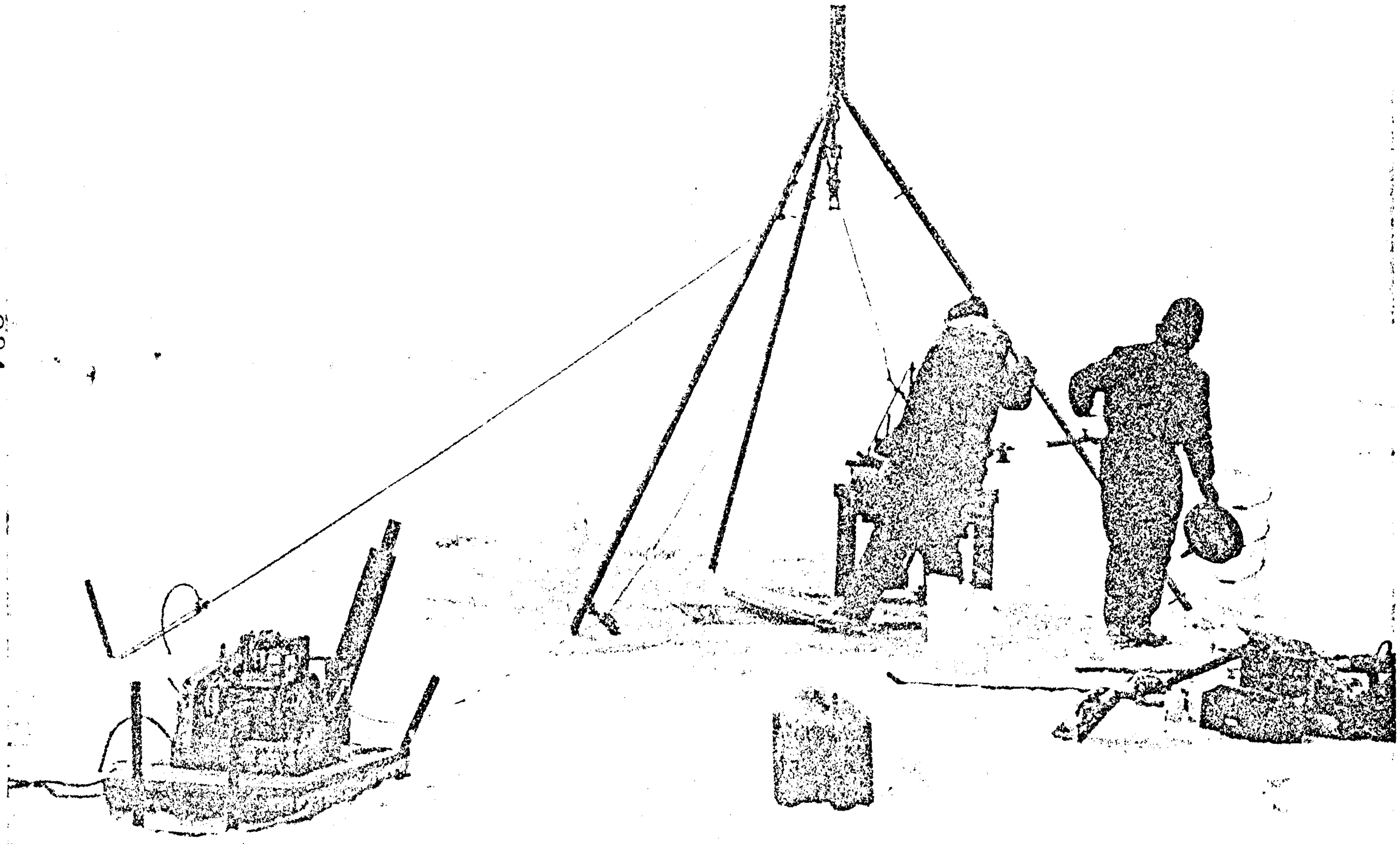
A benthic station is first located along the transect line by position and then depth. As most benthic organisms are distributed in depth zones, depth is an important criterion for station position. The water depth is determined either by a sounding wire or an electronic depth sounder (Data Marine, Model No. 2600).

Actual station preparation then starts with the cutting of a 4-foot square hole through the ice. A chain saw and/or an 8 inch power ice auger are used as the main cutting tools. The auger has proven to be more efficient in ice greater than 2 feet thick. The saw and/or auger are used to cut ice blocks to lift from the hole with the help of ice chisels. Large ice tongs are used to pull out the ice chunks.

After sampling hole is complete, a steel pipe ($1\frac{1}{2}$" diameter) tripod is rigged over the hole with one block at the apex and one at the base of one leg. The wire (3.16" diameter) wire is led first through the lower block, then through the upper one and finally is fastened to a roller bearing swivel and to the 0.1 m^2 Smith-McIntyre grab. For stability the tripod legs are placed into 2-3 inch deep holes chipped in the ice. Opposite the grab stand a guy line is attached from the upper tripod to a 1 inch aluminum pipe imbedded in the ice to counteract any lateral force exerted by deploying and retrieving the grab to and from the hole. The portable gasoline powered hydro winch (Hydro Products, Model No. HR35B) is placed on the ice to one side and positioned so the wire feeds freely to the lower block on one tripod leg. The winch is secured in place by 4 1-inch aluminium pipes sunk into predrilled $1\frac{1}{2}$" holes bored into the ice by a hand auger. The light weight grab stand made of a folding aluminium angle from is placed next to the hole between two tripod legs. It also is secured in place by 2 1-inch aluminium pipes.

Station preparation time varies from 2-3 hours depending on the ice thickness. Field trips in October 1975 and March 1976 have demonstrated the effectiveness of the sampling scheme. Though benthic sampling from and through sea ice has been accomplished before, this program is the first to occupy stations across a continental shelf up to 40 n mi offshore on a seasonal basis using a helicopter. The support vehicle provides extreme mobility and makes such a sampling scheme possible.

Figure 2. Benthic ice station, 26 October 1975. Note the basic layout with the hydro winch to the left and the tripod over the 4-foot square hole.



b. A new system for sieving infaunal benthic samples

The multiple screen cascading sediment siever, a new washing system for benthic infaunal samples has been designed, built and field tested. A new paired washing system with its own water supply was used on the March field trip. A paper reporting the design and initial results will be written for the yearly report and for publication.

During an earlier benthic survey in the Beaufort Sea (WEBSEC-71), it became evident that improved techniques for sieving were necessary for more efficient but less harsh sample processing. The alaskan shelf sediments often contain significant amounts of gravel and consolidated clay that are difficult to wash through the necessary fine mesh sieves of 0.42 mm aperture. Any forceful water spray damaged the animals being extracted from the substrate. A new design for a siever finally evolved, and the sieving system was built and tested at Barrow during the October 1975 field trip.

The sieving system consists of a flotation wash box with a bottom water spray that discharges onto a 0.6 cm aperture sieve (Figure 2). Each tiered sieve is exposed and recieves the successively screened water from the larger aperture sieve above. A collecting trough tightly fitted underneath each sieve collects the water and feeds it plus the smaller organisms and sediment particles through a spout to the next sieve. The water and contained particles cascades from one sieve box to the next. It finally flows through the 0.42 aperture sieve and out the discharge spout of the system. Two auxiliary hoses provide the water necessary for cleaning the screens and transfering the samples to containers. With the new redesigned system a large volume JABSCO bilge pump is driven by a 2 horsepower electric motor to provide the necessary volume of water to operate the two side-by-side sieving systems in the field. A heated hydro hut on the ice at Barrow and Prudhoe Bay provide the necessary environment for sample washing under Arctic conditions.

The prototype was tested on the October field trip during the seasonal sampling on the Pitt Point Station line. The three tiered sieves - 0.6 cm, 1.0 mm, and 0.42 mm aperture and the large volume, low velocity water supply functioned well. The clay conglomerates on the top sieve gradually broke up under the water stream from the wash box. The larger gravel was effectively screened out. Later laboratory work with the organisms verified that the animals were generally maintained in excellent shape.

The sieving device is constructed of marine plywood fastened together with Resorcinol glue and brass screws. The screens are stainless steel, except for the upper, largest aperture sieve which has galvanized steel mesh. All seams are caulked and contoured when inside the screen boxes and lower collecting trough. The units are fiberglassed and painted. All hoses are of low temperature plastic or rubber capable of maintaining its operating qualities in the Arctic environment. Each system unit is designed to fold and fit within a carrying box, which in turn functions as a base support and lowest water collector and final water discharge. Each sieving system cost $414 in materials and took 103 manhhours to build, The pump and electric drive motor fit within a carrying box. The pump system including intake and distribution hoses cost $662.

Figure 3. Cascading Multiple Sieve Sediment Washer. Note the flotation wash box on top with the successively finer sieve boxes below.

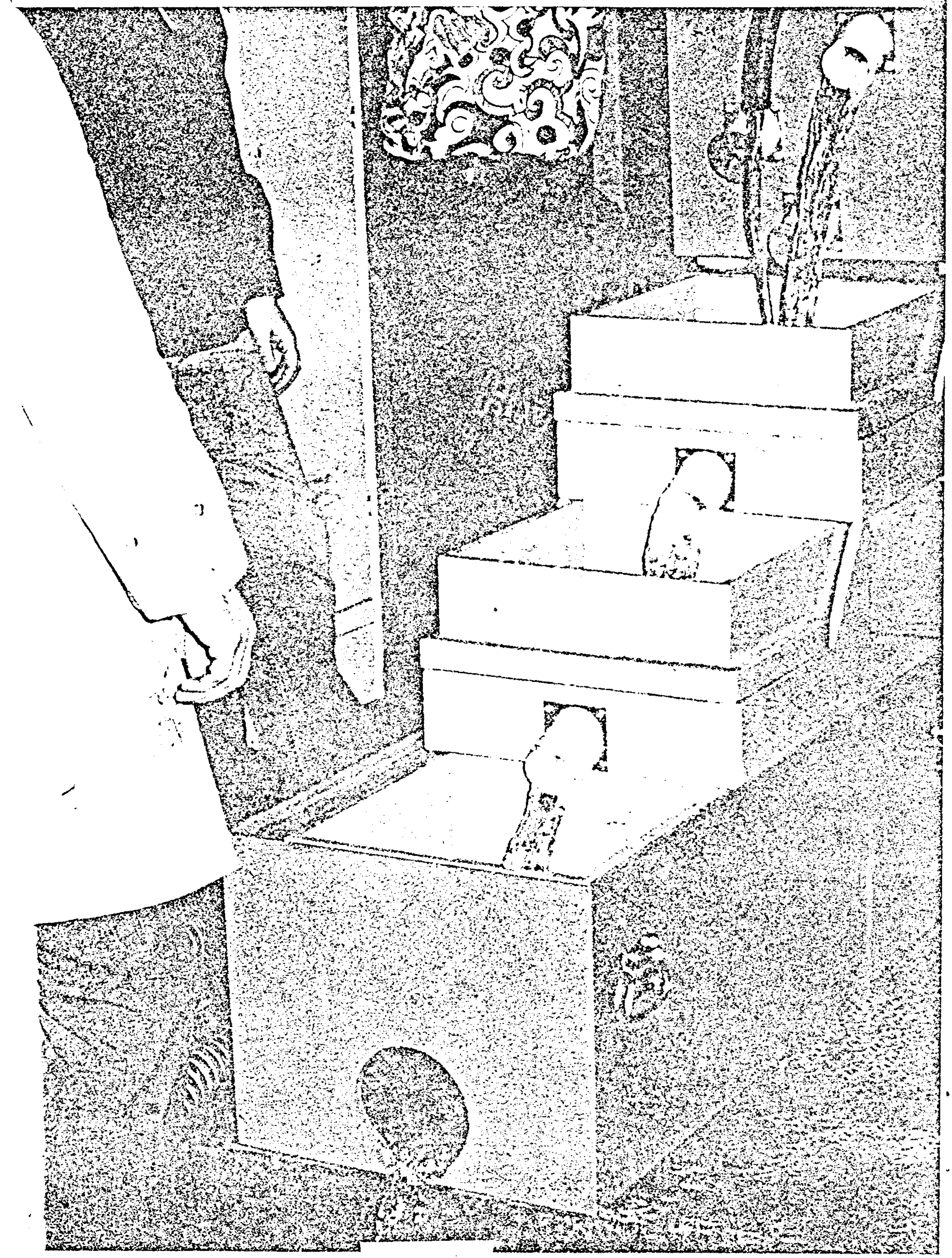


Figure 4. The JABSCO bilge pump driven by a 2 HP electric motor to provide water for the sieving system.

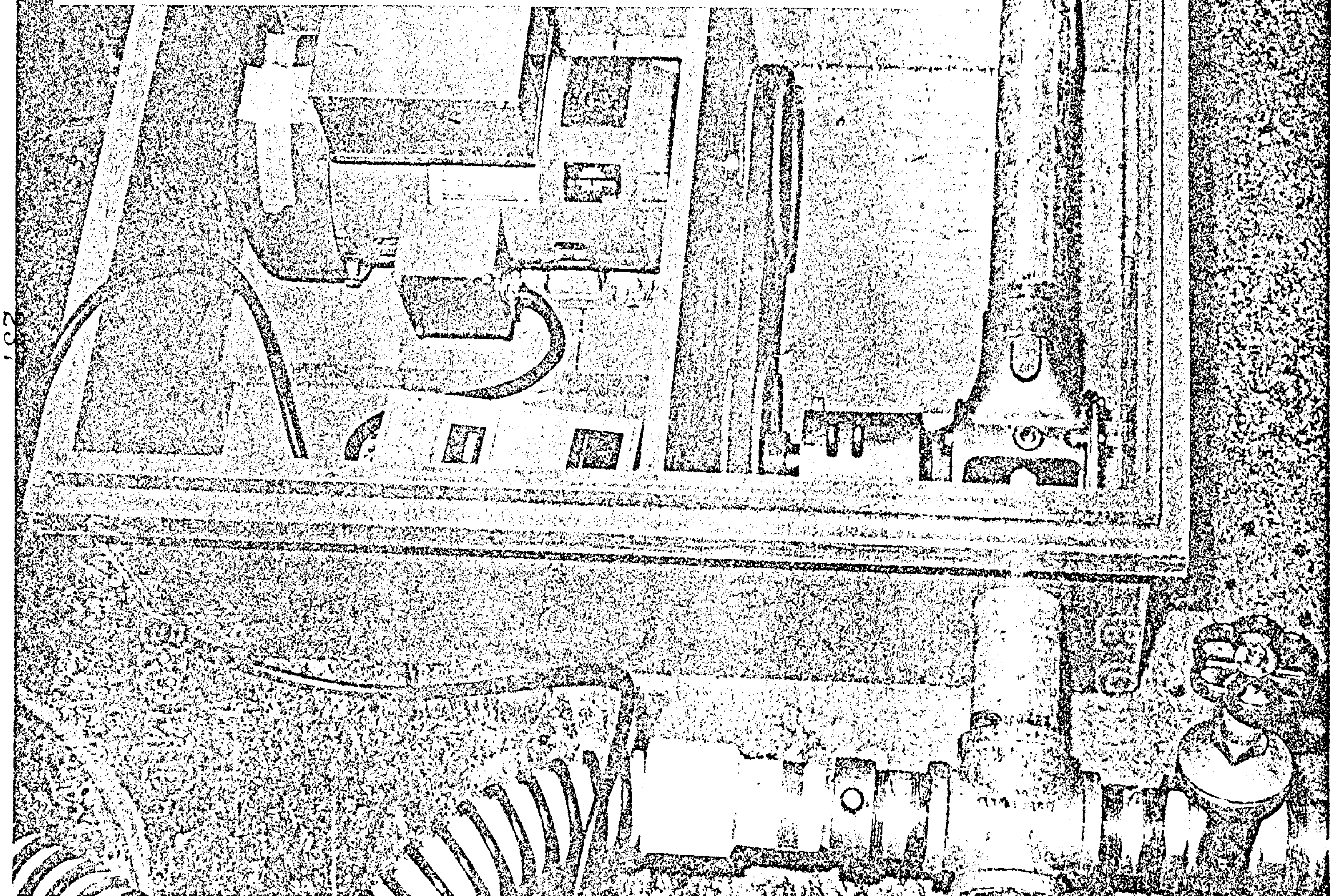
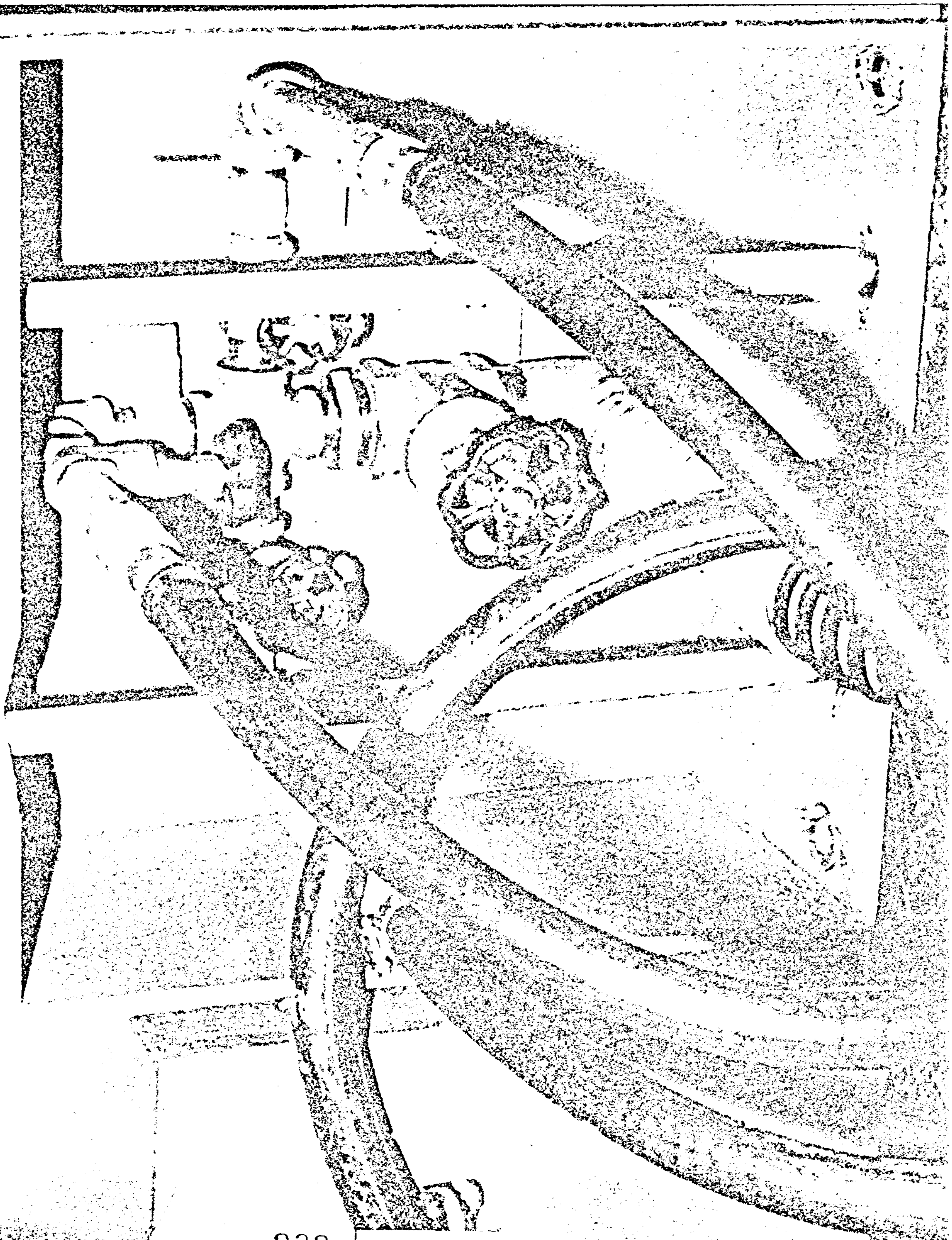


Figure 5. The water distribution system and volume control for the wash box hose (upper center) and two auxiliary hoses for washing out sieves.



c. Distribution of samples

Seasonal samples will be collected at as many stations as possible across the continental shelf on the 3 100-km long transects that lie at 20° to the northeast of Pitt Point, Prudhoe Bay, and Barter Island. The benthos stations are located at depths 25, 40, 55, 70 and 100 meters. Experience from the October and March field trips demonstrates that we can occupy stations at 2 transects at the most. Emphasis will be placed on the Pitt Point line with the philosophy that if time is inadequate strong data from one station line is more advisable than a broader but thinner coverage on several.

Summer fieldwork from vessels will occupy the seasonal stations on all 3 lines plus additonal frequent samples along the 30 meter contour between Pt. Barrow and the Demarcation Line and areas of interest in coastal waters between the 5 and 20 meter contours. More samples will be obtained in the Prudhoe Bay and Barter Island areas because of environmental and ecological interest, respectively.

C. Data management

Definition of Data Types

The following information will be supplied to NODC/EDS when available, in a form suitable for automatic data processing in partial fulfillment of the tasks mentiond above:

I. Cruise Information
   1) Cruise number
   2) Vessel name
   3) Observations, comments, etc.

II. Station Information
   1) Station number
   2) Starting depth (M)
   3) Starting data (GMT)
   4) Starting time (GMT)
   5) Starting Latitude
   6) Starting Longitude
   7) Ending depth (M)
   8) Ending date (GMT)
   9) Ending time (GMT)
   10) Ending Latitude
   11) Ending Longitude
   12) Distance offshore (km)
   13) Tow direction (°)
   14) Starting core depth (cm)
   15) Ending core depth (cm)
   16) Sample penetration depth (mm)
   17) Area sampled (M^2)
   18) Bottom salinity (°/$_{oo}$)
   19) Bottom temperature (c)
   20) Bottom oxygen (ml/l)
   21) Sediment Organic Carbon (%)
   22) Sediment total carbon (%)
   23) Percent Sand
   24) Percent silt
   25) Percent clay
   26) Minimum Sieve size (mm)
   27) Wire length out (M)
   28) Wire angle
   29) Average Phi size
   30) Equipment code
   31) Sample number

III. Taxon Information
   1) Modified VIMS 12 digit taxonomic code
   2) Number of individuals of the above taxon counted
   3) Total wet weight of all above individuals (gm)

240

Although a complete discussion of the laboratory and sampling techniques used to arrive at the above parameters is not feasible, some of the conventions used to record the data can be mentioned. All dates are written in the year-month-day format with times recorded in the 24 hour form to the nearest tenth of an hour. The position of a station is recorded in degrees, minutes, and seconds with a hemisphere indicator for both latitude and longitude. The parameter "Distance offshore" has been interpreted as the distance the station is from the 5 meter depth contour to avoid the ambiguity of measuring the distance from the mainland or an island when they are present. Directions are entered in whole degrees relative to true North, and sediment percentages are calculated by weight. If a core was taken and divided into subsamples the beginning and ending core depth describes the position of the slice in relation to the top of the core. If both depths are zero it is meant to refer to the floculent layer that was floated off the top of the core. If the above descriptions are not sufficient more detailed information can be provided by contacting the principal investigator.

Schedule and Quantity of Data

The information will be transmitted to the Juneau Project Office on magnetic tape (9 track, EBCDIC, 800BPI) quarterly beginning July 1976. Information will be submitted at two levels. The first level will consist of all new information available which was collected or analysed since the last quarter. The second level of information is associated with previously transmitted information, which is now available for the first time. This information may be new information or data that supercedes previous information. We expect that the second level information at times will be substantial since identifications are often performed by specialists and are not available for extended periods of time. Any new taxonomic groups which do not have a VIMS code assigned to it will be sent to the Juneau Project Office for a code to be determined. All taxa for which VIMS codes have not been assigned will be withheld until we are notified of the appropriate codes. The quanity of data that will be transmitted each quarter is difficult to estimate since the richness of area is not well known at this time. A liberal estimate would be 200 cards per sample, which converts to 1000 cards per station. The number of stations per quarter will be variable but another gross estimate would be 12 to 20 stations about every 3 months.

Format Declaration

All information sent will be in a format consistent with the NODC file type 032. The information will be stored on an unlabeled, 9 track magnetic tape recorded at a density of 800 BPI in EBCDIC code, with an 80 frame fixed block format (card images).

Quality Control

Data will generally be originally recorded on forms from which cards can be keypunched directly. All forms will be verified before they are keypunched, then verified again in card form. The cards are processed by computer and preliminary summarys are calculated, the information is then placed in an inhouse data base. Quarterly the data base will be searched and information that will be transmitted will be written on the magnetic tape in the proper format. The data base will be constantly updated and verified to minimise incorrect data, and since the magnetic tape uses information stored in the computer a transcription step has been eliminated, as well as giving more flexability in correcting errors and retrieving data.

D. Statistical analyses of data

There are many techniques for evaluating data which involve species occurences at specified stations; these range from a careful overview of the spatial distributions, to diversity analysis (diversity, niche breadth, etc.), and on to more complex statistical methods such as principal components, or canonical correlation. The choice of the technique is often dependent on the specific questions being asked. The results should always be interpreted relative to the sampling strategy used. As the complexity of the analysis increases more assumptions have to be made about the relationships between the species. The complexity also forces many people into viewing the techniques as "black boxes", not fully understanding the limitations they impose on the interpretation of the relationships among the species. The analysis of data, therefore, should be the simplist that achieves the desired resolution.

With the above philosophy in mind the following is a series of analyses that are appropriate for evaluating which species are found to co-occur. The analyses are presented in roughly the order of their complexity. The level of resolution sufficient to answer the questions is one of those subjective and intuitive decisions that can not be computed; it is best left to the principal investigator to decide. (1) Species diversity, niche breadth, and multiple correlation are techniques that give a good description of the data set. These analyses provide perspective into the data set, since they are familiar types of analyses. The correlation matrix is also useful because it often embodies all the information necessary for multivariate techniques. The linear patterns that these techniques extract must be in the original correlation matrix.

(2) Recurrent species groups can also be separated using the various clustering algorithms (Sneath and Sokal, 1973; Lance and Williams, 1967a; Lance and Williams, 1967b). Clustering techniques can utilize many different cluster algorithms and similarity functions. Euclidean distance, however, has the advantage of being computationally simple and intuitively easy to visualize.

(3) Multivariate analysis of the data set is the next level of complexity. Two techniques are commonly used, they are 1) principal components or factor analysis (Hughes, Peer, and Mann, 1972), and 2) canonical correlation (Cassie, 1972a; Cassie, 1972b). This are by no means a complete list of applicable analyses that determine recurrent groups of species (Fager, 1957), but they are commonly used to classify species into fixed groups. We have been evaluating these statistical techniques in preparation for analyses of Beaufort Sea benthic data. We will initially start with the simpler, more straight-forward approaches. If necessary, some of the more complex analyses will be used.

VI. Results

A. Sampling

Two major attempts were made to sample the benthos during the summer of 1975, however, unusually heavy summer sea ice conditions aborted both the operations on the USCGC GLACIER and on the R/V NATCHIK. The ice prevented the collection of coastal samples (5-20 meters in depth) from Point Barrow to Prudhoe Bay and along the shelf (30 meter contour) from Point Barrow to the United States-Canadian border.

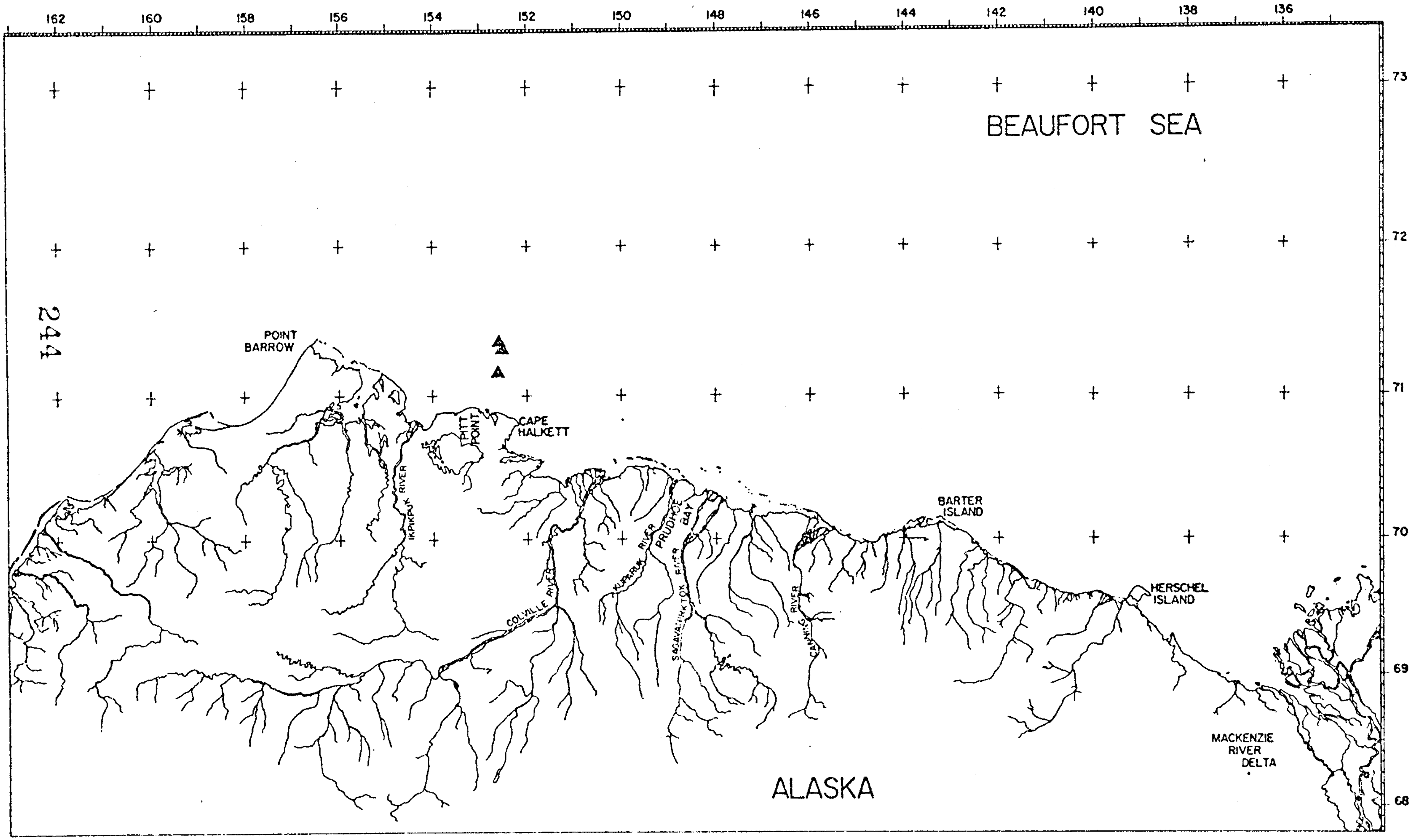
Seasonal sampling at standard stations on the Pitt Point station line slightly west of Cape Halkett was initiated. Techniques and gear were developed to successfully transport sampling gear to an ice station on the shelf and to effectively operate through the ice. The following samples were obtained:

	Station	Location		No. Grabs	Depth (m)
26 Oct 75	PPB - 2	71° 08.7' N	152° 39.9' W	6	25
29 Oct 75	PPB - 5	71° 19.1' N	152° 34.0' W	5	59
30 Oct 75	PPB - 6	71° 21.6' N	152° 35.0' W	5	102

B. Sample processing, faunal systematics, and data analysis

The 16 Smith-McIntyre grab samples collected during the October field trip on the ice have been picked and sorted to major taxonomic categories. They were put aside until the development of a suitable non-destructive technique for preserved wet weight biomass measurement.

Figure 6. Location of Standard Seasonal Stations on the Pitt Point Transect Occupied October 1975.



VII. Discussion

From the review of the literature and unpublished data to date, it is evident that available data are sparse. It is difficult to draw firm conclusions concerning the potential effect of man's accelerated oil and gas drilling and xploration on the ecology of the North Slope and adjacent coastal waters. Before any real or potential effects can be evaluated, much basic and long-term information has to be obtained on the structure of the benthic assemblages, on the natural distribution and abundance of the fauna, on the interactions between species populations, and on the interactions of the sea floor with the remainder of the oceanic ecosystem. Any continental shelf natural system north of the equatorial region is variable in space time; this truism pertains directly to the Arctic. Seasonality is accentuated, and the sublittoral benthic environment is marked by contrasts.

The Beaufort Sea continental shelf is highly variable as an environment. Sediments are generally poorly sorted and patchy in distribution (Naidu, 1974; and Barnes and Reimnitz, 1974). Salinity fluctuates seasonally and spatially (Hufford et al, 1974). In the summer months, ice meltwater and river discharge create an estuarine environment in inshore waters. Freshwater dilution effects are felt at the bottom to a depth of 15 meters (Wacasey, 1974), particularly near the Mackenzie River and Alaskan rivers. Sea ice generally melts, breaks up, and is transported off the shelf during the summer months, and the Polar pack ice retreats to the shelf edge. The amount of sea ice present on the continental shelf is highly variable from year to year, however. The keels of pack ice pressure ridges randomly gouging the bottom are a cause of environmental disturbance. There is a direct and marked effect on the sediments (Reimnitz and Barnes, 1974) and probably on the benthic fauna (Carey et al, 1974).

Biologically, these environmental factore significantly effect the ecosystem. The degree of ice cover during the summer has a direct effect on the ambient insolation and on the degree of wind induced turbulent mixing of the surface water layer. This yearly variability undoubtedly results in fluctuations in the degree of primary production.

Low salinity and sediment composition directly affect the distribution and abundance of the benthos. Ice has a major direct effect on the benthic environment and undoubtedly on the benthos. The sediments and associated animals are radically disturbed by ice gouging out to depth of about 40 meters on the continental shelf. It has been long known that sediment type can greatly influence the benthic infaunal organisms and to a large extent control the species composition within a given hydrographic and depth zone. Because of the patchiness of sediment types, it is not surprising that the infauna are patchy in distribution and that it is difficult to define descrete communities within environmental boundaries with the available data.

Trends in faunal abundance across the continental shelf and along the shelf form the basis for several interesting hypotheses. Numerical density and biomass generally increase across the shelf, reaching a maximum on the upper slope at a depth deeper than would be found in temperate waters. These two bio-indices demonstrate an increase from west to east within the depths of 20-30 meters from Cape Halkett to the Mackenzie River (Carey, et al, 1974 and Wacasey, 1974). Ice scour may depress faunal abundance inshore within the above depth zone, while river discharge of detrital material may increase the numerical density and biomass locally. Furthermore, the Mackenzie River may influence much of the south-eastern Beaufort Sea by its influence on turbidity and associated detritus. There may be local nutrient concentration effects caused by coastal upwelling (Hufford, 1974) or by the river discharge. Across the shelf the maximum infaunal abundance may sometimes be located at greater than 600 meters depth, possibly because of along-slope currents at the Arctic surface water and Atlantic water mass boundaries, or because of the movement of Bering Sea, Chukchi Sea water at depth.

VIII. Conclusions

It is premature to draw any conclusions from the samples collected, but many logistic and sampling questions have been answered. Although shipboard sampling of the benthos is common and very routine, sampling through the ice is quite uncommon. The arctic climate is harsh, and previous experience has shown that sampling under such conditions is difficult but entirely possible. Due to logistic problems, the October sampling period was only moderately profitable in the number of samples obtained, but it did demonstrate that sampling through the ice is practical. Problems such as clothing, equipment weight, sample washing techniques, field data recording, and ice cutting methods were assessed and solutions developed, eliminating many of the problems which originally hindered the sampling effort in October. Perfection of the above techniques shows that a seasonal sampling program on the continental shelf of Northern Alaska is feasable.

IX. Needs for further study

The determination of the species, ecological type, or community critical to the normal functioning of an ecosystem is an extremely difficult set of problems. Ideally information on trophic and competive species interactions are needed to characterize the ecosystem, yet this information is virtually impossible to measure and can only be infered from those parameters that can be measured. Furthermore, statistically valid baseline information describing the present benthic community structure is critical as a "standard" at a point in time against which future community structure can be compared for an evaluation of the degree of change. Thirdly, biological information on life histories is essential for the determination of repopulation rates and the rate of restoration toward the normal range of community structure and function should a benthic assemblage be drastically disturbed.

Research in these three areas have been requested by NOAA for the Beaufort Sea ecosystem. The determination of the structure, function, and basic state (health) of an ecosystem is an extremely long-term project, probably requiring tens of years in such a highly variable, unpredictable environment. It is evident that valid data cannot be obtained in all essential aspects of benthic ecology in the time and with the funds available for this project. Nevertheless, research can be undertaken at least in some of the less complex endeavours to provide enough data for a description of a simplified, basic structure and for the construction of qualified generalities. The Bureau of Land Management can then make better educated decisions on the leasing of undersea lands for exploratory drilling and the eventual production of gas and oil.

Research on the ecology of benthic invertebrates in the southwestern Beaufort Sea requires at least the following objectives to provide any useful information to the Outer Continental Shelf Energy Program:

(1) description of the patterns of species distribution and abundance, including estimates of variance.

a. extensive quantitative sampling on the continental shelf for macrofauna ($\geq$ 1.0 mm) and mega-epifauna (>1.3 cm) with sufficient replicate samples to define natural variability.

b. extensive bottom photography of larger, visible epibenthos when ice conditions prevent trawling to provide data for estimates of fauna numerical density.

c. seasonal sampling to estimate degree, if any, of change in total numerical density, biomass, and species composition, and community structure at representative stations across the width of the continental shelf. Numerically dominant species should be sampled seasonally to estimate possible changes in population size structure.

d. long term sampling, (five to ten years) at characteristic stations is important to establish the natural variability of the communities on a year to year time scale, and how their size and structure changes.

d. cont.

Without this sampling you lack the prospective of seasonal variability and yearly trends.

(2) Statistical analyses of benthic ecological data

a. definition of species groupings, i.e. communities, and determination of their distributions.

b. community structure analysis including diversity.

c. correlation of dominant species and species groups with benthic environmental characteristics. For these studies it is essential complementary water and sediment data be collected during the same period by other research groups.

(3) Biological studies on the abundant, dominant infaunal species

a. analysis of reproductive activity based on seasonal samples from standard stations collected over a period of two years.

b. analysis of recruitment of abundant species into the benthic population.

c. feasibility studies on the analysis of mortality and growth.

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XI. Summary of 4th quarter operations

A. Field Activities

1. Second OCS seasonal benthic sampling

The second seasonal field trip to the Beaufort Sea was highly successful in spite of delays caused by weather, health, sampling gear, and heavy ice conditions. We have not yet been able to sample both the Pitt Point and the Prudhoe Bay Transect Lines, but our 7-20 March 1976 field trip yielded 42 good quality, quantitative Smith-McIntyre grab samples from the Pitt Point Transect Line.

A chartered Era Bell 205 helicopter was utilized. The logistic support for ice operations was very successful.

2. Scientific party

Gail Erskine	Oregon State University
Paul A. Montagna	Oregon State University
R. Eugene Ruff	Oregon State University
Paul H. Scott	Oregon State University

The research assistants operated as a team collecting and processing the samples. Paul H. Scott was party chief of the field group.

3. Methods

A 0.1 m^2 Smith-McIntyre bottom grab was the basic sampling gear. Techniques for sampling the benthos from sea ice are described in section V.B-1-a. A powered 8-inch ice auger was the major tool for cutting out the necessary 4-foot square hole through the ice.

4. Sample localities

The following samples were collected on the March 1976 seasonal field trip at the following standard seasonal stations for the Benthos program. The stations are arranged in depth intervals along the station line and are located in the field by navigational instrumentation and electronic depth sounder lowered through a test auger hole in the ice.

Station	Location		No. Grabs	Depth (m)
PPB - 2	71° 10' N	153° 46' W	10	25
PPB - 3	71° 12' N	153° 50' W	6	40
PPB - 4	71° 19' N	153° 37' W	10	55
PPB - 5	71° 20' N	153° 39' W	6	70
PPB - 6	71° 22' N	153° 38' W	10	100

A large percentage of time and effort was involved this quarter with the acquistion, design and construction of field support gear for ice operations. The Cascading Multiple Sieve System construction was finished; it includes a pair of sieve systems and a pump water supply. The design and construction of a folding aluminum grab stand was completed this quarter.

B. Laboratory Activities

1. Personnel

a. Andrew G. Carey, Jr. — Oregon State University School of Oceanography Associate Professor, Principal Investigator

Responsibilities: coordination, evaluation, analysis, reporting, and holothurian systematics

b. James B. Gish — Oregon State University School of Oceanography, Research Assistant

Responsibilities to date: data management, statistical analysis, and field collection

c. R. Eugene Ruff — Oregon State University School of Oceanography, Research Assistant

Responsibilities to date: invertebrate reference museum, species list, laboratory personnel, bottom photography and photo analysis, and echinoderm and anthozoan systematics

d. Paul H. Scott — Oregon State University School of Oceanography, Research Assistant

Responsibilities to date: field equipment, wet weights, sample picking and sorting, molluscan systematics, and field collection

e. part-time workers:
Kamran Malik
David Marinos
Bruce Milan
Patricia Tester
Don Ward

Responsibilities: assist with key punching, sample processing, equipment maintenance, photographic processing, sediment analysis, wet weight measurement

2. Methods and analysis

Systematic studies of certain crutacean groups and the polychaetes from the October samples were initiated. Evaluation of biomass (wet preserved weight) measurement techniques continued.

RU#7

VOLUME I

FIRST YEARLY REPORT

Contract No. 03-5-022-68
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April 1, 1975 - March 31, 1976
Pages 1 - 444

Summarization of existing literature and unpublished data on the distribution, abundance, and life histories of benthic organisms

Andrew G. Carey, Jr., Principal Investigator
School of Oceanography
Oregon State University
Corvallis, Oregon 97331

March 22, 1976

This is an interim report which presents preliminary information for the use of the Outer Continental Shelf Energy Program (OCSEP). No material contained may be quoted in external reports without written permission from the OCSEP Project Office and the principal investigator.

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I. Summary of objectives, conclusions and implications with respect to outer continental shelf (OCS) oil and gas development

The western Beaufort Sea has not been extensively sampled until recently. The objectives of this effort are to summarize existing published and unpublished work and to infer conclusions about the species composition and distribution of the benthos. The natural variability that exists will also be estimated, and the control that environmental conditions have on the ecosystem will be investigated, using correlations of the environmental variables and species abundance information. Life histories of the dominant species and their reproductive activity are important aspects when assessing particular times of the year or development stages when organisms are especially vulnerable to pollutants, and in estimating their capacity to repopulate an area.

These objectives will establish a reference state from which future studies may evaluate deviations, and determine the impact of oil and gas development on the benthic component of the ecosystem.

II. INTRODUCTION

A. General nature and scope of the problem

The systematics and ecology of Beaufort Sea benthos on the outer continental shelf (OCS) will be summarized and statistically analyzed. Published and unpublished data including those to be obtained from samples, collections, and bottom photographs already in hand at Oregon State University will be evaluated for the type and degree of information needed to describe benthic biotic baselines in the western Beaufort Sea.

B. Specific Objectives

(1) Species lists and distributional patterns; (2) Patterns and natural variability of distribution and abundance of benthic species, recurrent species groups (and communities) and ecological types; (3) Possible correlations of these patterns with features of the benthic environment to determine those features of potential ecological importance in this subarctic environment; and (4) The type and degree of information that is needed for describing benthic biotic baselines in the Beaufort Sea.

C. Relevance to problems of petroleum development

Extensive drilling for oil and gas on the Alaskan and Canadian North Slope creates the potential for high environmental pollution and degradation in the coastal area.

The basic structure of the coastal ecosystem could be adversely affected in local areas, and the food web disrupted by oil spills toxic to phytoplankton, the primary producers, and to zooplankton (including larvae of benthic invertebrates). In the inner shelf environment, the bottom could be a sink for heavier oils, and perhaps include large amounts of toxic volatiles because of the colder temperatures found in the Beaufort Sea. Coastal benthic fauna could have high mortalities caused by a spill so carnivores, including fish, whales, seals, and polar bears, would find less to feed on.

It is evident, however, after a year of gathering data that our basic knowledge of the Beaufort Sea fauna is very poor. Information concerning species composition, variability in space and time, reproduction, growth, and physiology is virtually nil. This lack of knowledge makes it very difficult to predict or to assess the degree and extent of environmental degradation. To understand what effect an oil spill or well blow-out might have on the functioning of the coastal and inner shelf ecosystem, we need to know more about the biota especially the critical species in the benthic communities.

Summaries and data analyses of the present and future assembled material on the benthos in the Beaufort Sea will provide a basis for evaluating the potential effects of possible oil spills and general environmental pollution caused by the necessary supportive activities by man in this relatively unspoiled environment. Areas for additional study will be identified.

III. CURRENT STATE OF KNOWLEDGE

Except for a few early scattered samples collected in 1880's extensive sampling of the benthos in the Beaufort Sea did not begin until the early 1950's when MacGinitie began sampling from the Naval Arctic Research Laboratory at Barrow, Alaska (MacGinitie, 1955). This slow start in oceanographic research in the Beaufort Sea is concerned with: lack of accesibility, lack of early commercial interest, e.g. fisheries, and scientific tradition (Curtis, 1975). Until the advent and availability of modern icebreakers, routine research in the area was not practical because of the generally heavy sea ice conditions and the very short summer season of variable open water. The dominant factor behind the recent rapid expansion of oceanographic research, including benthic ecological research has been the potential oil and gas production on the Beaufort Sea continental shelf.

The few early benthic samples in the Beaufort Sea were collected during the cruises of the YUKON (1880) and CORWIN (1884). Some benthic samples were also collected in the area during the International Polar Year Expedition to Point Barrow (1881-83), (Curtis, 1975).

Qualitative but fairly extensive benthic collections were obtained by MacGinitie (1955) during his tenure as director of the Naval Arctic Research Laboratory (NARL). The Naval camp at Point Barrow was established for early oil explorations in the 1940's, but later became the site of the Naval Arctic Research Laboratory, a development which made the Beaufort Sea more accessible for oceanographic research. MacGinitie's samples provide us with the first extensive benthic species lists and scattered natural history notes. The collection locations were mainly west of Point Barrow in the Chukchi Sea. NARL has been used as a base for isolated studies since that time (Mohr, 1969).

During the 1960's, benthic sampling was undertaken in the eastern Beaufort Sea by the Canadians aboard the Fisheries Research Board of Canada vessel, SALVELINUS. This field program was part of the Canadian investigations in the western Canadian Arctic during 1960-65(Curtis, 1975). Deepwater benthic collections by Menzies (1963) and Paul and Menzies (1974) were made in the northern sector of the Beaufort from U.S. ice stations Bravo and T-3 as they drifted through the region.

The 1970's has been a period of rapid development in Beaufort Sea oceanographic investigations especially in benthic ecology and systematics. The development of oil and gas fields on United States and Canadian coastal lands stimulated scientific investigations of the environment, biota, and ecosystem. Offshore explorations of potentially large oil and gas fields underneath the continental shelf have directly stimulated marine research. The Canadian oceanographic vessel HUDSON obtained quantitative benthic samples from the Beaufort Sea in 1970. The U.S. Coast Guard sponsored a series of ecological baseline cruises (WEBSEC) to the area soon after the discovery of the extensive oil and gas fields on the Alaskan North Slope. Benthic sampling and photography was undertaken by Carey in 1971-72 (Carey, *et al*. 1974; Carey and Ruff, unpublished ms.).

Extensive environmental research programs were initiated by the Canadians in the southeastern Beaufort Sea and by the United States in the southwestern sector. The Canadian quantitative benthic sampling concerned the Mackenzie River delta region, the Eskimo Lakes, and much of the Southeastern continental shelf (Wacasey, 1974). The U.S. Outer Continental Shelf Energy Program (OCSEP) environmental assessment research includes work by Carey (this report) on the benthos.

Wacasey (1974) reported that the diversity and biomass of the benthic in infauna in the southeastern Beaufort Sea increased with depth and distance away from the Mackenzie River delta between depths of 3 to 94 meters. The number of species ranged from 1 to 51; the numerical density from 52 to $12,444/m^2$; and the biomass from 0.1 - 67.7 g (dry wt)/m^2. Seventeen stations were occupied between Cape Dalhousie and Herschel Island during July, 1973.

The Mackenzie River outflow significantly influences the surrounding area, creating estuarine conditions down to 15 meters depth. The freshwater dilution, however, is more marked to the east near Tuktoyaktuk Peninsula. Salinities at the stations ranged from 0.0 ‰ at 3 meters depth to 32.8 ‰ at 42 meters depth.

Sixteen additional stations have subsequently been sampled by Wasasey on the southeastern Beaufort shelf (Wacasey, 1974a). The Eskimo Lakes to the east of Tuktoyaktuk Peninsula have also been sampled and preliminary data reported in a Technical Report (Wecasey, 1974b).

In the western segment of the Beaufort Sea, the maximum macro-infaunal biomass is at 140 meters depth on the upper continental slope (Carey et al, 1974). The maximum numerical density, however, occurs at a depth of 700 meters; this is considerably deeper than the numerical maxima found in more temperate waters. The standing stocks of inshore fauna at depths of 20 meters are depressed in numbers and biomass, perhaps implicating ice scour as a major environmental disturbance (Carey and Ruff, unpublished manuscript).

The numerical densities of the western Beaufort Sea macrofauna are similar to those from temperate waters, but the biomass reaches higher levels in the Beaufort. The benthic environment near the Mackenzie river but deep enough ($\geq$ 33 meters) to be below the effect of freshwater dilution, supports considerably larger amounts of benthos than at similar depths in the western portion.

IV. STUDY AREA

The Beaufort Sea

The Beaufort Sea extends along the northern coast of Alaska from the Pt. Barrow area eastward to the western boundary of the Canadian Archipelago (Fig. 1). In contrast to the other shallow satellite seas bordering the arctic rim, the Beaufort is physically and oceanographically considered a part of the Arctic Ocean (Coachman, 1963). The continental shelf in this region is very narrow and in general is covered with muds and gravels (Carsola, 1954; Barnes and Reimnitz, 1975). The shallow shelf break averages only 70 meters in depth, and the continental slope decends steeply to meet the floor of the Canada Basin at approximately 3500 meters (Carsola et al., 1961). The hydrography of the Beaufort Sea is characteristic of the Arctic Ocean, exhibiting (1) a mixed Arctic surface layer, (2) an intermediate Atlantic water layer, and (3) a lower layer of Arctic bottom water (Coachman and Barnes, 1961; Coachman, 1963). The surface layer is a mixture of continental runoff, seasonal ice melt, and intrusions of water to an unknown extent from the Bering and Chukchi Seas. In certain areas the surface water may occasionally be enriched with underlying waters by coastal upwelling. This phenomenon has been detected during one summer cruise at the shelf ecge north of the Barter Island region during unusually light sea ice conditions (Hufford, 1975; Mountain, 1975).

Ice forms across the surface of the southern Beaufort Sea in the early fall and completely covers the continental shelf until the following summer. Shore-fast ice extends seaward to a water depth of 1-20 meters where it impinges on the main polar ice pack. During the short arctic summer this ice breaks up and edge of the pack usually recedes beyond the shelf break, although its exact location is highly variable from year to year (U.S. Navy Hydrographic Office, 1958). Drifting and grounded ice floes are often present on the continental shelf throughout the summer. Recent evidence has indicated that grounded pressure ridge keels and ice islands plow along the shelf at random intervals, reworking the sediments to a significant extent (Kovacs and Mellor, 1975; Reimnitz and Barnes, 1975; Barnes and Reimnitz, 1975).

The Beaufort Sea ecosystem is controlled to a large degree by the stability of the water column, the marked seasonality, and the presence of seasonal and permanent sea ice. These features produce an environment in which oceanic waters beyond the continental shelf are extremely low in biological productivity (English, 1961; Meguro et al., 1966). Recent work has demonstrated significant populations of shade adapted under-ice diatoms in neritic waters (Meguro et al., 1966; Bunt and Lee, 1970; Horner and Alexander, 1972; Horner, In Press). Although the geographical and temporal extent of these algae is unknown, the strongly stratified water column beneath the ice curtails nutrient renewal: overall production from these species is probably limited. The degree of primary production in coastal waters remains relatively unknown. Occasional large standing stocks of phytoplankton with high chlorophyll concentrations have been noted during summers with open water (Horner, personal communication), but in general, evidence indicates that nearshore production is variable from year to year, and very low on the average (Appollonio, 1965; McRoy, et al., 1972).

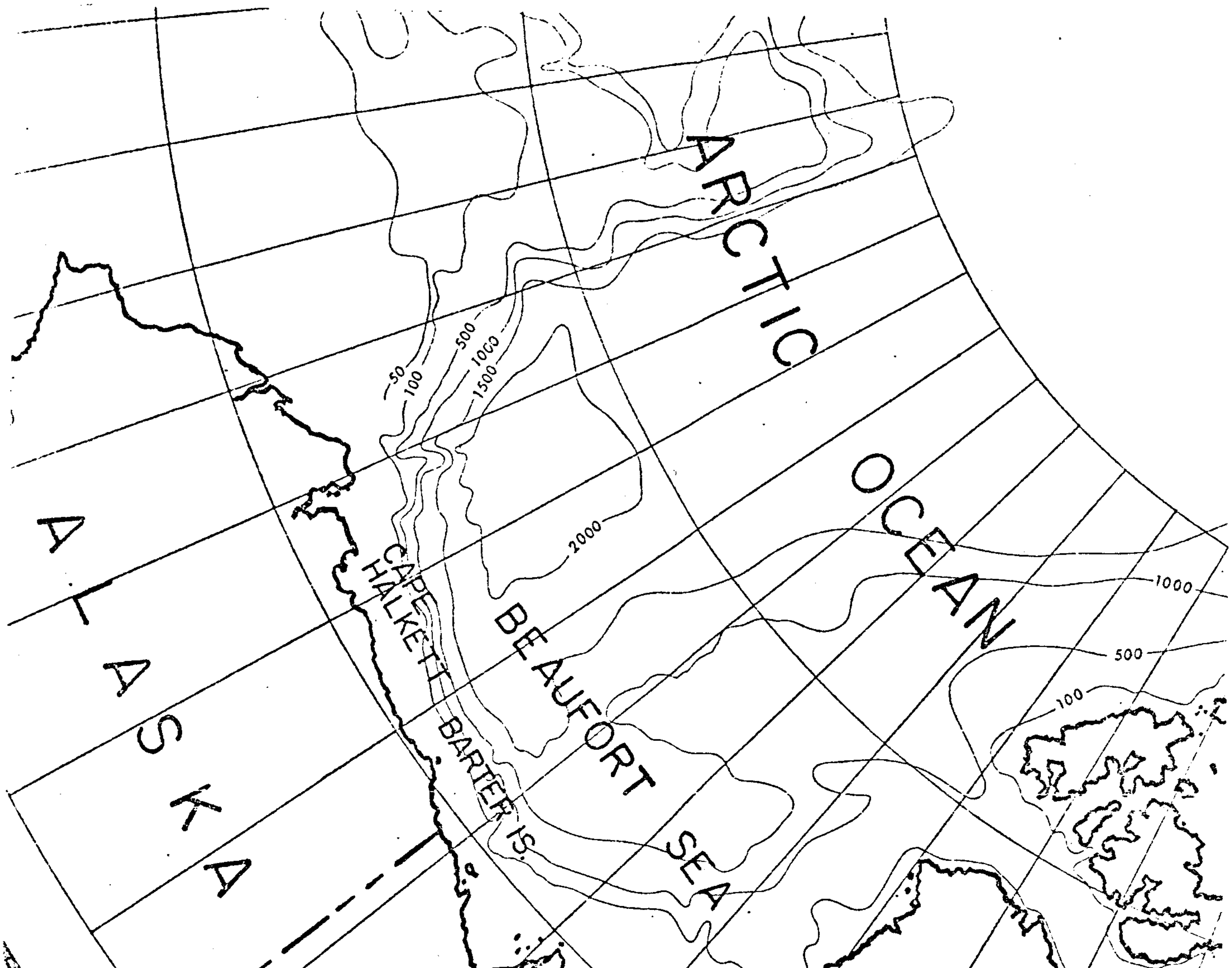


Figure 1:

Map of the Beaufort Sea and Surrounding Area

depth contours in fathoms

(Redrawn from H. O. Pub. No. 705)

V. SOURCES, METHODS AND RATIONAL OF DATA COLLECTION

A. Past data collection (Oregon State University)

The large meio-faunal samples (0.42-1.00 mm) and the stereo bottom photographs, to be worked up as far as possible during this phase of our research, were collected during WEBSEC-71 and WEBSEC-72 respectively from Barter Island to Cape Halkett (Carey, et al., 1975; Carey and Ruff, In Press).

Grab samples were obtained during the first year of field work at 40 stations laid out on 10 approximately north-south transects which ranged from the 20 m contour down to a depth of 2300 m. Smith-McIntyre 0.1 m^2 spring-loaded bottom grab samplers are rugged, easy to use, and can obtain quantitative infaunal samples under adverse field conditions (Smith and McIntyre, 1954). They can be lowered vertically through leads in the pack ice and can be handled easily on deck. Given a uniform substrate, these instruments obtain samples of similar volume. The Smith-McIntyre grab was selected as an efficient sampler (Gallardo, 1965) that minimizes the leading·turbulent "bow" wave which can push low density organisms away as it descends (Wigley, 1967). The grabs used on WEBSEC-71 were fitted with hinged metal top plates that minimize washing of the sample during ascent but still allow passage of water through the screen tops during descent to decrease turbulence (Carey and Paul, 1968).

Grabs do, however, embody some special sampling problems (Wigley, 1967; Gallardo, 1965; Holme and McIntyre, 1971). The Smith-McIntyre grab bites efficiently to full depth in soft sediments but not in harder substrates. Gravel and shells can jam the jaws of a grab, and it does not sample evenly from the surface of the sediment to maximum depth. However, given the restricted vertical clearance on the icebreaker's working deck and the adverse sea ice conditions, the Smith-McIntyre grab performed effectively. Though grabs undoubtedly do select a portion of the total fauna, the results should be comparable within the study and between studies where the same gear and methods have been used.

Five grabs, covering a total surface area of 0.5 m^2, were obtained per station, and the sediment volume of each sample was measured. The samples were then washed through a 420 μ mesh sieve-trough using a modified flotation technique, and perserved in neutralized formalin. In the laboratory the macrofauna (>1.00 mm) were screened out for analysis (see appended manuscripts) and the large meiofauna (0.42-1.00 mm) were sieved and saved for future study.

During the second year of fieldwork extensive bottom photography was undertaken to provide data for estimates of population densities of the larger epifauna in areas where ice conditions made trawling very difficult. An E G & G deep-sea camera system integrated a stereo pair of Model 200 35 mm cameras, a pair of Model 210 Strobe flash units, and a Model 220 sonar-pinger onto a 6 foot long mounting rack. Black and white (35 mm Kodak Plus-x) and color (35 mm High-speed Ektachrome-ER, Type 5257 Daylight) film were used simultaneously in the stereo cameras. A Coast Guard Oceanographic Unit photographer developed the black and white film in the ship's photo lab to maintain a continuous check on photographic quality. The Ektachrome film was commercially processed after the cruise.

The deep-sea camera system was operated approximately 2 m off the bottom with automatic shuttering and was "flown" above the bottom with the ship's drift. A minimum of 100 high quality stereo pairs per station was deemed essential for sufficient areal coverage. In most cases we were successful in obtaining an adequate series of bottom photographs.

Environmental data were collected by several research groups aboard the USCGC GLACIER during both cruises. The Coast Guard Oceanographic Unit undertook the hydrography including salinity, temperature, dissolved oxygen, nutrient, and current data. Standard oceanographic bottle casts plus an STD were used. Water samples were analyzed on board ship with a Technicon-auto-analyzer. The U.S. Geological Survey studied the processes of sedimentation, and Dr. Peter Barnes and his associates obtained sediment samples by grab for particle size analyses, water turbidity by transmissometer lowerings, as well as pelagic and benthic foraminiferal samples by meter net and from additional grabs. Box core samples for microstratigraphy and several piston cores were also obtained. The University of Alaska collected metal-free cores for geochemical studies. Many of these results are available for our use, others will be shortly (Hufford, *et al.*, 1974).

B. Other data sources

The major source of unpublished data on the Beaufort Sea benthos will come from the work of Wacasey in Canadian waters. Further data reports and papers should be available soon as part of the Canadian environmental survey in the southeastern Beaufort Sea.

Inshore sampling and data analysis in the Prudhoe Bay area has also been accomplished by Dr. Howard Feder of the University of Alaska. A final report should soon be available on the shallow water survey with a compiled and annotated bibliography.

VI. RESULTS

The results compiled to date on the summarization and analysis of existing literature and unpublished data on the distribution, abundance, and life histories of benthic organisms are in the following sections. This is work in progress; substantial evaluation and analysis of data will be undertaken before completion of the final report in September, 1976.

A. Species List

A list of benthic organisms found in the Beaufort Sea is being compiled. A computerized data base is being developed to maintain an inventory of what organisms have been found, their latin name, a taxonomic reference, and associated codes. Eash species has a unique five (5) character inhouse code, as well as a twelve (12) digit VIMS code used in all official transmissions of data.

The species list now consists of identifications of specimens collected during the 1971 and 1972 WEBSEC cruises. The only exception to this is the polychaete worms which were transcribed from Pettibone (1954). The pelecypods were identified by Dr. Frank Bernard[1]. Dr. James McLean[2] identified the gastropod specimens. The cumacea and amphipods were identified as part of a doctoral thesis by Dr. Jorge Castillo, and the remaining organisms were identified by inhouse specialists.

The scientific names of the organisms in our data base are the most current, based on their use by experts who are up to data on the literature in their speciality.

The data base will continue to expand and be updated as more organisms are collected and as more names are derived from publications and data reports.

[1] Biologist, Fisheries Research Board of Canada, Pacific Biological Laboratory, Nanaimo, B.C.

[2] Curator of invertebrate Zoology, Los Angeles County Museum of Natural History.

AMPHIPODA

TAXON NAME	VIMS CODE	OSU CODE
ACANTHONOTOZOMA INFLATUM	5331010101	AA001
ACANTHONOTOZOMA SERRATUM		AA002
ACANTHOSTEPHEIA MALMGRENI		AA075
ACEROIDES LATIPES		AA076
ACIDOSTOMA LATICORNE		AA048
AMPELISCA BIRULAI		AA004
AMPELISCA ESCHRICHTI		AA005
AMPELISCA MACROCEPHALA	5331020101	AA006
ANISOGAMMARUS LOCUSTOIDES	5331210102	AA036
ANONYX DEBRUYNII		AA049
ANONYX NUGAX	5331340302	AA050
APHERUSA SARSI		AA016
ARGISSA HAMATIPES		AA013
ARISTIAS TUMIDUS		AA051
ARRHIS LUTHKEI		AA077
ARRHIS PHYLLONYX		AA078
ATYLUS BRUGGENI		AA014
ATYLUS SMITTI		AA015
BATHYMEDON OBTUSIFRONS		AA079
BOECKOSIMUS DUBIUS		AA052
BYBLIS GAIMARDI	5331020202	AA007
BYBLIS SP.		AA122
BYBLIS SP. B		AA124
BYBLIS SP. C		AA125
BYBLIS SP. D		AA126
BYBLIS SP.A		AA123
CAPRELLA SP.	53319807	AA121
CENTROMEDON PUMILUS		AA053
COROPHIUM ACHERUSICUM		AA018
DULICHIA FALCATA		AA109
DULICHIA SPINOSA		AA110
DULICHIA TUBERCULATA		AA111
EPIMERIA LORICATA		AA089
ERICHTHONIUS MEGALOPS		AA019
ERICTHONIUS TOLLI		AA020
EURYSTHEUS DENTATUS		AA021
EUSIRUS CUSPIDATUS		AA031
GAMMARACANTHUS LORICATUS		AA037
GAMMAROPSIS MELANOPS		AA022
GAMMARUS LOCUSTA		AA038
GOESIA DEPRESSA		AA023
GUERNEA NORDENSKJOLDI		AA030
HALIRAGES QUADRIDENTATUS		AA017
HAPLOOPS LAEVIS		AA008
HAPLOOPS ROBUSTA		AA009
HAPLOOPS SETOSA		AA010
HAPLOOPS TUBICOLA	5331020301	AA011
HARPINIA KOBJAKOVAE	5331420102	AA097
HARPINIA MUCRONATA		AA098
HARPINIA PECTINATA		AA099
HARPINIA SERRATA		AA100
HIPPOMEDON ABYSSI		AA054
HIPPOMEDON DENTICULATUS ORIENTALIS		AA055
HIPPOMEDON GORBUNOVI		AA056
HIPPOMEDON HOLBOLLI		AA057
HYPERIA MEDUSARUM		AA044
ISCHYROCERUS COMMENSALIS		AA045
ISCHYROCERUS LATIPES		AA046
LEMBOS ARCTICUS		AA012

AMPHIPODA

TAXON NAME	VIMS CODE	OSU CODE
LEPIDEPECREUM EOUM		AA058
LEPIDEPECREUM UMBO		AA059
LILJEBORGIA FISSICORNIS		AA047
MAERA DANAE	5331210801	AA039
MELITA DENTATA		AA040
MELITA FORMOSA		AA041
MELITOIDES MAKOROVI		AA042
METOPA ROBUSTA		AA114
METOPA SPINICOXA		AA115
METOPELLA CARINATA		AA116
METOPELLA NASUTA		AA117
MONOCULODES BOREALIS		AA080
MONOCULODES LATIMANUS		AA081
MONOCULODES LONGIROSTRIS		AA082
MONOCULODES PACKARDI		AA083
MONOCULODES SCHNEIDERI		AA084
MONOCULODES TUBERCULATUS		AA085
NEOHELA MONSTROSA		AA024
NEOPLEUSTES BOECKII		AA102
NEOPLEUSTES PULCHELLUS		AA103
ODIUS CARINATUS		AA003
ONISIMUS AFFINIS		AA060
ONISIMUS EDWARDSI		AA061
ONISIMUS PLAUTUS		AA062
ORCHOMENE SERRATA		AA063
ORCHOMENELLA GROENLANDICA		AA064
ORCHOMENELLA MINUTA		AA065
PARADULICHIA SPINIFERA		AA112
PARALIBROTUS SETOSUS		AA066
PARAMPHITHOE HYSTRIX		AA090
PARAMPHITHOE POLYACANTHA		AA091
PARAPHOXUS OCULATUS		AA101
PARAPLEUSTES ASSIMILIS		AA104
PARAPLEUSTES GRACILIS		AA105
PARDALISCA ABYSSI		AA092
PARDALISCA CUSPIDATA		AA093
PARDALISCA TENUIPES		AA094
PARDALISCELLA LAVROVI		AA095
PARDALISCELLA MALYGINI		AA096
PAROEDICEROS LYNCEUS		AA086
PAROEDICEROS PROPINQUUS		AA087
PARONESINUS BARENTSI		AA067
PHOTIS REINHARDI		AA025
PLEUSTES PANOPLA		AA106
PODOCEROPSIS LINDAHLI		AA026
PONTOPOREIA FEMORATA		AA043
PROTOMEDEIA FASCIATA		AA027
PROTOMEDEIA GRANDIMANA		AA028
RHACHOTROPIS ACULEATA		AA032
RHACHOTROPIS HELLERI	5331201302	AA033
RHACHOTROPIS INFLATA	5331201304	AA034
ROZINANTE FRAGILIS		AA035
SOCARNES BIDENTICULATA		AA068
STEGOCEPHALUS INFLATUS		AA113
STENOPLEUSTES ELDINGI		AA107
SYMPLEUSTES KARIANUS		AA108
SYRRHOE CRENULATA		AA119
TIRON SPINIFERUM		AA120
TMETONYX CICADA		AA069

AMPHIPODA

TAXON NAME	VIMS CODE	OSU CODE
TRYPHOSELLA GROENLANDICA		AA070
TRYPHOSELLA PUSILLA		AA071
TRYPHOSELLA RUSANOVI		AA072
UNCIOLA LEUCOPIS		AA029
WESTWOODILLA MEGALOPS		AA088
WEYPRECHTIA HEUGLINI		AA073
WEYPRECHTIA PINGUIS		AA074

ASTEROIDEA

TAXON NAME	VIMS CODE	OSU CODE
BATHYBIASTER VEXILLIFER		EA001
CROSSASTER PAPPOSUS	6801110103	EA002
CTENODISCUS CRISPATUS	6801060101	EA003
HYMENASTER PELLUCIDUS		EA004
LEPTYCHASTER ARCTICUS	6801020202	EA005
LOPHASTER FURCIFER		EA006
PORANIOMORPHA TUMIDA		EA007
PTERASTER OBSCURUS	6801100303	EA008
URASTERIAS LINCKI	6801120701	EA009

CRINCIDEA

TAXON NAME	VIMS CODE	OSU CODE
HELIOMETRA GLACIALIS MAXIMA		EC001

CUMACEA

TAXON NAME	VIMS CODE	OSU CODE
BRACHYDIASTYLIS NIMIA		AU001
BRACHYDIASTYLIS RESIMA	5328050301	AU002
CAMPYLASPIS RUBICUNDA	5328070103	AU034
CUMELLA CARINATA	5328080101	AU035
DIASTYLIS ASPERA	5328050102	AU003
DIASTYLIS BIDENTATA	5328050103	AU004
DIASTYLIS EDWARDSI	5328050106	AU005
DIASTYLIS GLABRA	5328050107	AU006
DIASTYLIS GOODSIRI	5328050108	AU007
DIASTYLIS NUCELLA	5328050117	AU008
DIASTYLIS OXYRHYNCHA	5328050113	AU009
DIASTYLIS POLITA		AU010
DIASTYLIS RATHKEI	5328050116	AU011
DIASTYLIS RATHKEI TYPICA		AU012
DIASTYLIS SCORPICIDES	5328050118	AU013
DIASTYLIS SPINULOSA	5328050119	AU014
DIASTYLIS TUMIDA		AU015
EUDORELLA ARCTICA		AU017
EUDORELLA EMARGINATA	5328040201	AU018
EUDORELLA GRACILIS		AU019
EUDORELLA GROENLANDICA		AU020
EUDORELLA HISPIDA		AU021
EUDORELLA NANA		AU022
EUDORELLA PARVULA		AU023
EUDORELLA PUSILLA		AU024
EUDORELLA TRUNCATULA	5328040204	AU025
EUDORELLOPSIS INTEGRA	5328040301	AU026
LAMPROPS FASCIATA	5328020103	AU016
LEPTOSTYLIS SP. A		AU041
LEPTOSTYLIS SP. B		AU042
LEPTOSTYLIS SPP.	53280504	AU037
LEUCON ACUTIROSTRIS	5328040106	AU027
LEUCON FULVUS	5328040104	AU028
LEUCON LATICAUDA		AU029
LEUCON NASICA	5328040101	AU030
LEUCON NASICOIDES	5328040102	AU031
LEUCON NATHORSTI	5328040107	AU032
LEUCON PALLIDUS	5328040105	AU033
LEUCON SP. A		AU043
MAKROKYLINDRUS SP. A		AU039
MAKROKYLINDRUS SP. B		AU040
MAKROKYLINDRUS SPP.		AU038
PETALOSARSIA DECLIVIS	5328060101	AU036

DECAPODA

TAXON NAME	VIMS CODE	OSU CODE
EUALIS GAIMARDII	5333050406	A0001
EUALIS MACILENTUS	5333050412	A0002
HYAS COARCTATUS ALEUTACEUS	5333170202	A0003
LEBBEUS GROENLANDICA		A0004
LEBBEUS POLARIS	5333050305	A0005
NECTOCRANGON LAR		A0006
PANDALUS GONIURUS	5333040102	A0007
SCLEROCRANGON BOREAS	5333060201	A0008
SCLEROCRANGON SALEBROSA		A0009
SPIRONTOCARIS DALLI	5333050207	A0010
SPIRONTOCARIS PHIPPSII	5333050205	A0011
SPIRONTOCARIS SPINA	5333050211	A0013

DEUTEROSTOMES

TAXON NAME	VIMS CODE	OSU CODE
ARTEDIELLUS SCABER	7915040305	DU003
ASPIDOPHOROIDES OLRIKII	7915050303	DU004
BOREOGADUS SAIDA	7909020201	DU005
COTTUNCULUS MICROPS		DU006
EUMICROTREMUS DERJUGINI	7915060904	DU007
GYMNELIS VIRIDIS	7909040603	DU008
GYMNOCANTHUS TRICUSPIS	7915041304	DU009
ICELUS BICORNIS	7915041701	DU010
ICELUS SPATULA	7915041705	DU011
LEPTOCLINUS MACULATUS		DU012
LIPARIS KOEFOEDI	7915061215	DU013
LUMPENUS MEDIUS		DU014
LYCODES EUDIPLEUROSTICTUS		DU015
LYCODES MUCOSUS	7909041109	DU016
LYCODES POLARIS	7909041111	DU017
LYCODES SEMINUDUS		DU018
RAJA ROSISPINIS	7603020109	DU002
REINHARDTIUS HIPPOGLOSSOIDES	7917021901	DU019
TETHYUM AURANTIUM		DU001
TRIGLOPS PINGELII	7915044105	DU020

ECHINOIDEA

TAXON NAME	VIMS CODE	OSU CODE
STRONGYLOCENTROTUS DROEBACHIENSIS	6802040201	EE001

GASTROPODA

TAXON NAME	VIMS CODE	OSU CODE
ACTEON SP.		MG031
ADMETE COUTHOUYI	4905400101	MG001
ADMETE SPP.		MG064
ALVANIA JANMAYENI		MG032
BERINGIUS BEHRINGII	4905330204	MG033
BERINGIUS STIMPSONI	4905330205	MG002
BOREOTROPHON CLATHRATUS		MG003
BOREOTROPHON MURICIFORMIS		MG036
BUCCINUM ANGULOSUM	4905320101	MG004
BUCCINUM CILIATUM	4905320127	MG005
BUCCINUM GLACIALE	4905320116	MG034
BUCCINUM PLECTRUM	4905320128	MG006
BUCCINUM POLARE	4905320126	MG007
BUCCINUM SCLARIFORME	4905320104	MG008
BUCCINUM SPP.	49053201	MG035
CEPHALASPIDEAN SP.		MG037
CINGULA SP.	49051103	MG038
COLUS PUBESCENS		MG009
COLUS ROSEUS	4905330310	MG039
COLUS SPITZBERGENSIS	4905330301	MG010
COLUS TOGATUS		MG011
CYLICHNA ALBA	4905490203	MG041
CYLICHNA SP.	49054902	MG042
DIAPHANA MINUTA	4905460101	MG043
DIAPHANA SP.	49054601	MG040
EPITONIUM GREENLANDICUM	4905210102	MG012
LEPETA CAECA	4905050201	MG044
MARGARITES COSTALIS	4905060315	MG013
MARGARITES GIGANTEUS	4905060306	MG014
MARGARITES VORTICIFERA	4905060304	MG015
MARSENINA GLABRA		MG016
NATICA CLAUSA	4905250201	MG017
NEPTUNEA HEROS	4905330810	MG018
NEPTUNEA VENTRICOSA	4905330302	MG019
OENOPOTA BICARINATA	4905410411	MG046
OENOPOTA DECUSSATA		MG047
OENOPOTA ELEGANS	4905410415	MG048
OENOPOTA HARPA	4905410414	MG049
OENOPOTA IMPRESSA	4905410406	MG050
OENOPOTA INEQUITA	4905410403	MG051
OENOPOTA NOVAJASEMLIENSIS		MG052
OENOPOTA RETICULATA		MG053
OENOPOTA SP. A		MG065
OENOPOTA SP. B		MG066
OENOPOTA SP. C		MG067
OENOPOTA SP. D		MG068
OENOPOTA SP. E		MG069
OENOPOTA SPP.	49054104	MG045
PHILINE FINMARCHICA		MG060
PHILINE LIMA		MG061
PHILINE PRUINOSA		MG062
PHILINE SP.	49054701	MG063
PLICIFUSUS KROEYERI	4905330901	MG020
POLINICES PALLIDUS		MG021
PROPEBELA GOULDII		MG056
PROPEBELA MITRULA		MG055
PTYCHATRACTUS OCCIDENTALIS	4905380101	MG022
PYRULOFUSUS DEFORMIS	4905331002	MG023
RETUSA SP.	49054501	MG058

GASTROPODA

TAXON NAME	VIMS CODE	OSU CODE
SCAPHANDER SP.	49054903	MG054
SCAPHANDER SP. A		MG070
SCAPHANDER SP. B		MG071
SOLARIELLA OBSCURA	4905060402	MG024
SOLARIELLA VARICOSA	4905060403	MG057
TACHYRHYNCHUS EROSIS	4905180101	MG025
TACHYRHYNCHUS RETICULATUS	4905180102	MG026
TRICHOTROPIS BOREALIS	4905240203	MG027
VELUTINA PLICATILIS	4905270204	MG028
VELUTINA UNDATA	4905270203	MG029
VELUTINA VELUTINA	4905270201	MG030
VOLUTOPSIUS CASTANEAS		MG059

HOLOTHUROIDEA

TAXON NAME	VIMS CODE	OSU CODE
IRPA ABYSSICOLA		EH001
MYRIOTROCHUS RINKII		EH002
PSOLUS PERONI	6804120204	EH003
PSOLUS PHANTAPUS	6804120205	EH004

ISOPODA

TAXON NAME	VIMS CODE	OSU CODE
MESIDOTEA ENTOMON		AI003
MESIDOTEA SABINI	5330020103	AI001
SYNIDOTEA BICUSPIDA	5330020201	AI002

OPHIUROIDEA

TAXON NAME	VIMS CODE	OSU CODE
AMPHIODIA CRATERODMETA		E0010
AMPHIURA PSILOPORA		E0009
AMPHIURA SUNDEVALLI		E0002
GORGONOCEPHALUS CARYI	6803040201	E0001
OPHIACANTHA BIDENTATA	6803050105	E0003
OPHIOCTEN SERICEUM	6803090401	E0004
OPHIOPHOLIS ACULEATA	6803060101	E0005
OPHIOPLEURA BOREALIS		E0006
OPHIOSCOLEX GLACIALIS		E0007
OPHIURA SARSII	6803090611	E0008

PELECYPODA

TAXON NAME	VIMS CODE	OSU CODE
ARINOPSIDA ORBICULATA		MP050
ASTARTE ARCTICA		MP024
ASTARTE BOREALIS	4904110101	MP021
ASTARTE CRENATA		MP022
ASTARTE MIRABILIS	4904110108	MP023
ASTARTE MONTAGUI	4904110103	MP025
ASTARTE VERNICOSA		MP026
AXINOPSIDA ORBICULATA	4904150202	MP045
AXINULUS BREVIS		MP046
AXINULUS PYGMAEUS		MP052
BATHYARCA GLACIALIS		MP013
BATHYARCA PECTUNCULOIDES		MP014
CHLAMYS PSEUDISLANDICA		MP056
CLINOCARDIUM CILIATUM	4904200101	MP027
CRENELLA DECUSSATA	4904070201	MP015
CUSPIDARIA GLACIALIS	4904370201	MP030
CUSPIDARIA SUBTORTE		MP031
CYCLOCARDIA CREBRICCSTATA	4904120102	MP029
CYRTODARIA KURRIANA	4904290101	MP032
DACRYDIUM VITREUM		MP059
HIATELLA ARCTICA	4904290201	MP033
LIMATULA HYPERBOREA		MP019
LIOCYMA FLUCTOSA	4904210401	MP049
LIOCYMA VIRIDIS		MP051
LYONSIA ARENOSA	4904330201	MP034
MACOMA BALTHICA	4904240117	MP038
MACOMA CALCAREA	4904240101	MP039
MACOMA LOVENI	4904240110	MP040
MACOMA MOESTA		MP041
MALLETIA ABYSSOPOLARIS		MP057
MONTACUTA DAWSONI		MP060
MONTACUTA PLANATA		MP035
MUSCULUS CORRUGATUS	4904070403	MP016
MUSCULUS DISCORS	4904070402	MP017
MUSCULUS NIGER	4904070401	MP018
MYA PSEUDOARENARIA		MP055
MYA TRUNCATA		MP054
MYSELLA ALEUTICA	4904180103	MP036
NUCULA BELLOTII	4904020203	MP011
NUCULA TENUIS	4904020201	MP012
NUCULA ZOPHOS		MP058
NUCULANA MINUTA	4904030202	MP001
NUCULANA PERNULA	4904030201	MP002
NUCULANA RADIATA		MP003
PALLIOLUM GREENLANDICUS		MP020
PANDORA GLACIALIS	4904320101	MP037
PORTLANDIA ARCTICA	4904030301	MP004
PORTLANDIA FRATERNA		MP005
PORTLANDIA FRIGIDA		MP006
PORTLANDIA GLACIALIS	4904030302	MP007
PORTLANDIA INTERMEDIA		MP008
PORTLANDIA LENTICULA		MP009
SERRIPES GROENLANDICUS	4904200201	MP028
TELLINA LUTEA ALTERNIDENTATA	4904240201	MP042
THRACIA DEVEXSA	4904350206	MP043
THRACIA MYOPSIS	4904350202	MP044
THYASIRA GOULDII		MP048
THYASIRA SP.		MP047
YOLCIA HYPERBOREA	4904030502	MP010

PELECYPODA

TAXON NAME	VIMS CODE	OSU CODE
YOLDIA SCISSURATA		MP053
YOLDIELLA INTERMEDIA		MP061

POLYCHAETA

TAXON NAME	VIMS CODE	OSU CODE
AMMOTRYPANE AULOGASTER	4801560101	WM027
AMMOTRYPANE BREVIATA	4801560102	WM028
AMPHARETE ACUTIFRONS	4801650208	WM001
AMPHARETE GOESI	4801650207	WM002
AMPHARETE VEGA	4801650209	WM003
AMPHITRITE CIRRATA	4801660101	WM078
ANAITIDES GROENLANDICA	4801120102	WM039
ANTINOELLA SARSI	4801010202	WM040
ARCTEOBIA ANTICOSTIENSIS	4801010301	WM041
ARENICOLA MARENA GLACIALIS	4801600202	WM005
ARTACAMA PROBOSCIDEA		WM090
ASABELLIDES SIBIRICA	4801651001	WM004
AUTOLYTUS ALEXANDRI	4801220107	WM067
AUTOLYTUS FALLAX		WM068
AUTOLYTUS PRISMATICUS	4801220103	WM069
BRADA INHABILIS	4801520103	WM009
BRADA VILLOSA	4801520102	WM010
CAPITELLA CAPITATA	4801580101	WM006
CHAETOZONE SETOSA	4801490401	WM007
CHONE DUNERI	4801680104	WM052
CHONE INFUNDIBULIFORMIS	4801680102	WM053
CIRRATULUS CIRRATUS	4801490101	WM008
CISTENIDES GRANULATA	4801640202	WM031
CISTENIDES HYPERBOREA	4801640203	WM032
ETEONE FLAVA	4801120204	WM034
ETEONE LONGA	4801120205	WM035
ETEONE SPITSBERGENSIS	4801120202	WM036
EUALALIA MINUTA	4801120308	WM037
EUCHONE ANALIS	4801680201	WM054
EUNOE CLARKI	4801010501	WM043
EUNOE NODOSA	4801010503	WM044
EUNOE OERSTEDI	4801010506	WM045
EUSYLLIS BLOMSTRANDI	4801220602	WM070
EUSYLLIS MAGNIFICA	4801220604	WM071
EXOGONE DISPAR	4801220701	WM072
EXOGONE NAIDINA		WM073
FLABELLIGERA AFFINIS	4801520202	WM011
GATTYANA CILIATA	4801010602	WM046
GATTYANA CIRROSA	4801010603	WM047
GLYCERA CAPITATA	4801260101	WM012
GLYCINDE WIRENI	4801270102	WM013
HARMOTHOE EXTENUATA	4801010803	WM048
HARMOTHOE IMBRICATA	4801010806	WM049
IDANTHYRSUS ARMATUS	4801630102	WM051
LAEOSPIRA GRANULATUS	4801700701	WM060
LANASSA VENUSTA		WM080
LANGERHANSIA CORNUTA	4801221001	WM076
LEAENA ABRANCHIATA	4801660301	WM081
LUMBRINERIS FRAGILIS	4801300102	WM015
MALACOCEROS FULIGINOSUS		WM091
MALDANE SARSI	4801610301	WM016
MELAENIS LOVENI	4801011301	WM050
MICRONEPHTHYS MINUTA		WM089
MYSTA BARBATA	4801120701	WM033
MYSTIDES BOREALIS	4801120601	WM038
MYXICOLA INFUNDIBULUM	4801680502	WM057
NEOAMPHITRITE GROENLANDICA	4801660402	WM079
NEPHTYS CILIATA	4801240102	WM021
NEPHTYS DISCORS	4801240108	WM022

POLYCHAETA

TAXON NAME	VIMS CODE	OSU CODE
NEPHTYS LONGOSETOSA	4801240109	WM023
NEPHTYS PARADOXA	4801240110	WM024
NEREIMYRA APHRODITOIDES	4801200301	WM014
NEREIS PELAGICA	4801230403	WM025
NEREIS ZONATA	4801230406	WM026
NICOLEA VENUSTULA		WM082
NICOMACHE LUMBRICALIS	4801610501	WM017
NICOMACHE PERSONATA	4801610502	WM018
PETALOPROCTUS TENUIS	4801610702	WM019
PHOLOE MINUTA	4801050101	WM062
PICNOSYLLIS COMPACTA	4801220203	WM074
PISTA MACULATA		WM083
POLYCIRRUS MEDUSA	4801660802	WM084
POLYDORA CAULLERYI	4801420404	WM063
POLYNOE GRACILIS	4801011502	WM042
POTAMILLA NEGLECTA	4801680601	WM055
PRAXILLELLA PRAETERMISSA	4801610902	WM020
PRIONOSPIO CIRRIFERA		WM092
PRIONOSPIO MALMGRENI	4801420501	WM064
PROCLEA GRAFFII		WM085
PSEUDOPOTAMILLA RENIFORMIS	4801680703	WM056
SABELLA CRASSICORNIS	4801680301	WM058
SCALIBERGMA INFLATUM	4801550101	WM059
SCOLOPLOS ARMIGER	4801390301	WM030
SPHAEROSYLLIS ERINACEUS	4801220801	WM075
SPIO FILICORNIS	4801420701	WM065
SPIRORBIS SPIRILLUM	4801700504	WM061
STERNASPIS SCUTATA	4801570101	WM066
TEREBELLIDES STROEMII		WM086
THELEPUS CINCINNATUS		WM087
TRAVISIA CARNEA	4801560404	WM029
TRICHOBRANCHUS GLACIALIS		WM088
TYPOSYLLIS FASCIATA	4801220507	WM077

PRIAPULIDA

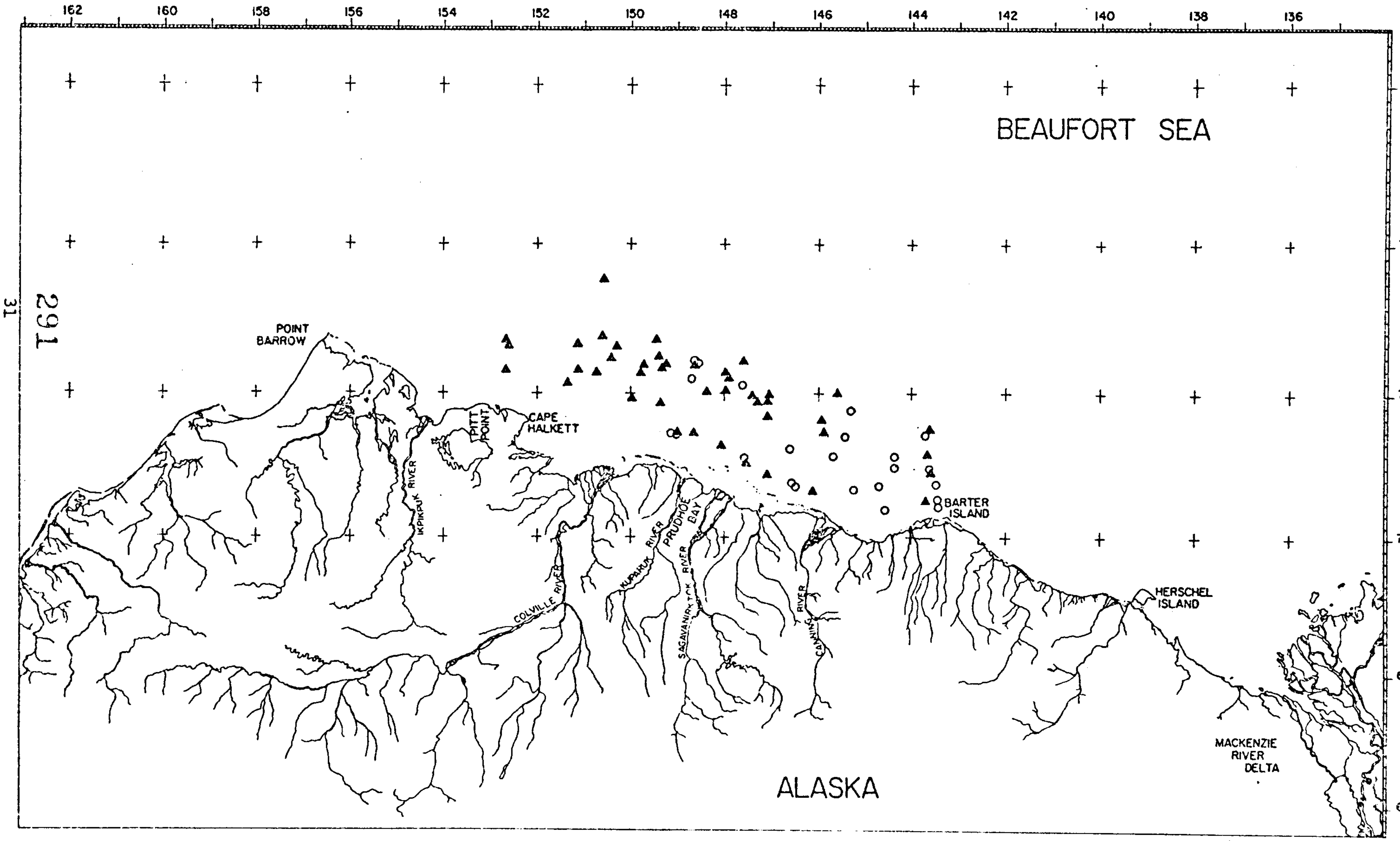
TAXON NAME	VIMS CODE	OSU CODE
HALICRYPTUS SPINULOSA		PR001

B. Species distribution patterns

A series of charts have been assembled to demonstrate the distributional patterns of the more common species in the southwestern Beaufort Sea. These organisms were collected on the U.S. Coast Guard's WEBSEC-71 -72 field programs (Hufford *et. al.*, 1974; Carey *et. al.*, 1974; Carey and Ruff, unpublished). Collections were made by Smith-McIntyre 0.1 m^2 grab and by 4 meter and 7 meter otter trawls (Fig. 2). For clarity of presentation, station locations are indicated for each species only where collected by trawl or grab. Empty molluscan shell collections are indicated as well (open circles).

FIGURE 2

Smith-McIntyre grab (triangle) stations and otter trawl (circle) stations occupied during WEBSEC-71-72 field programs



SPECIES DISTRIBUTIONS

MOLLUSCA - PELECYPODA

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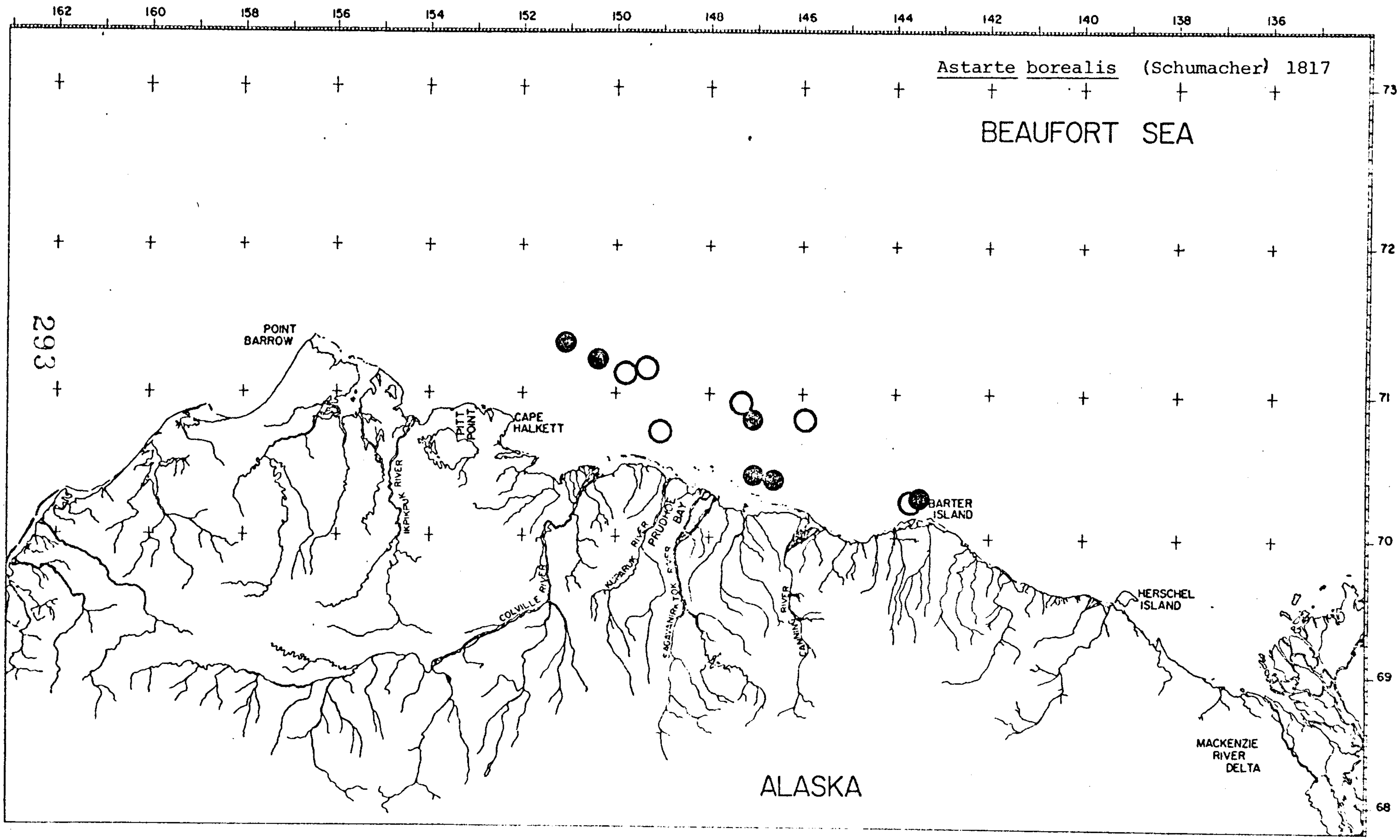
Astarte borealis (Schumacher) 1817
BEAUFORT SEA
ALASKA
POINT BARROW
CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
SAGAVANIRKTOK RIVER
CANNING RIVER
BARTER ISLAND
HERSCHEL ISLAND
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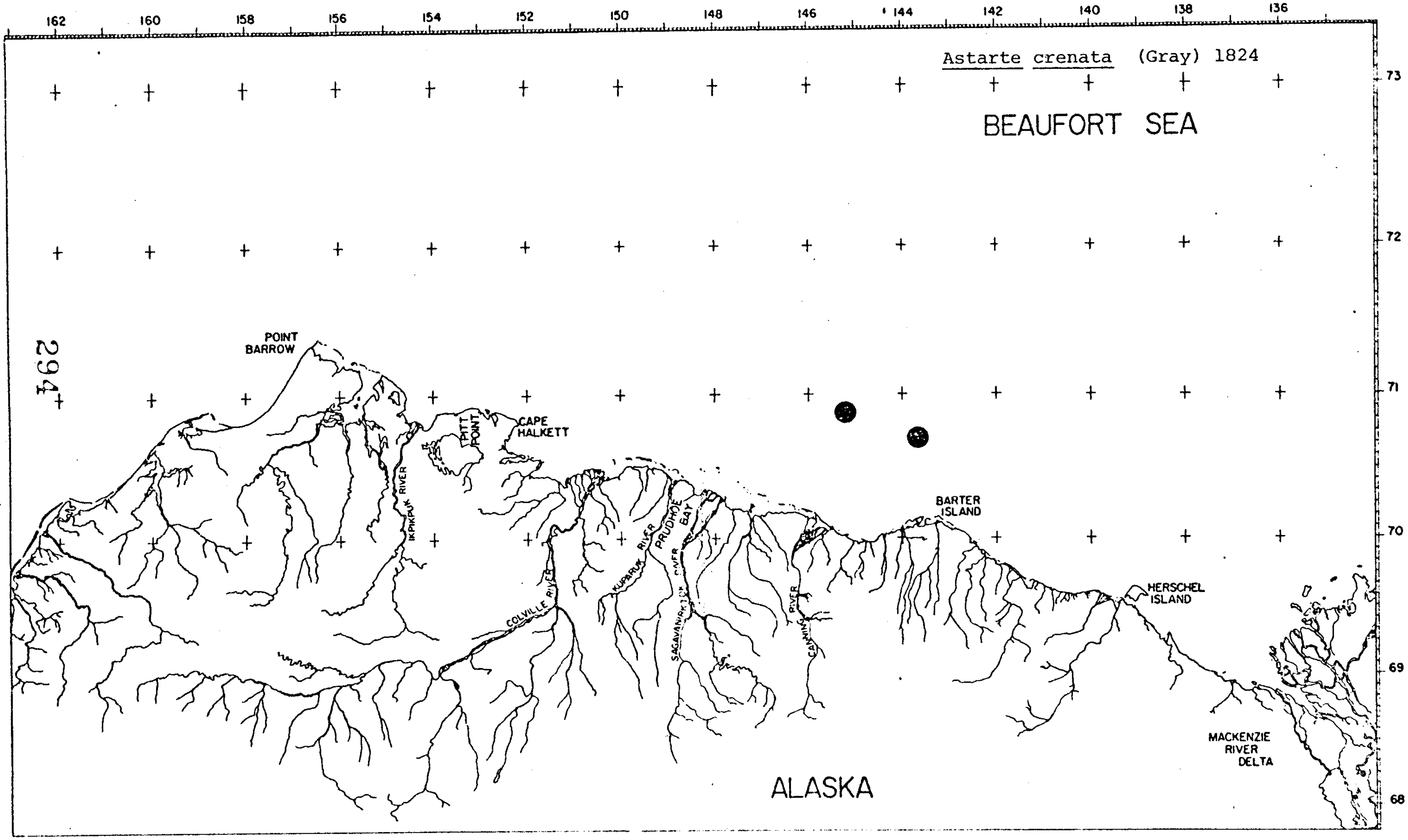
Astarte crenata (Gray) 1824
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HERSCHEL ISLAND
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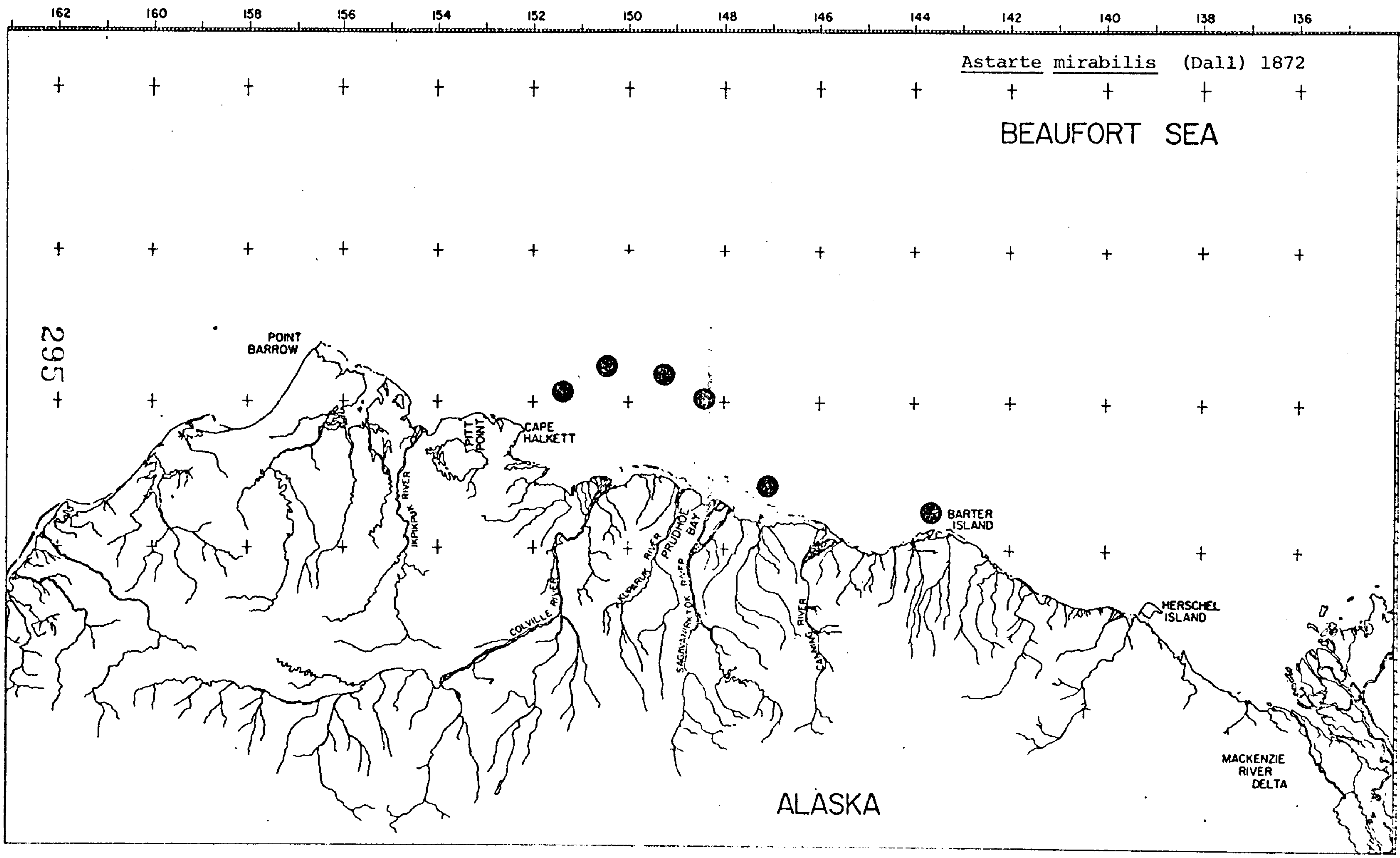
ALASKA


Astarte mirabilis (Dall) 1872
BEAUFORT SEA
POINT BARROW
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IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
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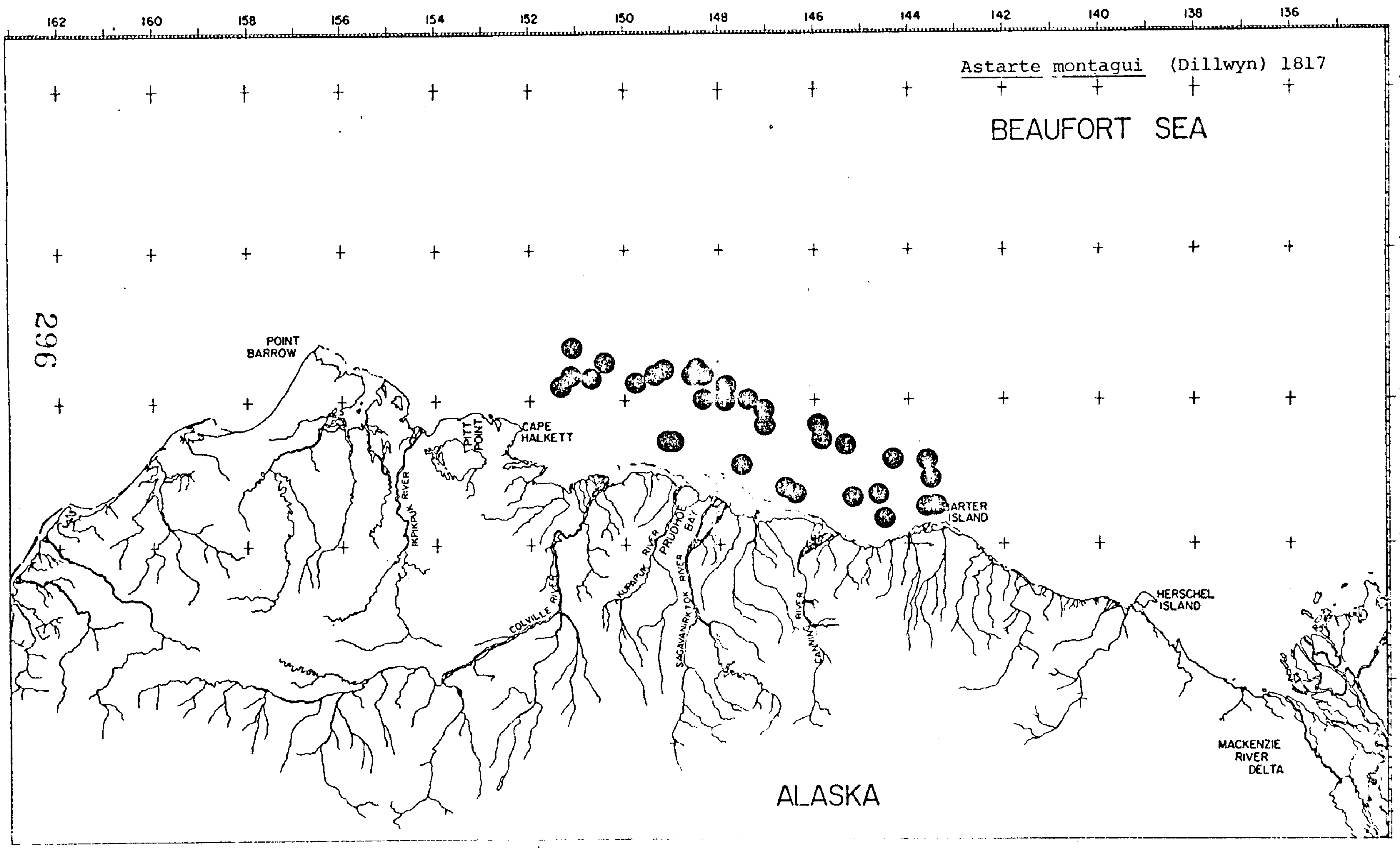
Astarte montagui (Dillwyn) 1817
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PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
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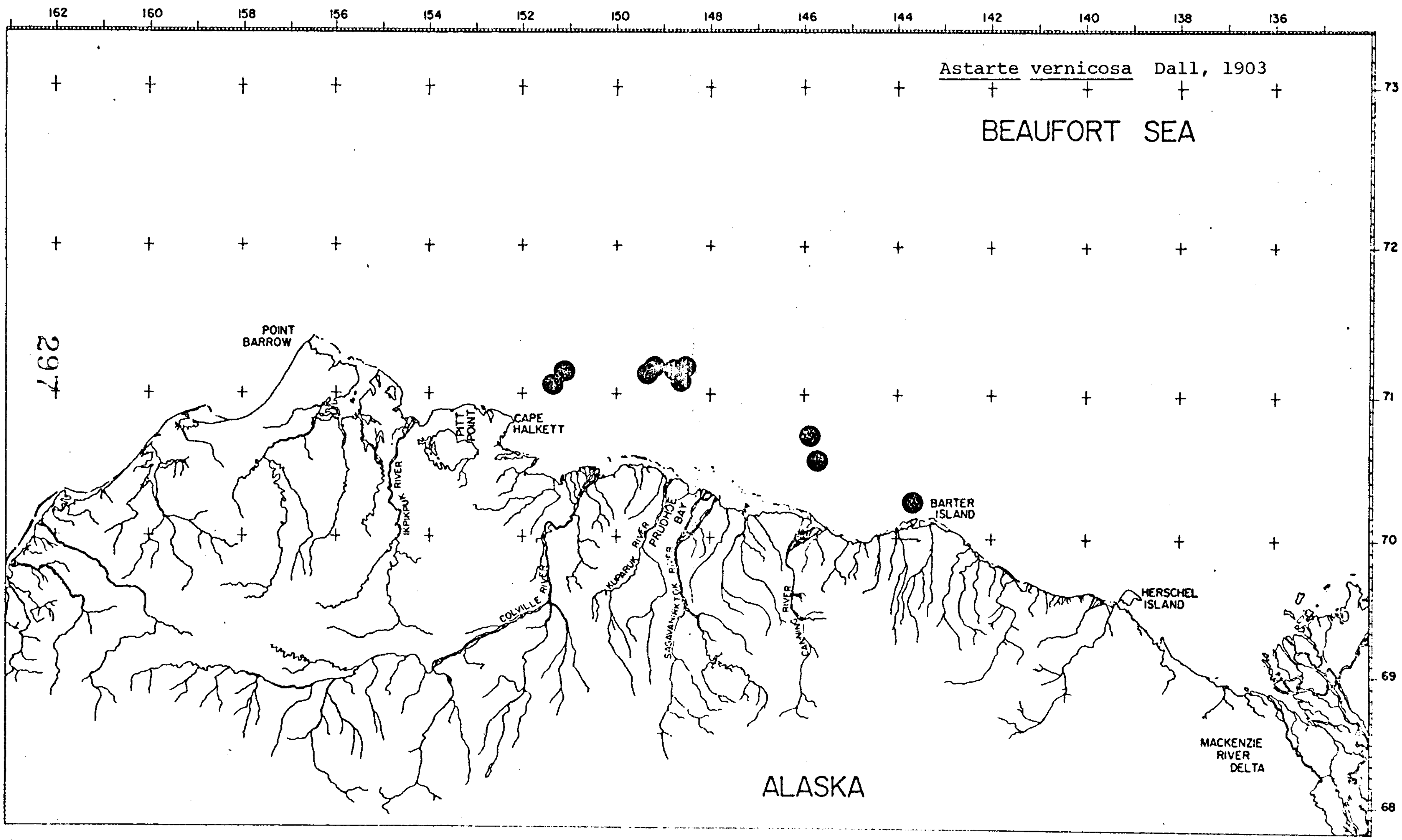
Astarte vernicosa Dall, 1903
BEAUFORT SEA
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POINT BARROW
CAPE HALKETT
PITT POINT
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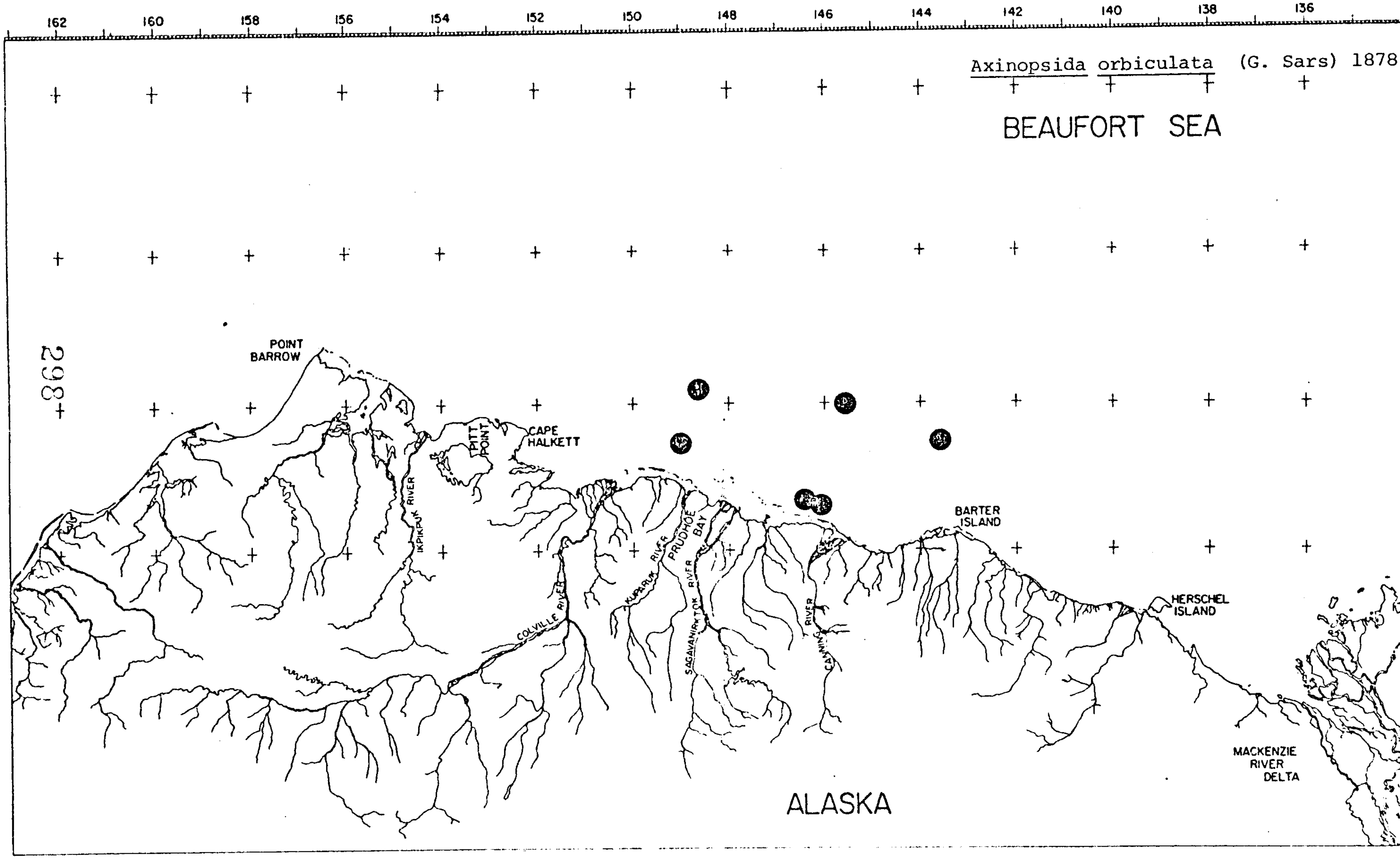
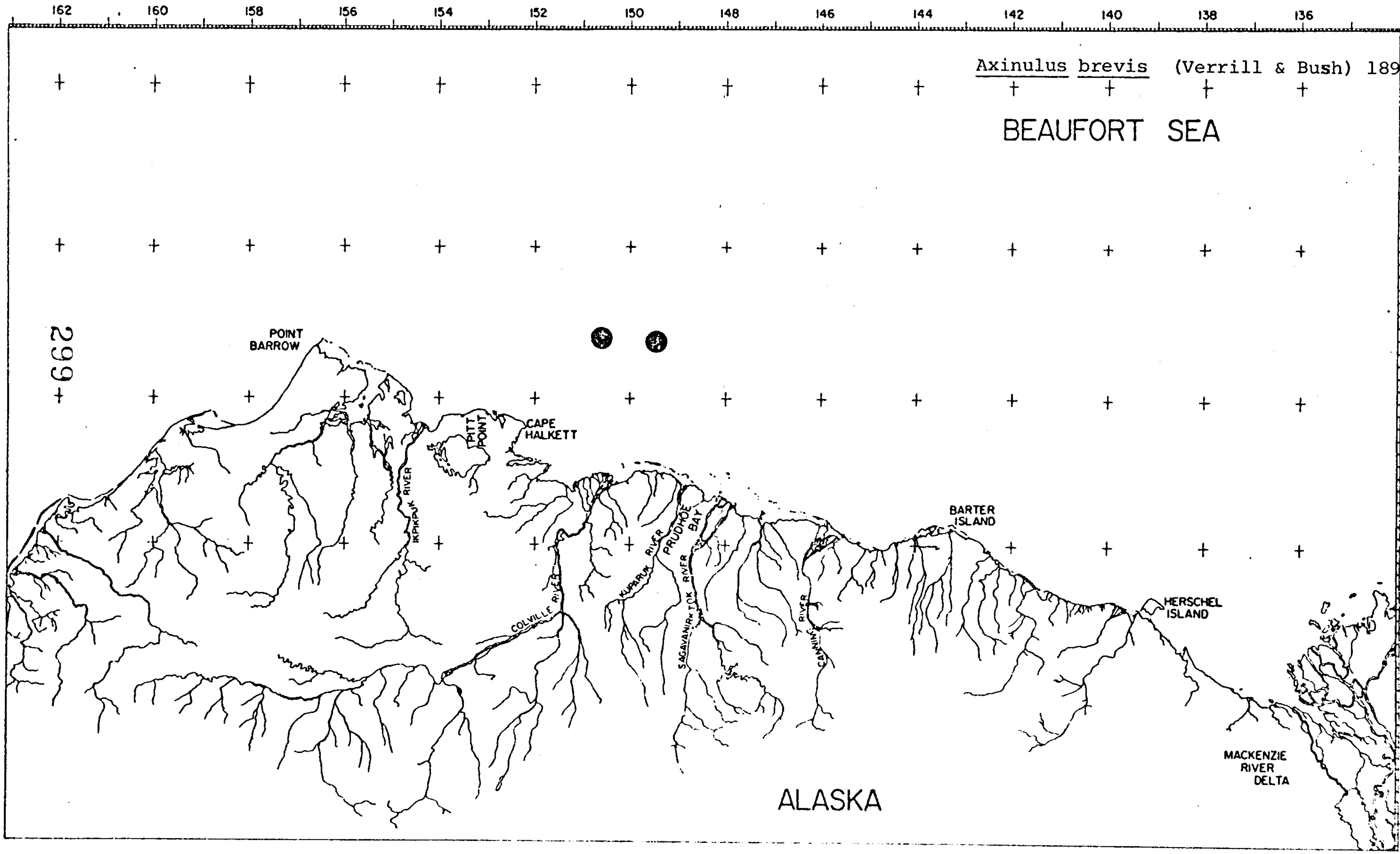
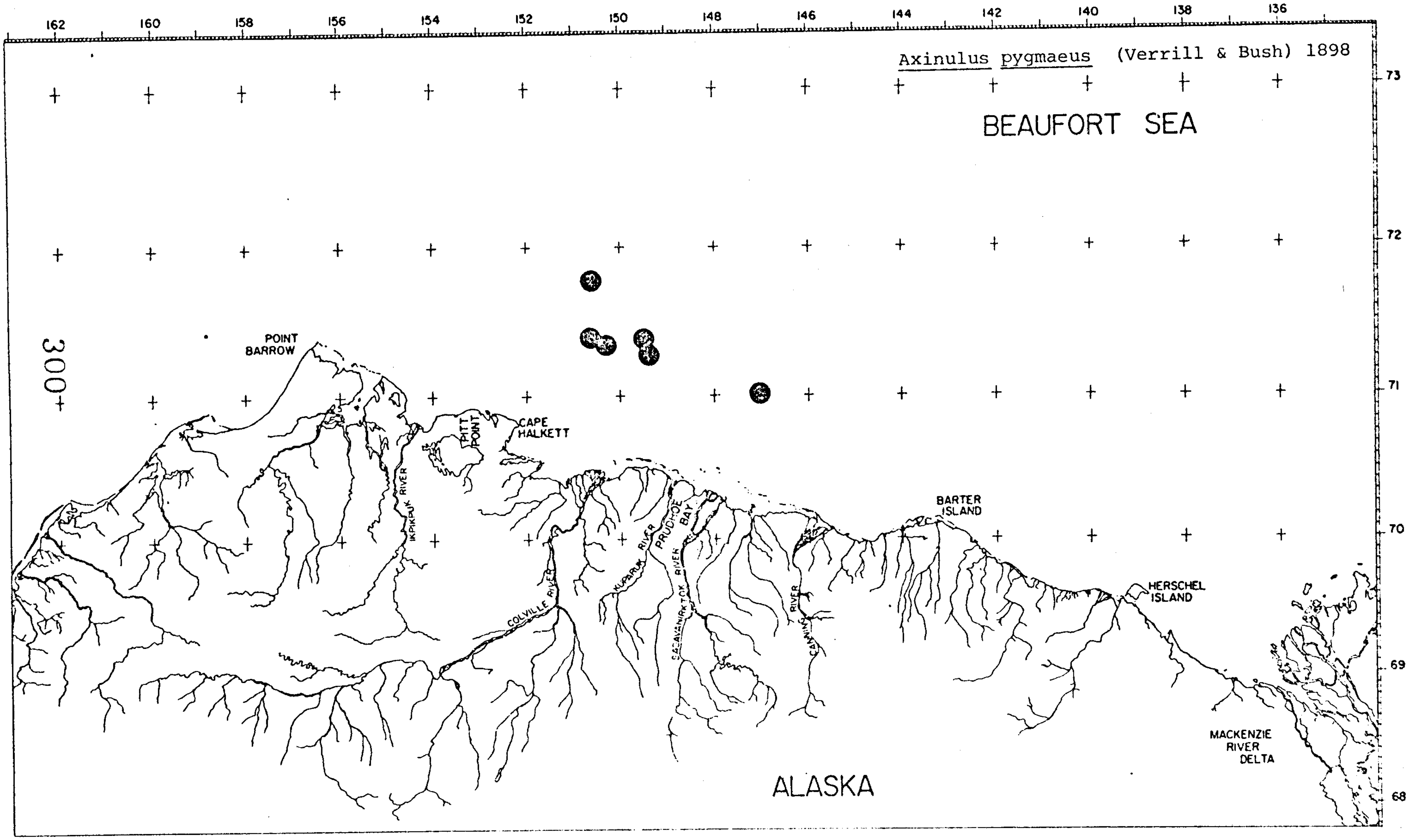


<u>Axinopsida</u> <u>orbiculata</u> (G. Sars) 1878

Axinulus brevis (Verrill & Bush) 1898




Axinulus pygmaeus (Verrill & Bush) 1898
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POINT BARROW
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IKPIKPUK RIVER
COLVILLE RIVER
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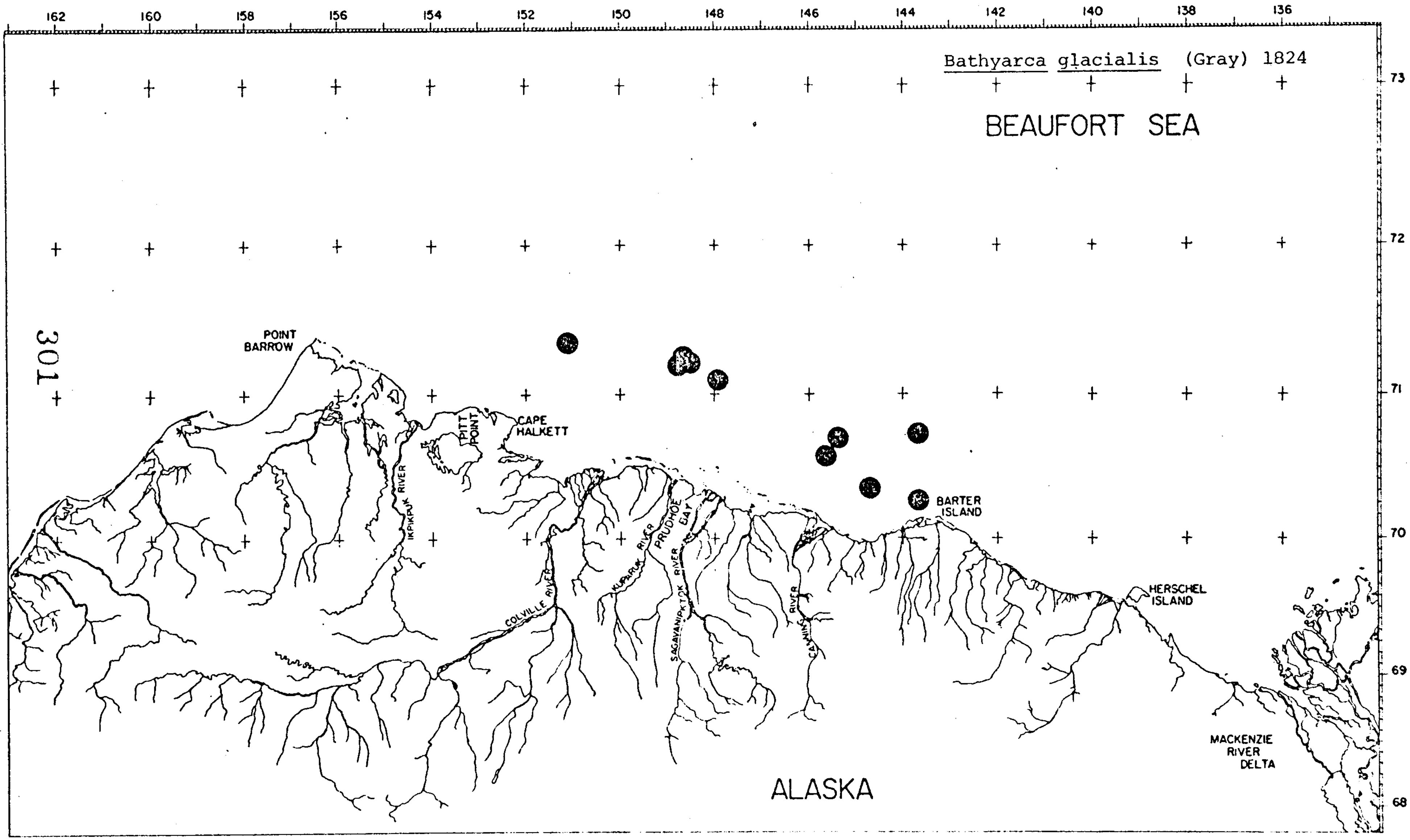
Bathyarca glacialis (Gray) 1824
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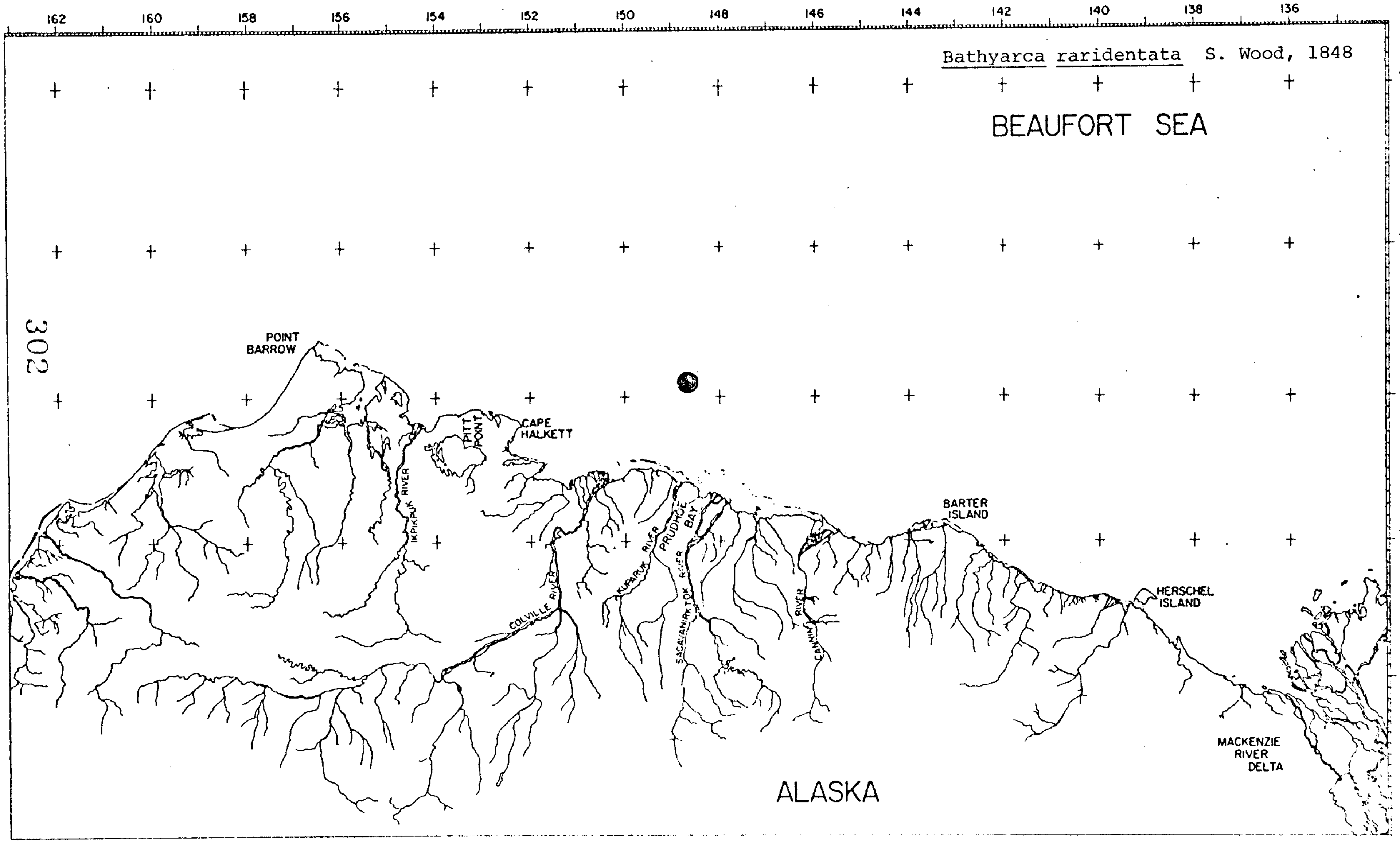
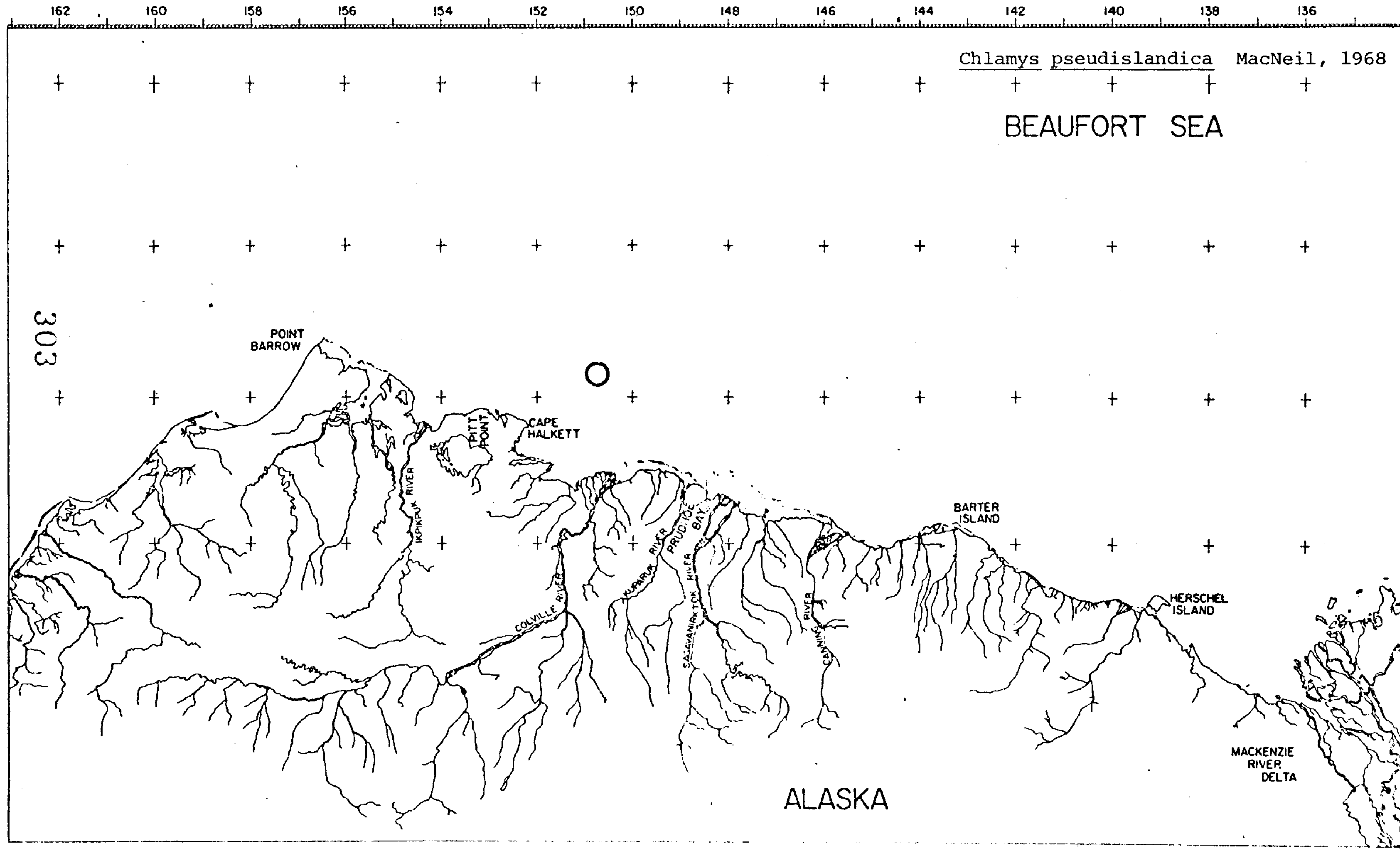
ALASKA



Bathyarca raridentata S. Wood, 1848


Chlamys pseudislandica MacNeil, 1968
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ALASKA
POINT BARROW
CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
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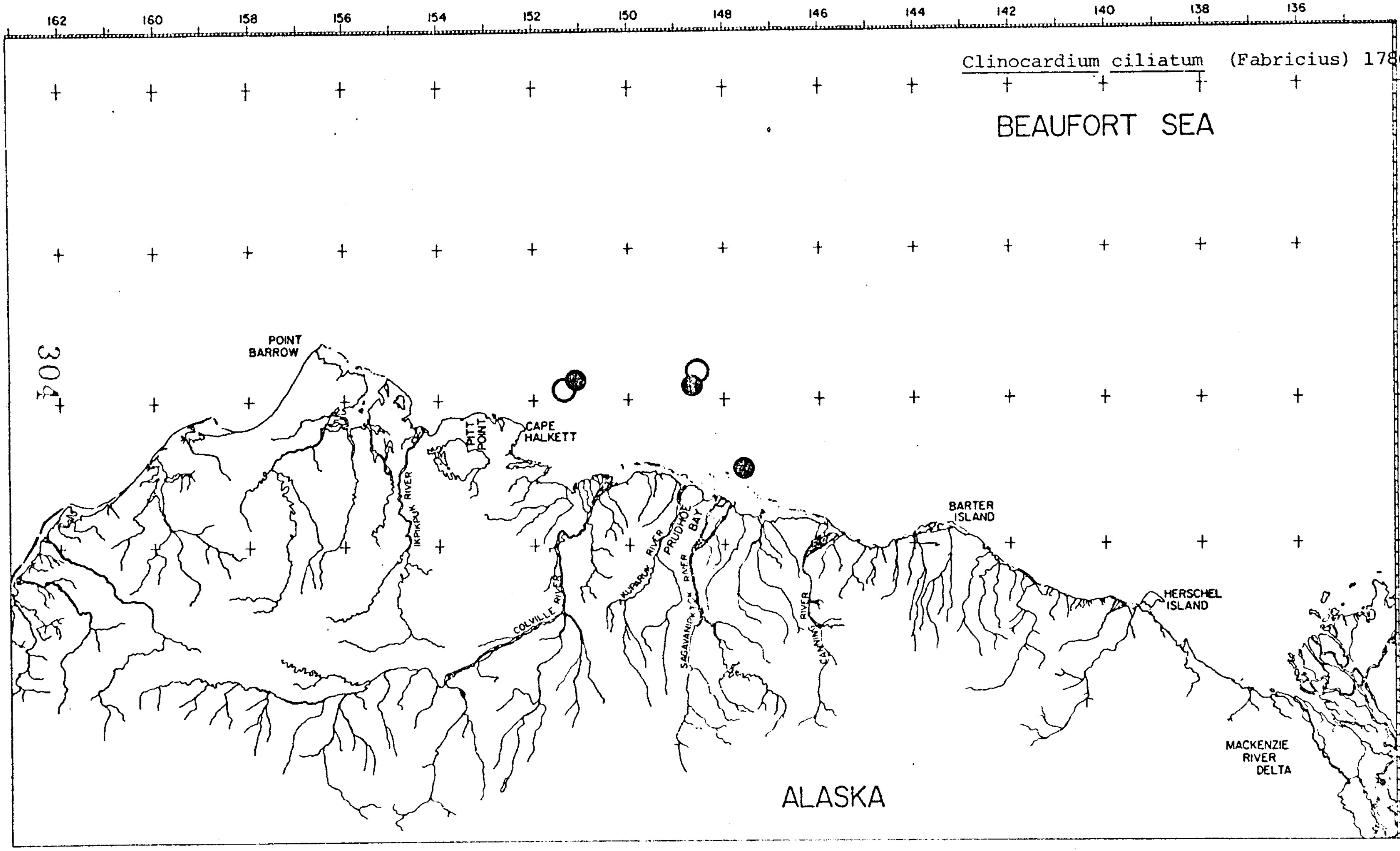
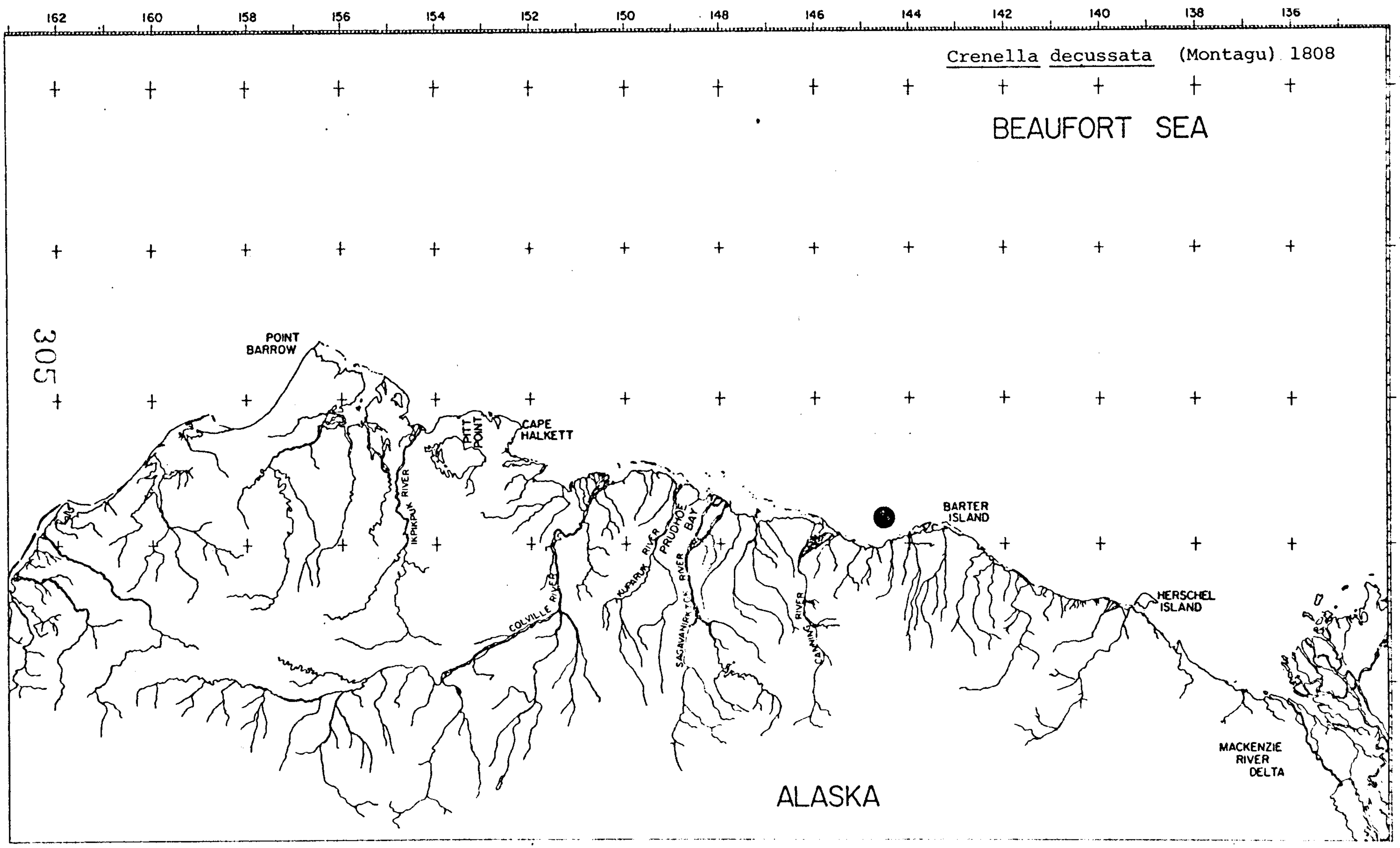
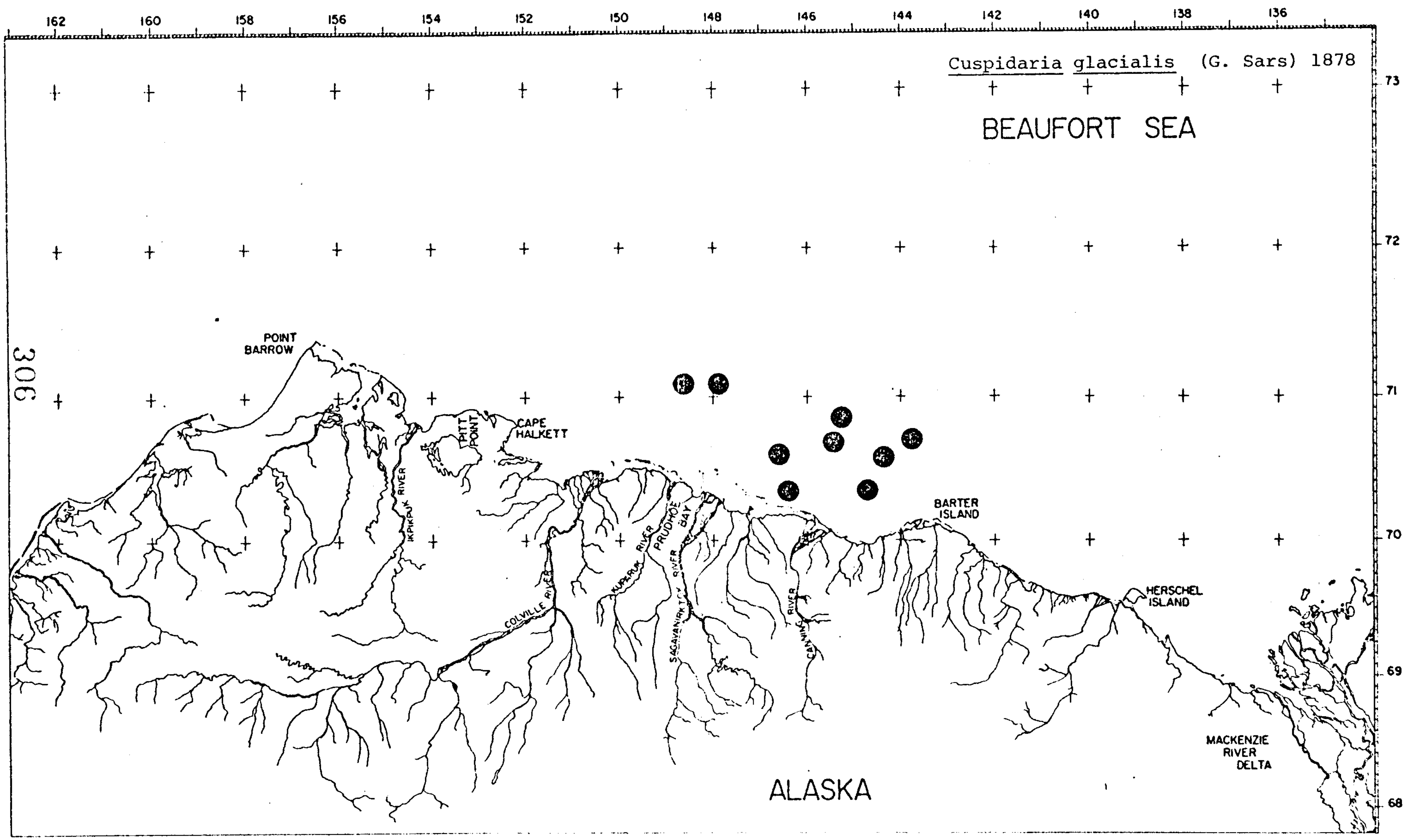


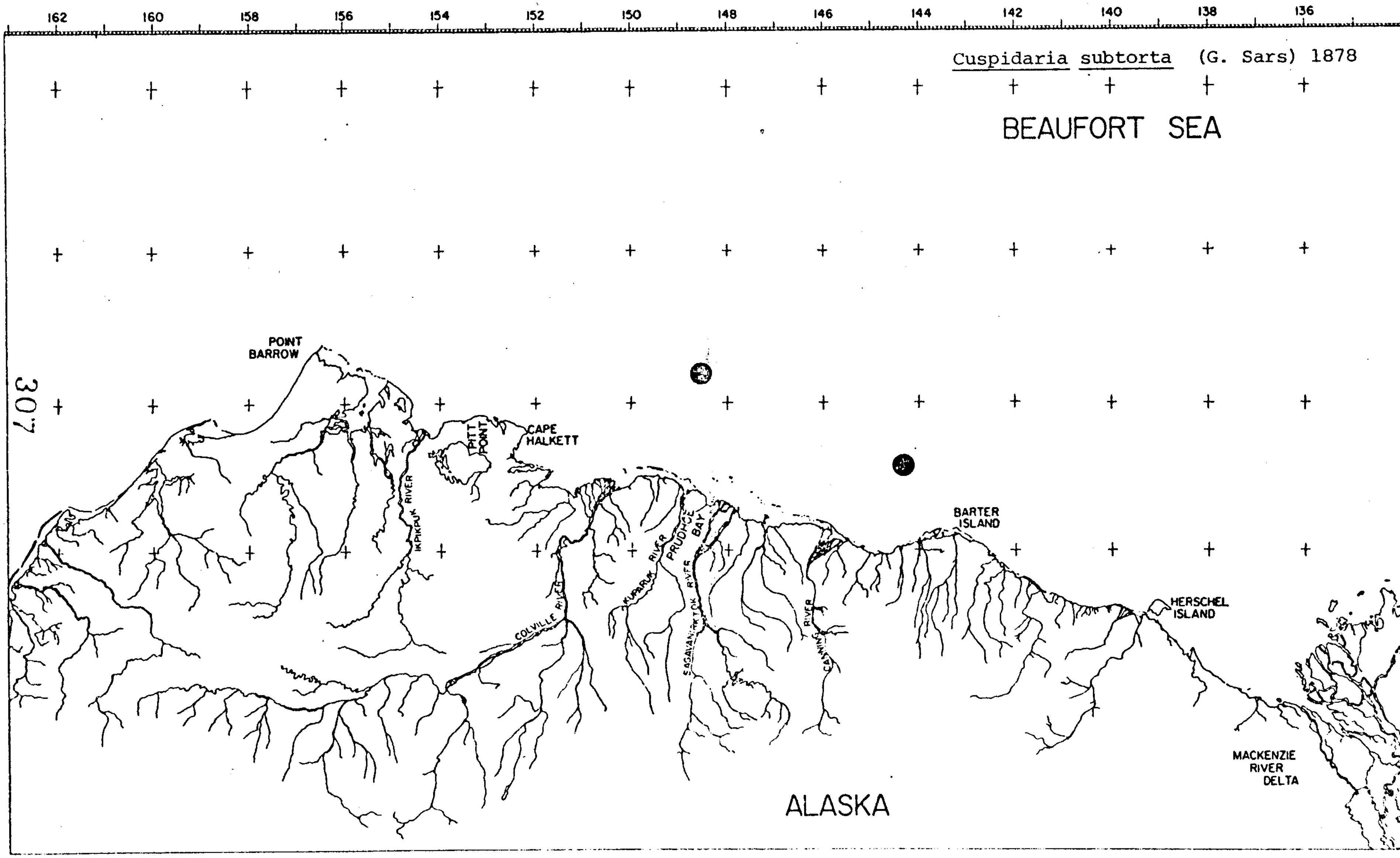
Clinocardium ciliatum (Fabricius) 1780



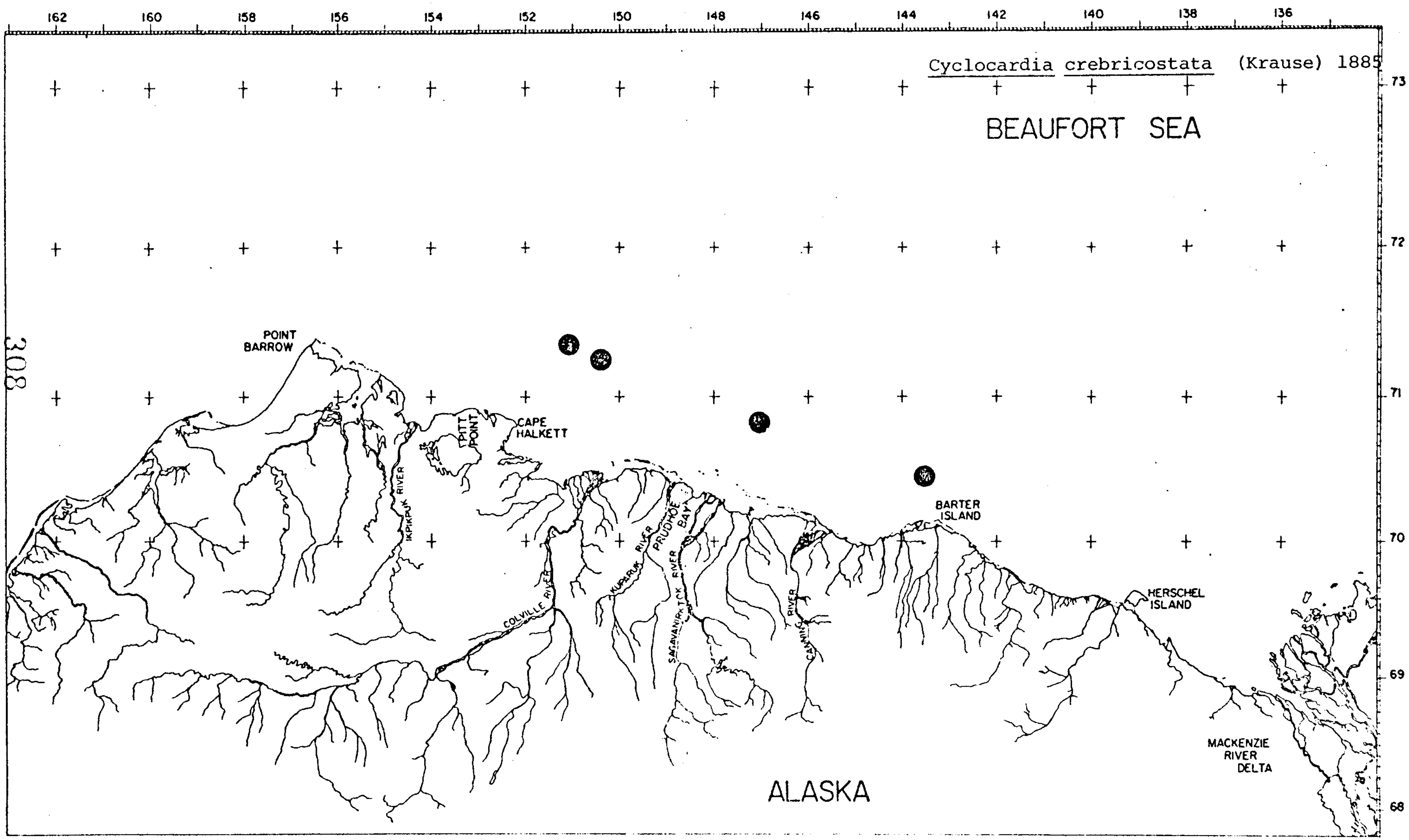
<u>Crenella</u> <u>decussata</u> (Montagu) 1808



<u>Cuspidaria</u> <u>glacialis</u> (G. Sars) 1878



Cuspidaria subtorta (G. Sars) 1878


Cyclocardia crebricostata (Krause) 1885
BEAUFORT SEA
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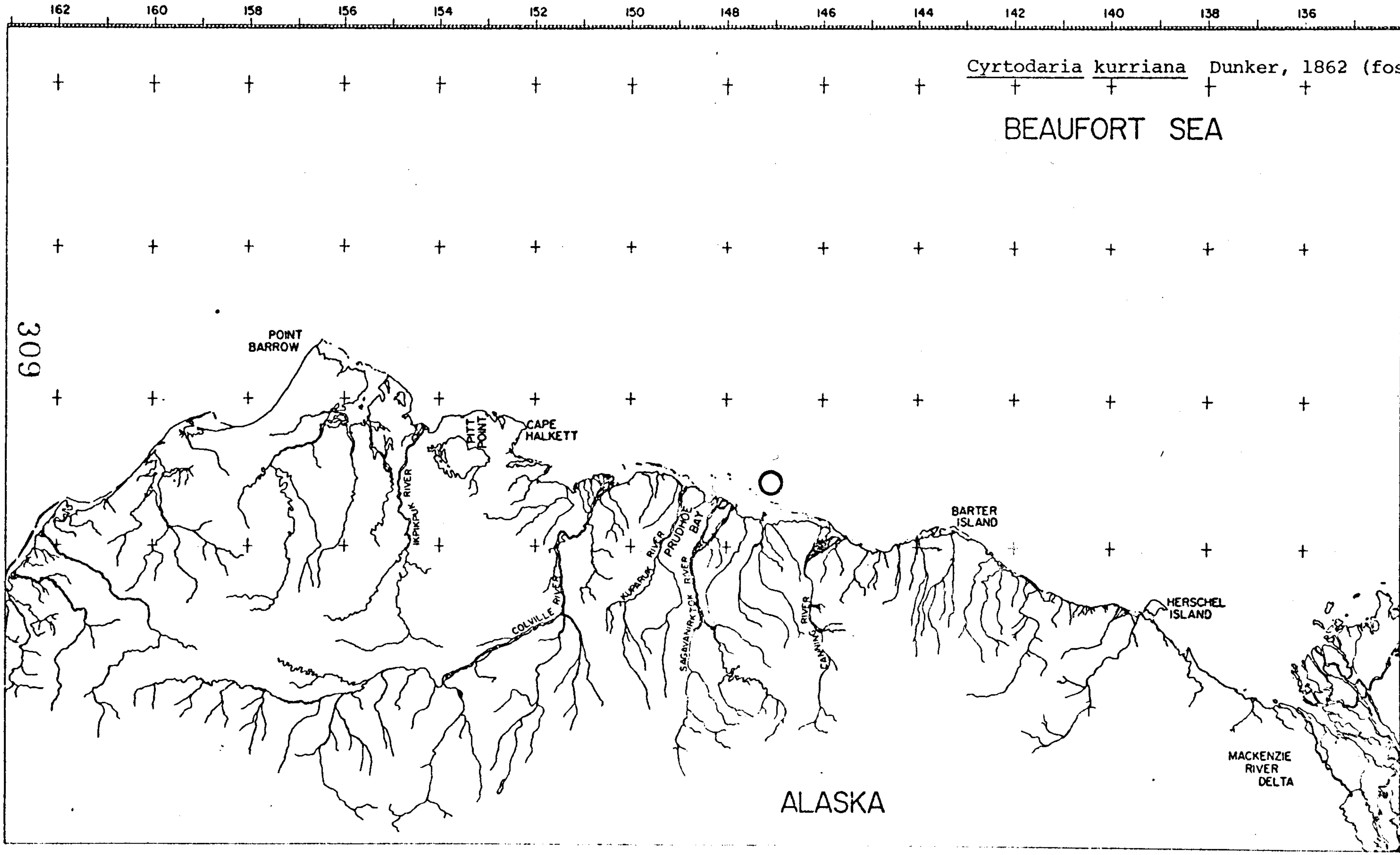
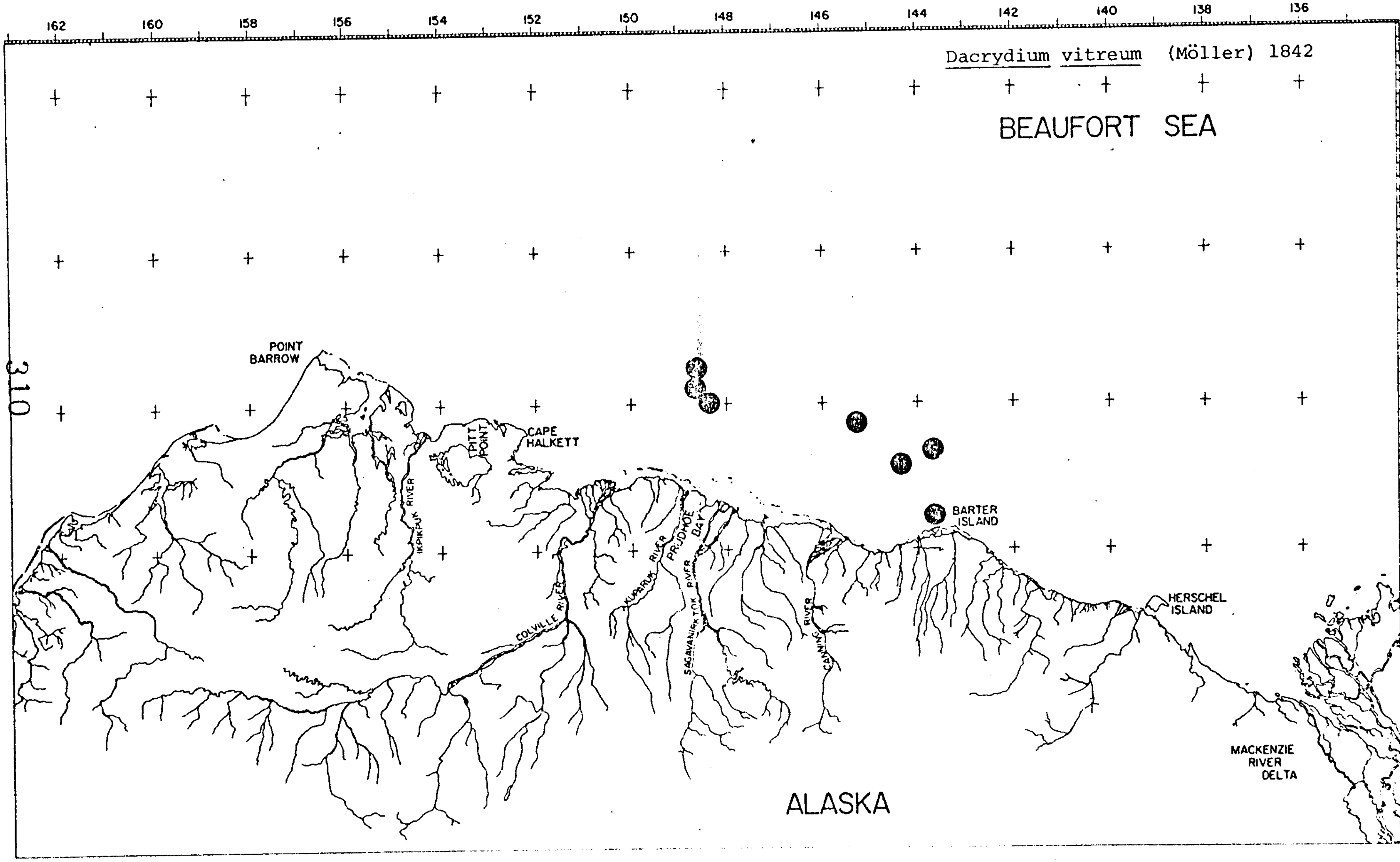
Cyrtodaria kurriana Dunker, 1862 (fossil)




Dacrydium vitreum (Möller) 1842
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ALASKA
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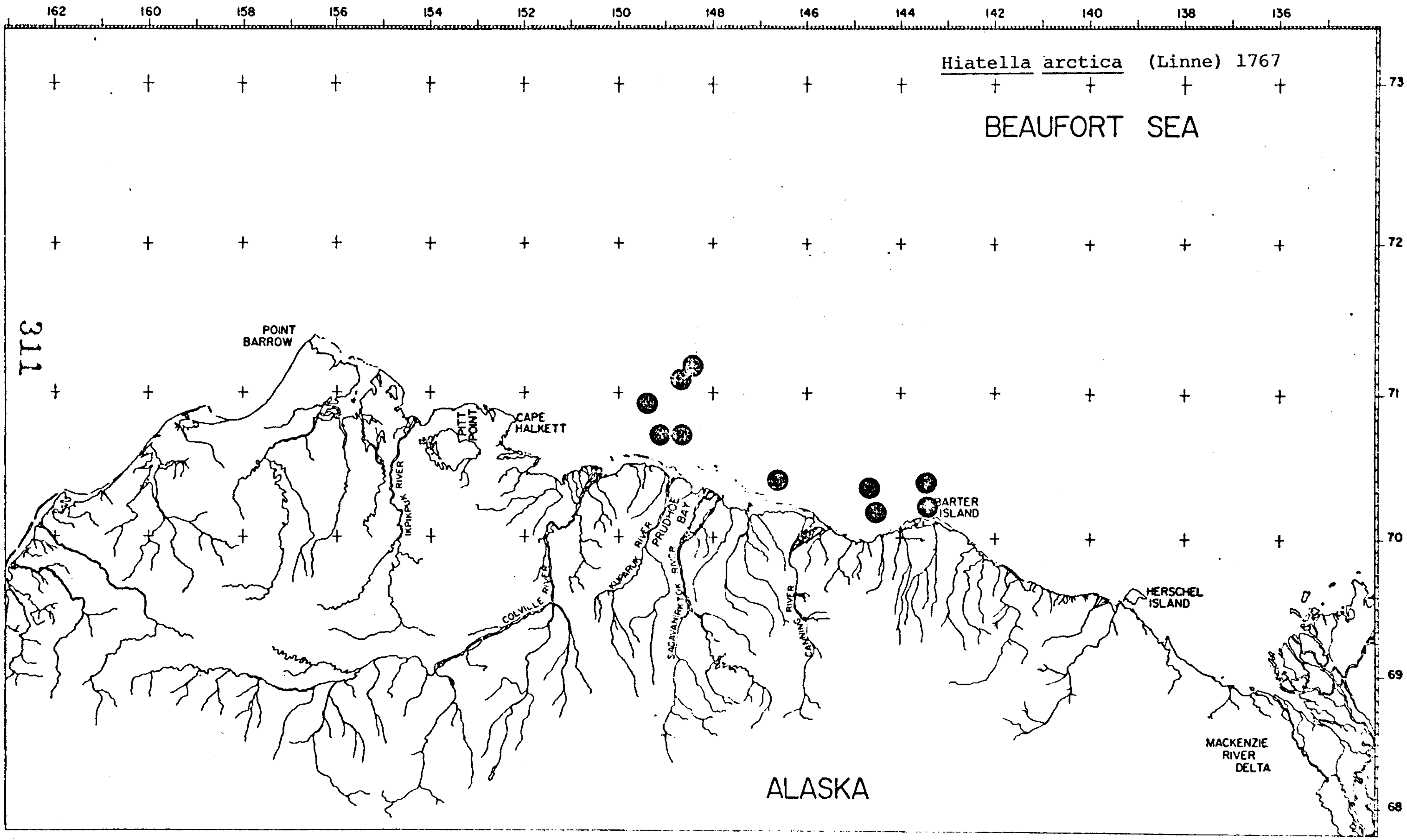
Hiatella arctica (Linne) 1767
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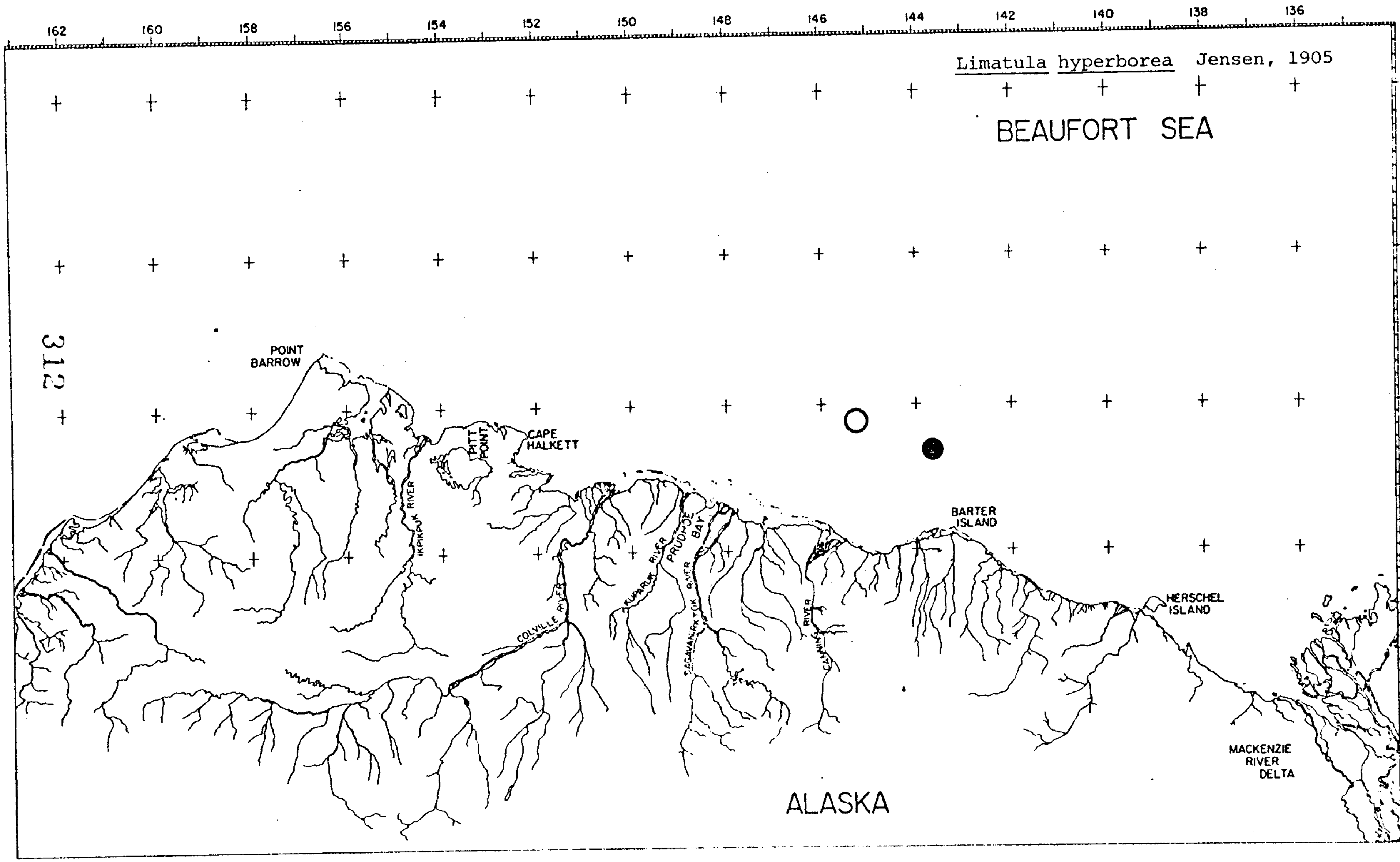
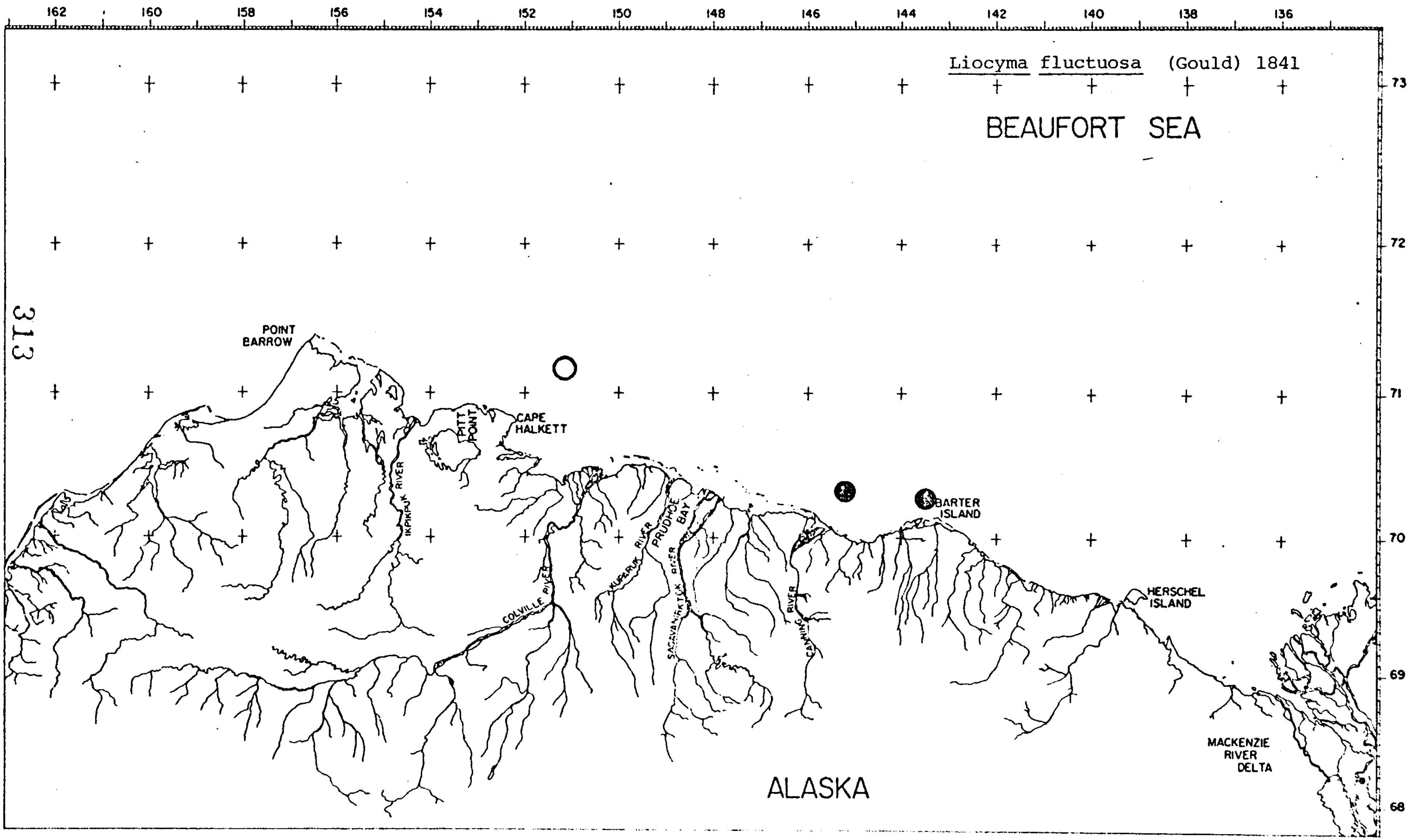
Limatula hyperborea Jensen, 1905





<u>Liocyma</u> <u>fluctuosa</u> (Gould) 1841

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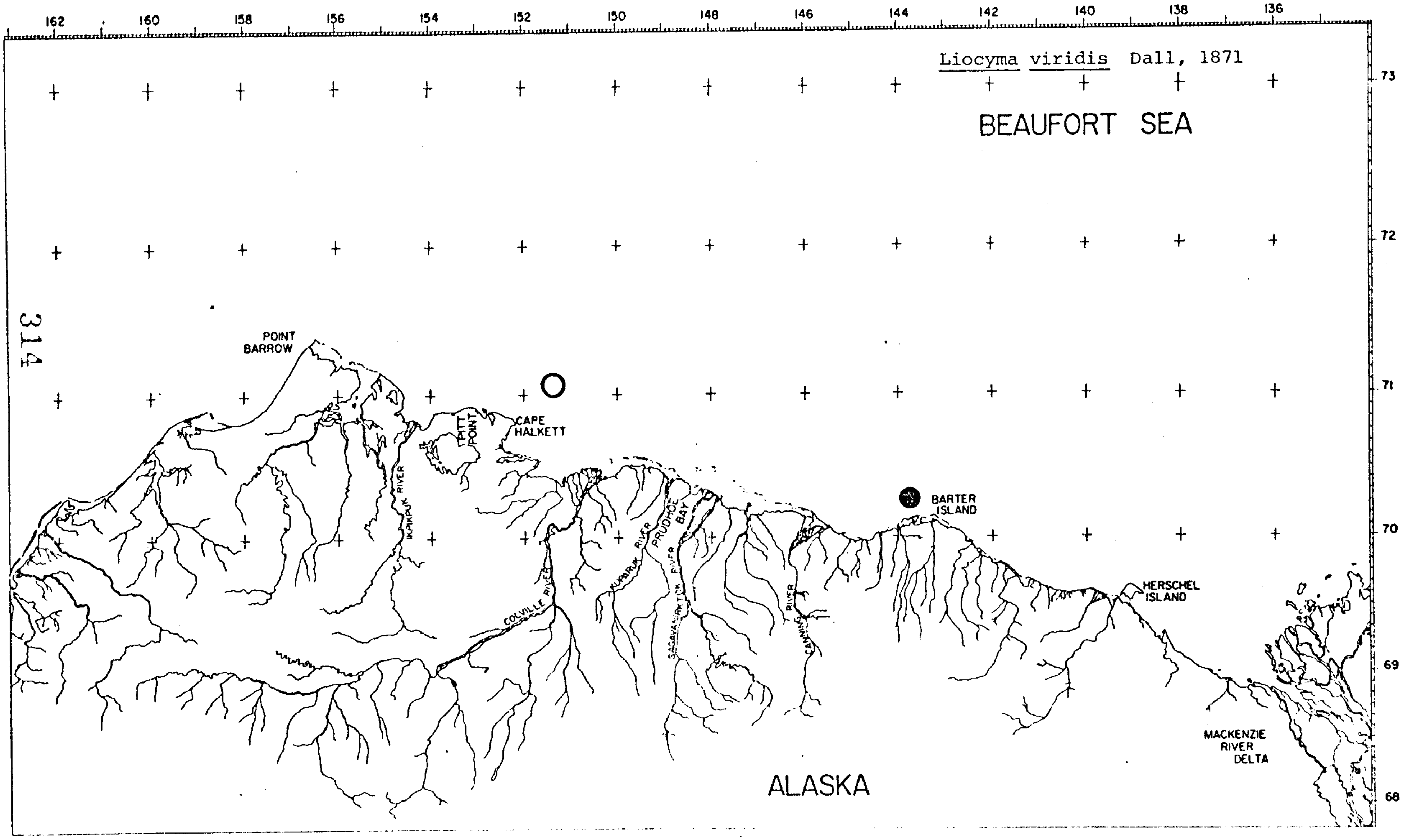

Liocyma viridis Dall, 1871
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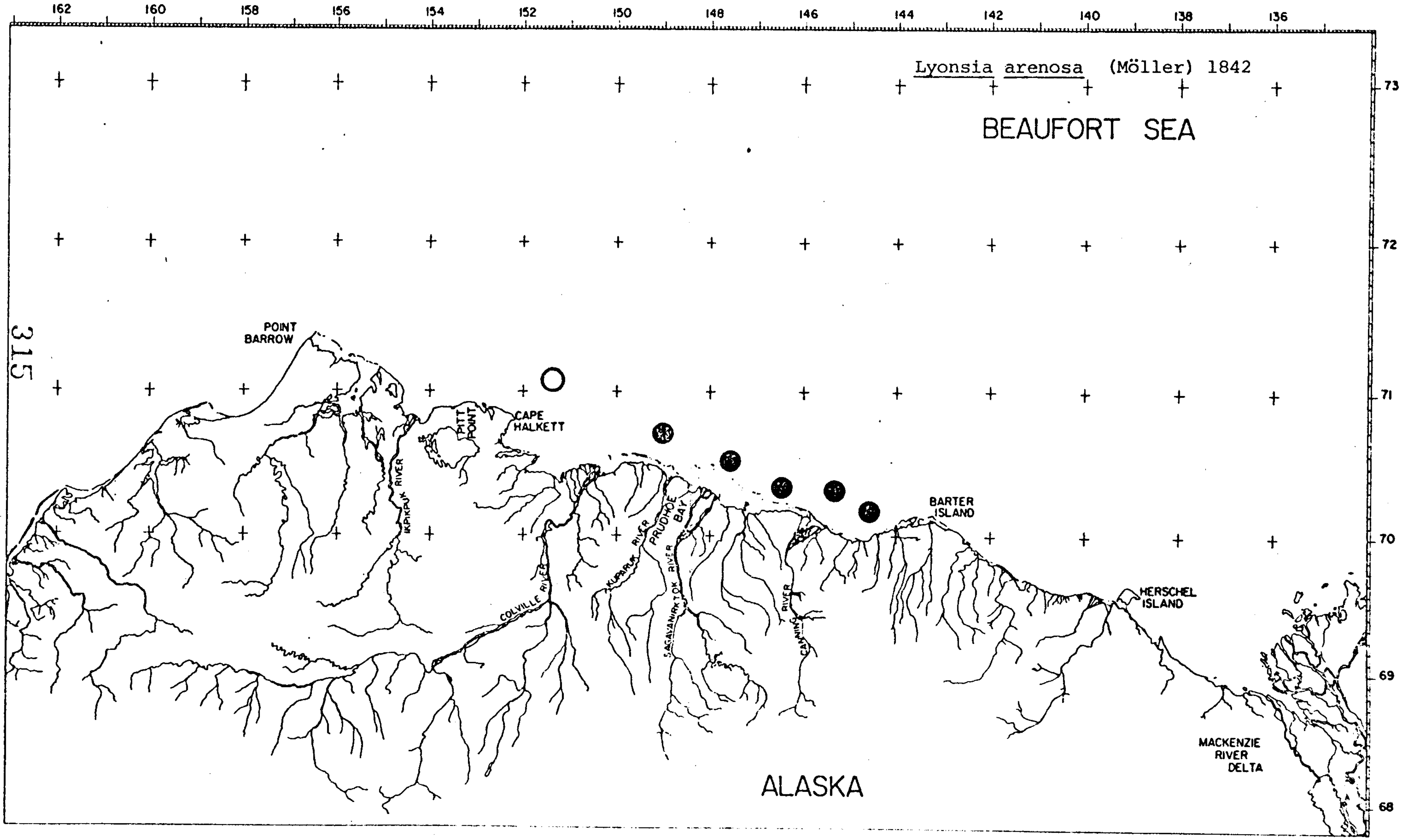
Lyonsia arenosa (Möller) 1842
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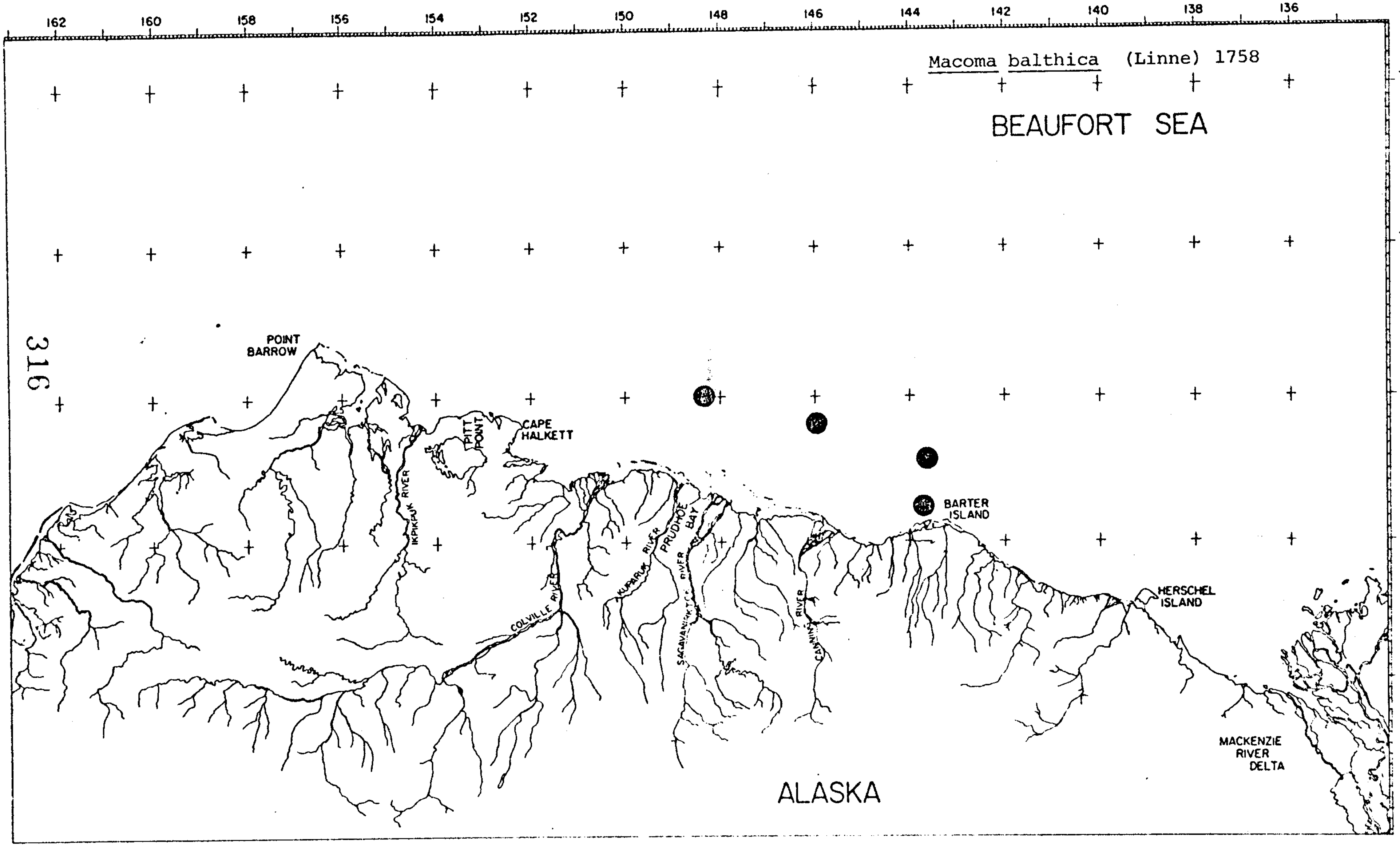
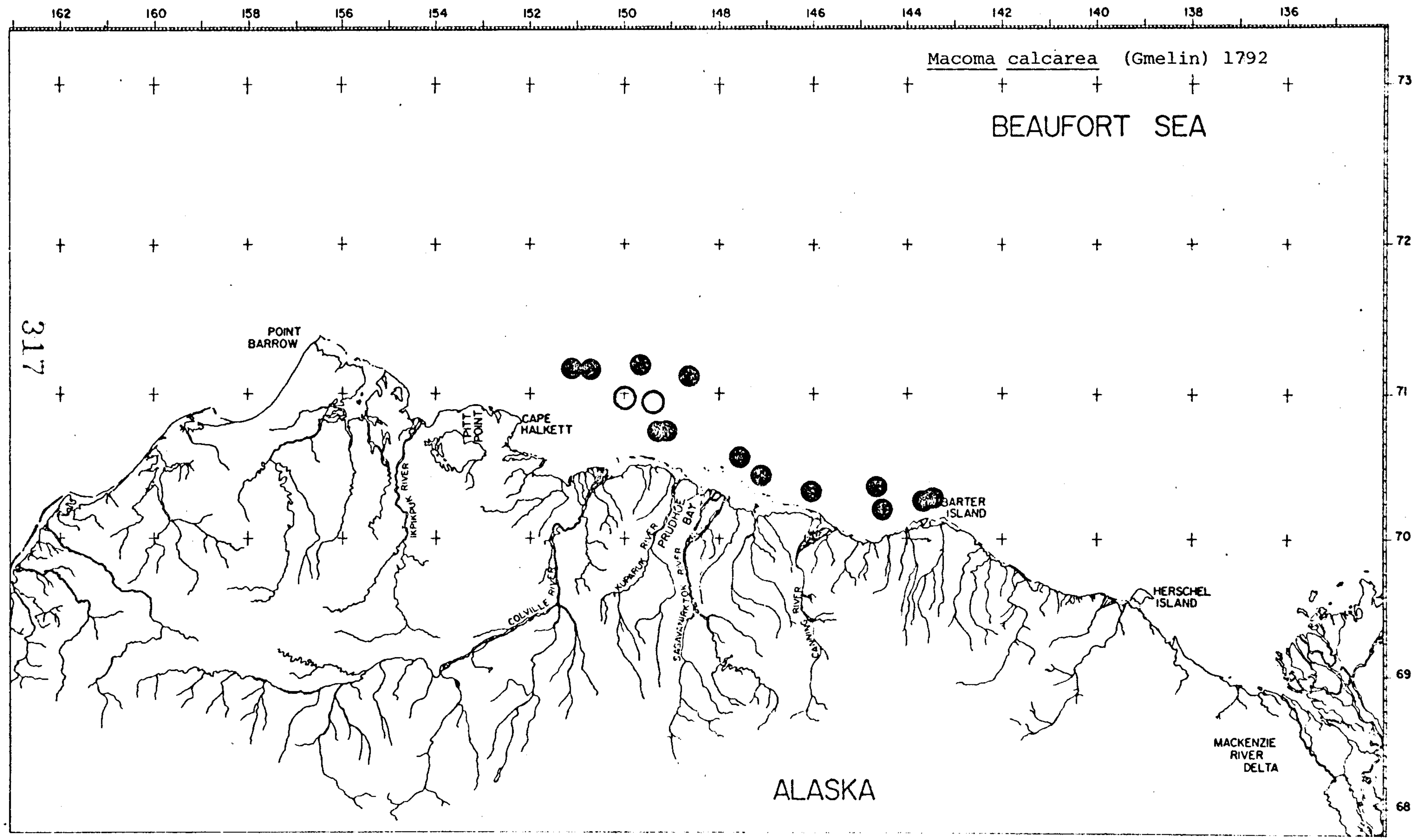
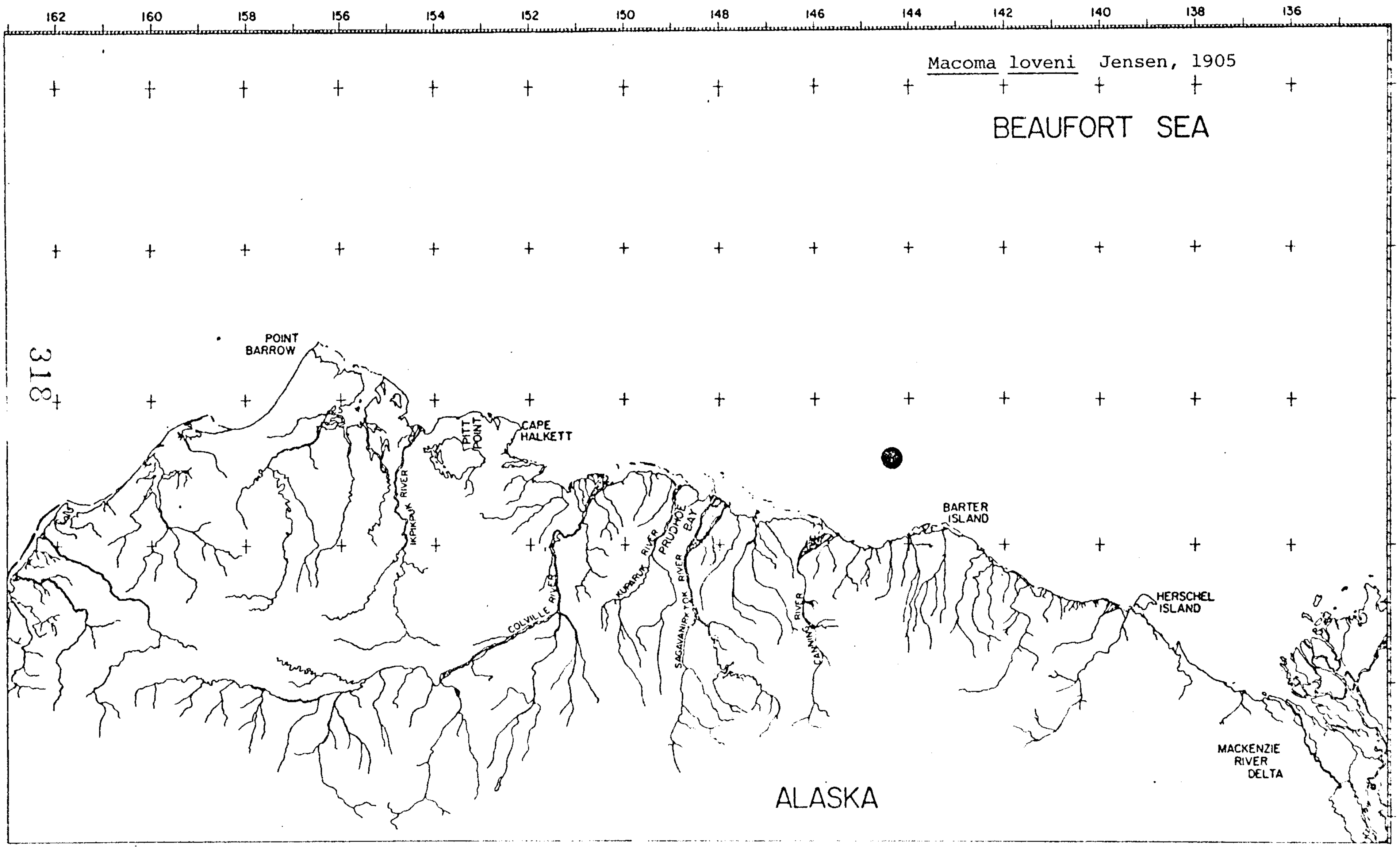


Macoma balthica (Linne) 1758



Macoma calcarea (Gmelin) 1792


Macoma loveni Jensen, 1905
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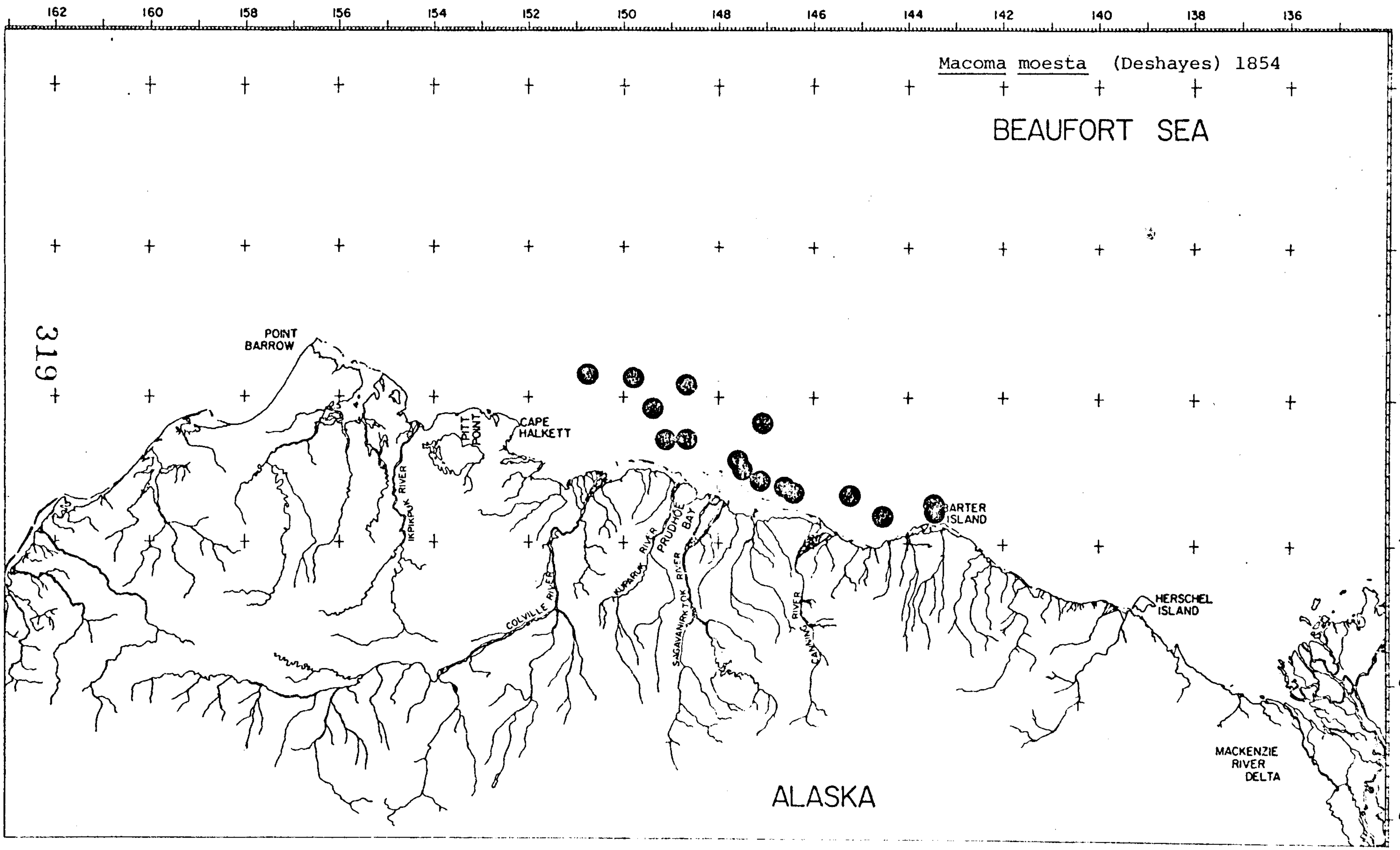
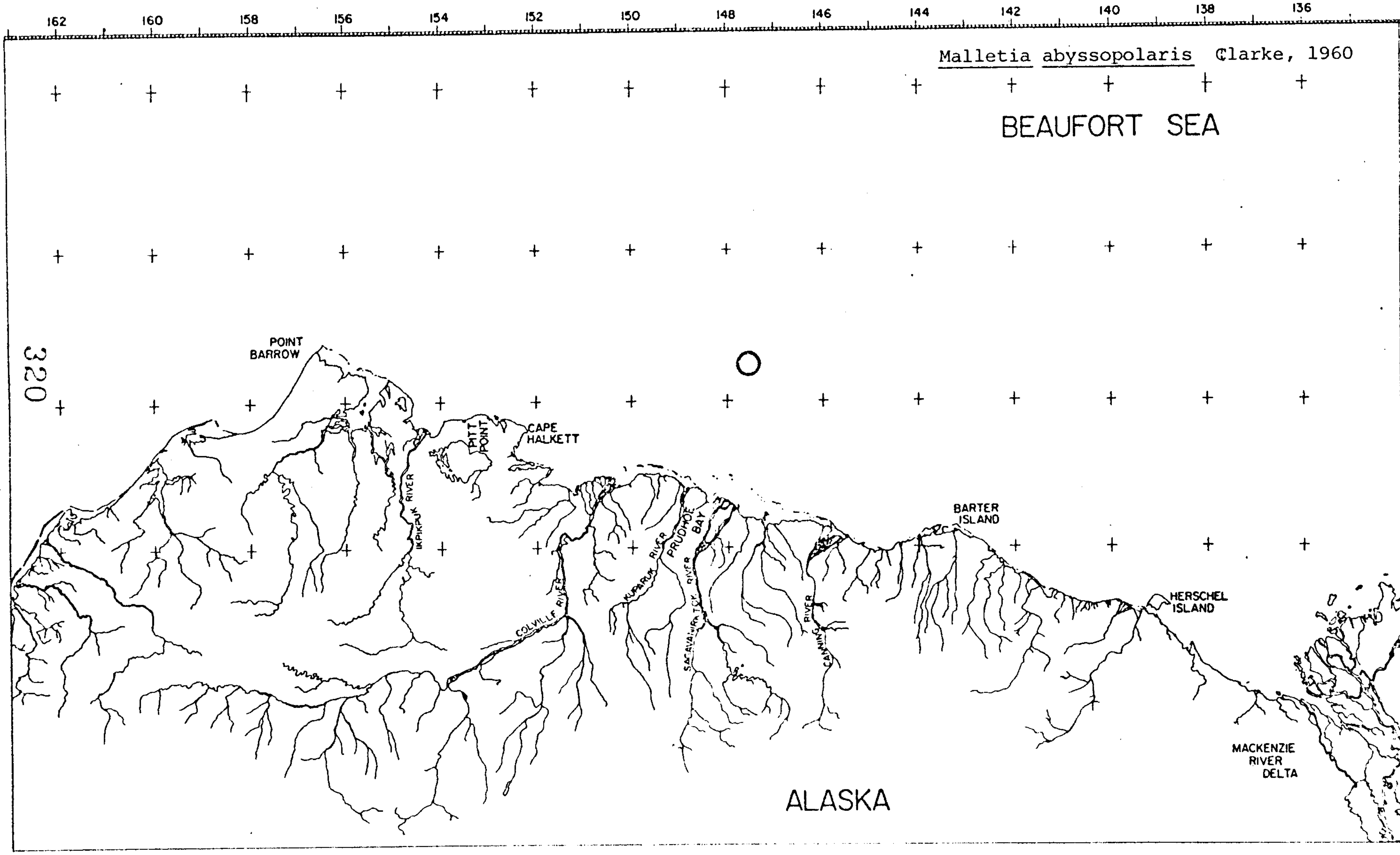


Macoma moesta (Deshayes) 1854


Malletia abyssopolaris Clarke, 1960
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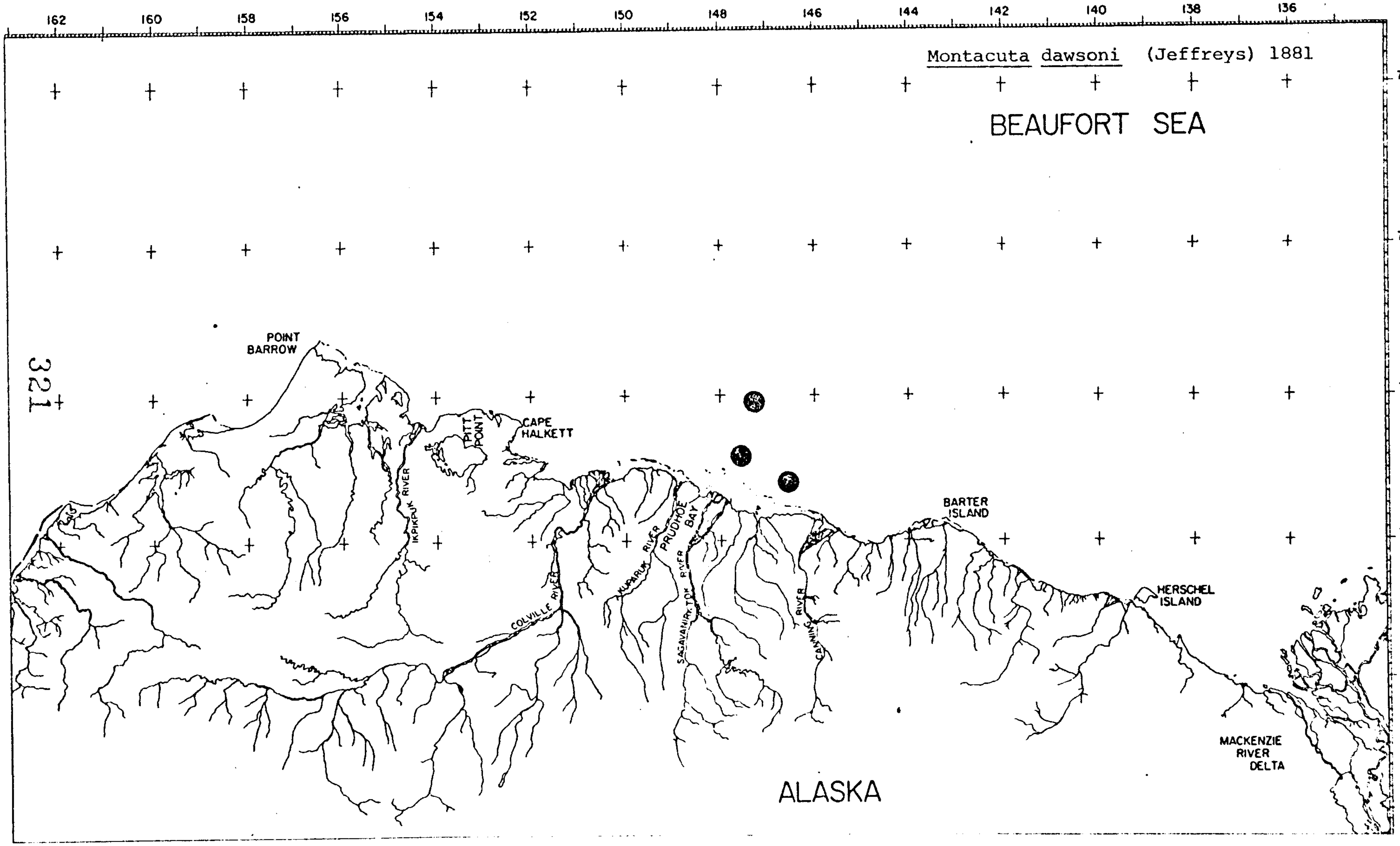
Montacuta dawsoni (Jeffreys) 1881
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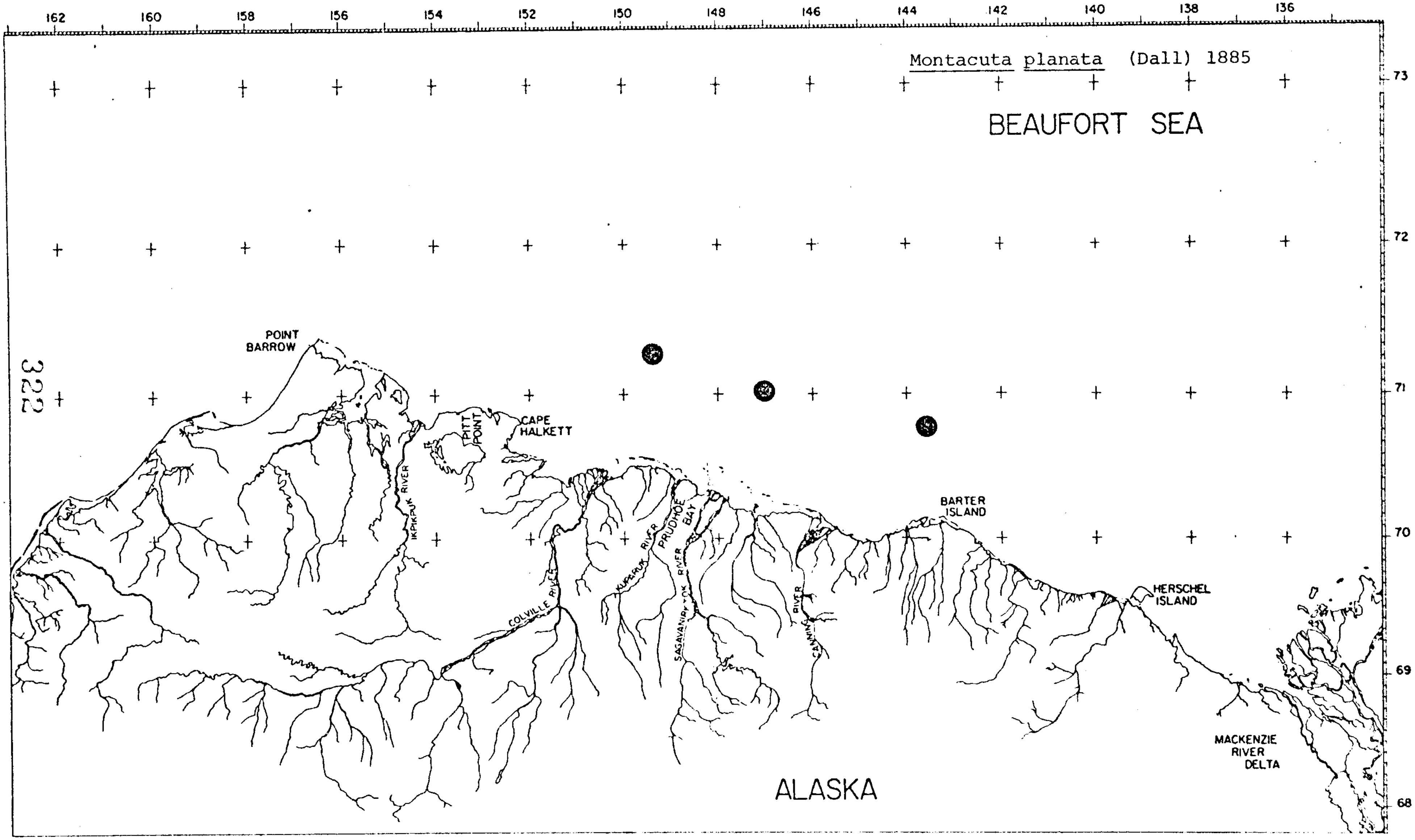
Montacuta planata (Dall) 1885
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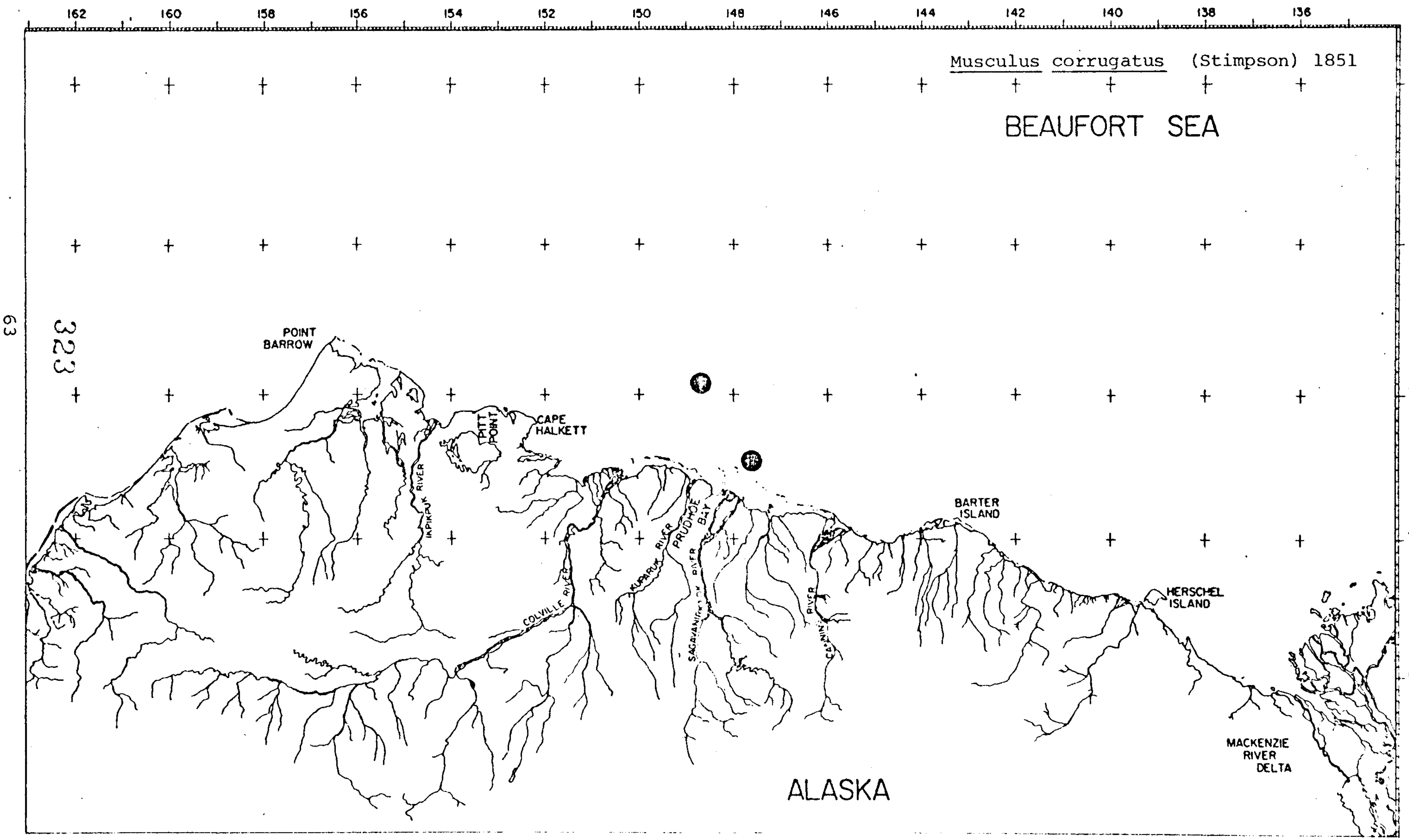
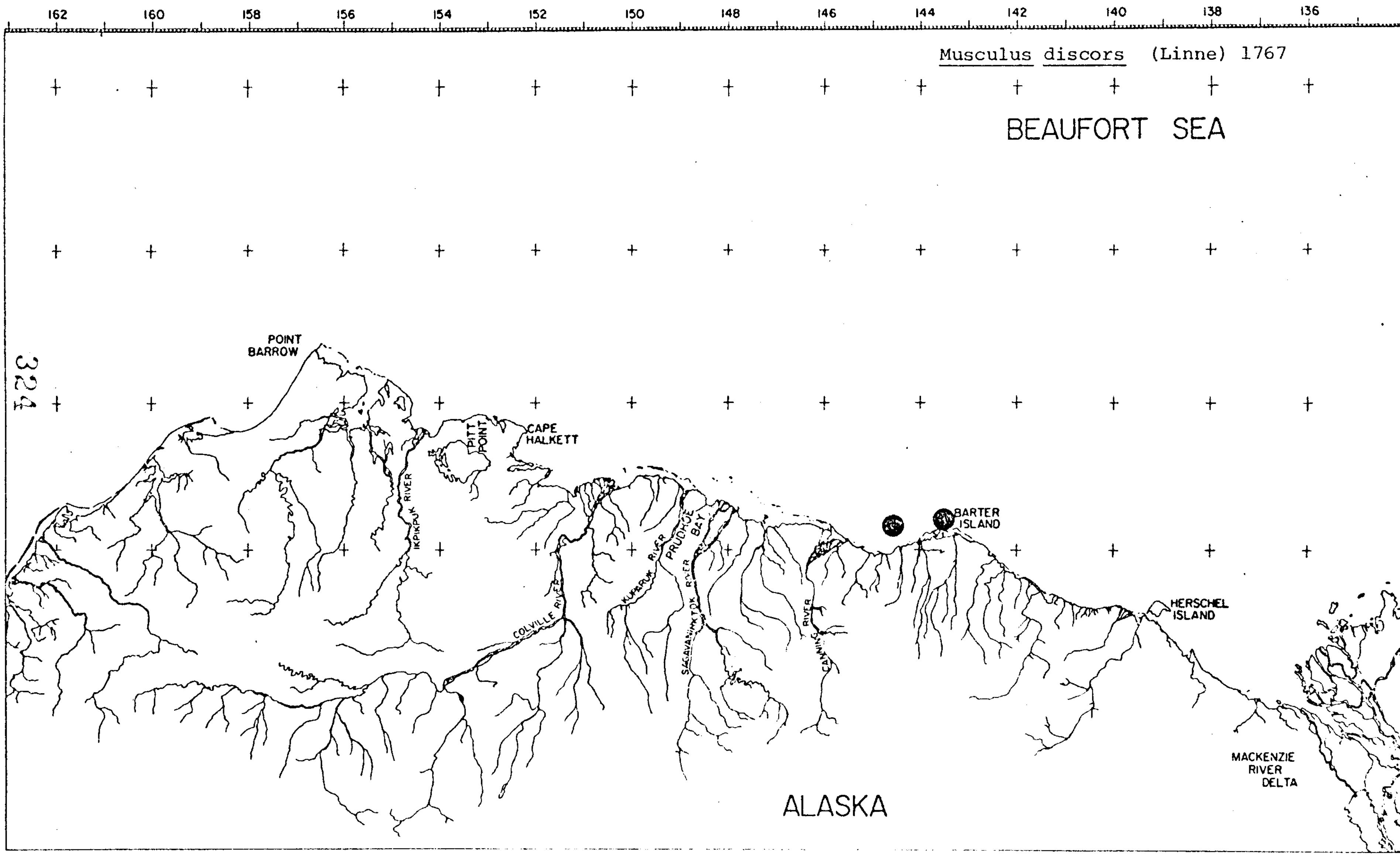


<u>Musculus</u> <u>corrugatus</u> (Stimpson) 1851


Musculus discors (Linne) 1767
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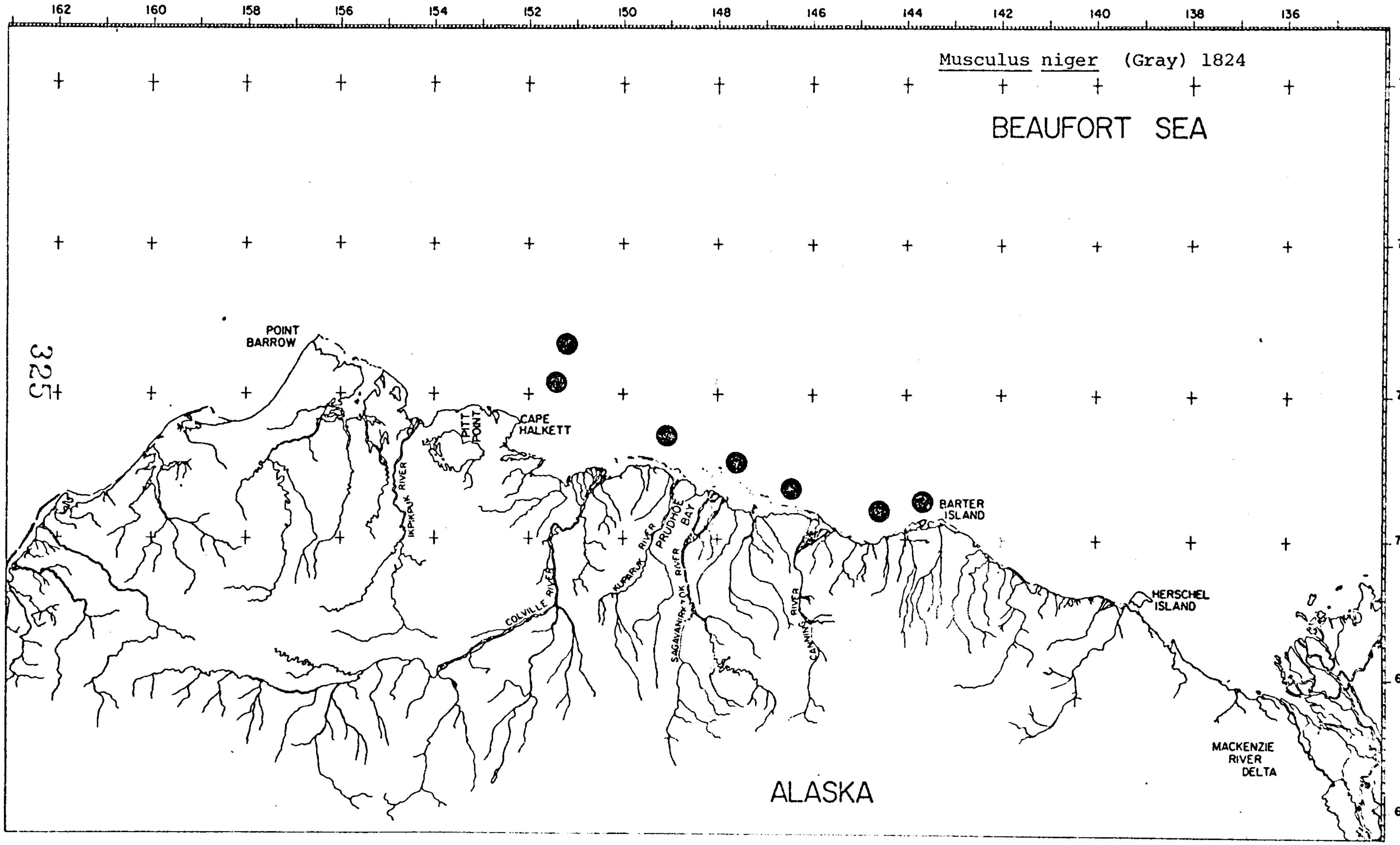
Musculus niger (Gray) 1824
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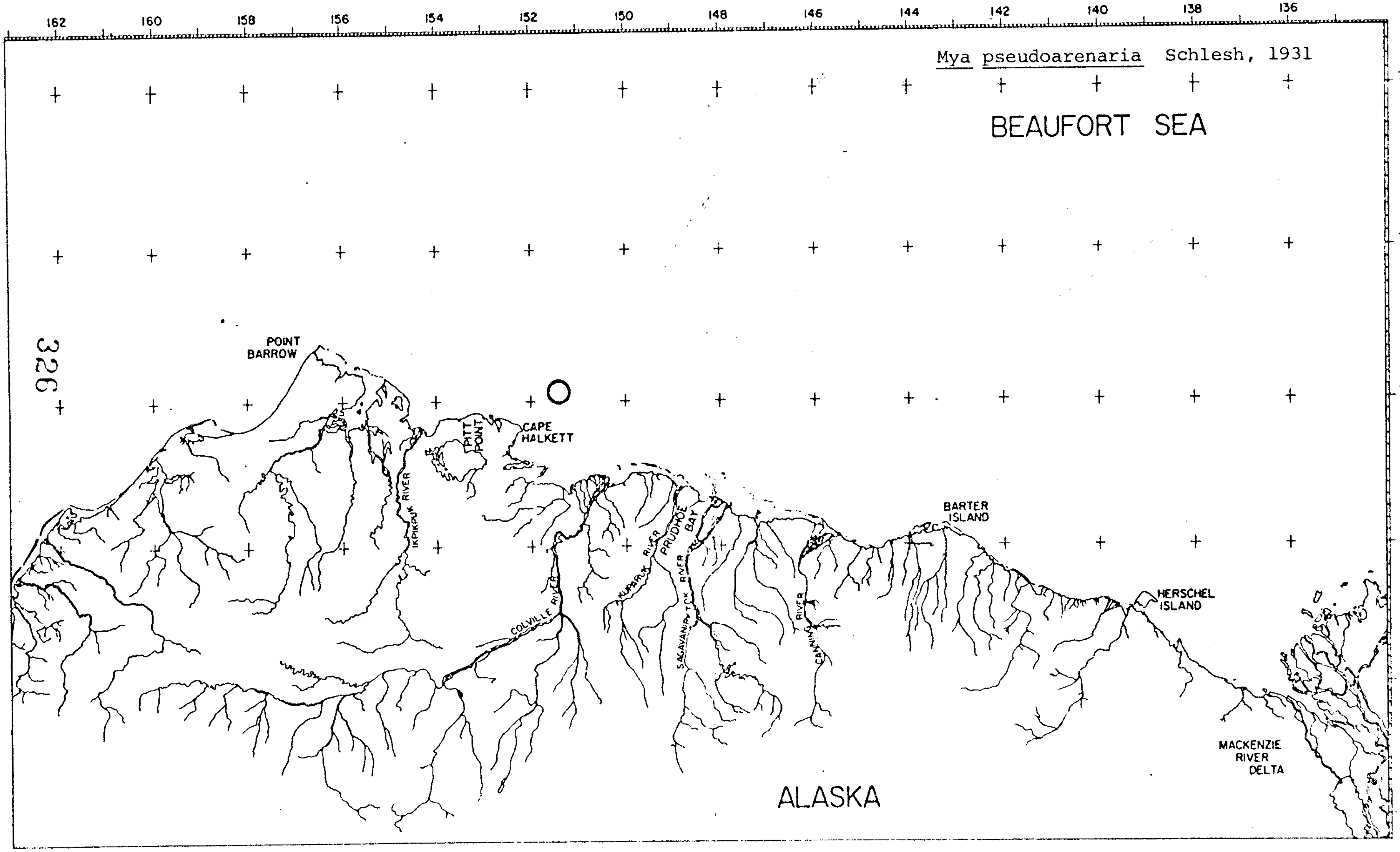
Mya pseudoarenaria Schlesh, 1931
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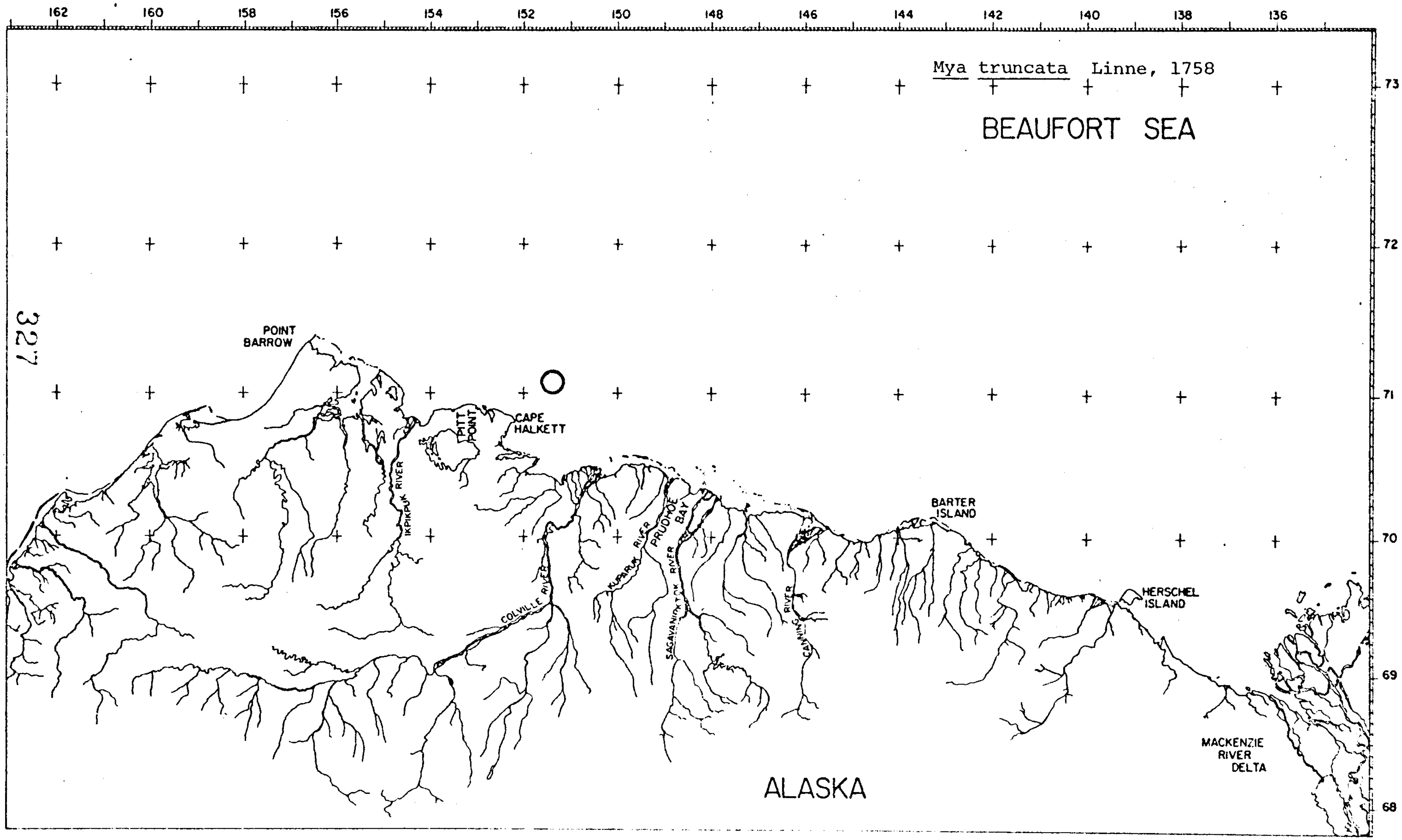

Mya truncata Linne, 1758
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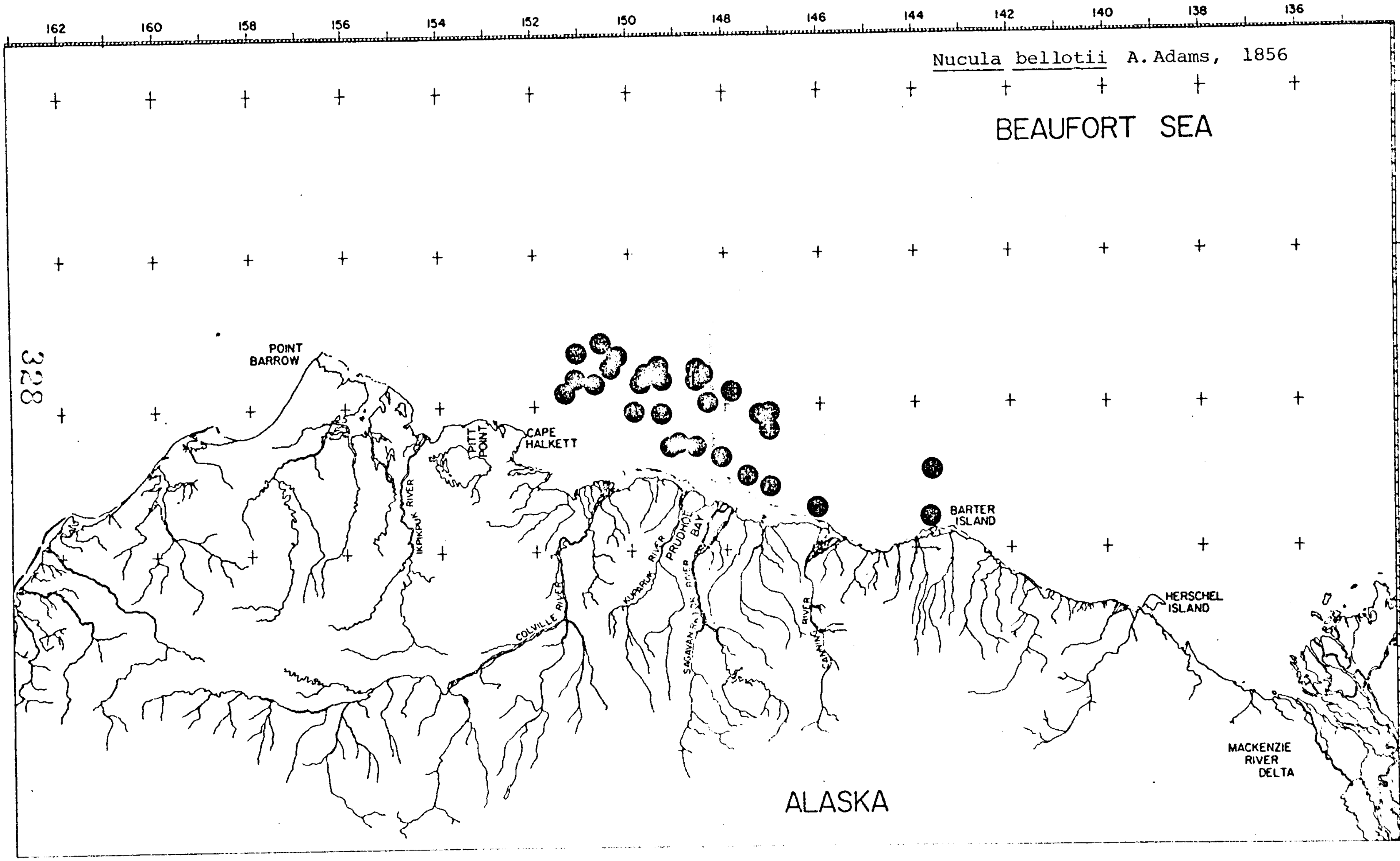
Nucula bellotii A. Adams, 1856
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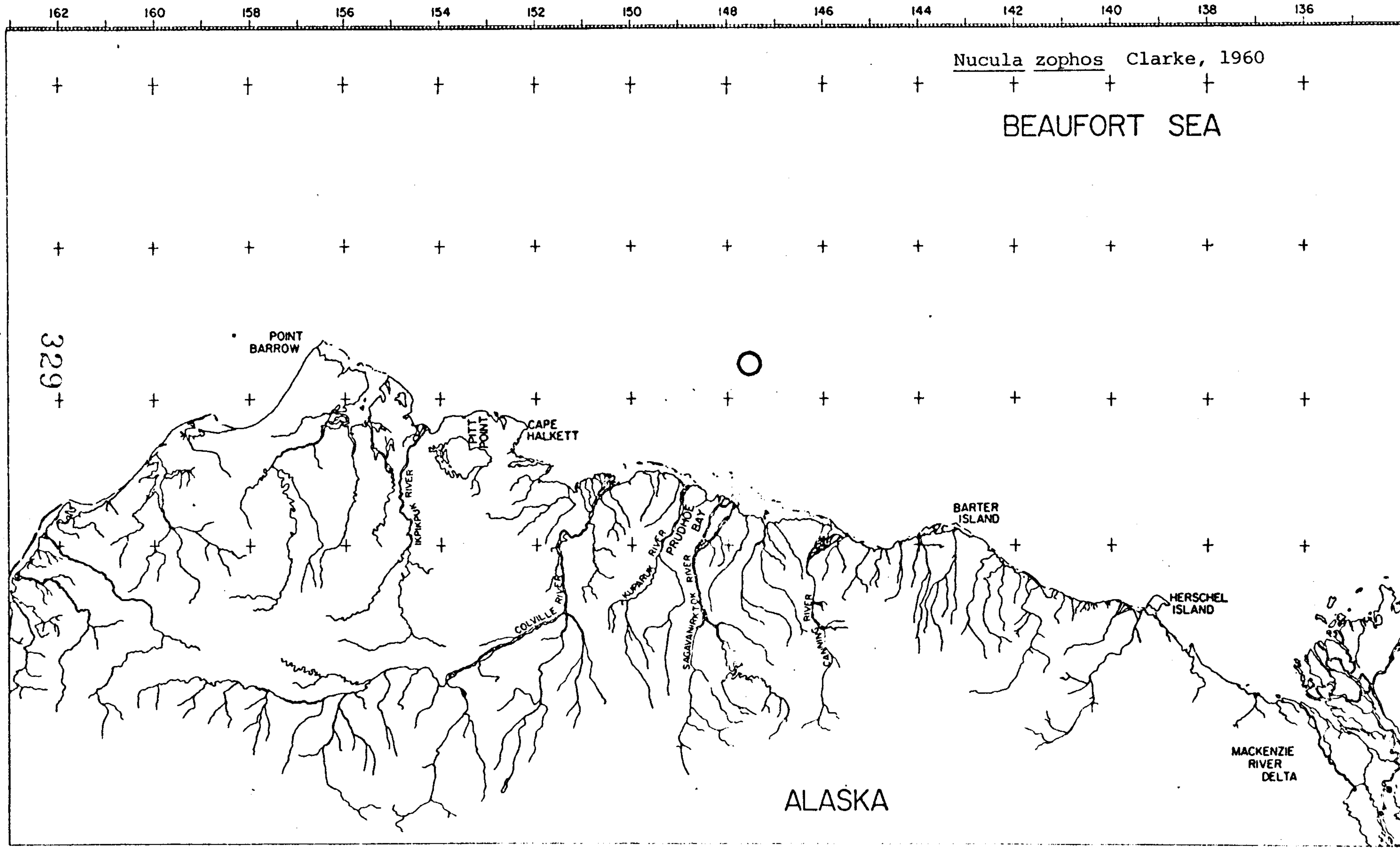
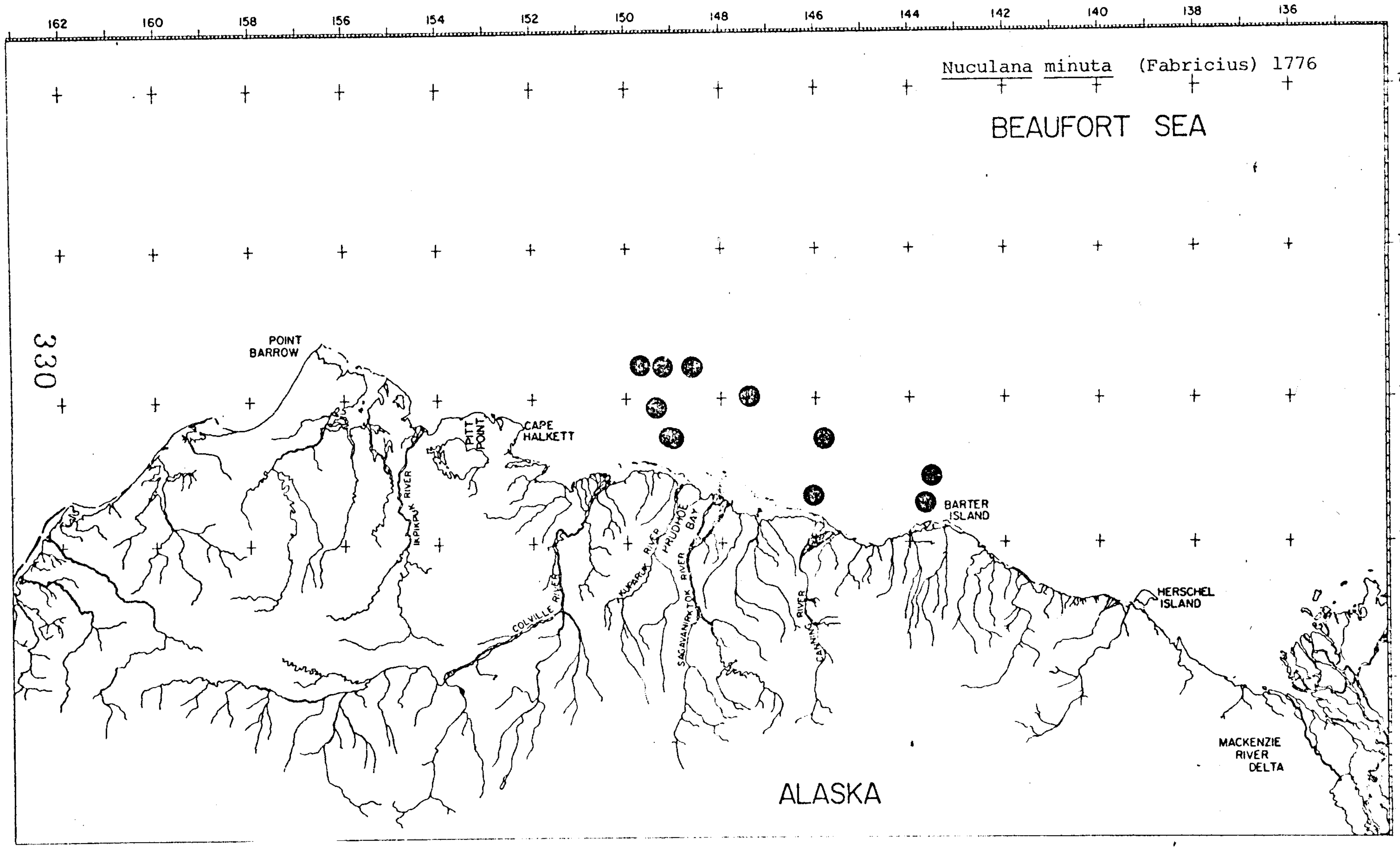
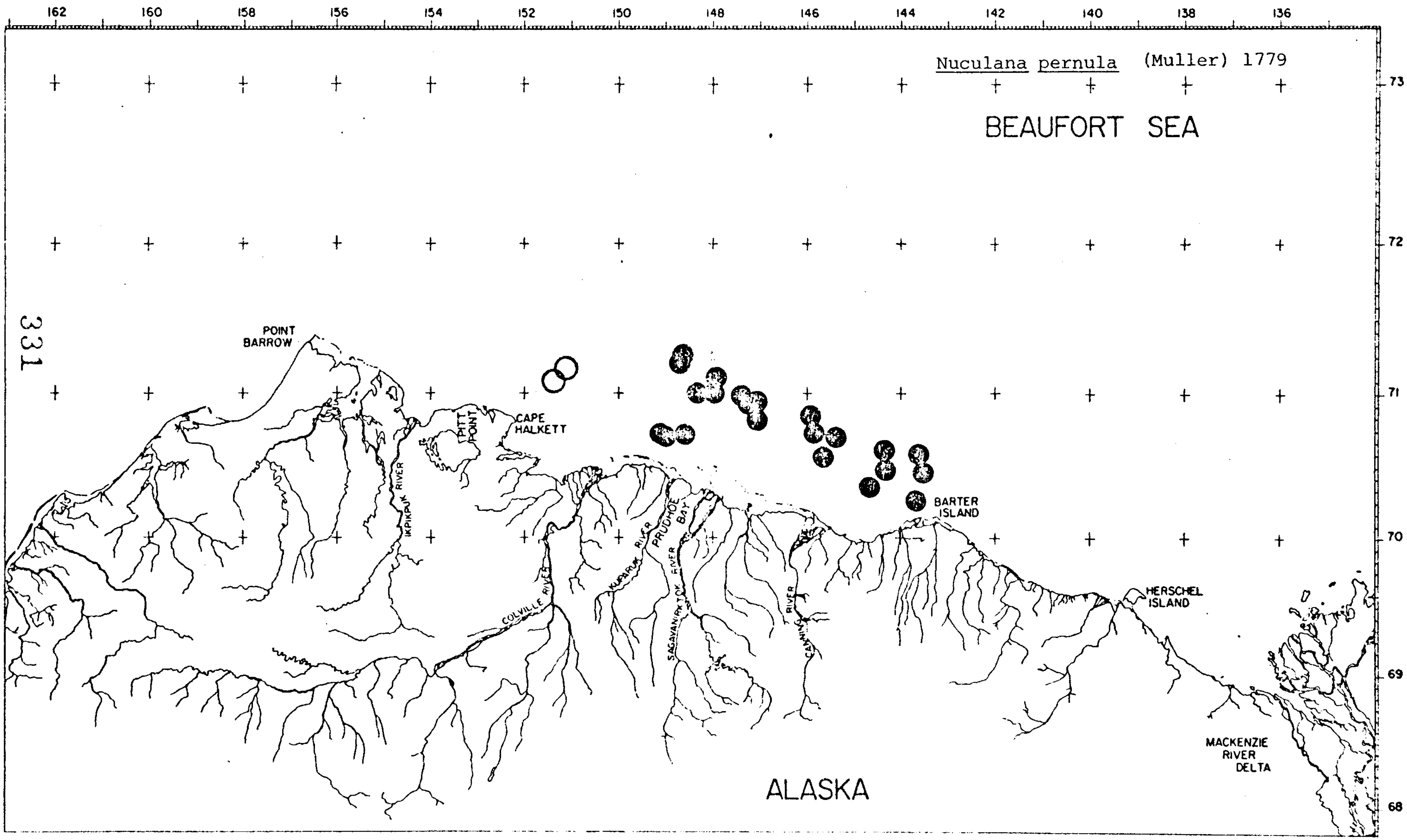
ALASKA

Nucula zophos Clarke, 1960





Nuculana minuta (Fabricius) 1776


Nuculana pernula (Muller) 1779
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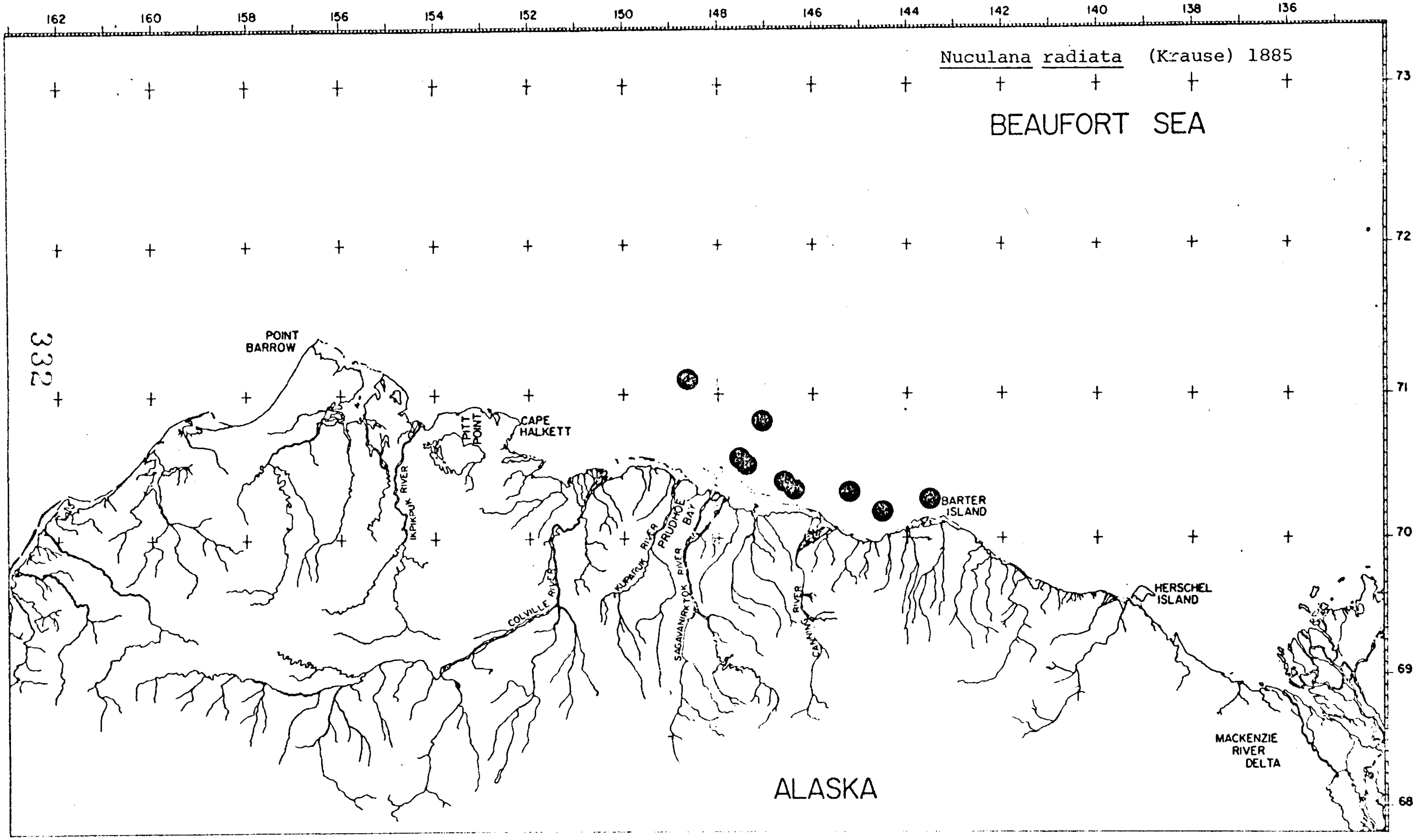
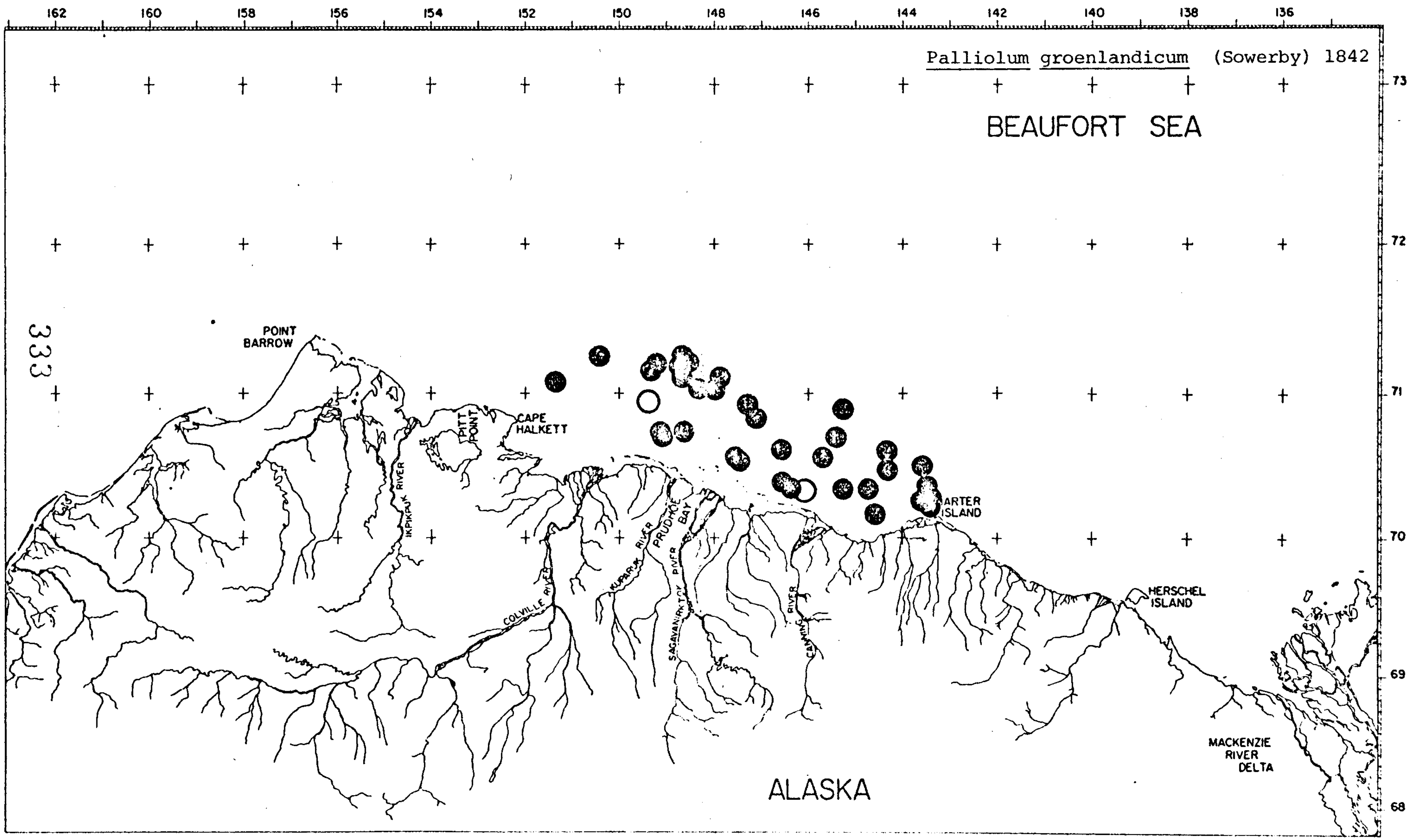
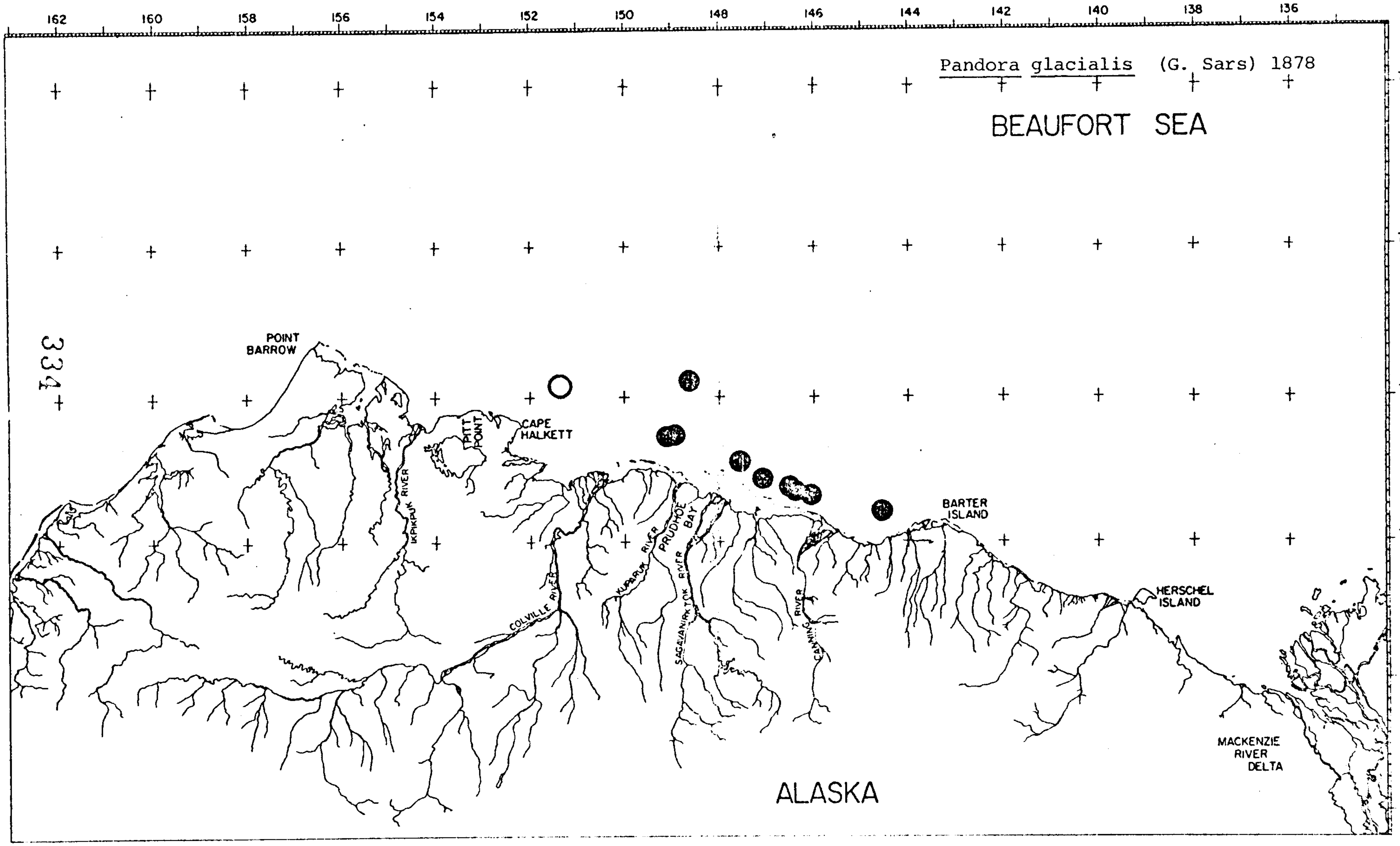


Nuculana radiata (Krause) 1885



Palliolum groenlandicum (Sowerby) 1842


Pandora glacialis (G. Sars) 1878
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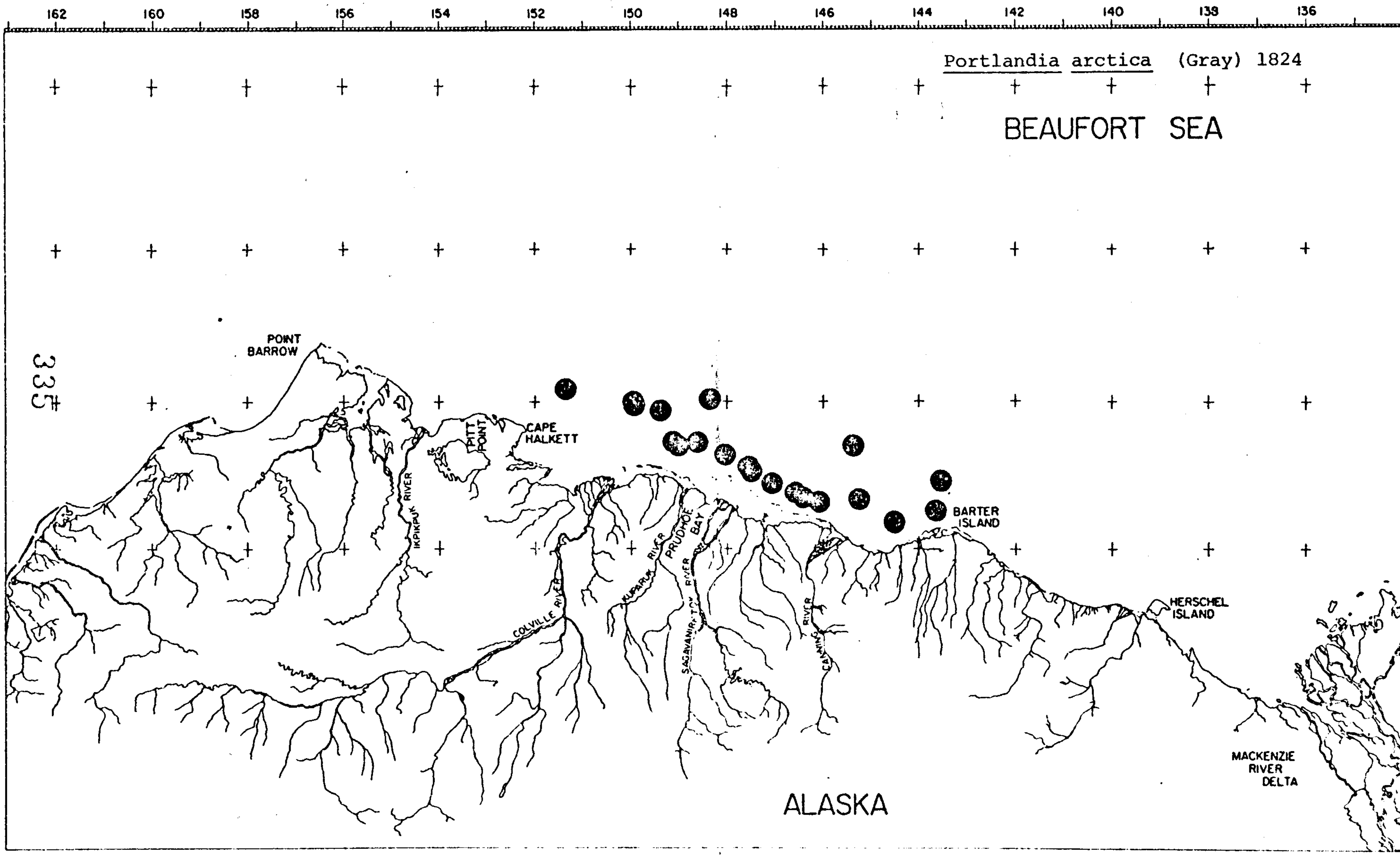
Portlandia arctica (Gray) 1824
BEAUFORT SEA
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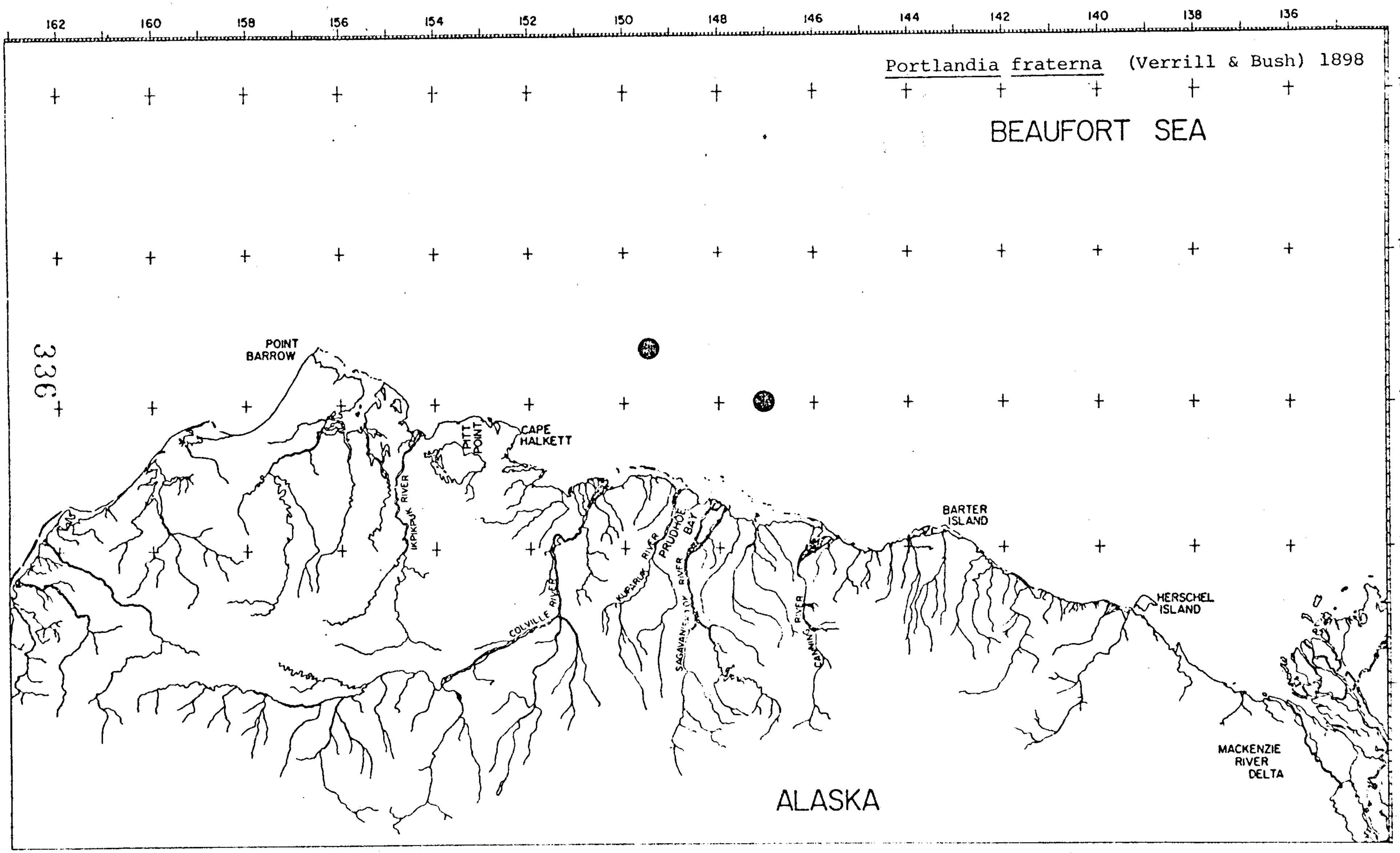
Portlandia fraterna (Verrill & Bush) 1898
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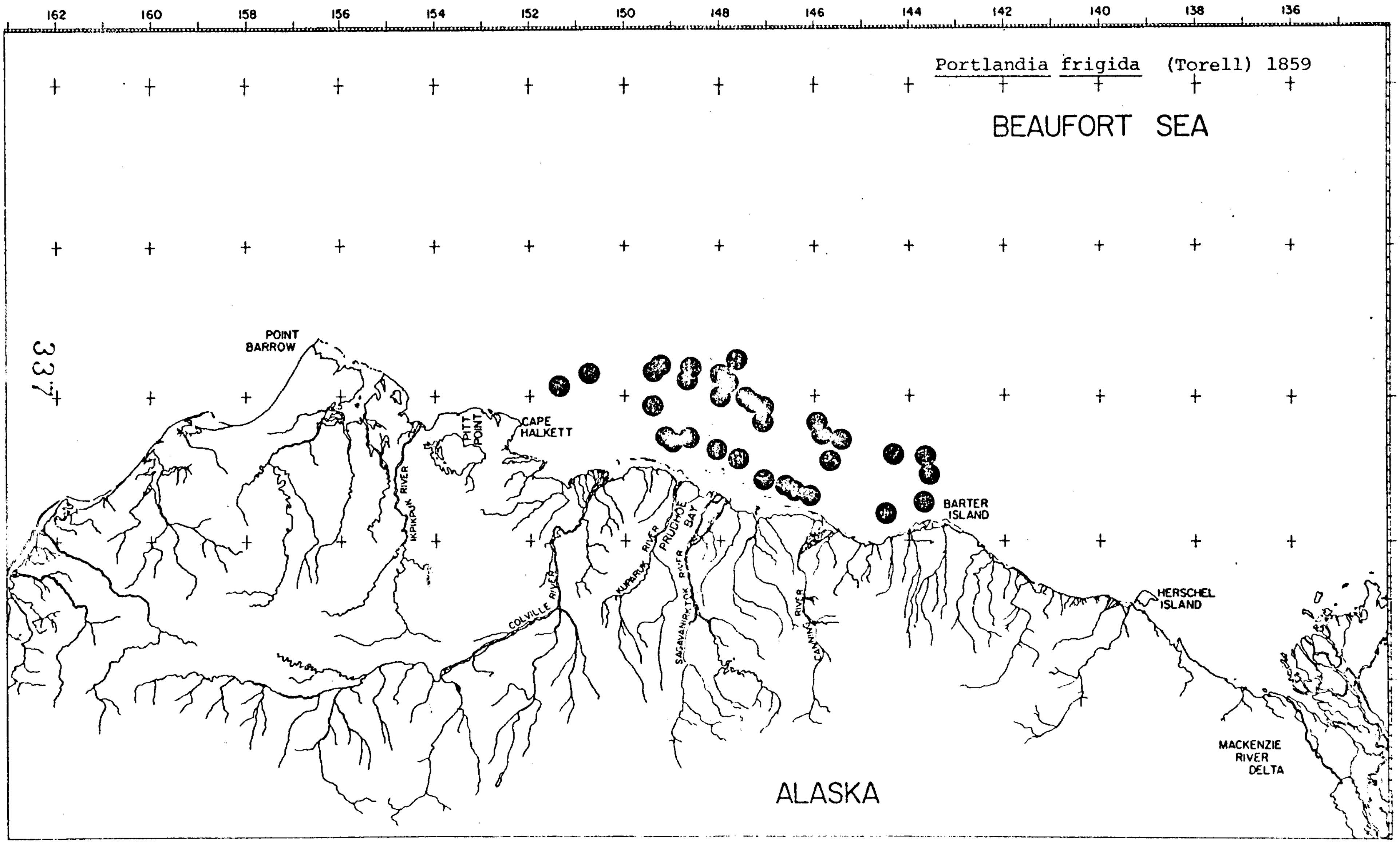

Portlandia frigida (Torell) 1859
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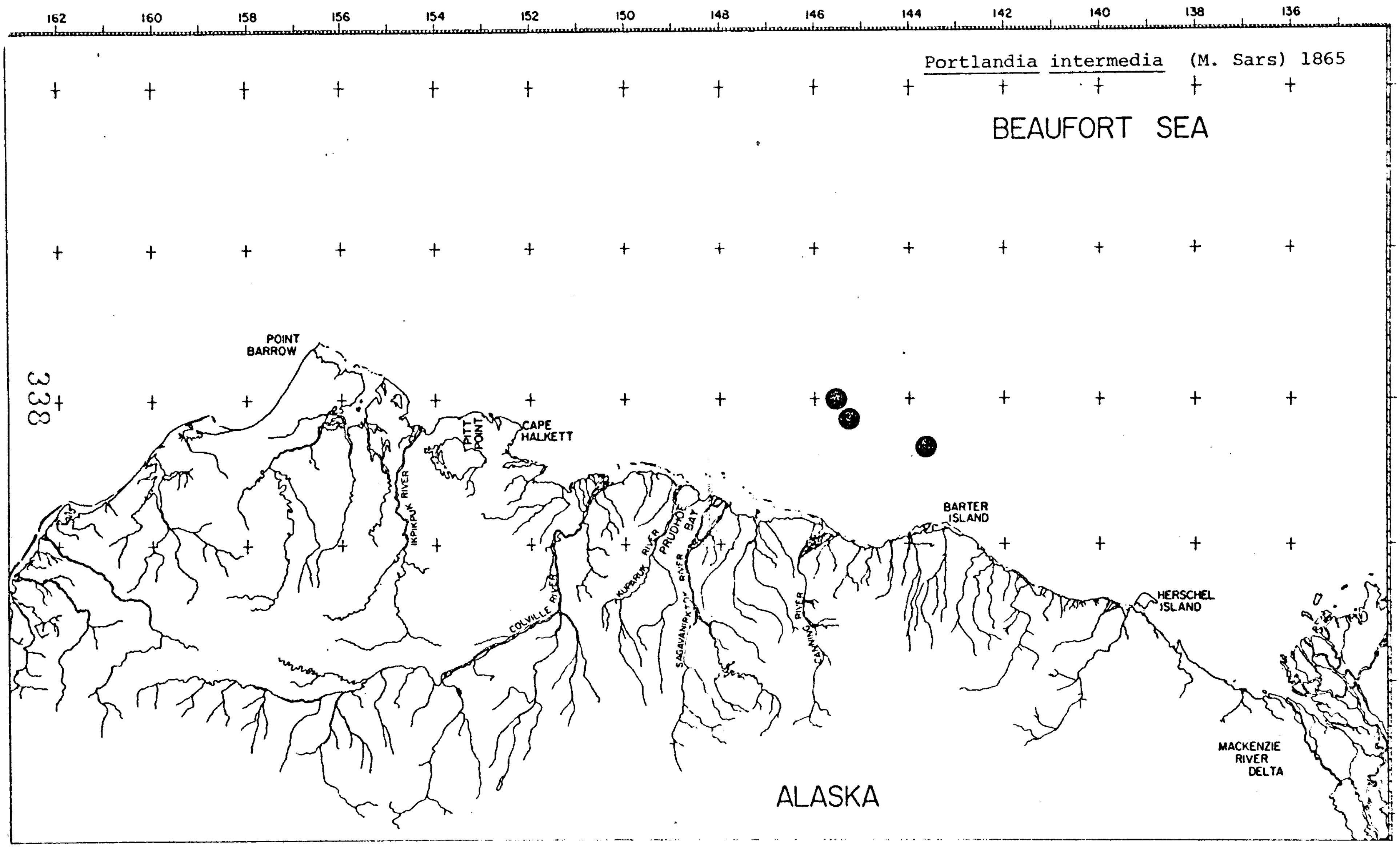

Portlandia intermedia (M. Sars) 1865
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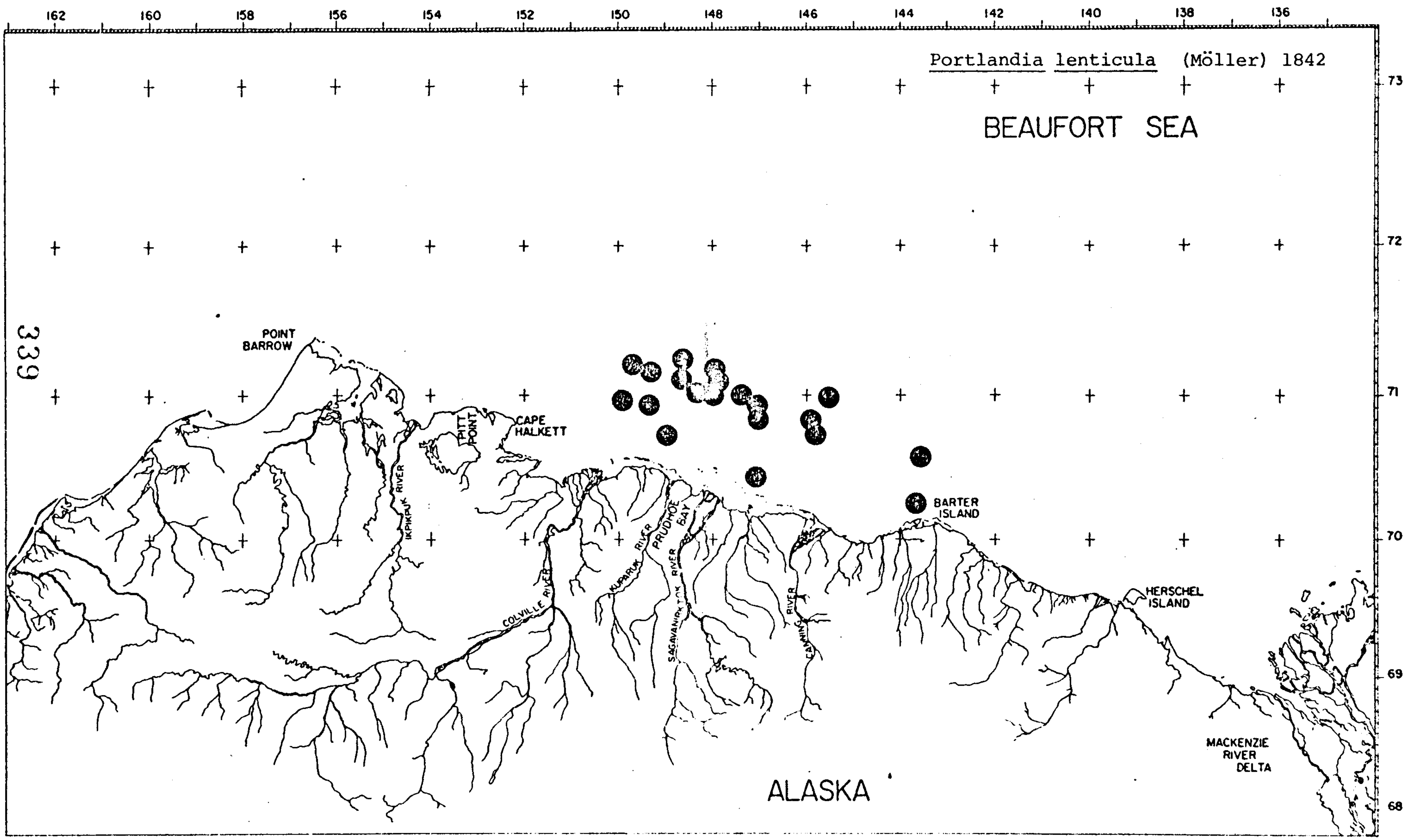
Portlandia lenticula (Möller) 1842
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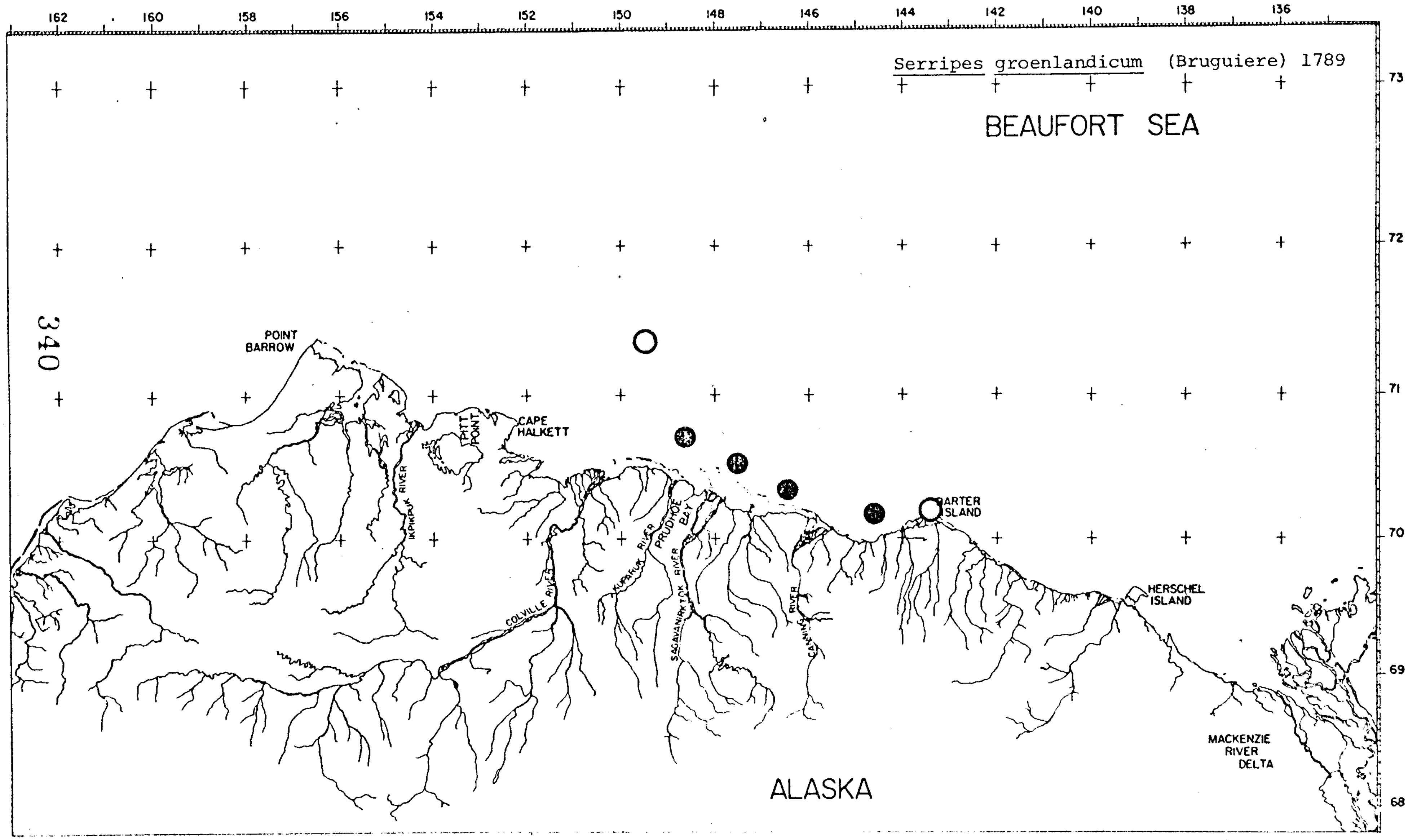
Serripes groenlandicum (Bruguiere) 1789
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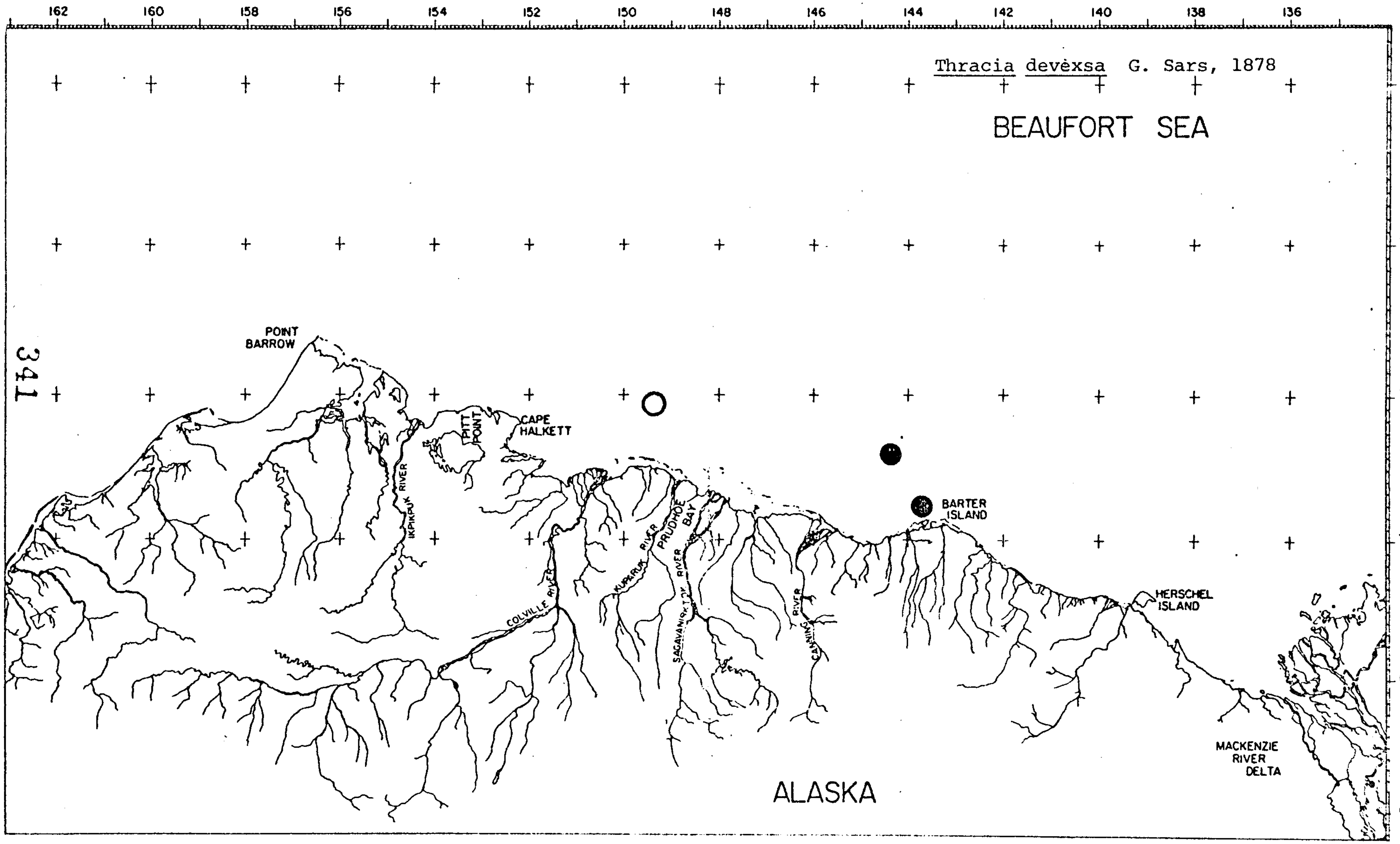
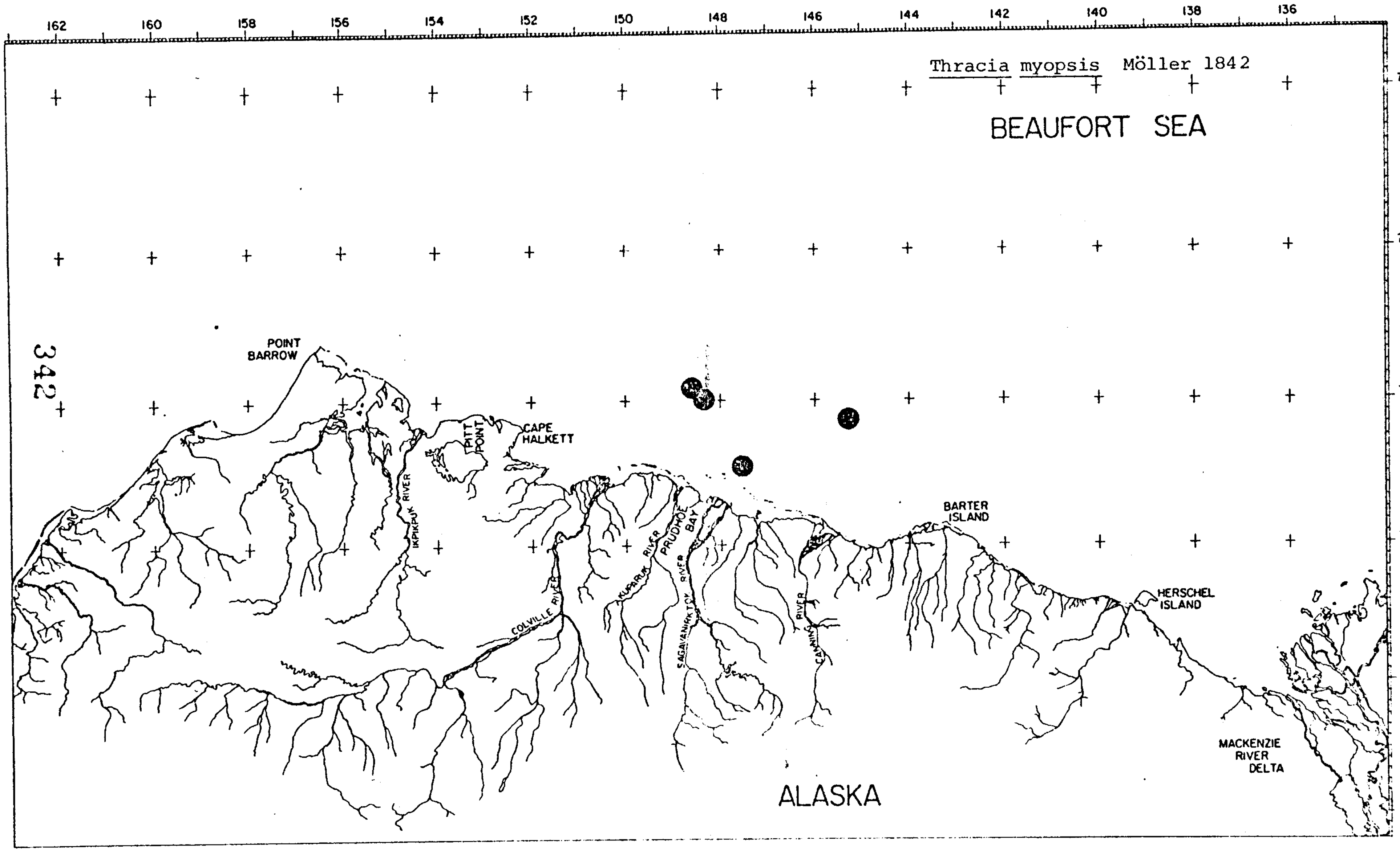


<u>Thracia</u> <u>devèxsa</u> G. Sars, 1878


Thracia myopsis Möller 1842
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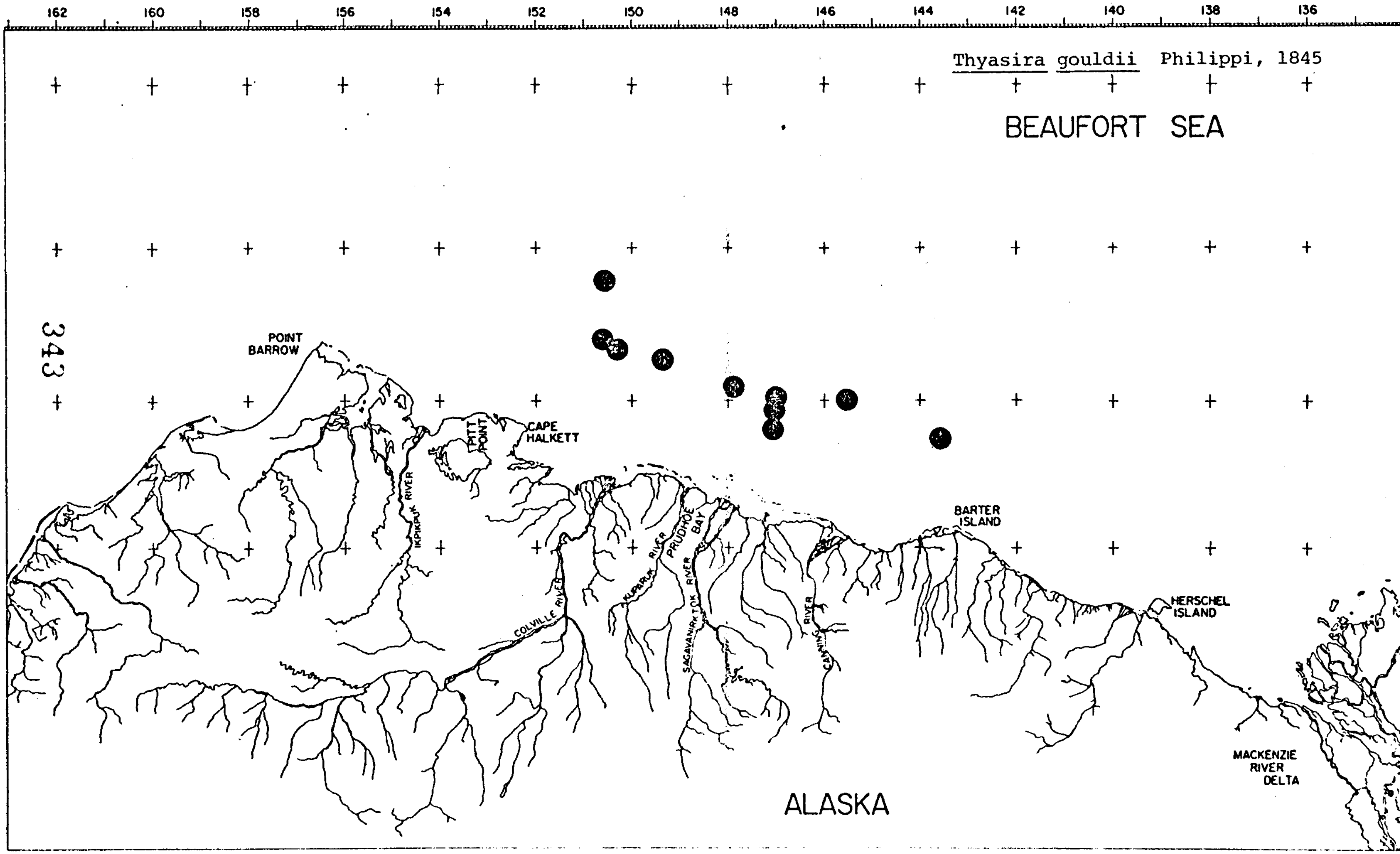
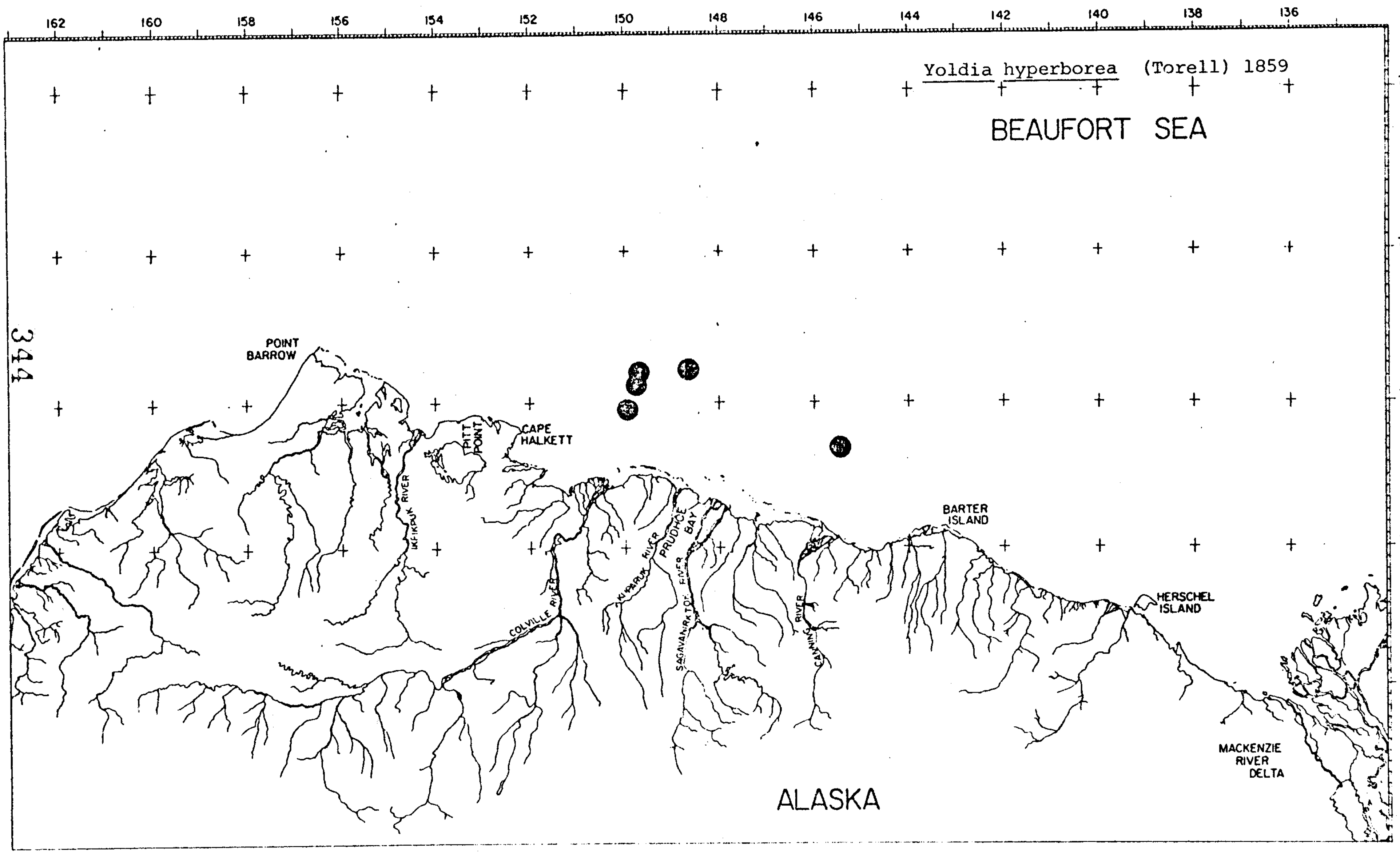


Thyasira gouldii Philippi, 1845


Yoldia hyperborea (Torell) 1859
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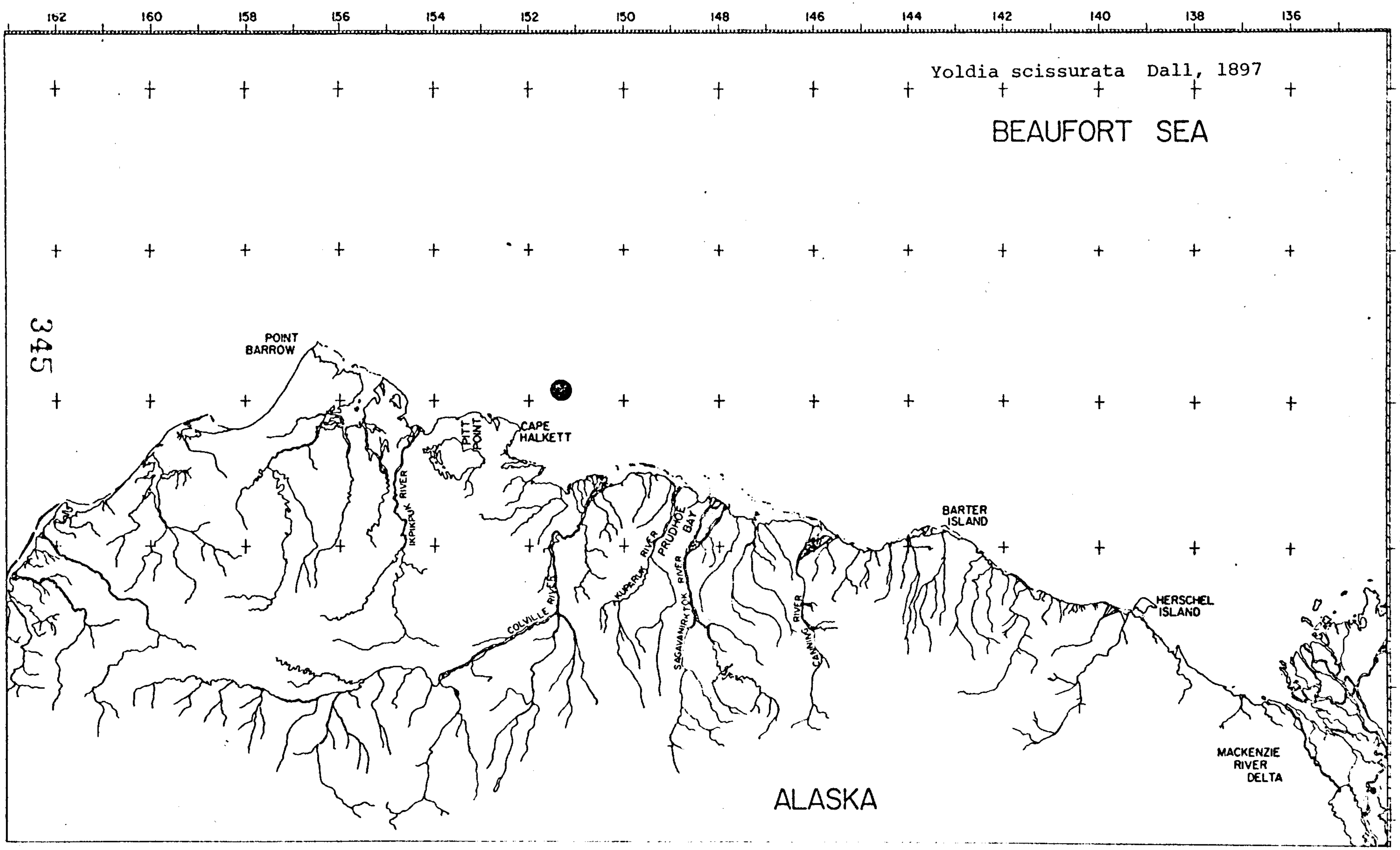
Yoldia scissurata Dall, 1897
BEAUFORT SEA
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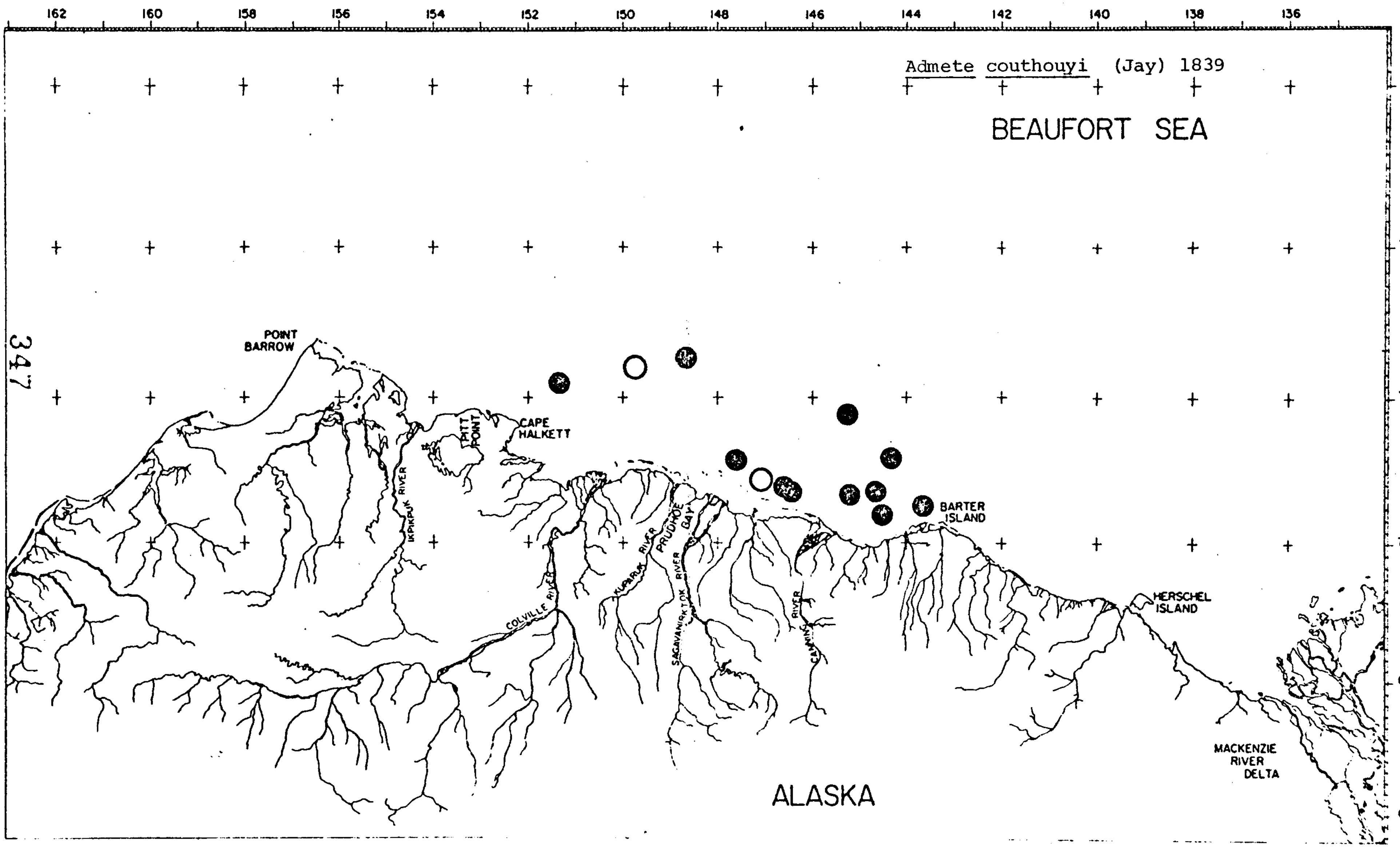
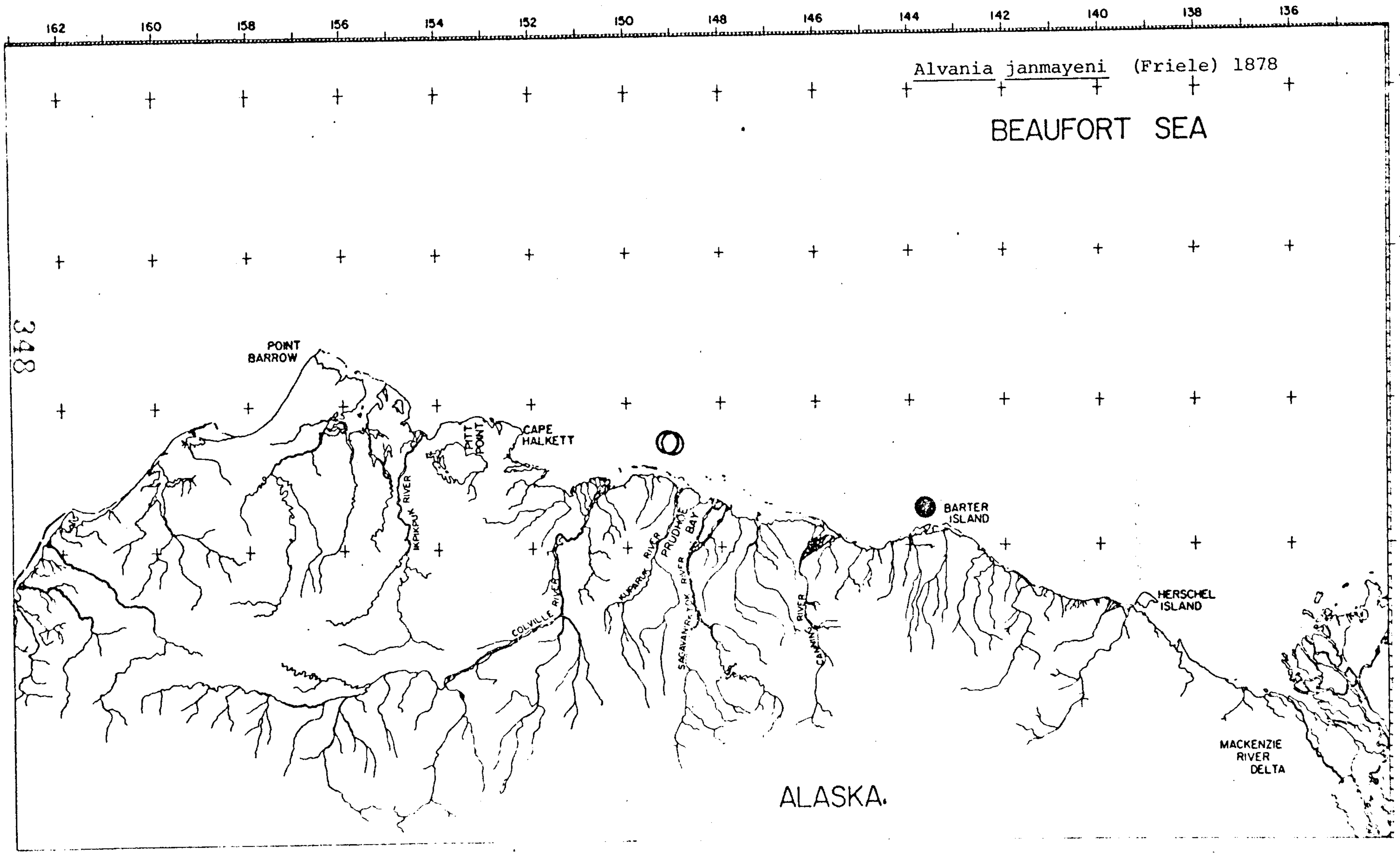


<u>Admete</u> <u>couthouyi</u> (Jay) 1839


Alvania janmayeni (Friele) 1878
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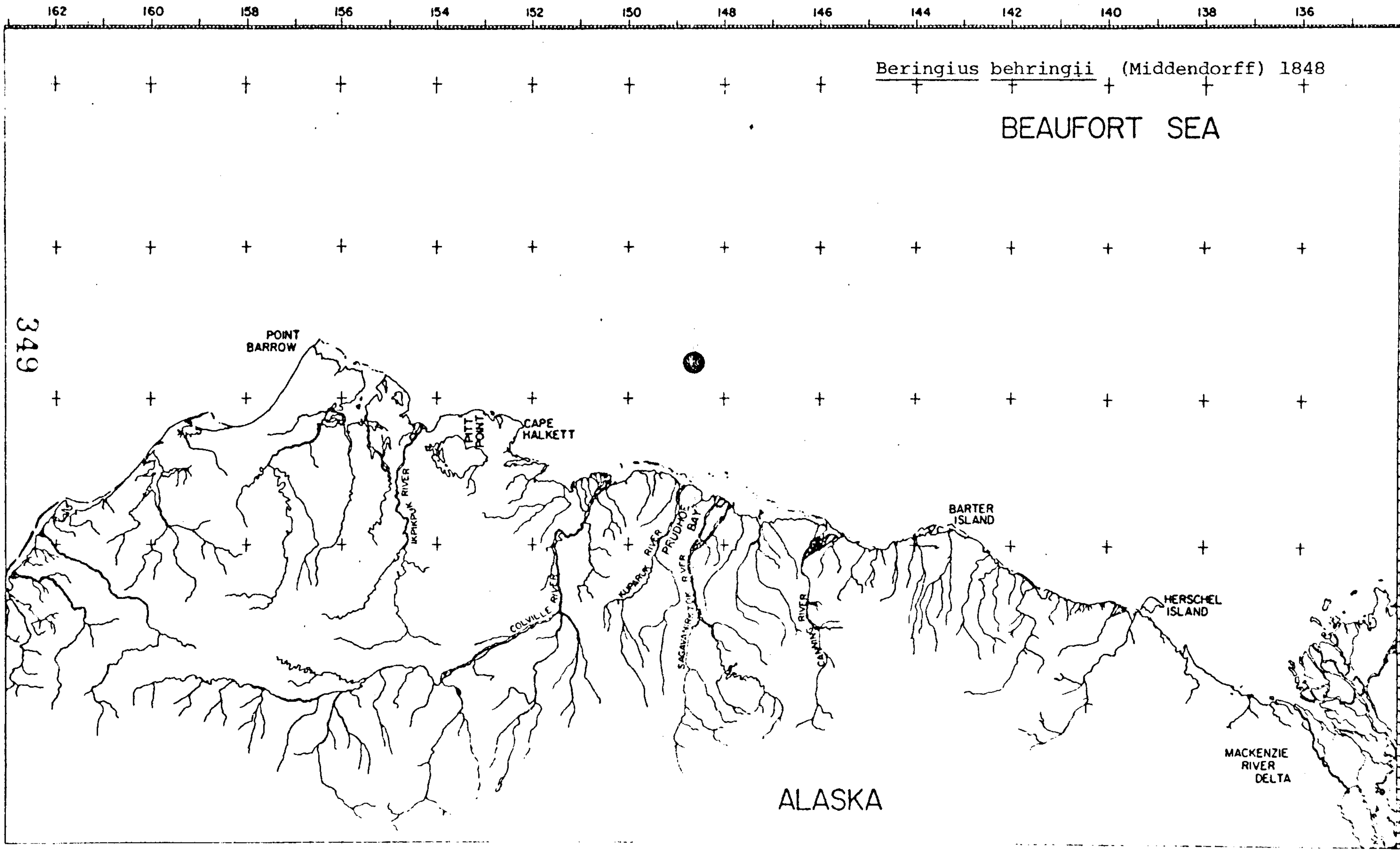
Beringius behringii (Middendorff) 1848
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PITT POINT
IKPIKPUK RIVER
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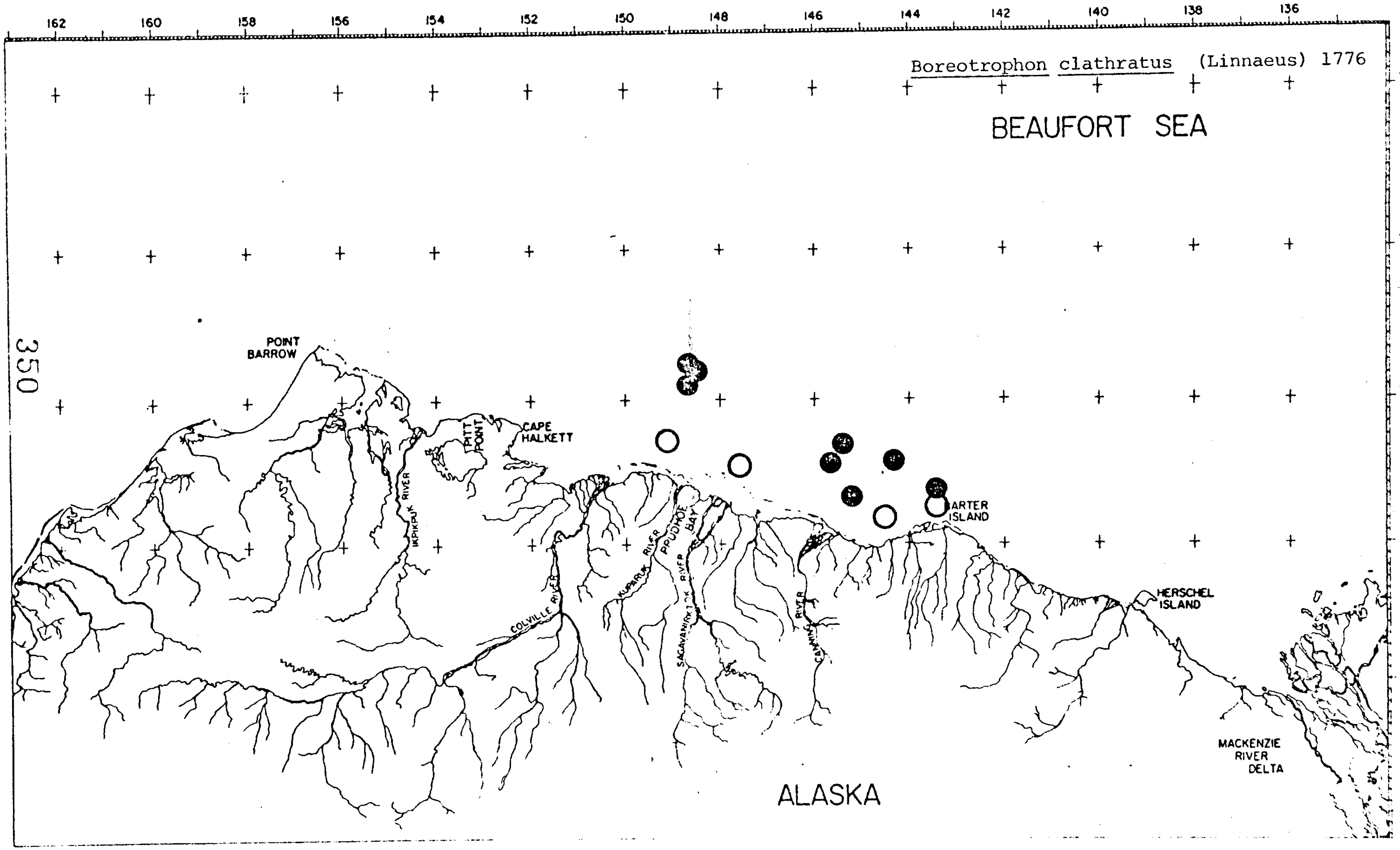
Boreotrophon clathratus (Linnaeus) 1776
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CAPE HALKETT
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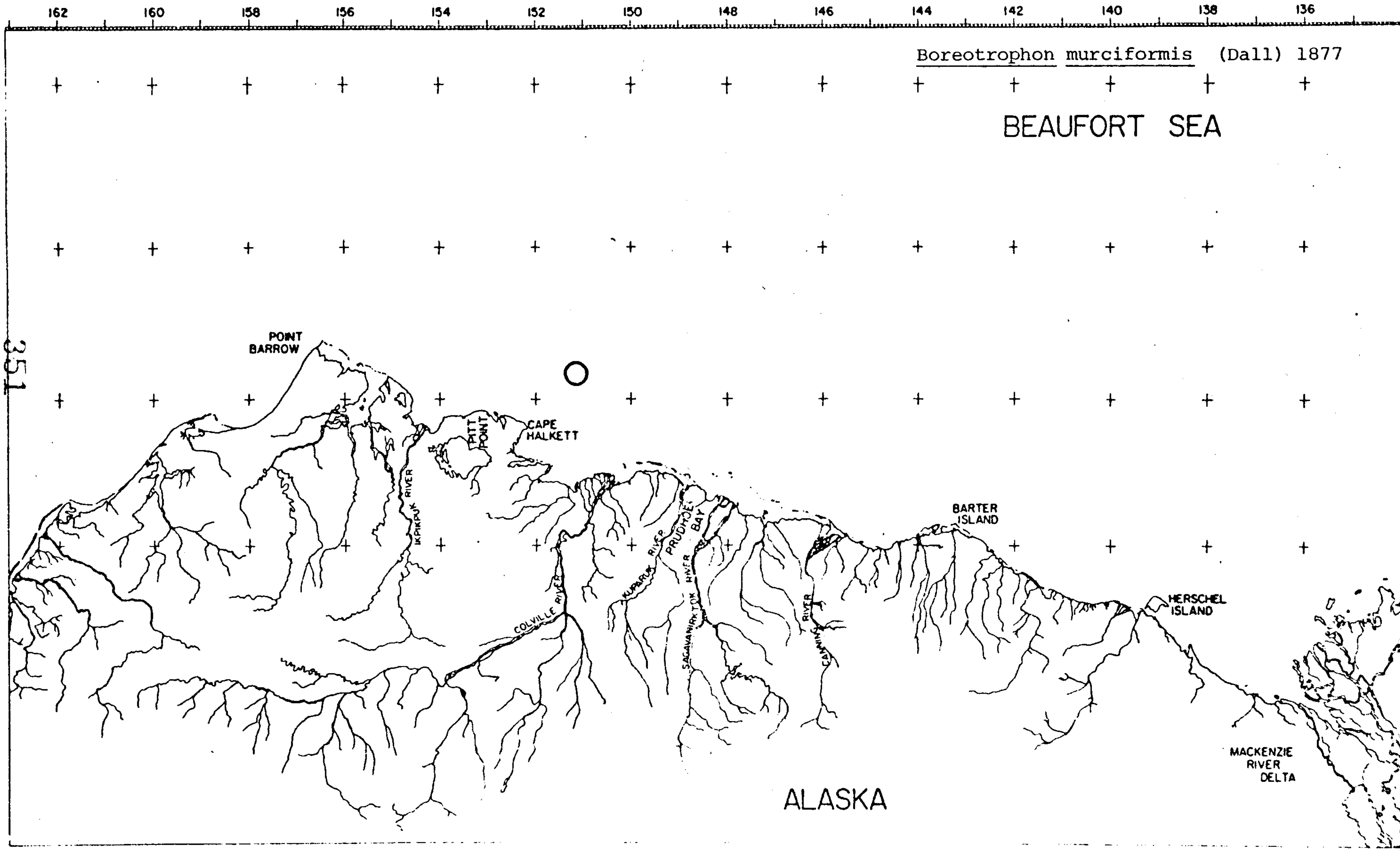
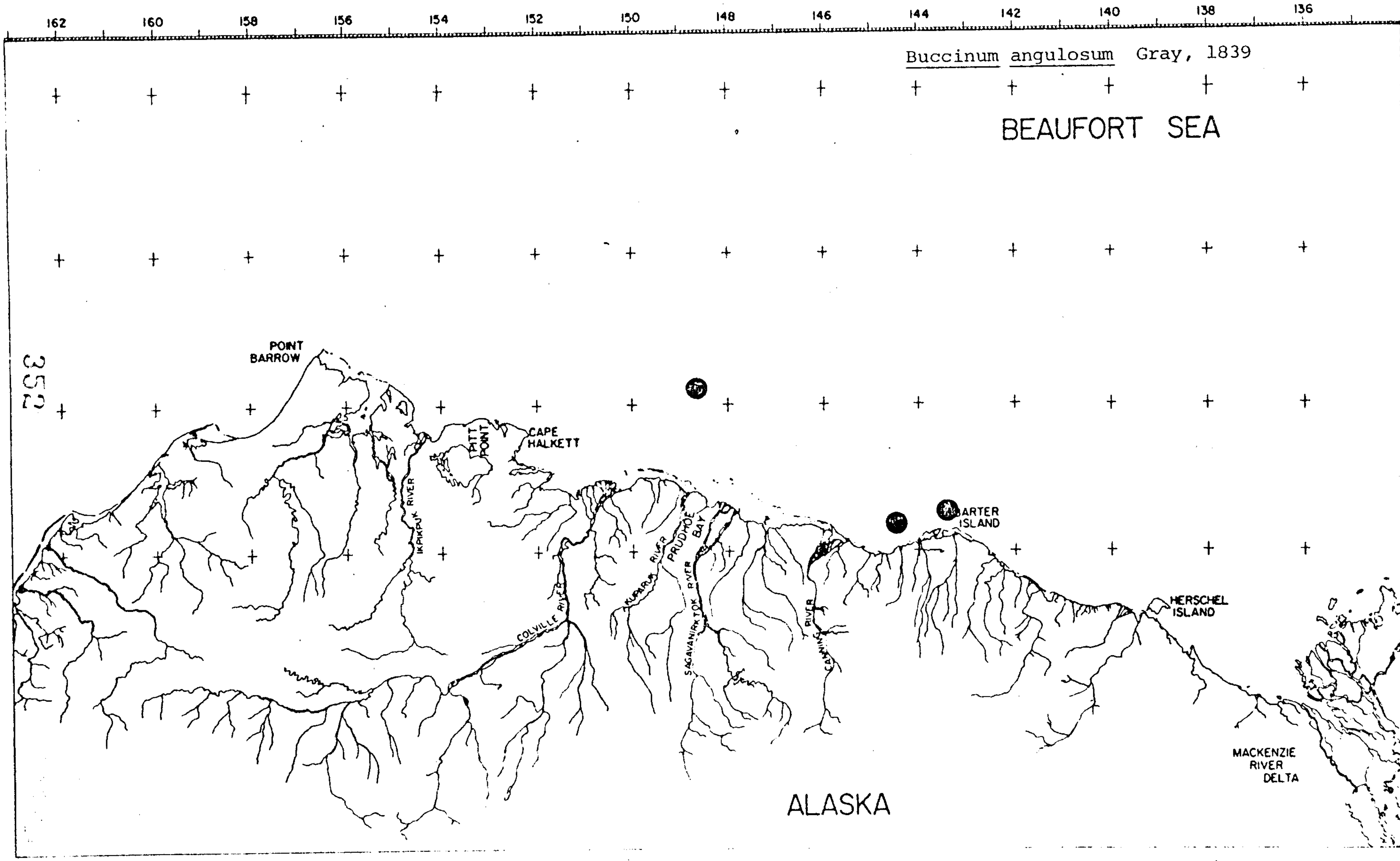


Boreotrophon murciformis (Dall) 1877


Buccinum angulosum Gray, 1839
BEAUFORT SEA
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COLVILLE RIVER
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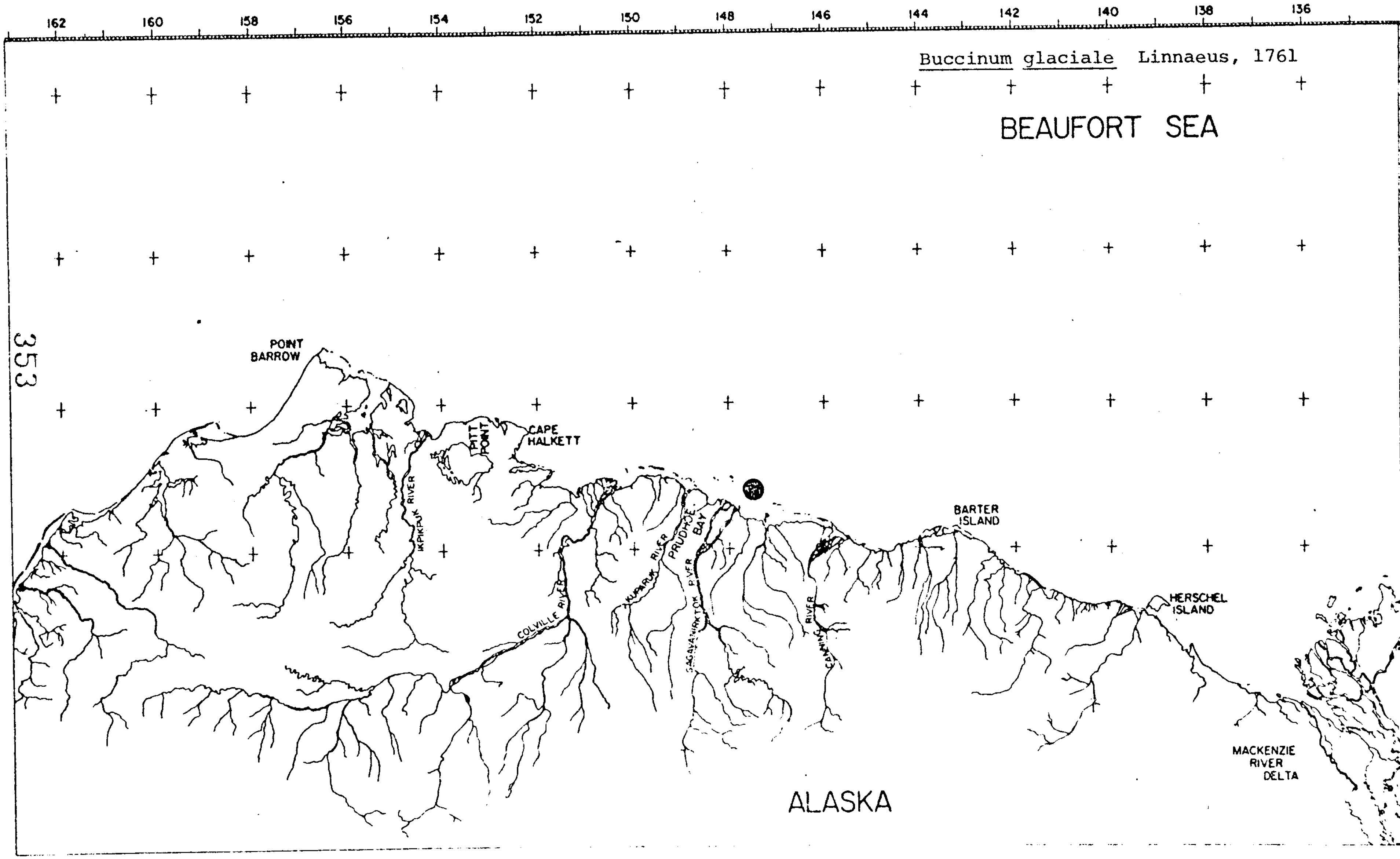
Buccinum glaciale Linnaeus, 1761
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KUPARUK RIVER
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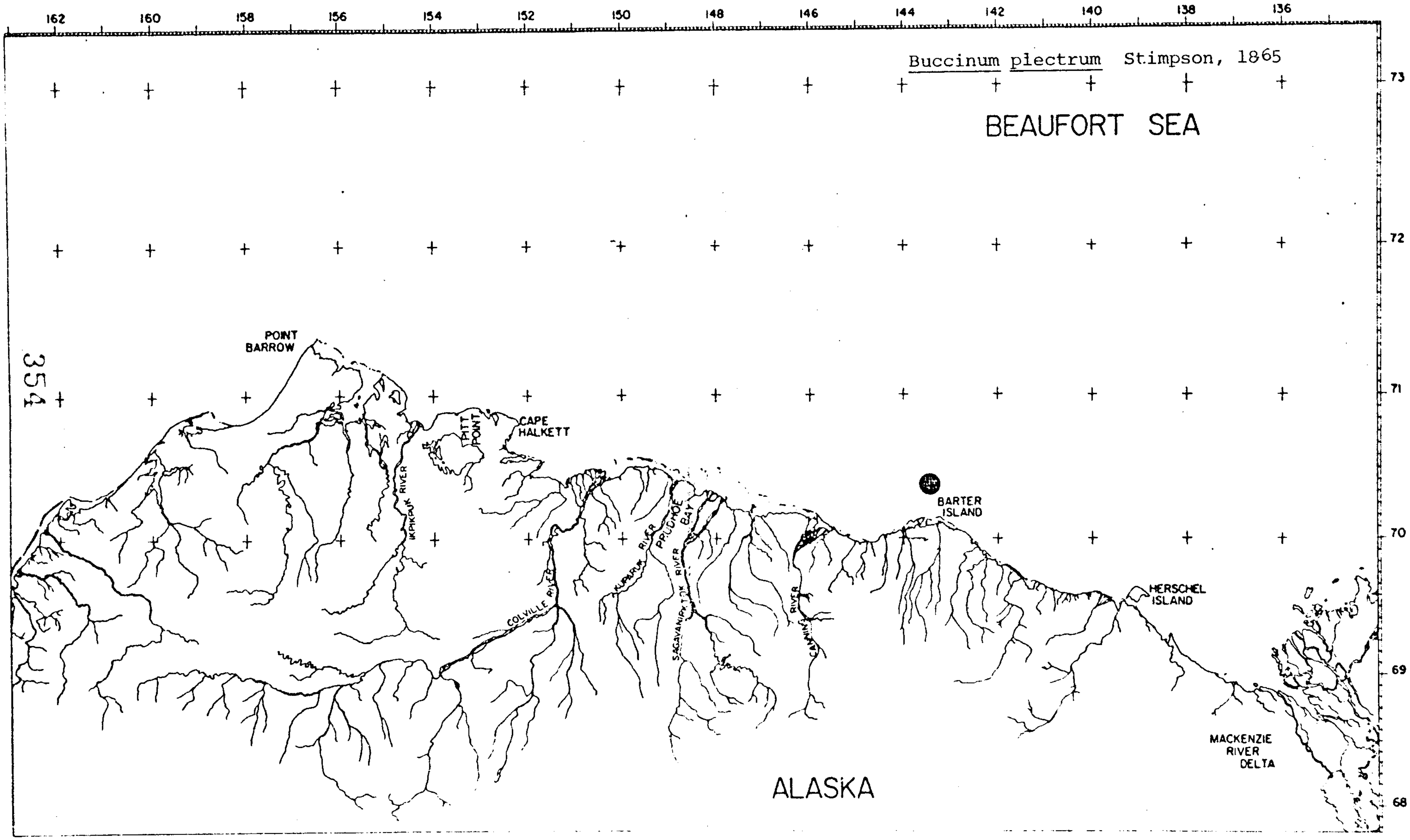

Buccinum plectrum Stimpson, 1865
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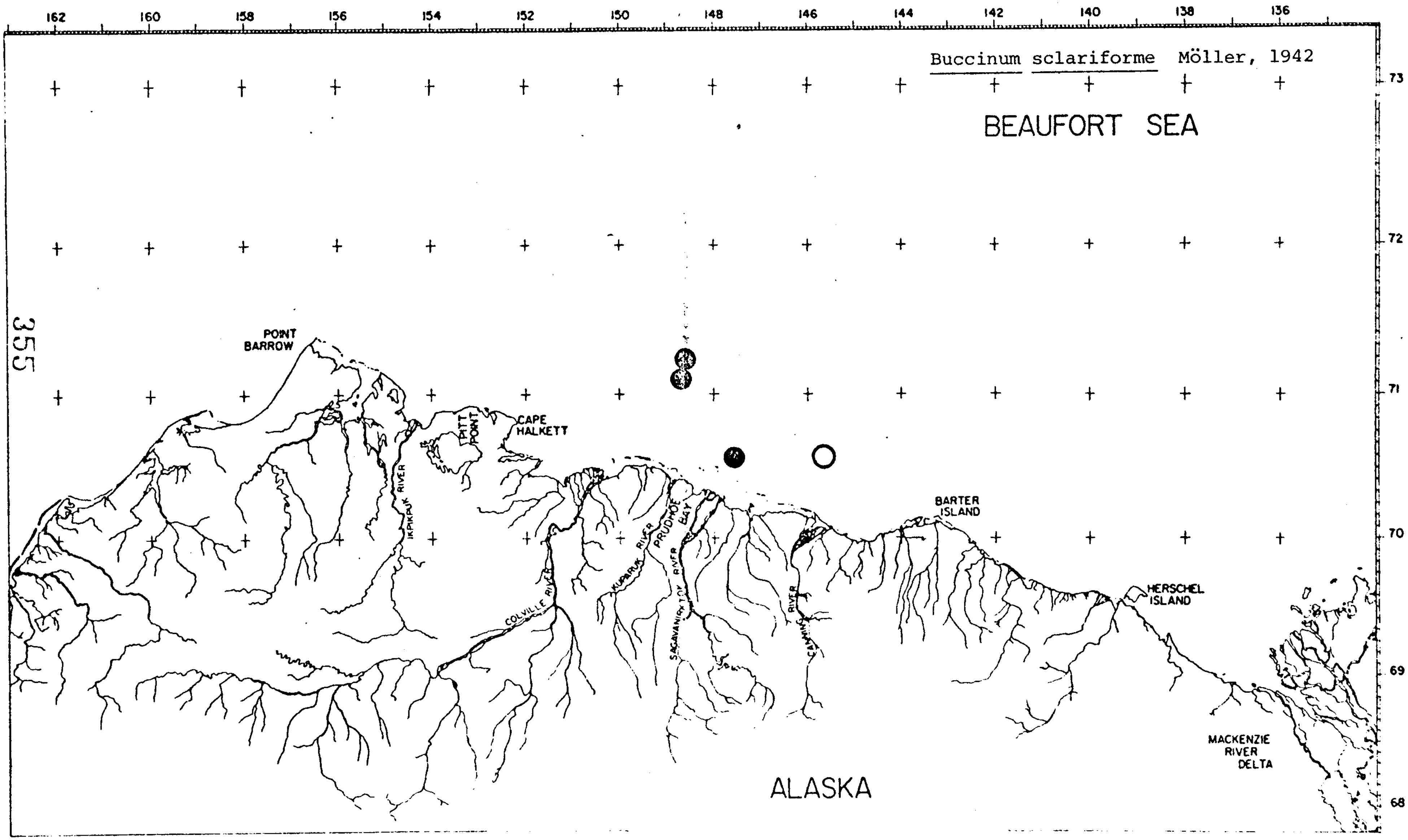
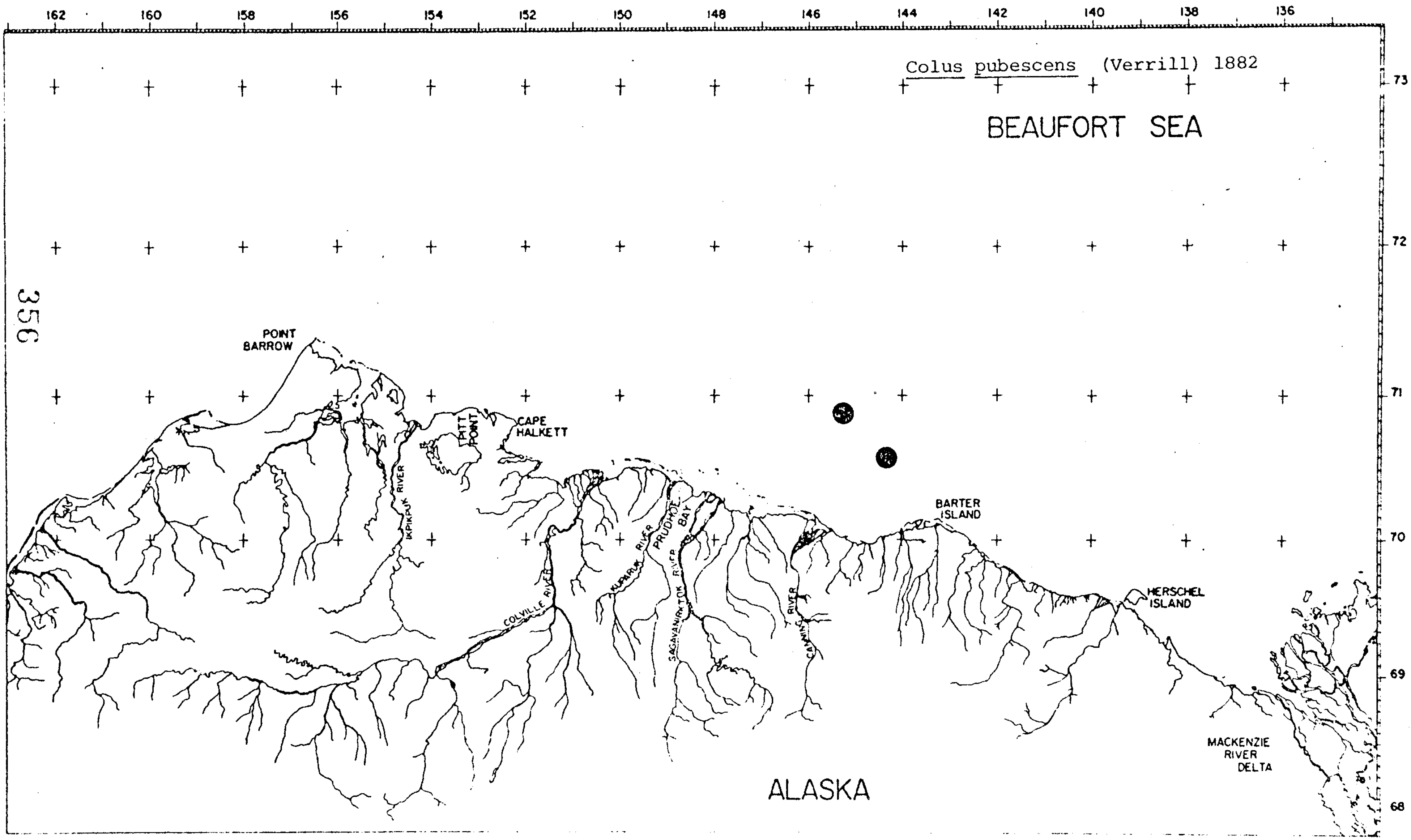


Buccinum sclariforme Möller, 1942



Colus pubescens (Verrill) 1882
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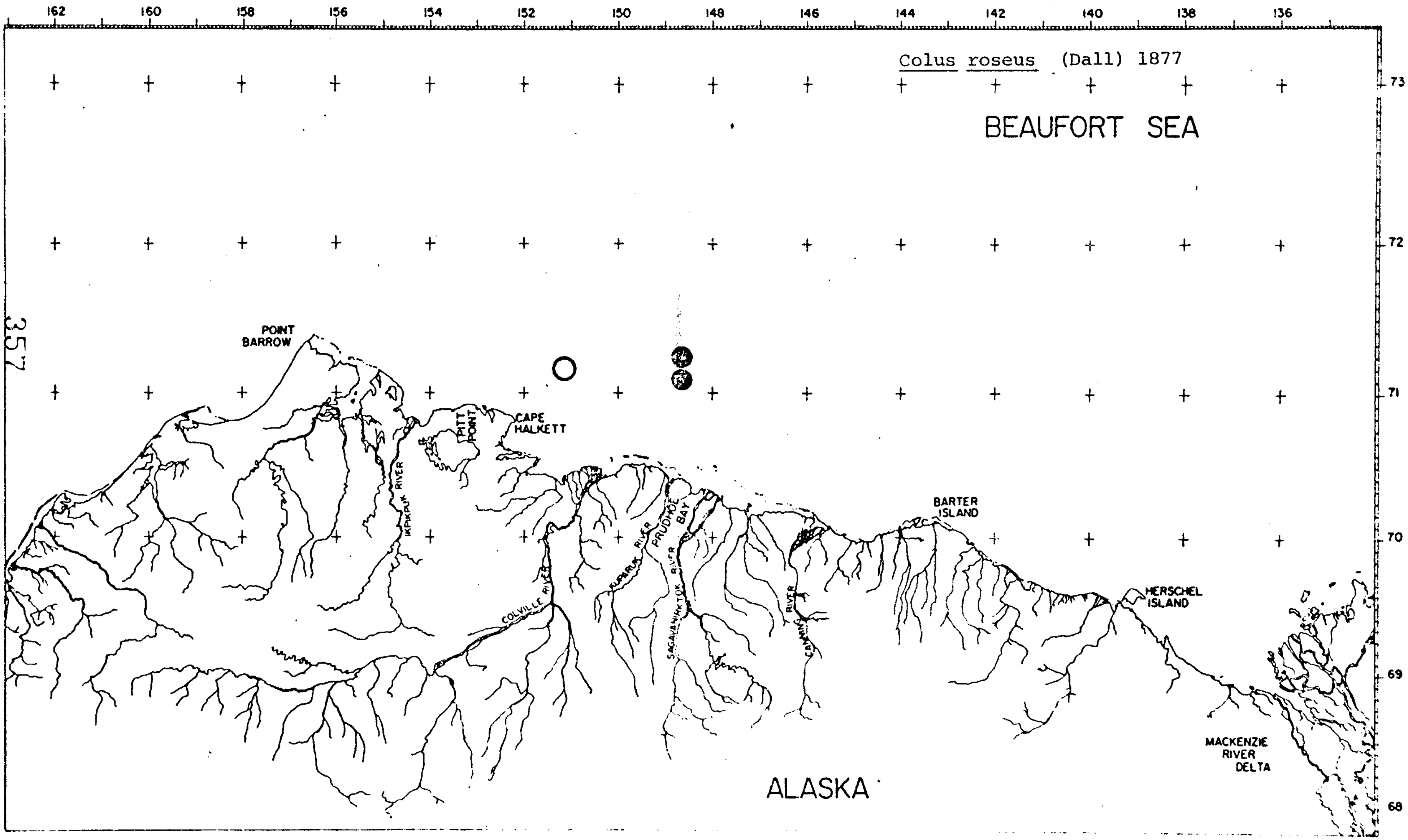
Colus roseus (Dall) 1877
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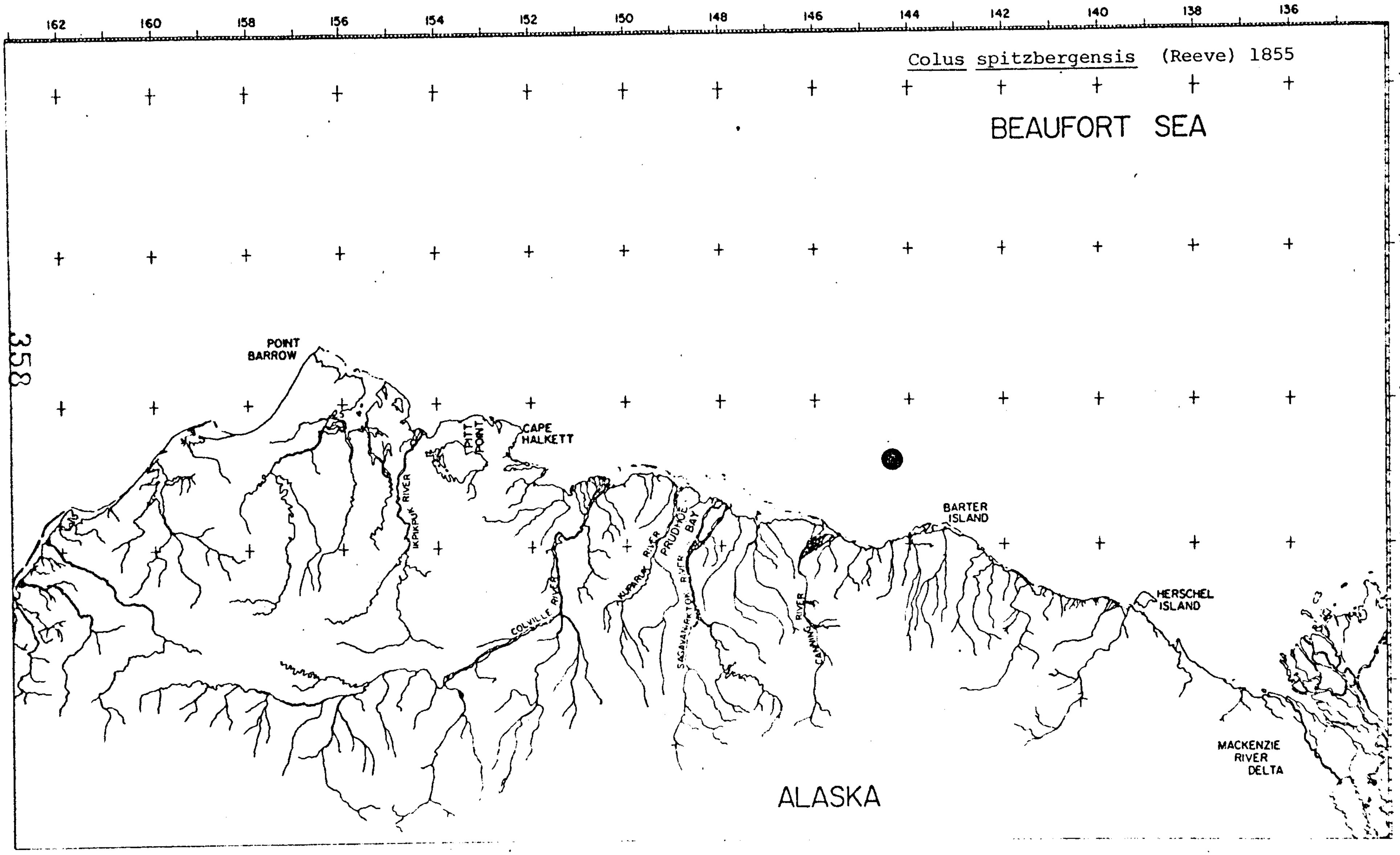
Colus spitzbergensis (Reeve) 1855
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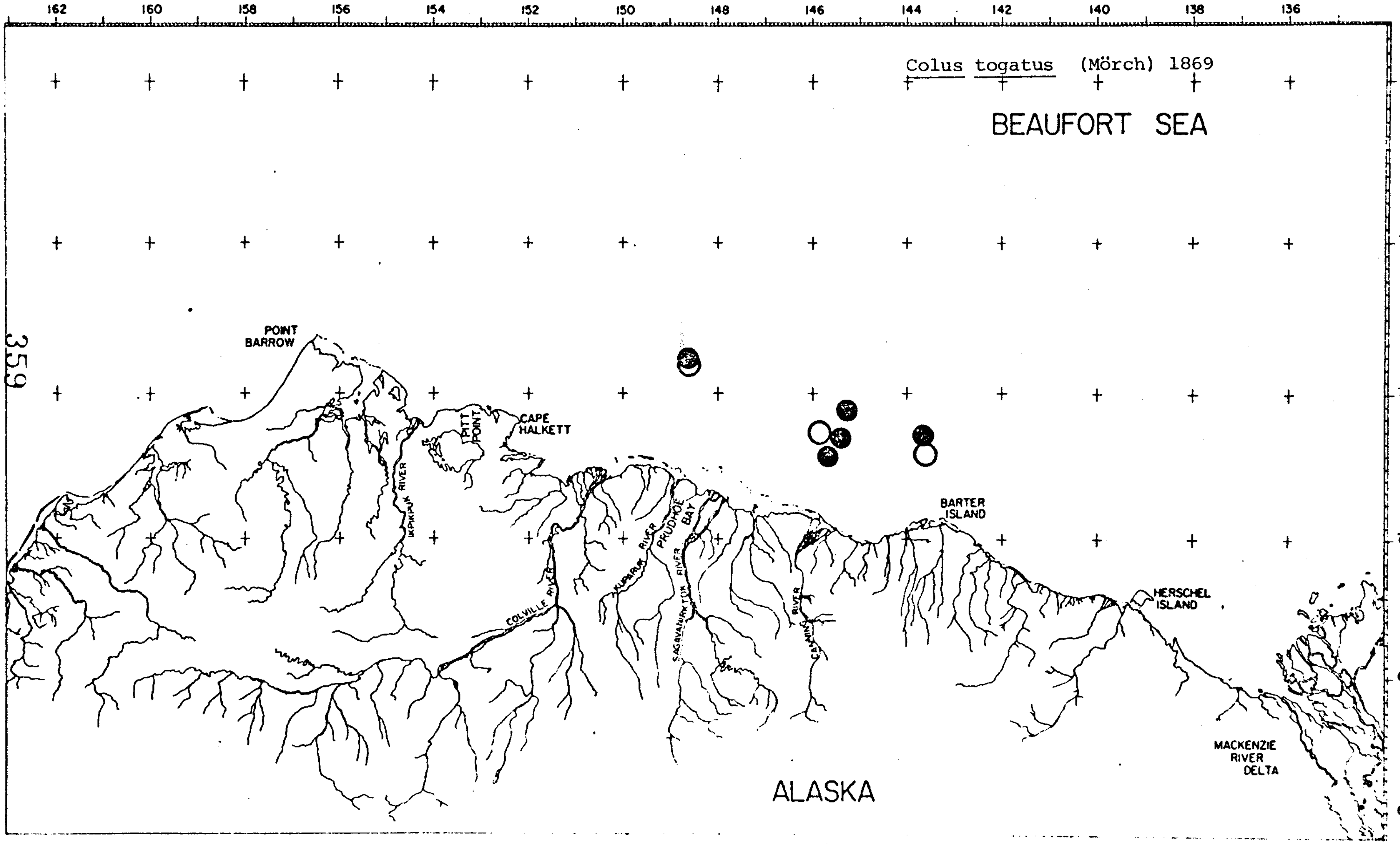
Colus togatus (Mörch) 1869
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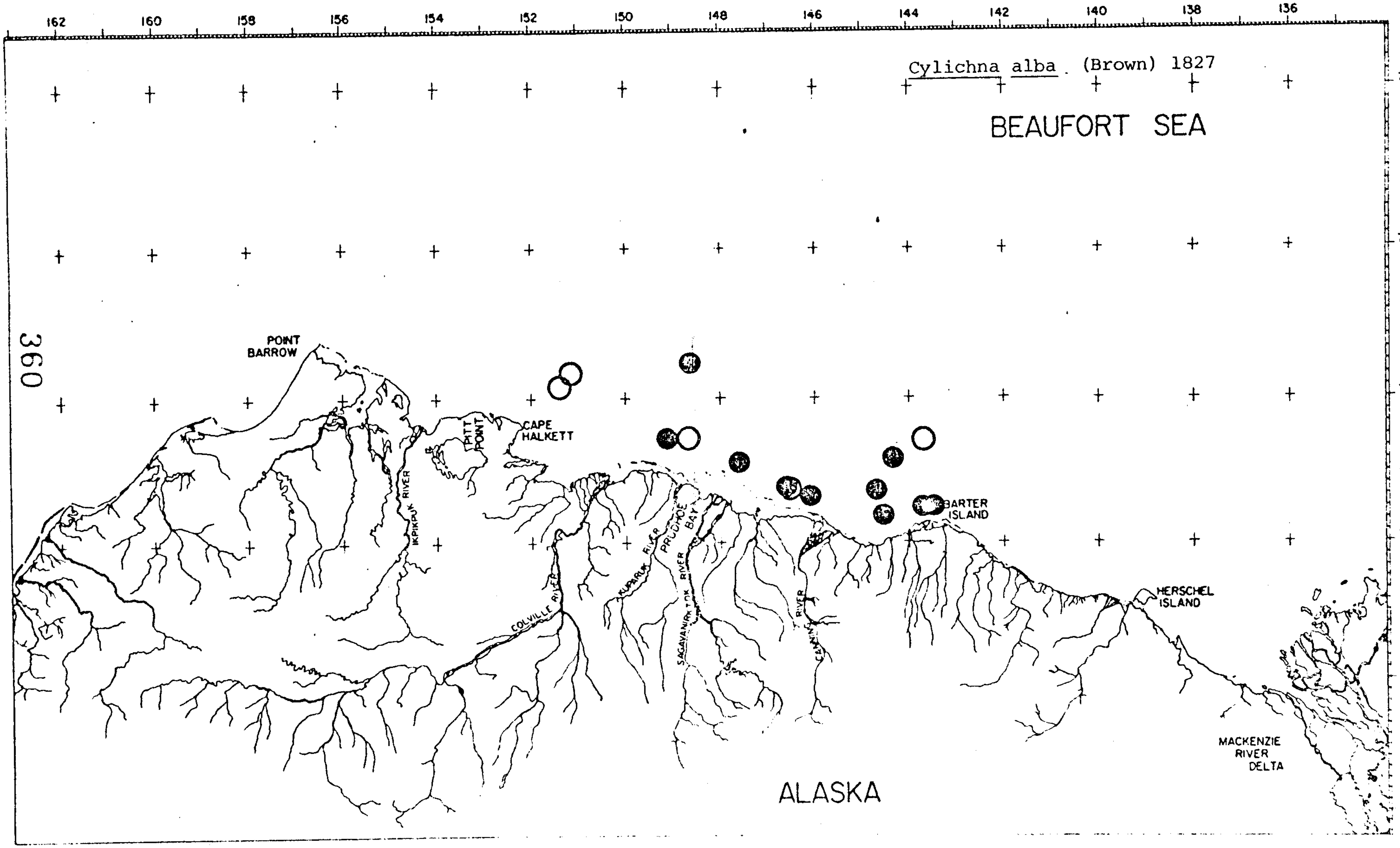
Cylichna alba (Brown) 1827
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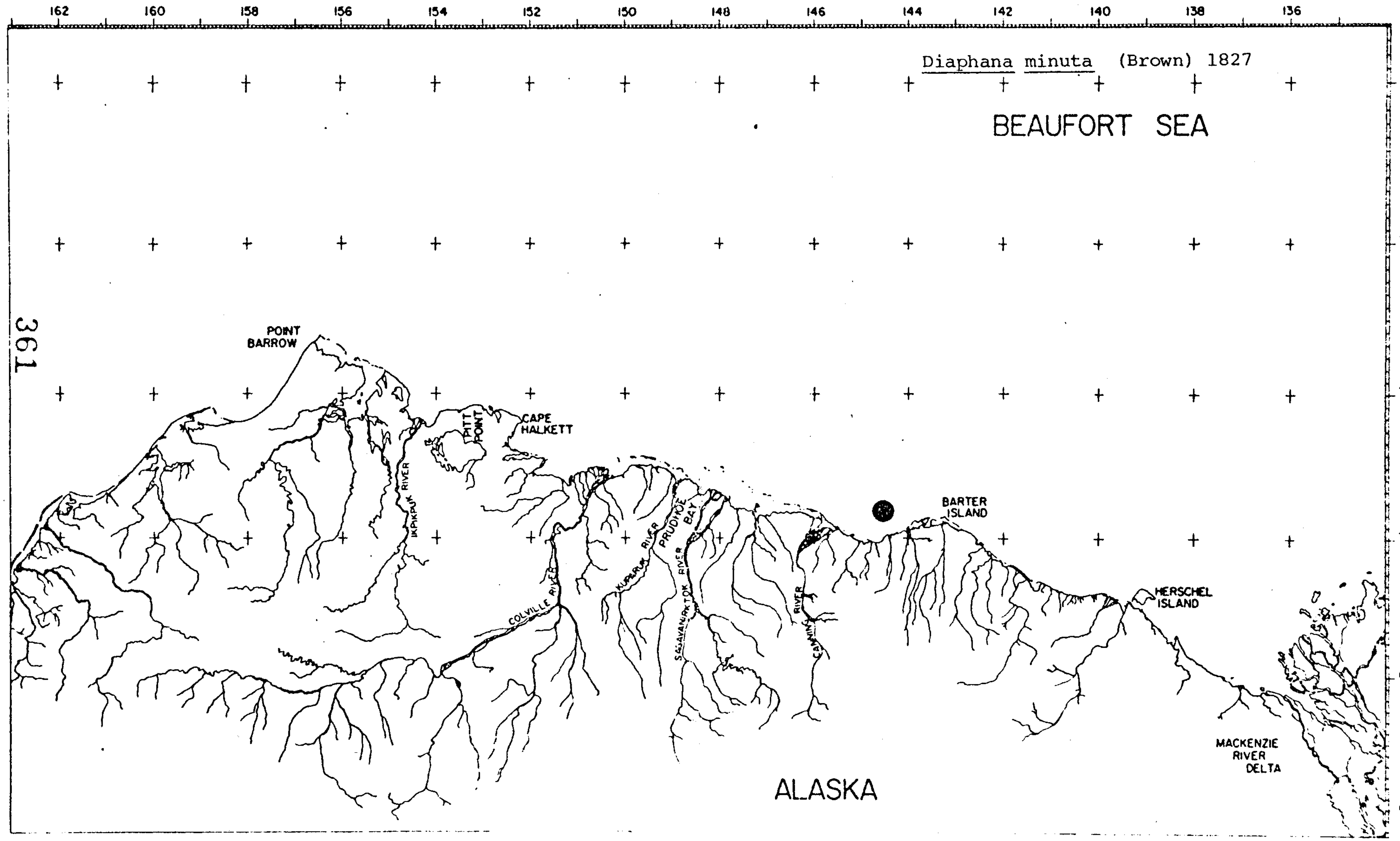
Diaphana minuta (Brown) 1827
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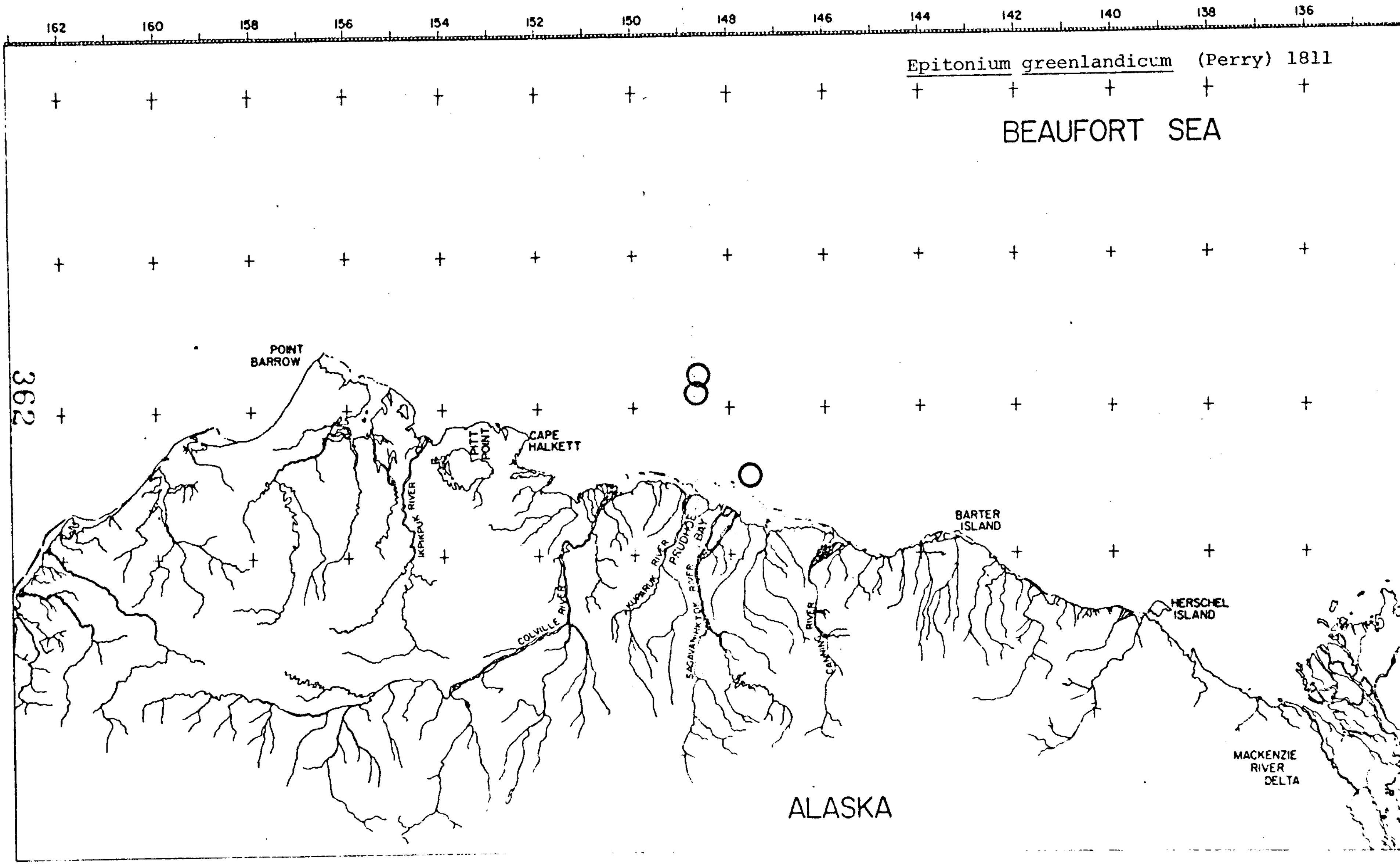
Epitonium greenlandicum (Perry) 1811
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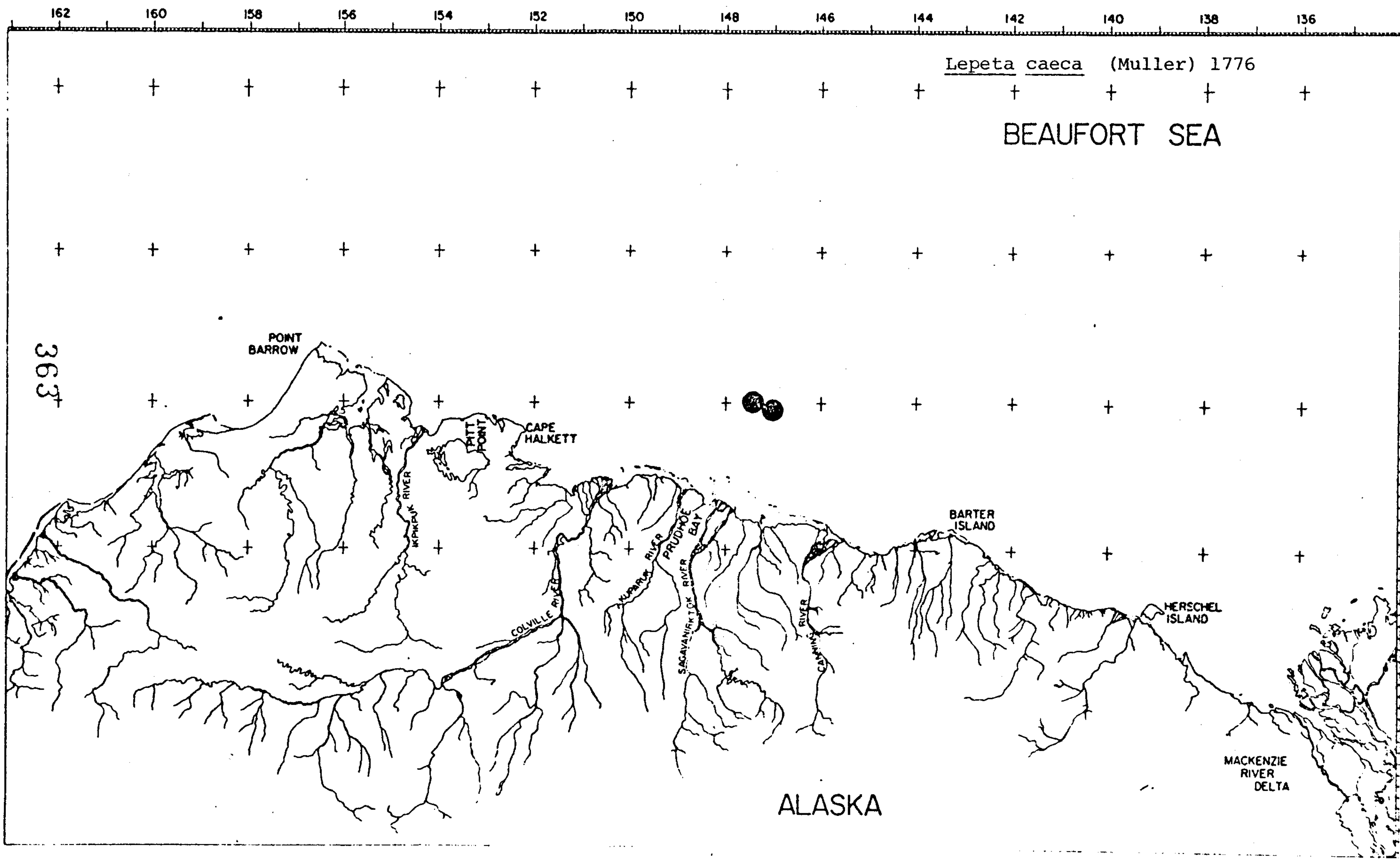
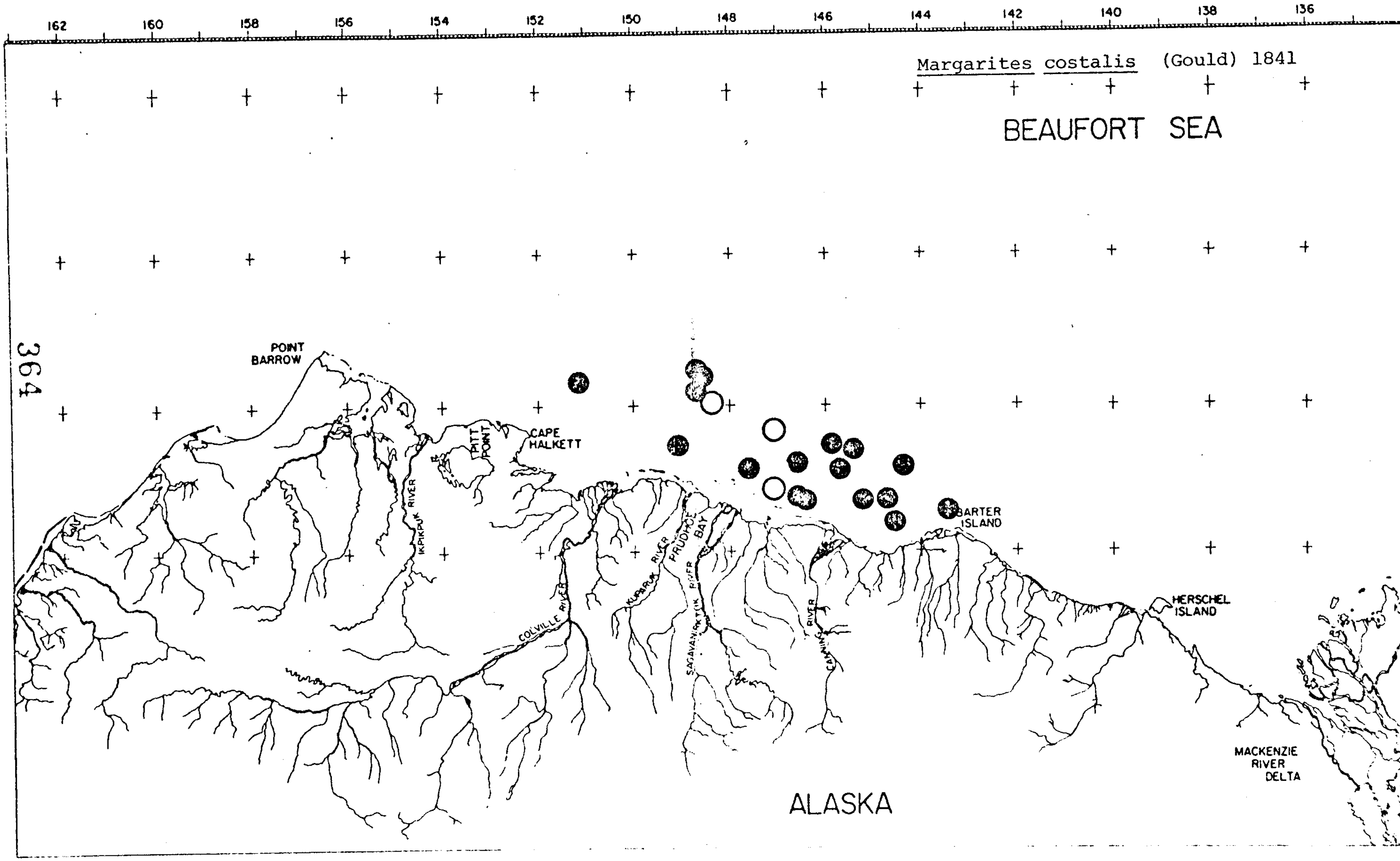


Lepeta caeca (Muller) 1776


Margarites costalis (Gould) 1841
BEAUFORT SEA
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KUPARUK RIVER
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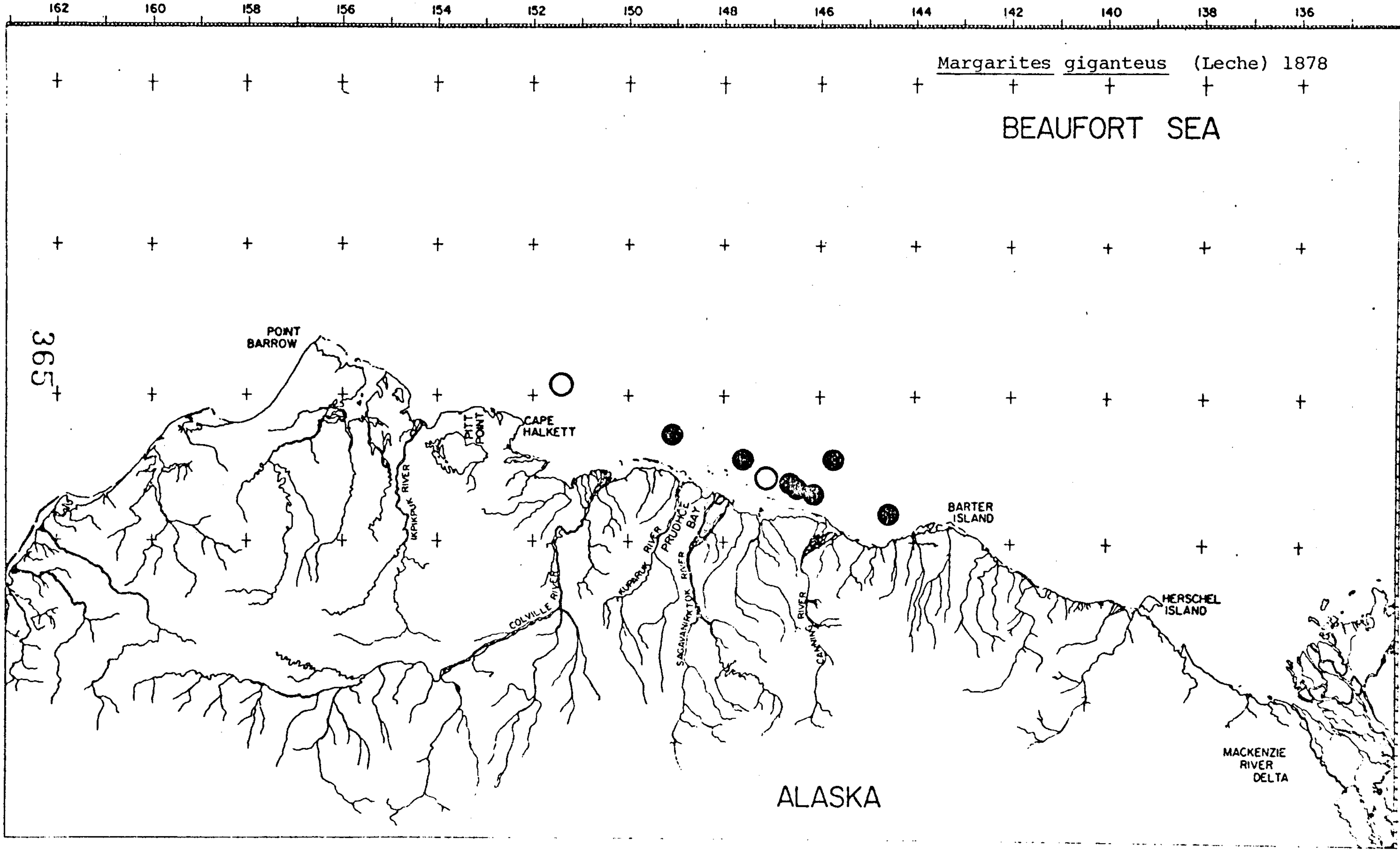
Margarites giganteus (Leche) 1878
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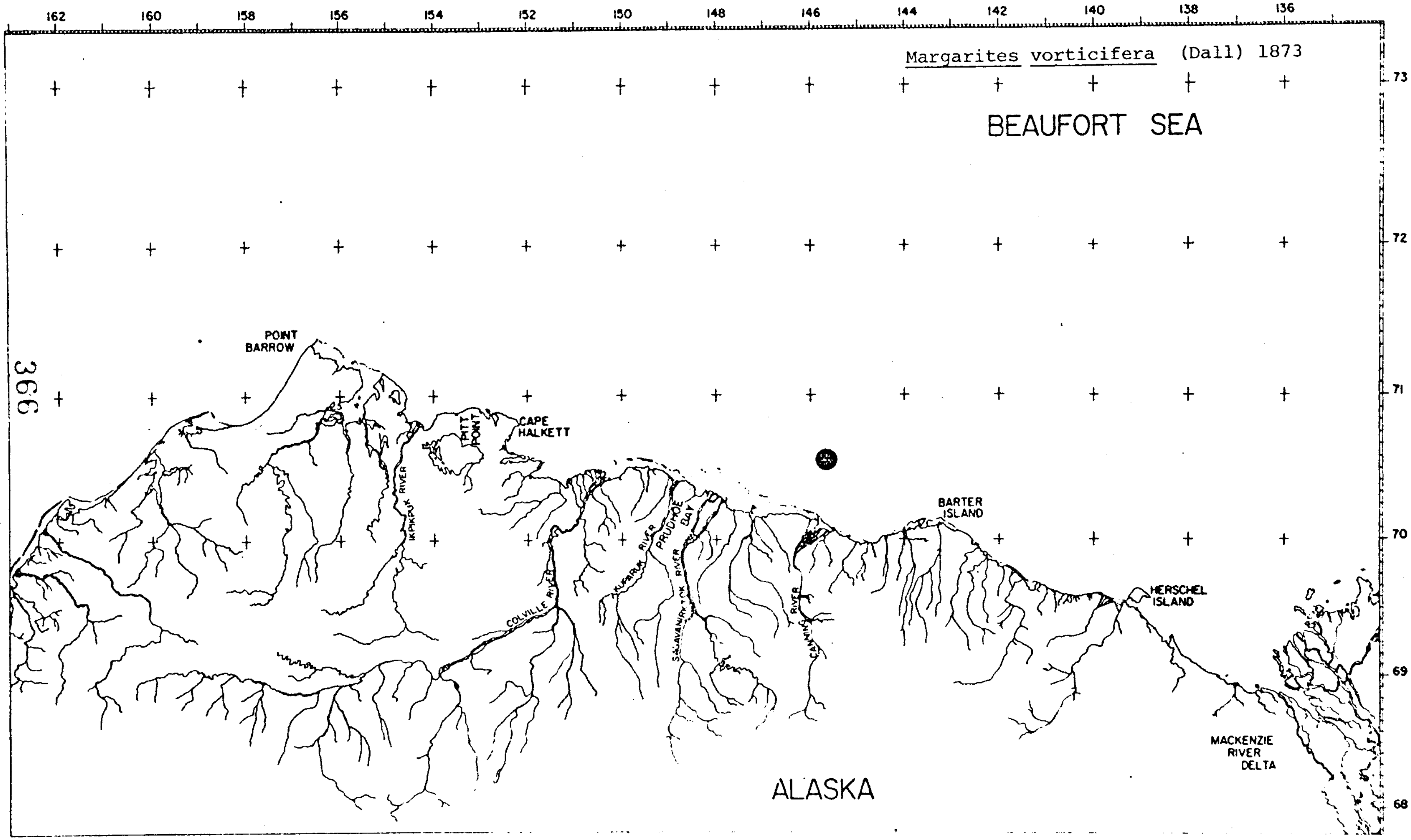
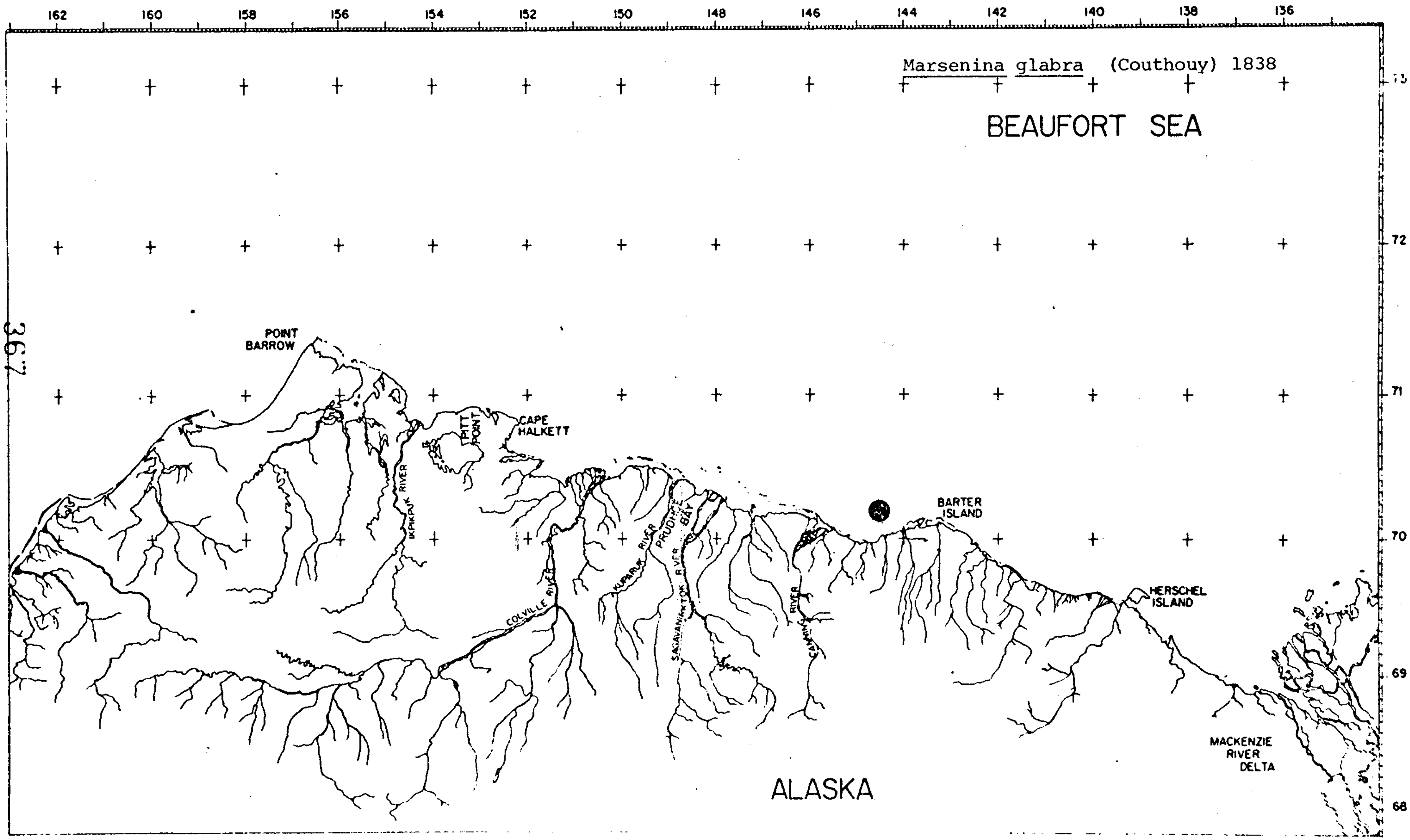


Margarites vorticifera (Dall) 1873


Marsenina glabra (Couthouy) 1838
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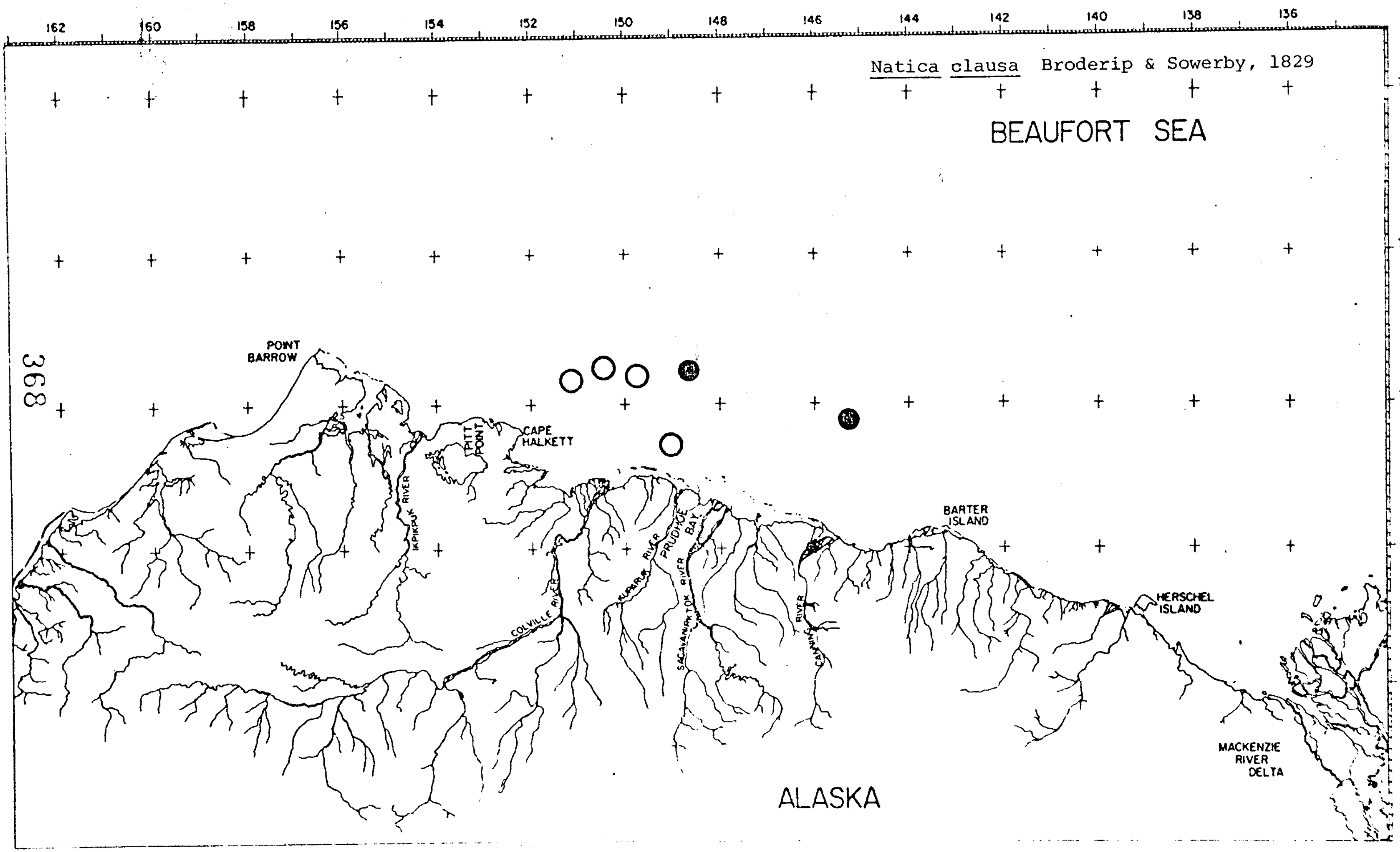
Natica clausa Broderip & Sowerby, 1829
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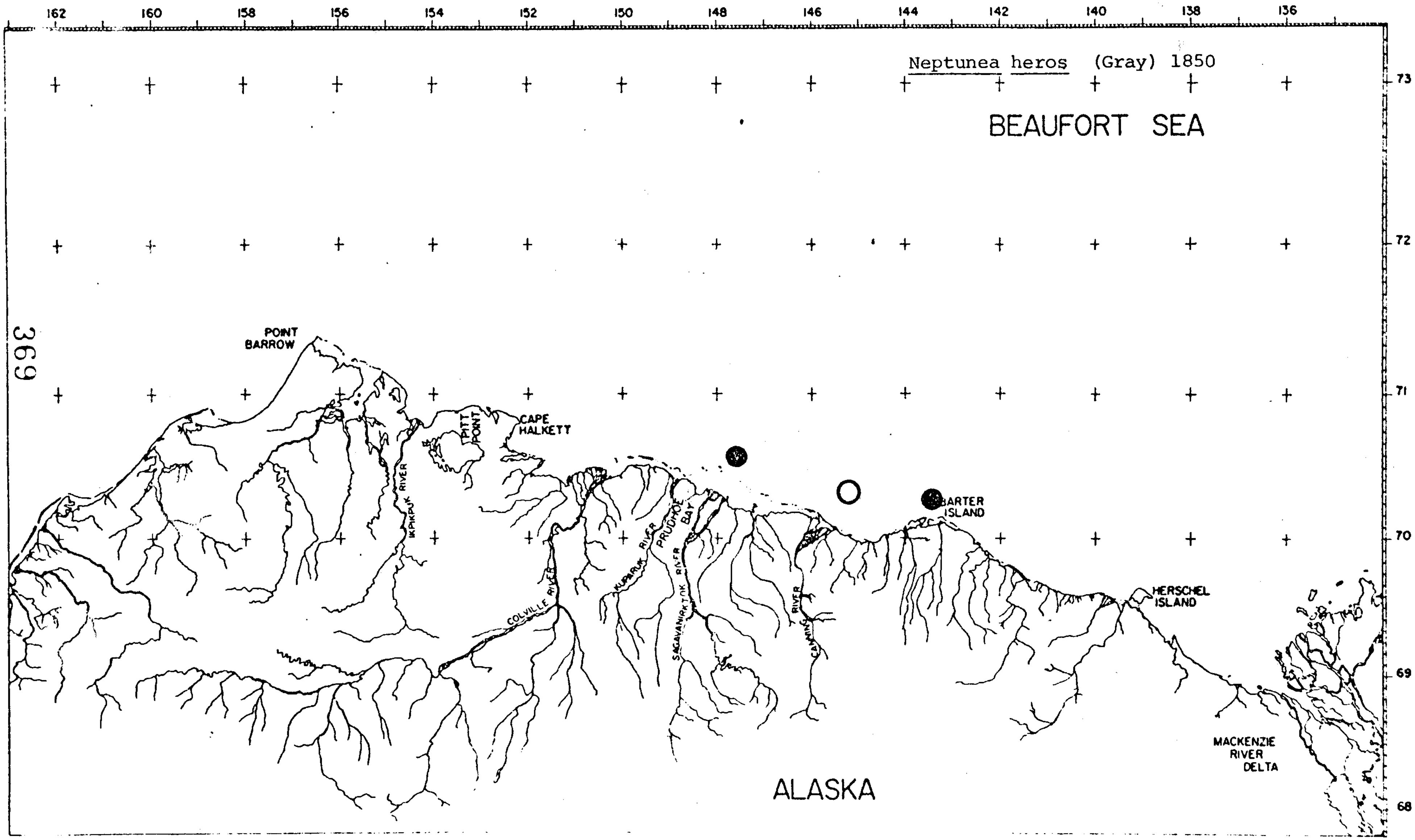
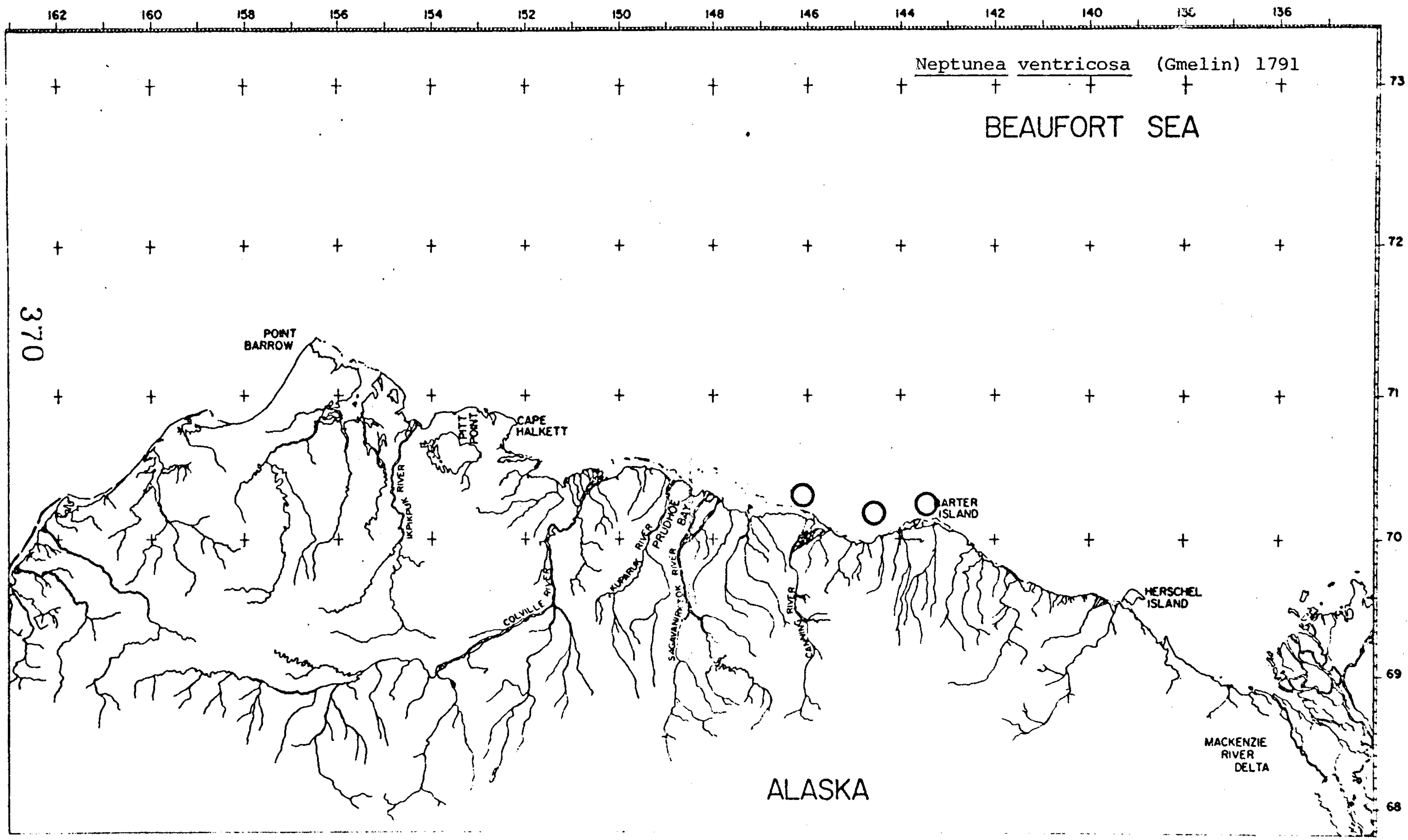


Neptunea heros (Gray) 1850


Neptunea ventricosa (Gmelin) 1791
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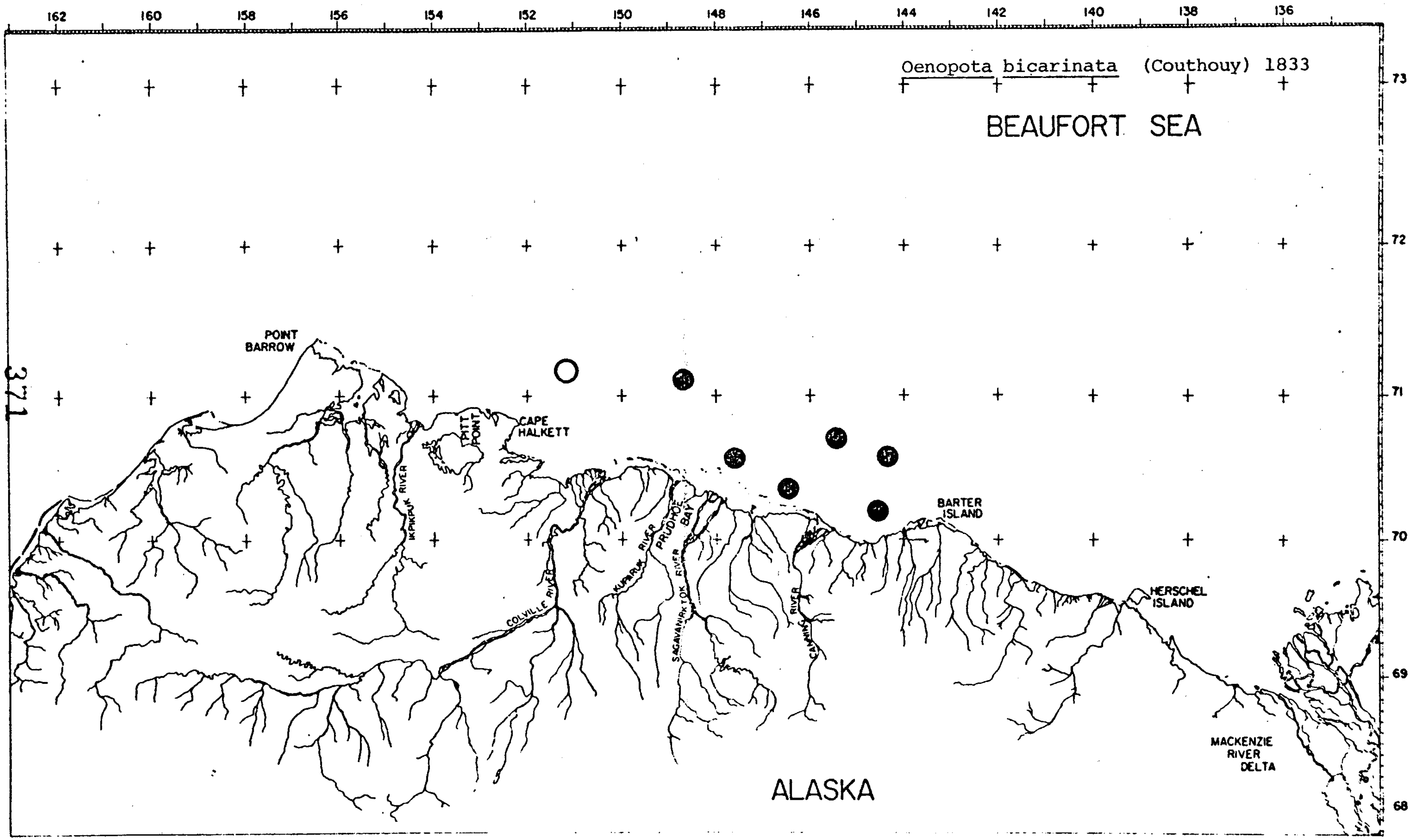
Oenopota bicarinata (Couthouy) 1833
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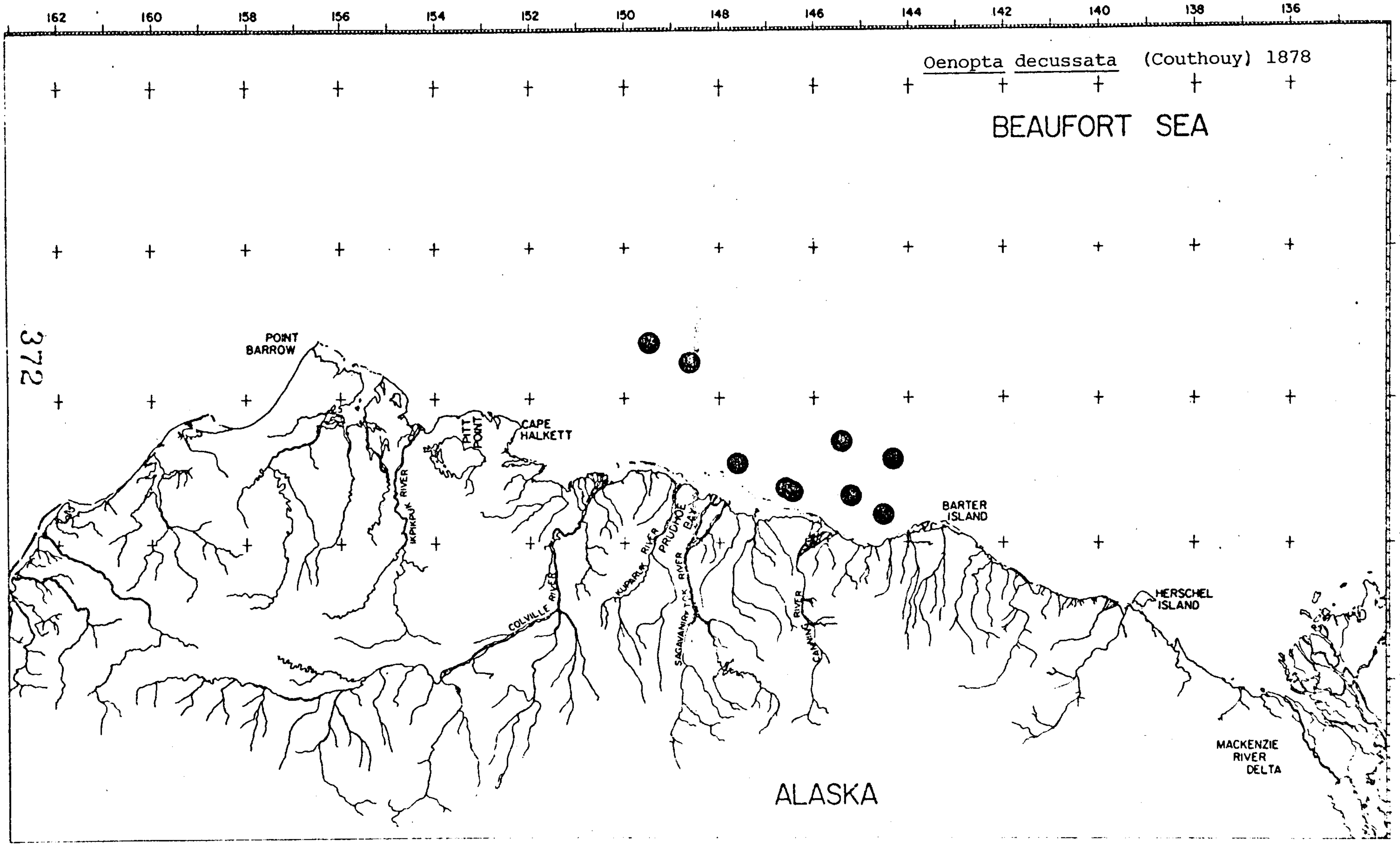
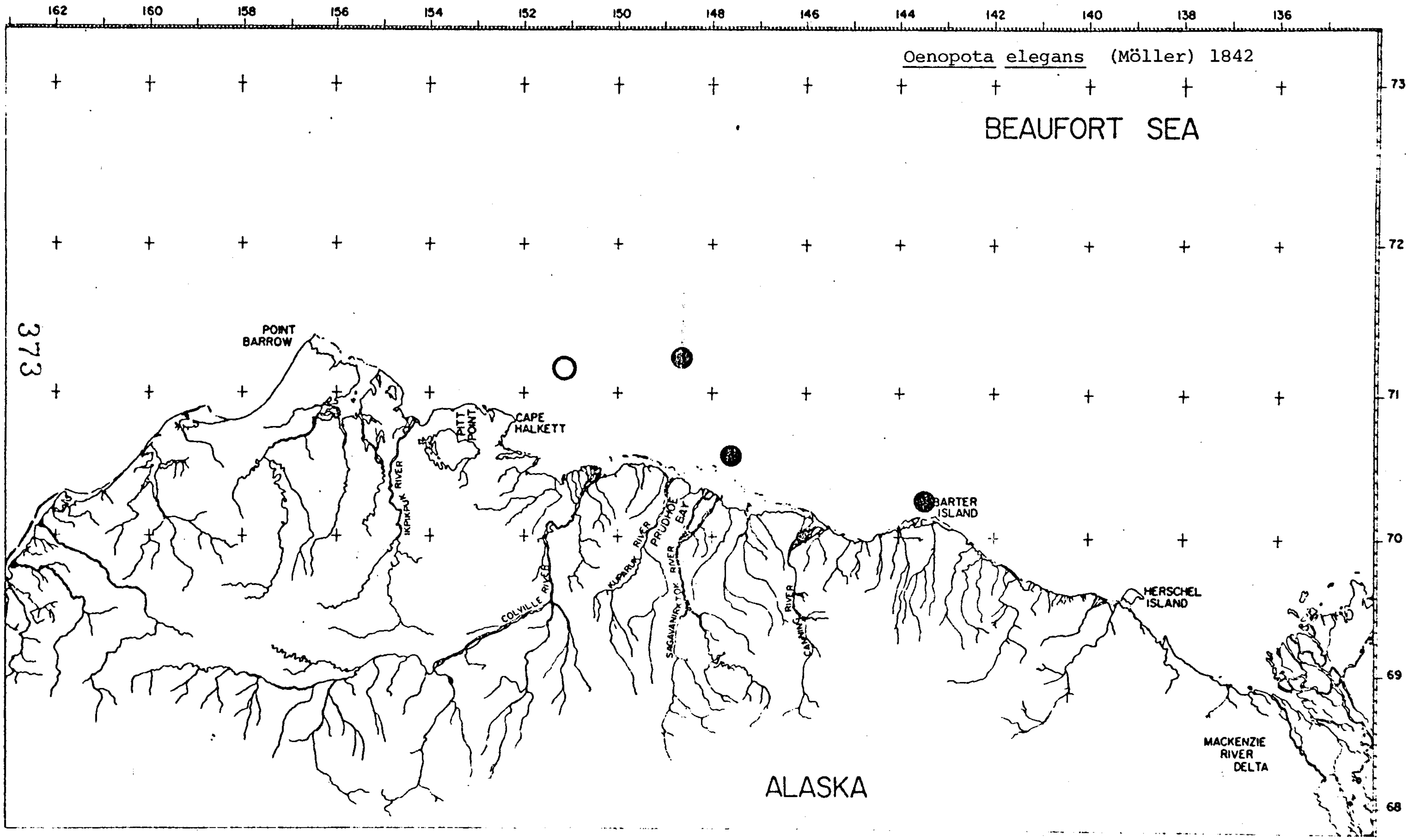


Oenopta decussata (Couthouy) 1878



Oenopota elegans (Möller) 1842

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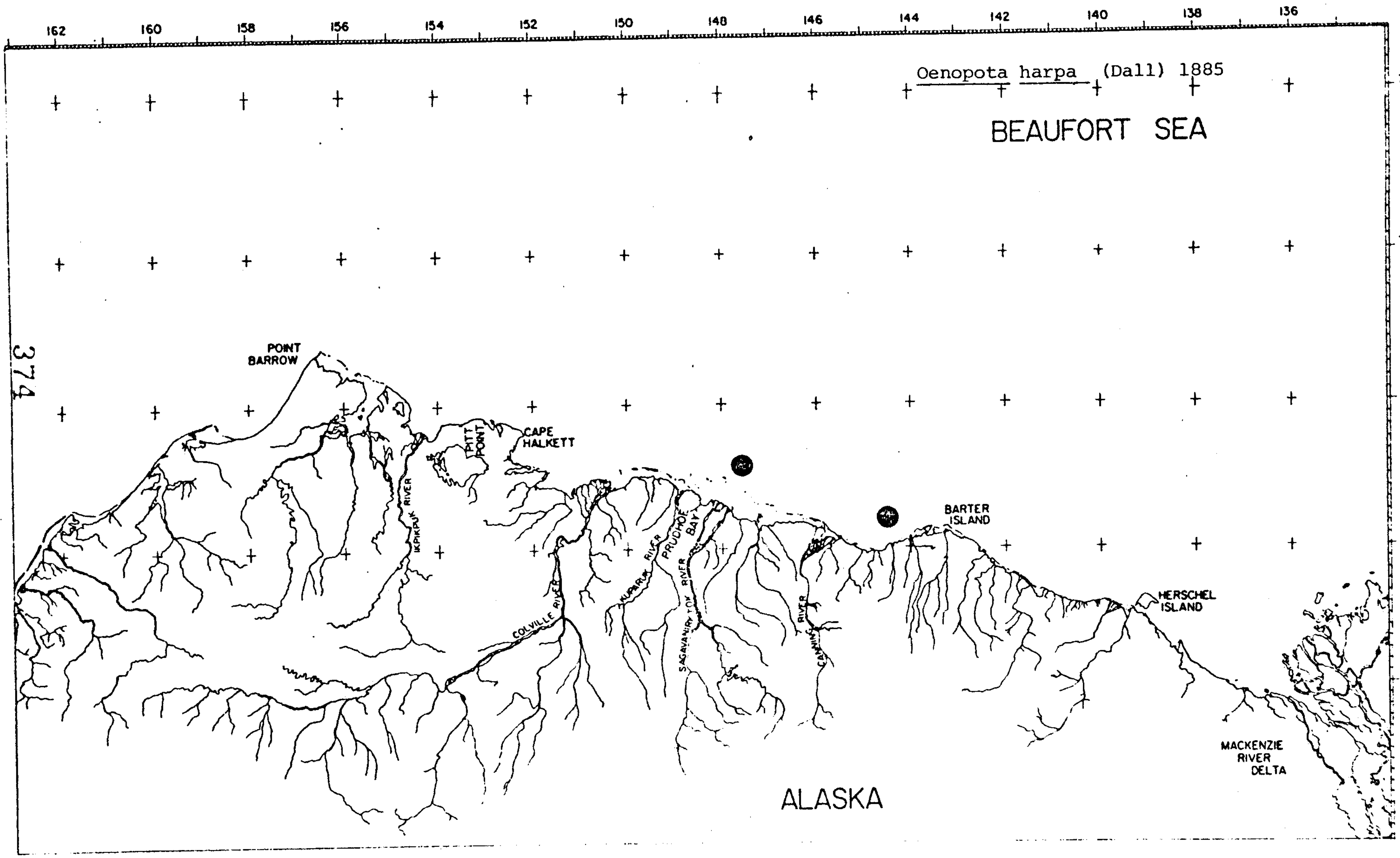
Oenopota harpa (Dall) 1885
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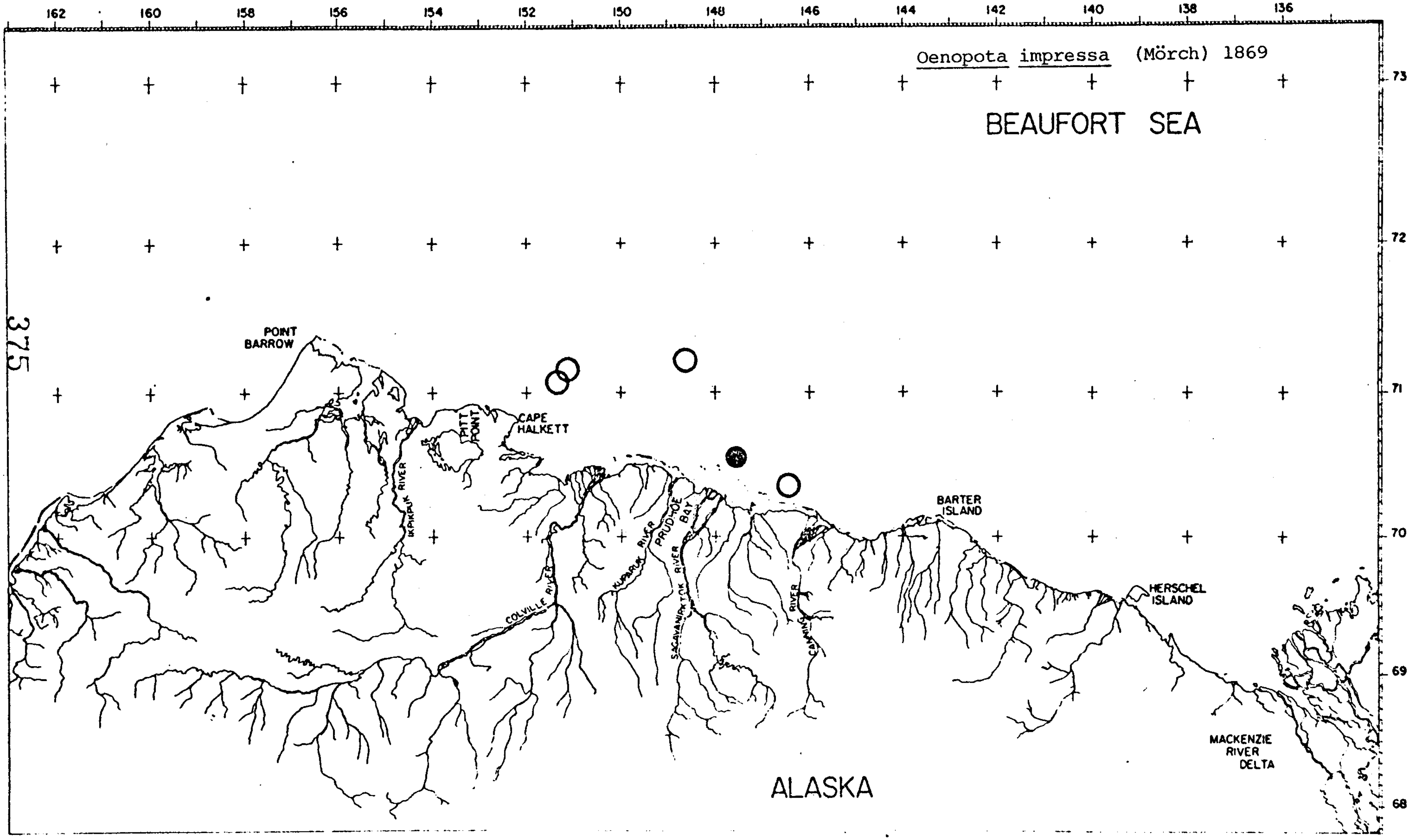
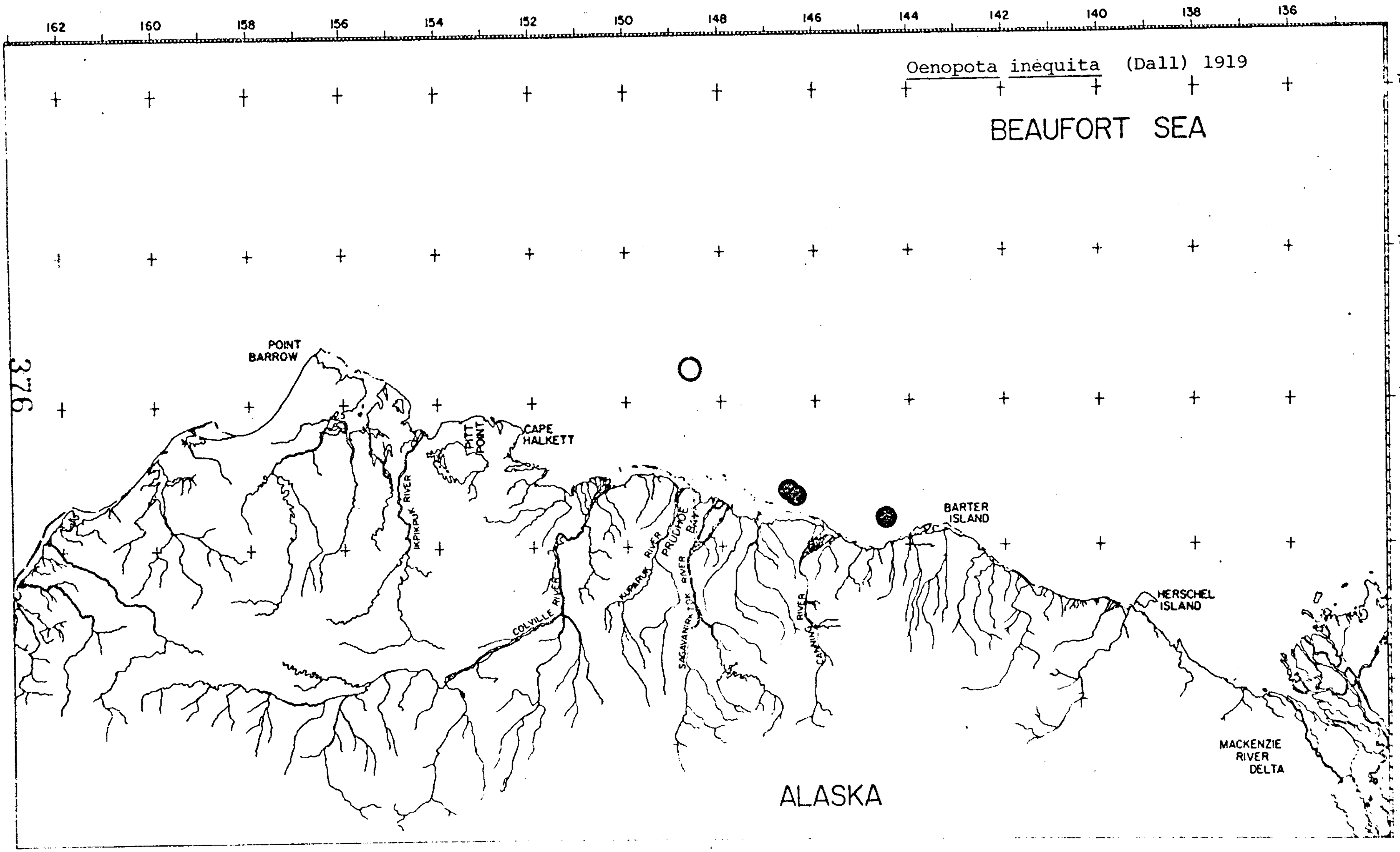


<u>Oenopota</u> <u>impressa</u> (Mörch) 1869


Oenopota inequita (Dall) 1919
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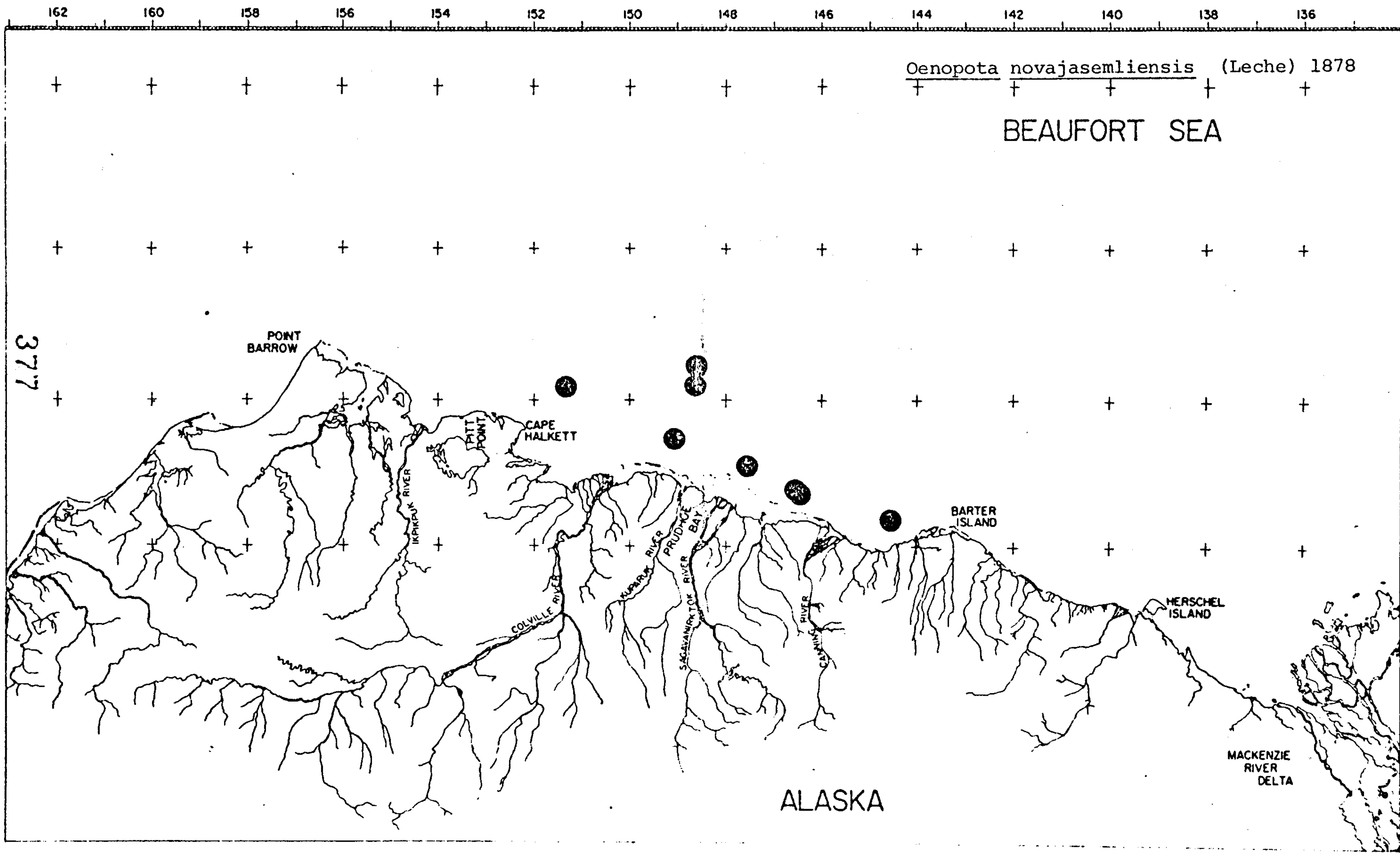
Oenopota novajasemliensis (Leche) 1878
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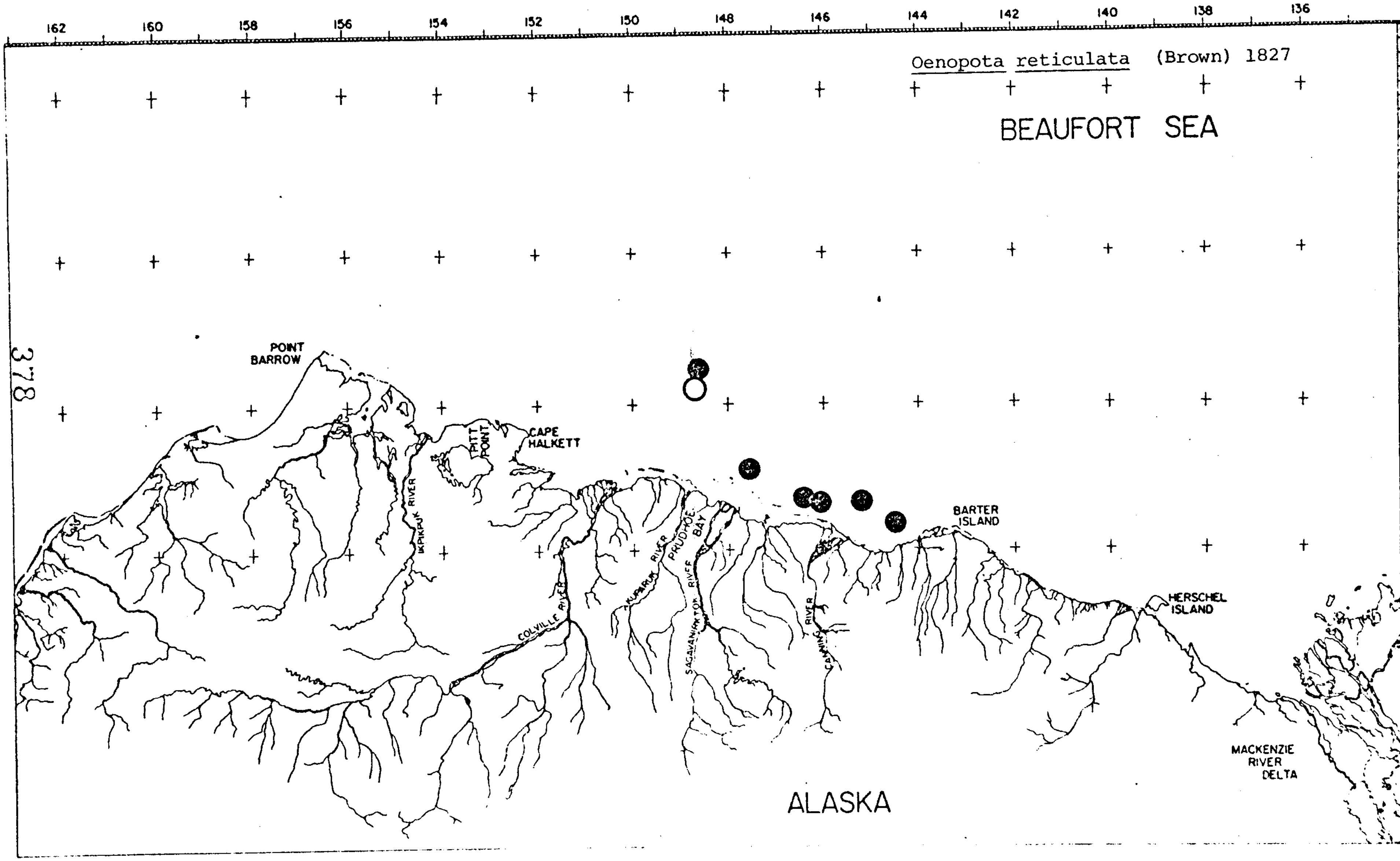
Oenopota reticulata (Brown) 1827
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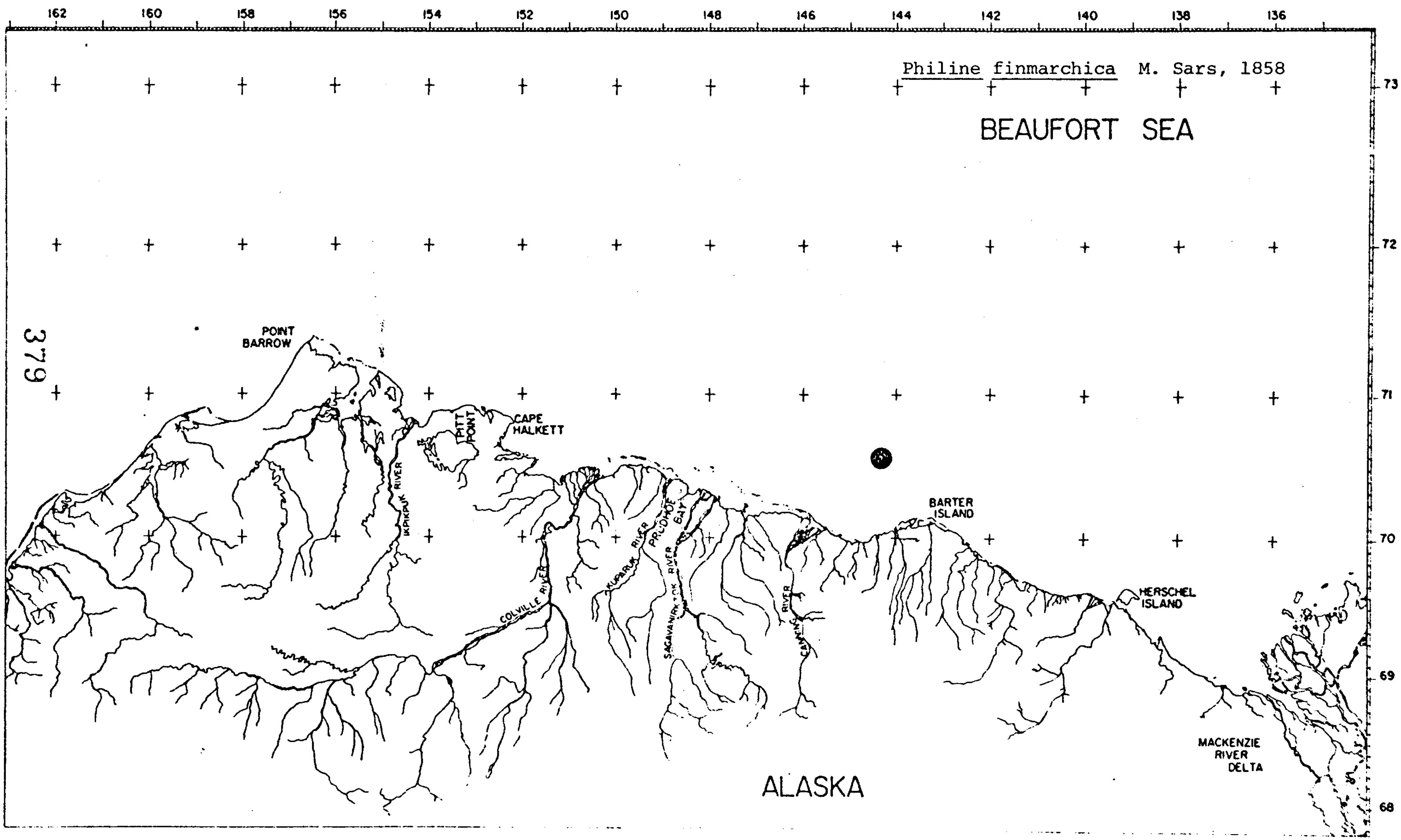
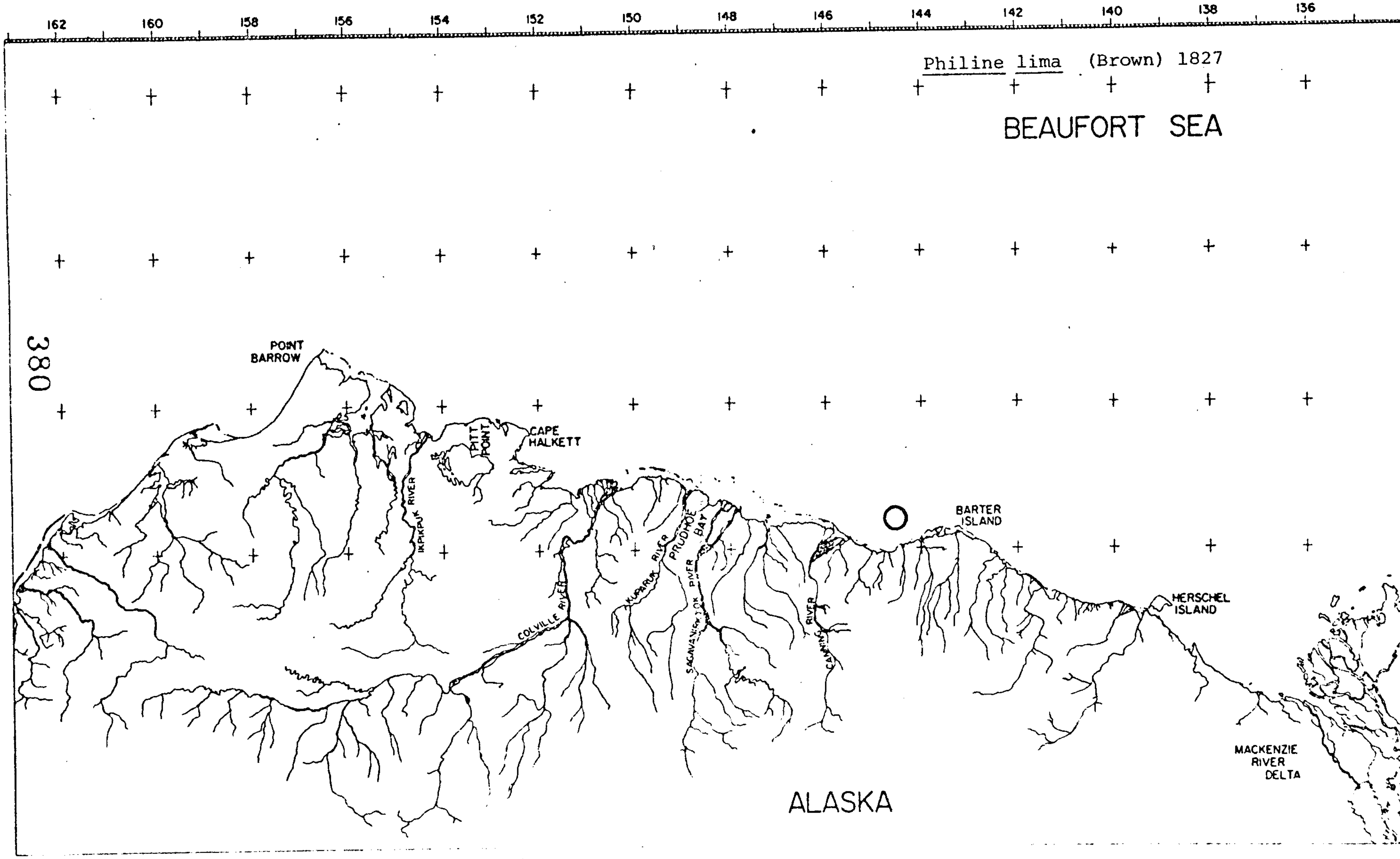


Philine finmarchica M. Sars, 1858


Philine lima (Brown) 1827
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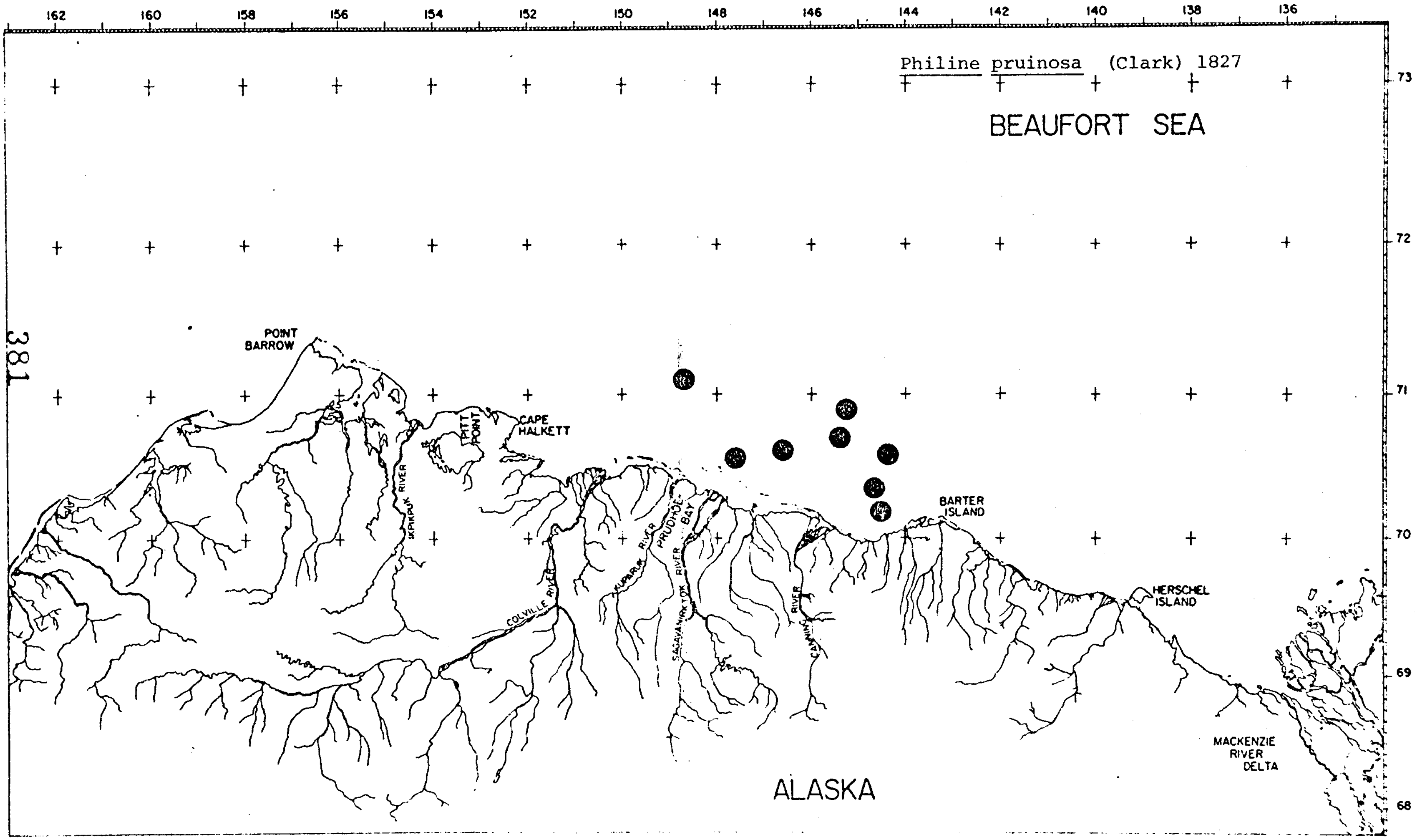
Philine pruinosa (Clark) 1827
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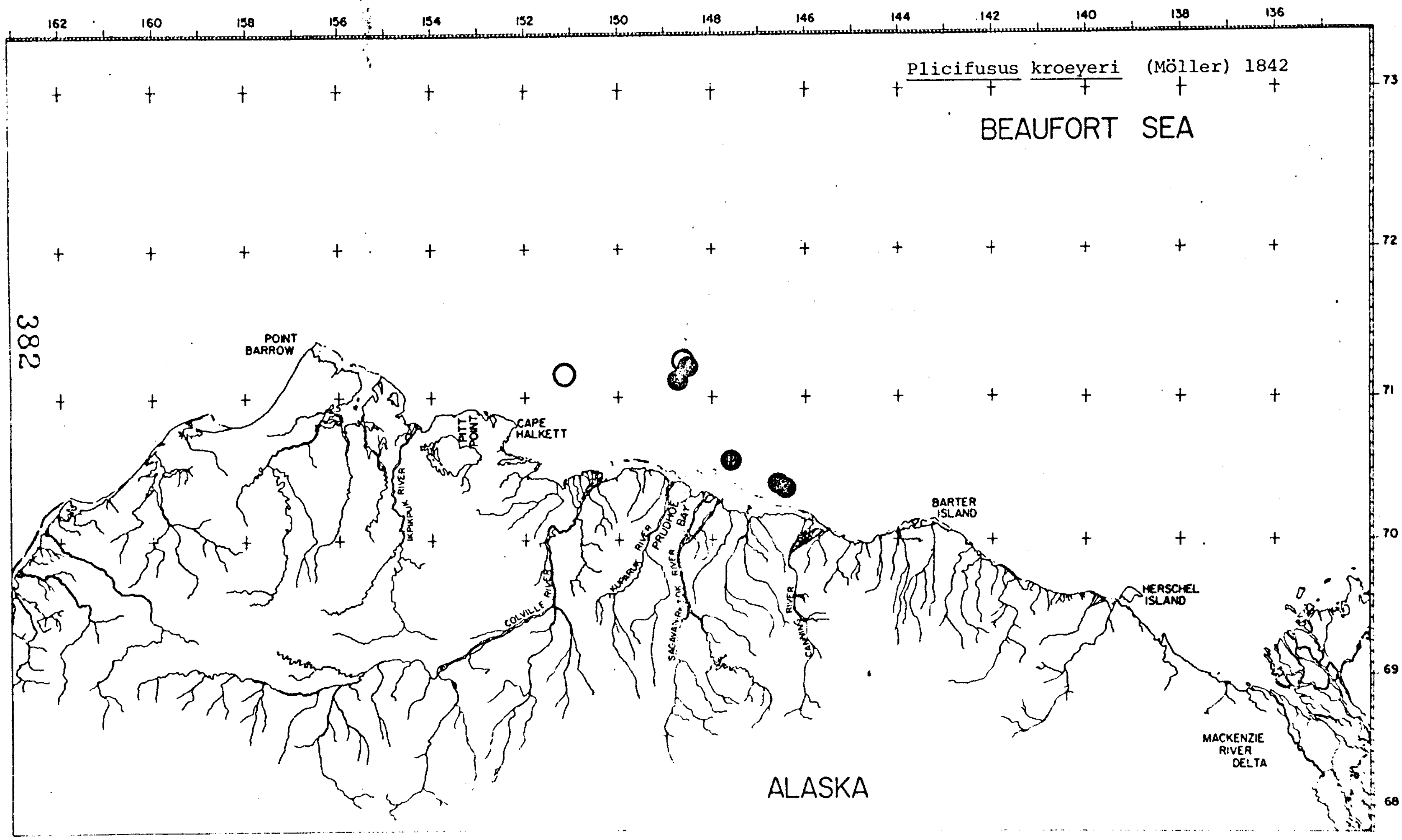
Plicifusus kroeyeri (Möller) 1842
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POINT BARROW
PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
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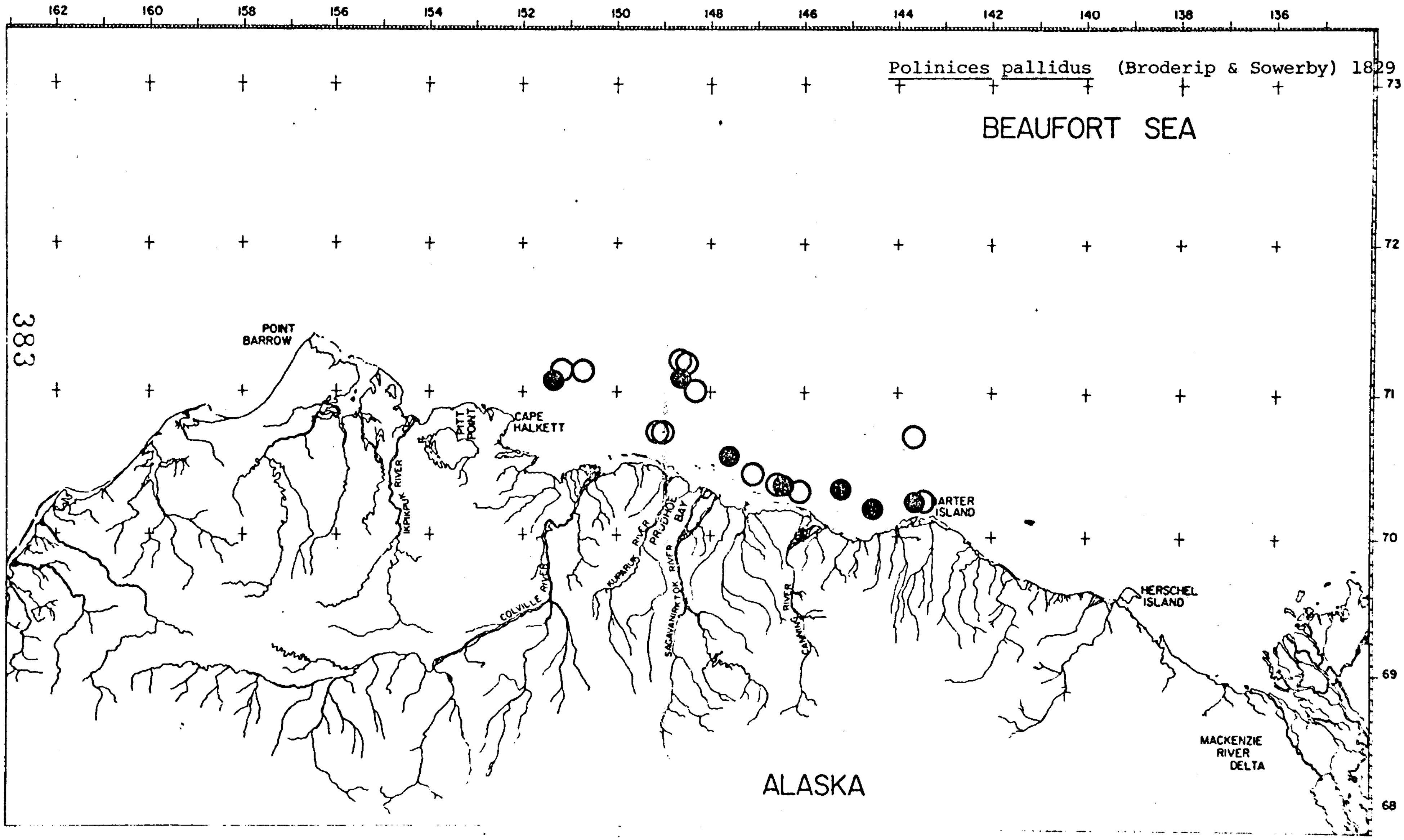
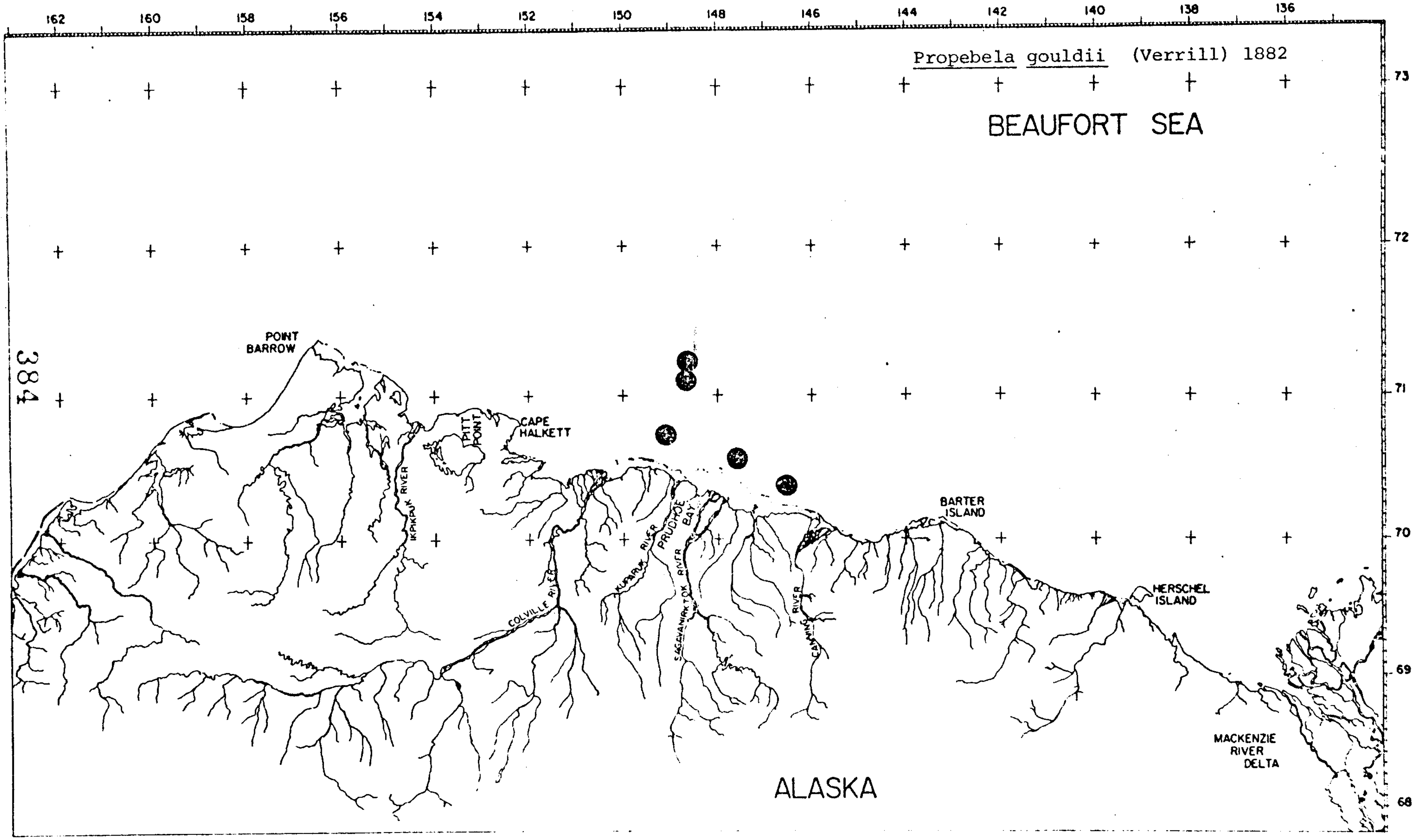


<u>Polinices</u> <u>pallidus</u> (Broderip & Sowerby) 1829


Propebela gouldii (Verrill) 1882
BEAUFORT SEA
POINT BARROW
PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
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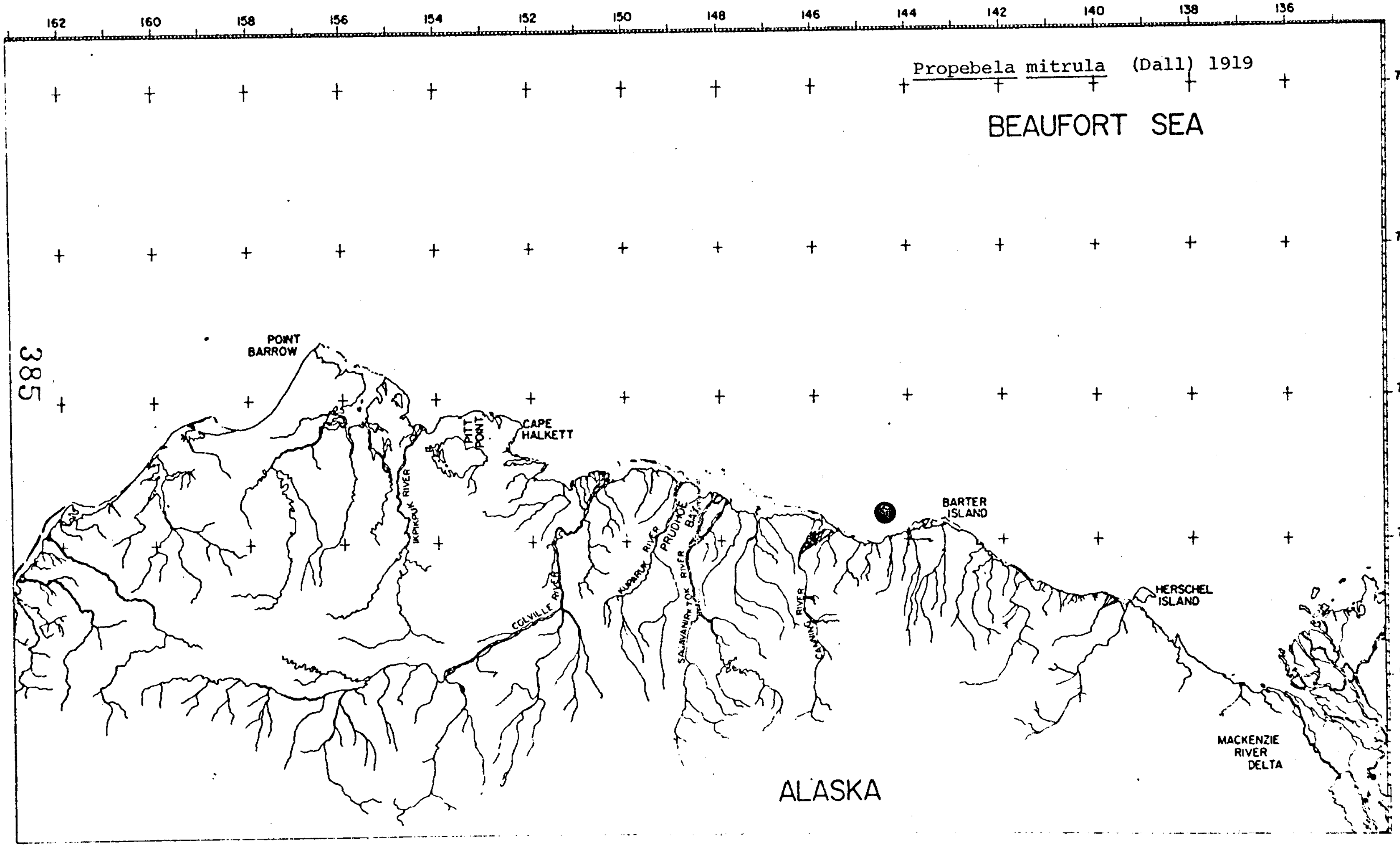
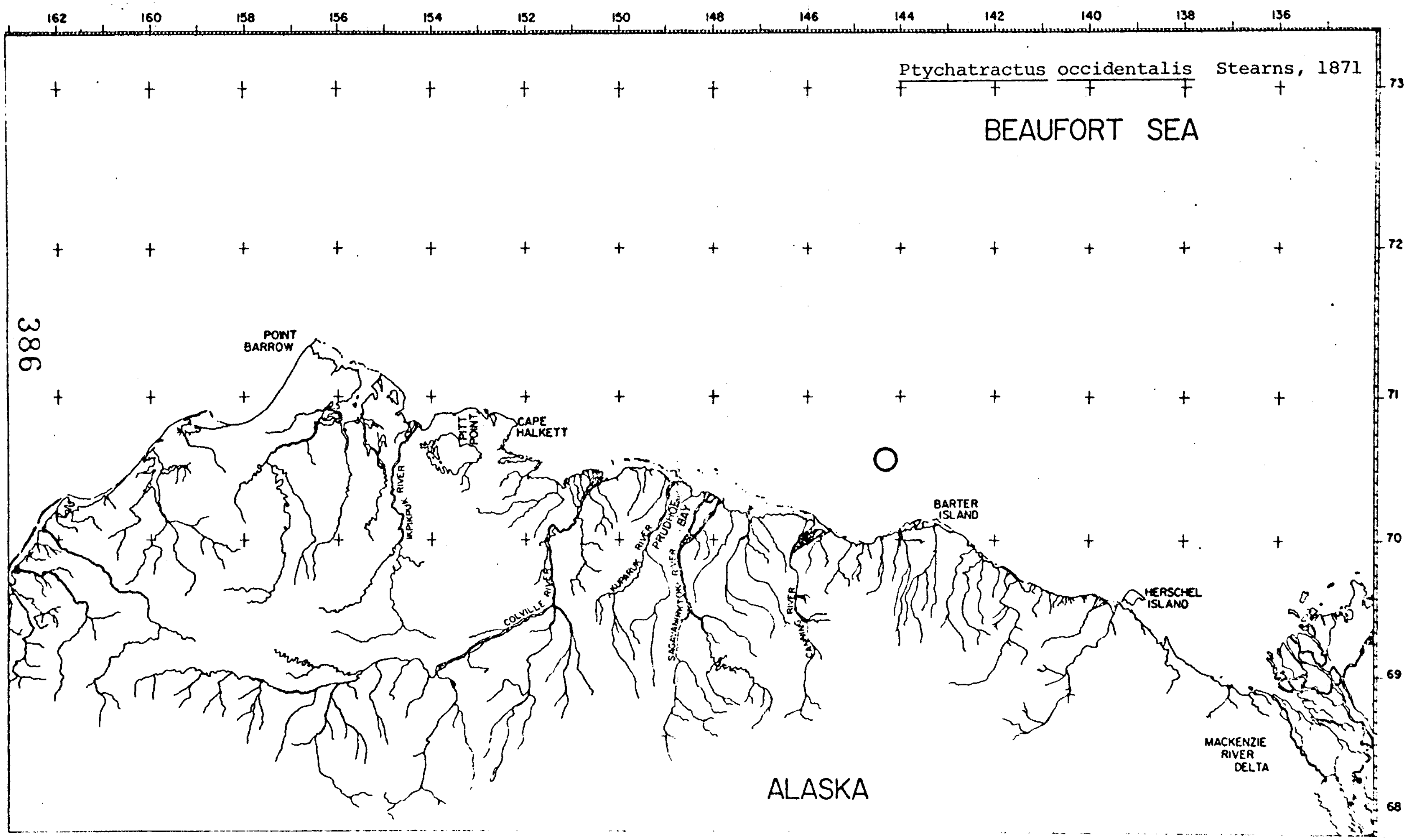


Propebela mitrula (Dall) 1919


Ptychatractus occidentalis Stearns, 1871
BEAUFORT SEA
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CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
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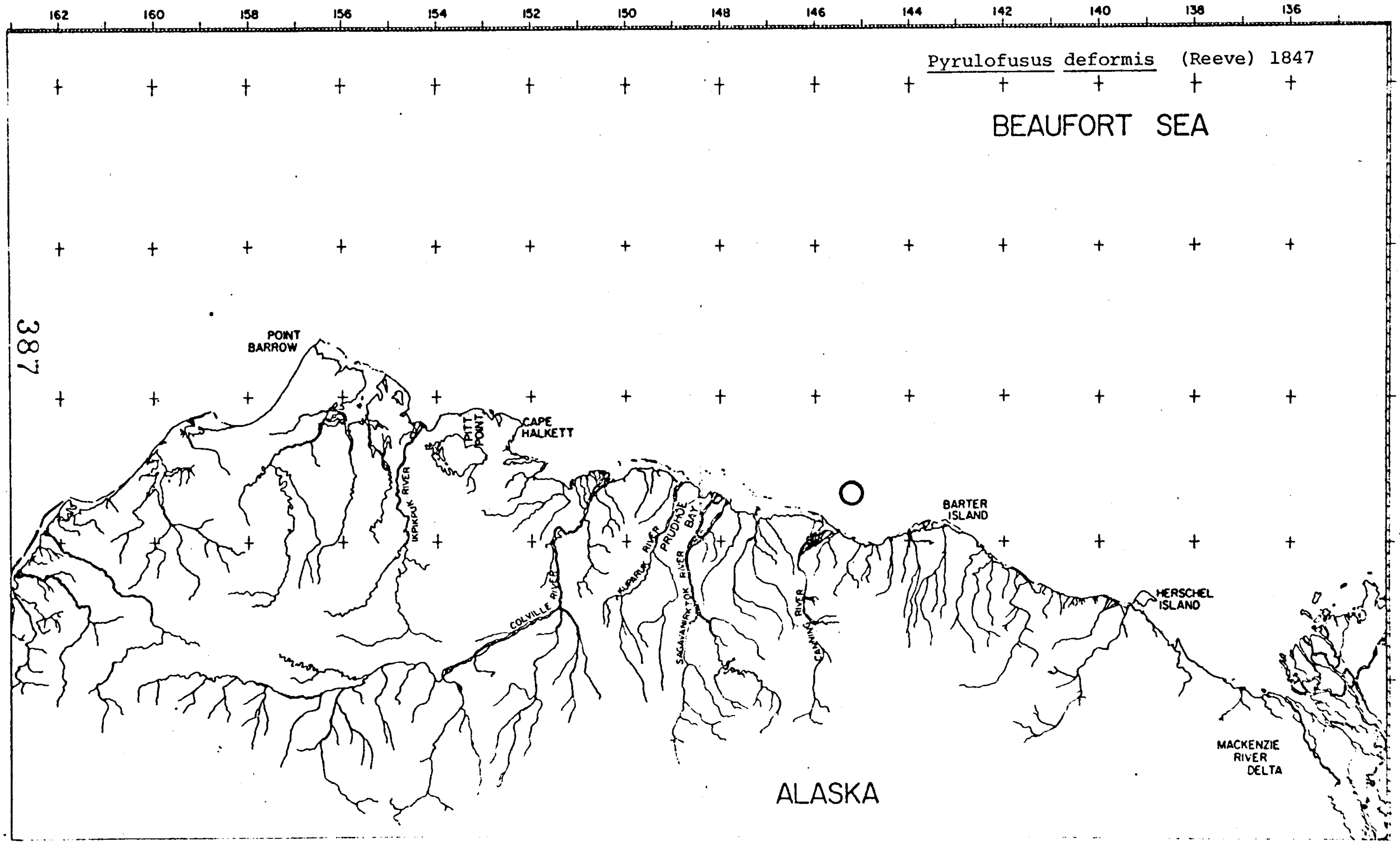

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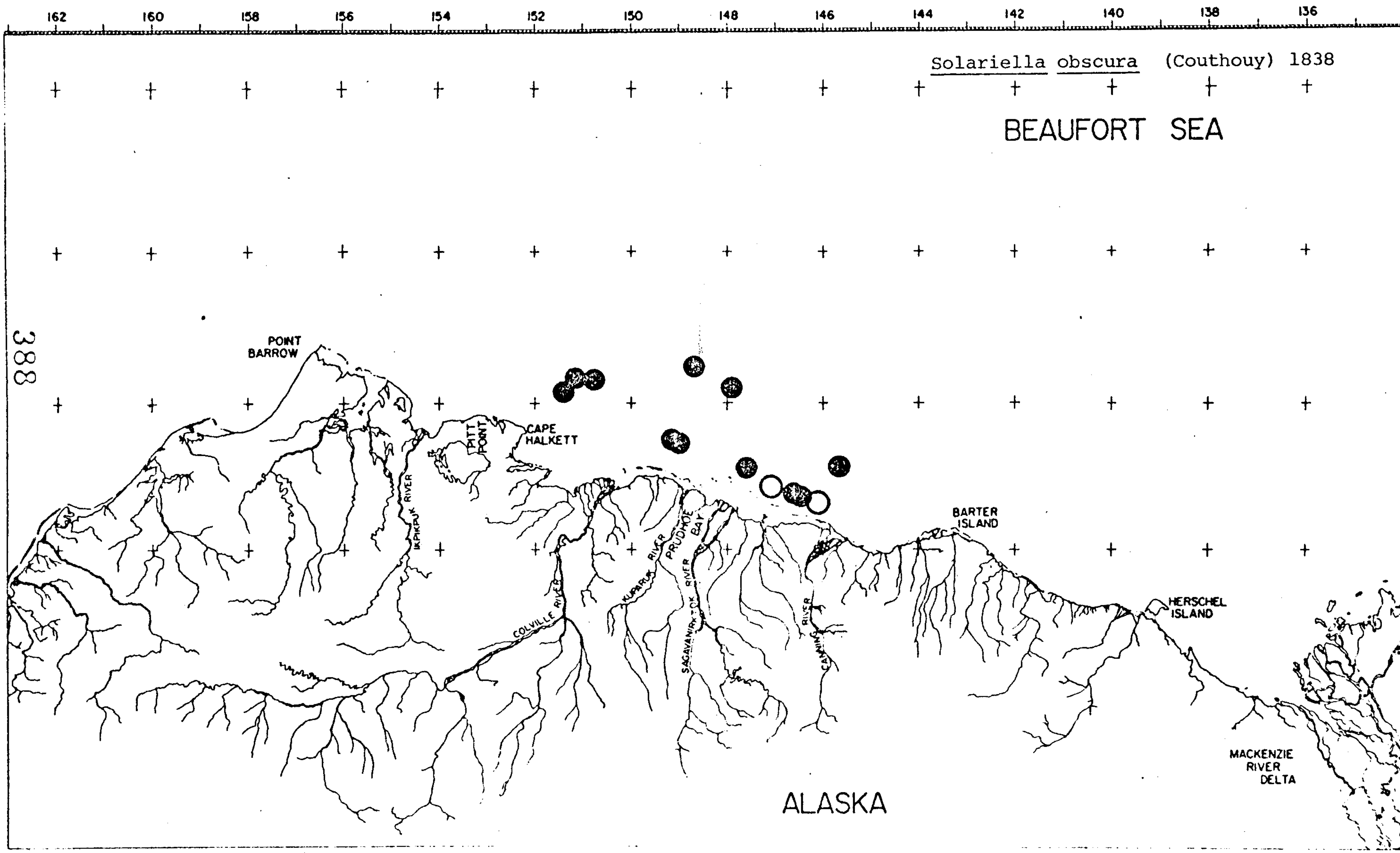

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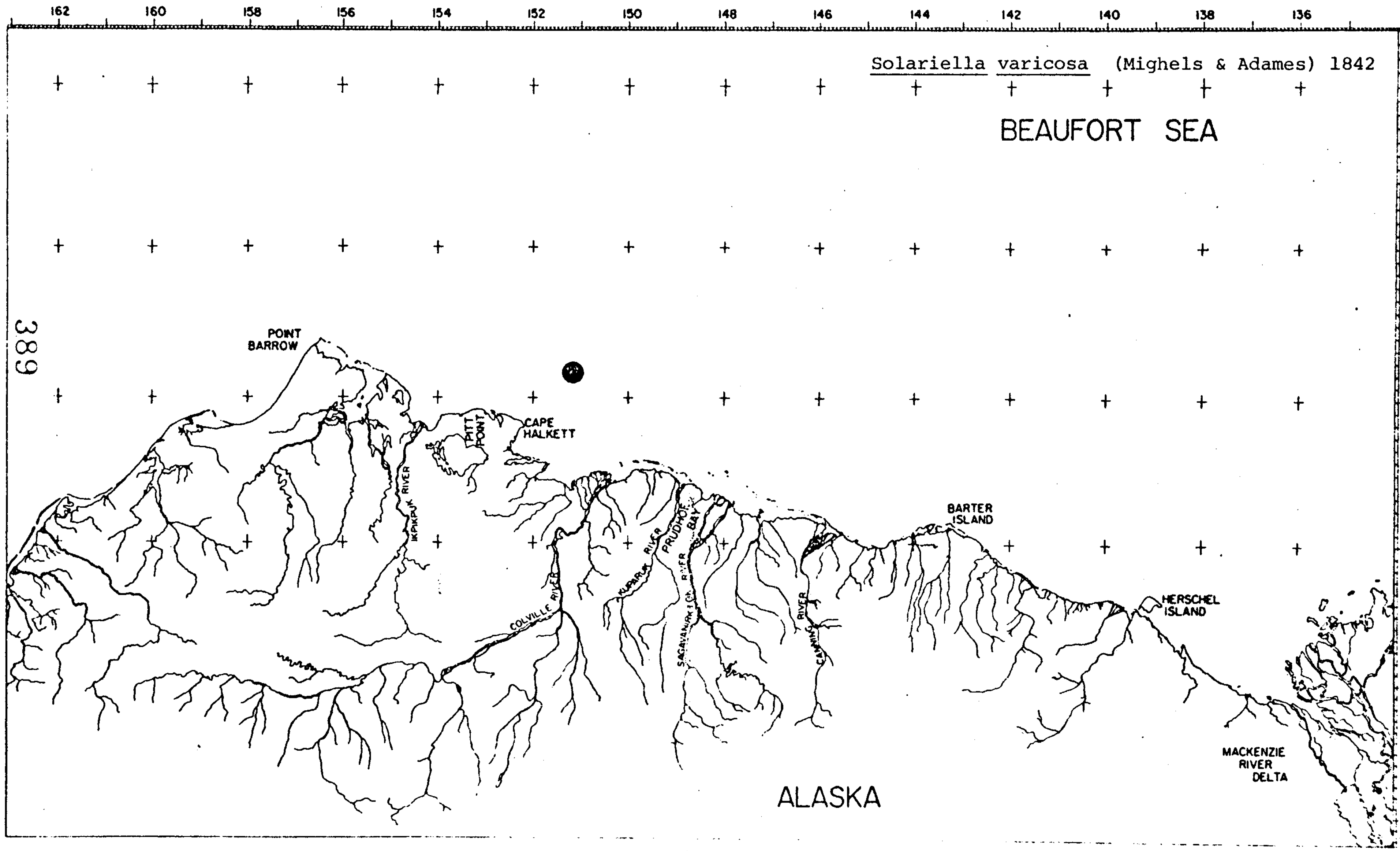

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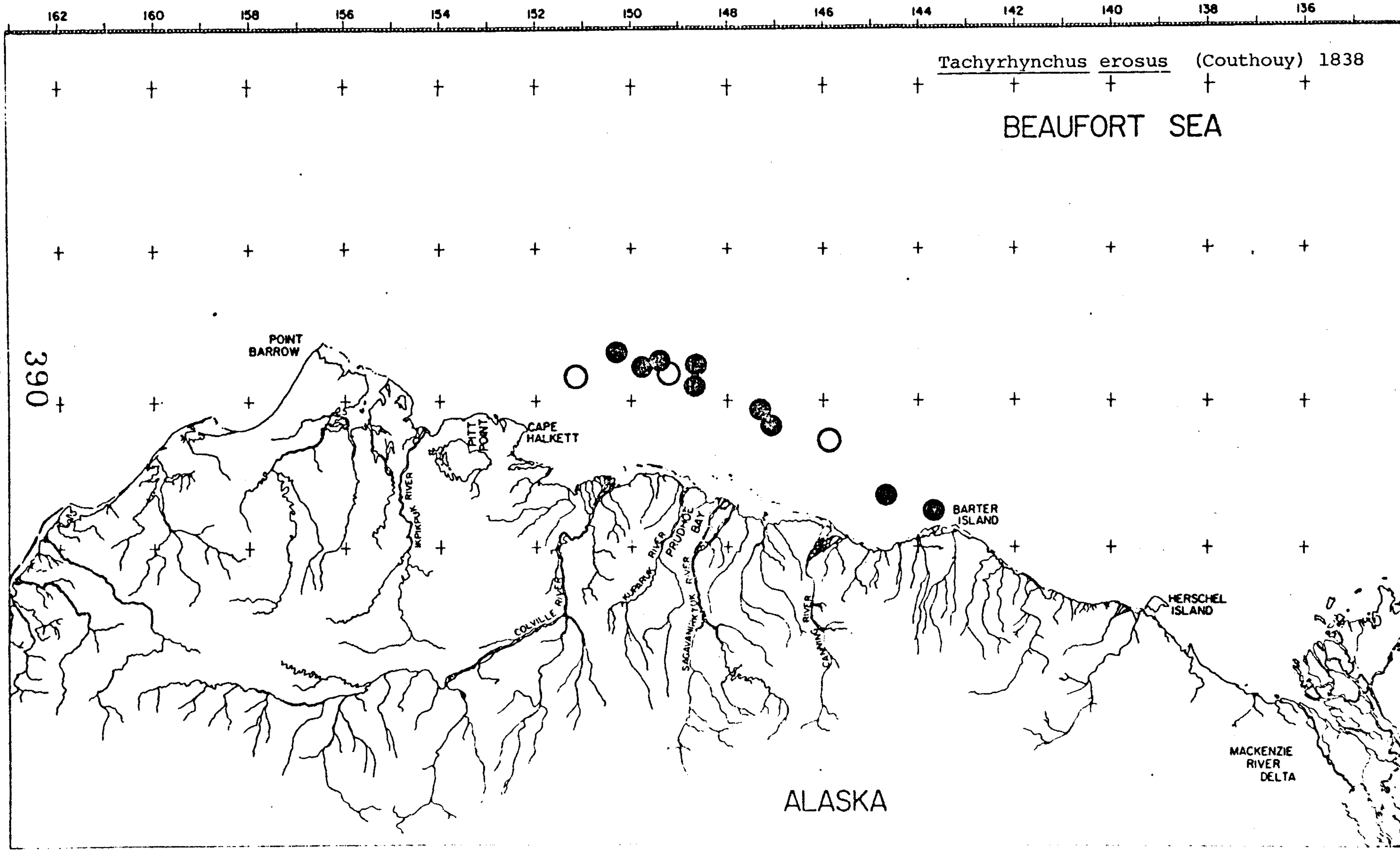
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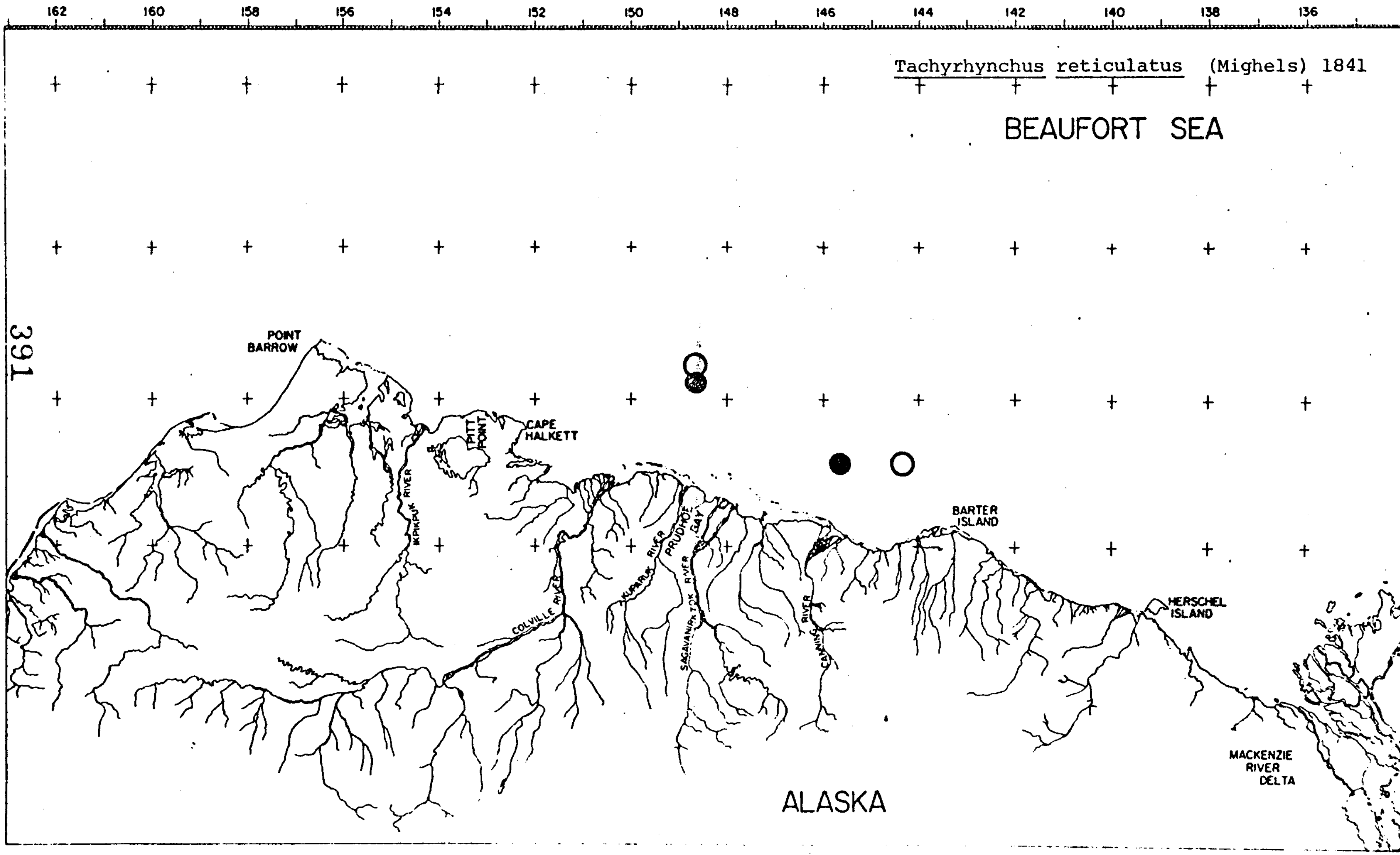
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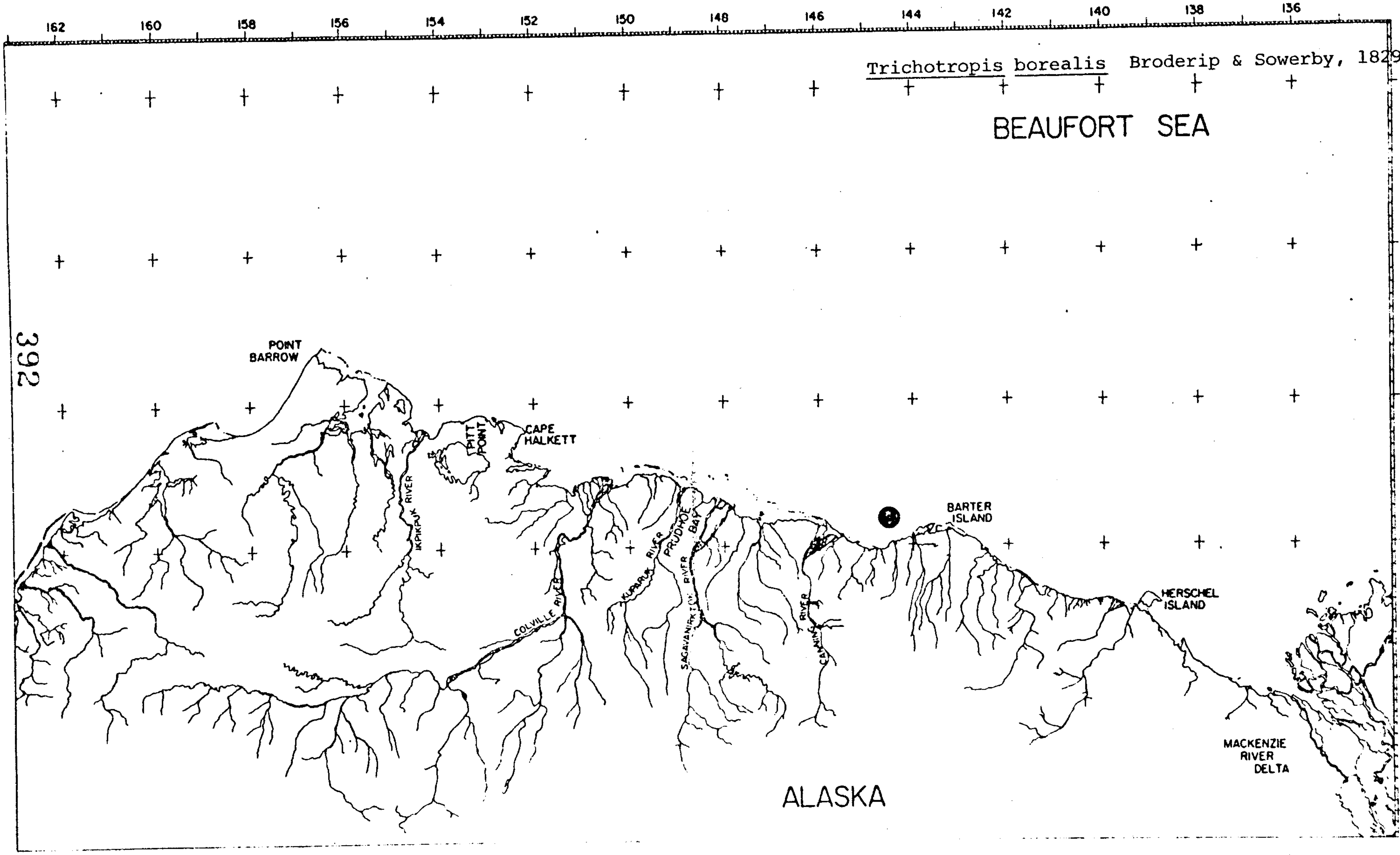
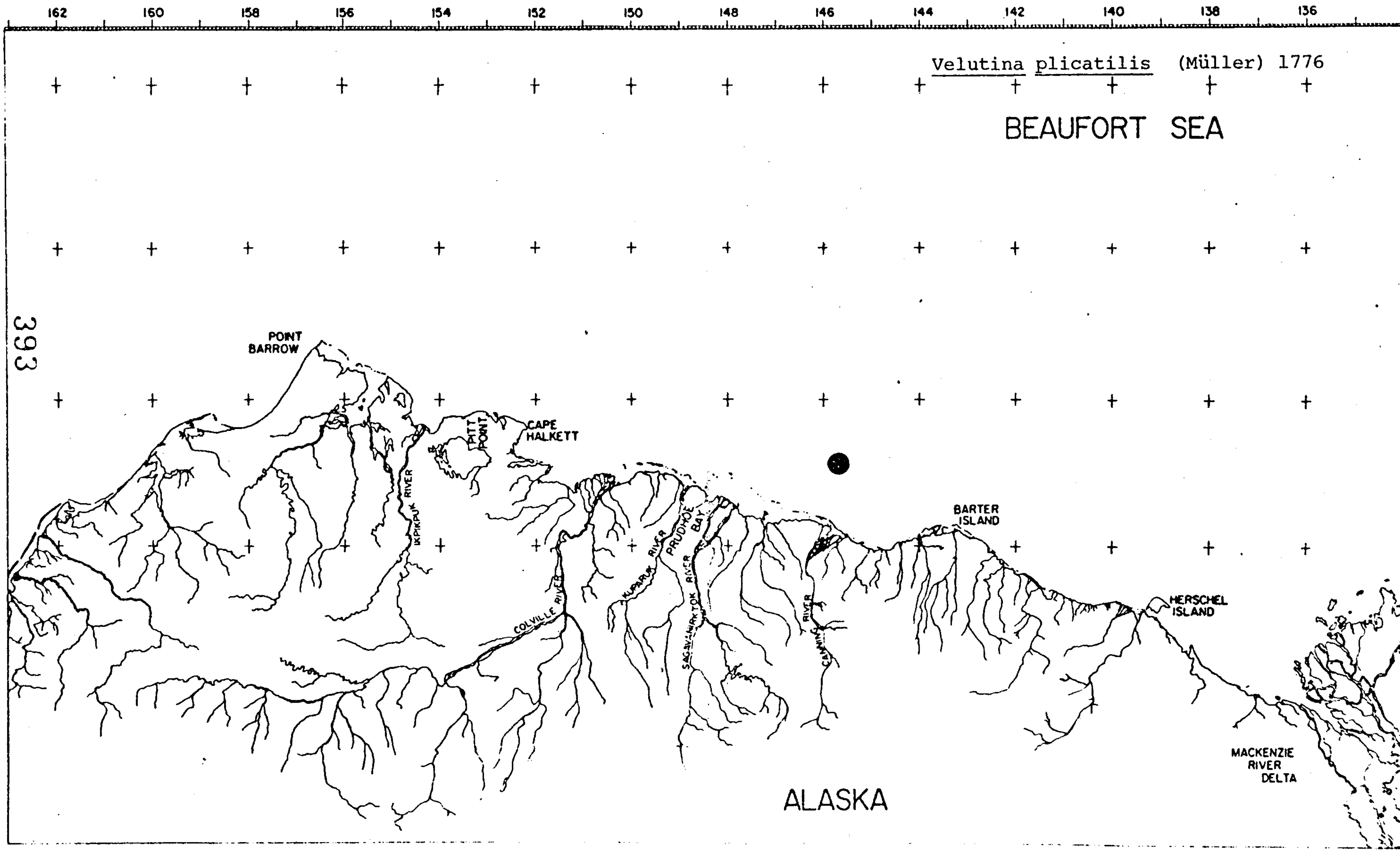


Trichotropis borealis Broderip & Sowerby, 1829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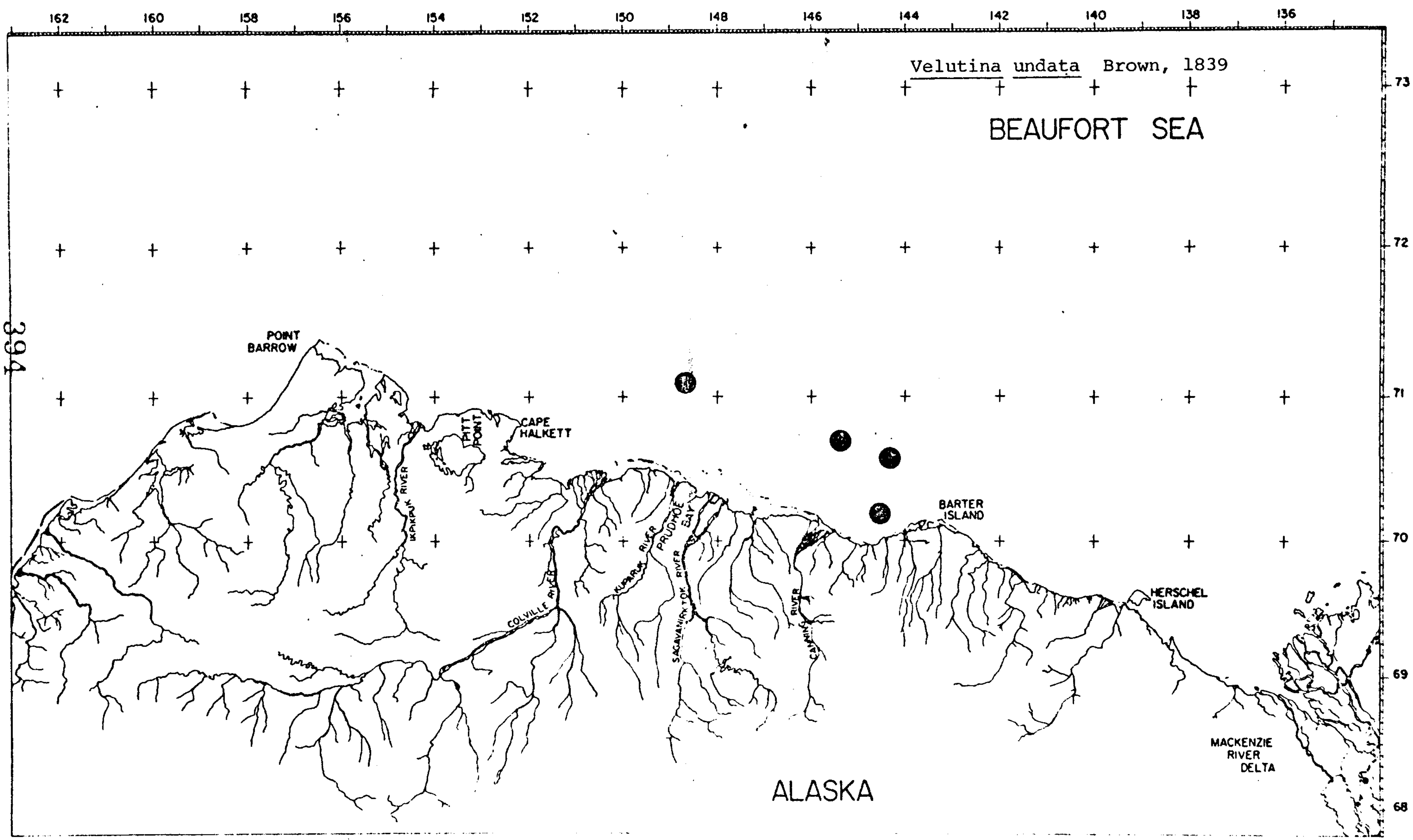

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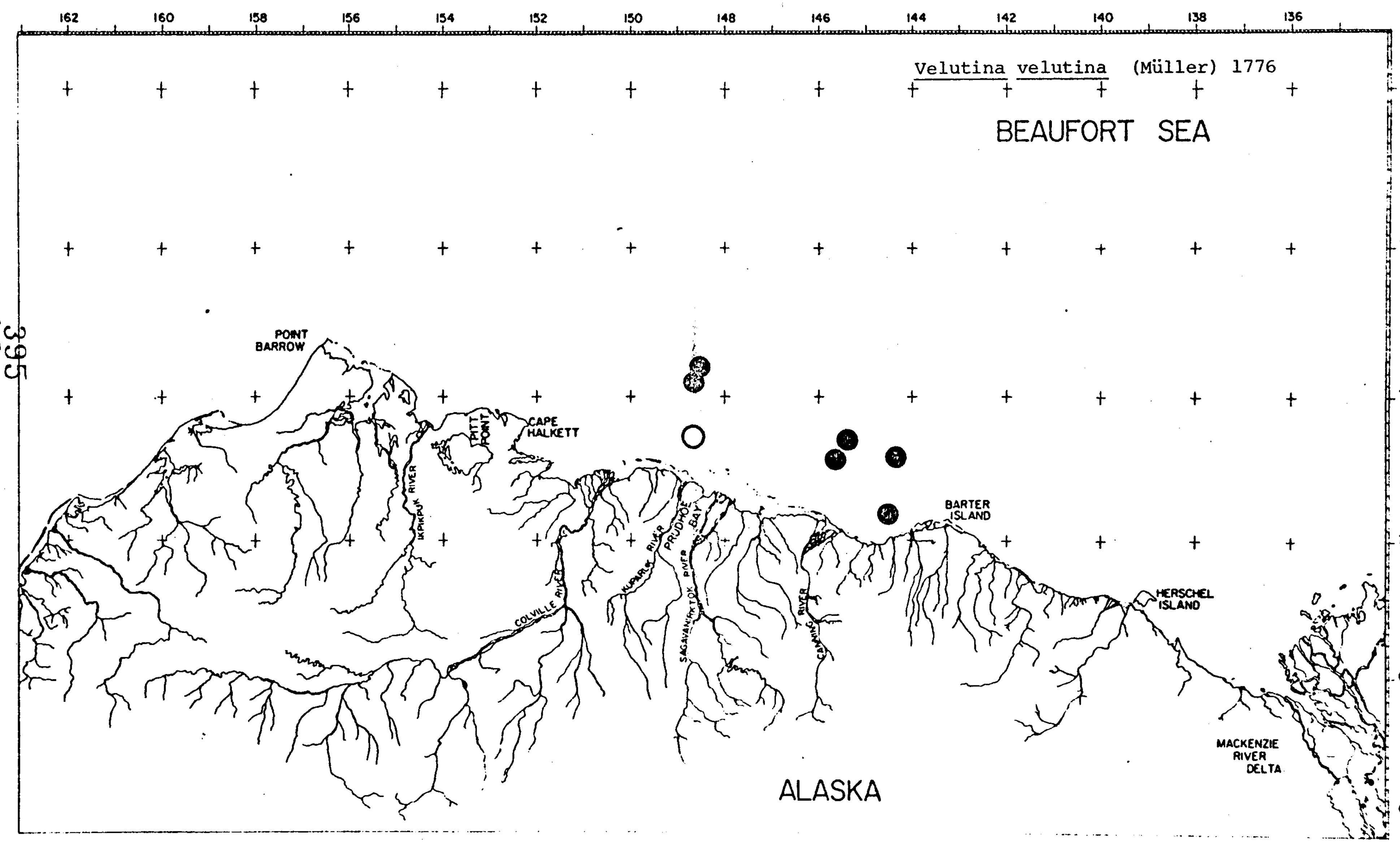
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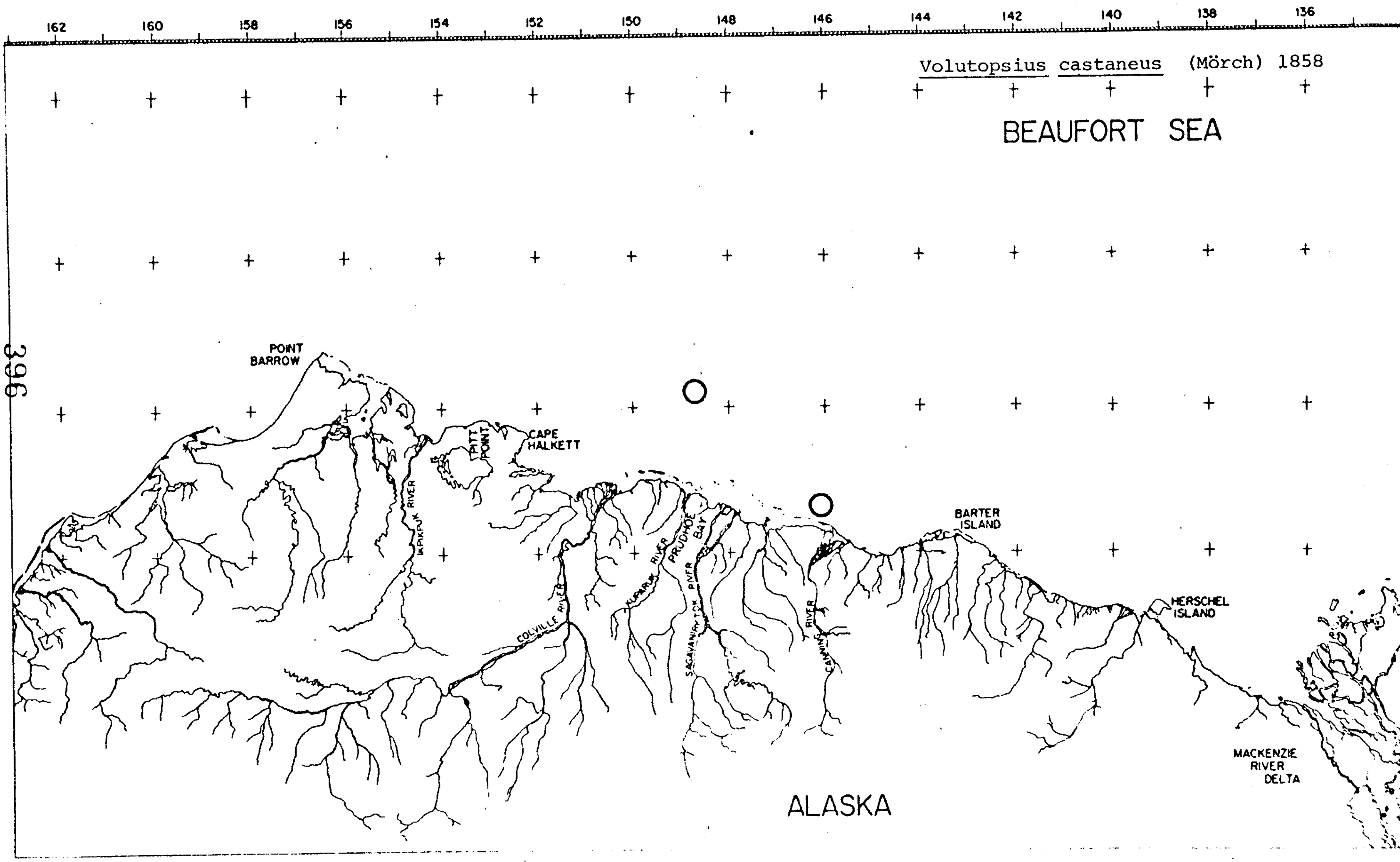
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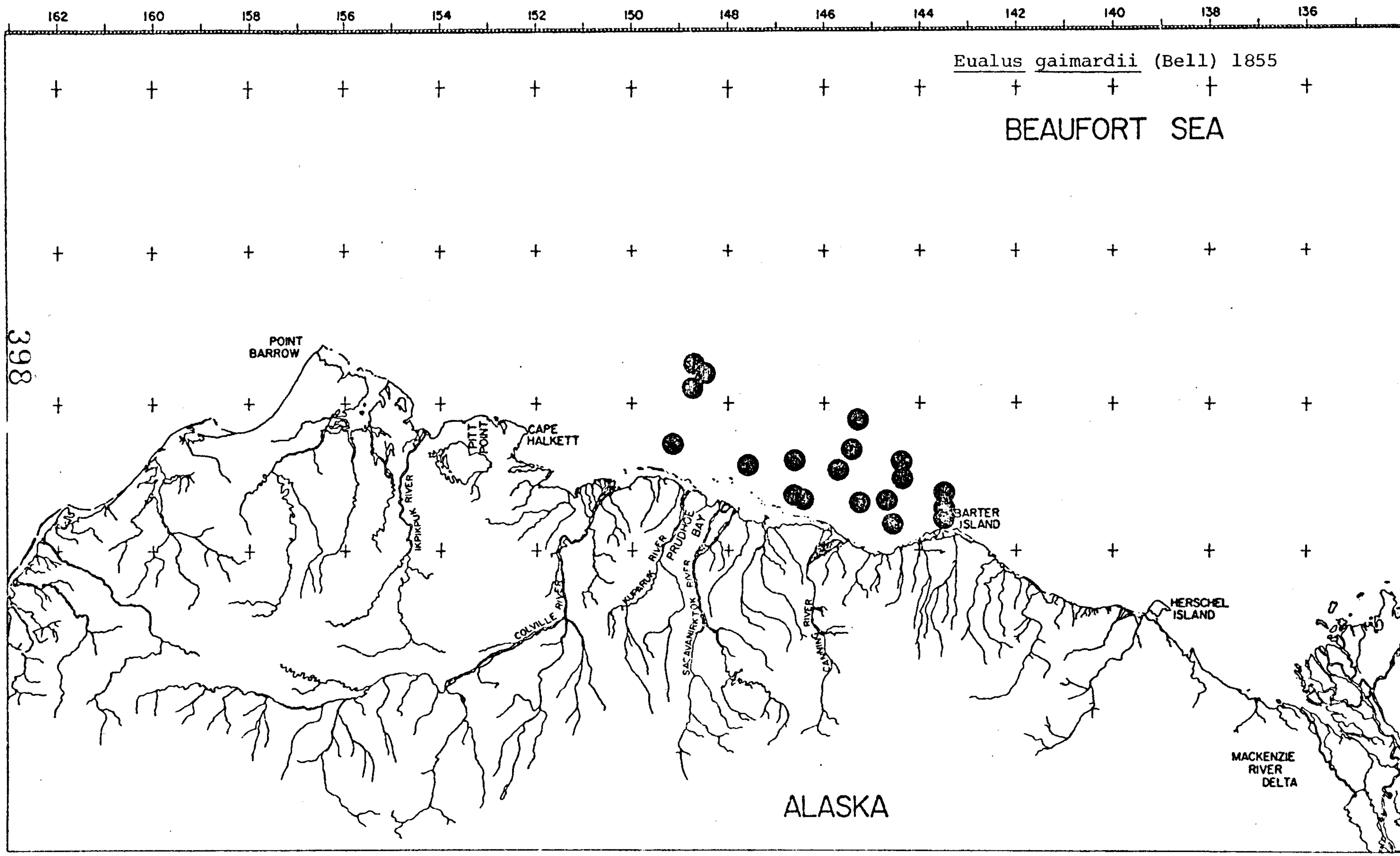
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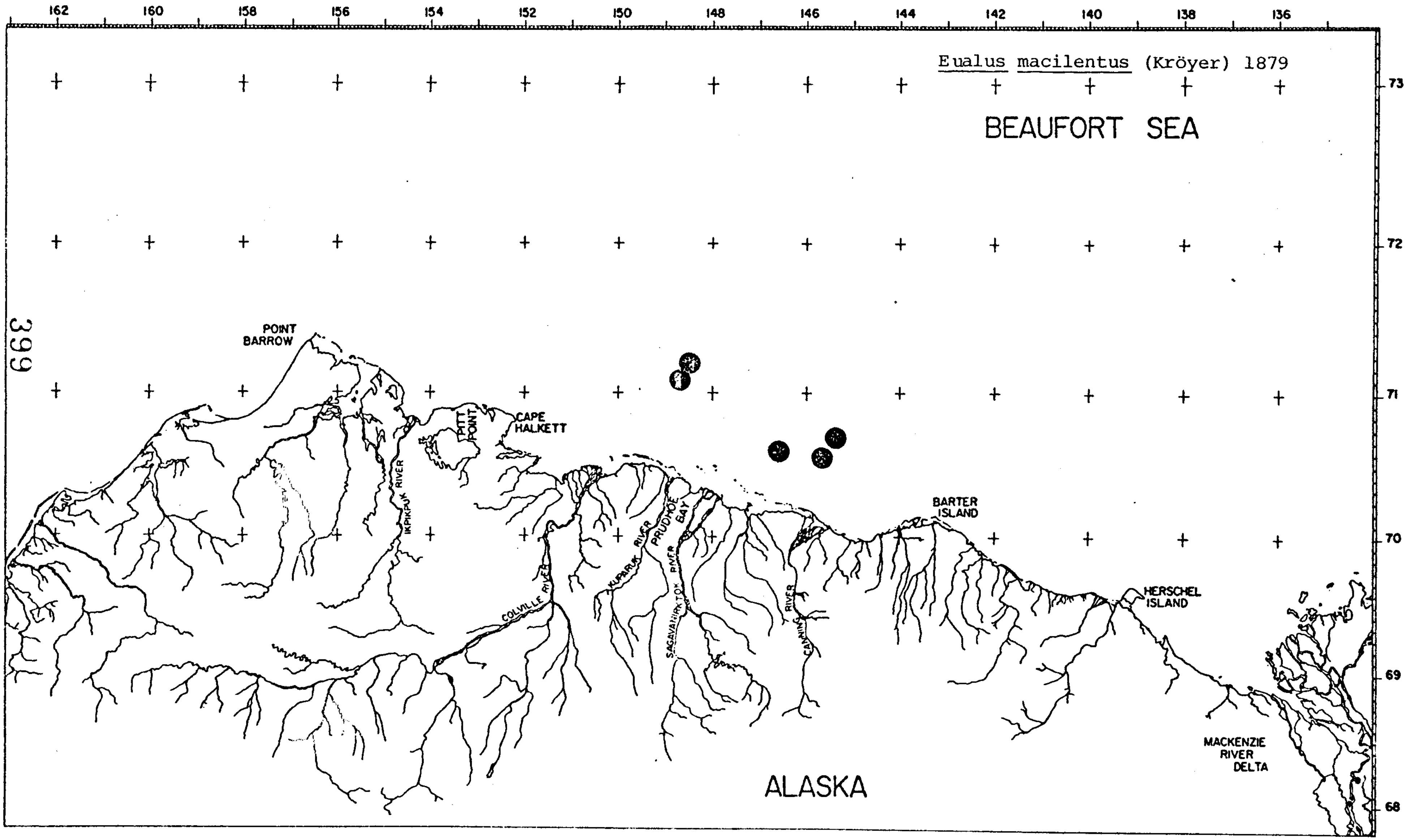
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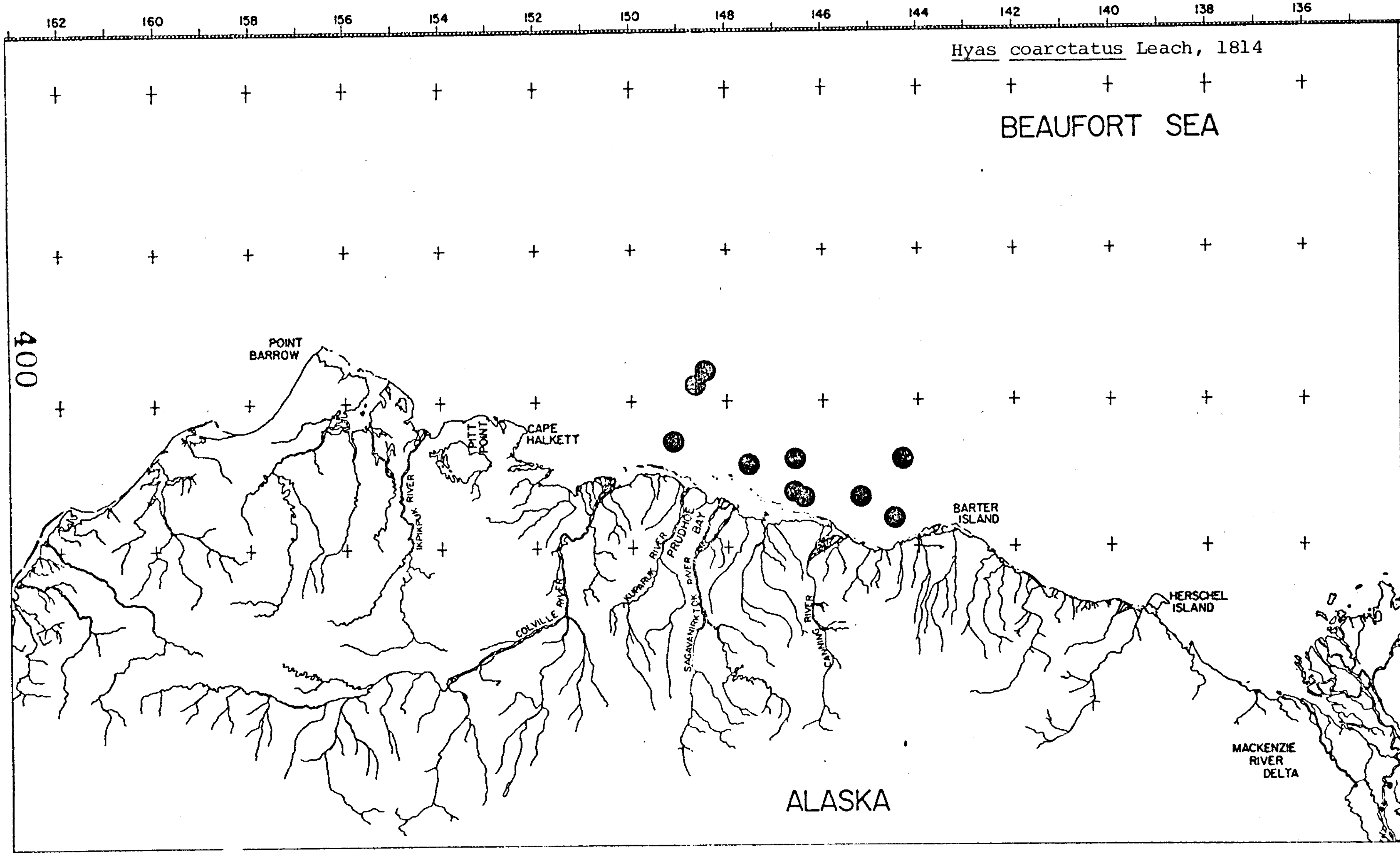

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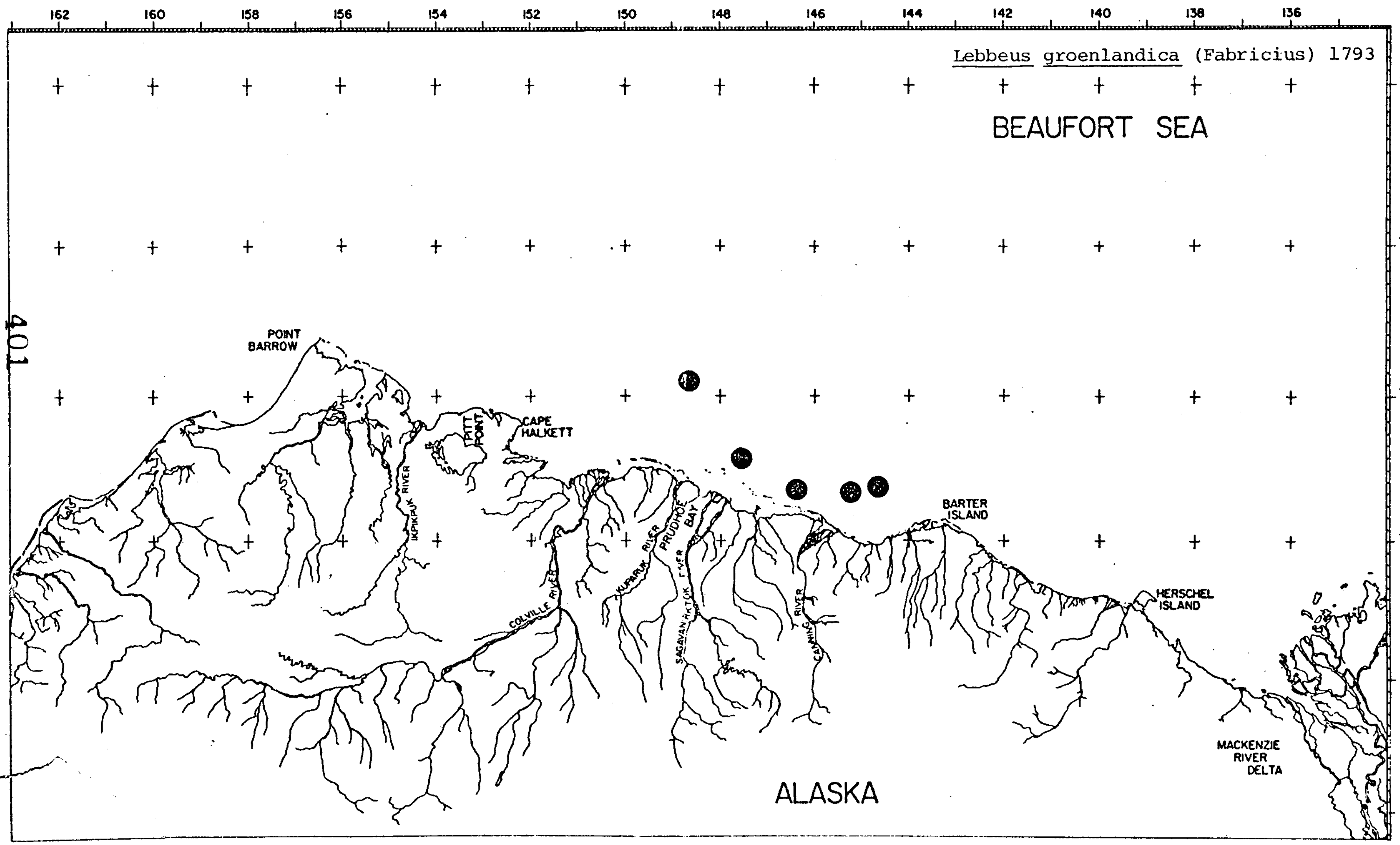
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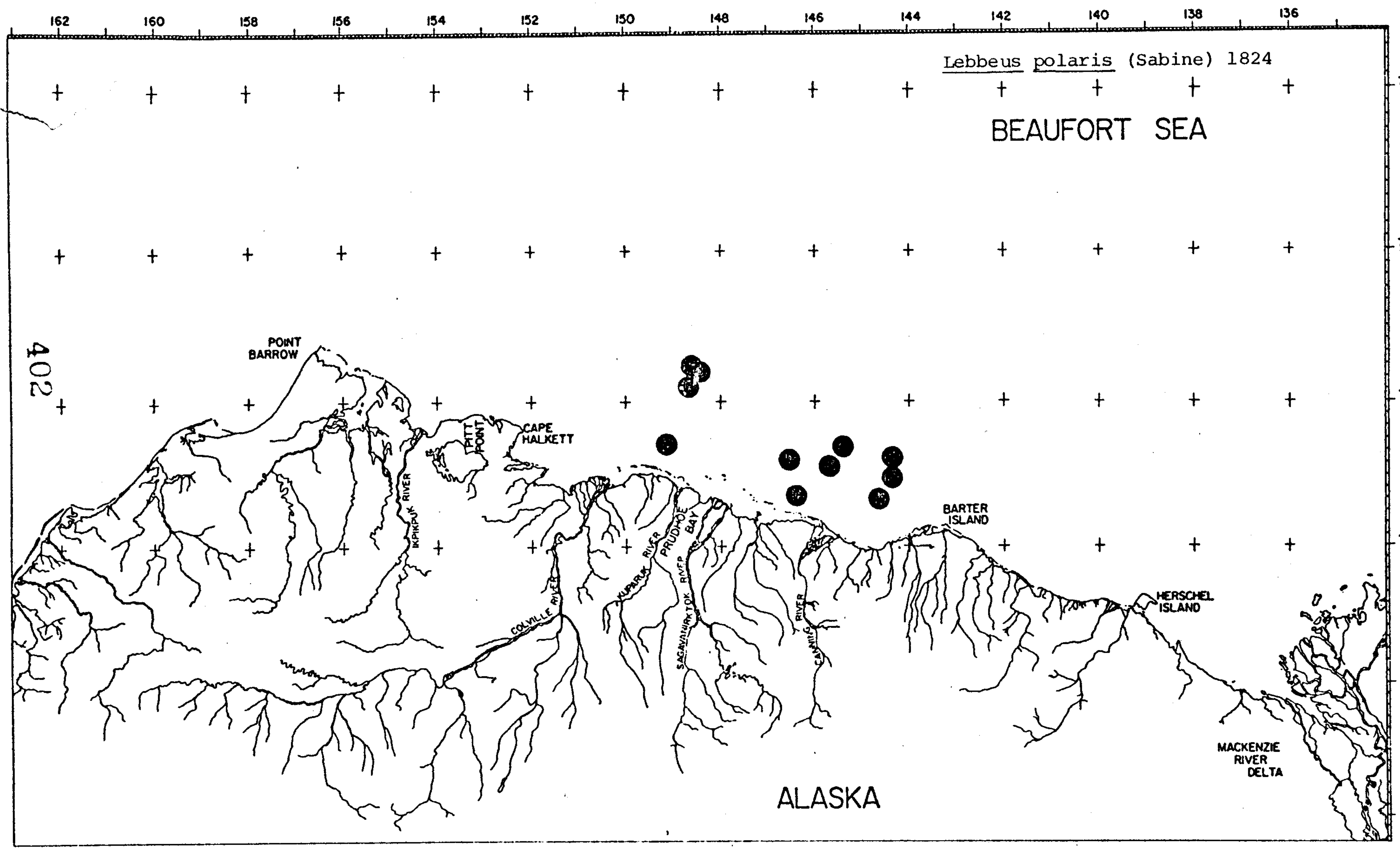
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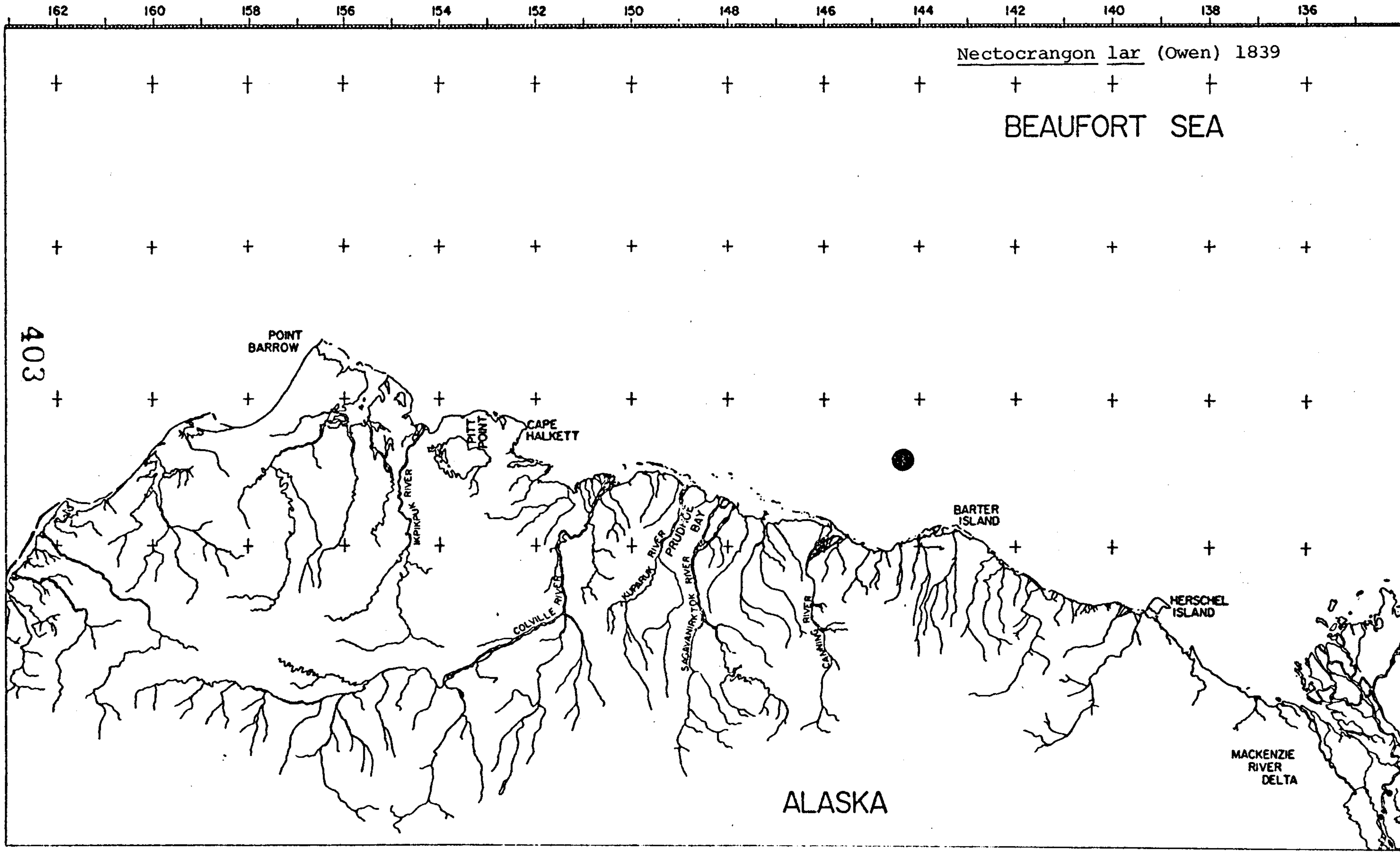
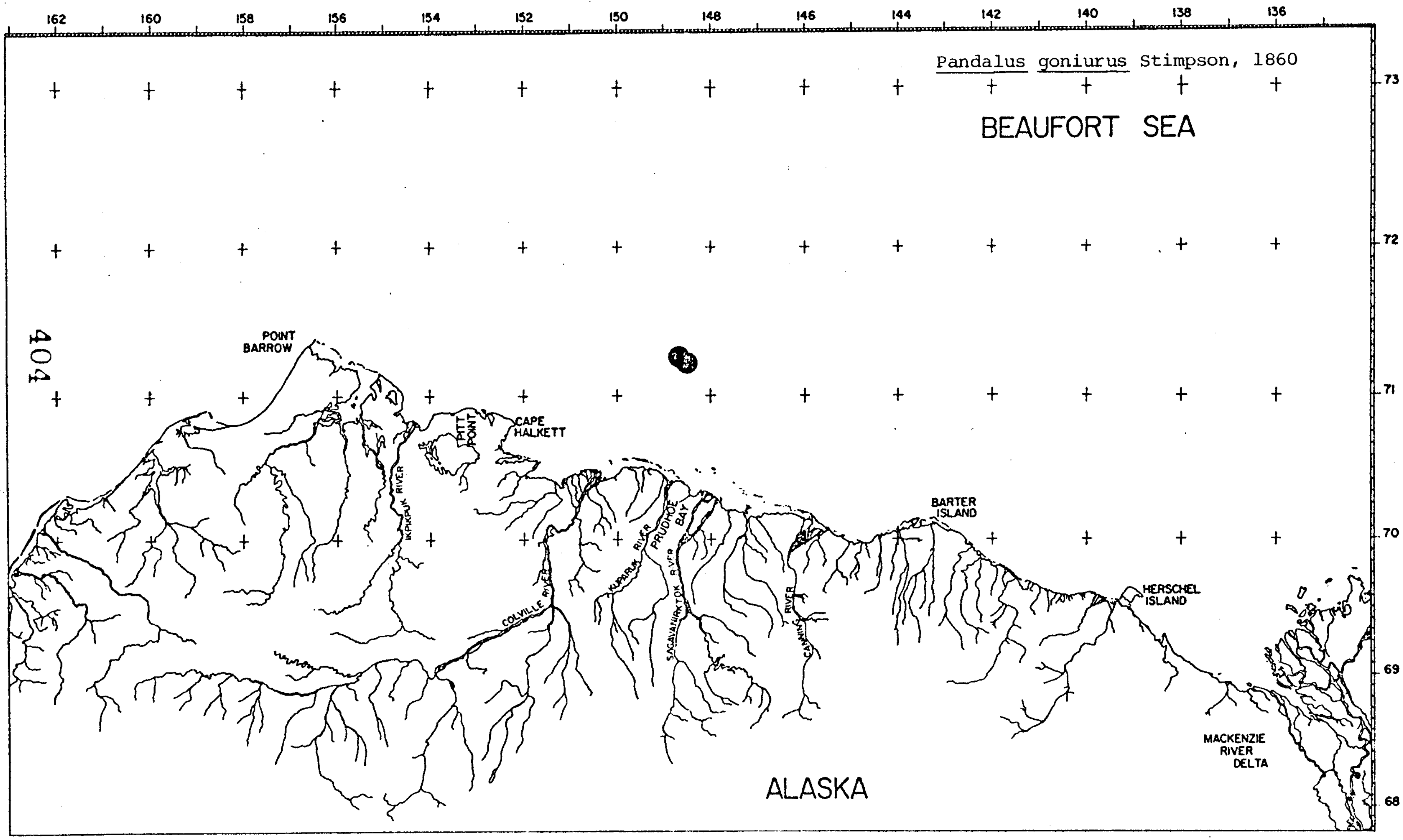


Nectocrangon lar (Owen) 1839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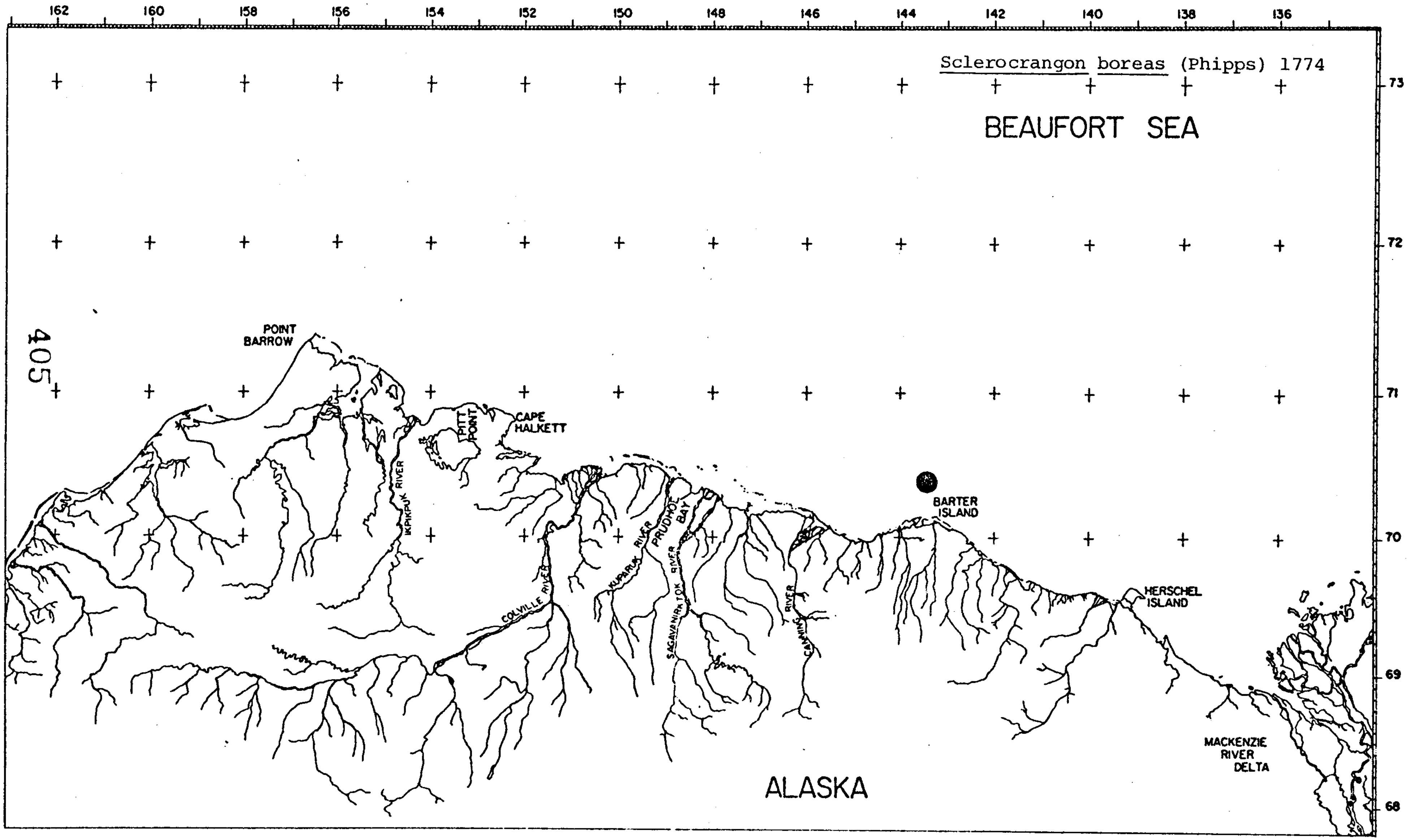
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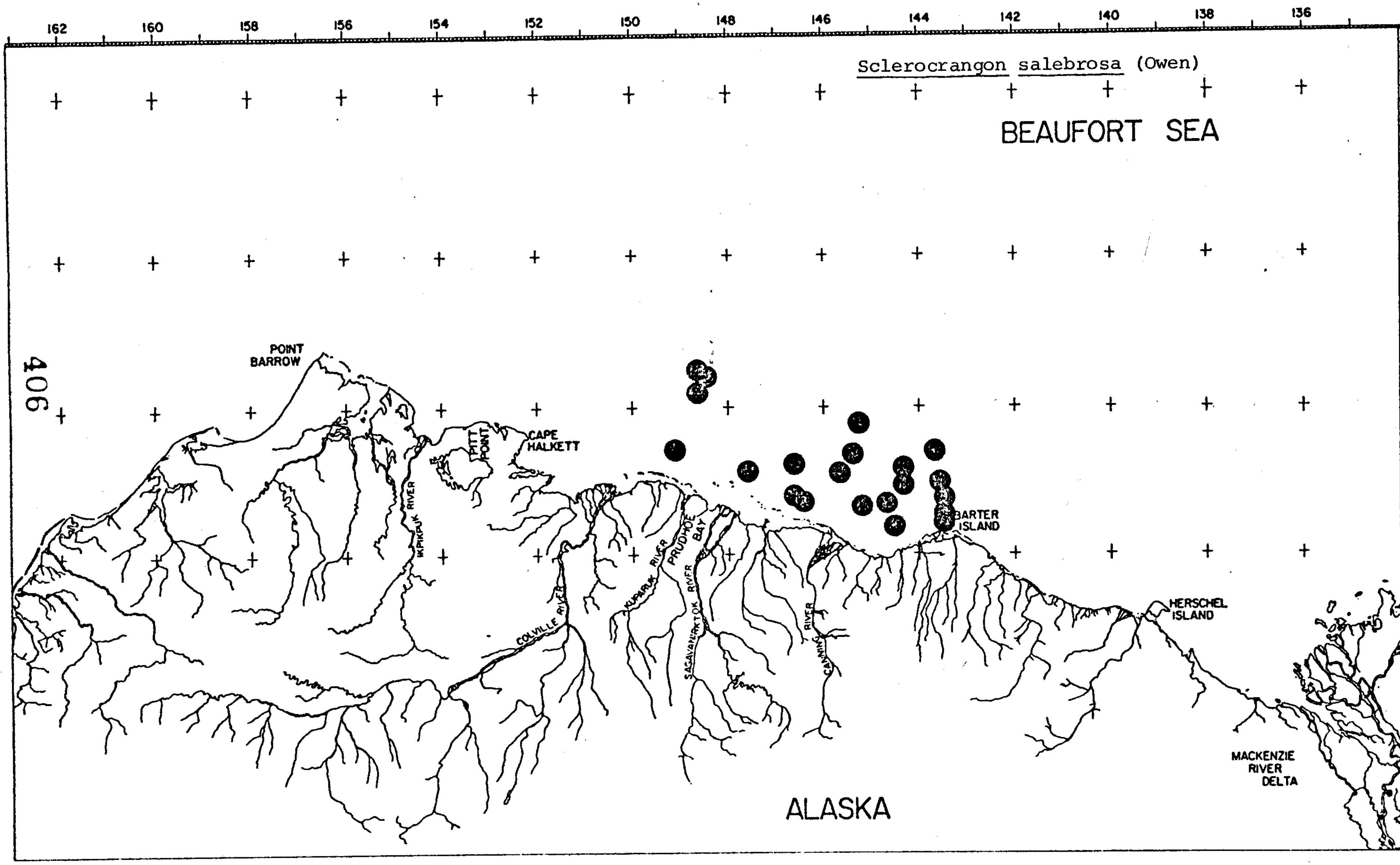

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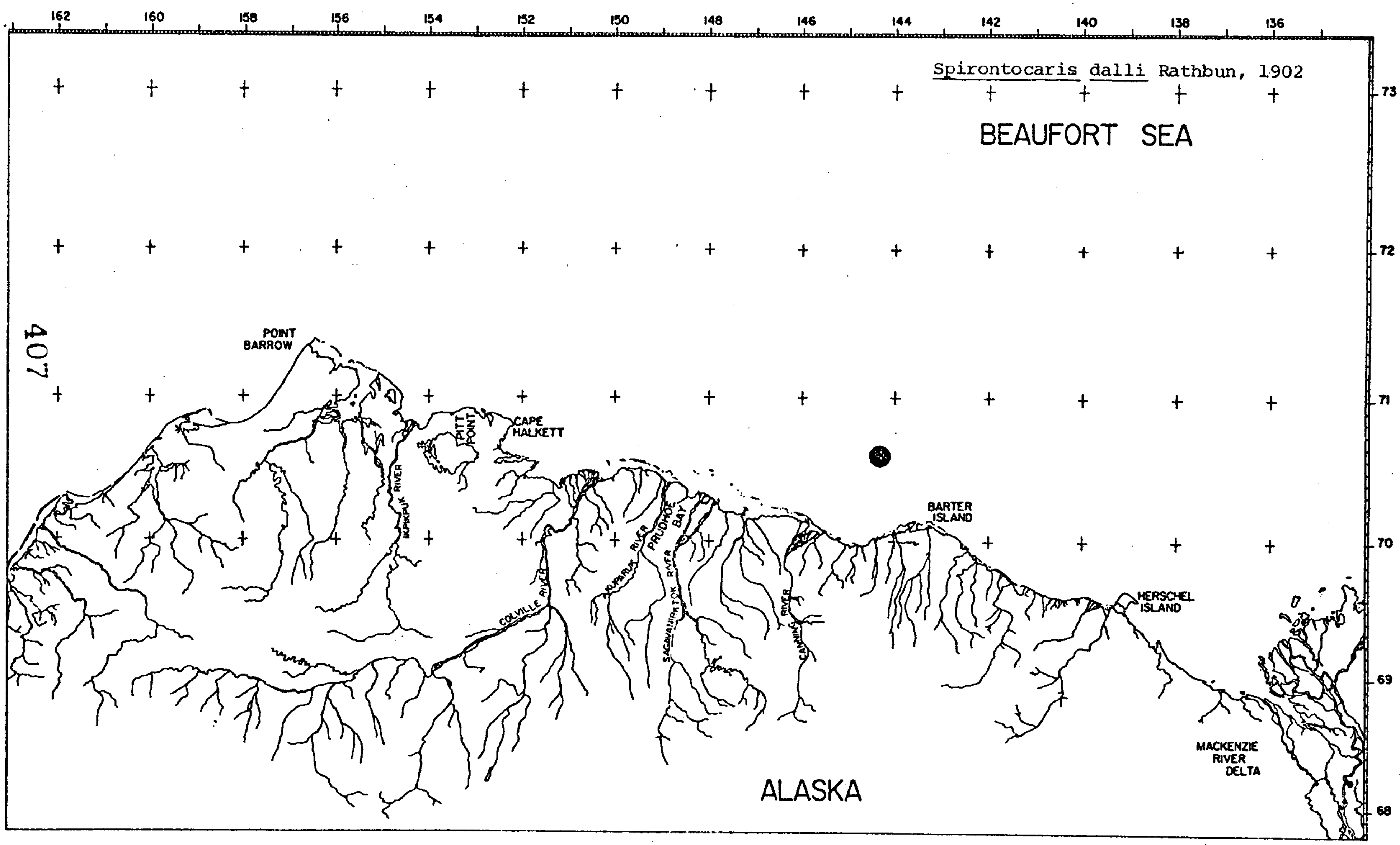
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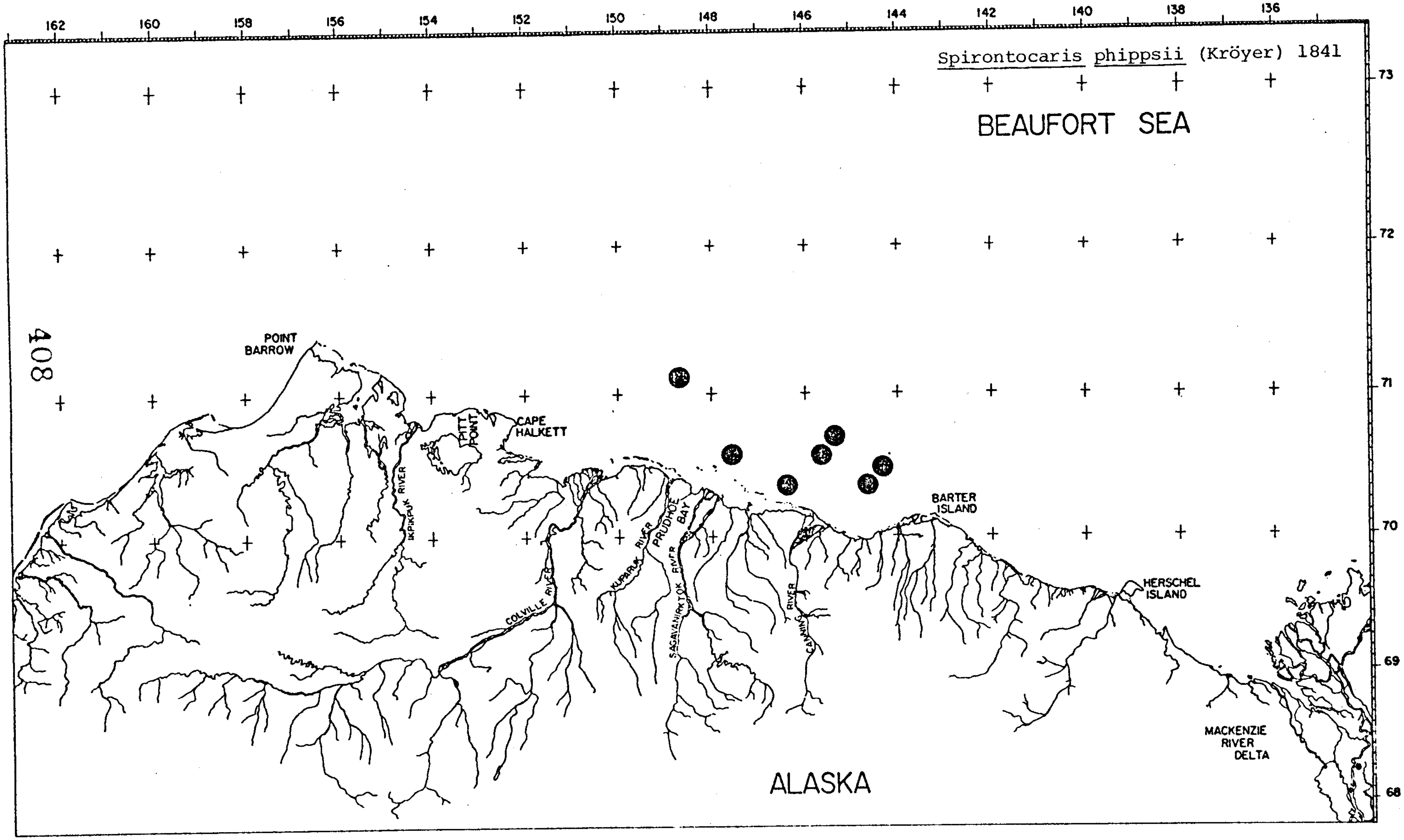

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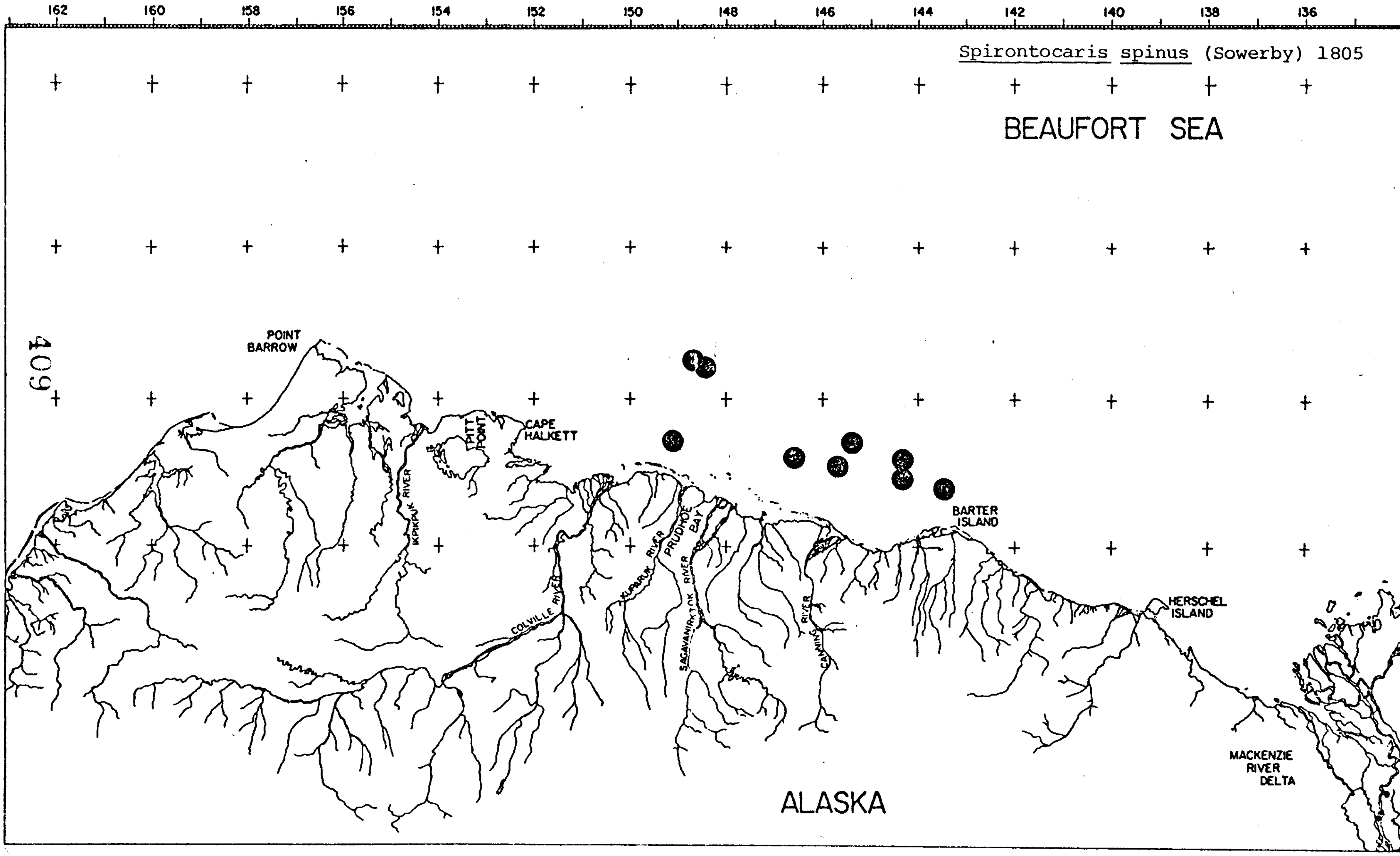

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FIRST YEARLY REPORT

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Task Order No. 4
April 1, 1975 - March 31, 1976
Pages 1 - 444

Summarization of existing literature and unpublished data on the distribution, abundance, and life histories of benthic organisms

Andrew G. Carey, Jr., Principal Investigator
School of Oceanography
Oregon State University
Corvallis, Oregon 97331

March 22, 1976

This is an interim report which presents preliminary information for the use of the Outer Continental Shelf Energy Program (OCSEP). No material contained may be quoted in external reports without written permission from the OCSEP Project Office and the principal investigator.

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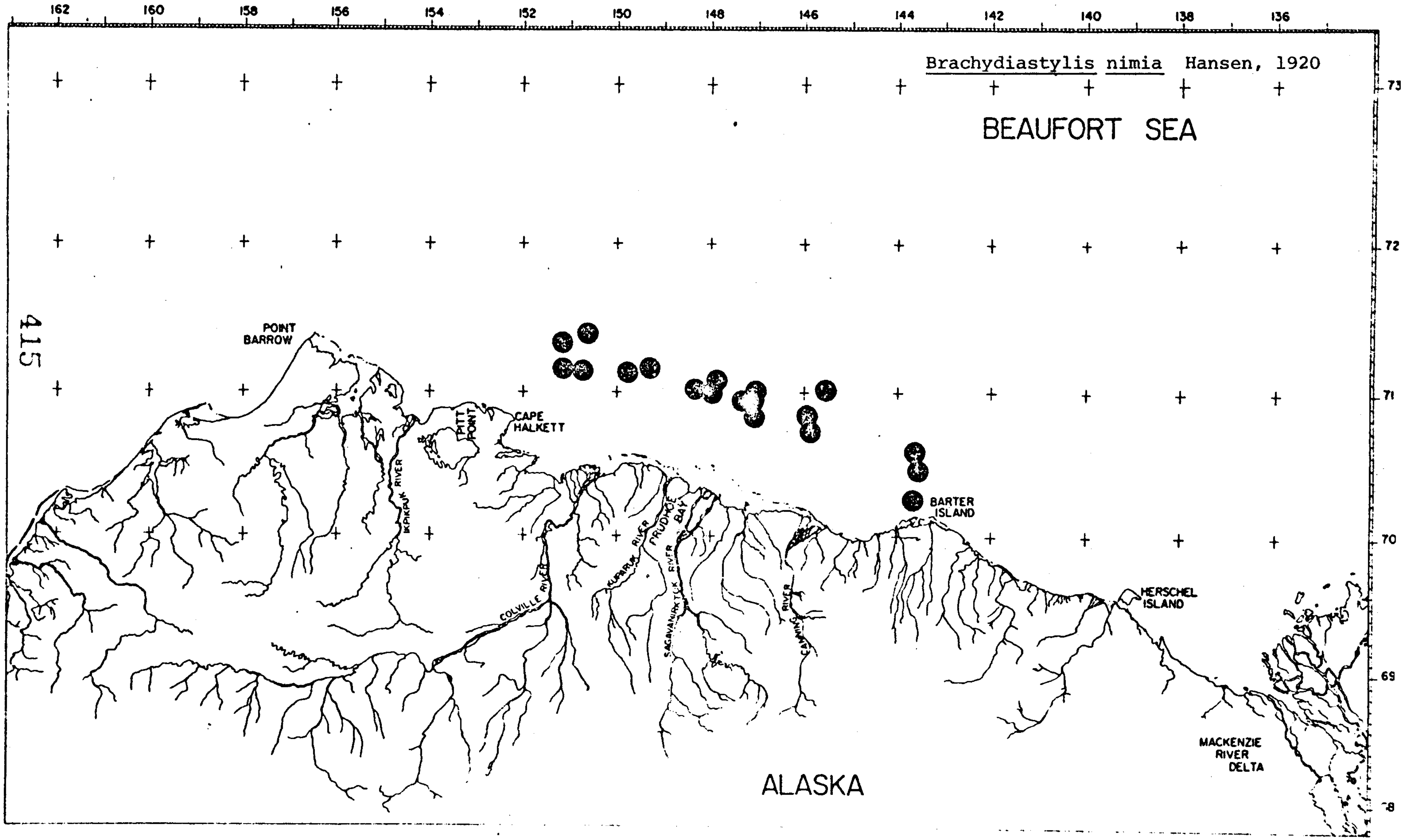
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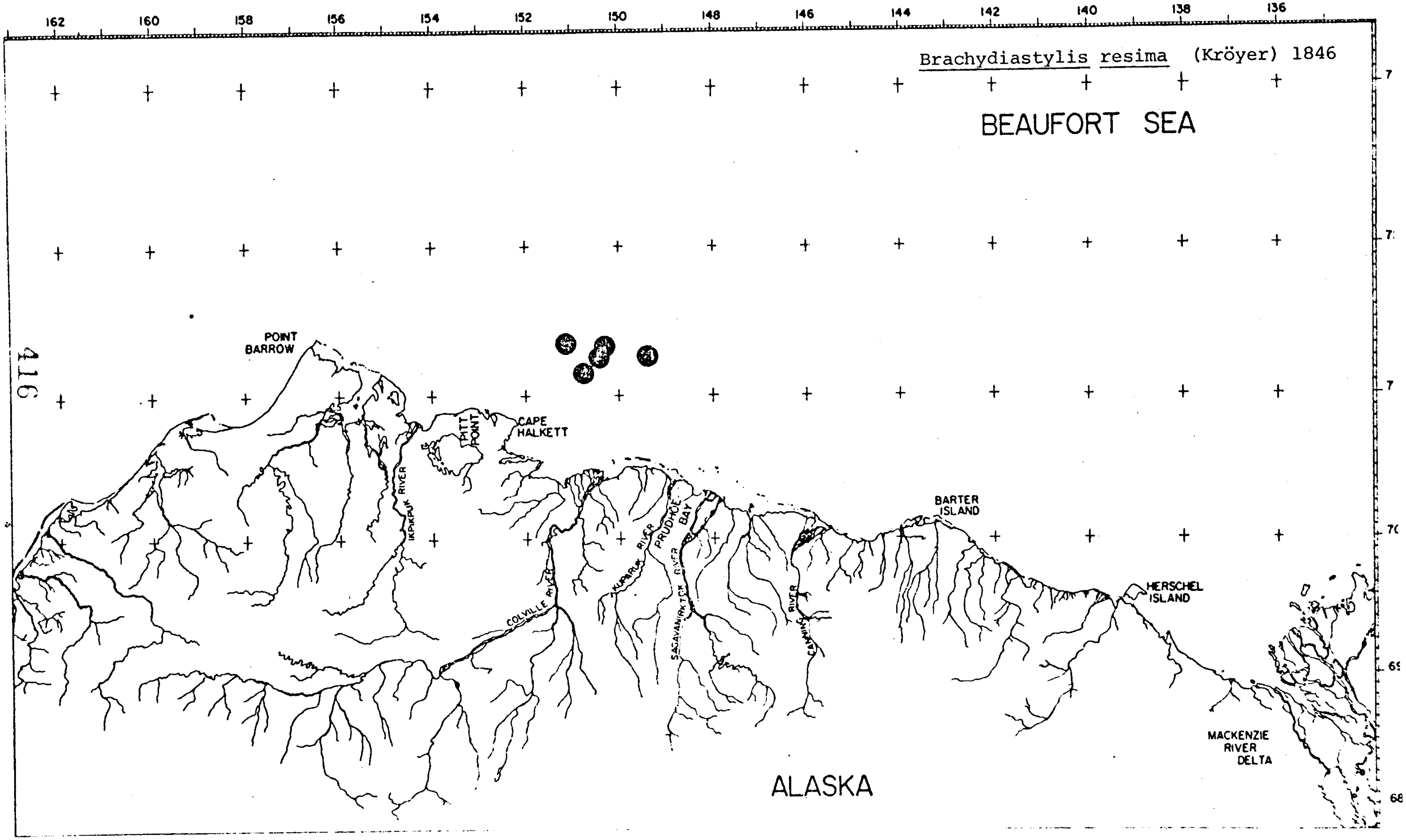
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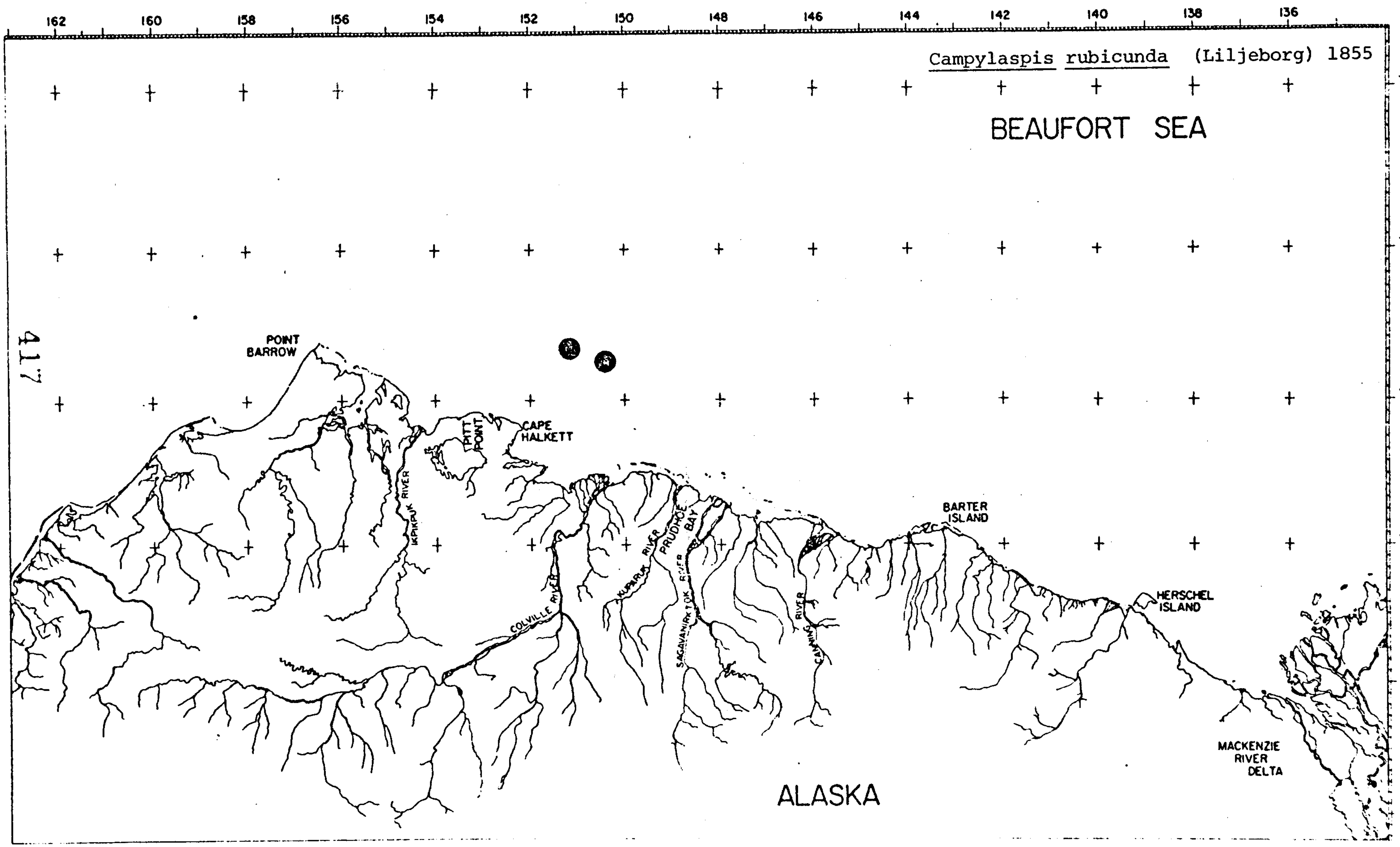

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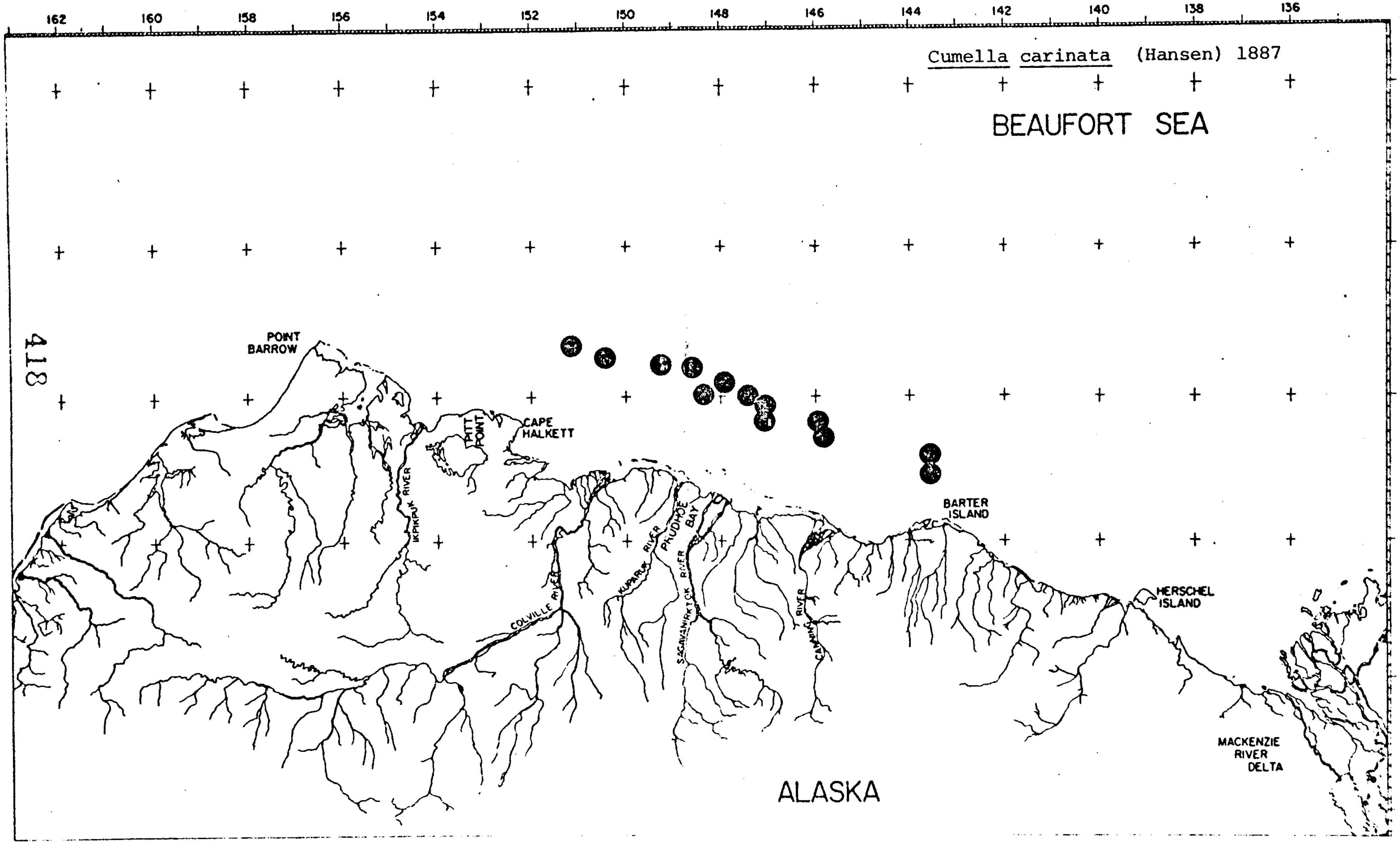

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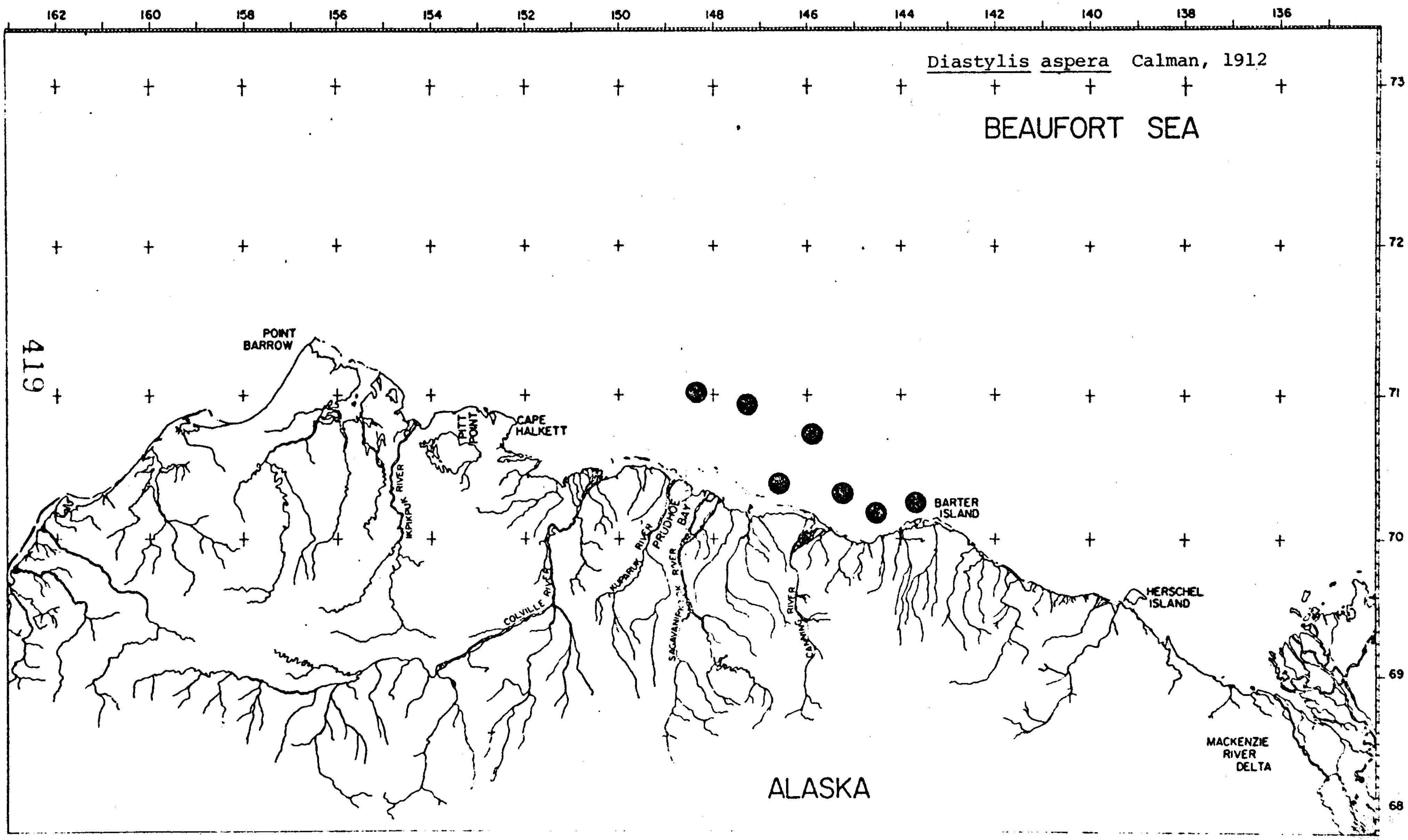
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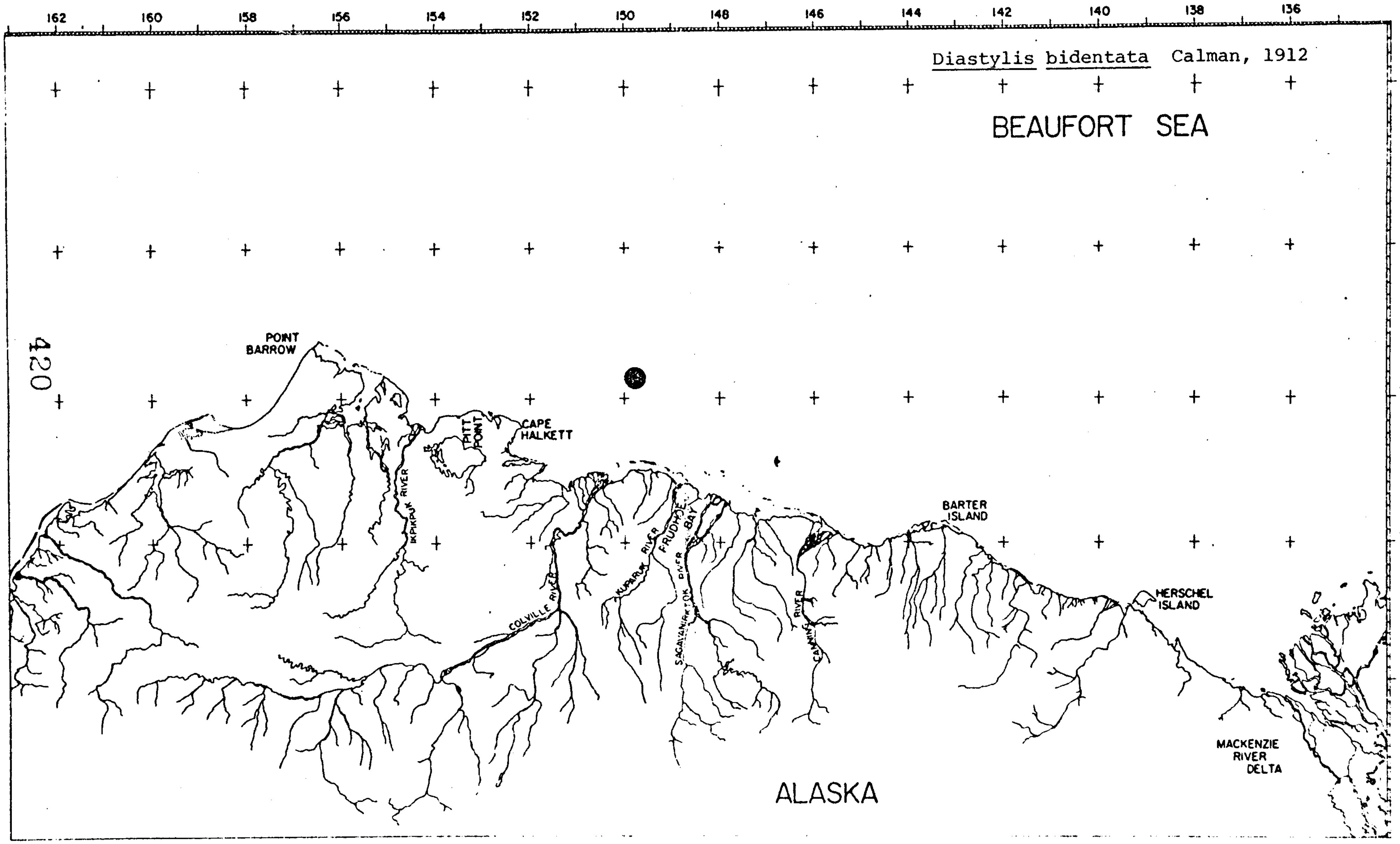
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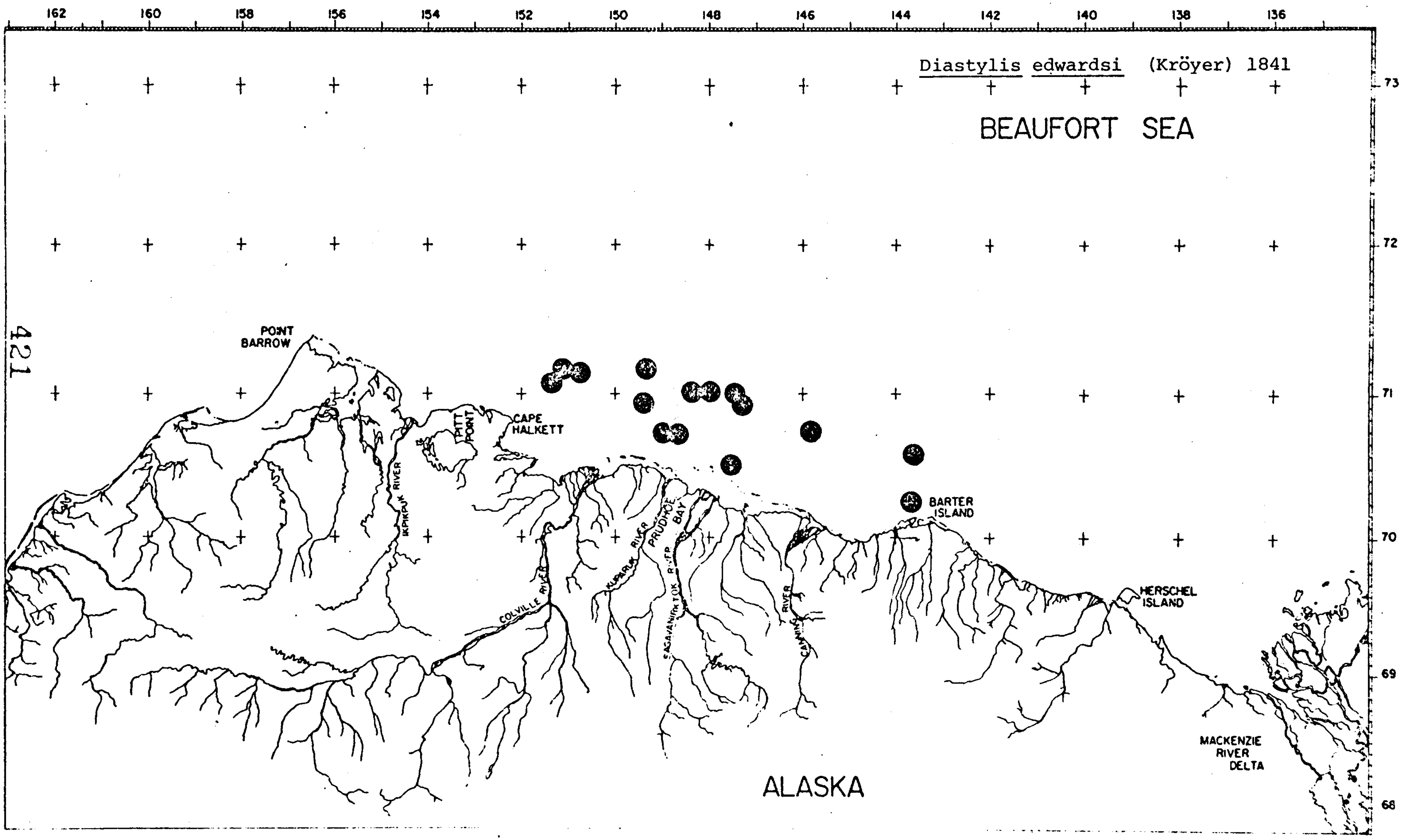
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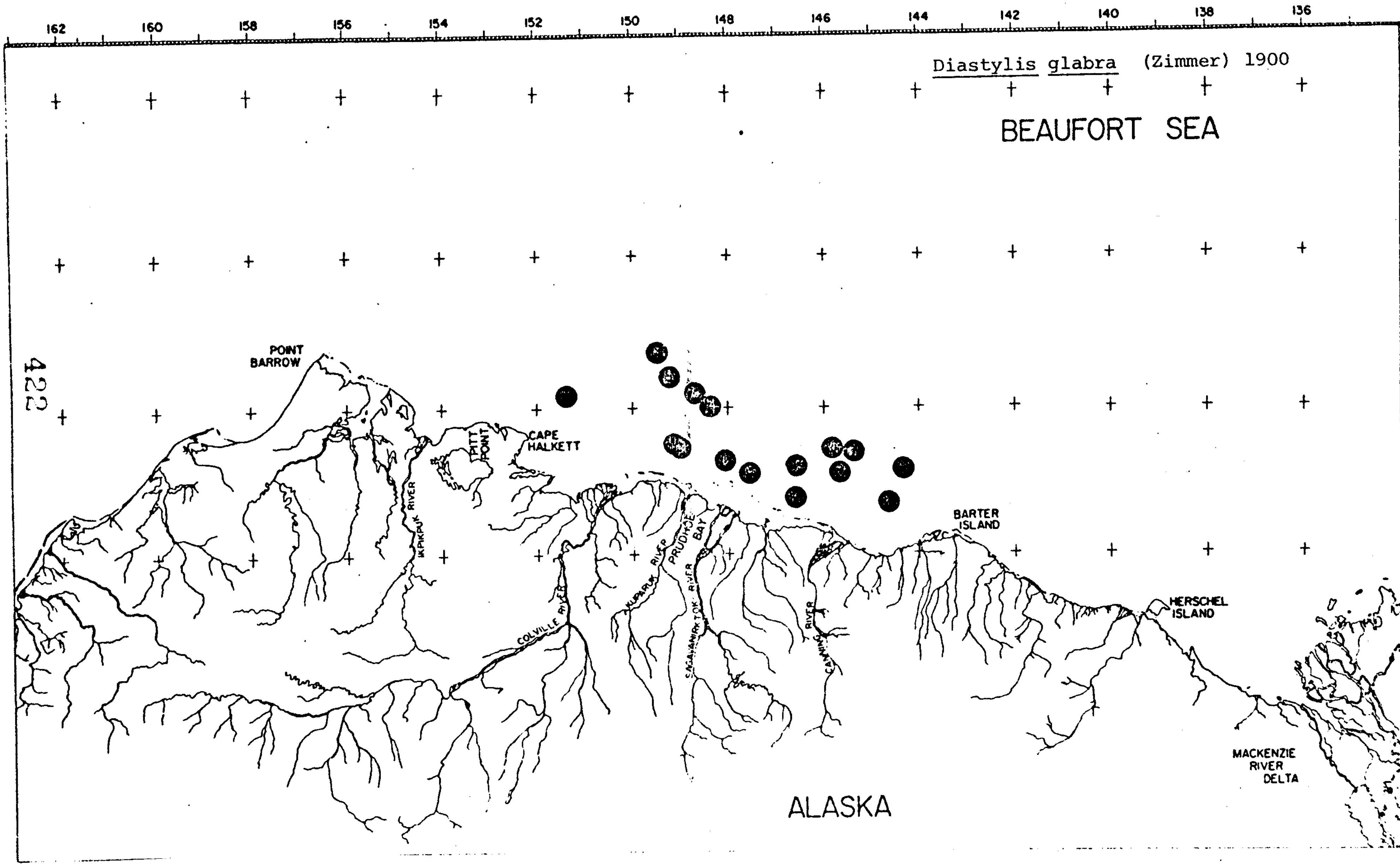
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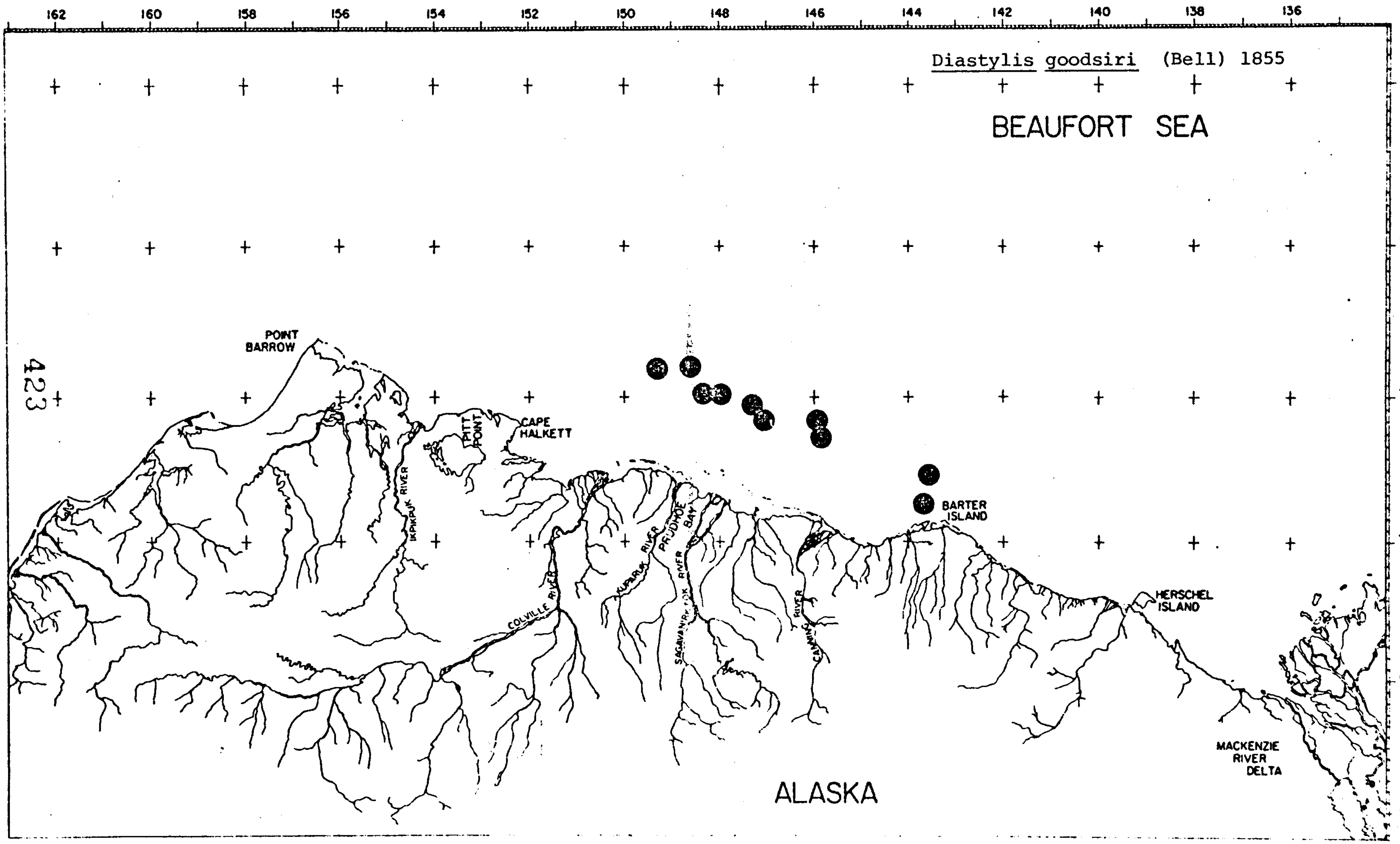
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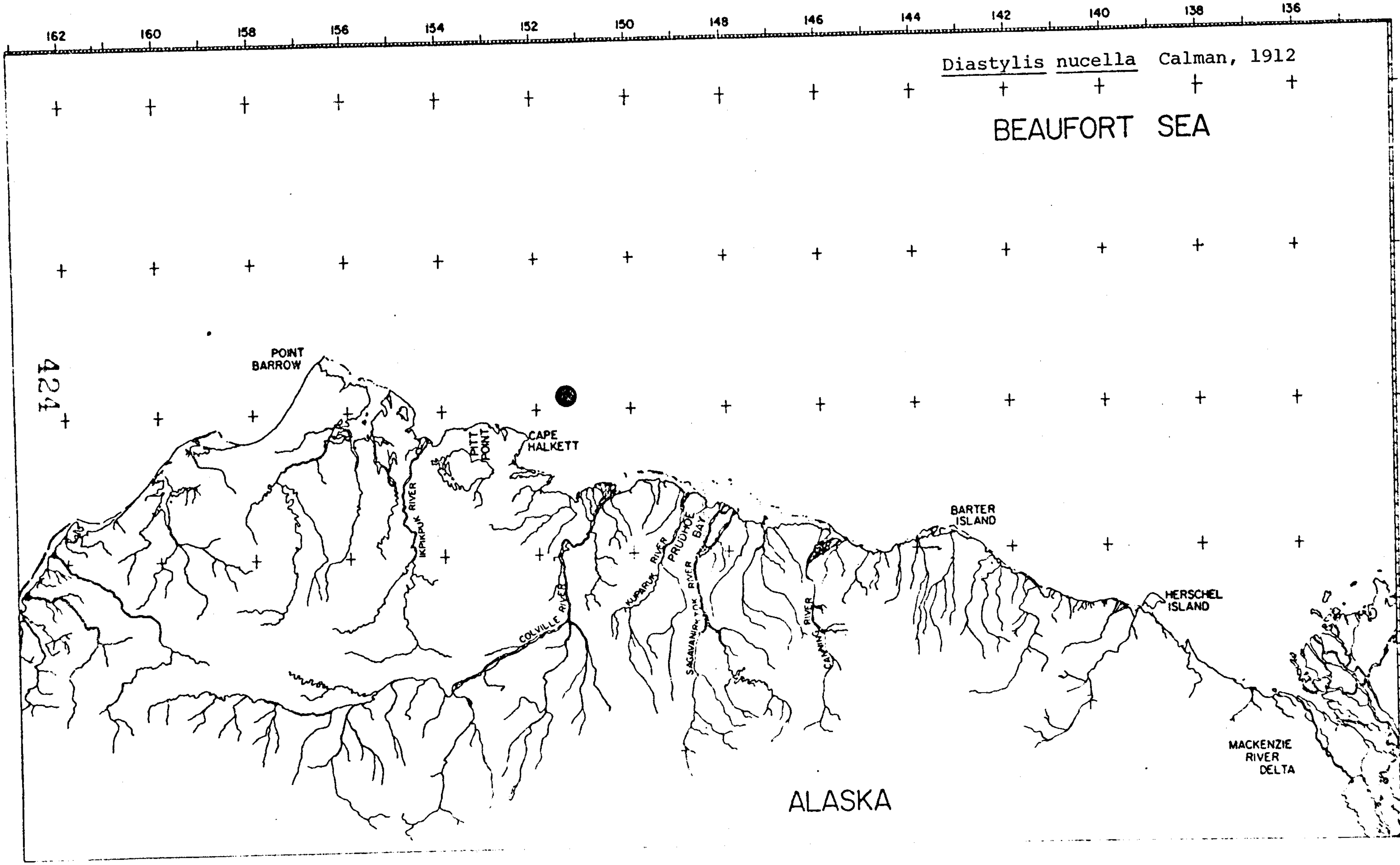
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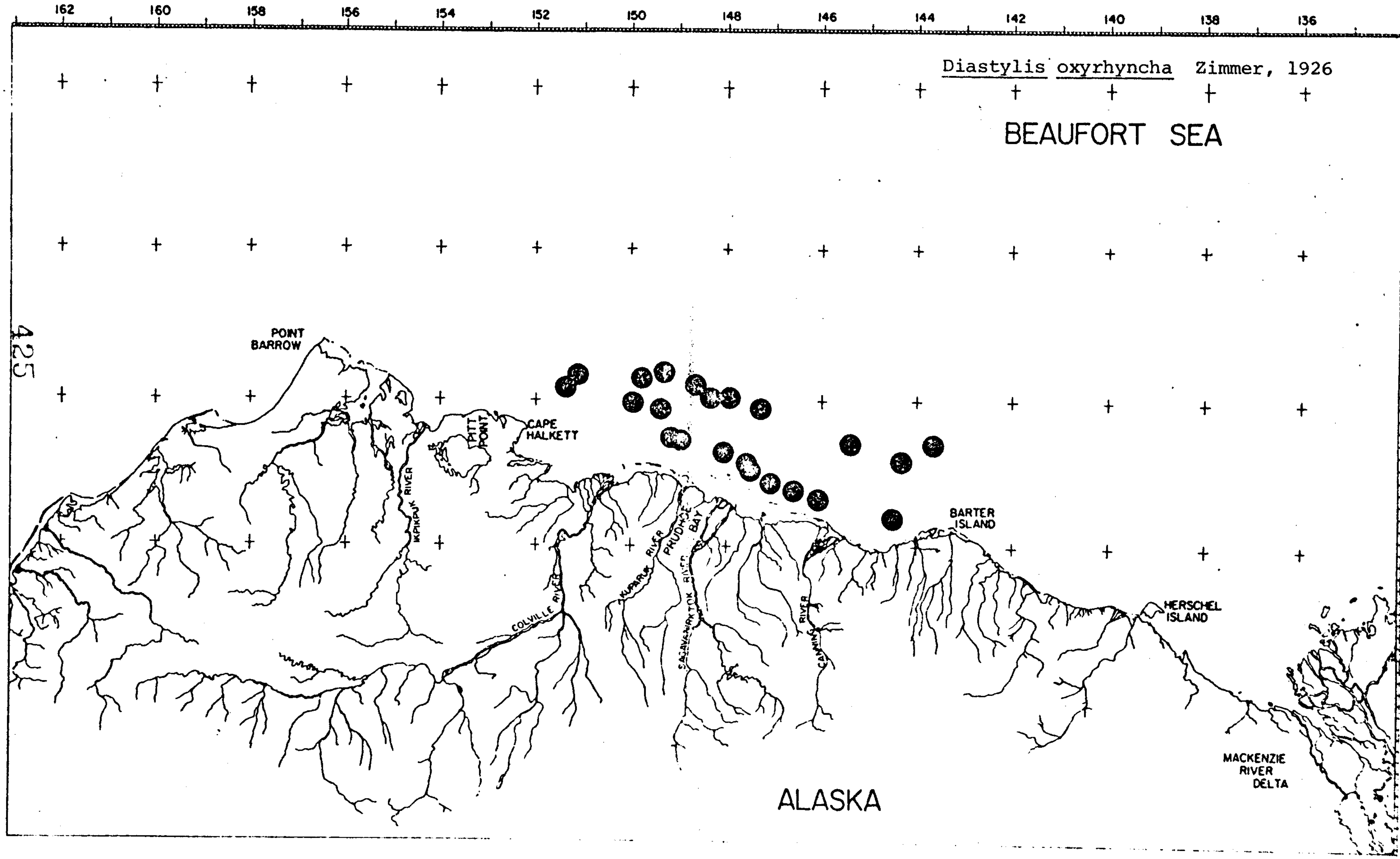
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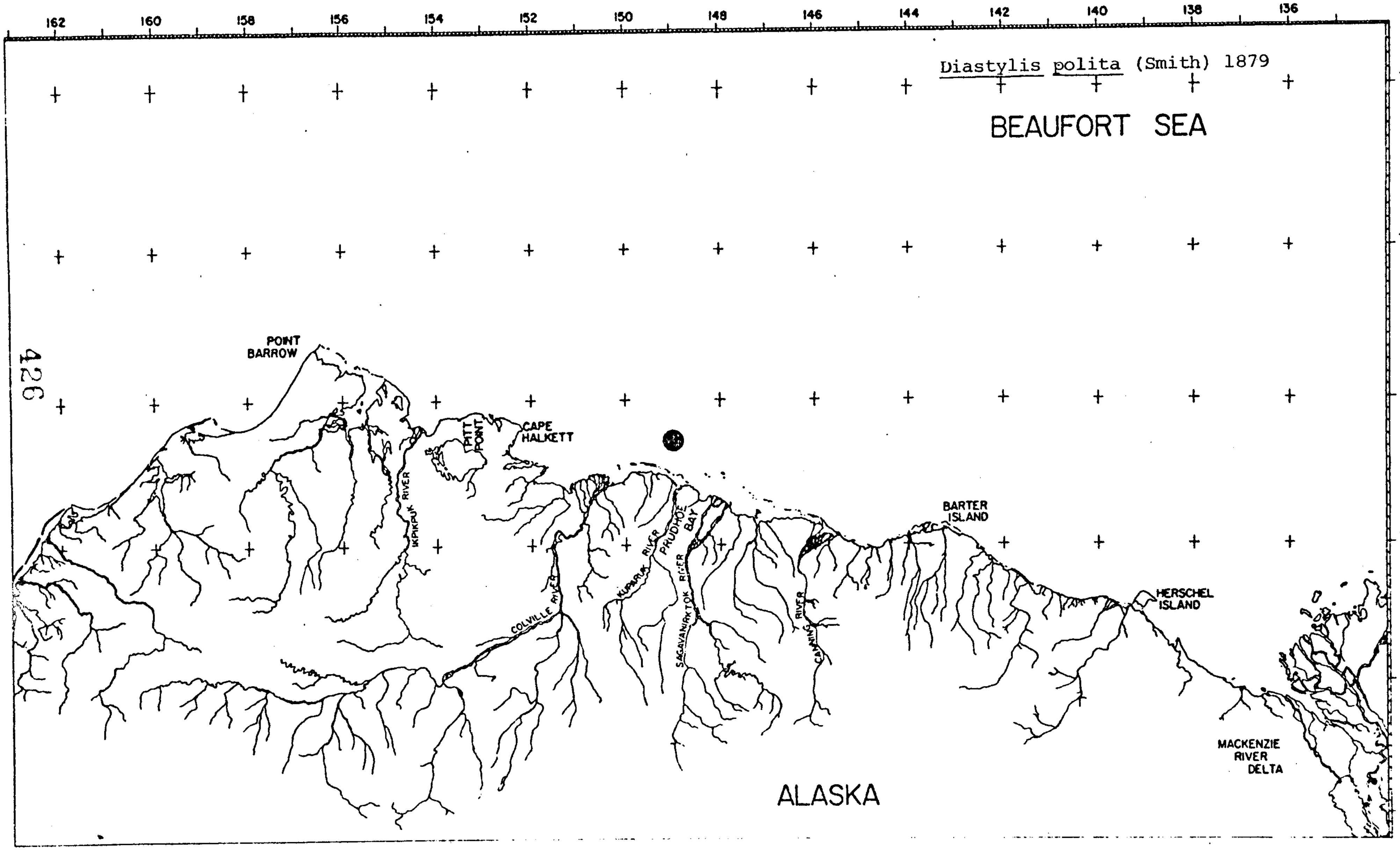
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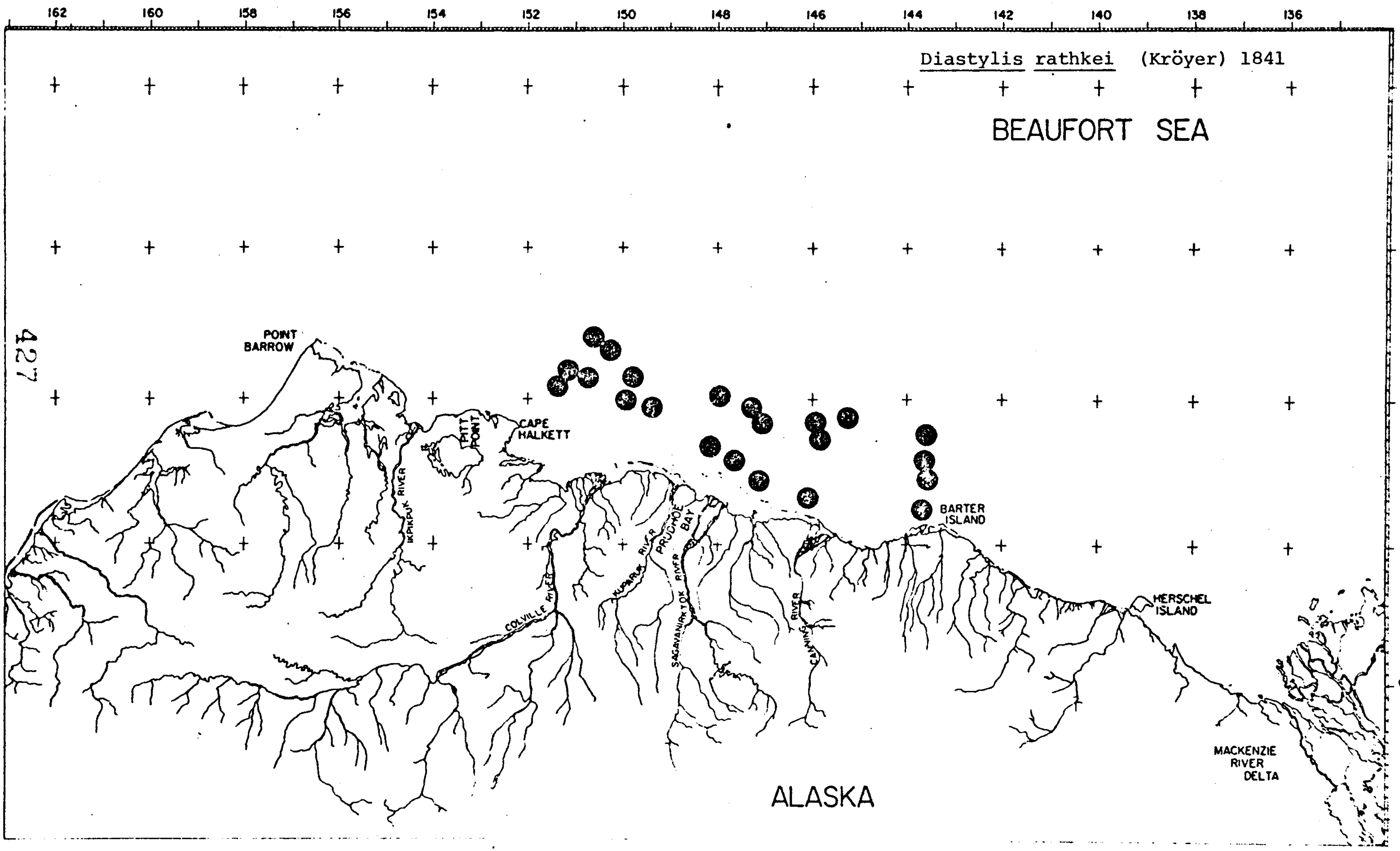
Diastylis rathkei (Kröyer) 1841
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PITT POINT
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COLVILLE RIVER
KUPARUK RIVER
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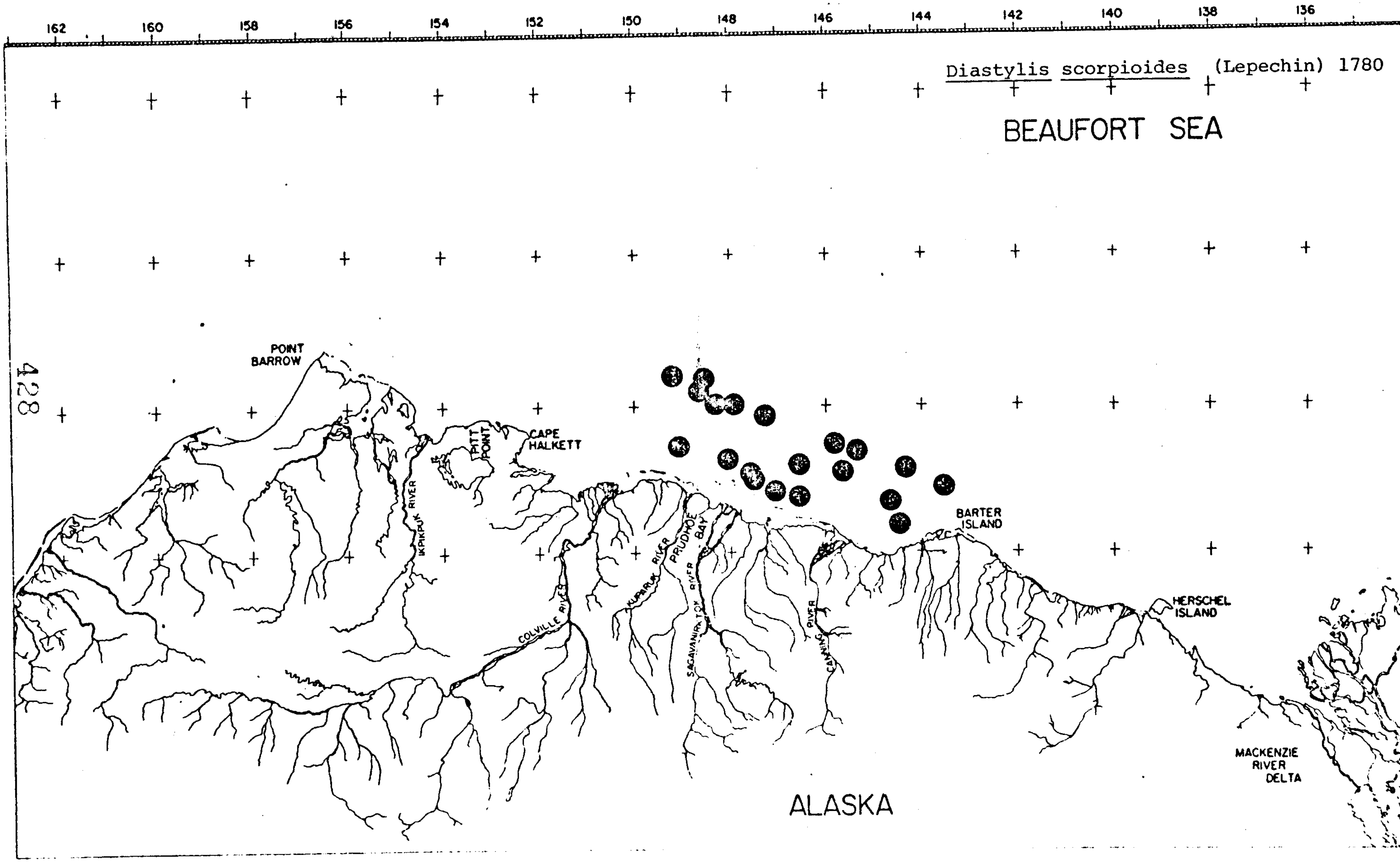
Diastylis scorpioides (Lepechin) 1780
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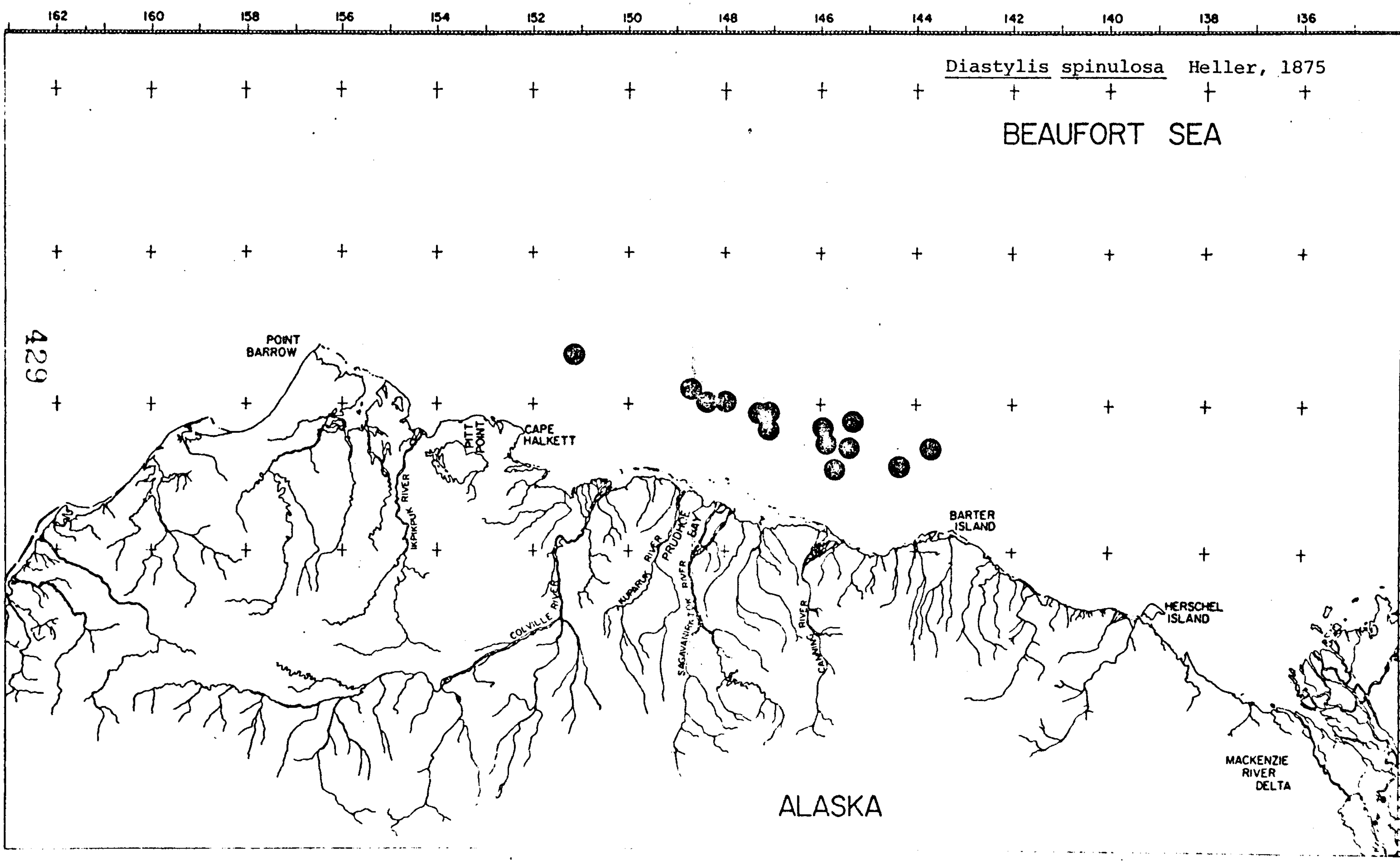
Diastylis spinulosa Heller, 1875
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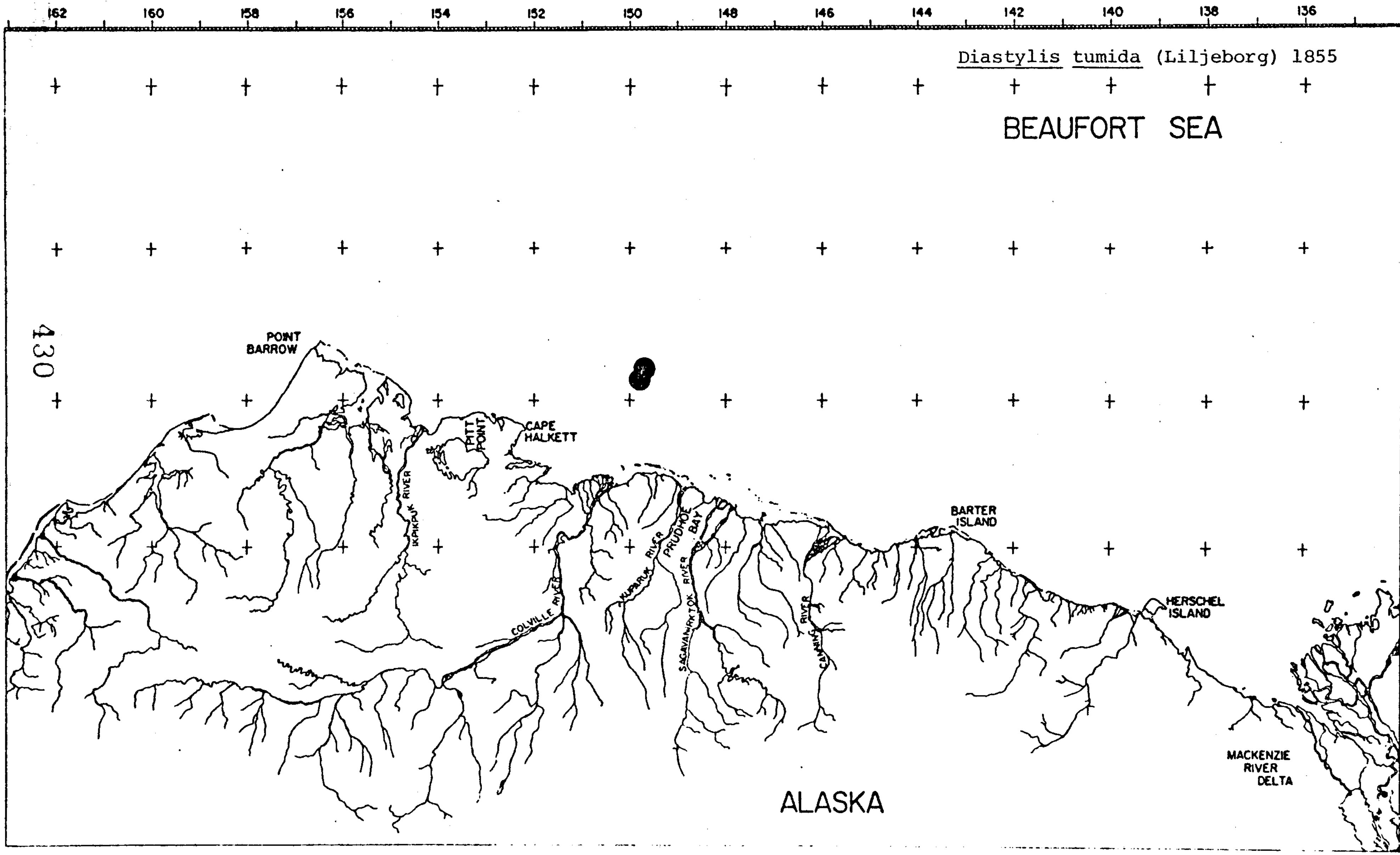
Diastylis tumida (Liljeborg) 1855
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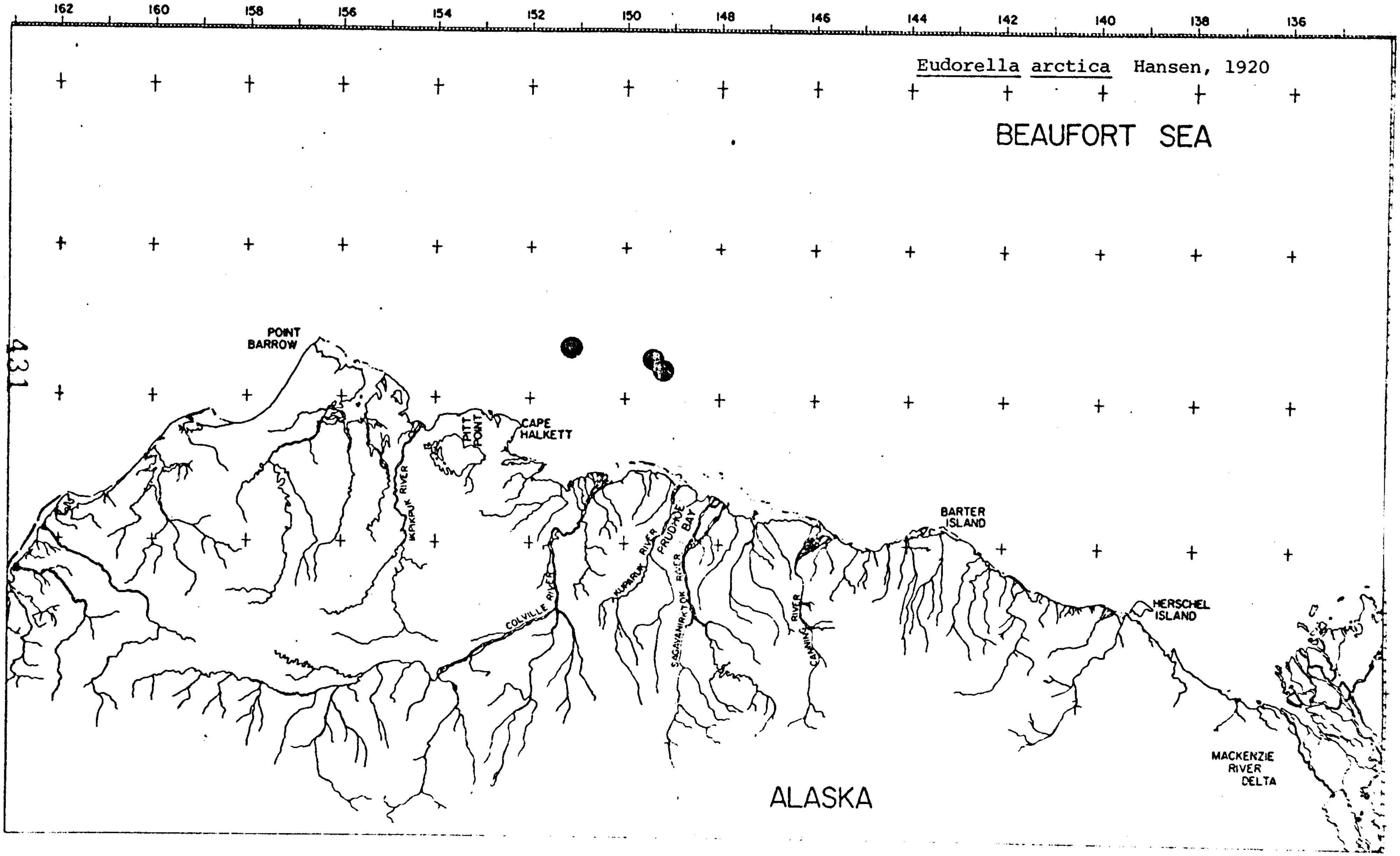
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Eudorella arctica Hansen, 1920
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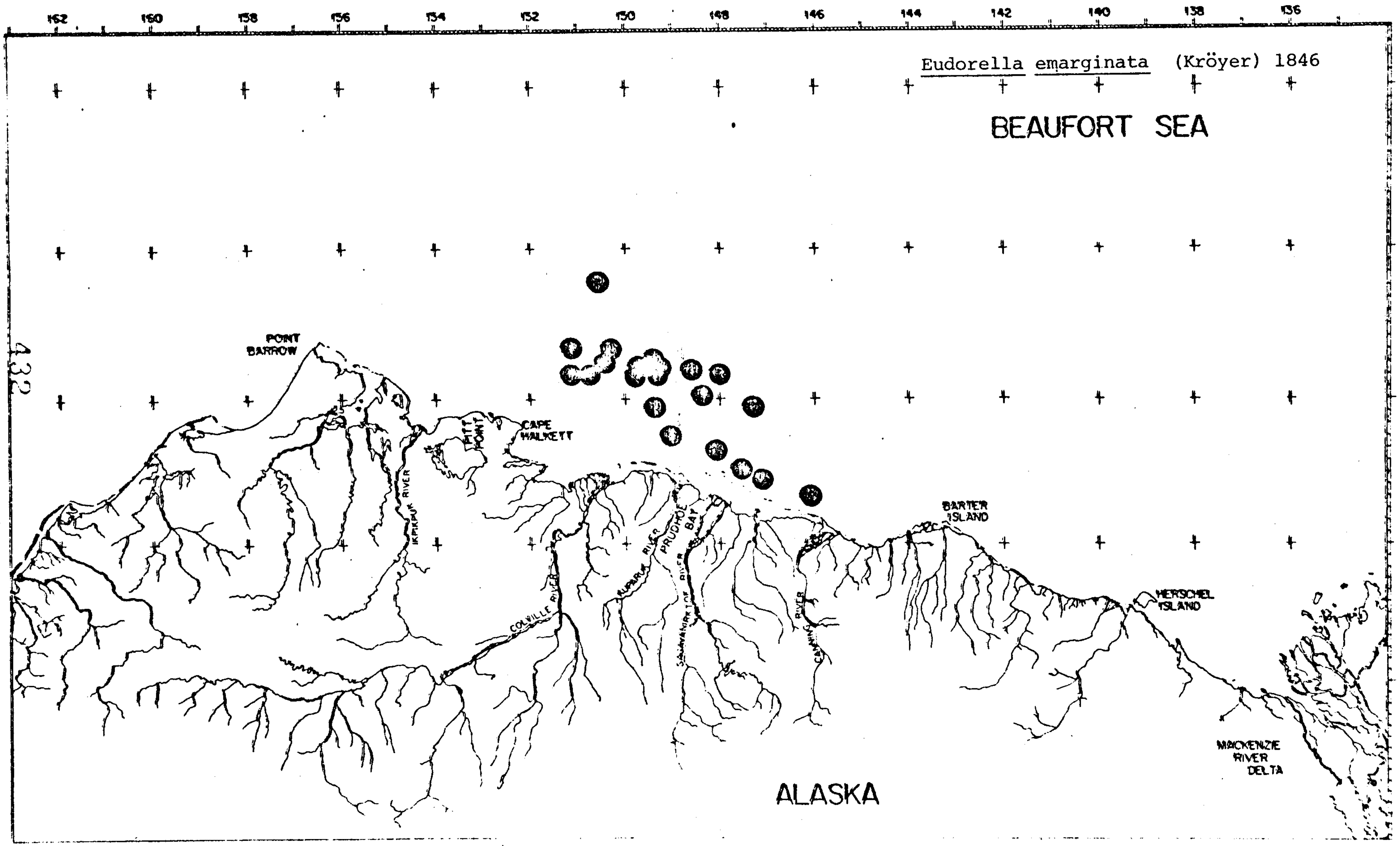
Eudorella emarginata (Kröyer) 1846
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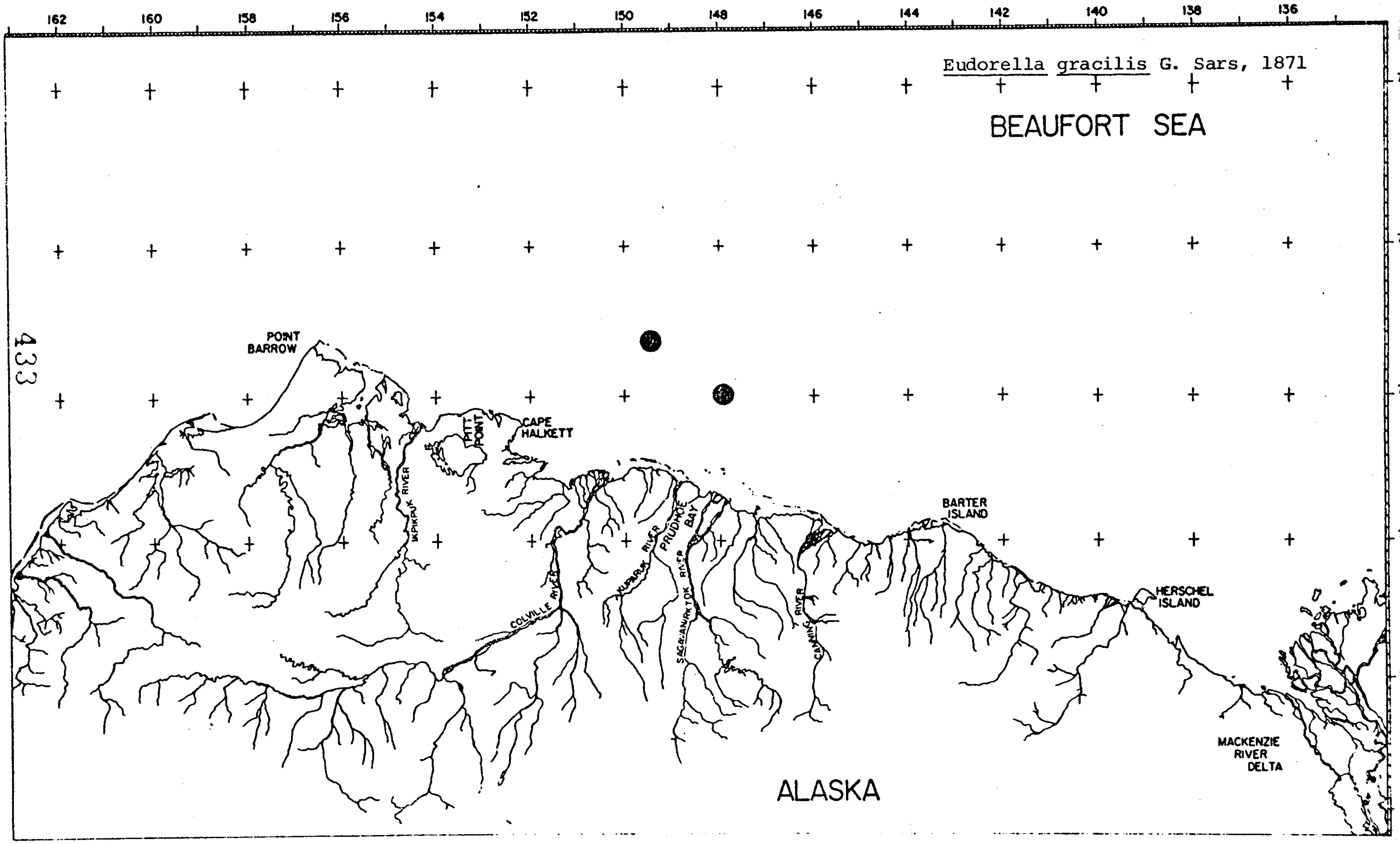
Eudorella gracilis G. Sars, 1871
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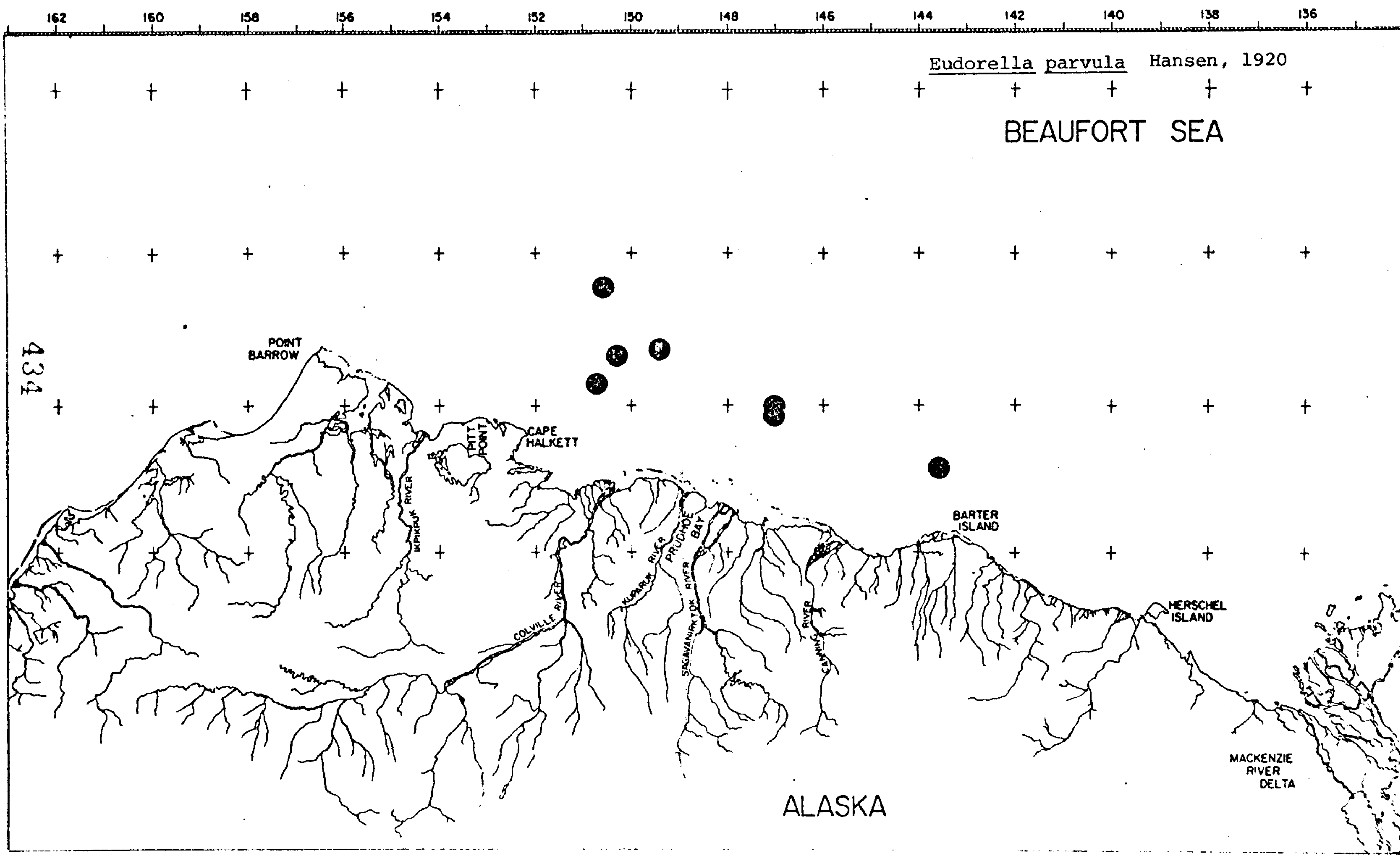
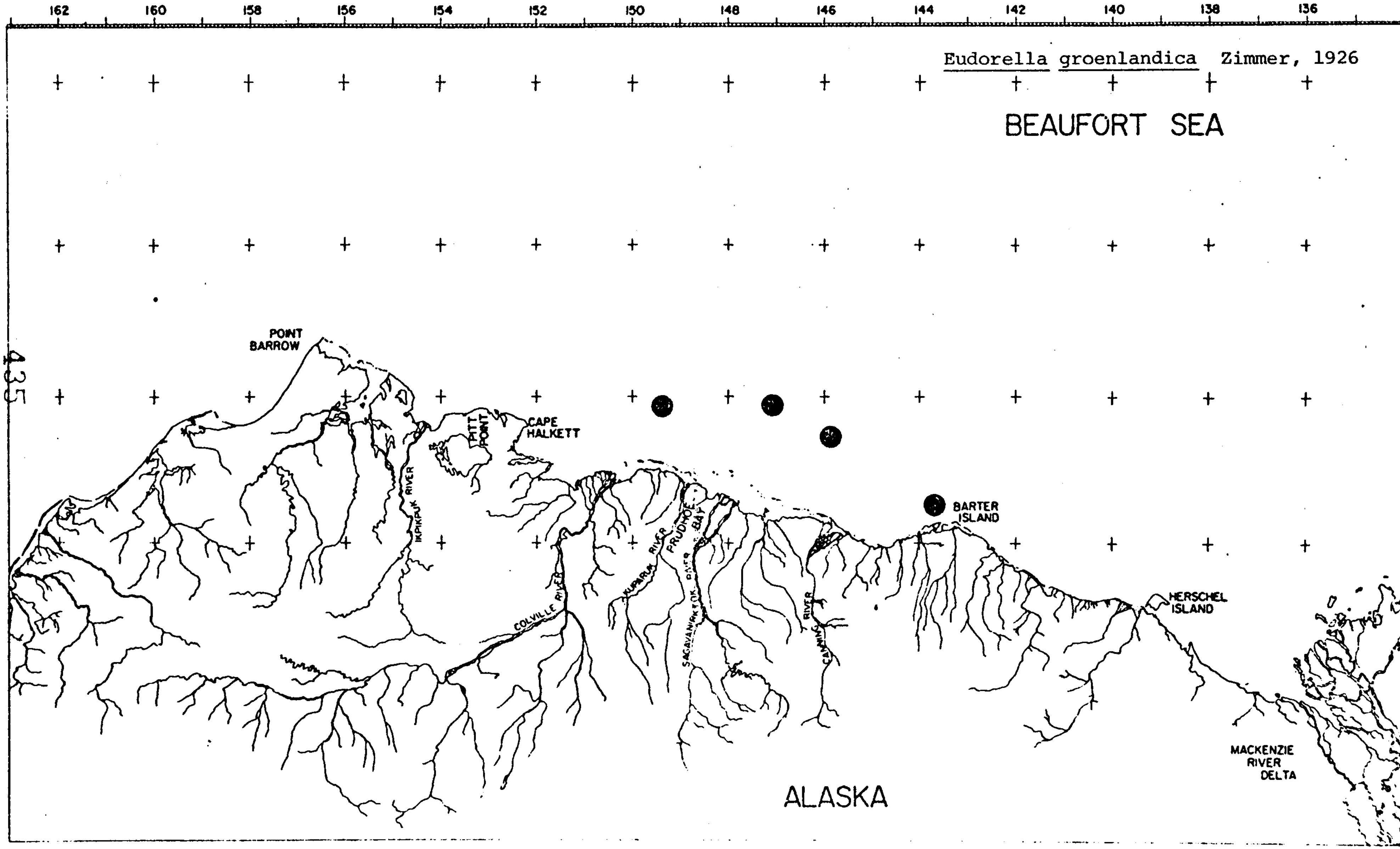


Eudorella parvula Hansen, 1920


Eudorella groenlandica Zimmer, 1926
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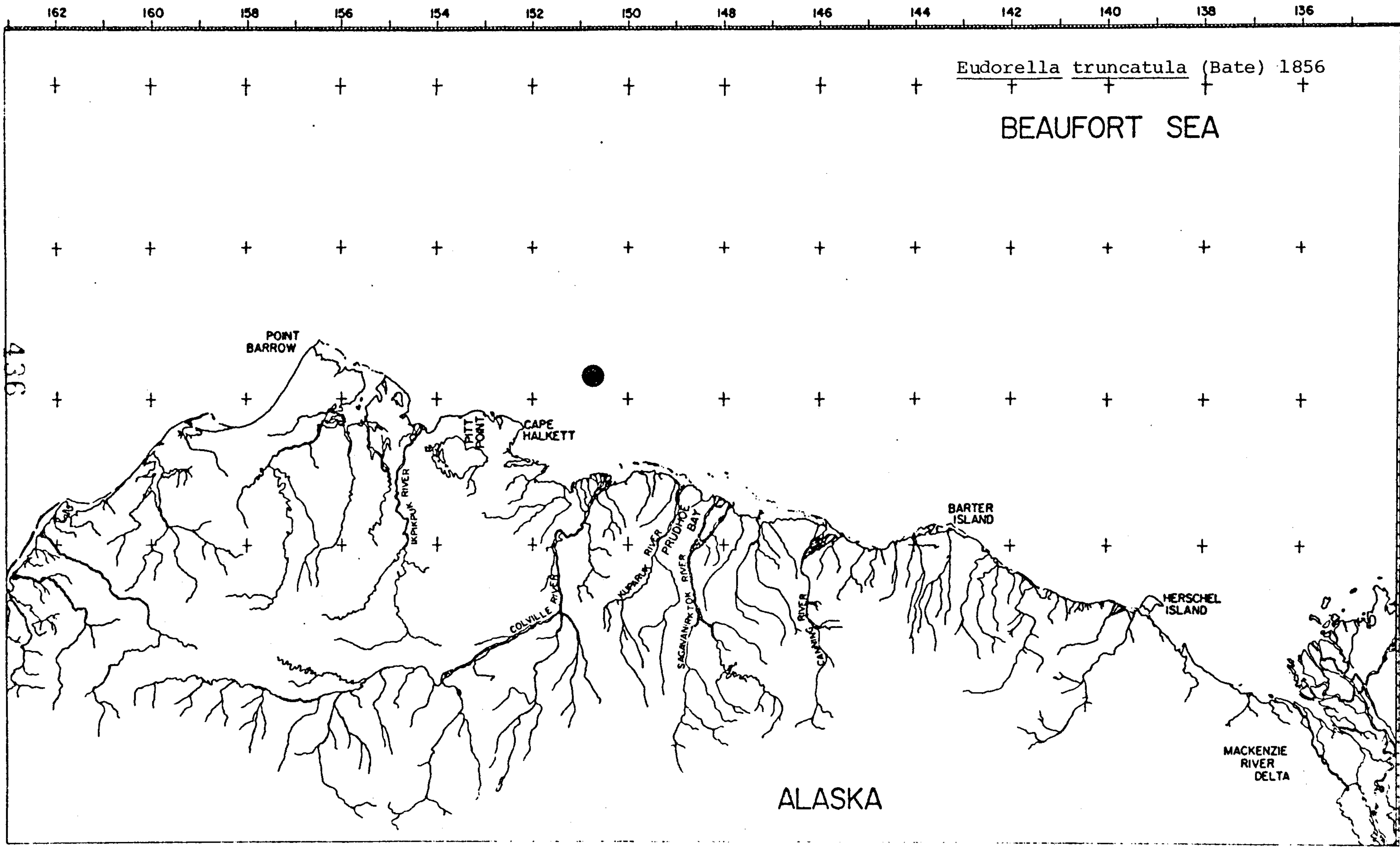
Eudorella truncatula (Bate) 1856
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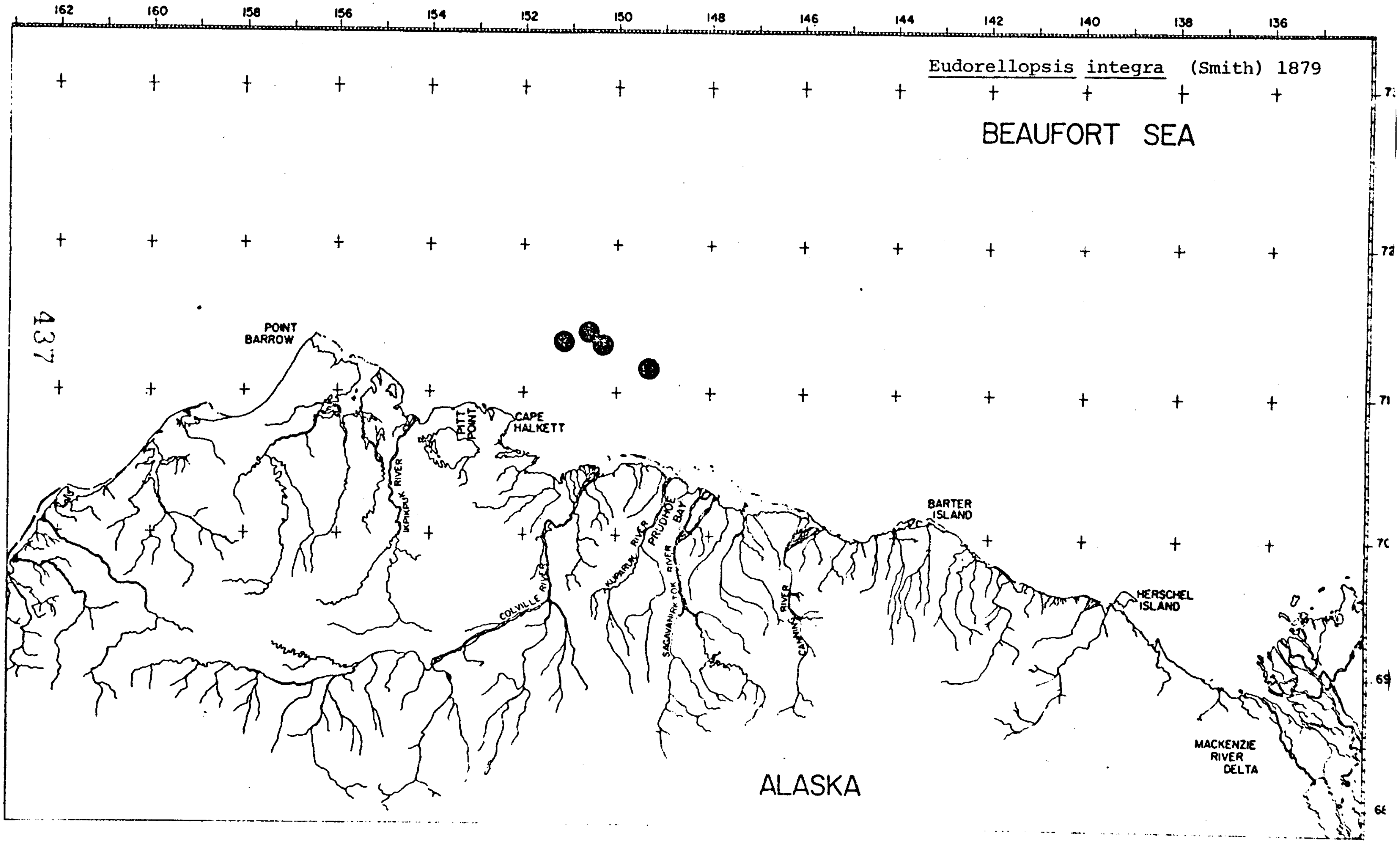
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Eudorellopsis integra (Smith) 1879
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CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
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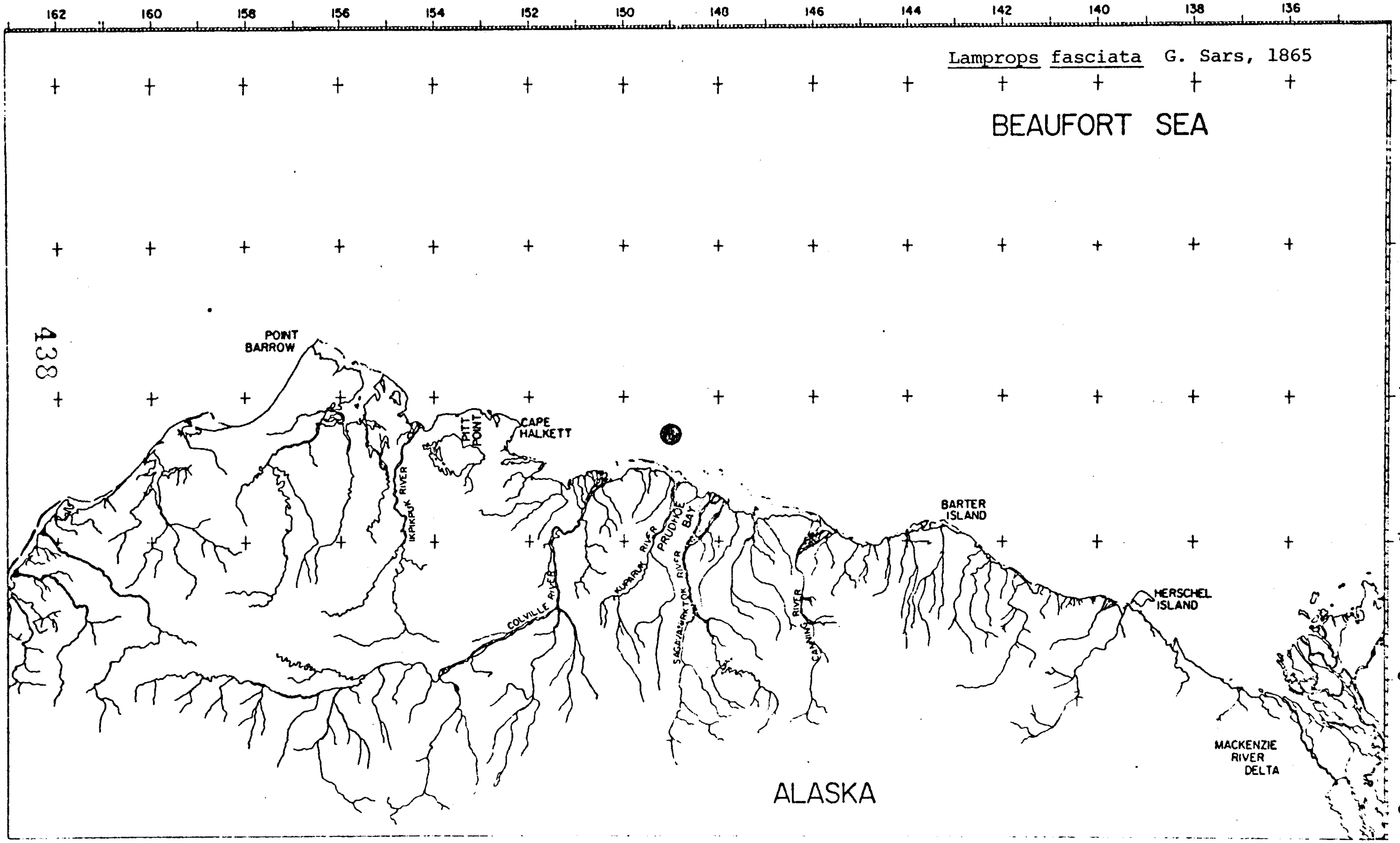
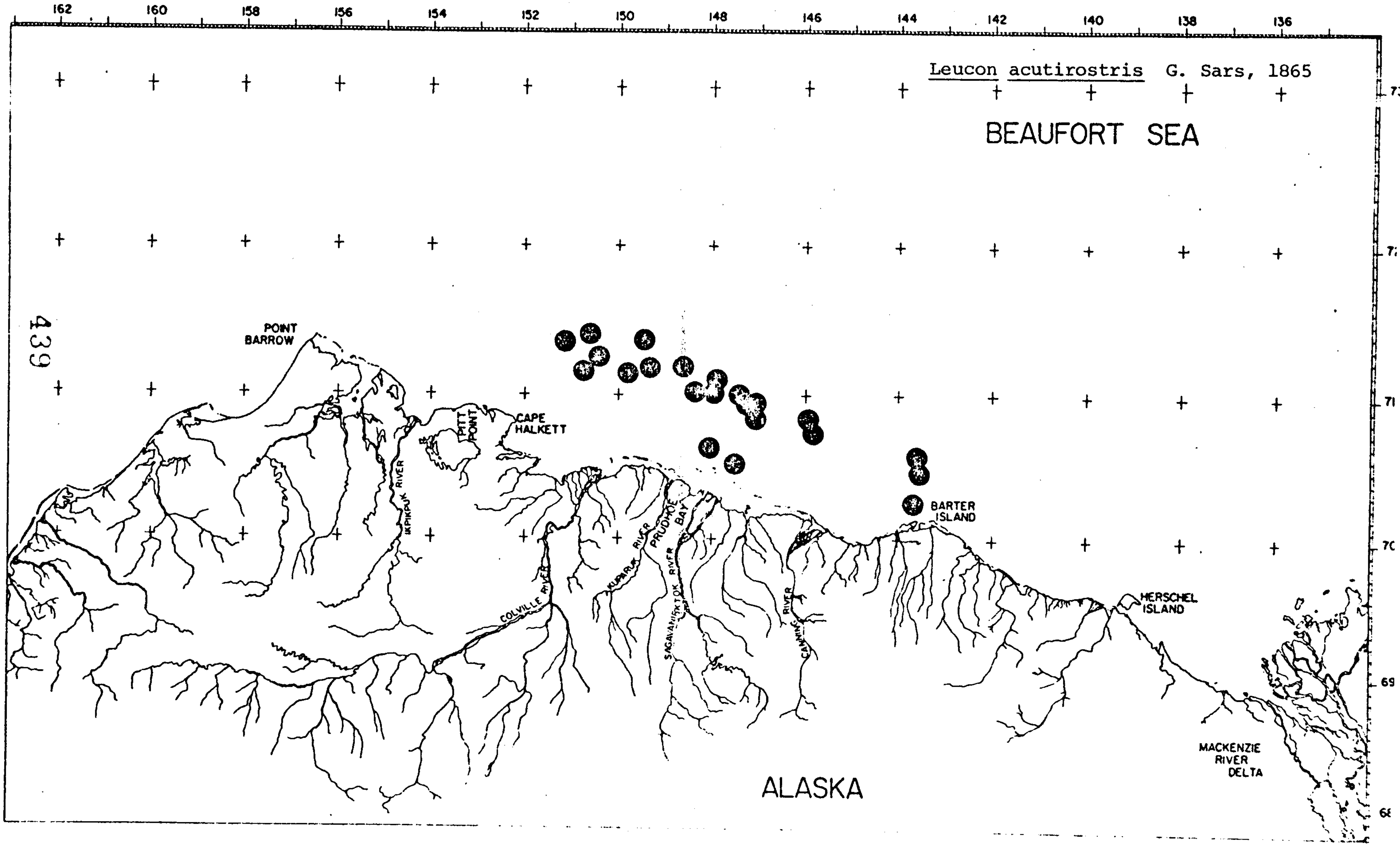


Lamprops fasciata G. Sars, 1865


Leucon acutirostris G. Sars, 1865
BEAUFORT SEA
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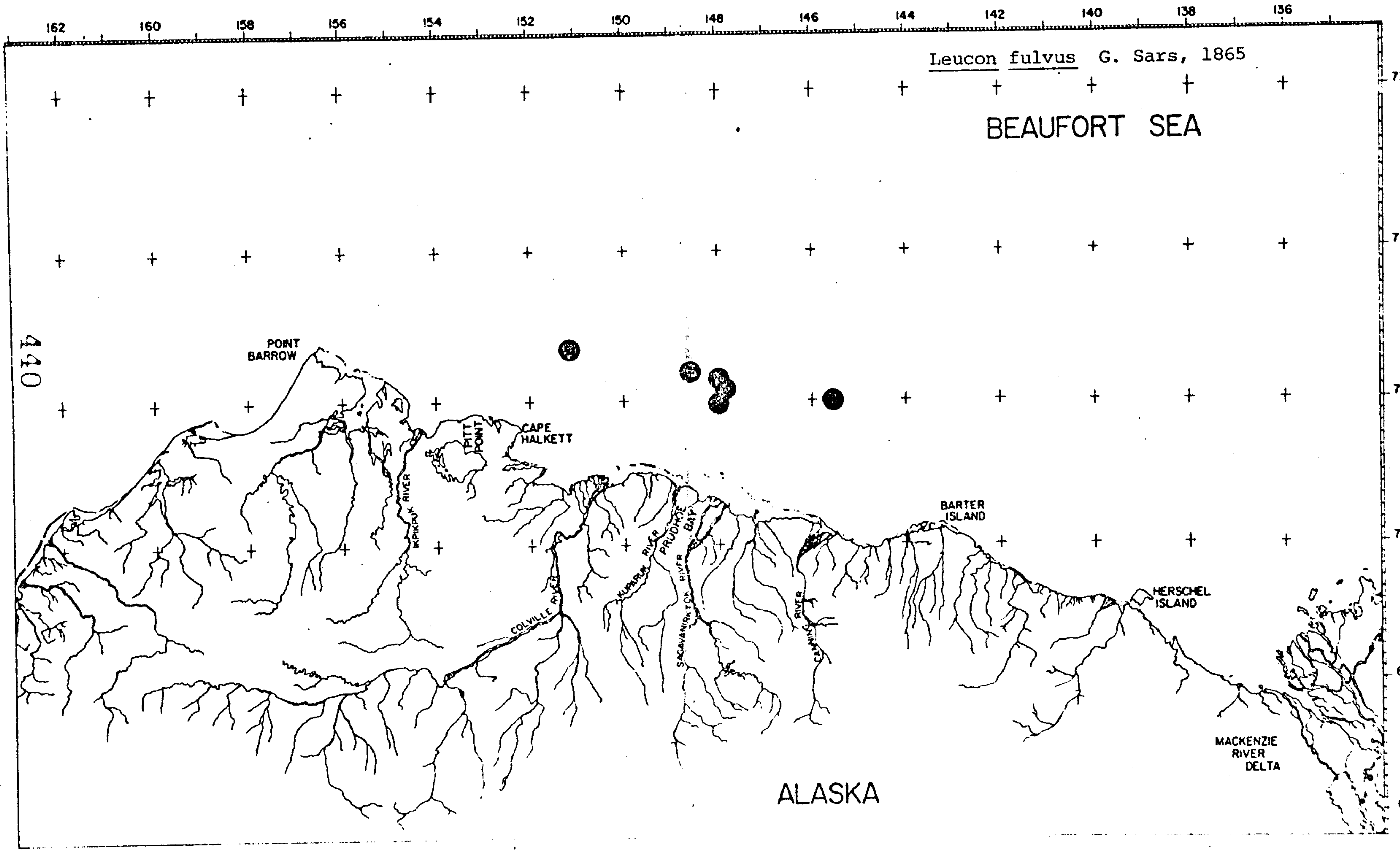
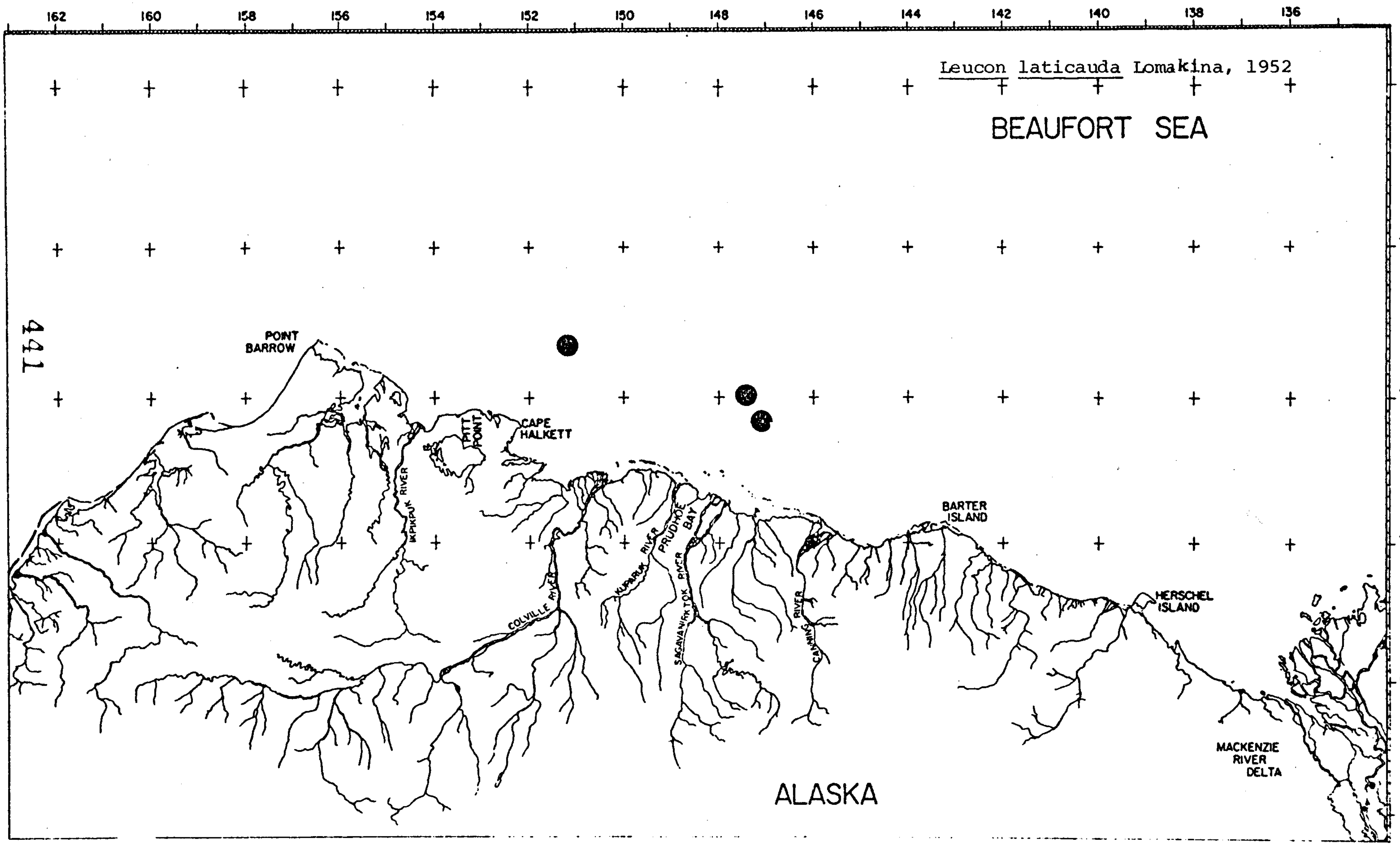
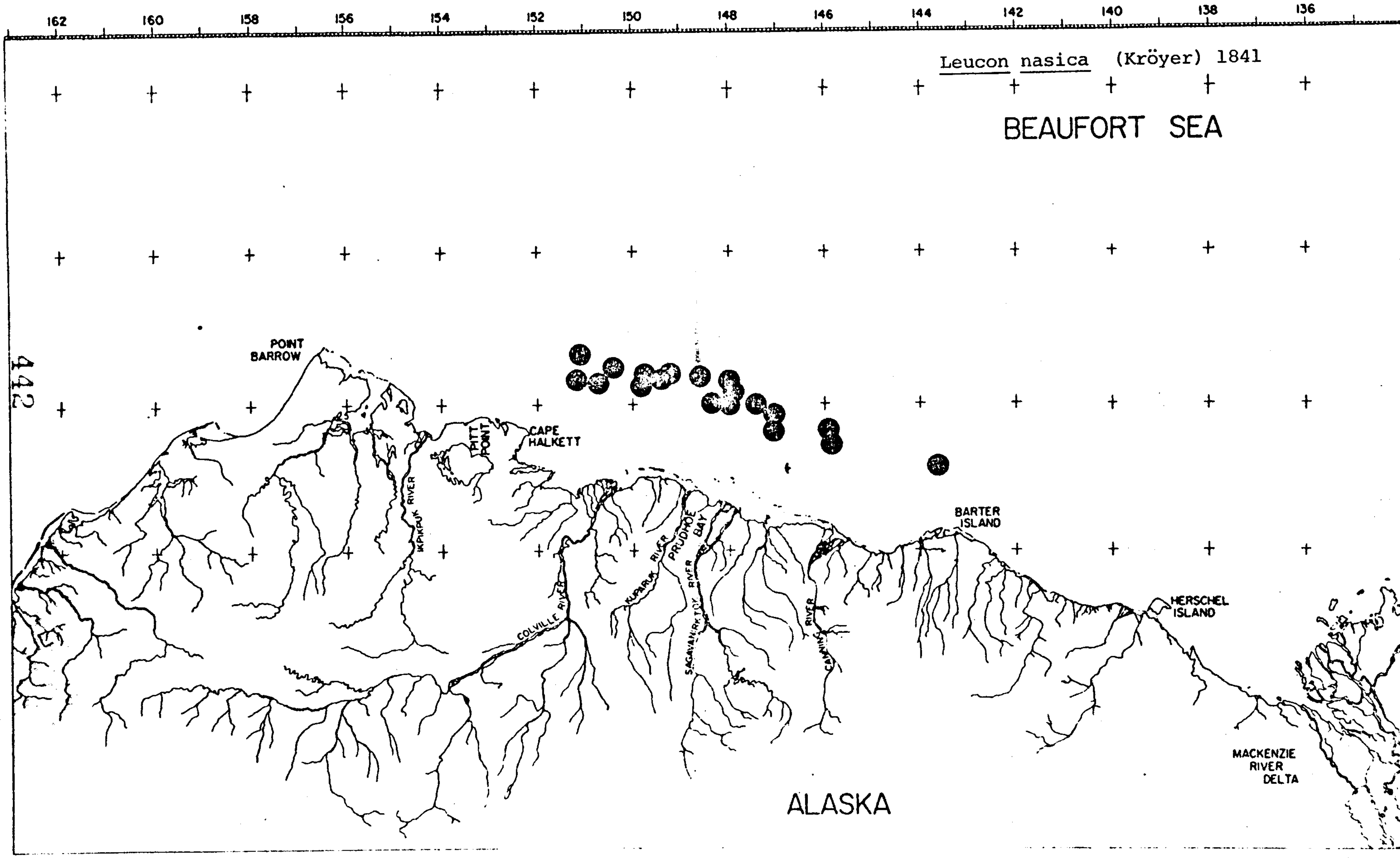


Leucon fulvus G. Sars, 1865



Leucon laticauda Lomakina, 1952


Leucon *nasica* (Kröyer) 1841
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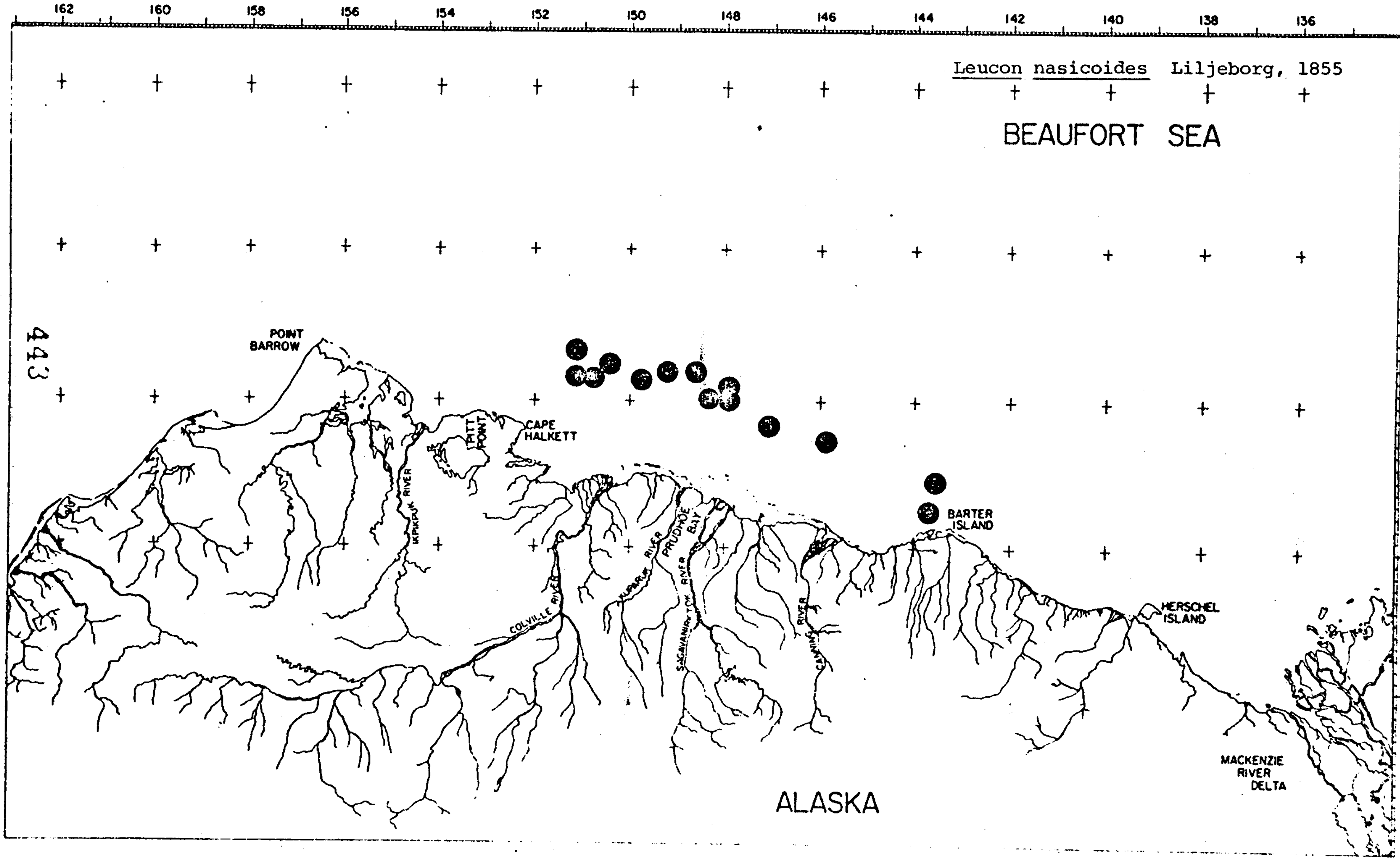
Leucon nasicoides Liljeborg, 1855
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PITT POINT
IKPIKPUK RIVER
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PRUDHOE BAY
SAGAVANIRKTOK RIVER
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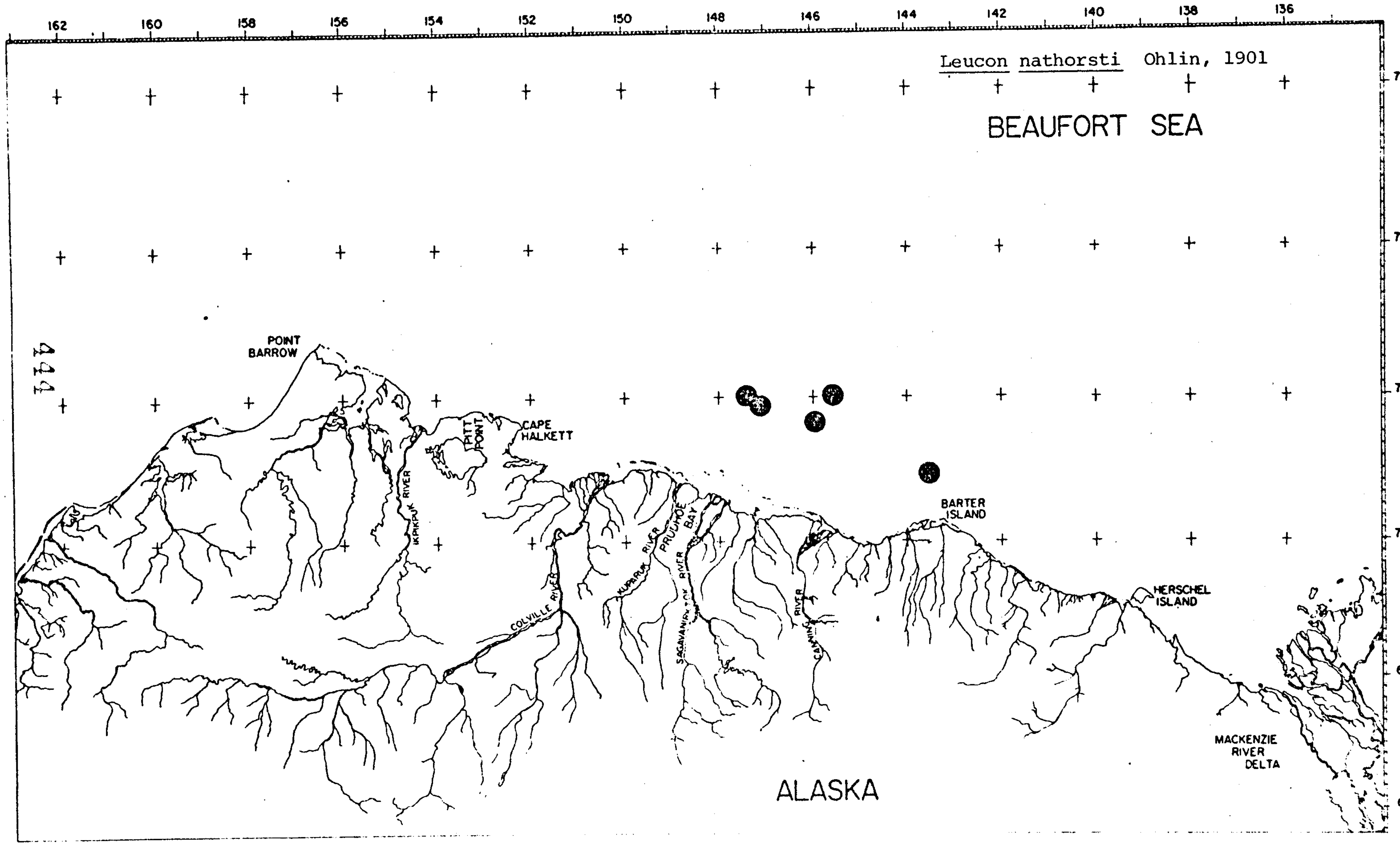
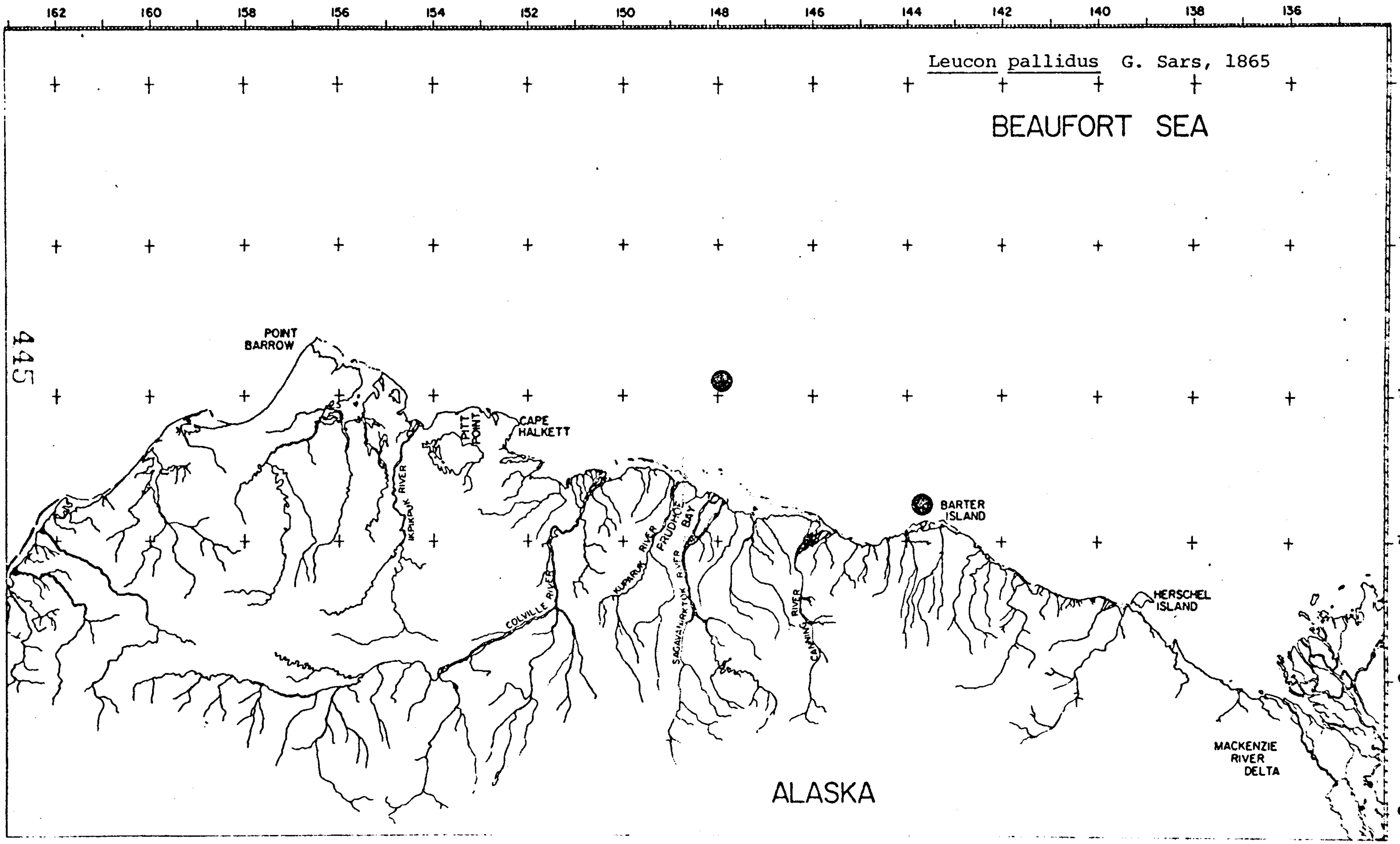
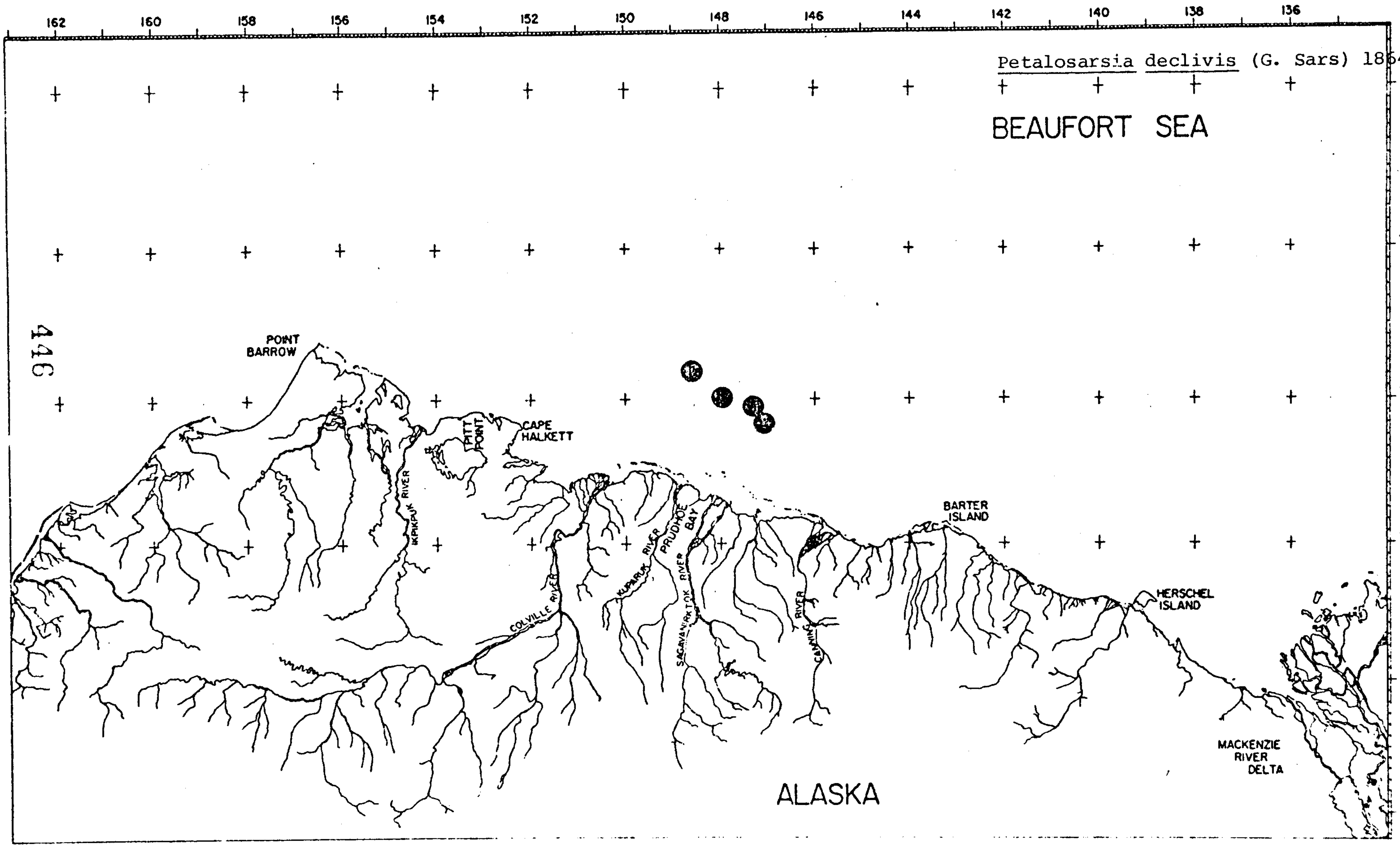


Leucon nathorsti Ohlin, 1901



Leucon pallidus G. Sars, 1865



Petalosarsia declivis (G. Sars) 1864

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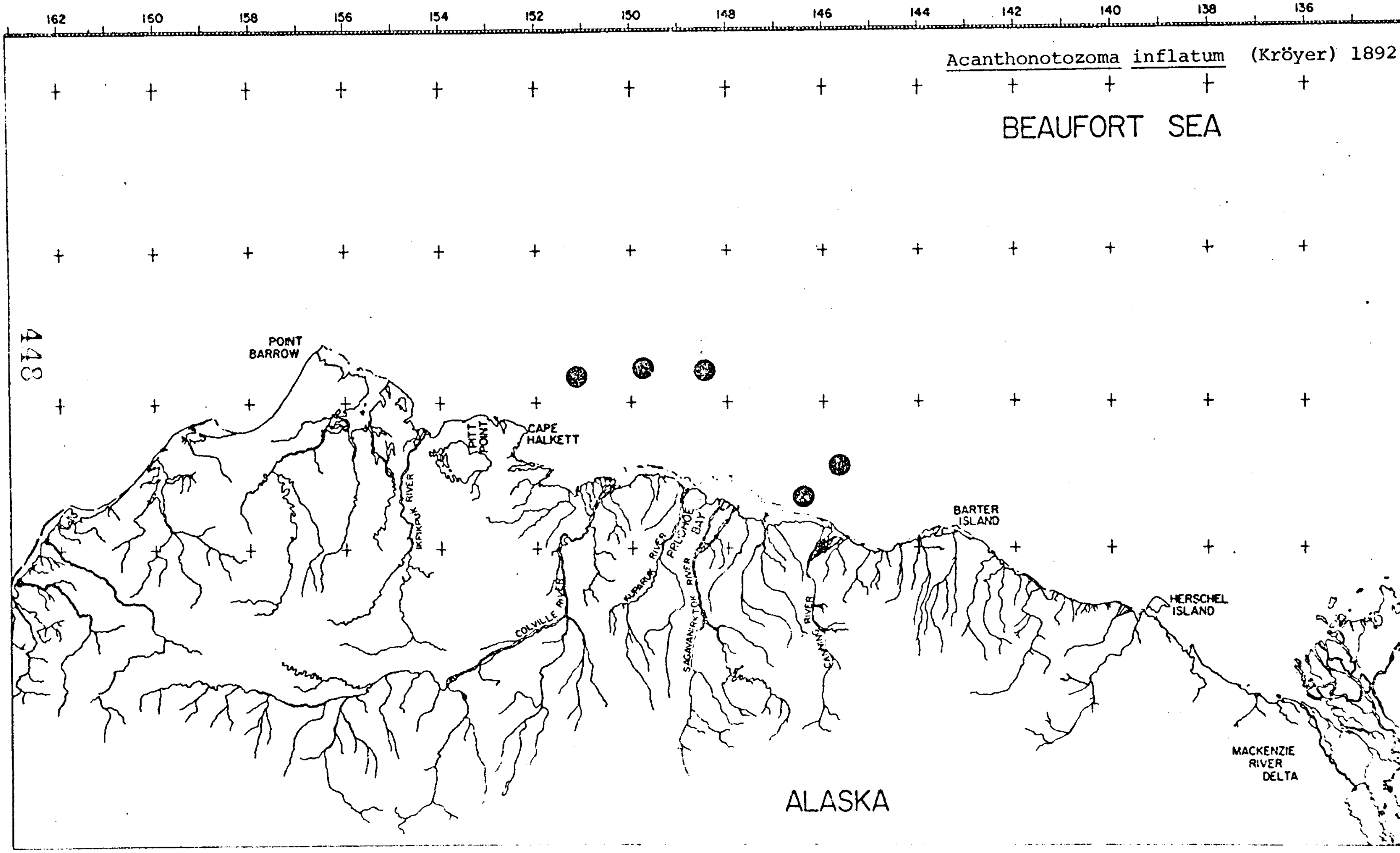
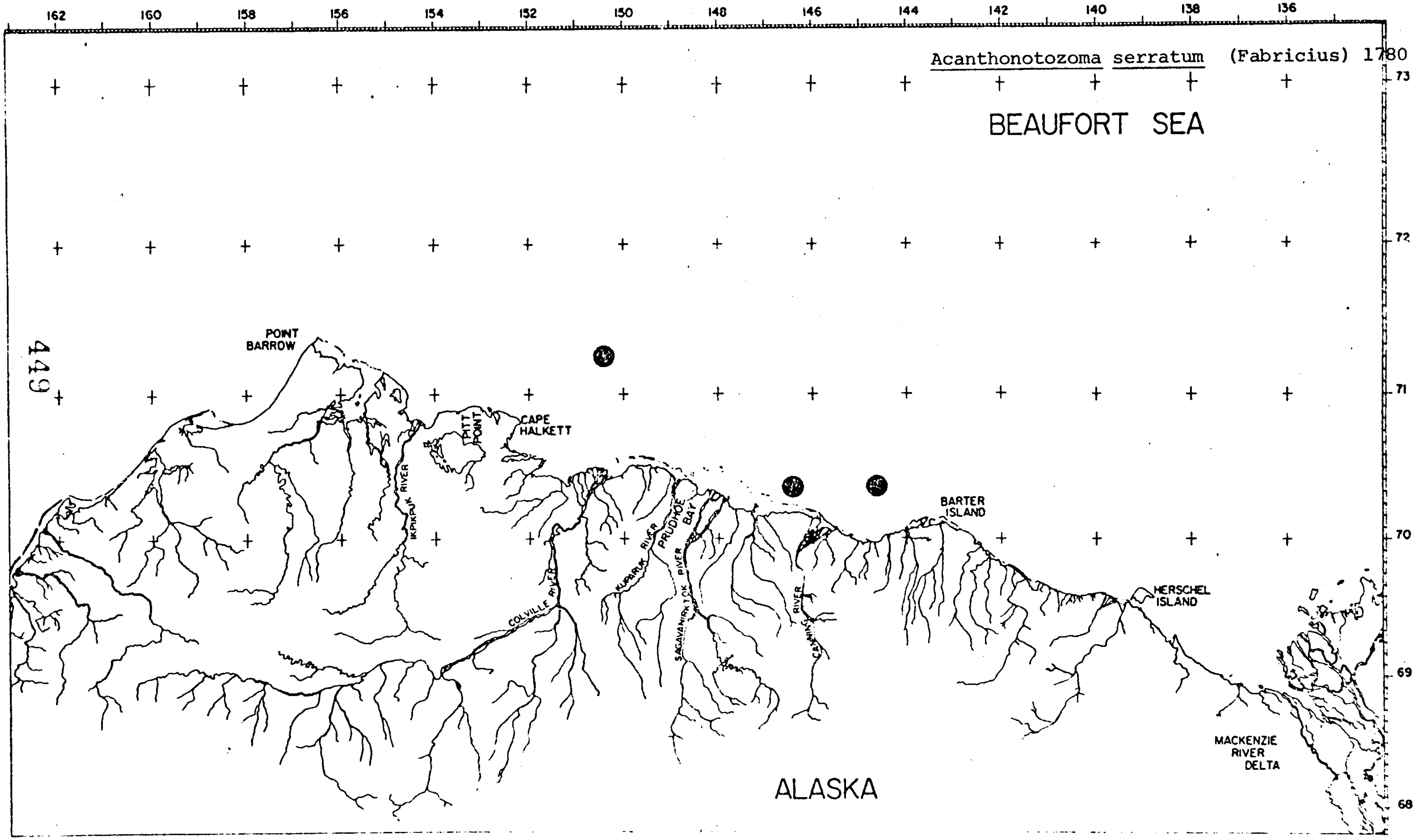
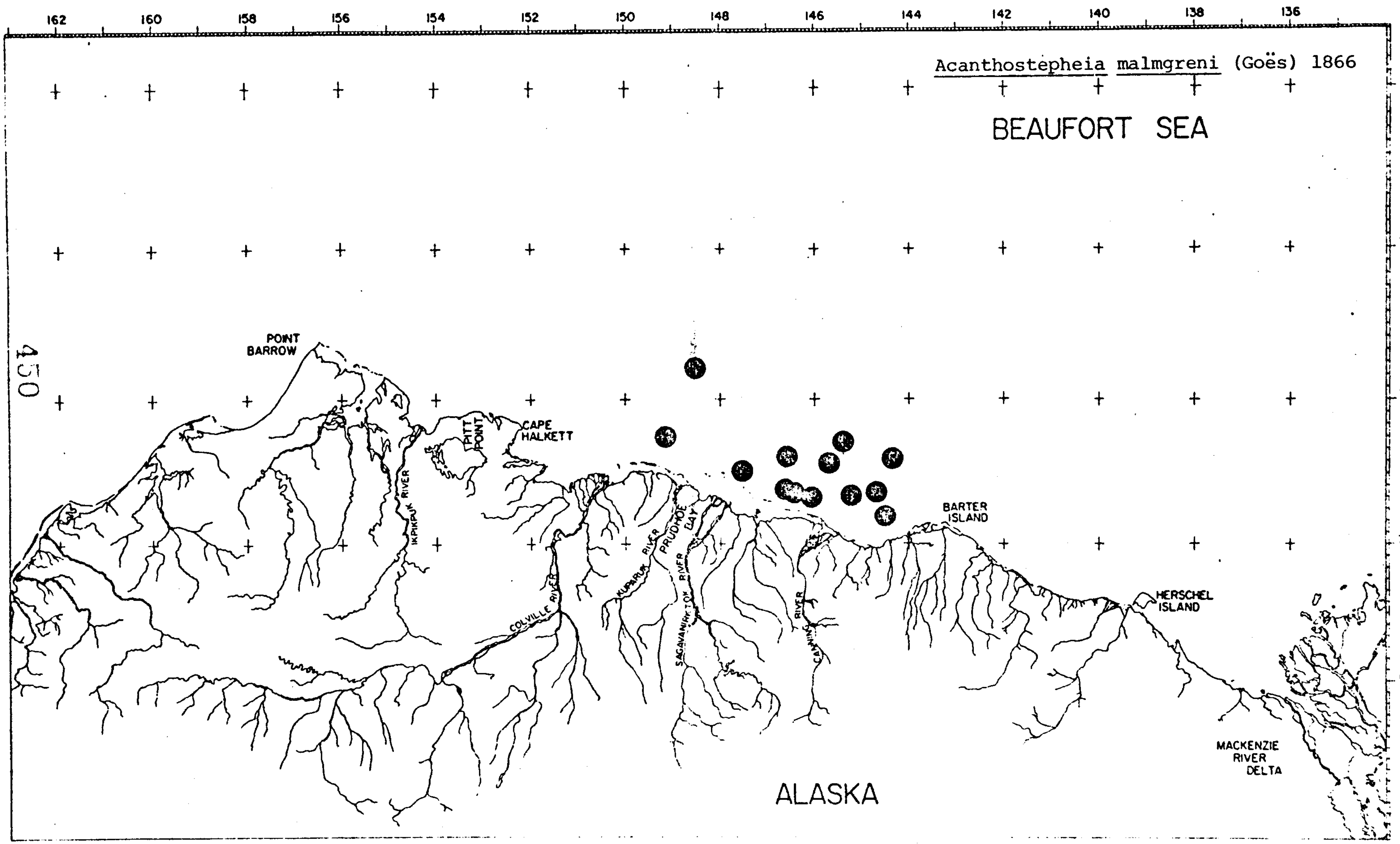


<u>Acanthonotozoma</u> <u>inflatum</u> (Kröyer) 1892

Acanthonotozoma serratum (Fabricius) 1780




Acanthostepheia malmgreni (Goës) 1866
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PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
SAGAVANIRKTOK RIVER
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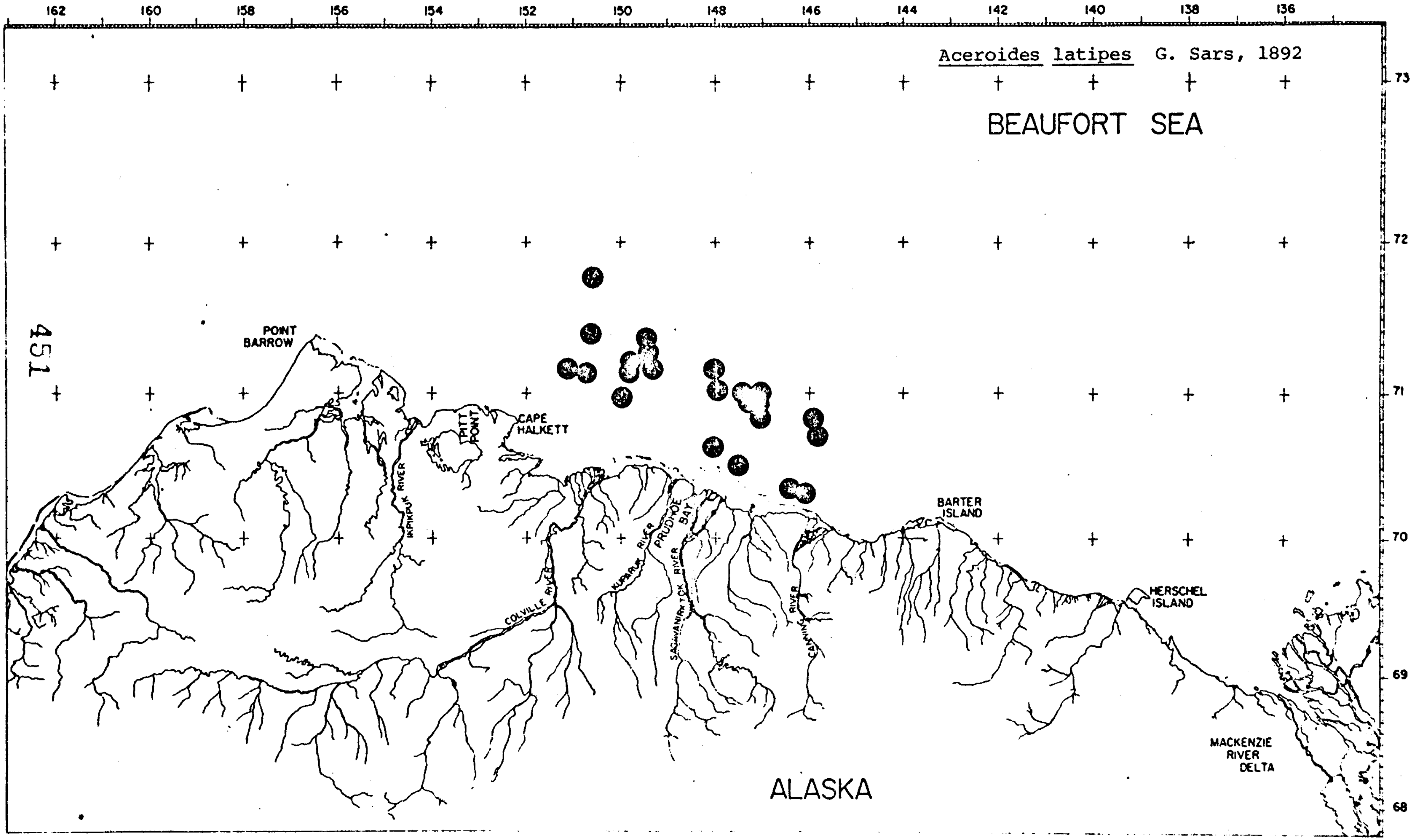
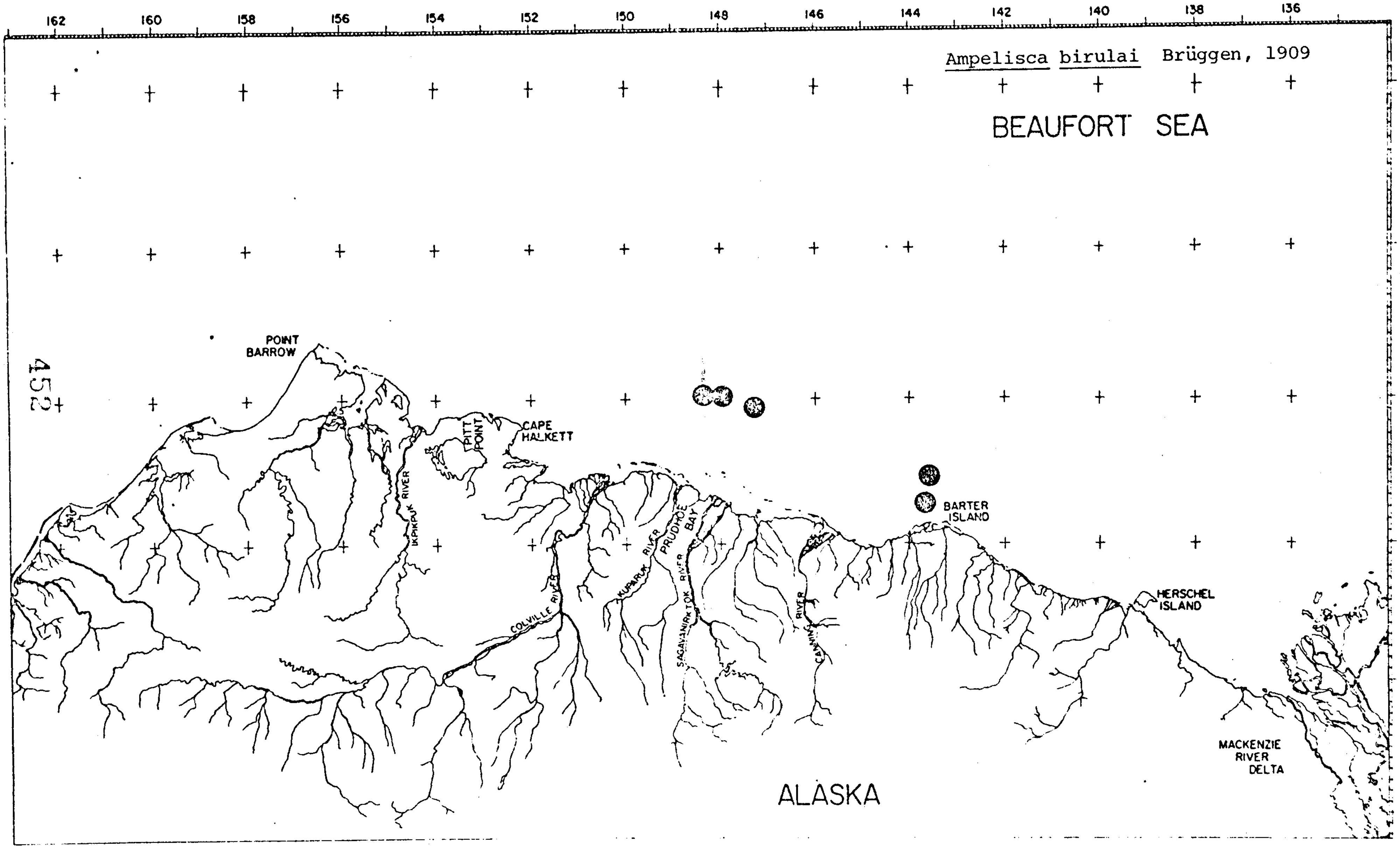
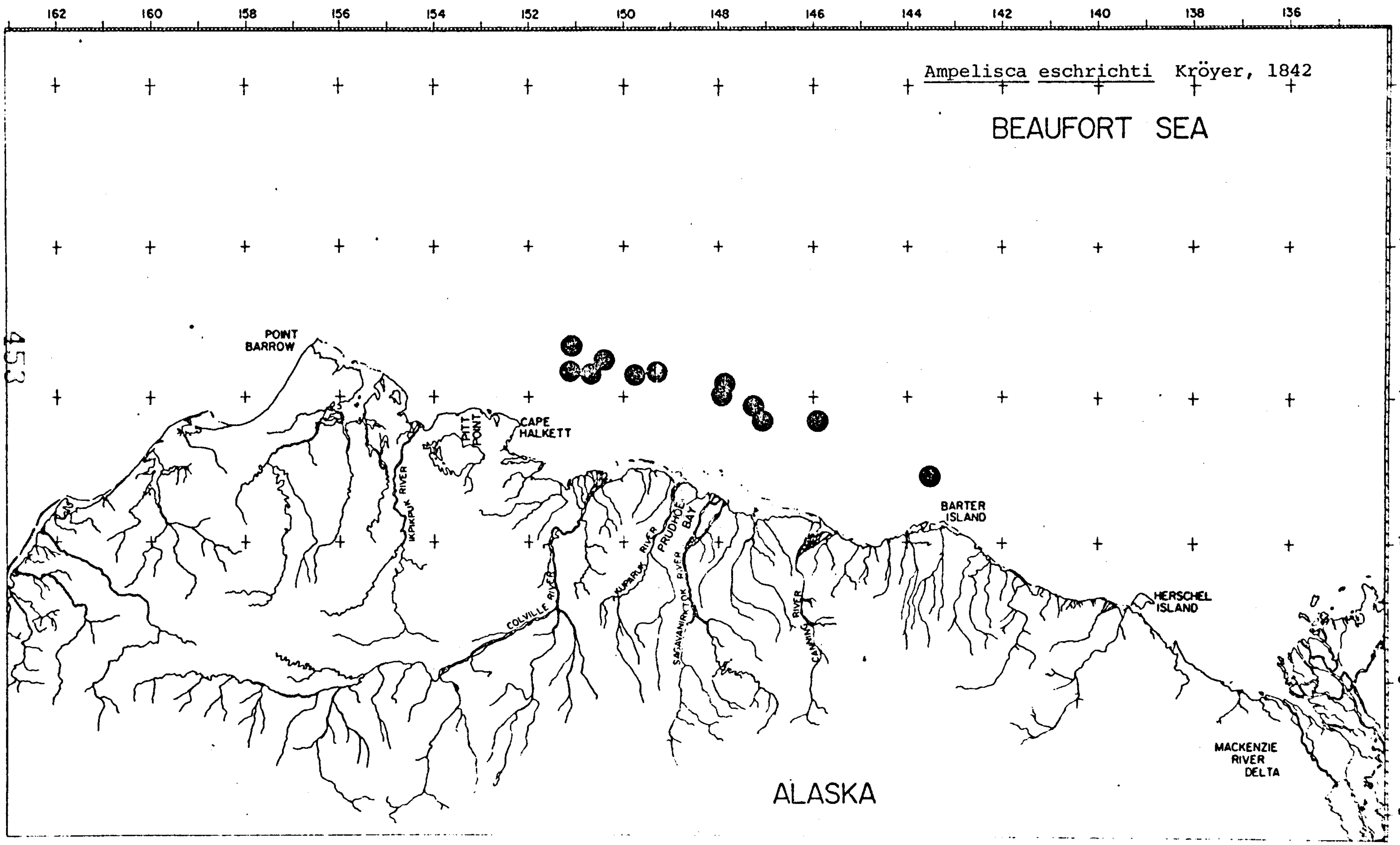


<u>Aceroides</u> <u>latipes</u> G. Sars, 1892



Ampelisca birulai Brüggen, 1909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Ampelisca eschrichti Kröyer, 1842
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IKPIKPUK RIVER
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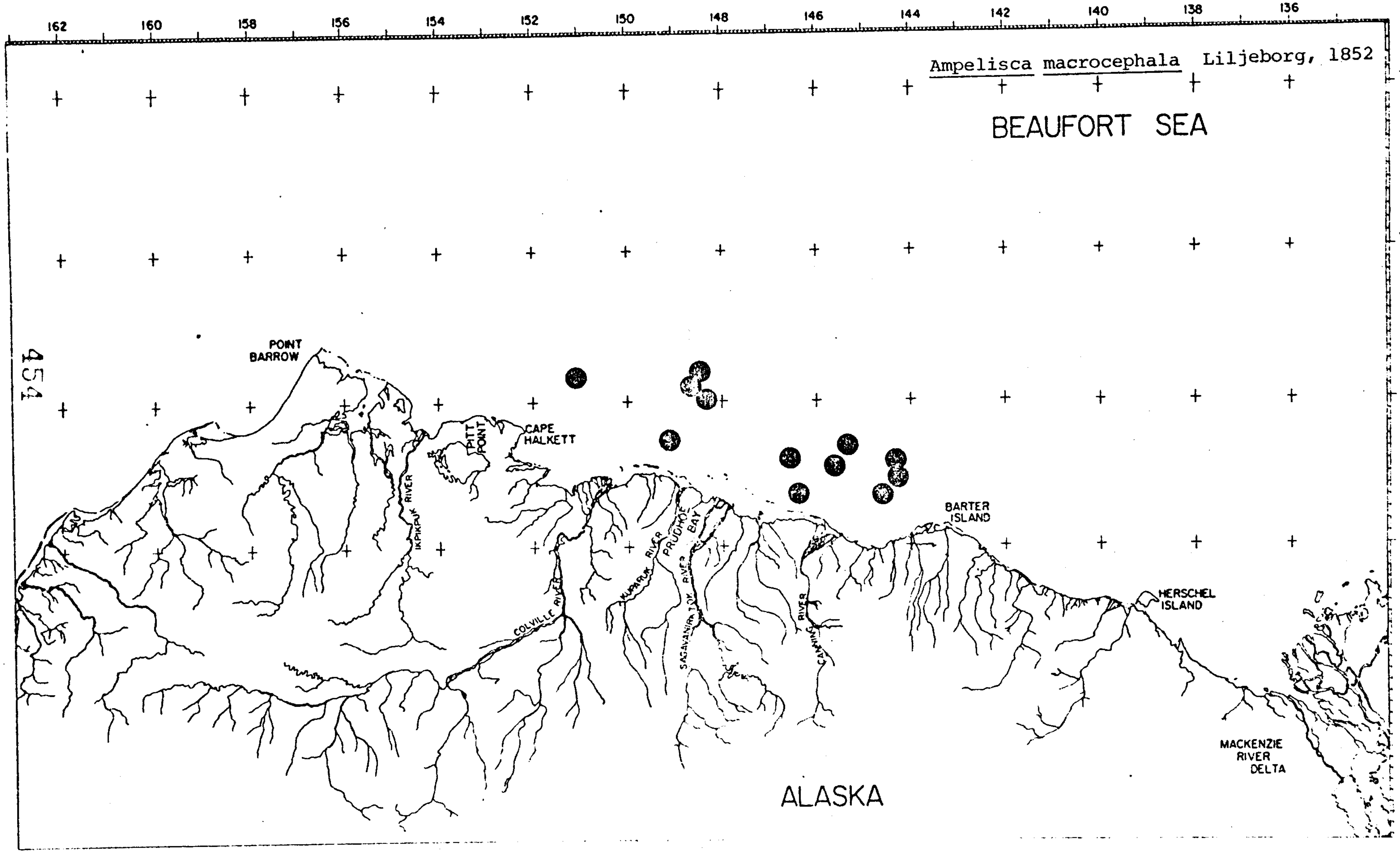
Ampelisca macrocephala Liljeborg, 1852
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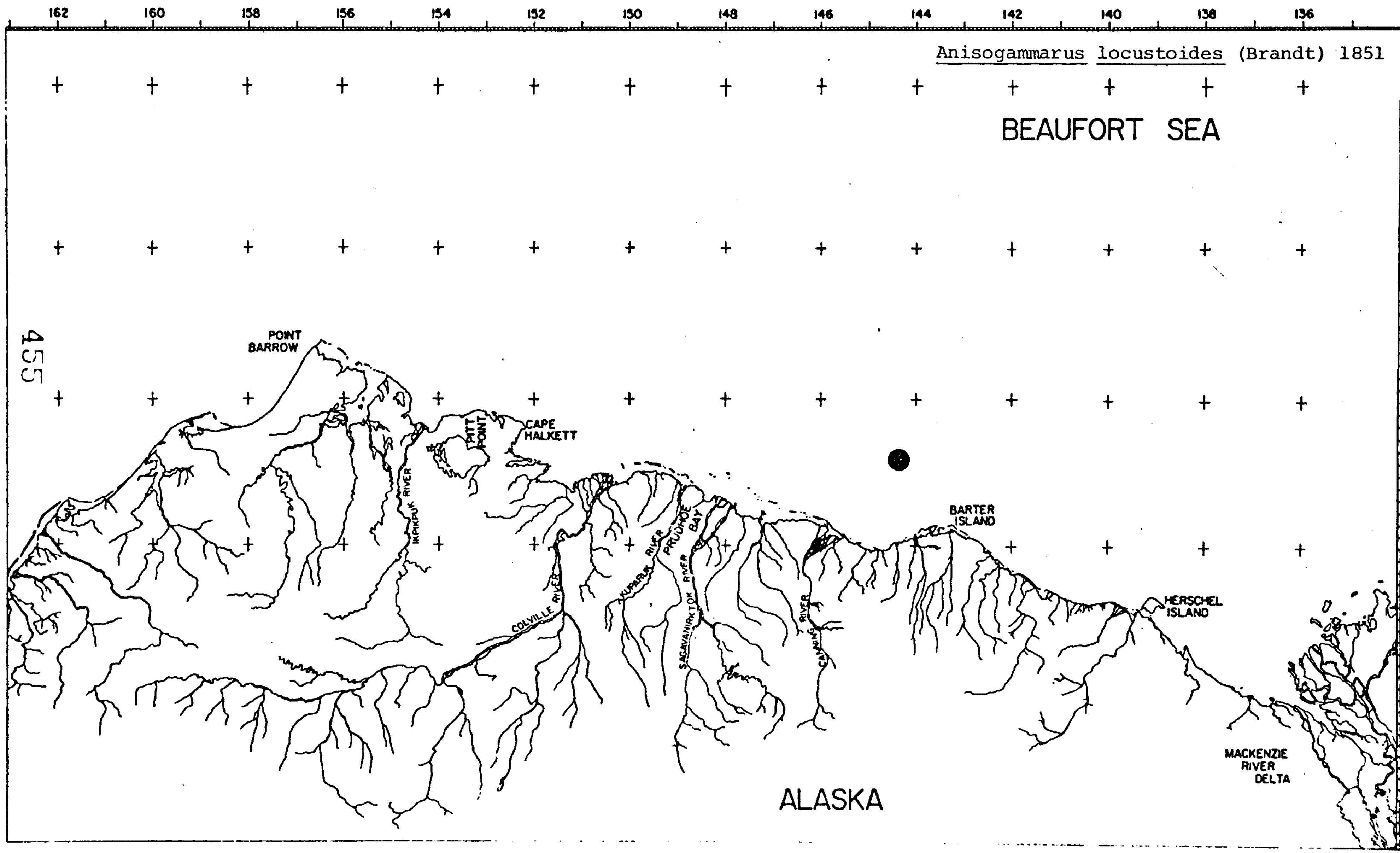
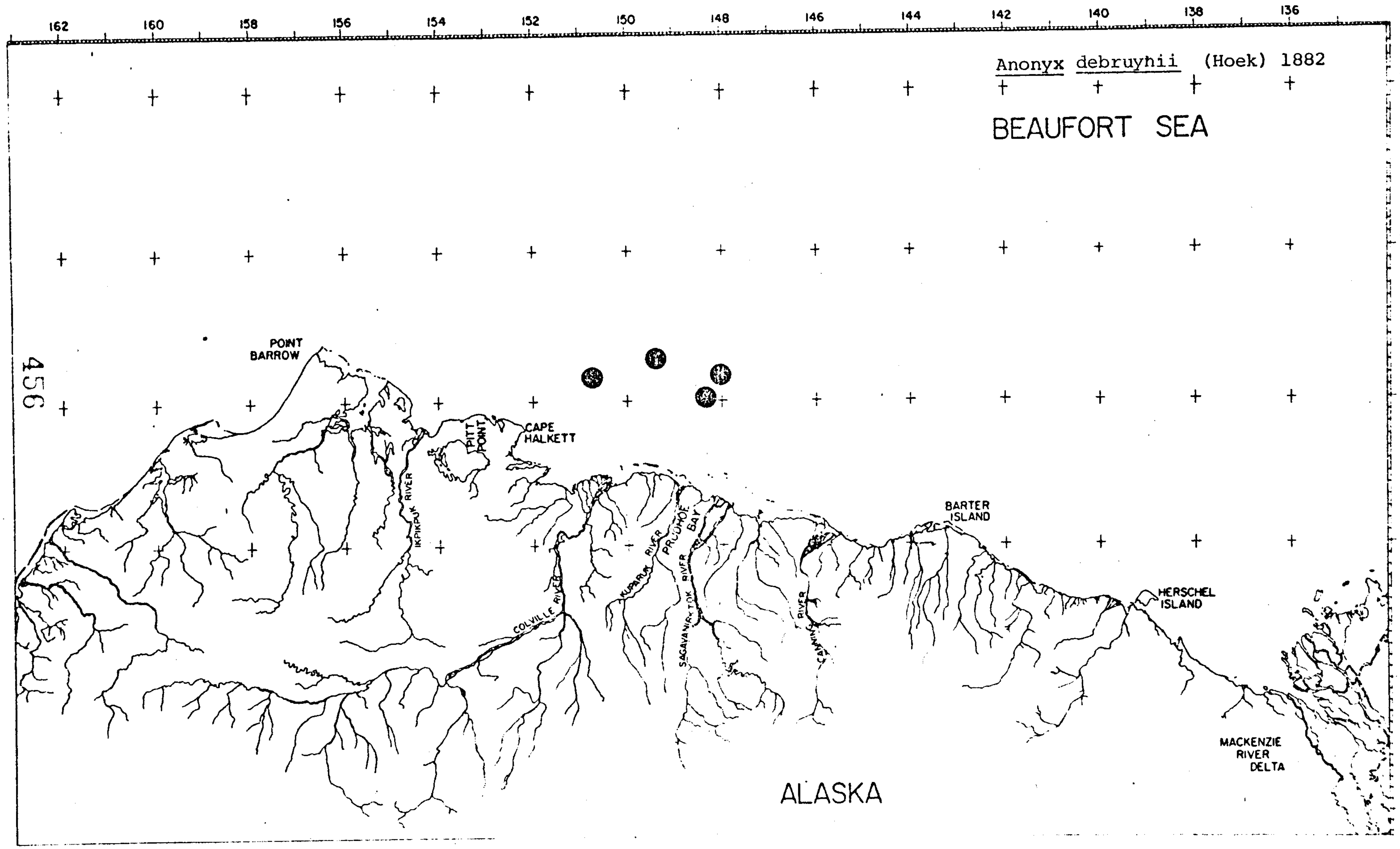


Anisogammarus locustoides (Brandt) 1851


Anonyx debruyhii (Hoek) 1882
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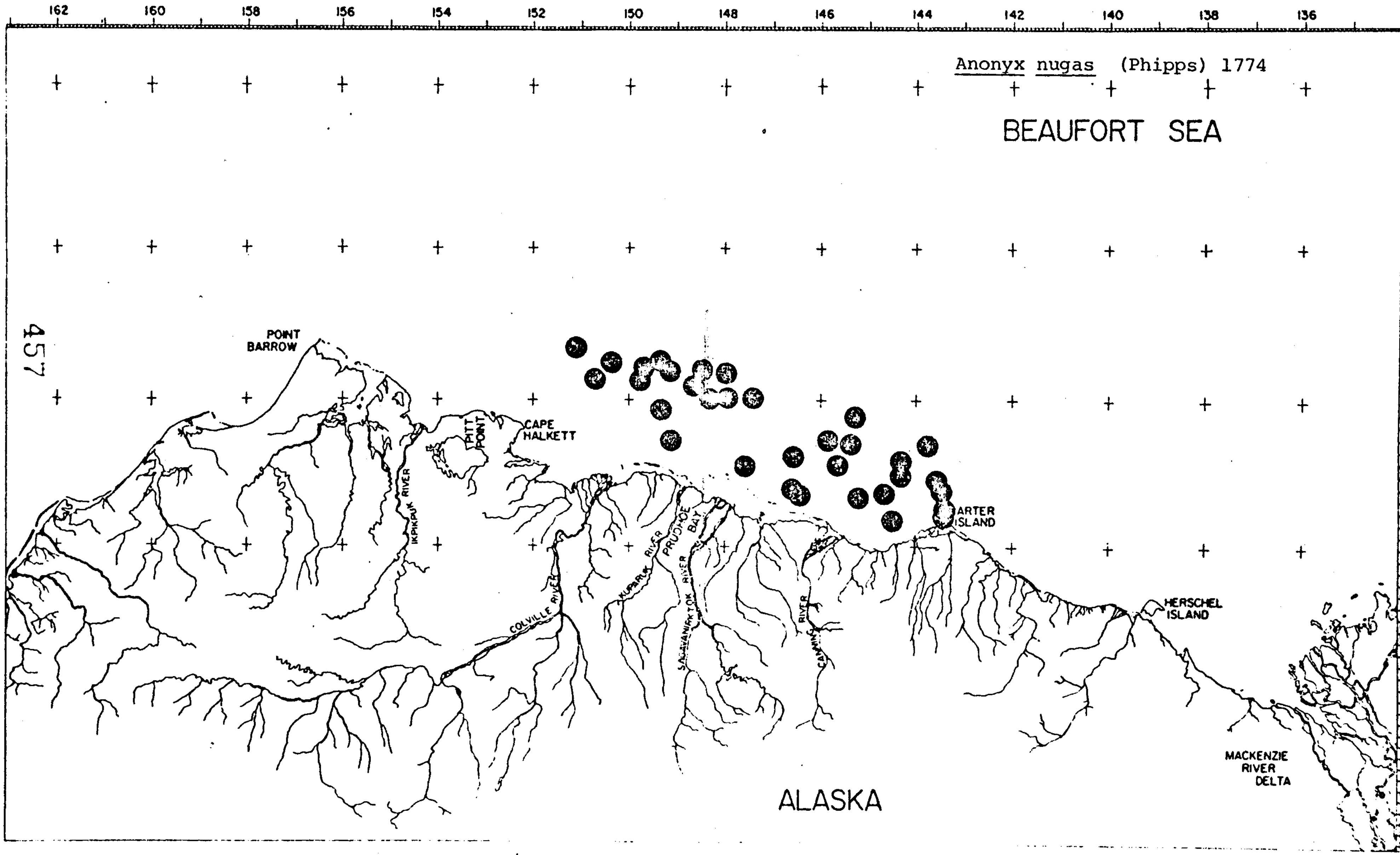
Anonyx nugas (Phipps) 1774
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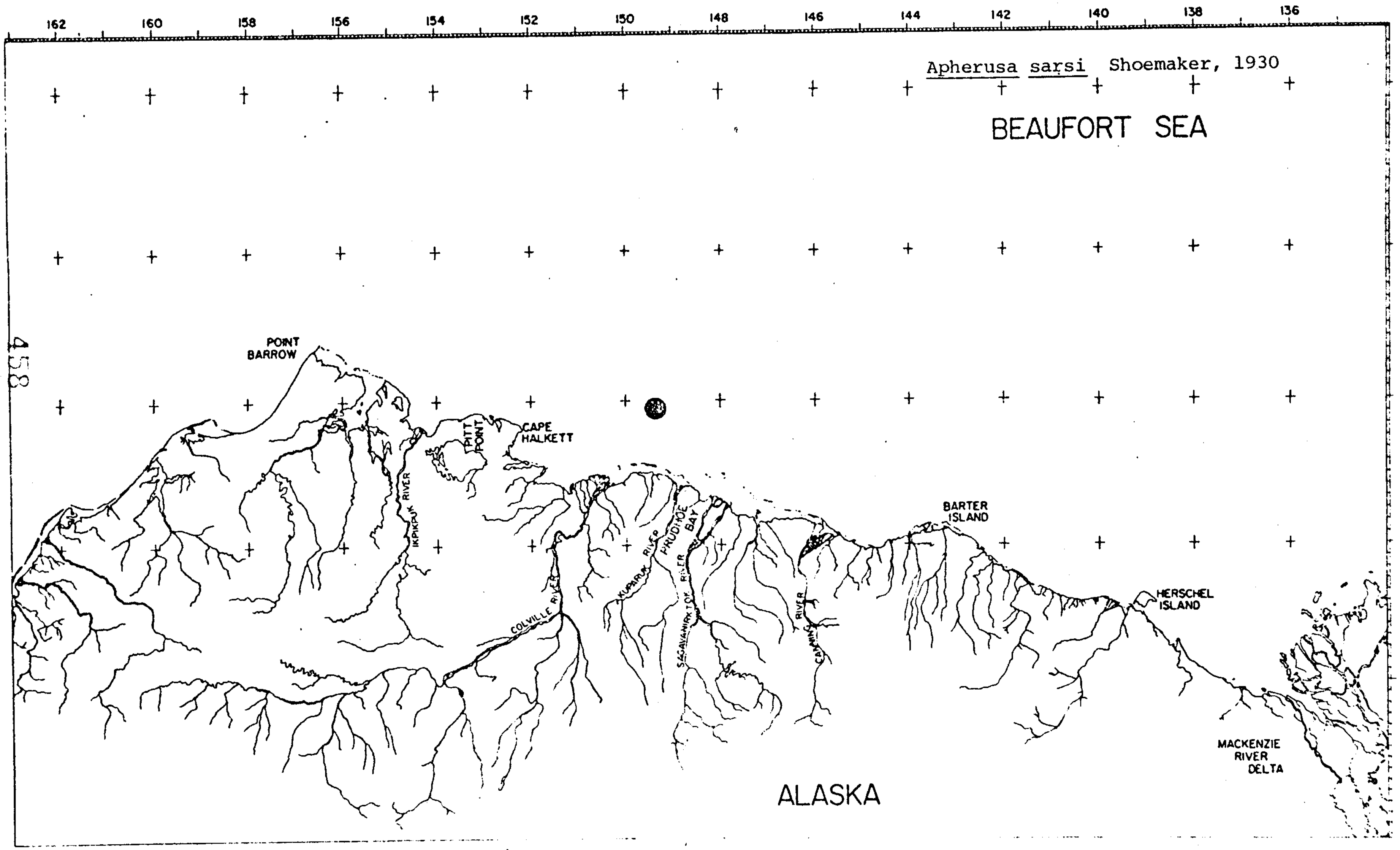
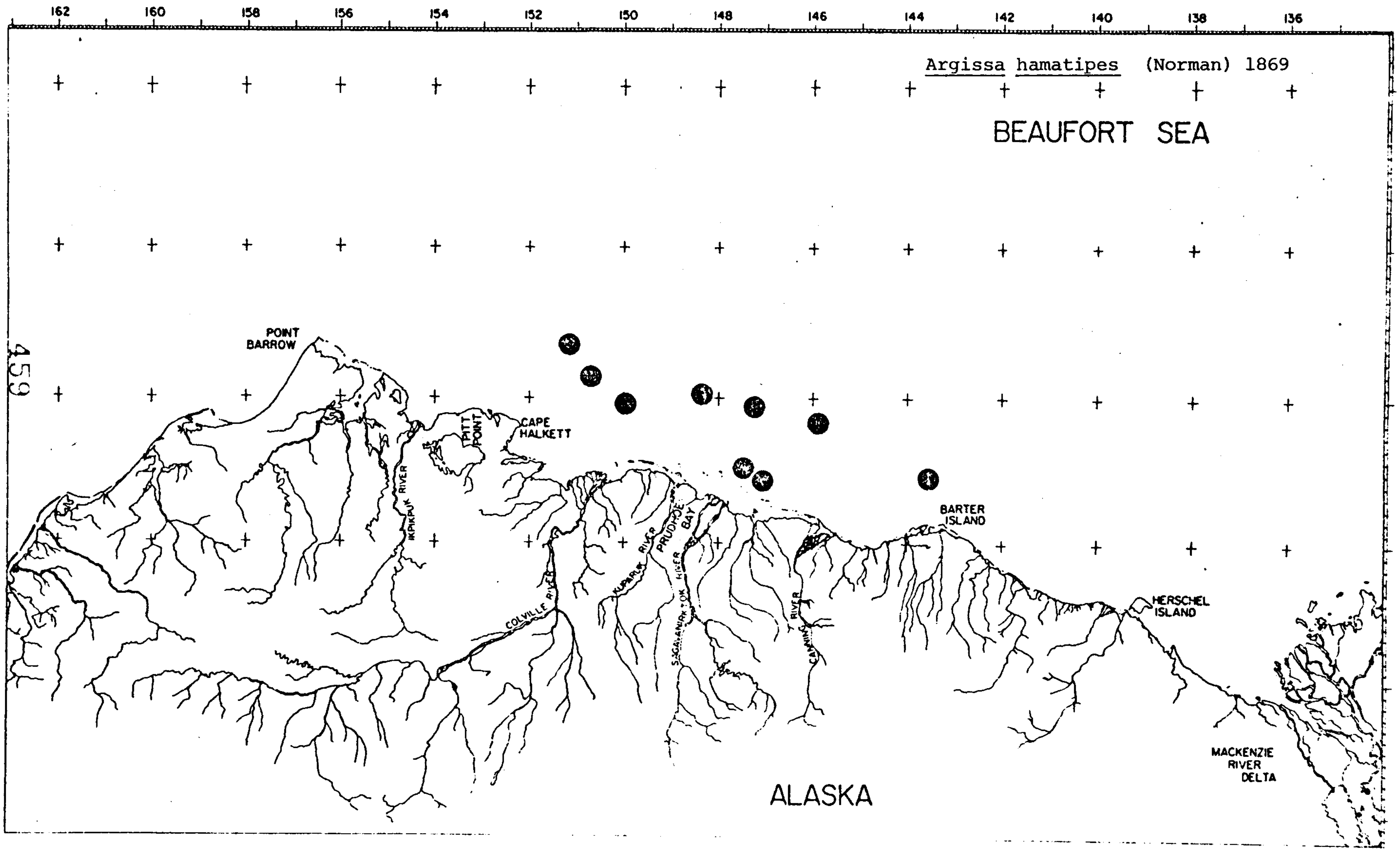


Apherusa sarsi Shoemaker, 1930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Argissa hamatipes (Norman) 1869
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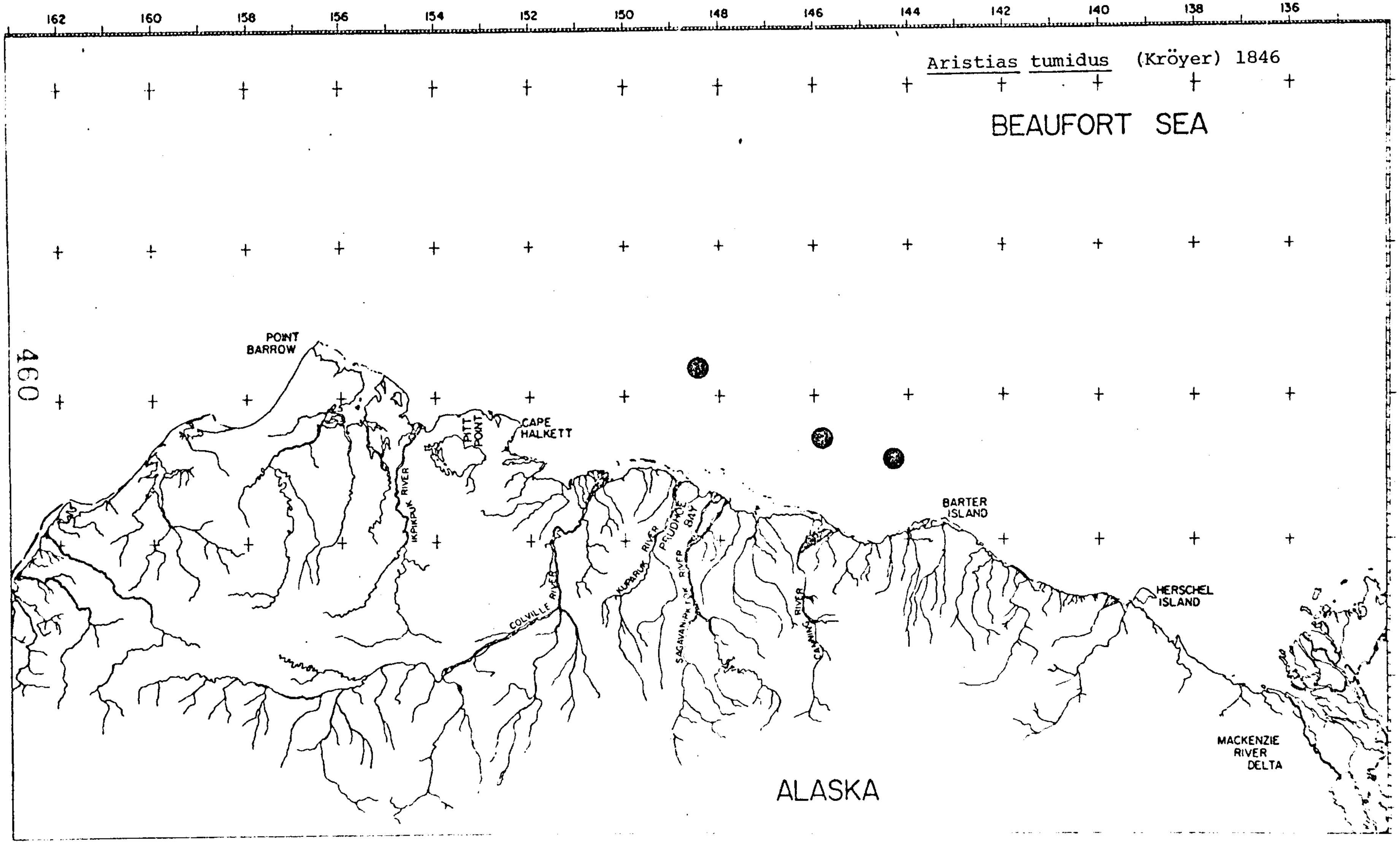

Aristias tumidus (Kröyer) 1846
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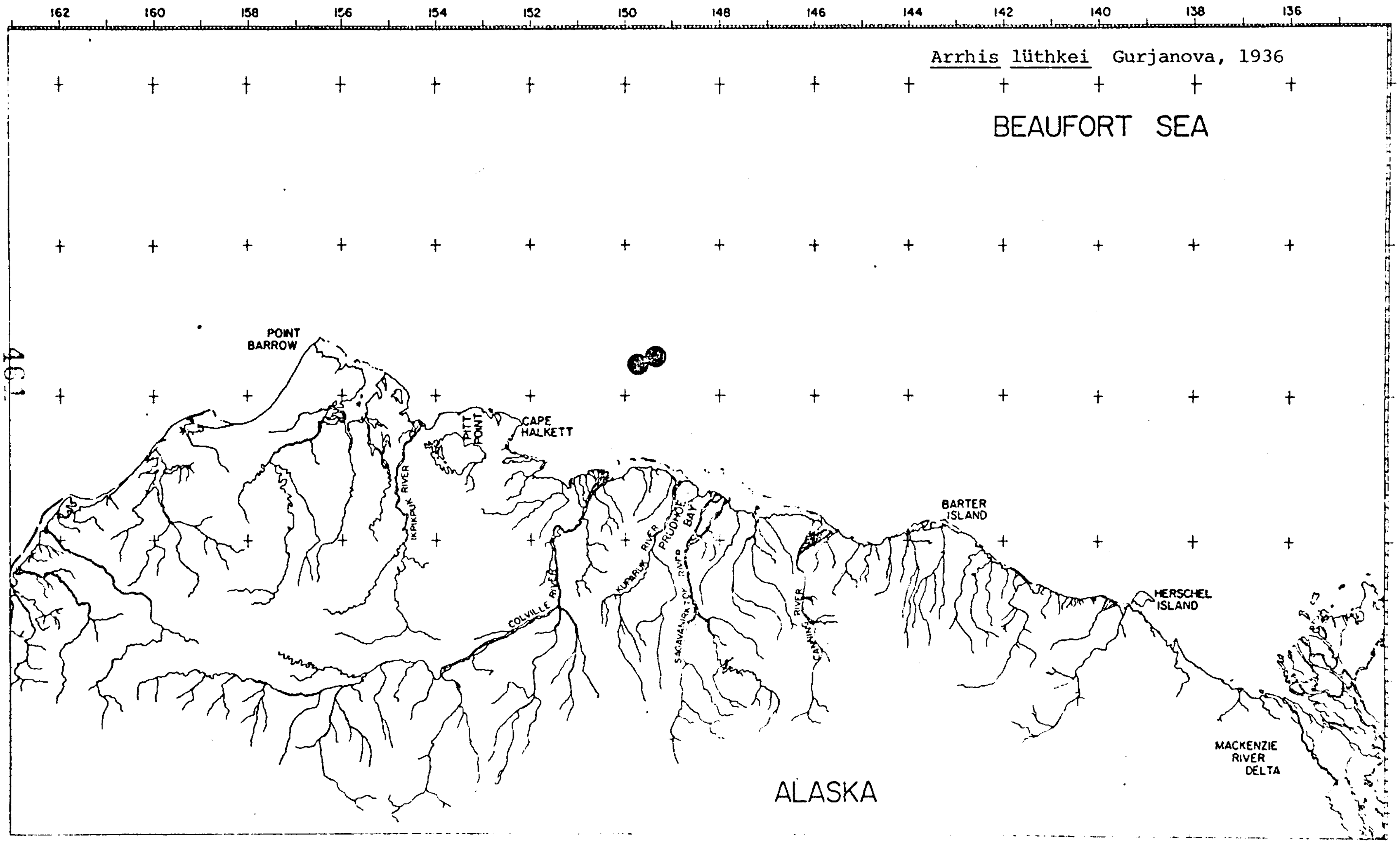
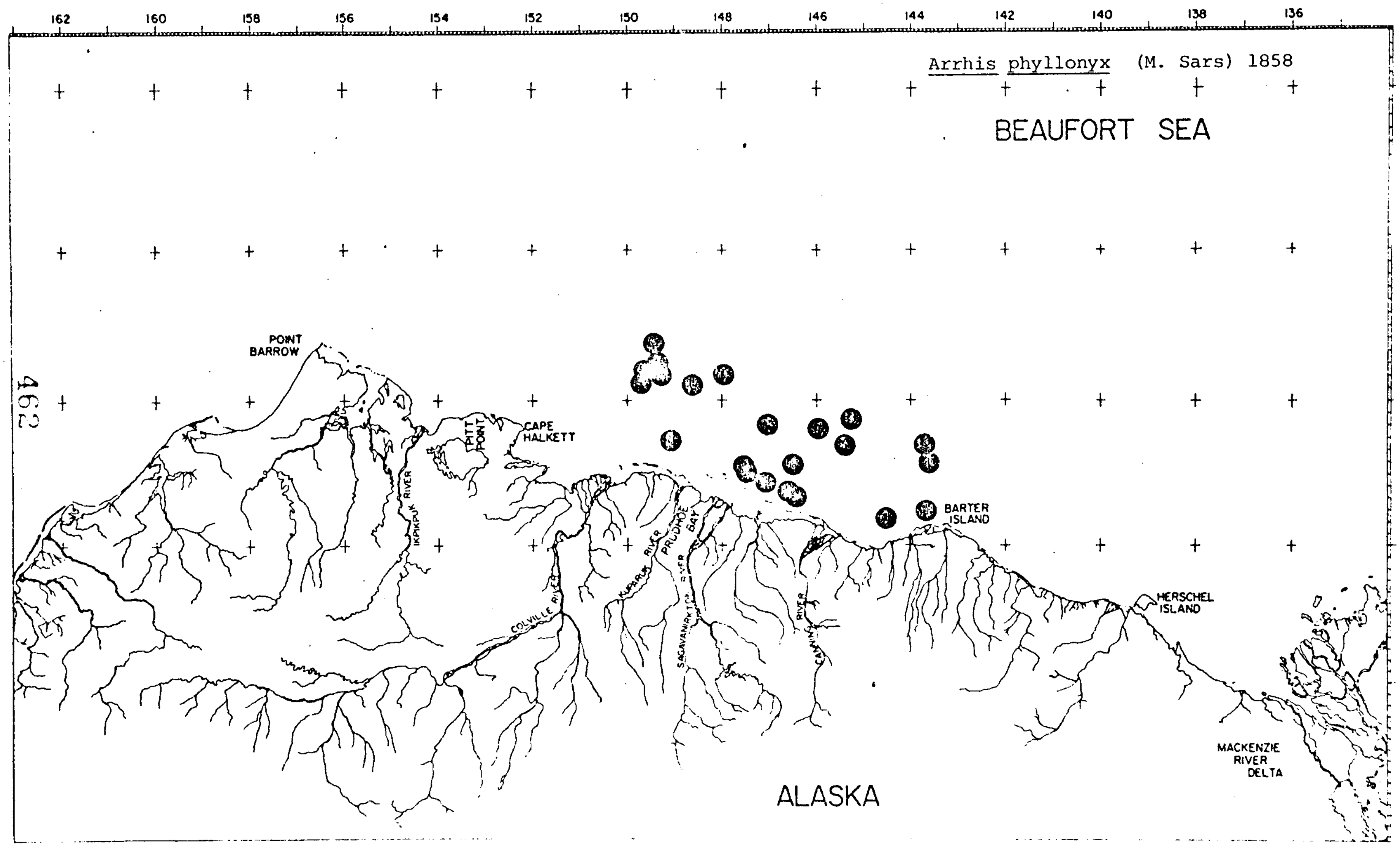
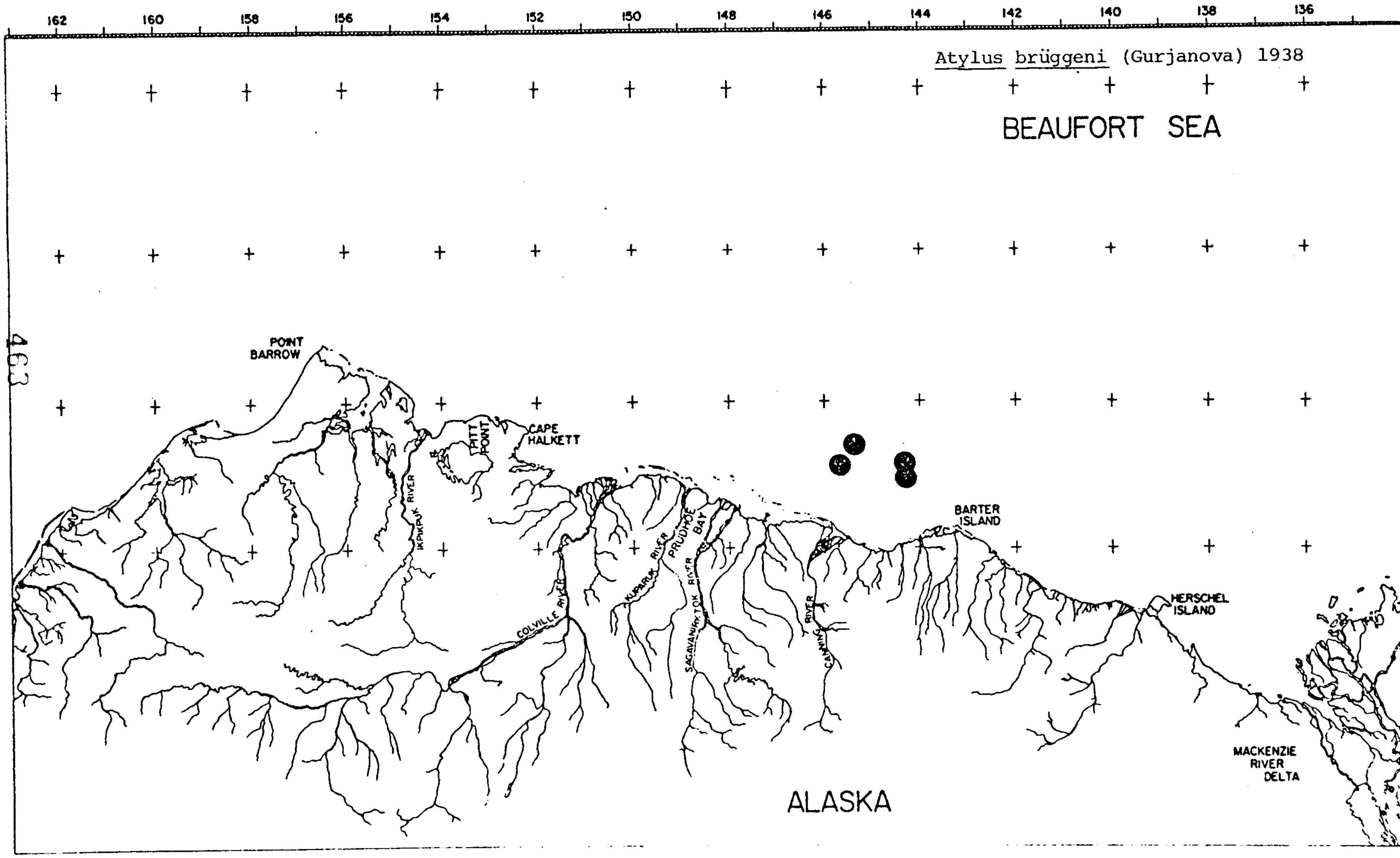
Arrhis lüthkei Gurjanova, 1936





Arrhis phyllonyx (M. Sars) 1858


Atylus brüggeni (Gurjanova) 1938
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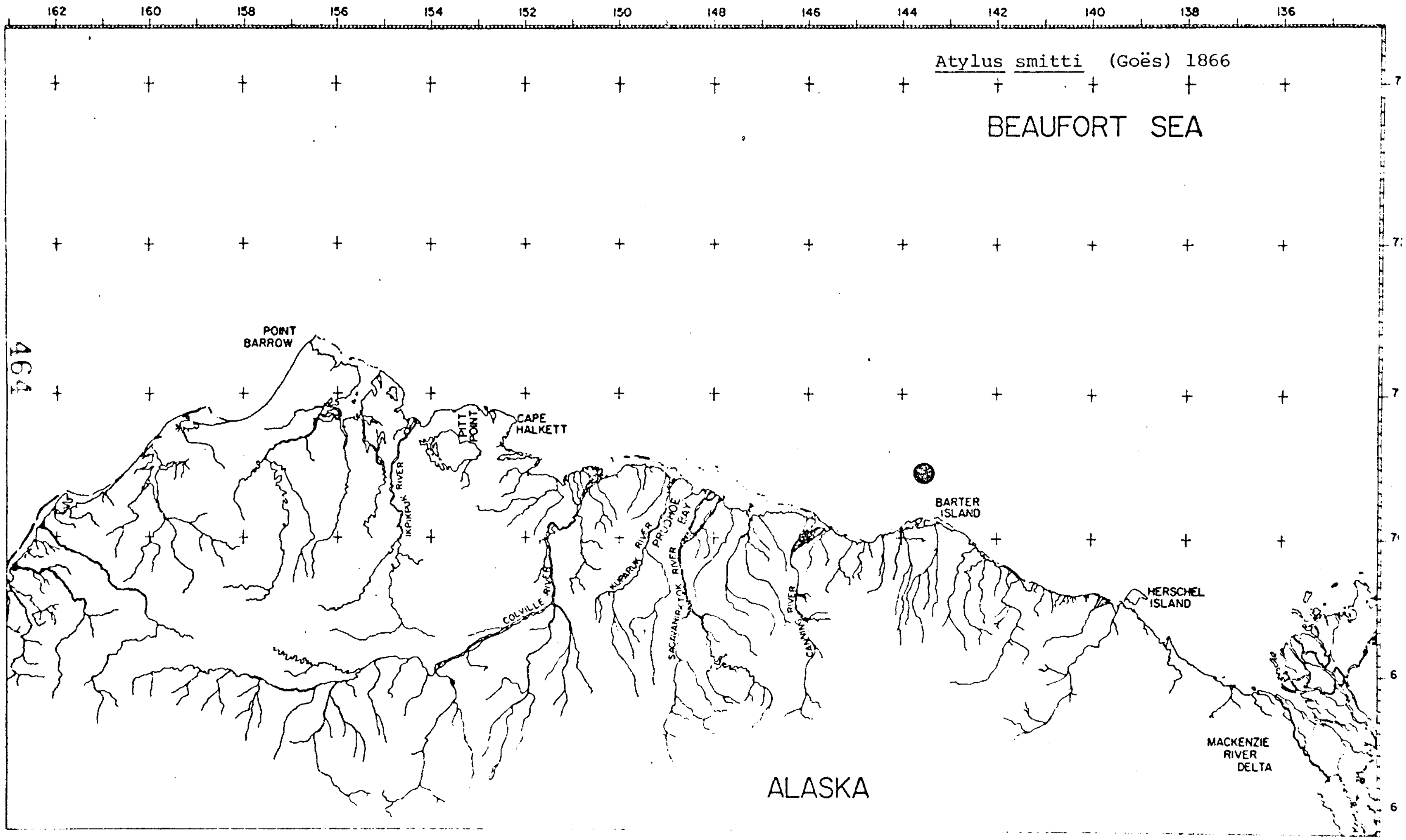
Atylus smitti (Goës) 1866
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CAPE HALKETT
PITT POINT
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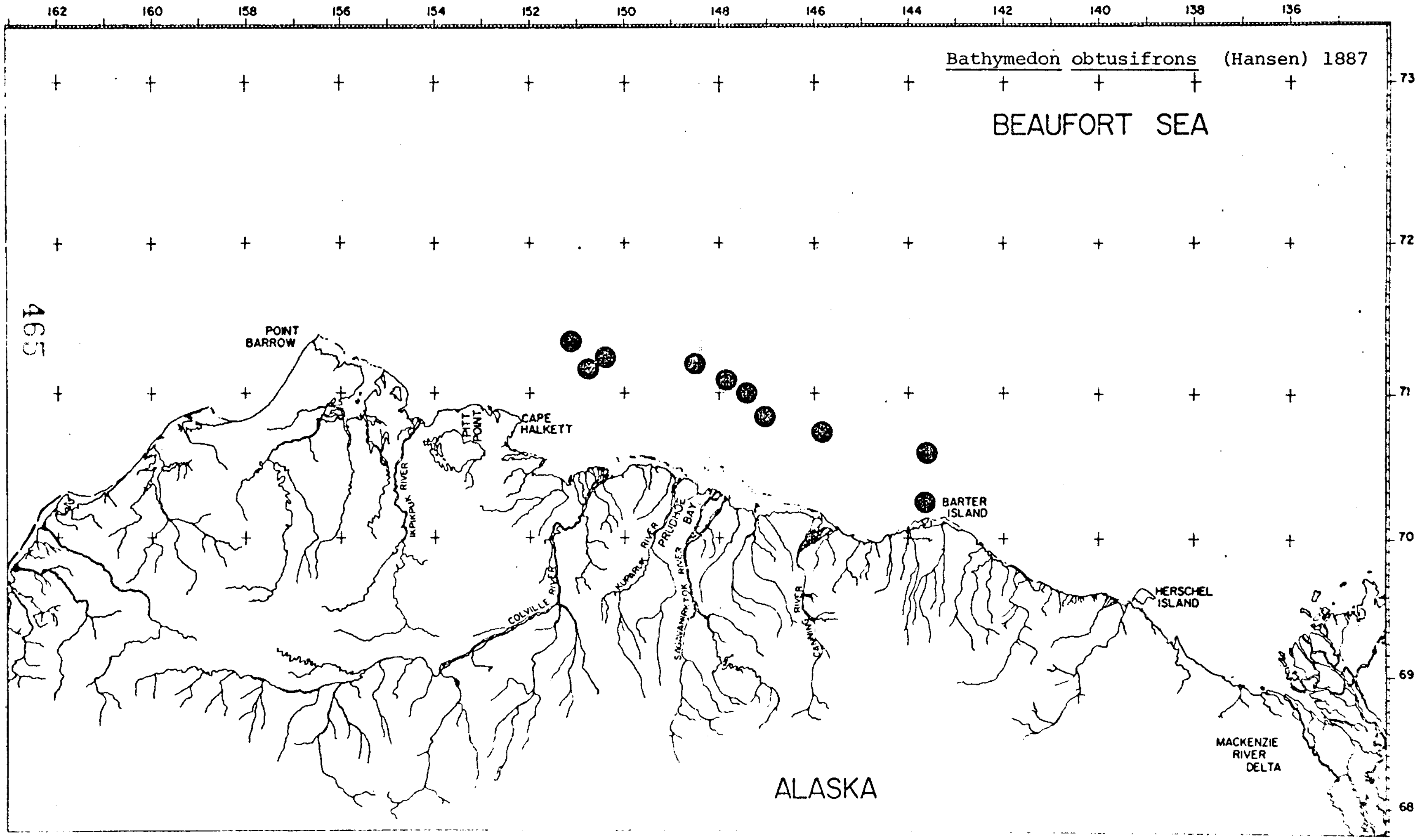
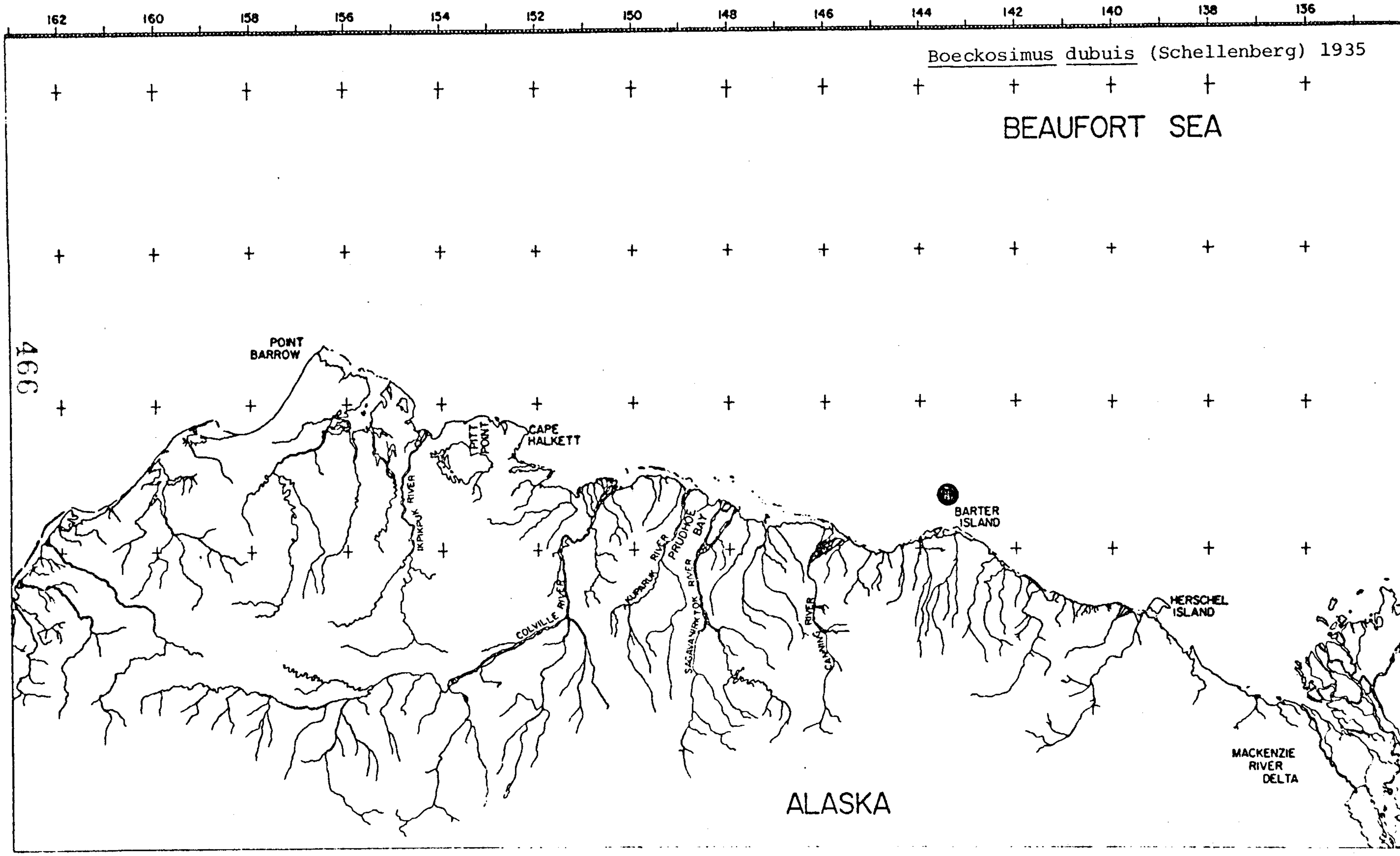
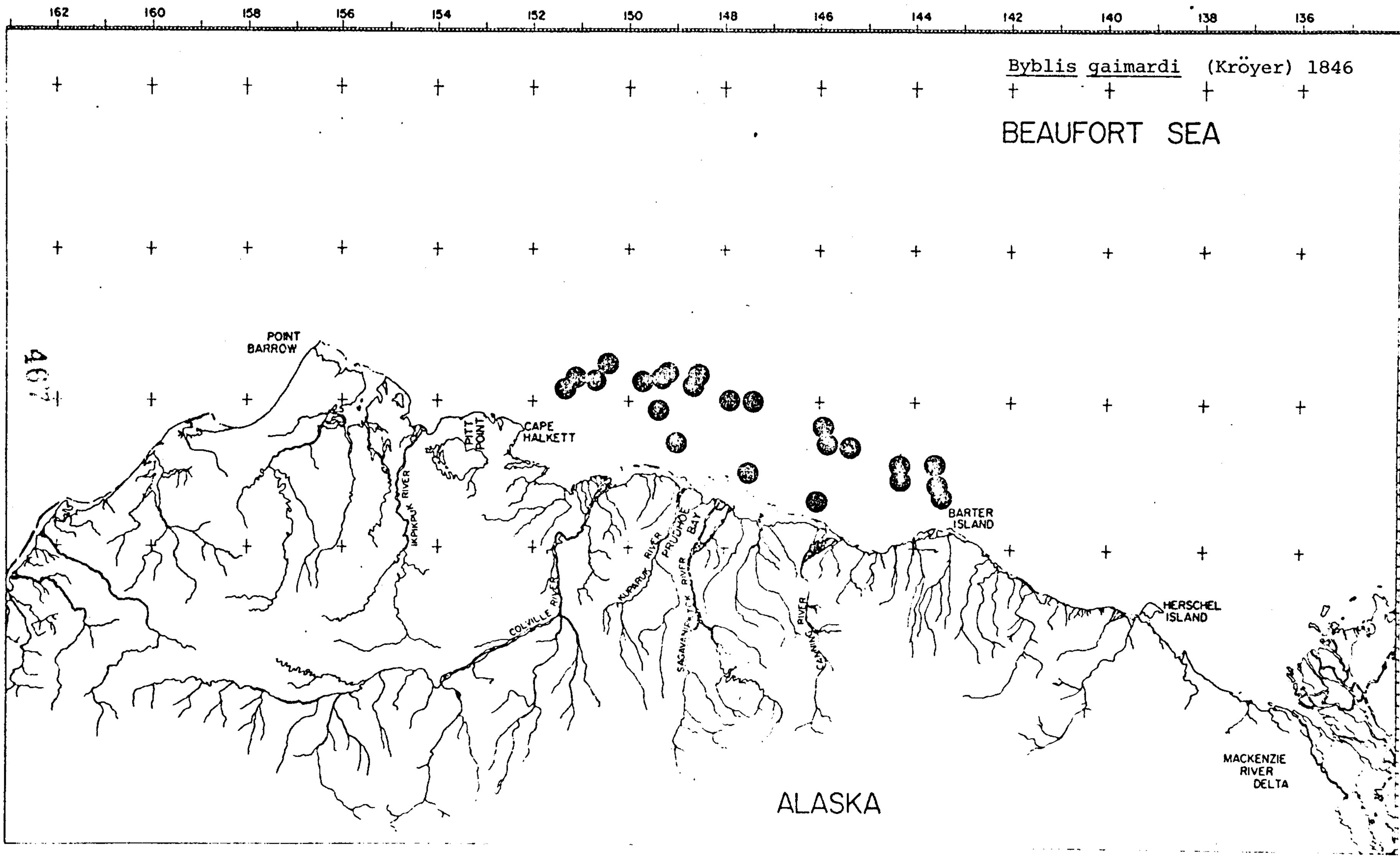


<u>Bathymedon</u> <u>obtusifrons</u> (Hansen) 1887

Boeckosimus dubuis (Schellenberg) 1935




Byblis gaimardi (Kröyer) 1846
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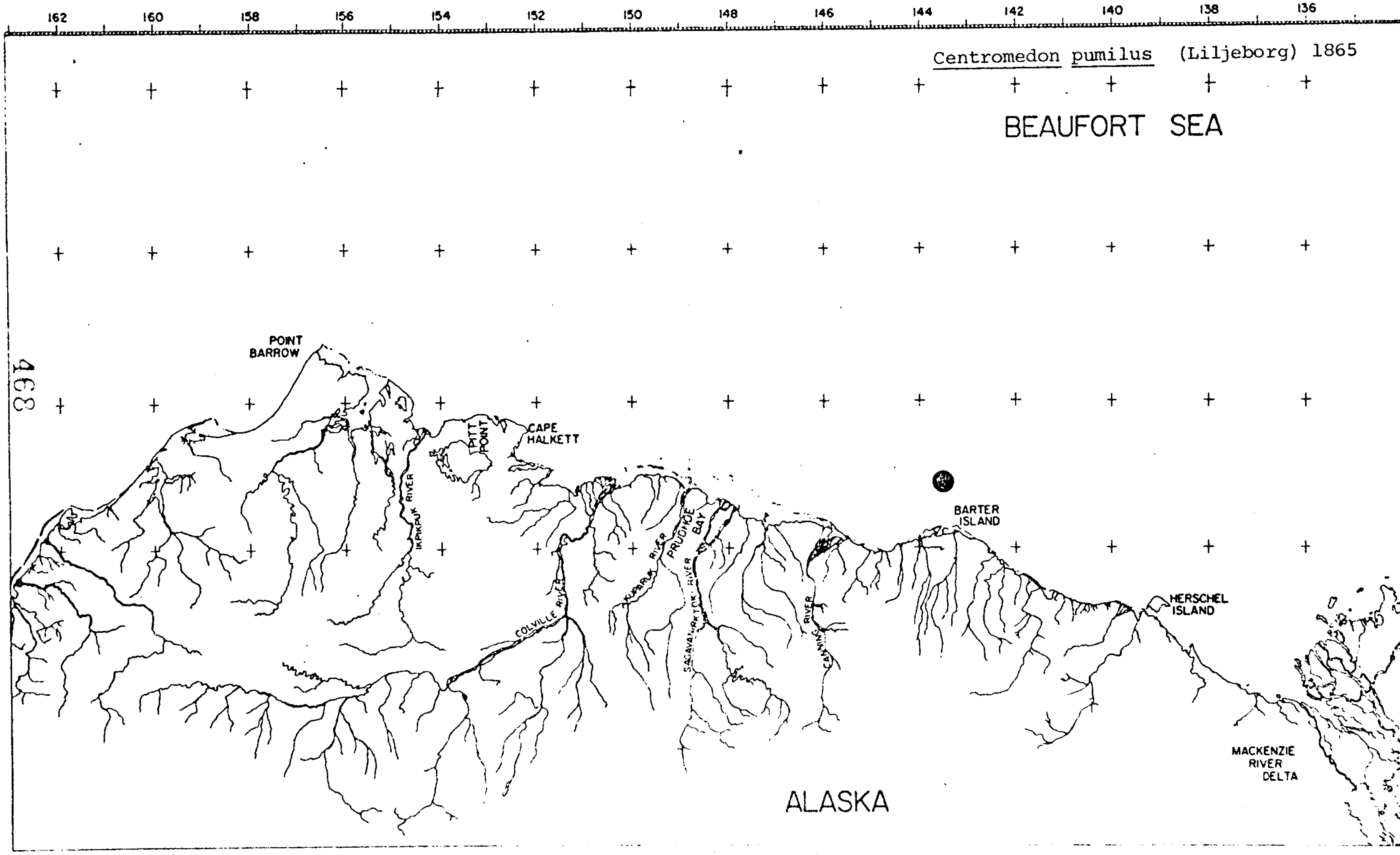
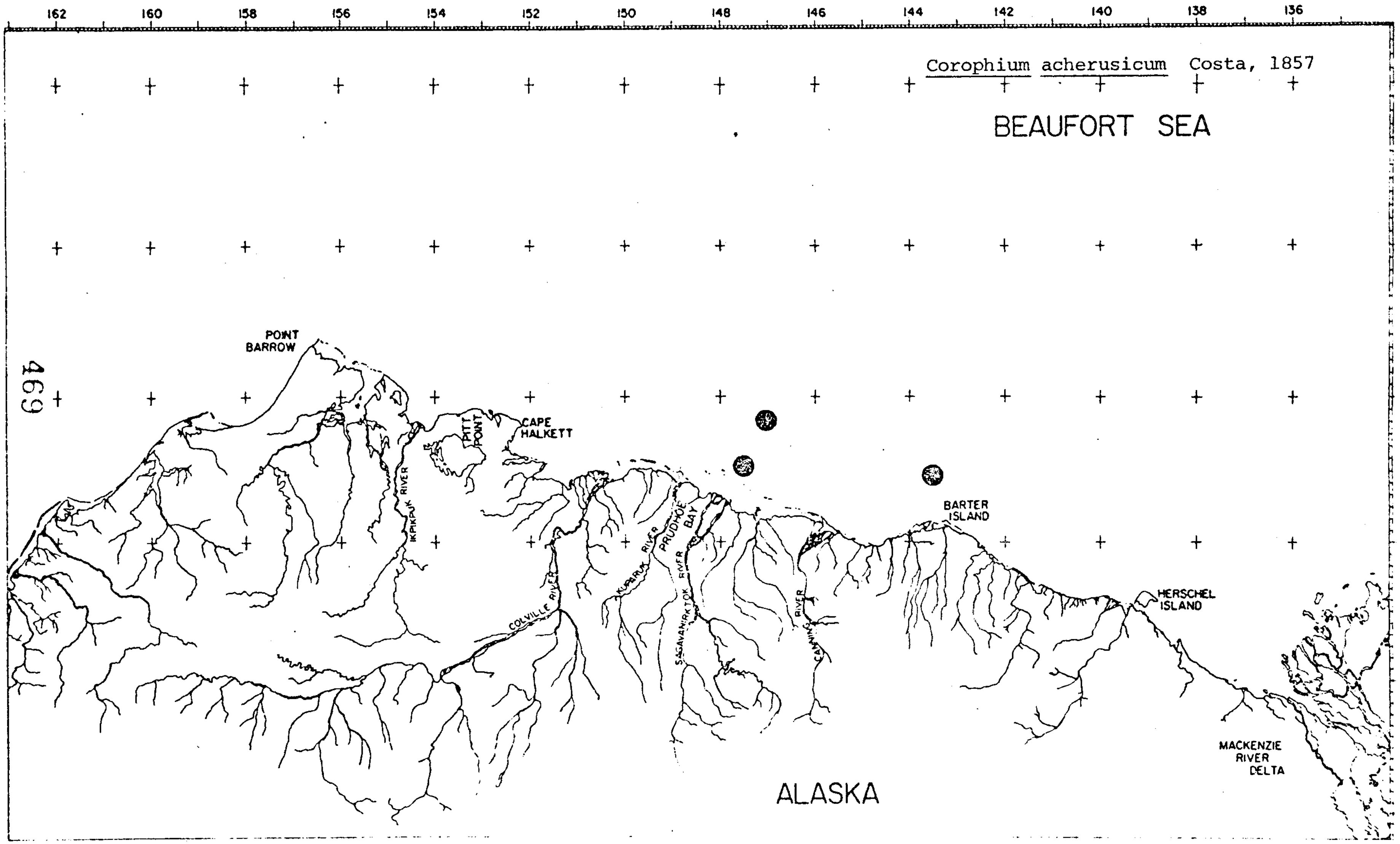


Centromedon pumilus (Liljeborg) 1865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Corophium acherusicum Costa, 1857
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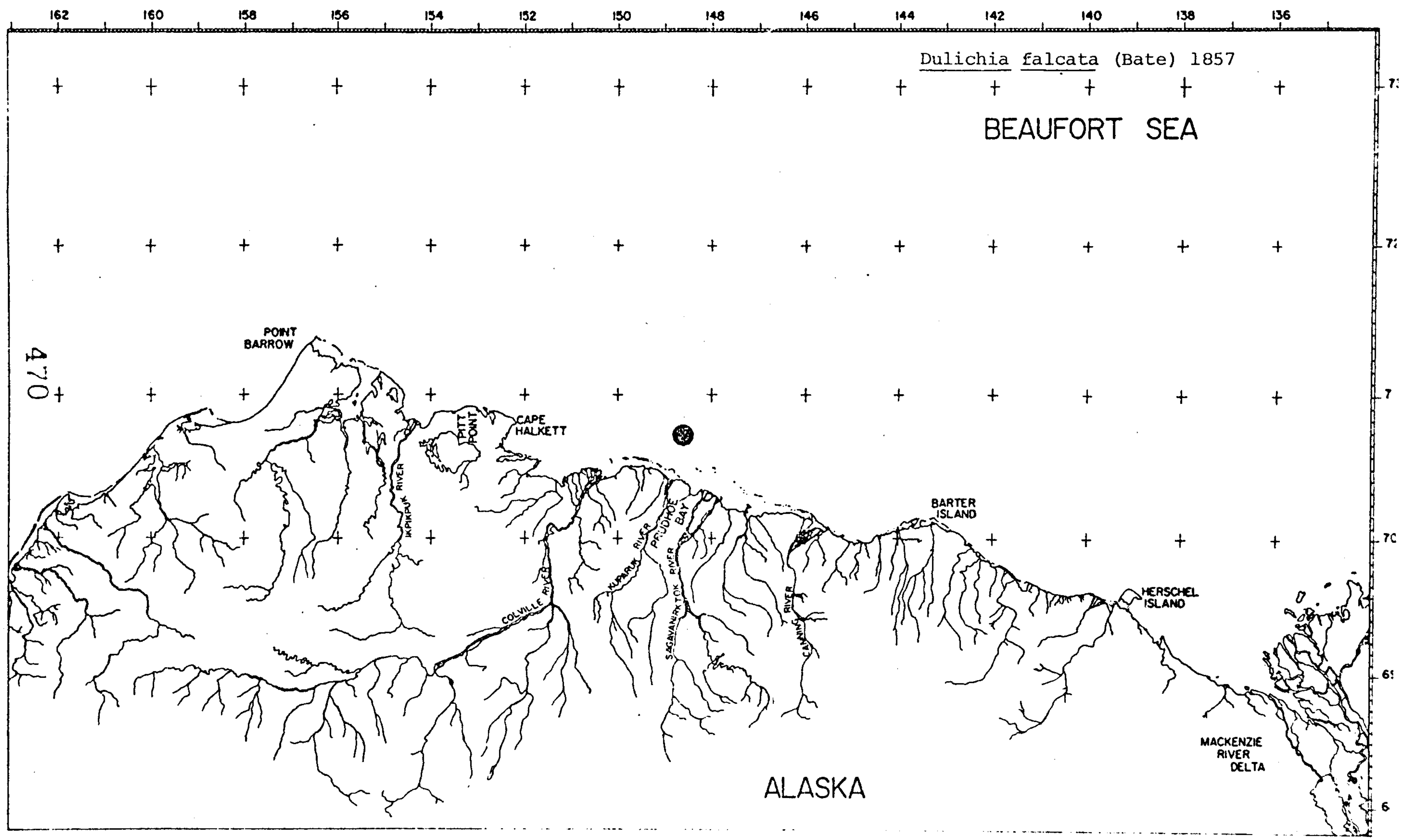
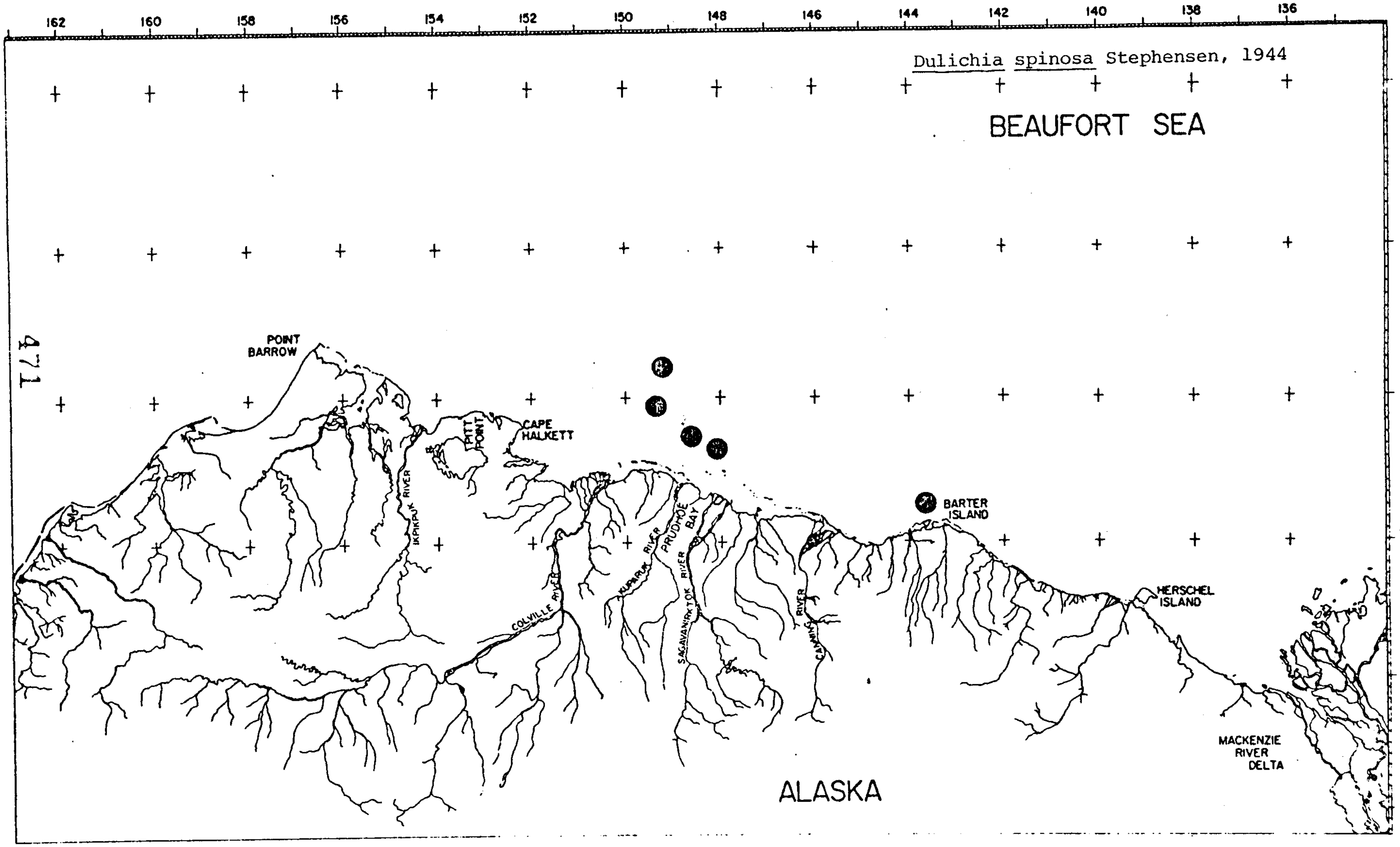


Dulichia falcata (Bate) 1857



Dulichia spinosa Stephensen, 1944
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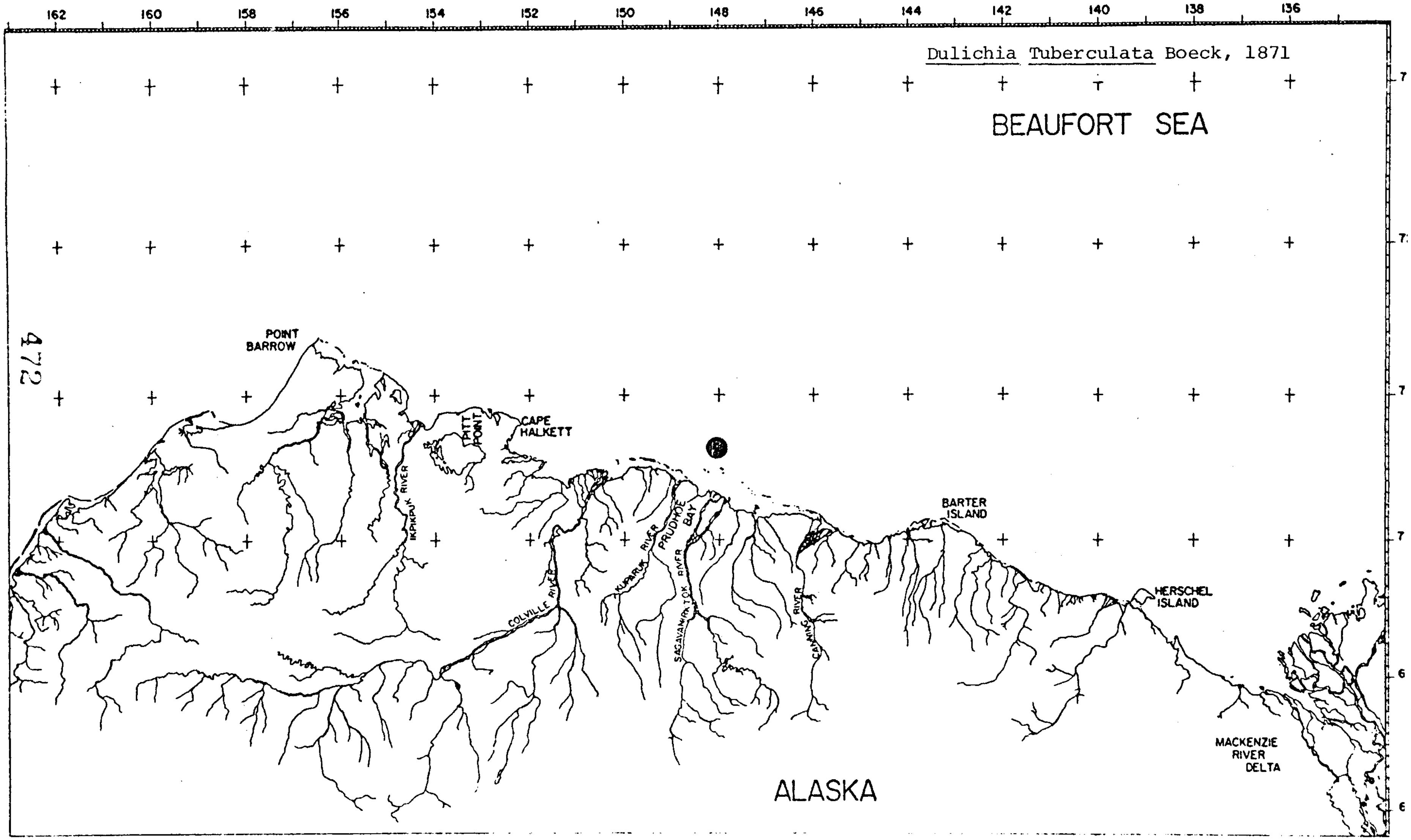
Dulichia Tuberculata Boeck, 1871
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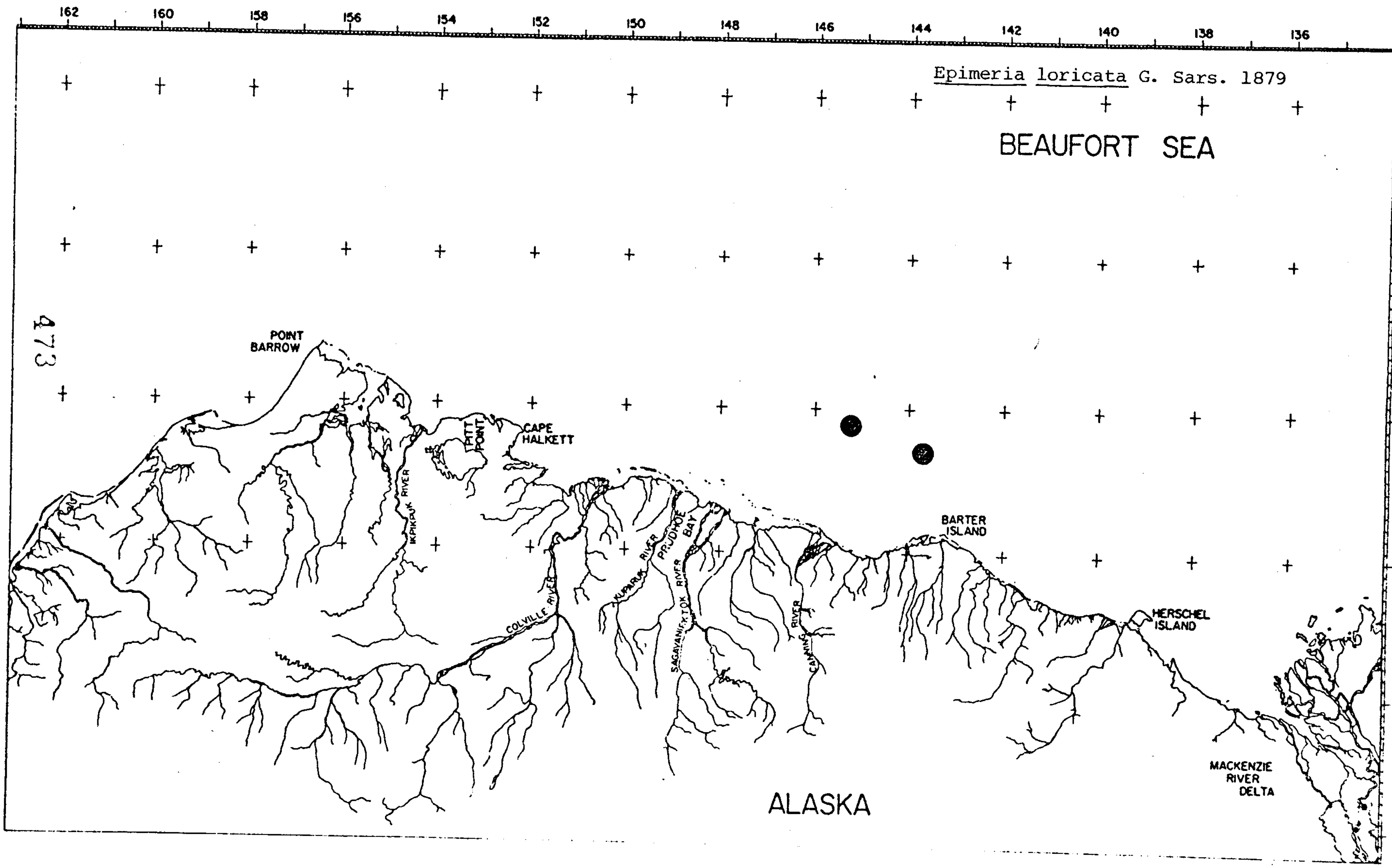
Epimeria loricata G. Sars. 1879
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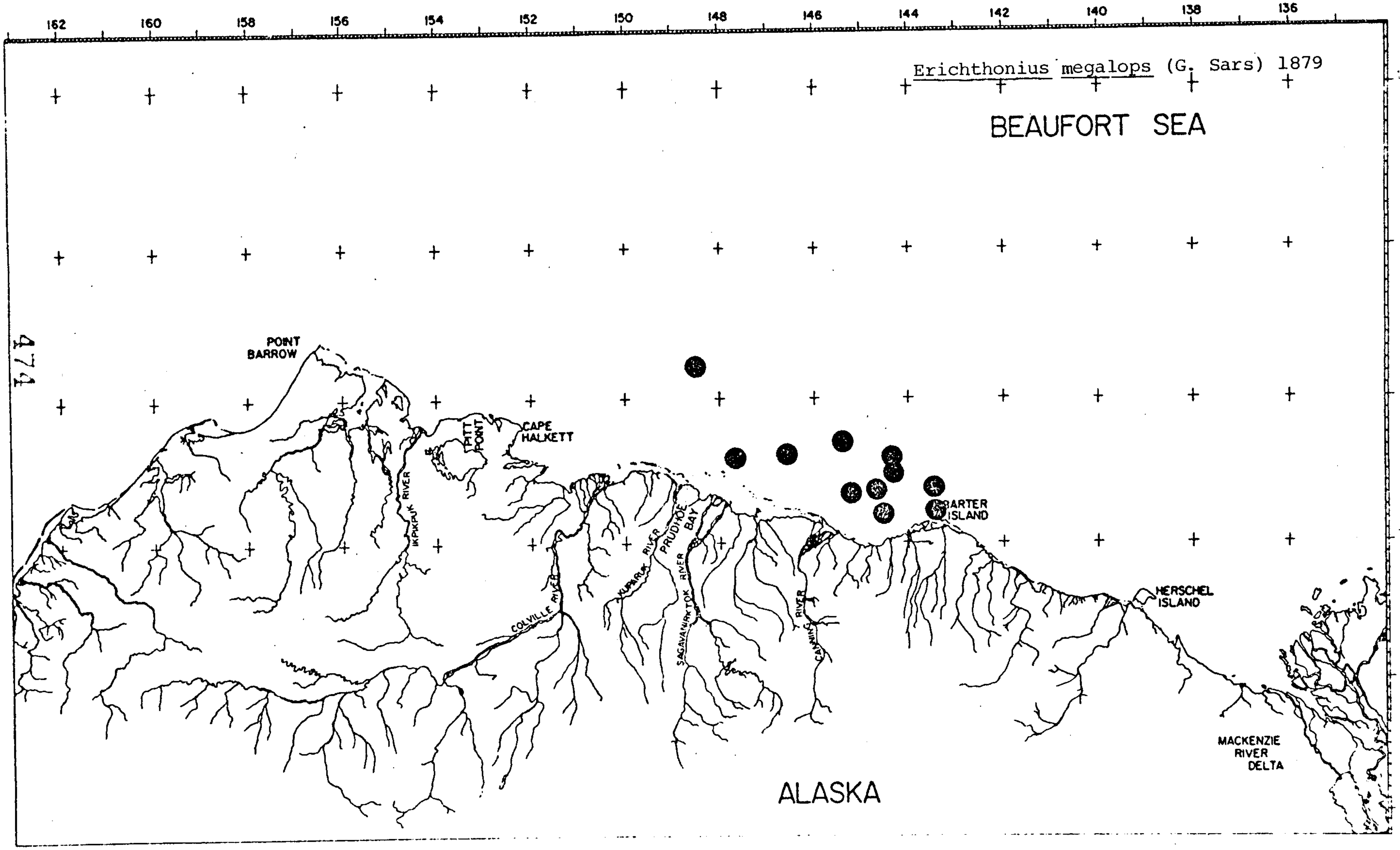
Erichthonius megalops (G. Sars) 1879
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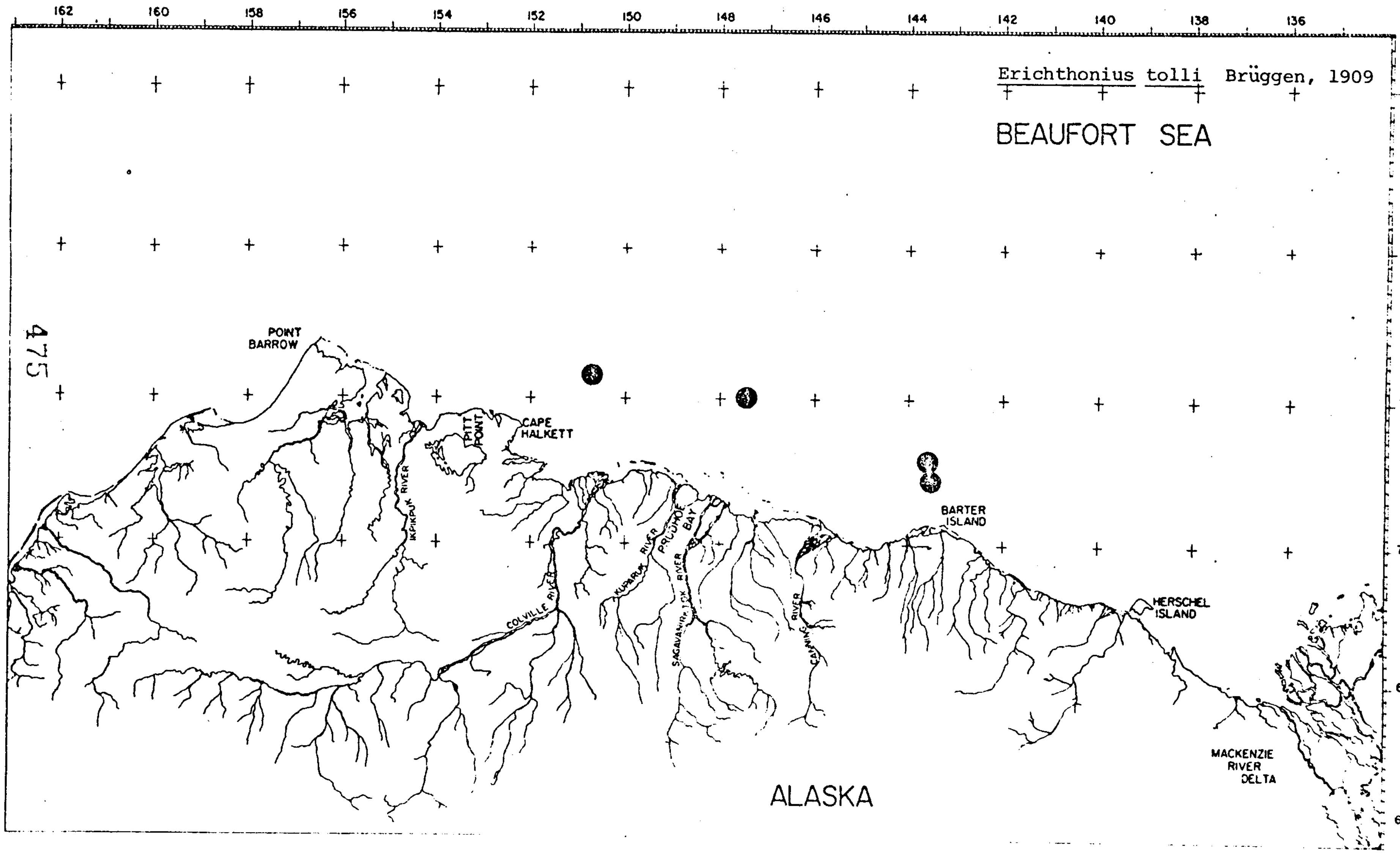
Erichthonius tolli Brüggen, 1909
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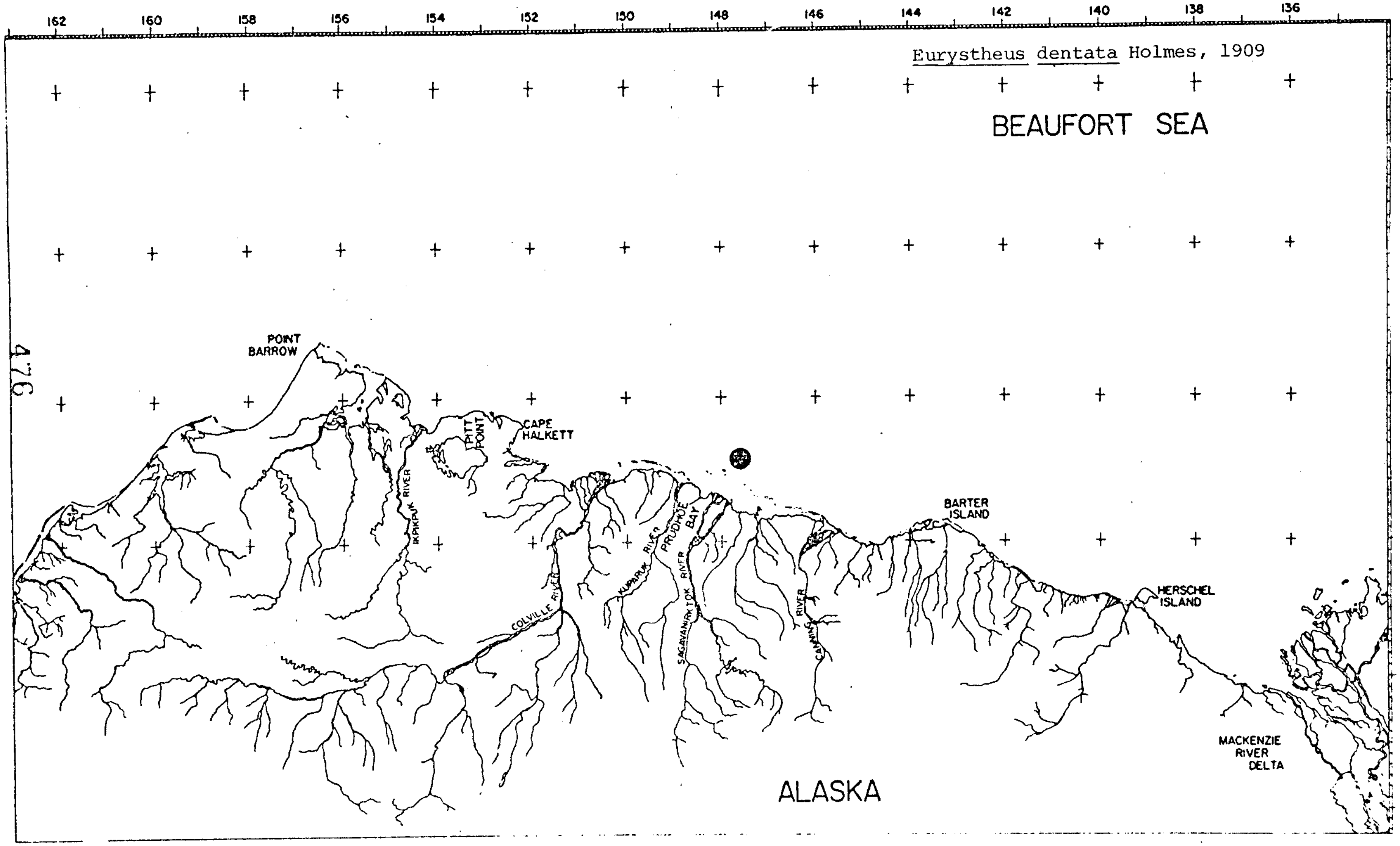
Eurystheus dentata Holmes, 1909
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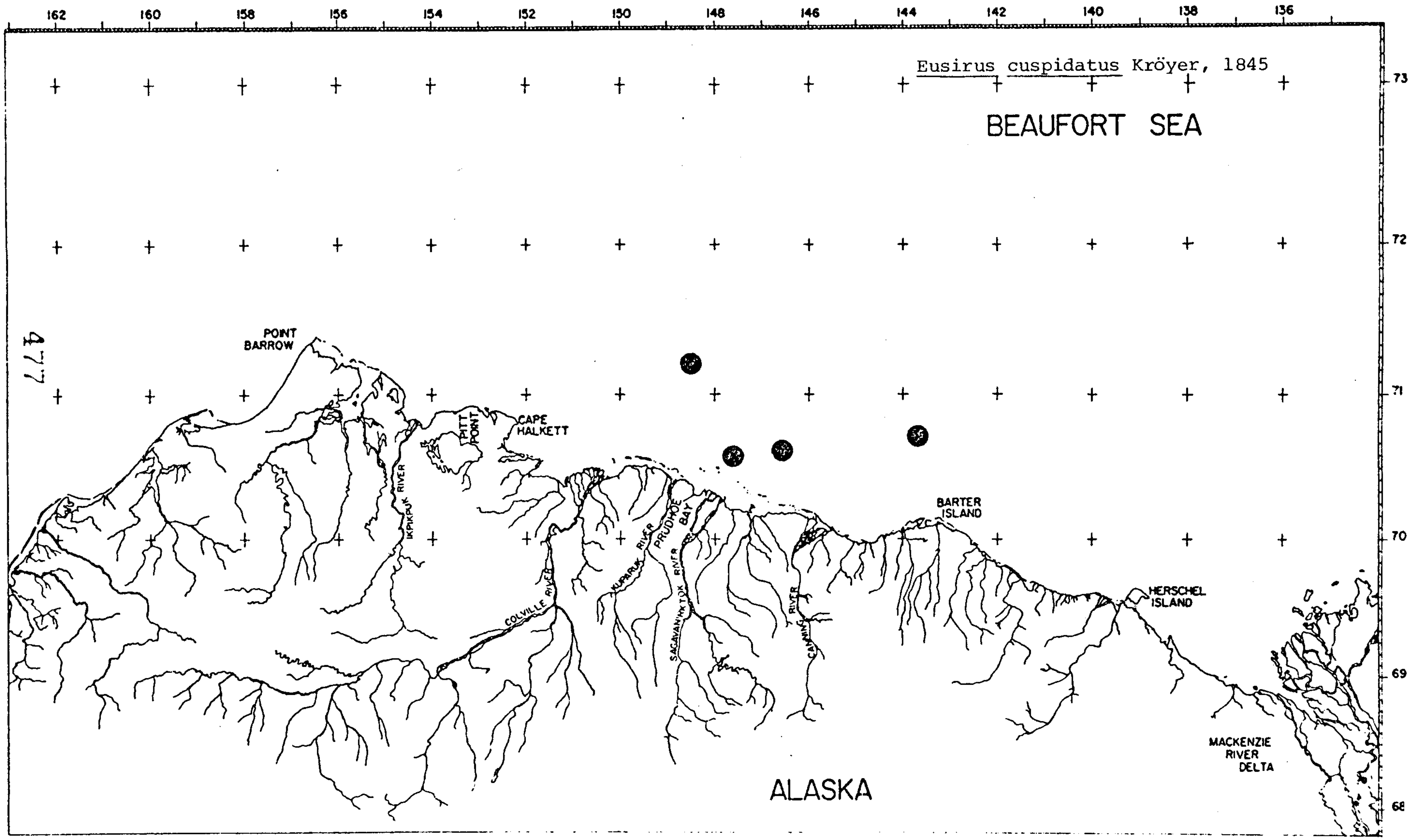
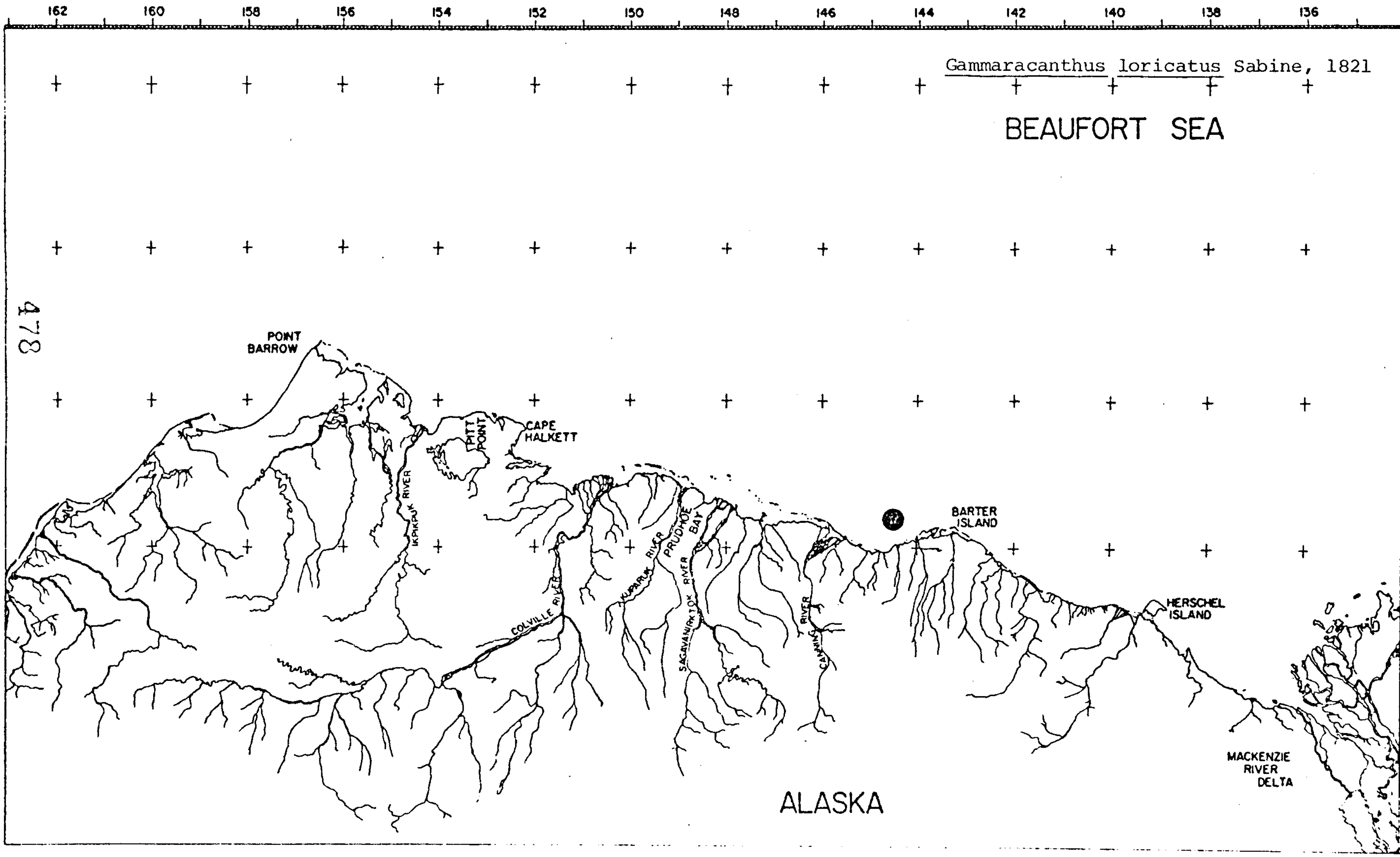
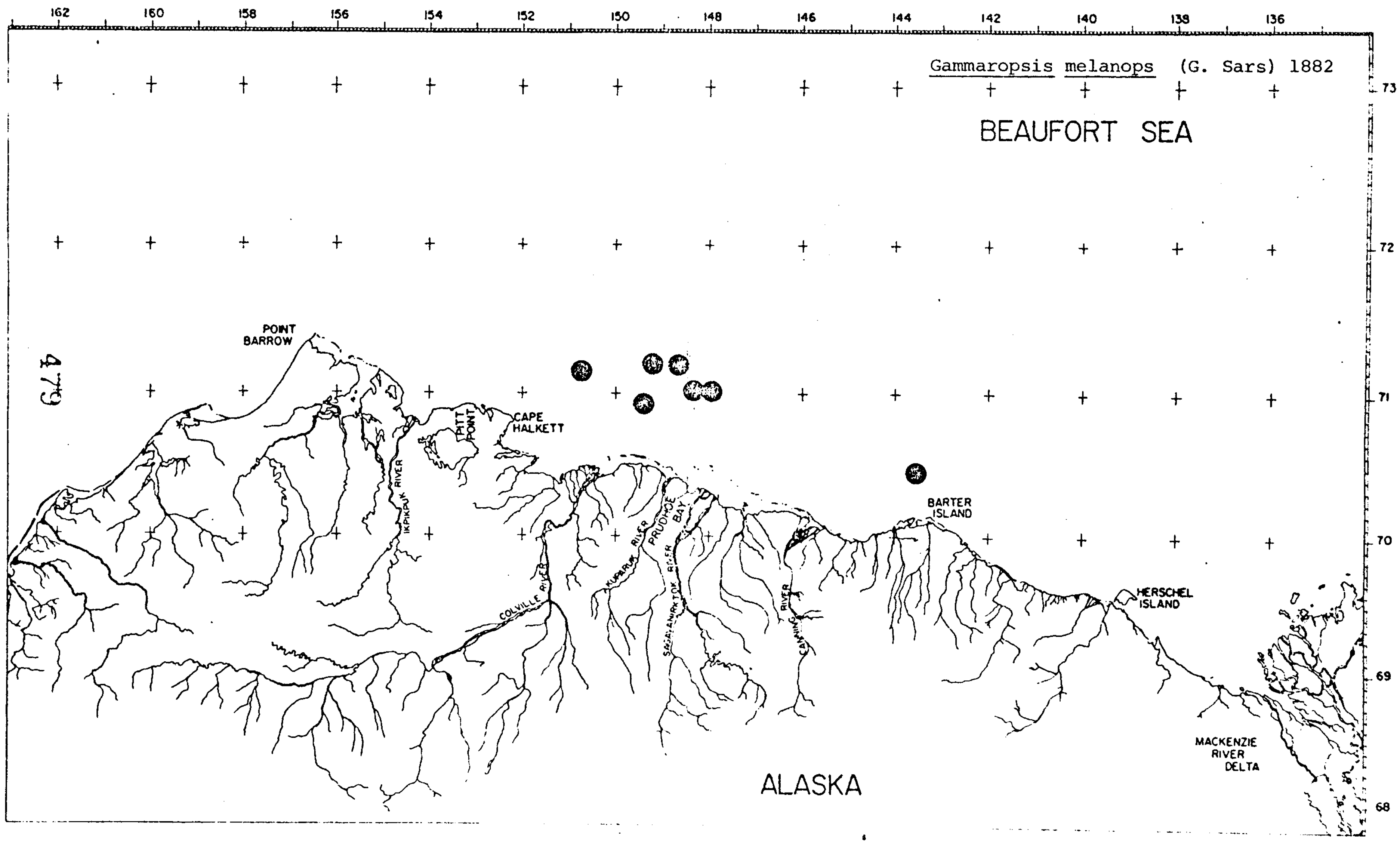


Eusirus cuspidatus Kröyer, 1845



Gammaracanthus loricatus Sabine, 1821


Gammaropsis melanops (G. Sars) 1882
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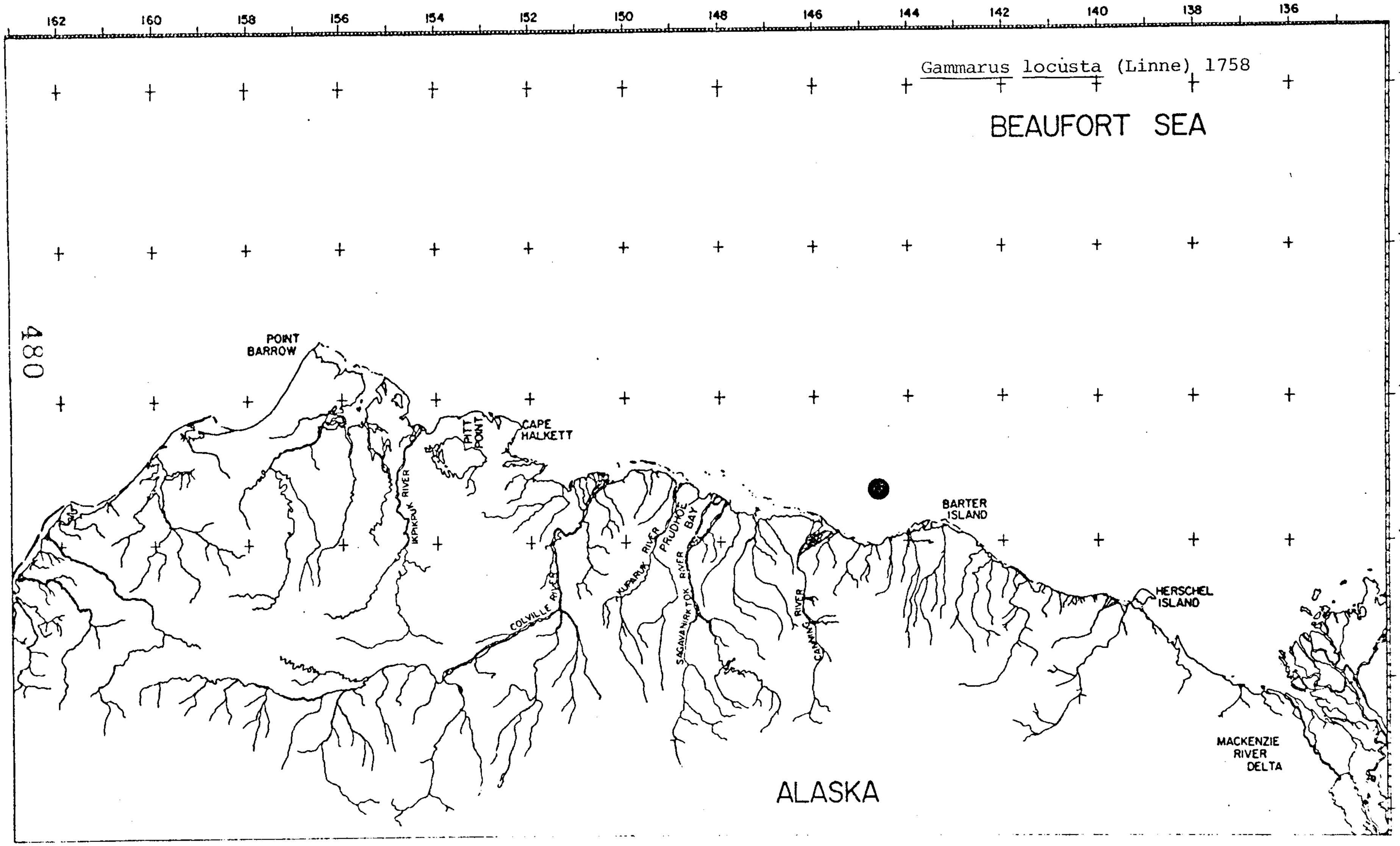
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Gammarus locusta (Linne) 1758
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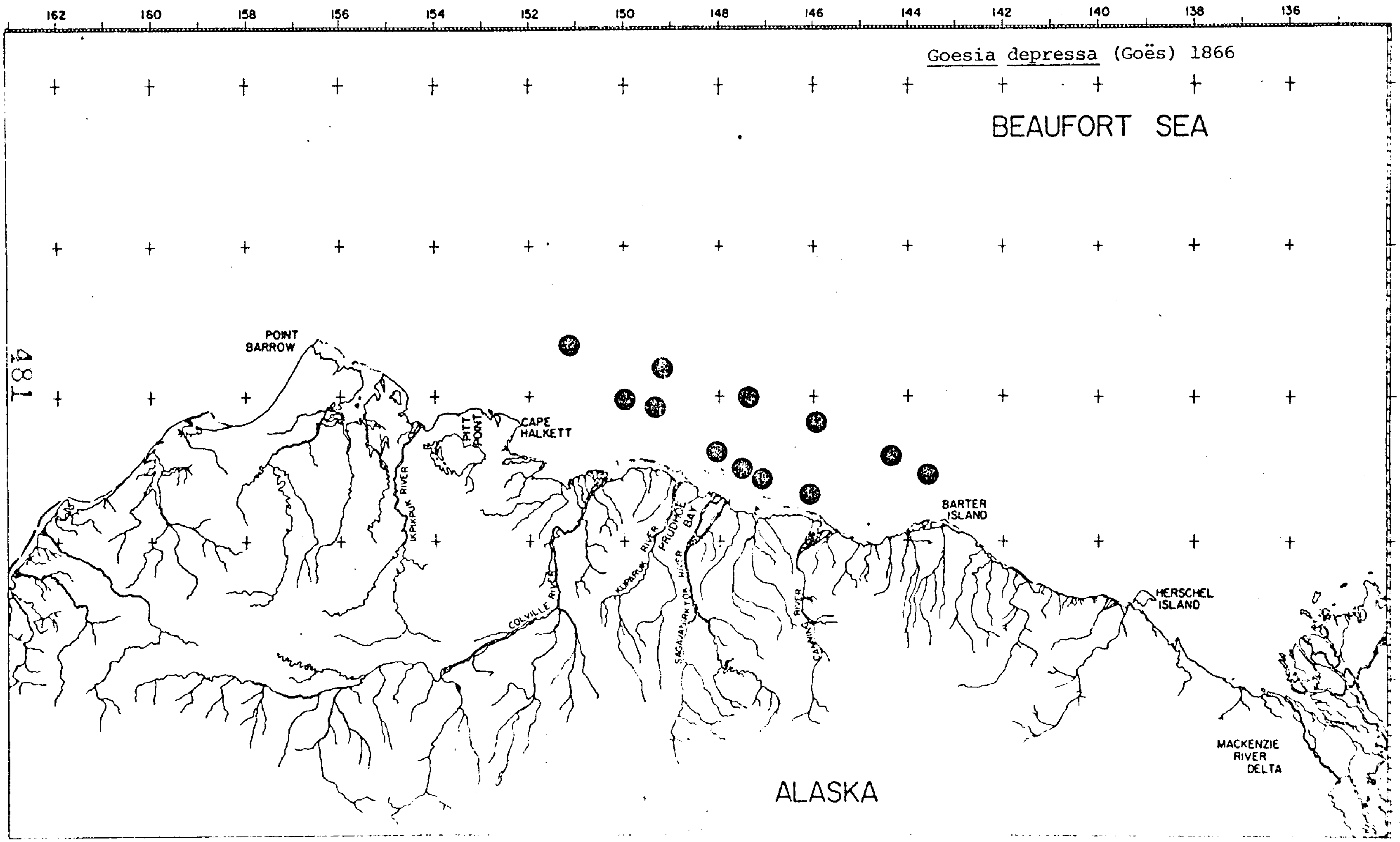
Goesia depressa (Goës) 1866
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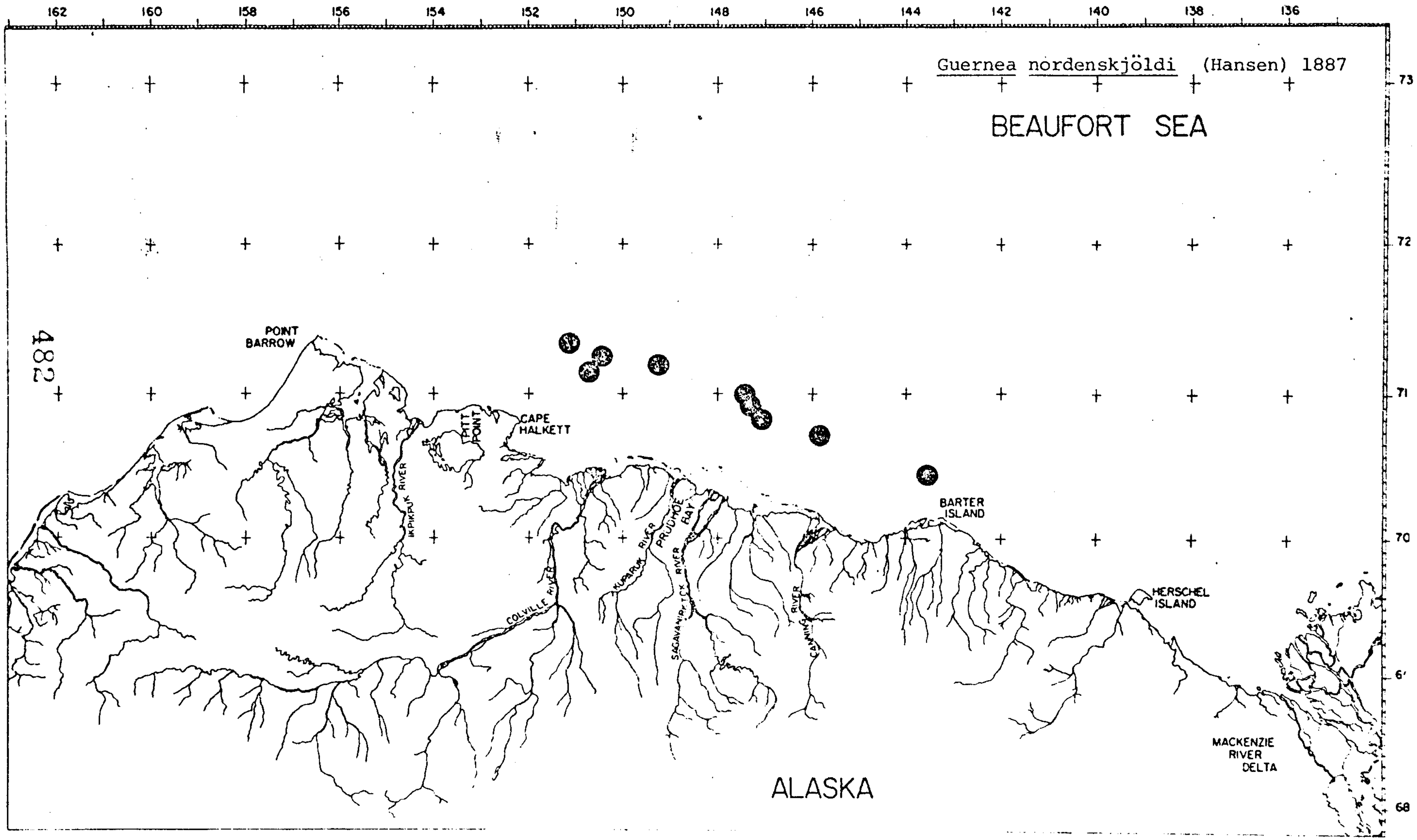
Guernea nordenskjöldi (Hansen) 1887
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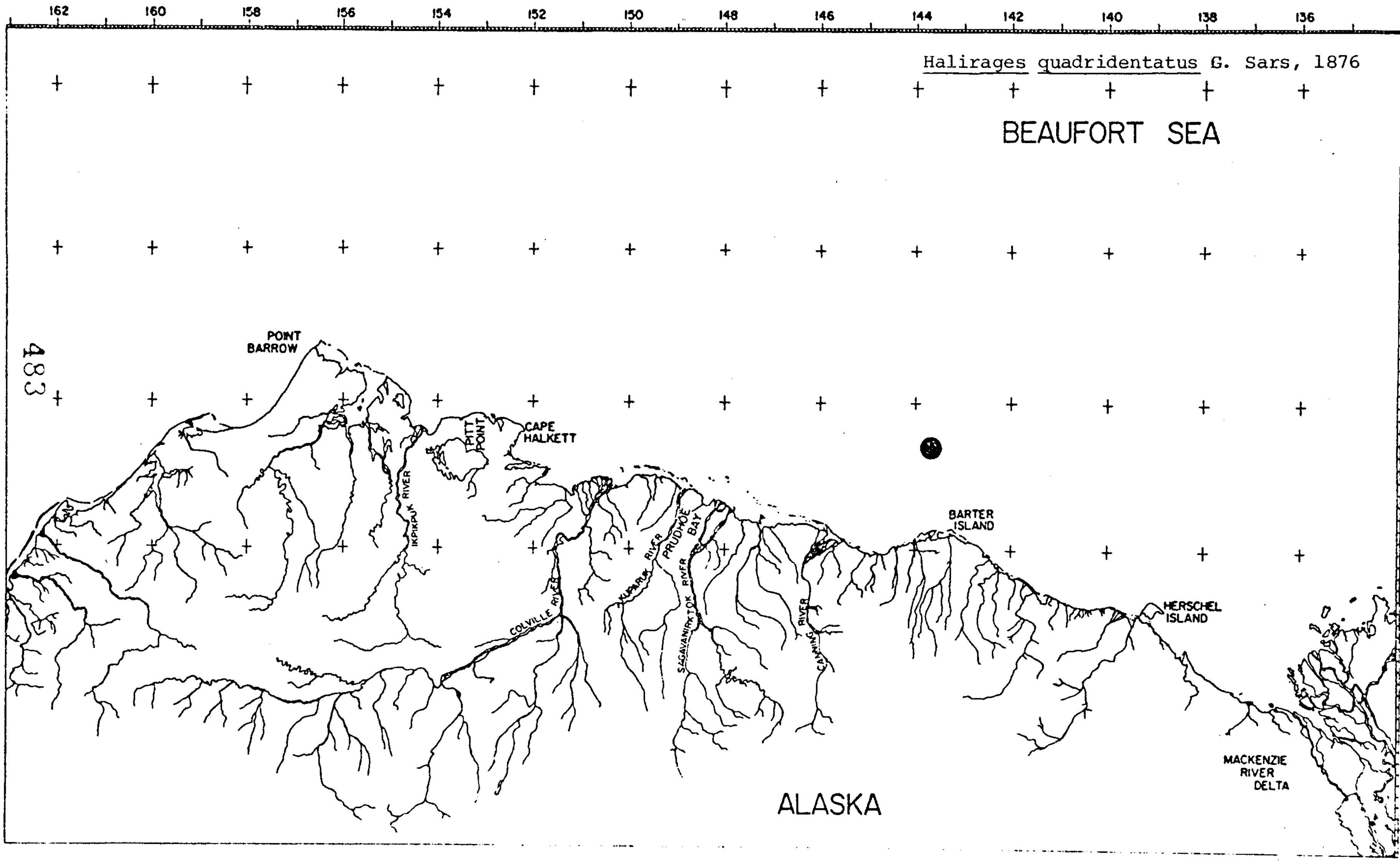
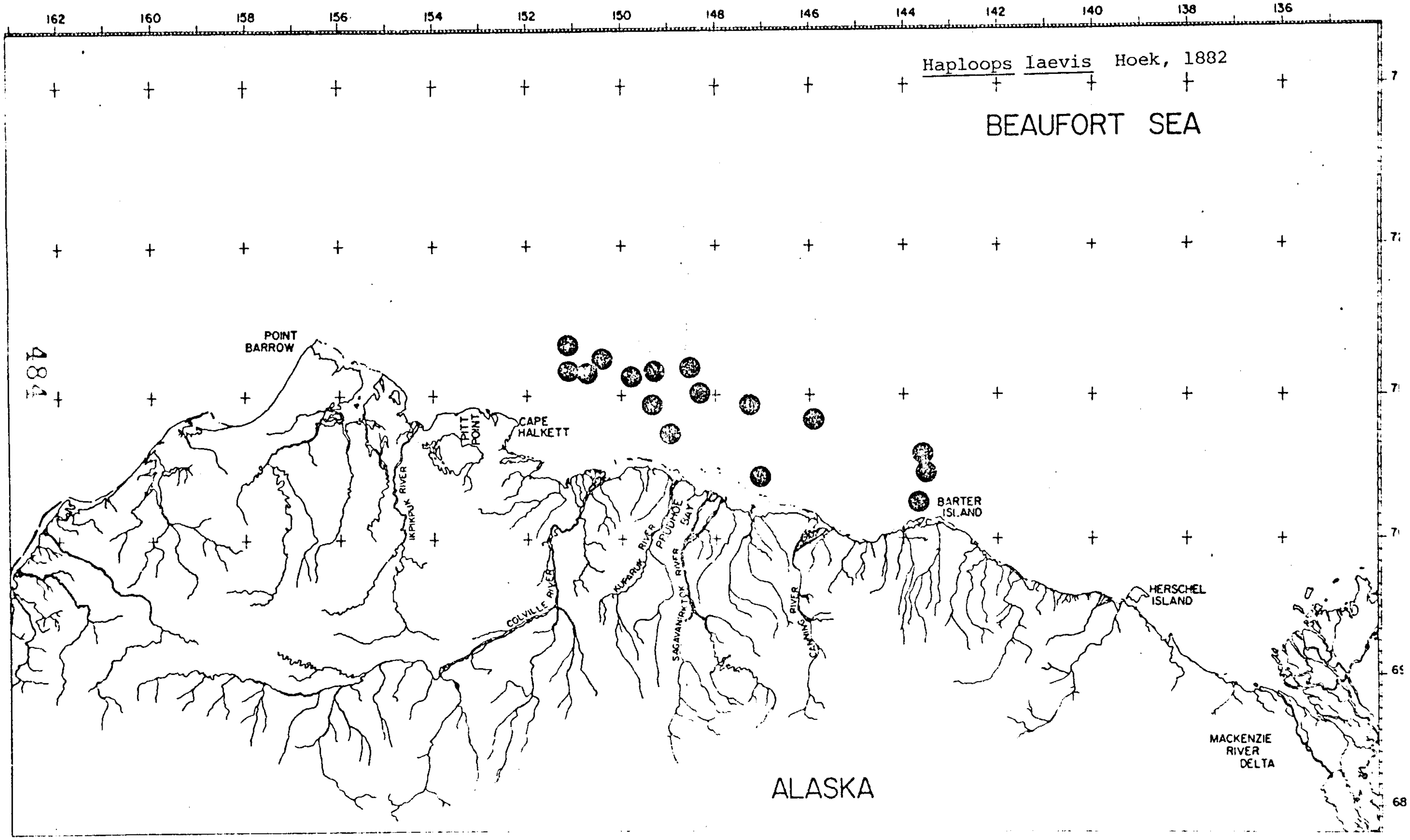


Halirages quadridentatus G. Sars, 1876


Haploops laevis Hoek, 1882
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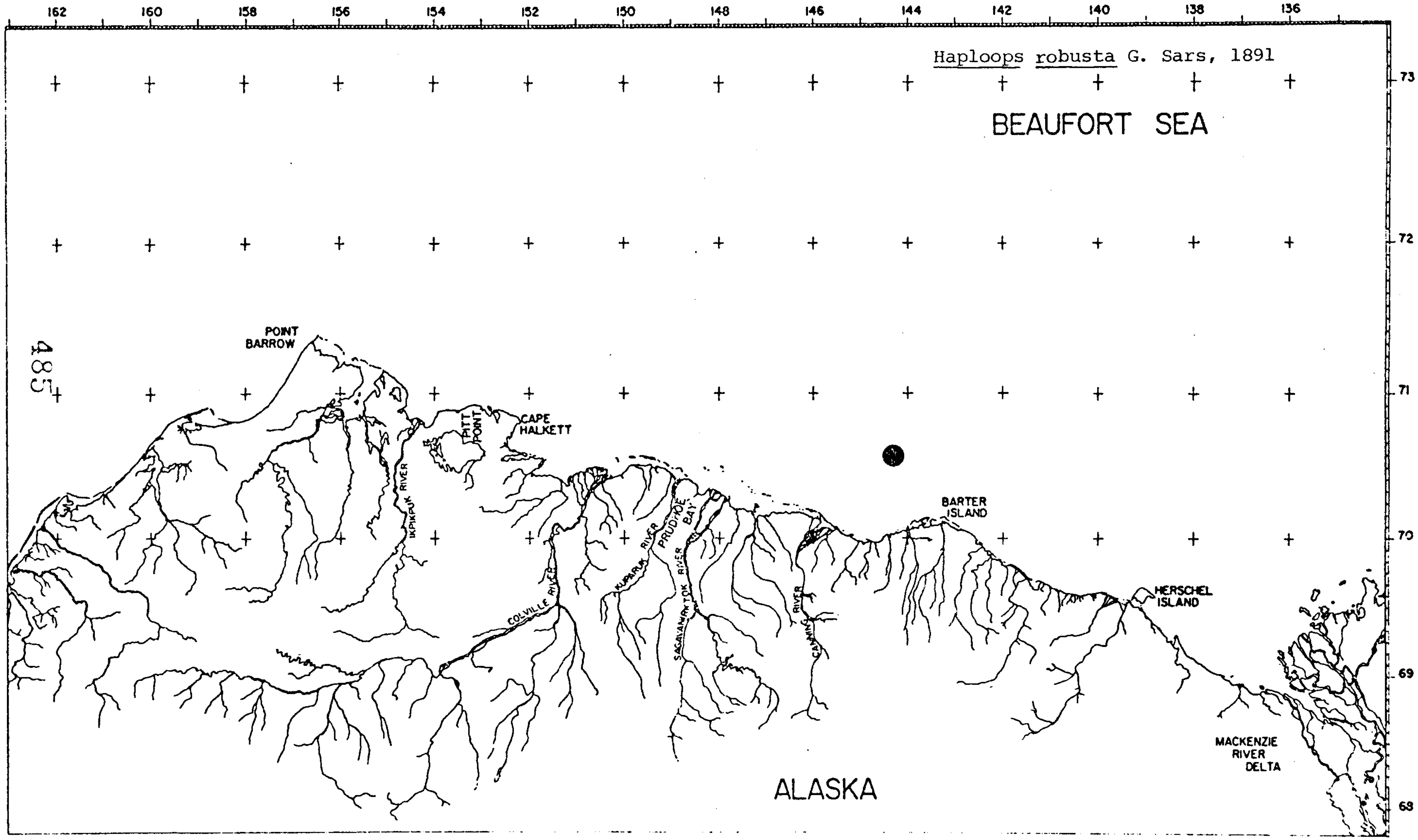
Haploops robusta G. Sars, 1891
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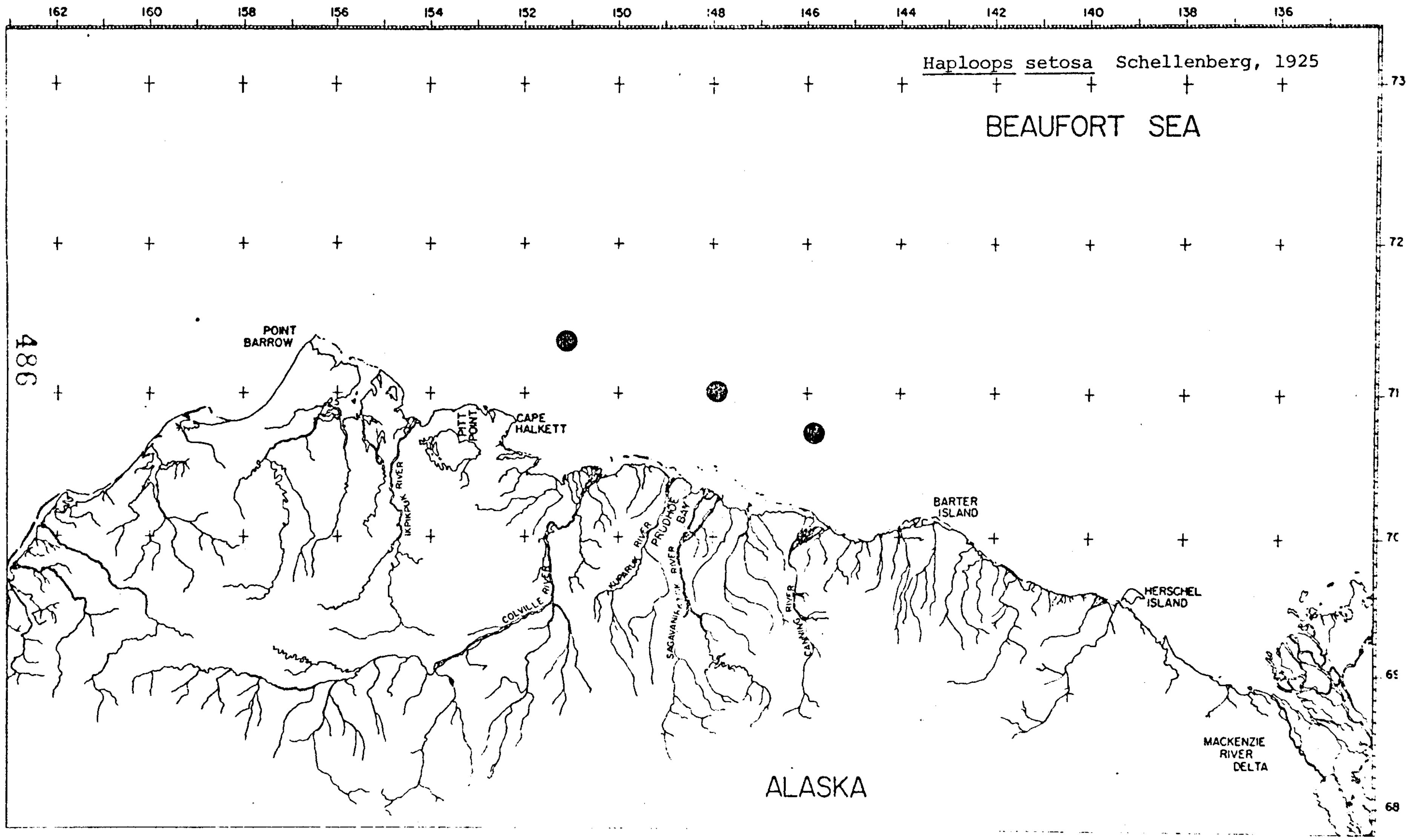
Haploops setosa Schellenberg, 1925
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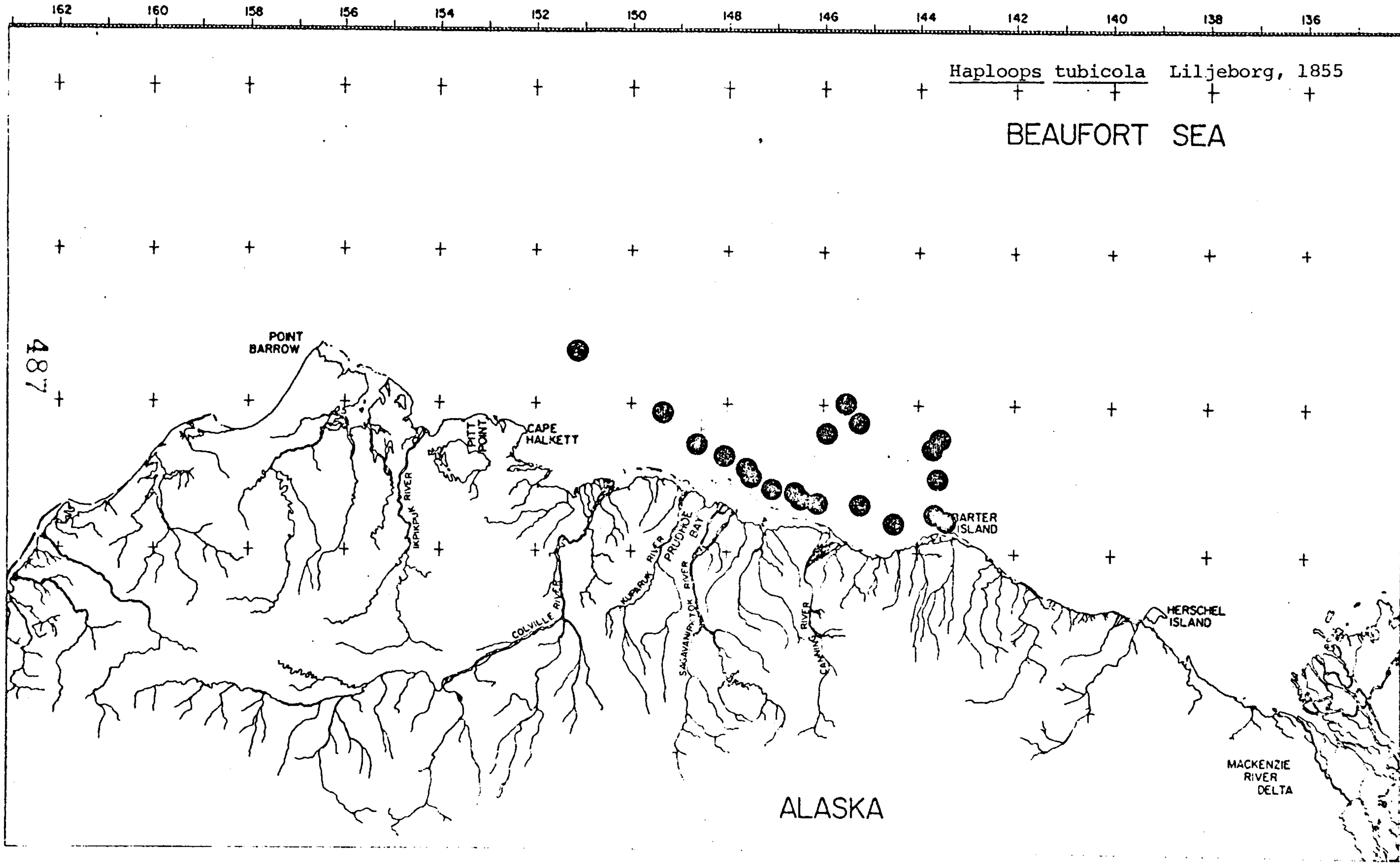
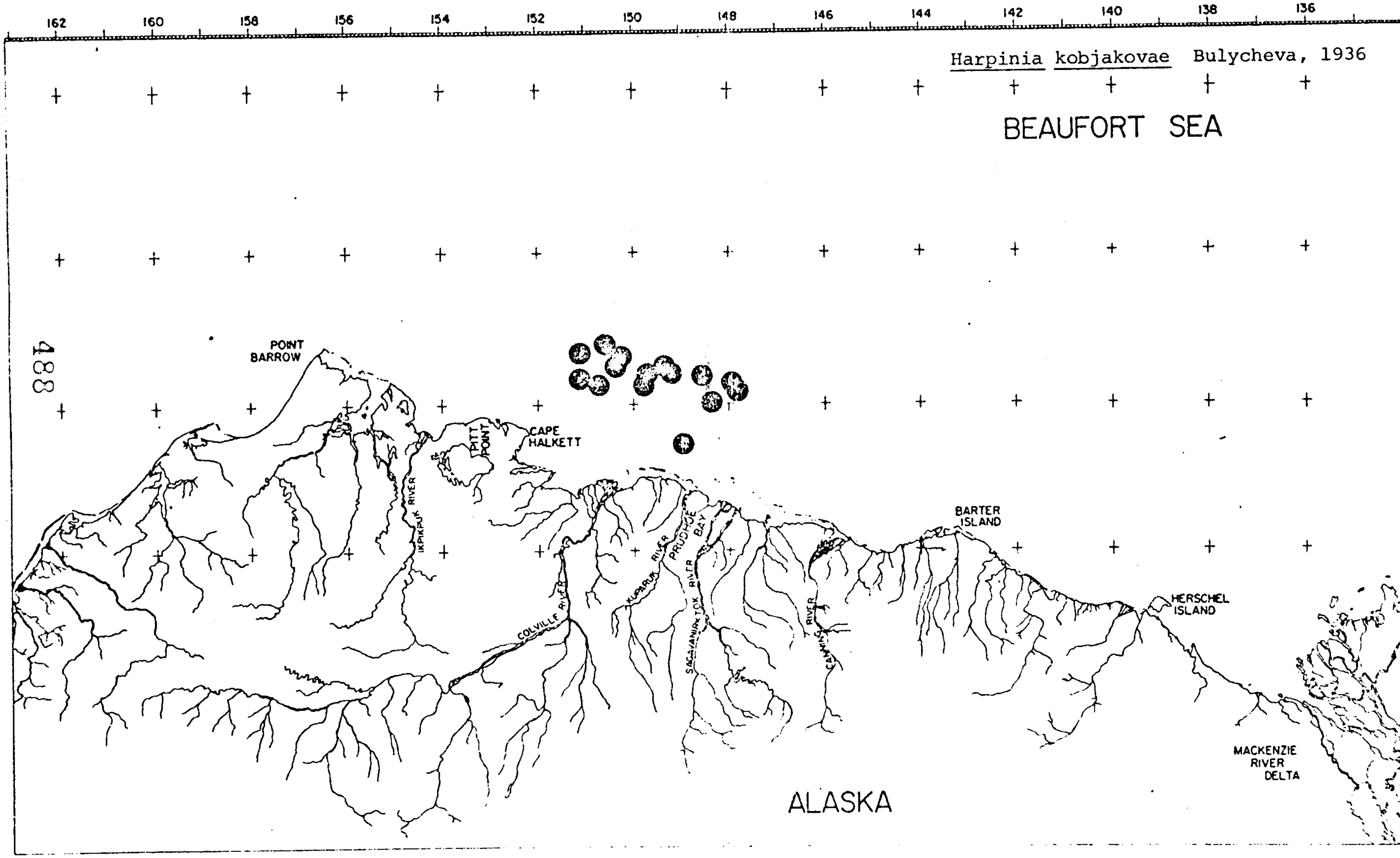


Haploops tubicola Liljeborg, 1855


Harpinia kobjakovae Bulycheva, 1936
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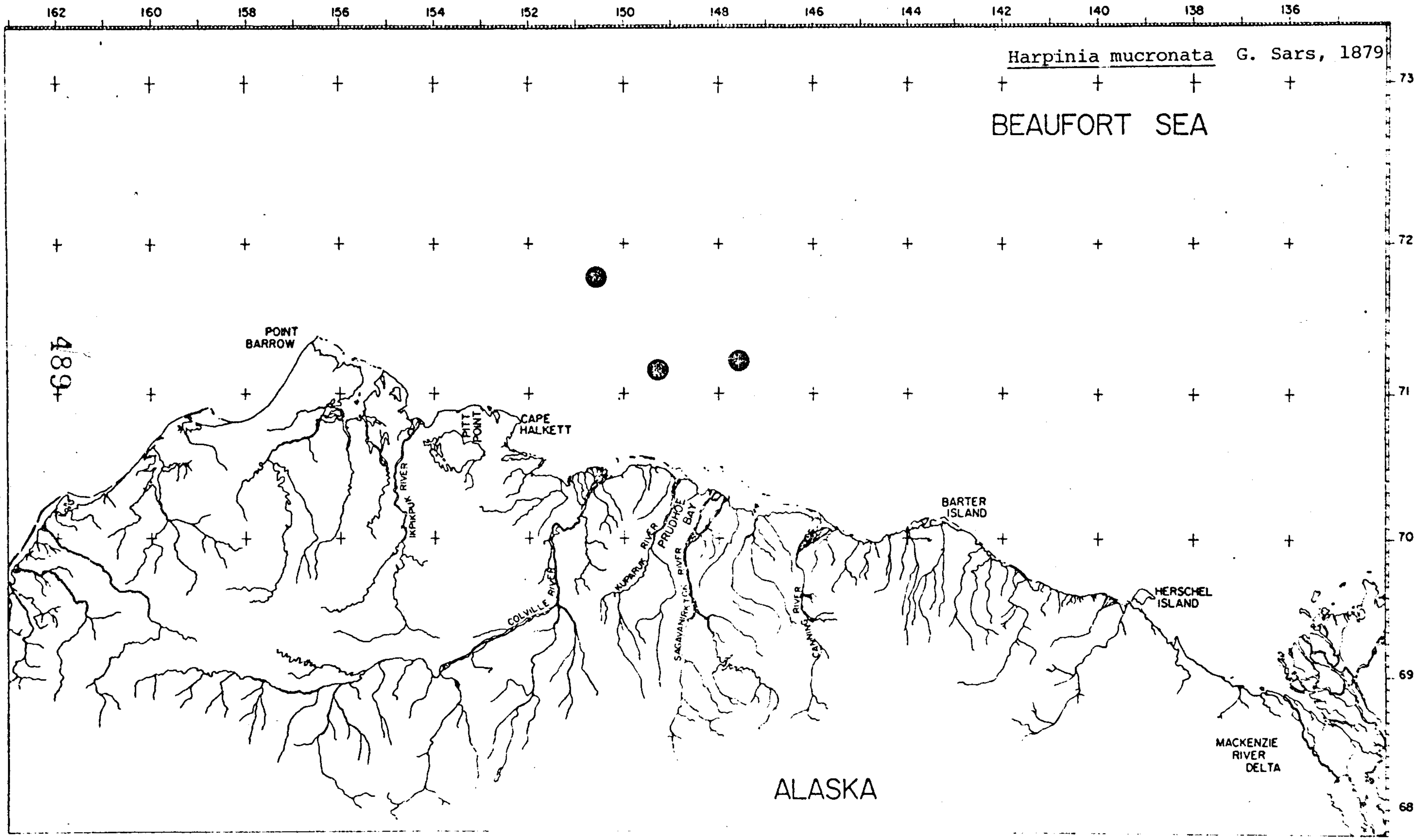
Harpinia mucronata G. Sars, 1879
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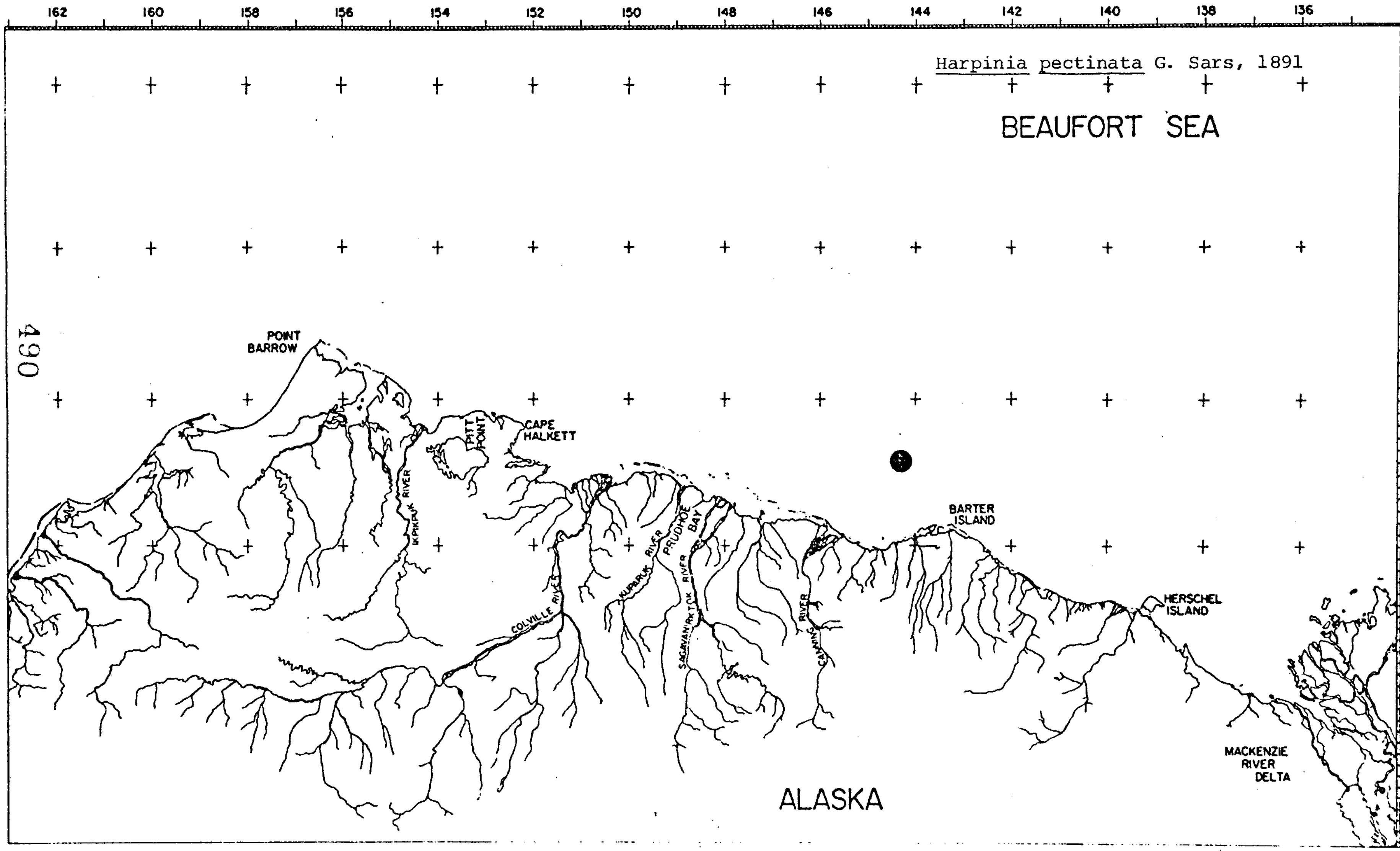
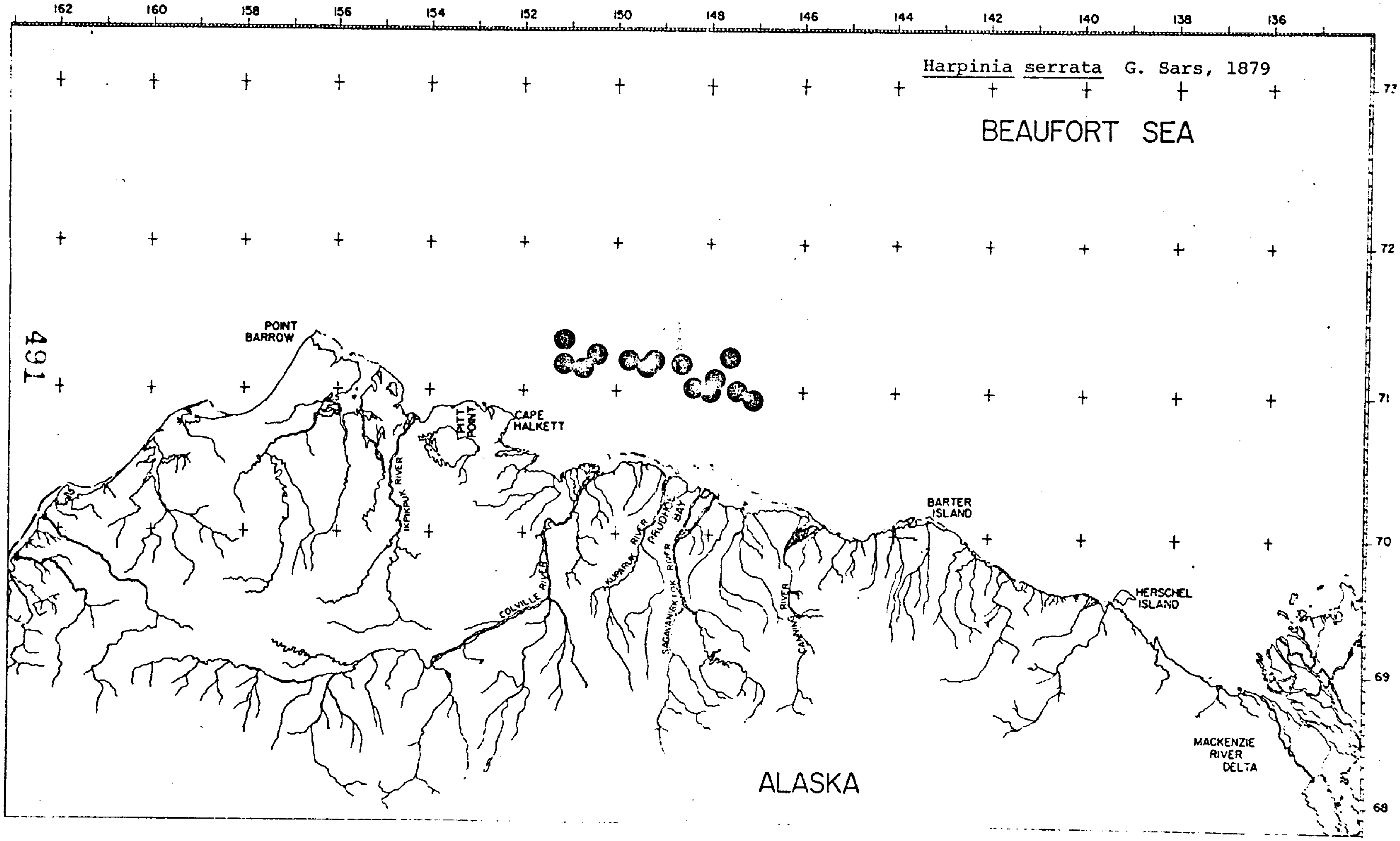


<u>Harpinia</u> <u>pectinata</u> G. Sars, 1891


Harpinia serrata G. Sars, 1879
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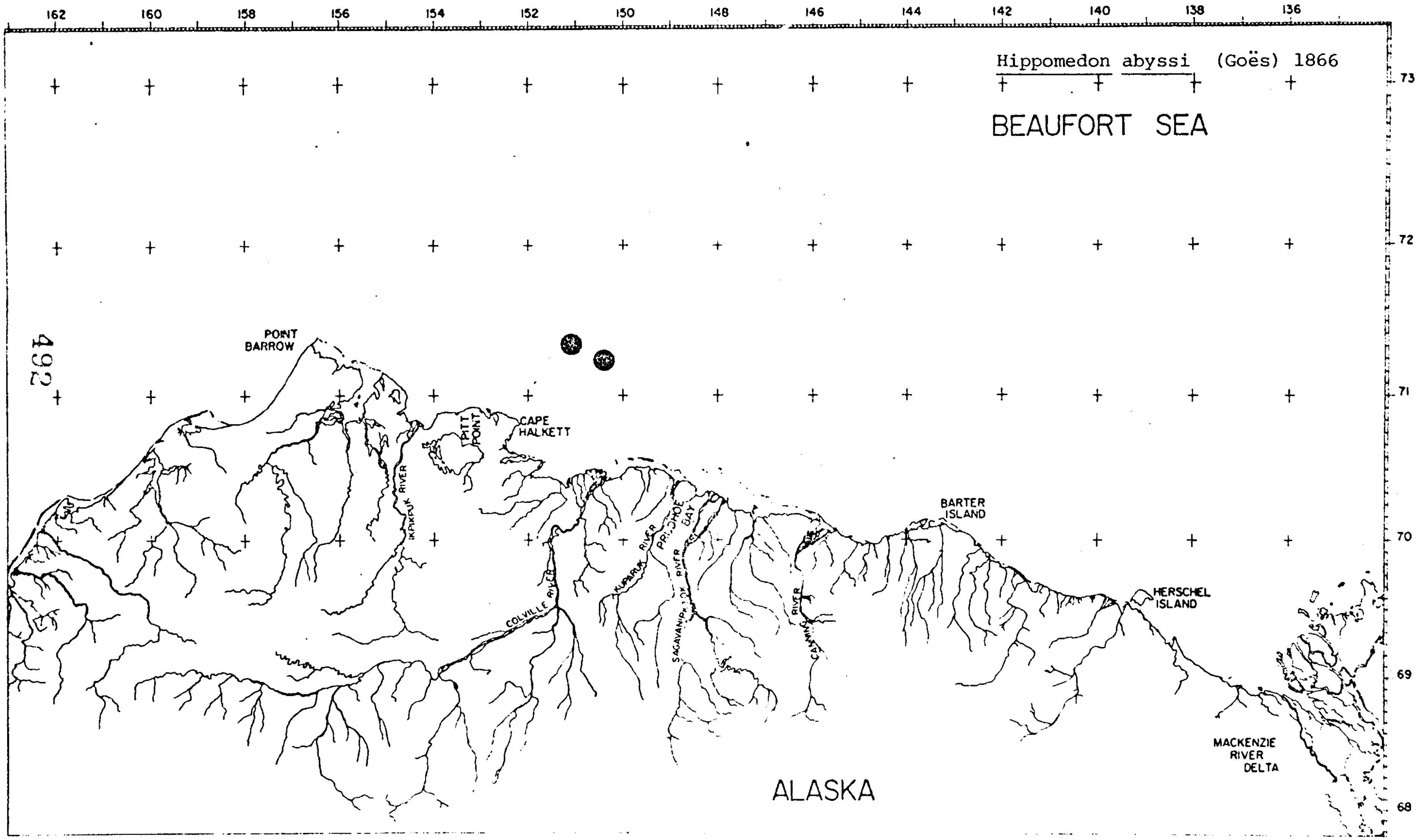

Hippomedon abyssi (Goës) 1866
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ALASKA
POINT BARROW
CAPE HALKETT
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IKPIKPUK RIVER
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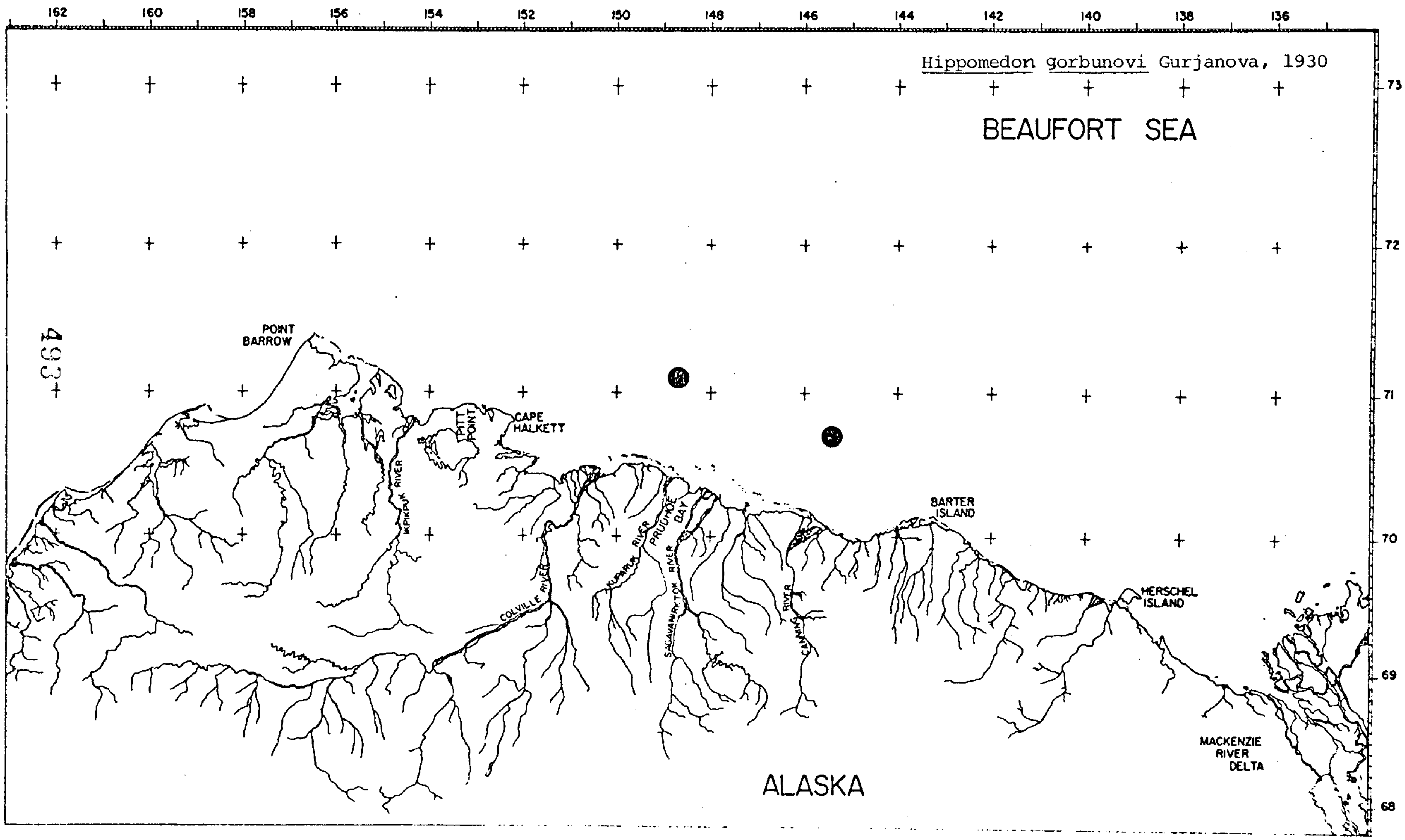
Hippomedon gorbunovi Gurjanova, 1930
BEAUFORT SEA
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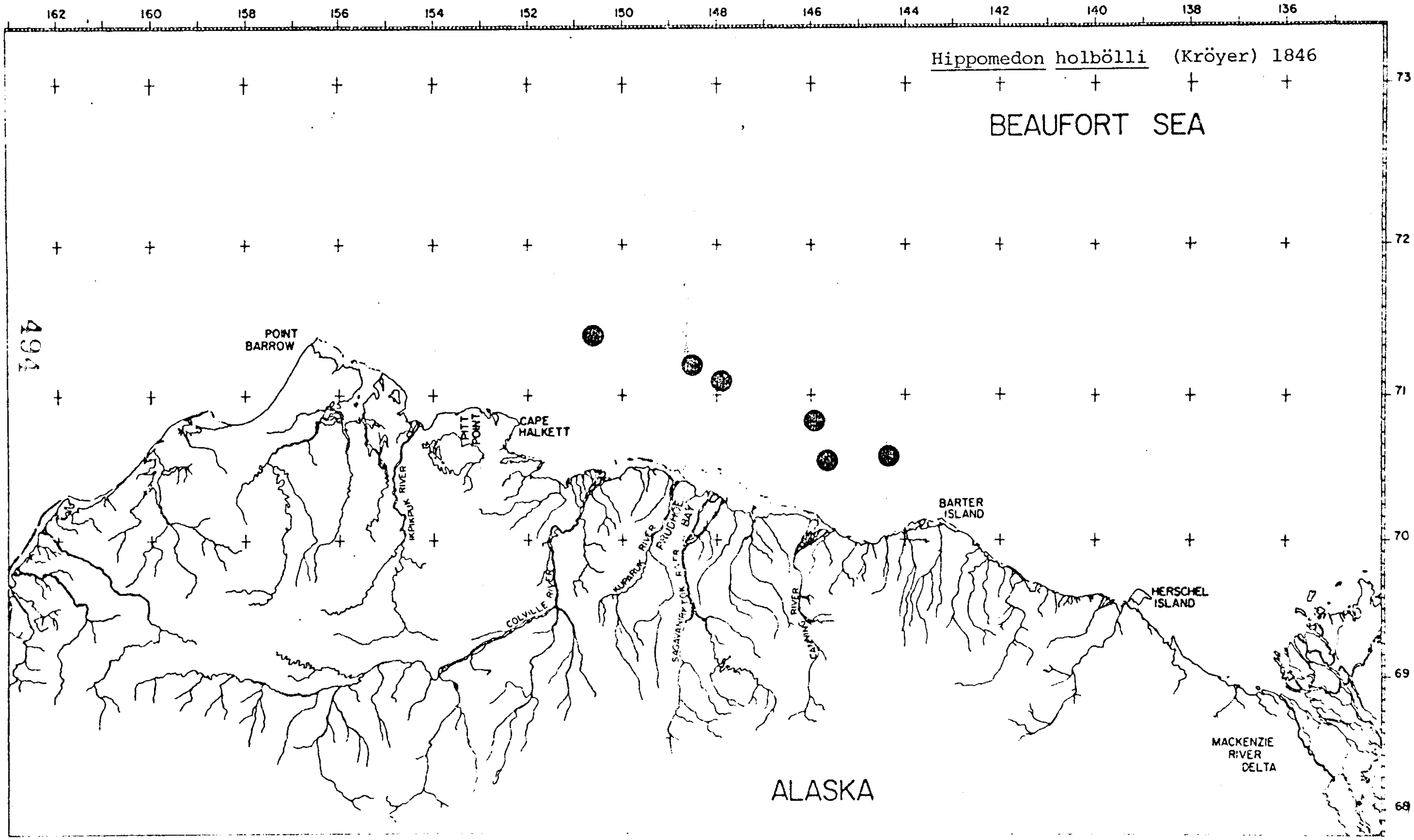
Hippomedon holbölli (Kröyer) 1846
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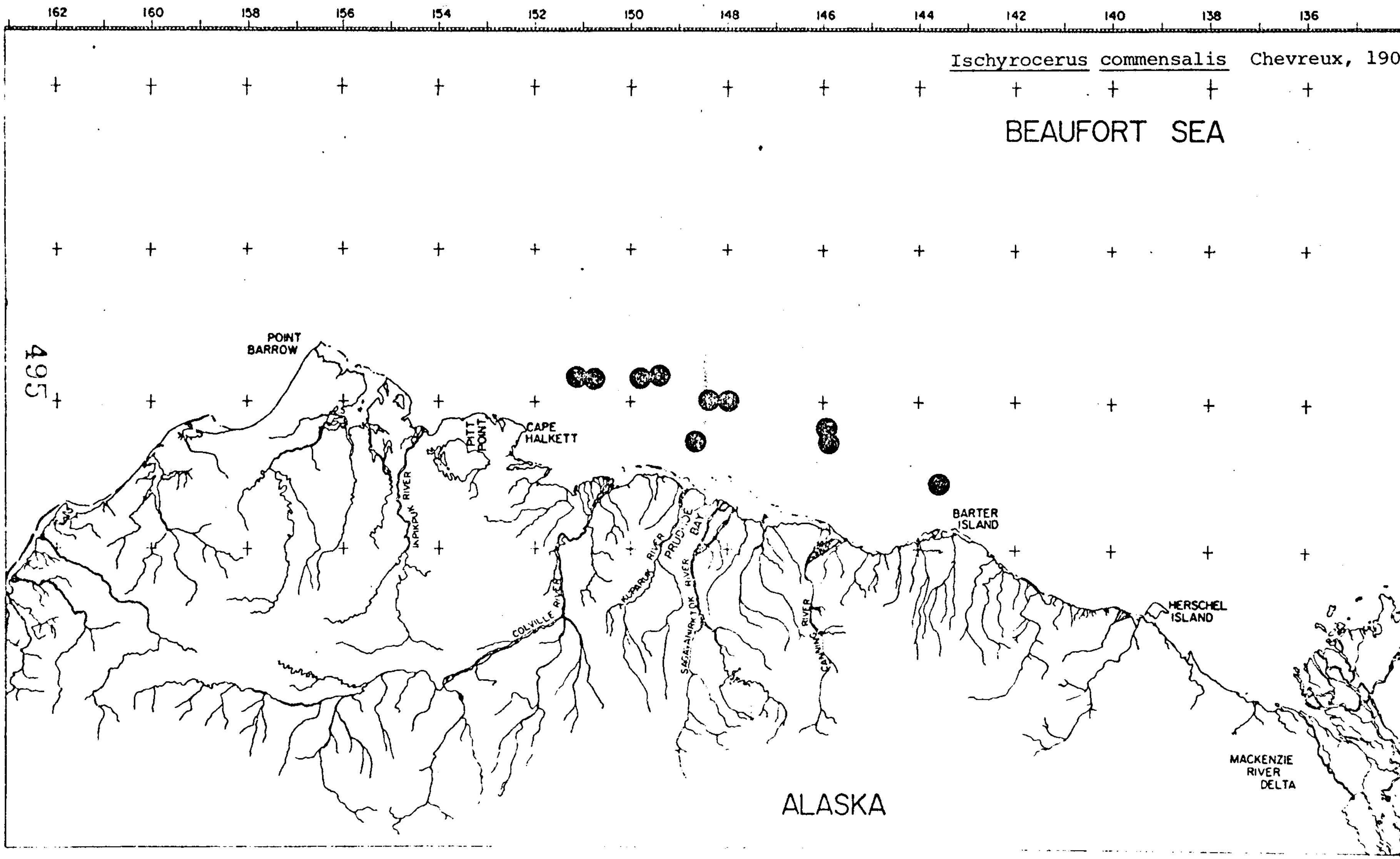
Ischyrocerus commensalis Chevreux, 1900
BEAUFORT SEA
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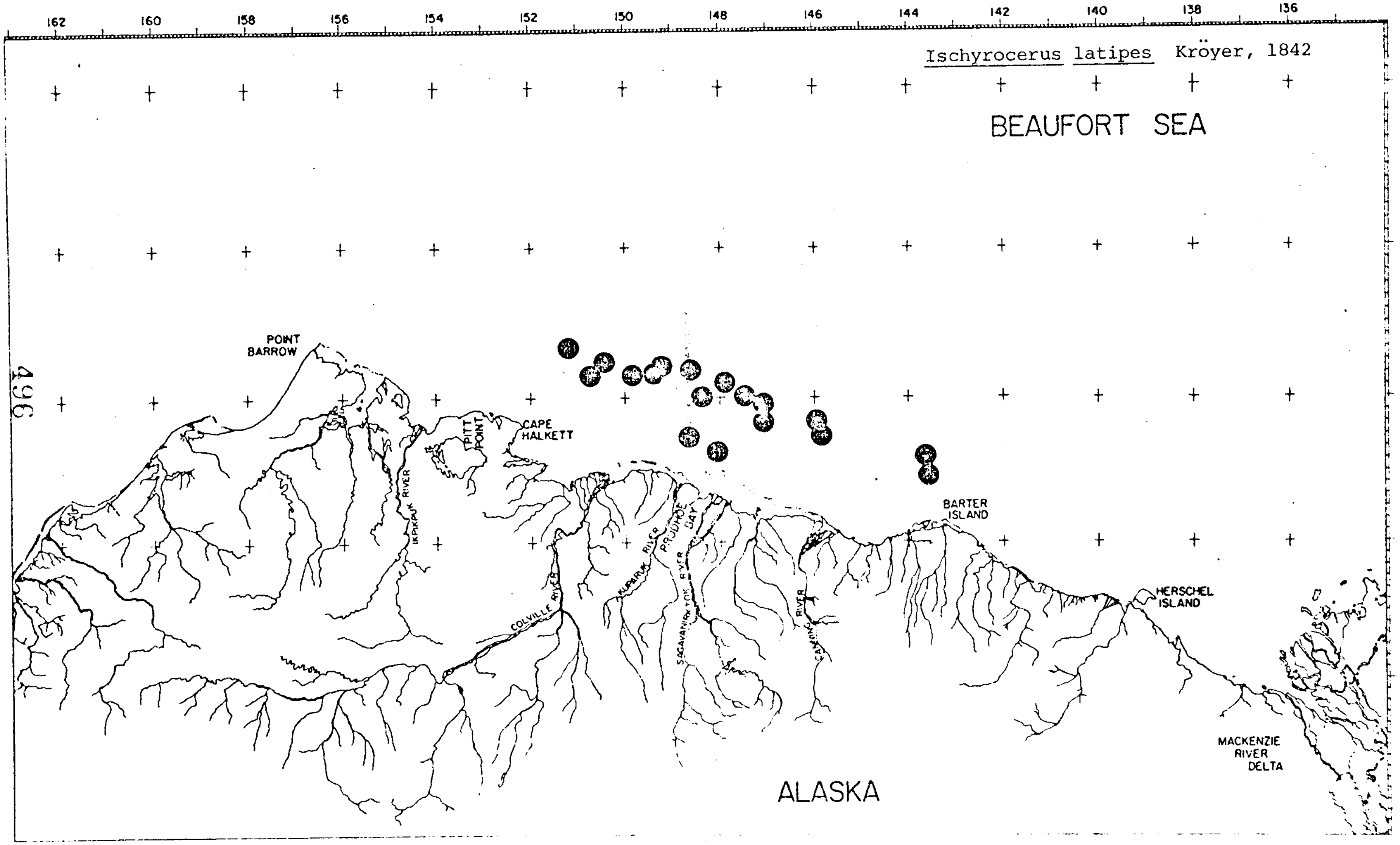
Ischyrocerus latipes Kröyer, 1842
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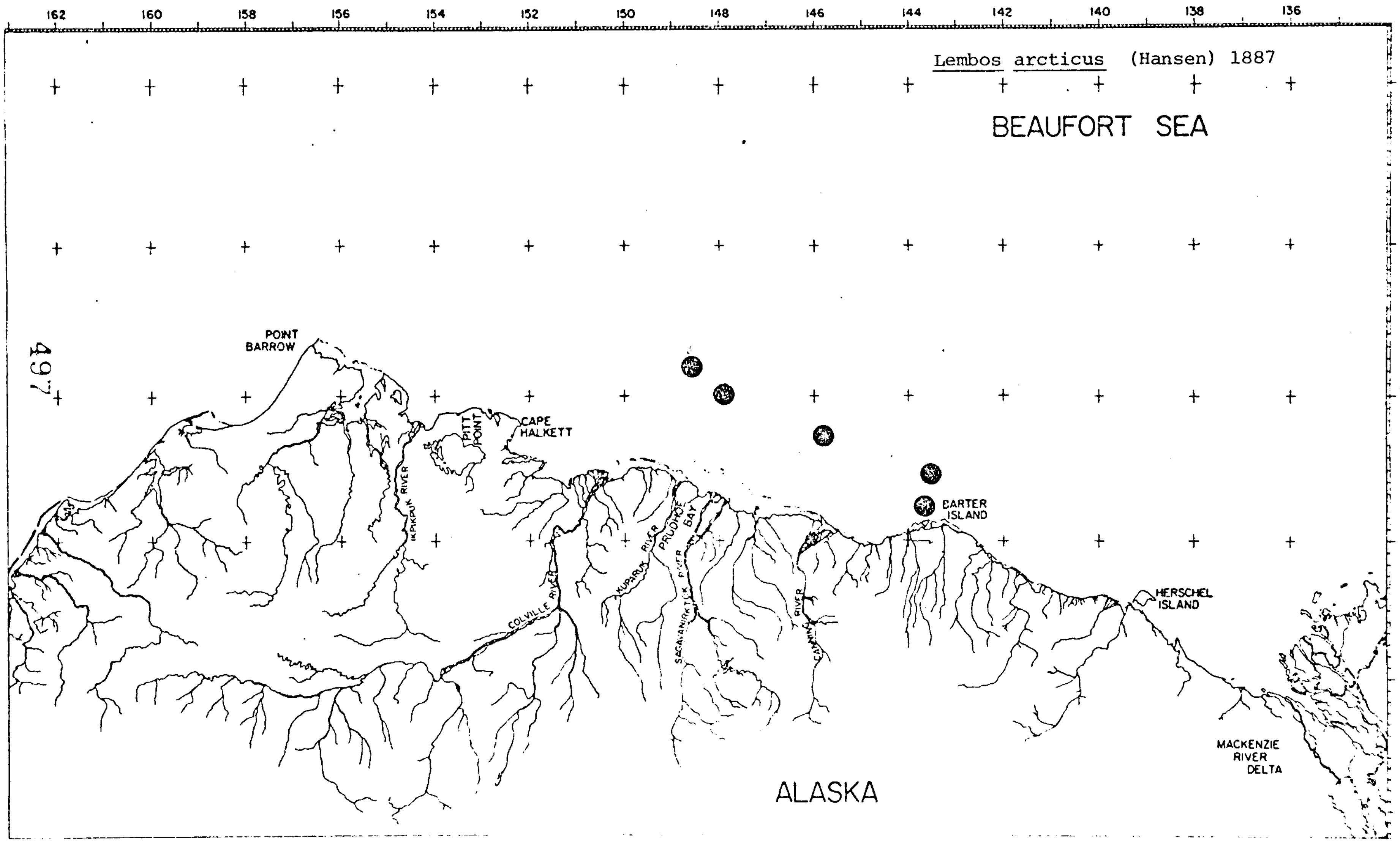
Lembos arcticus (Hansen) 1887
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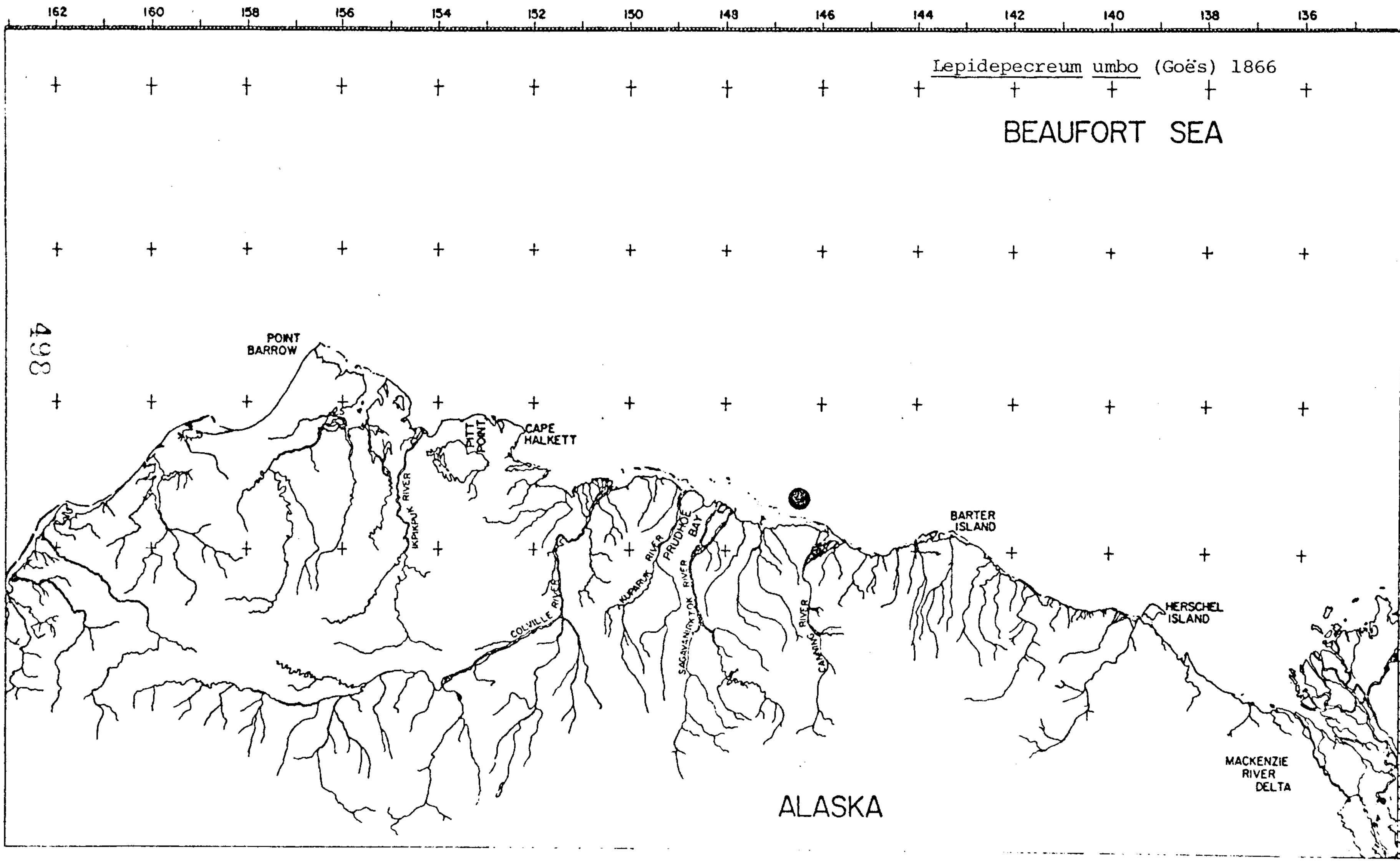
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Lepidepecreum umbo (Goës) 1866
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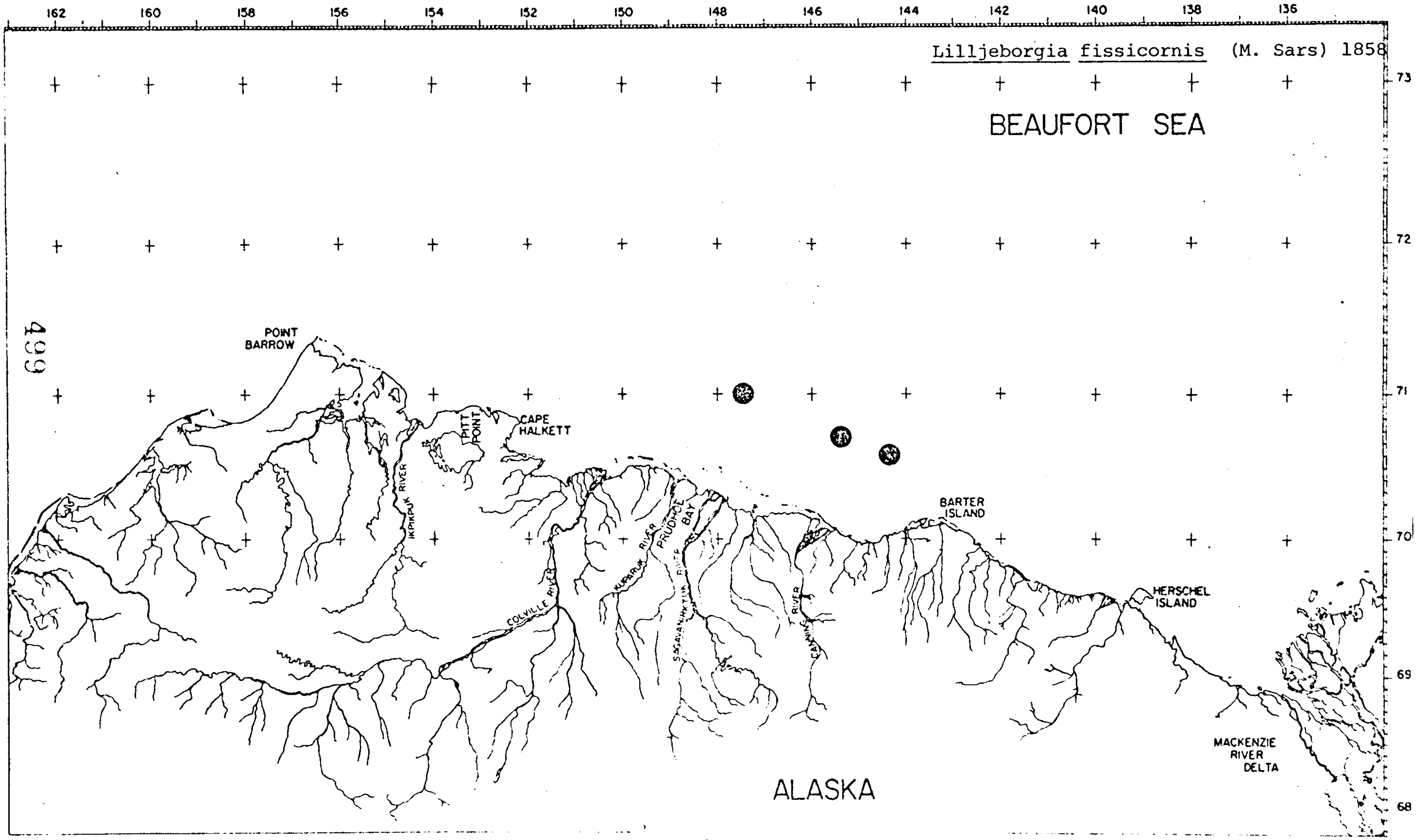
Lilljeborgia fissicornis (M. Sars) 1858
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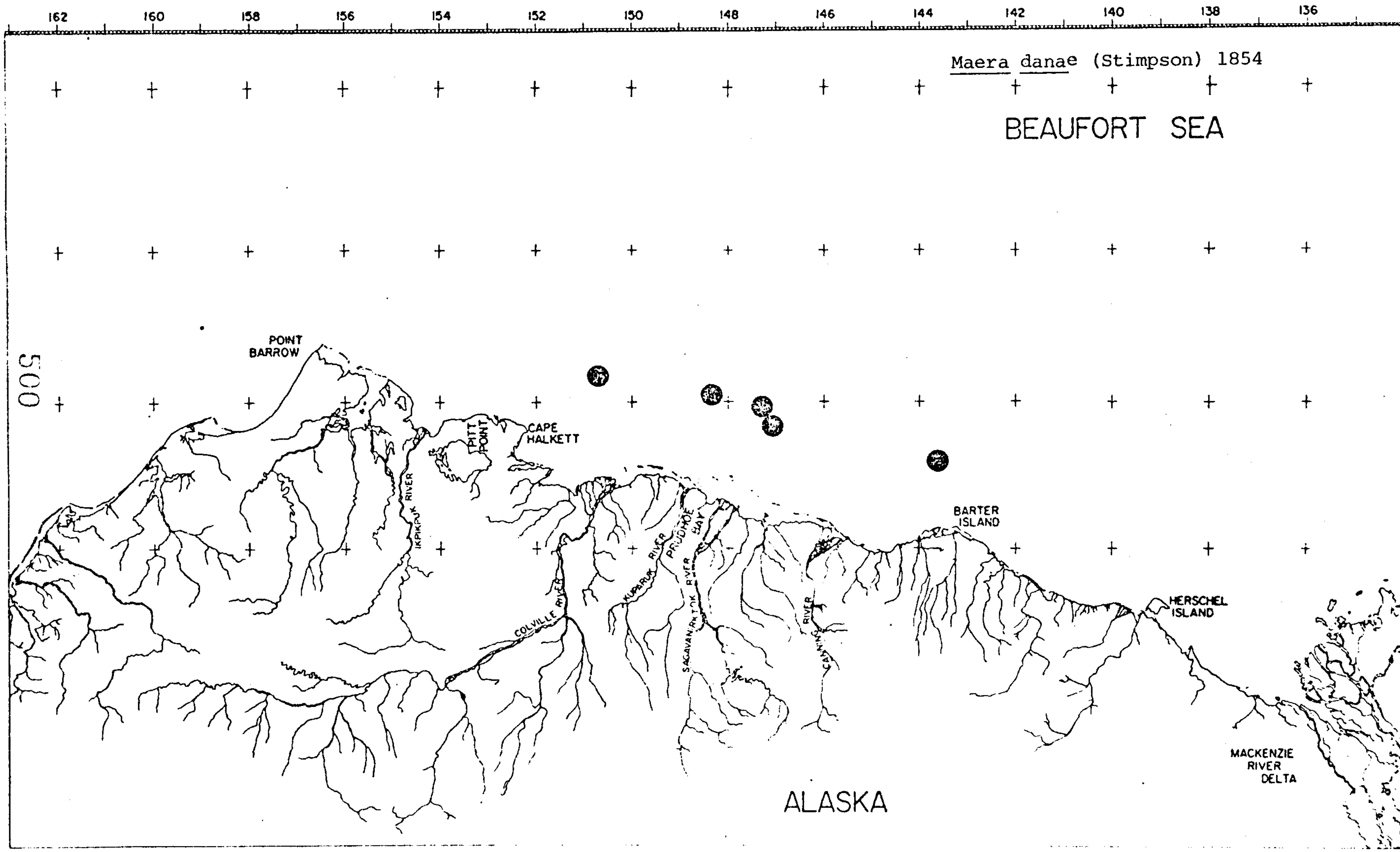
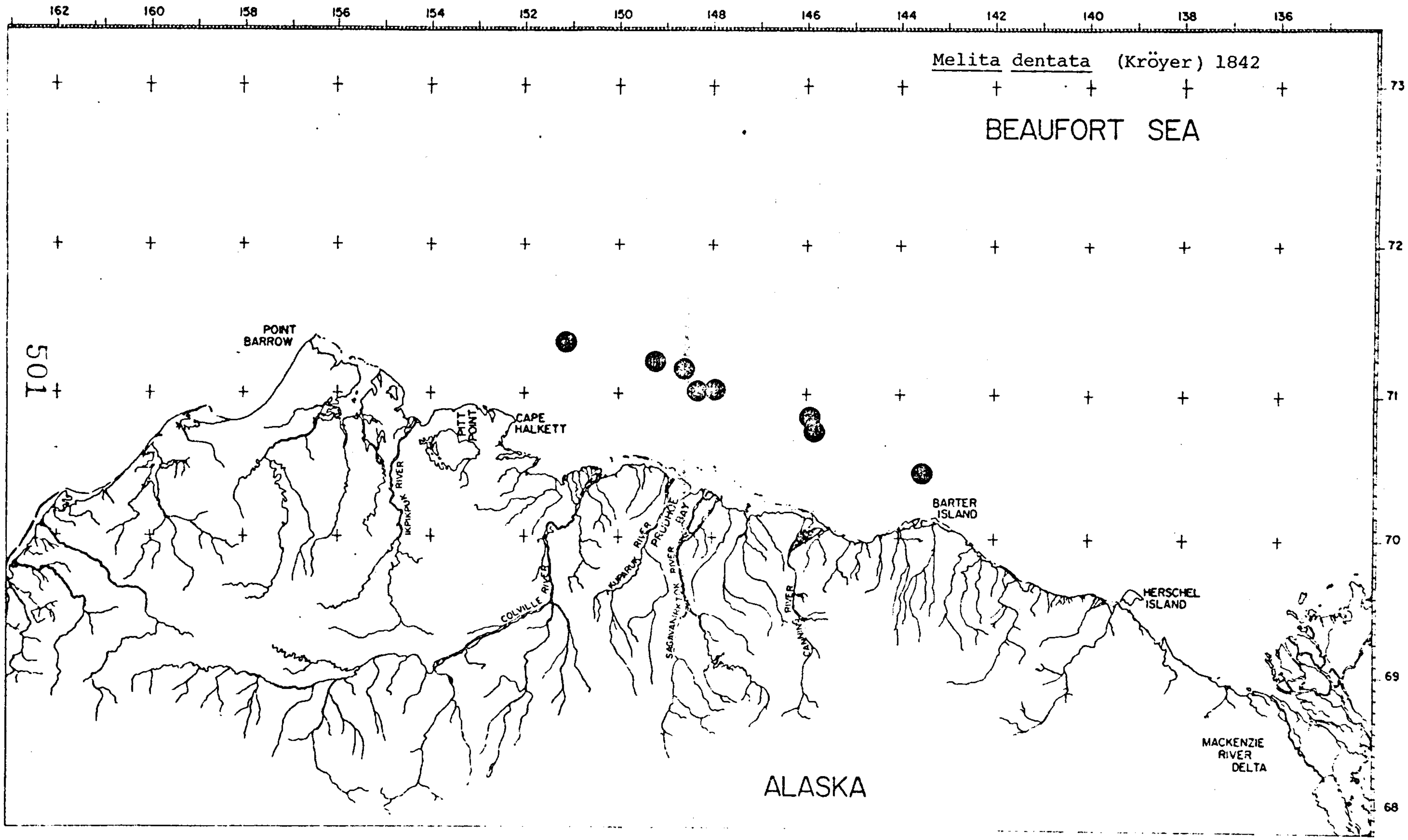
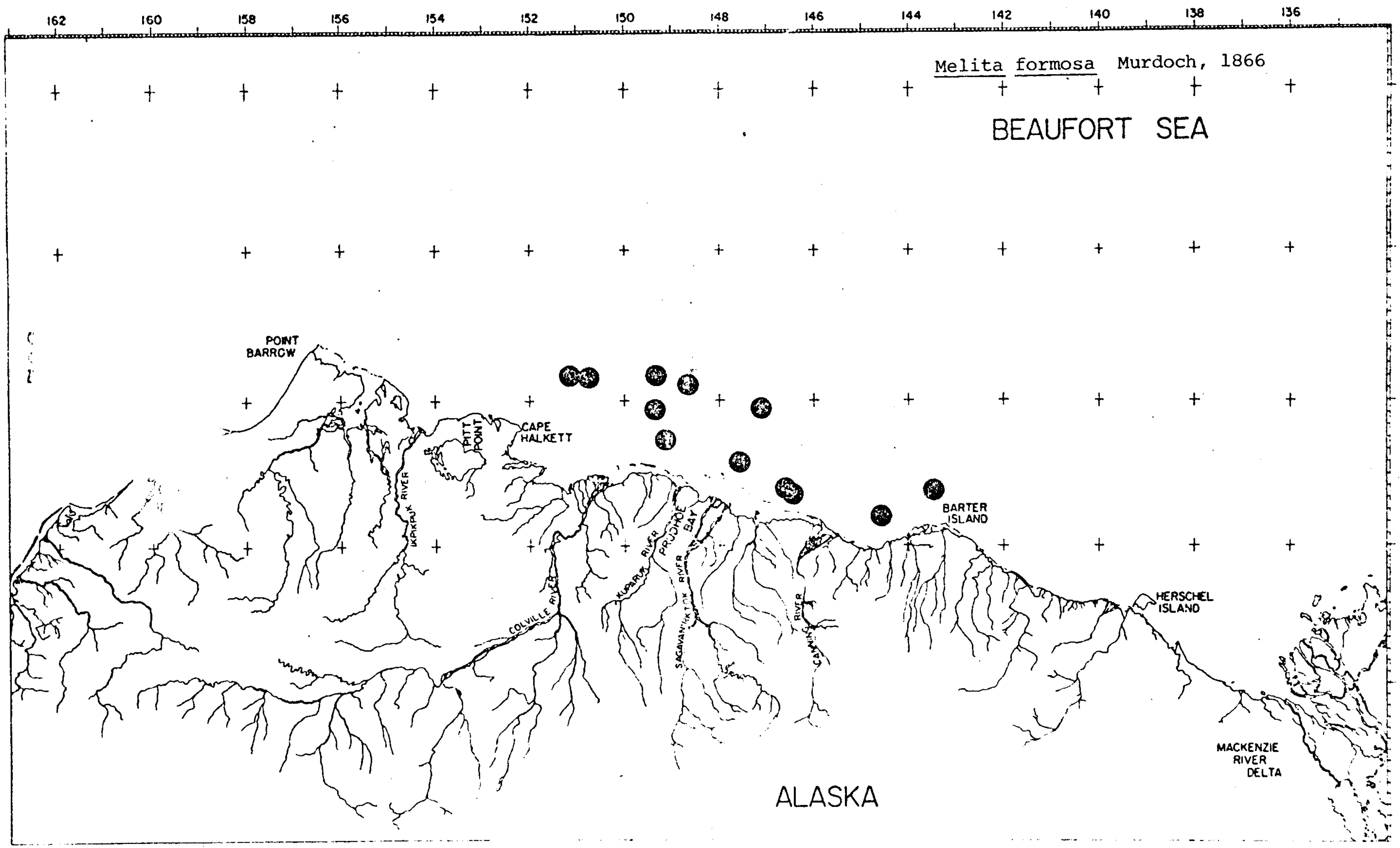
Maera danae (Stimpson) 1854

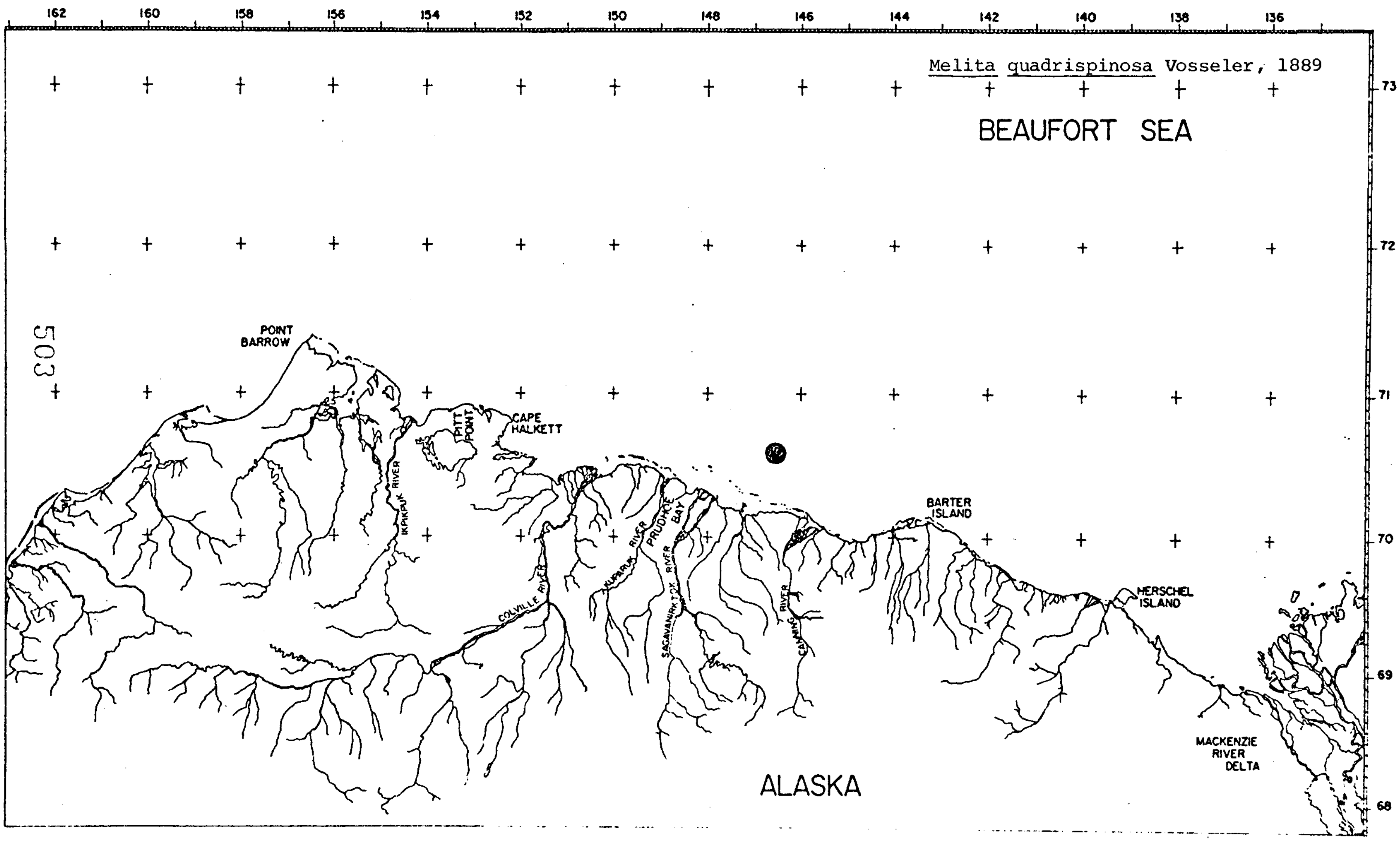




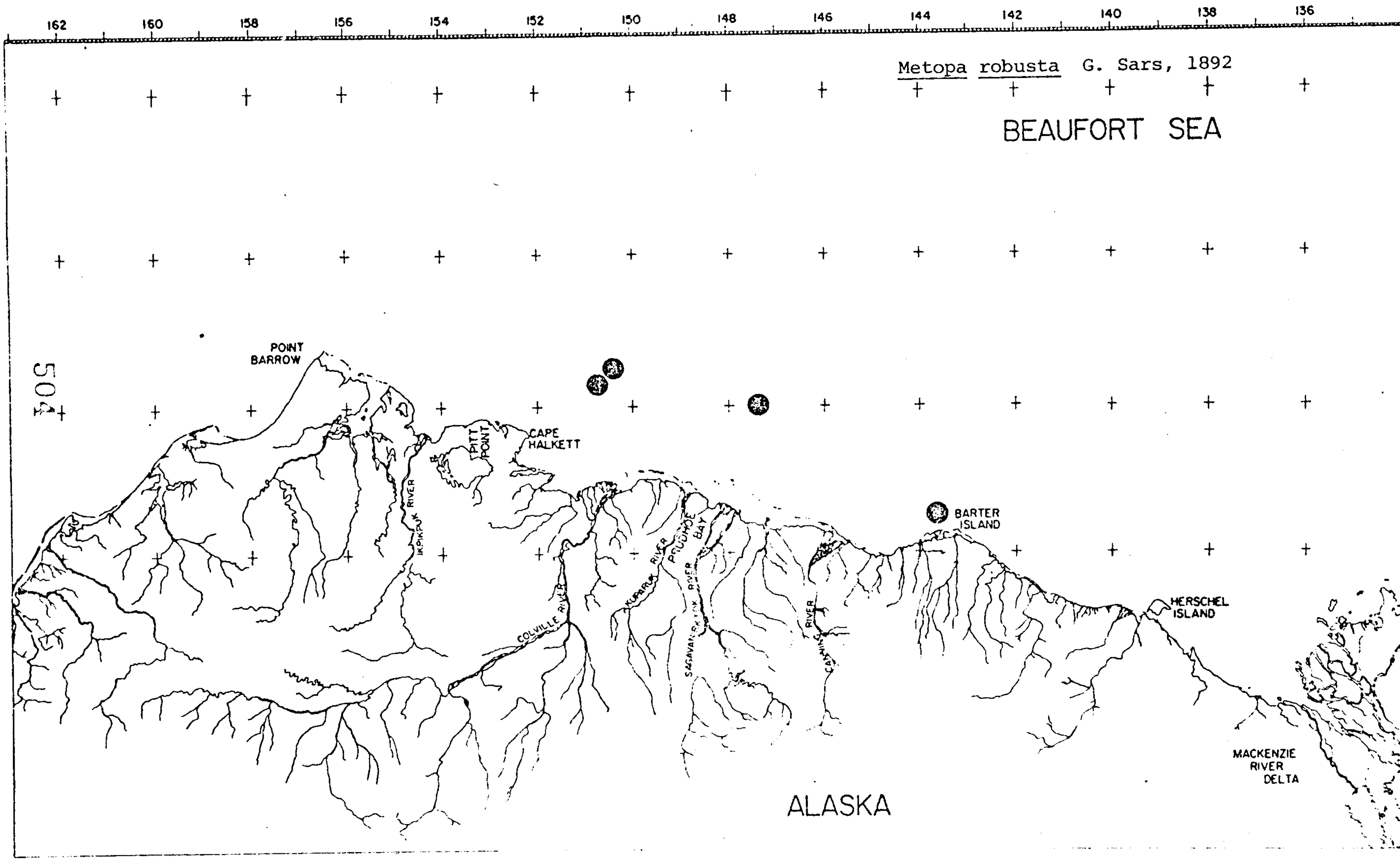
Melita dentata (Kröyer) 1842



Melita formosa Murdoch, 1866



<u>Melita</u> <u>quadrispinosa</u> Vosseler, 1889



Metopa robusta G. Sars, 1892
BEAUFORT SEA
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POINT BARROW
PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
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PRUDHOE BAY
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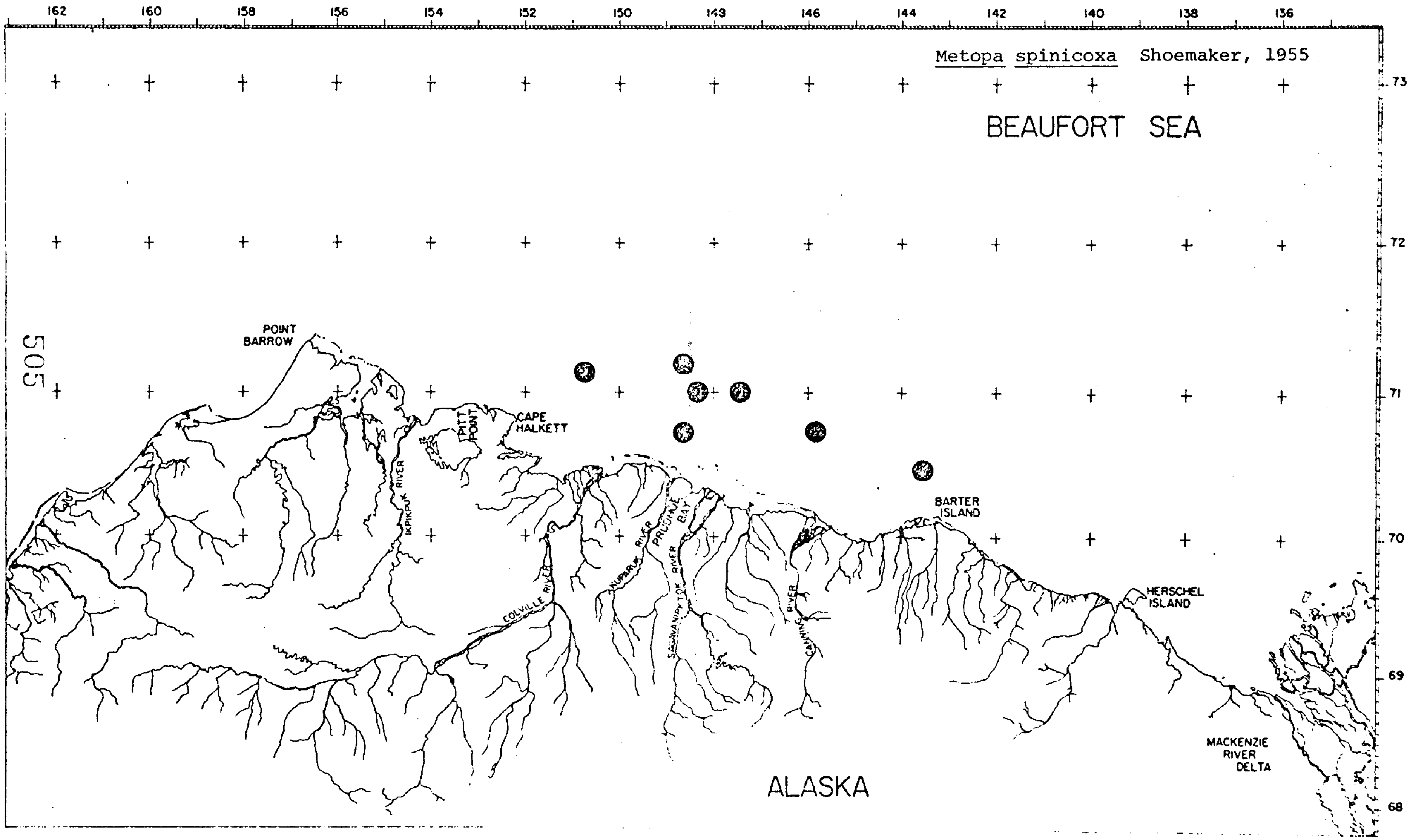
BARTER ISLAND
HERSCHEL ISLAND
MACKENZIE RIVER DELTA
ALASKA


Metopa spinicoxa Shoemaker, 1955
BEAUFORT SEA
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POINT BARROW
PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
SAGAVANIRKTOK RIVER
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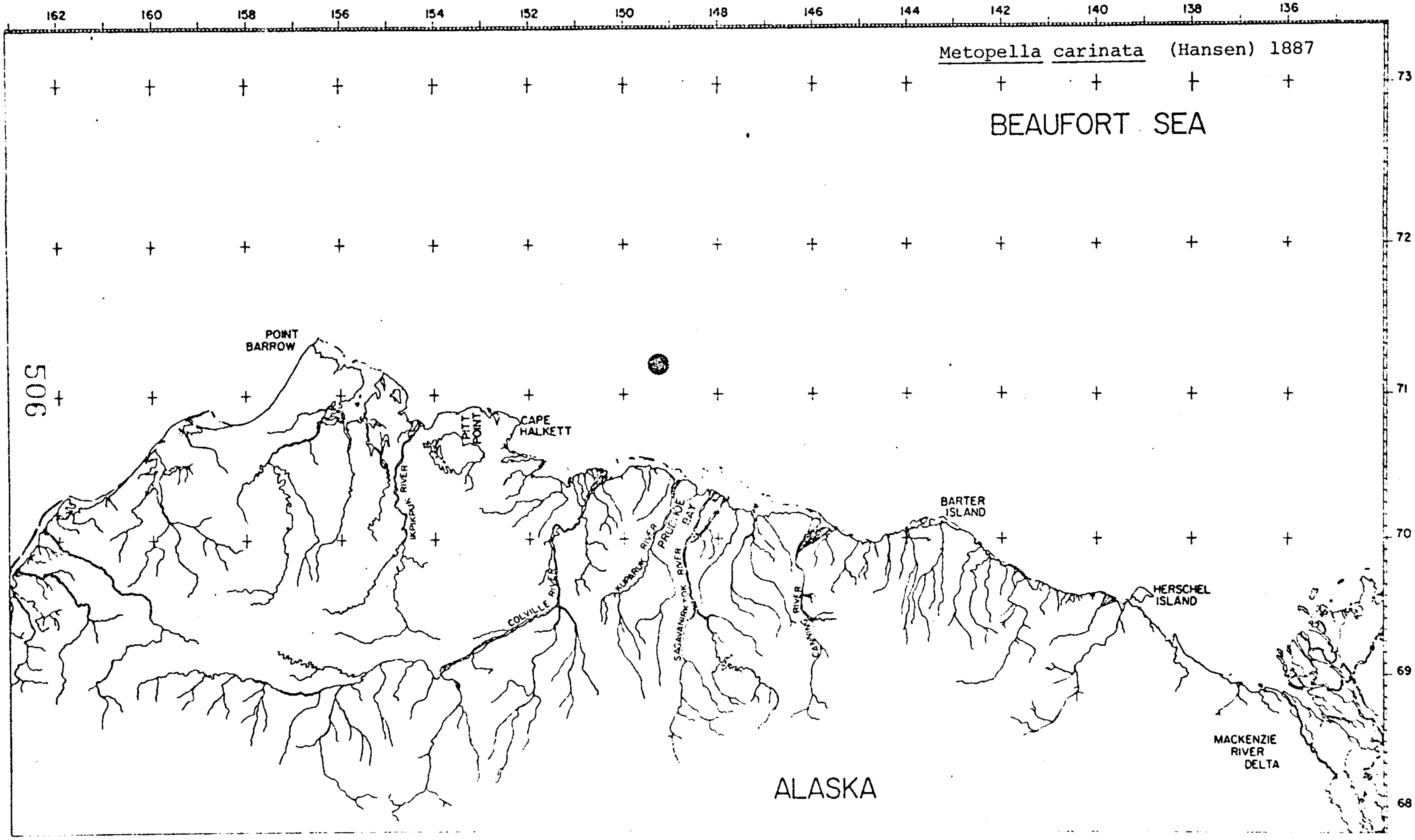
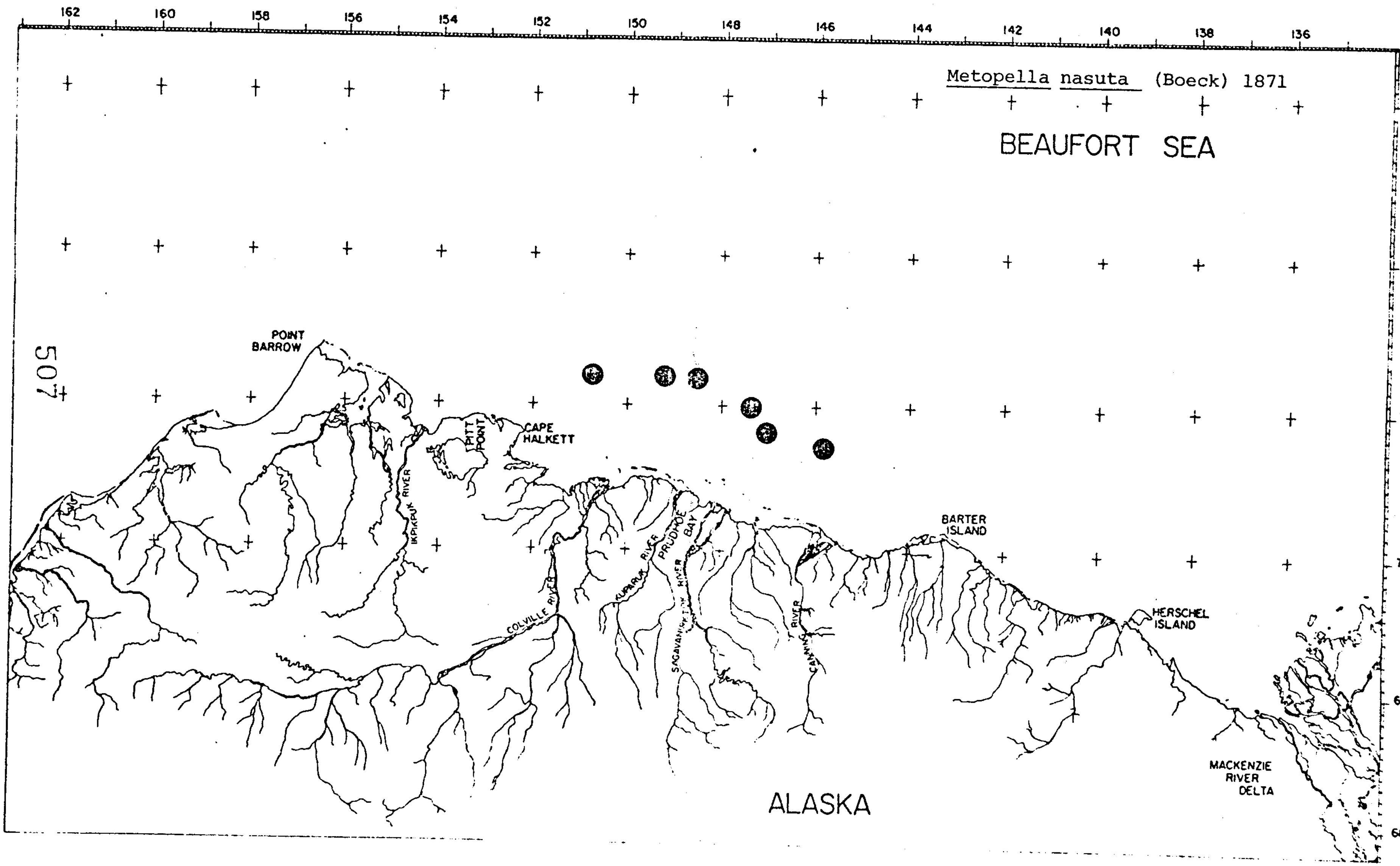


Metopella carinata (Hansen) 1887


Metopella nasuta (Boeck) 1871
BEAUFORT SEA
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PRUDHOE BAY
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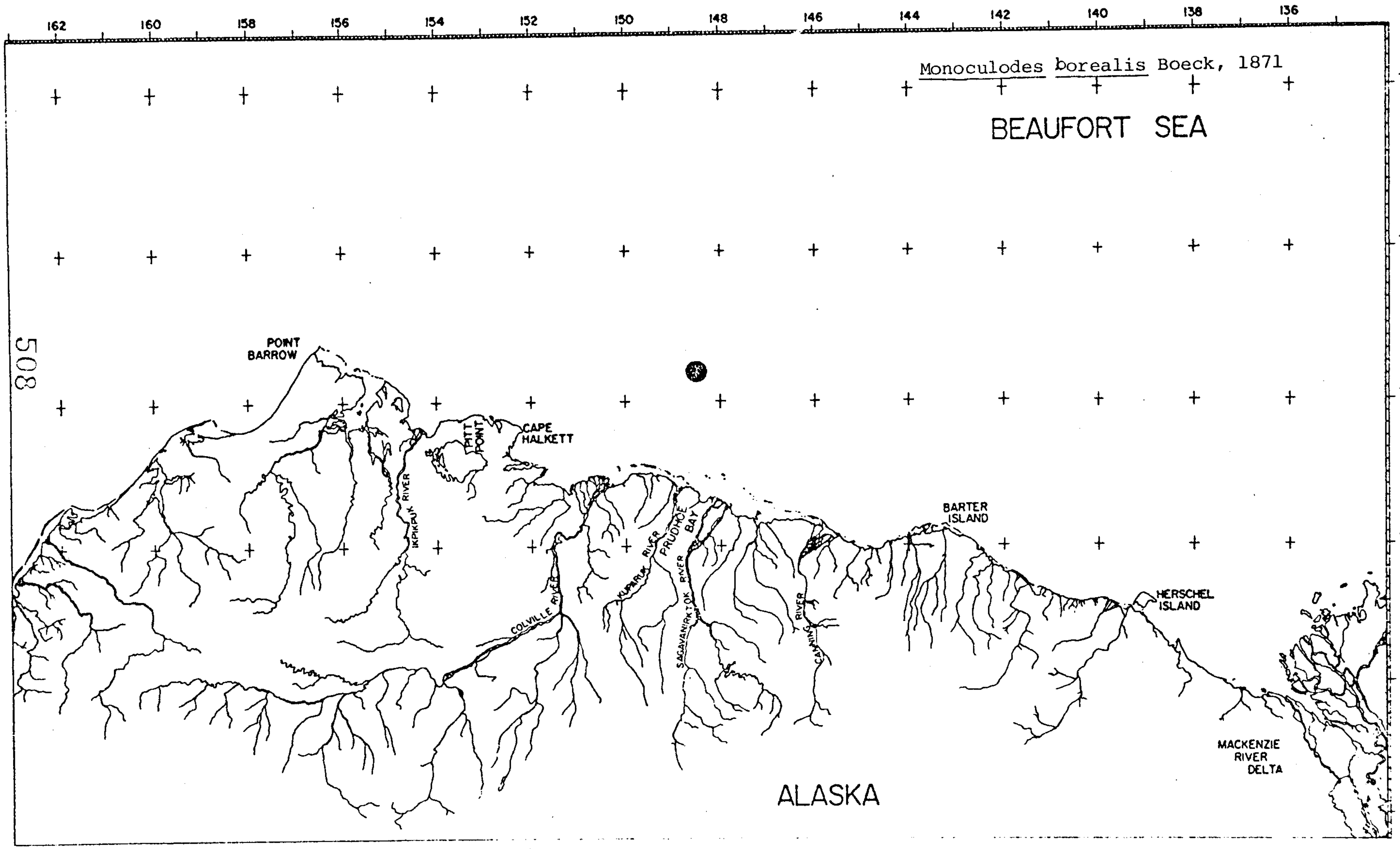
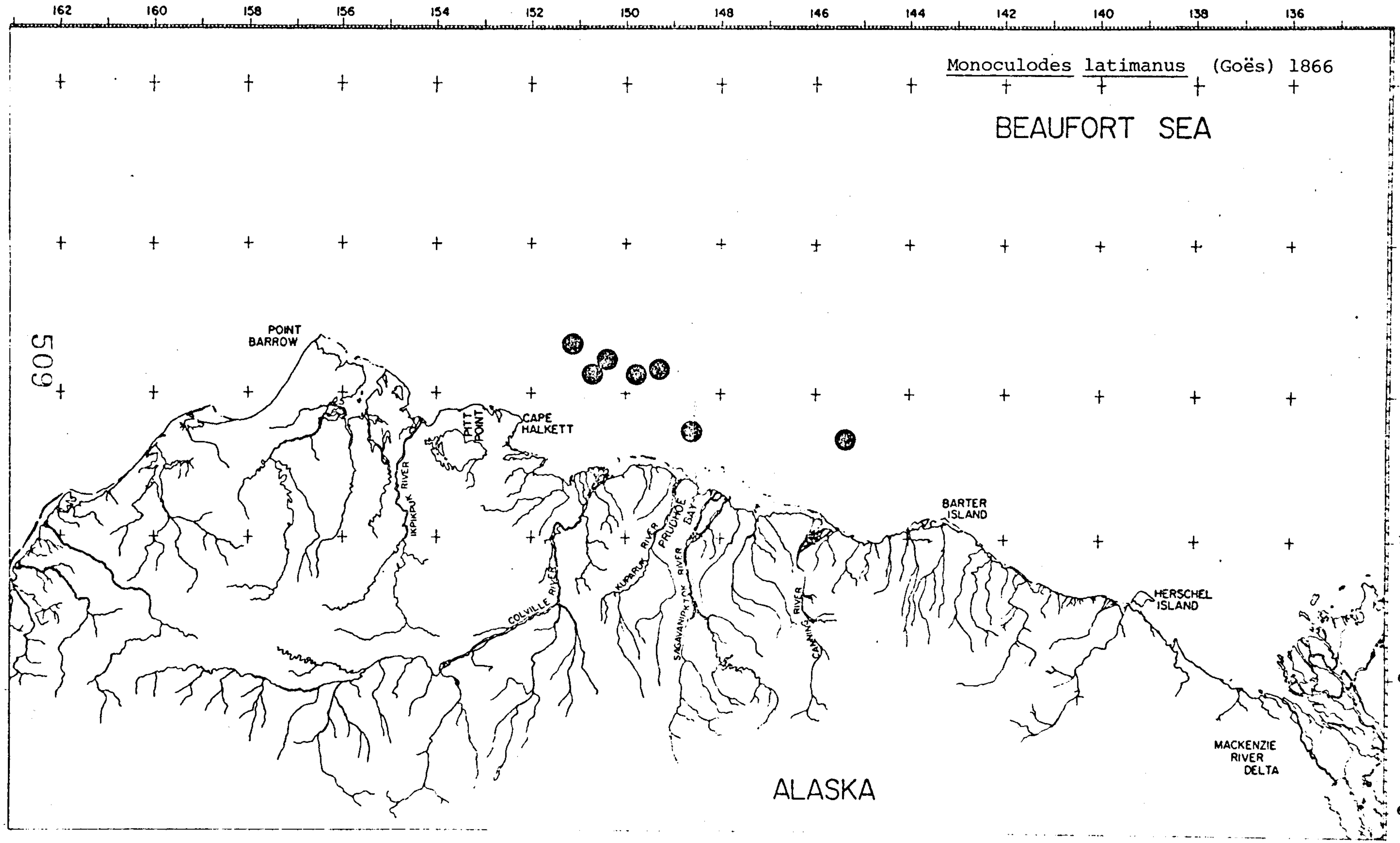
HERSCHEL ISLAND
MACKENZIE RIVER DELTA

Monoculodes borealis Boeck, 1871




Monoculodes latimanus (Goës) 1866
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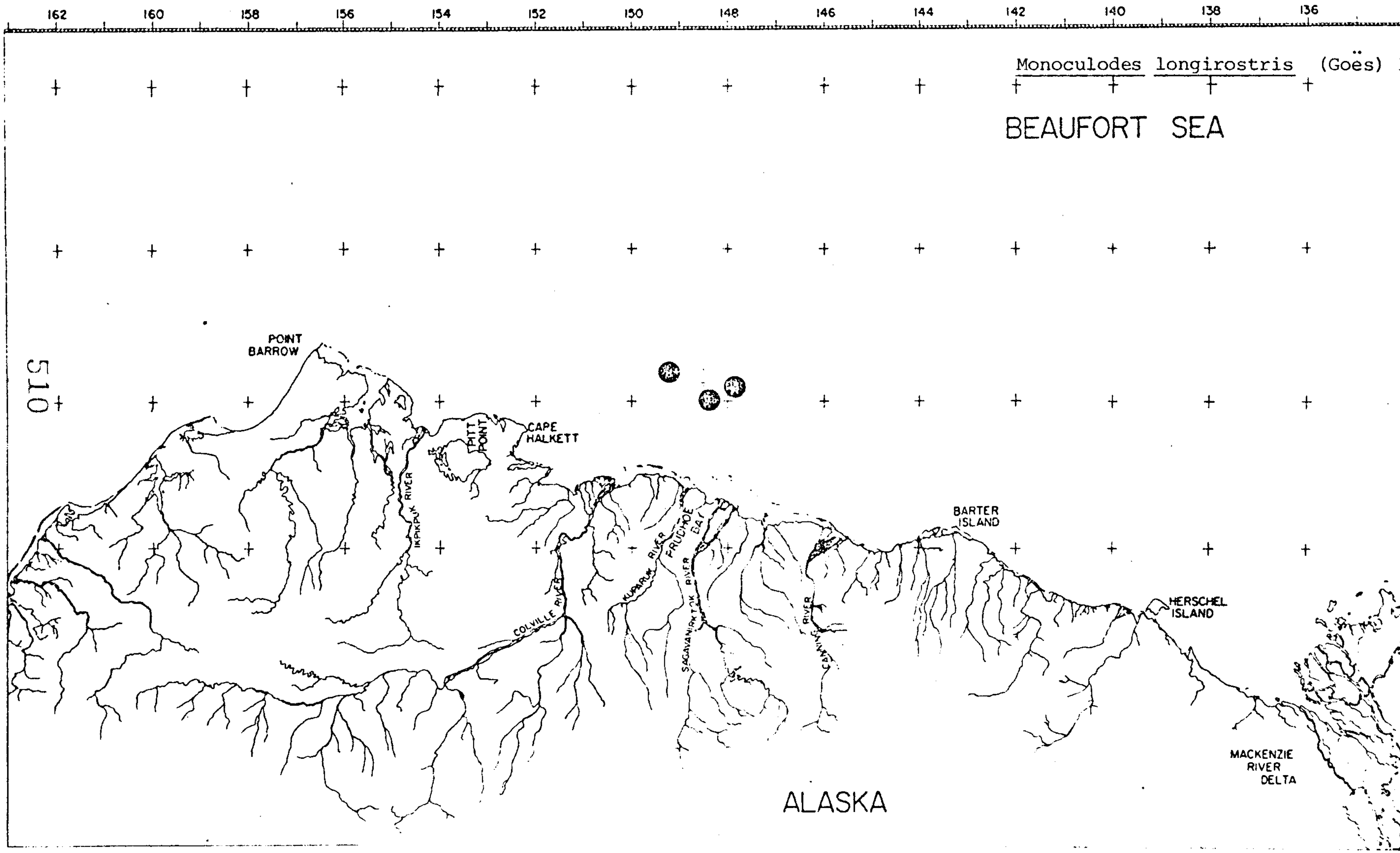
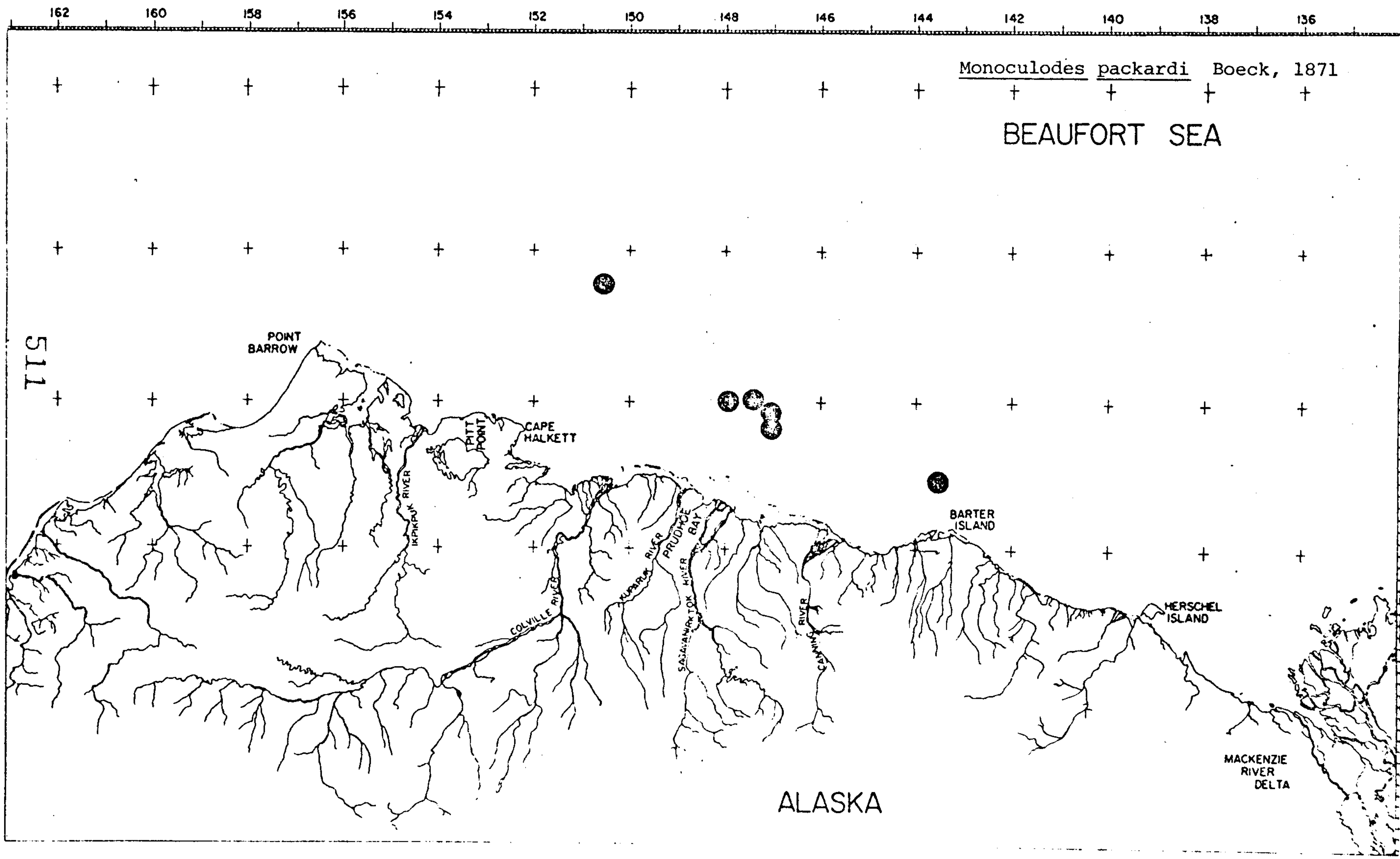


Monoculodes longirostris (Goës) 1866


Monoculodes packardi Boeck, 1871
BEAUFORT SEA
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POINT BARROW
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PRUDHOE BAY
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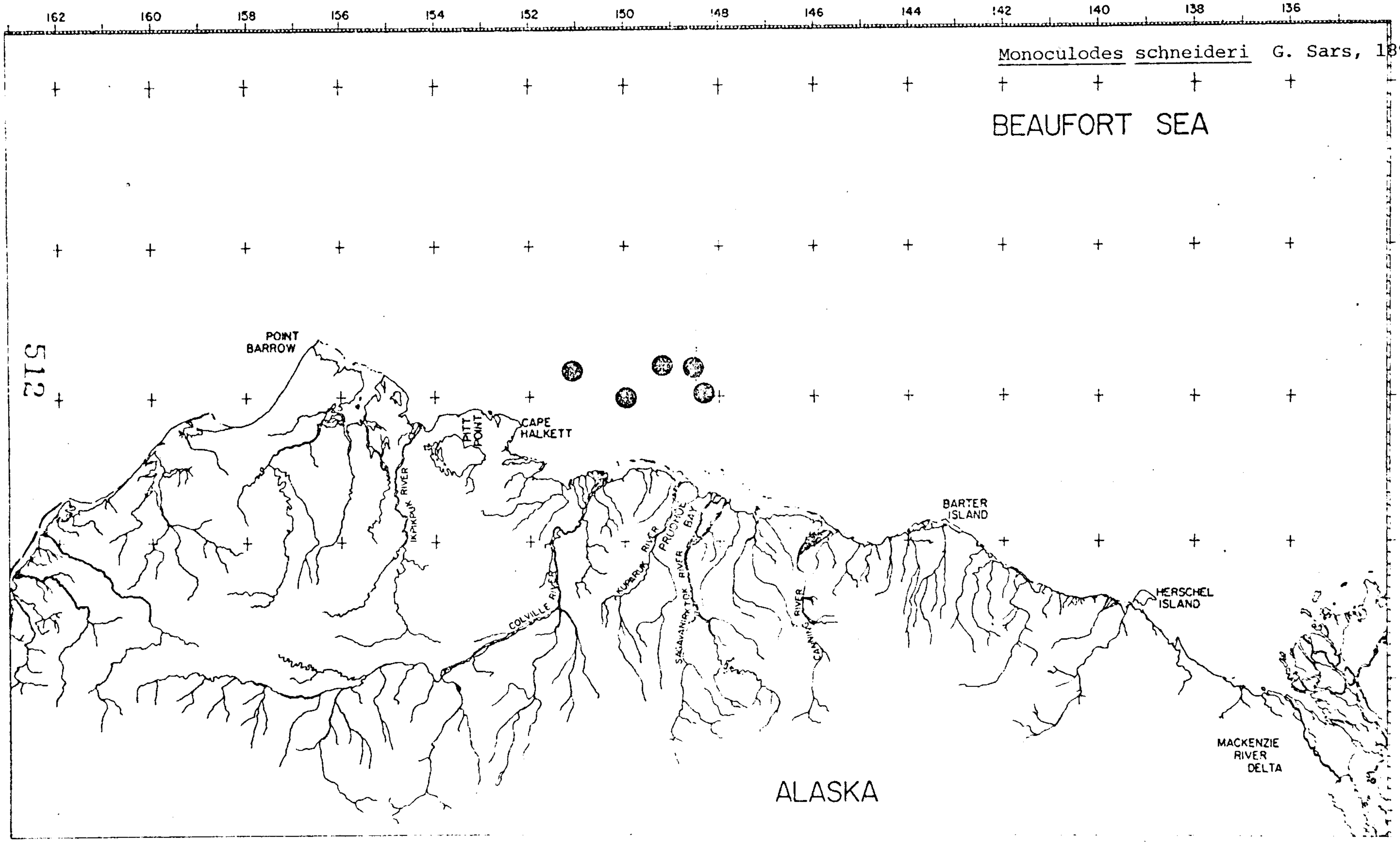
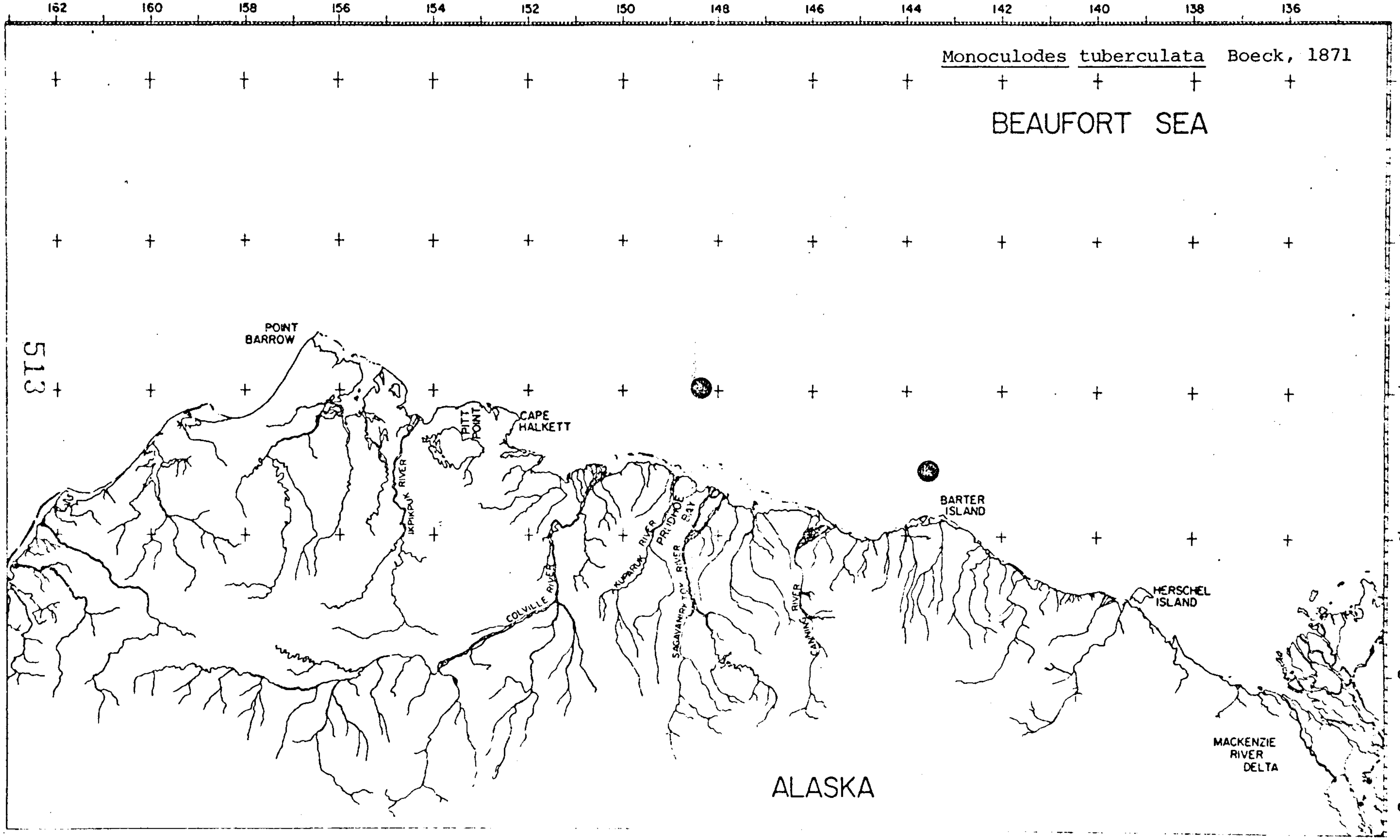
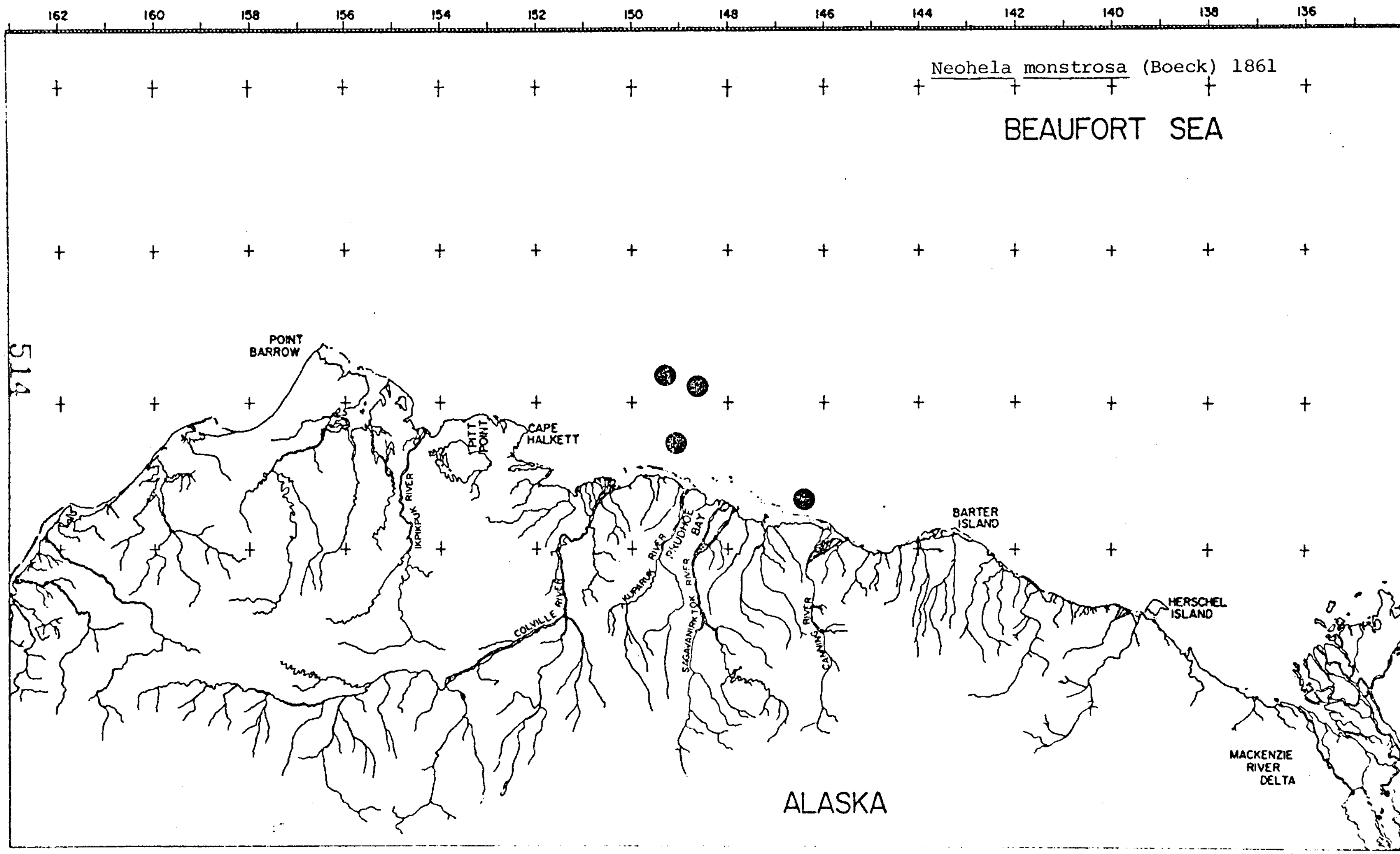
BARTER ISLAND
HERSCHEL ISLAND
MACKENZIE RIVER DELTA
ALASKA

Monoculodes schneideri G. Sars, 1895

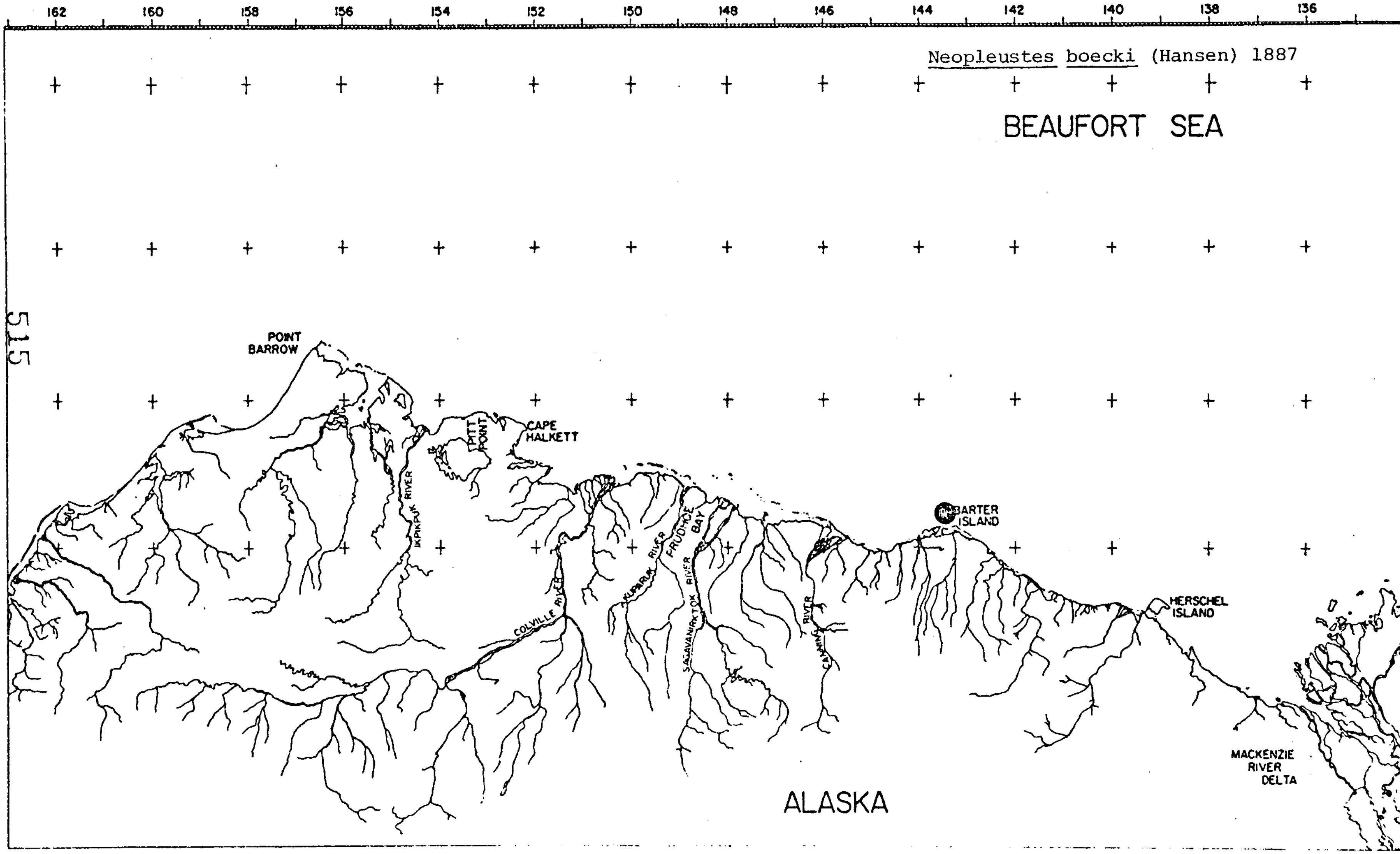




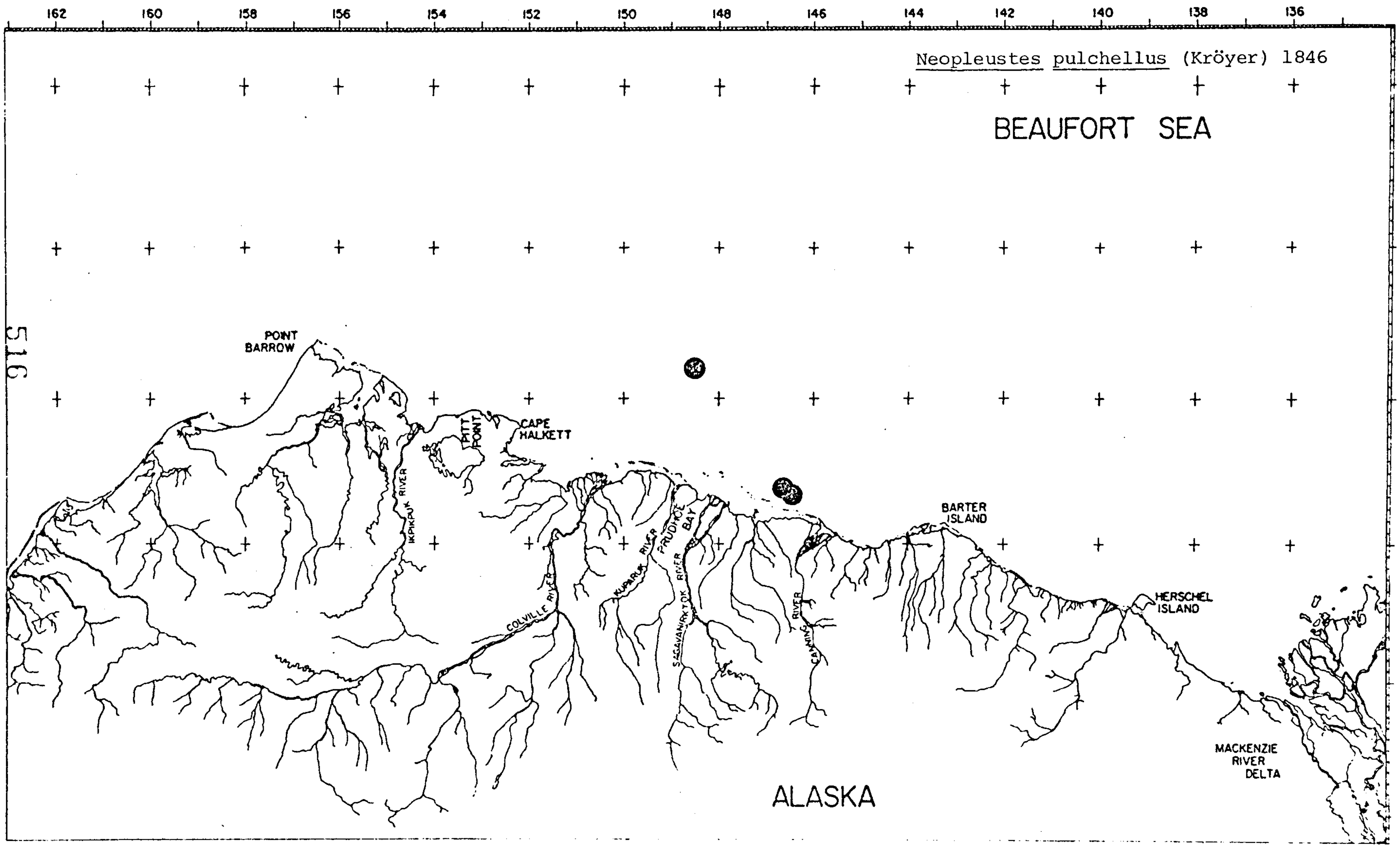
Monoculodes tuberculata Boeck, 1871



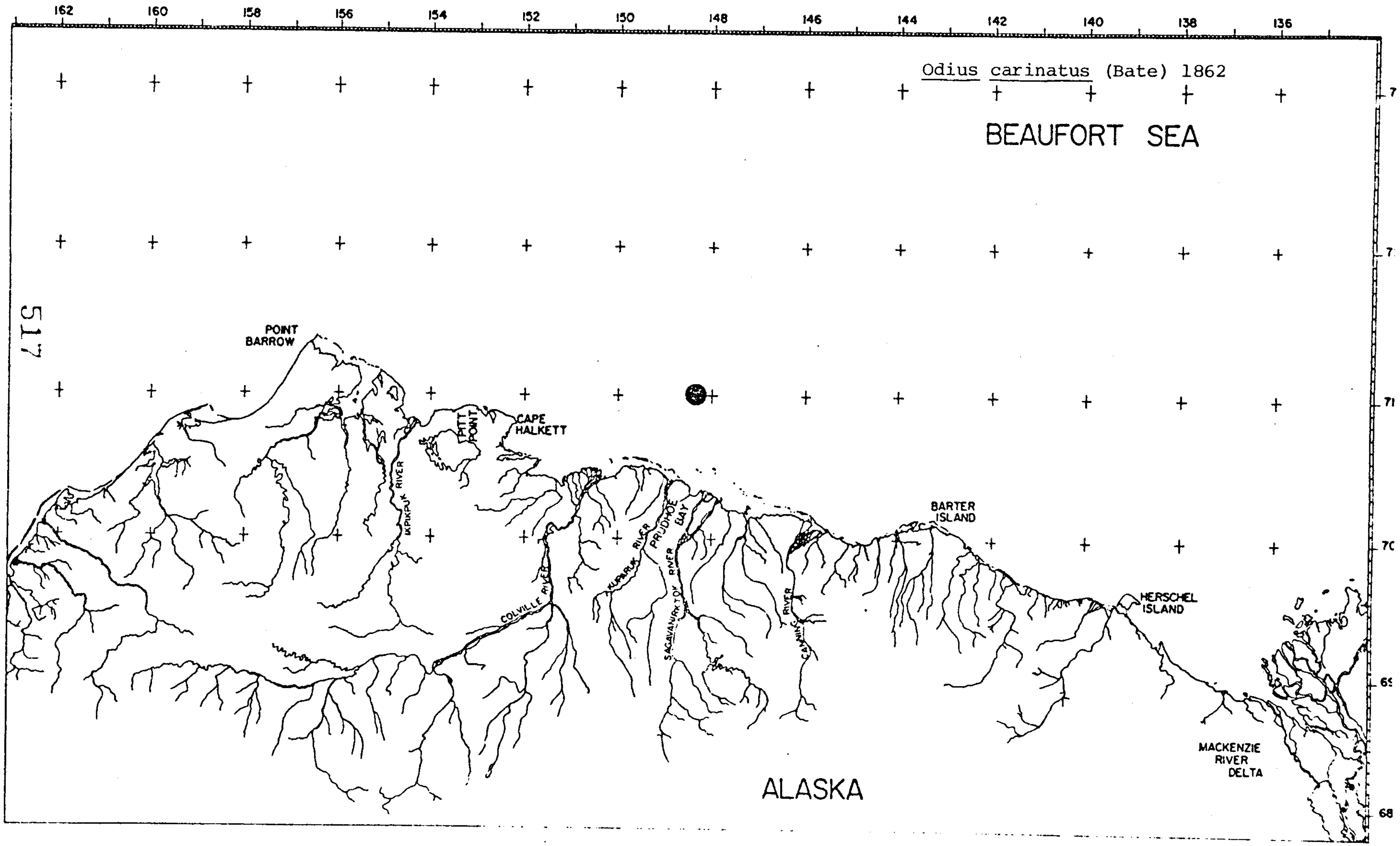
Neohela monstrosa (Boeck) 1861



<u>Neopleustes</u> <u>boecki</u> (Hansen) 1887



Neopleustes *pulchellus* (Kröyer) 1846


Odius carinatus (Bate) 1862
BEAUFORT SEA
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POINT BARROW
PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
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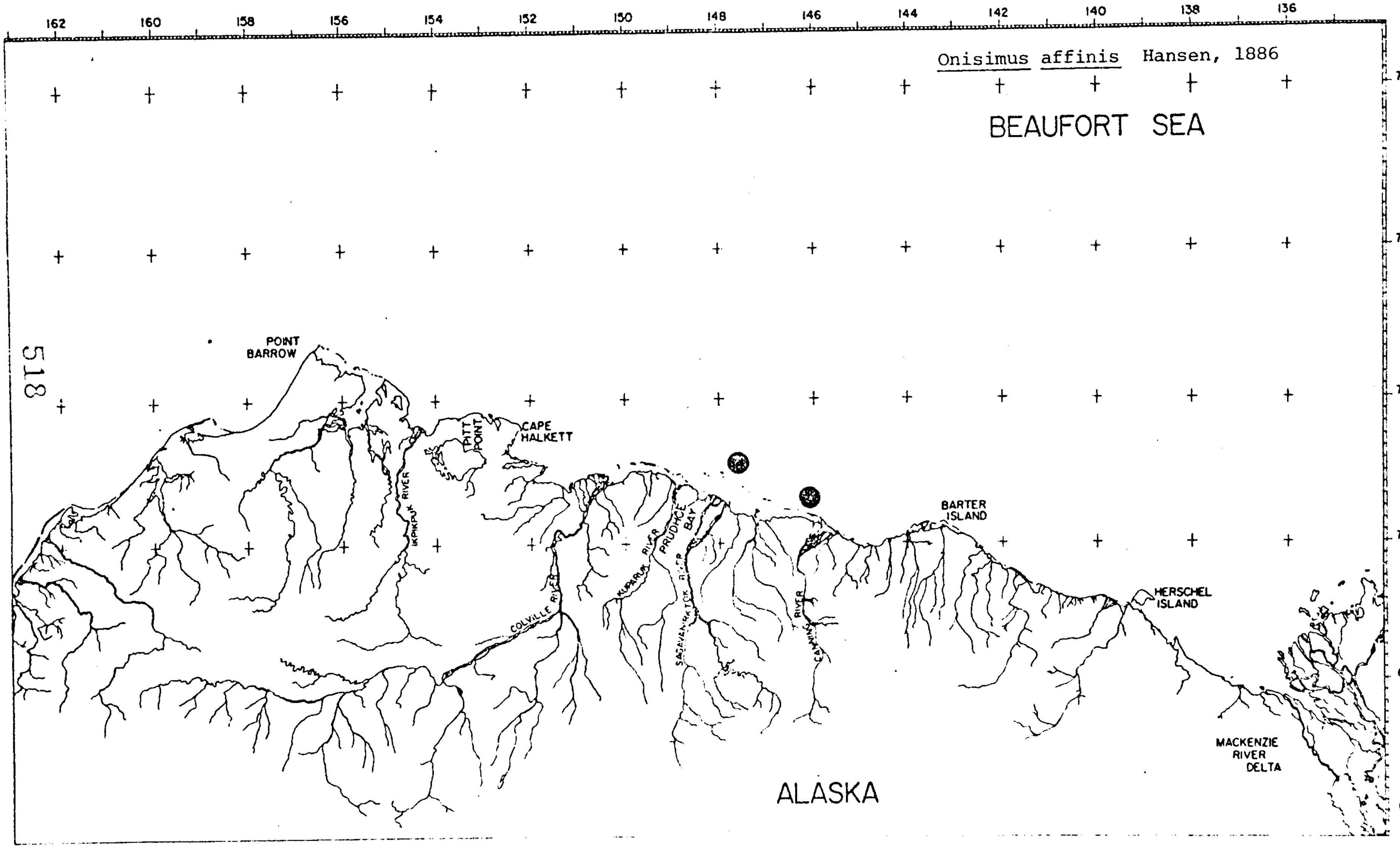
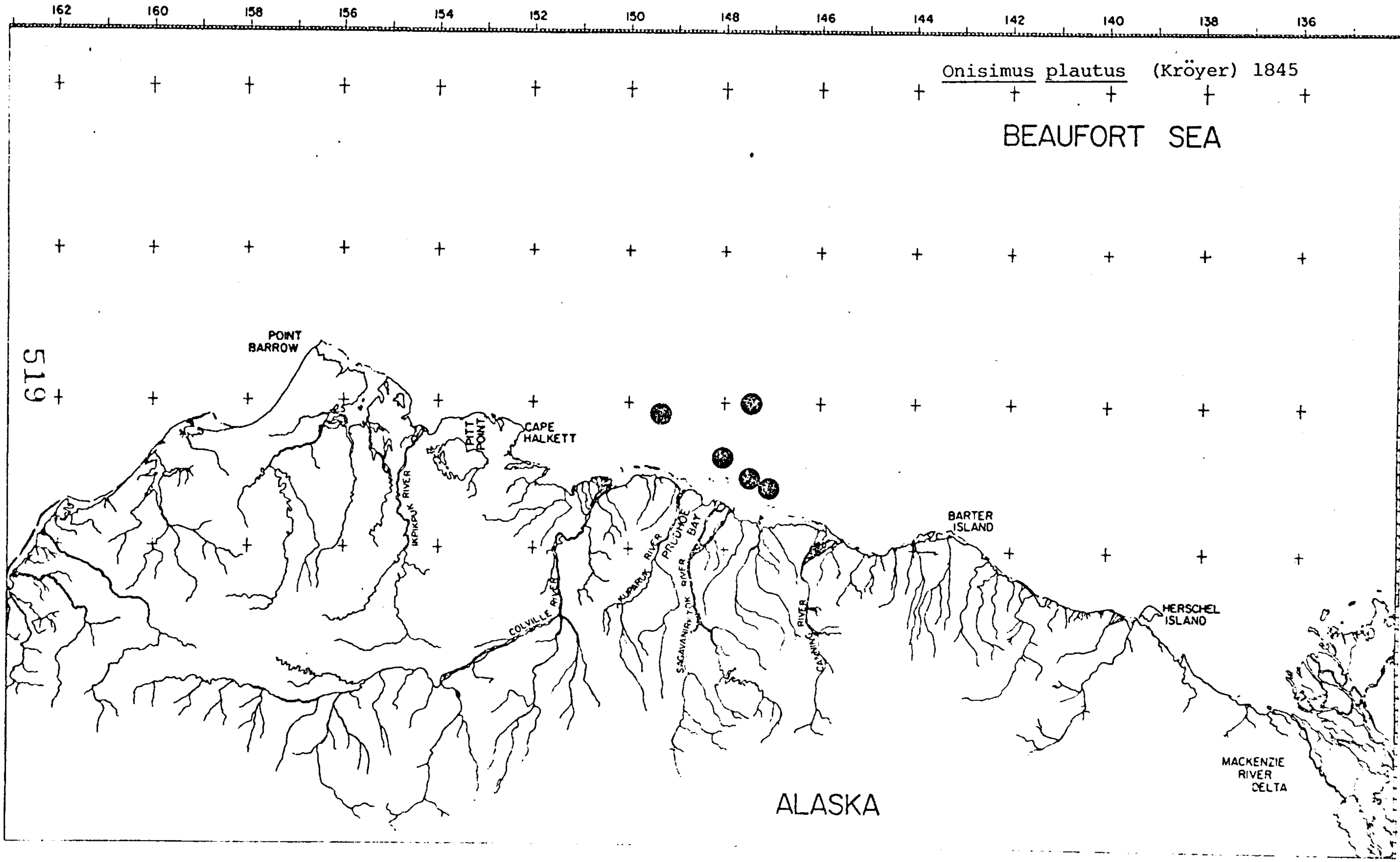
ALASKA



Onisimus affinis Hansen, 1886


Onisimus plautus (Kröyer) 1845
BEAUFORT SEA
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POINT BARROW
CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
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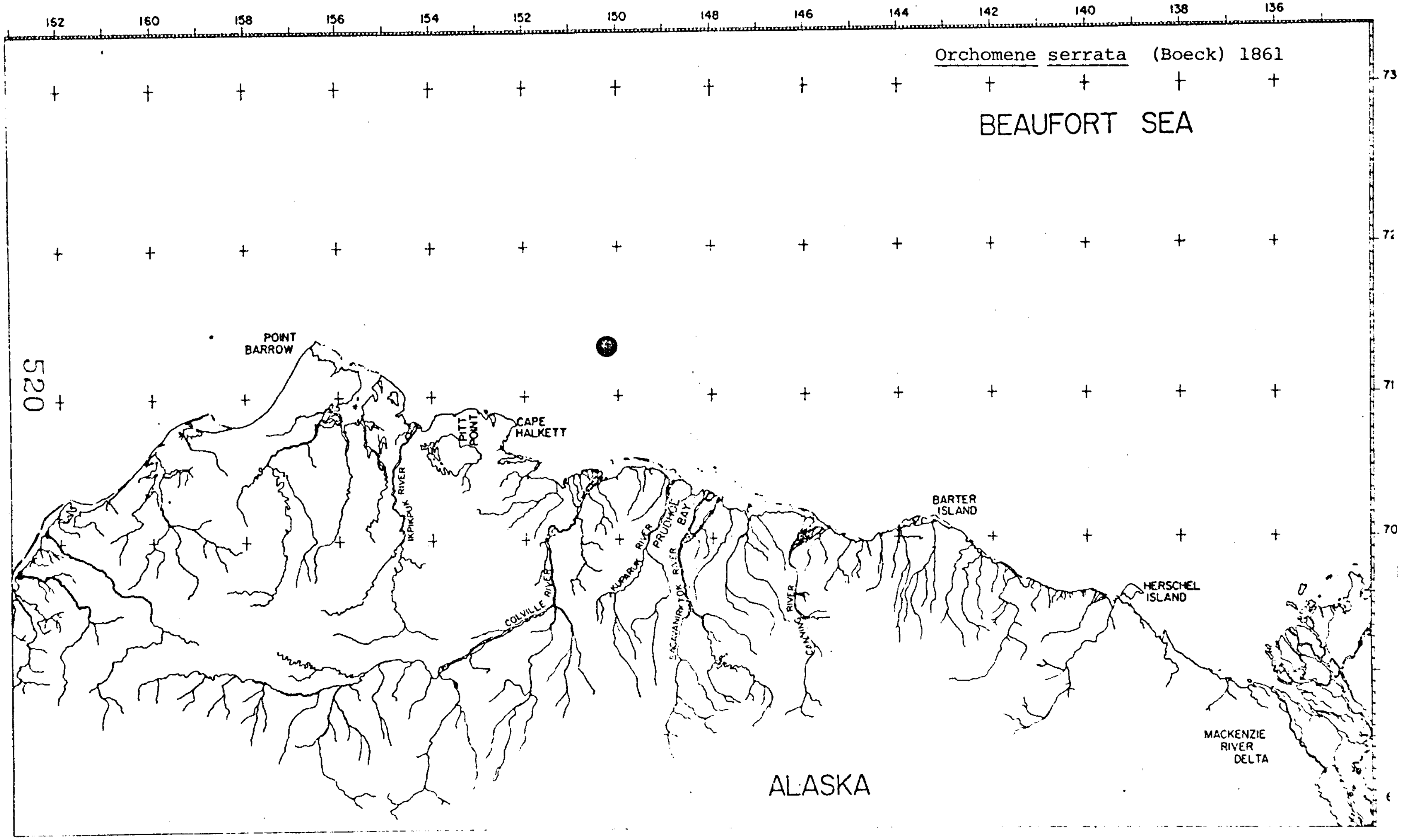
Orchomene serrata (Boeck) 1861
BEAUFORT SEA
ALASKA
POINT BARROW
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CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
SAGAVANIRKTOK RIVER
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BARTER ISLAND
HERSCHEL ISLAND
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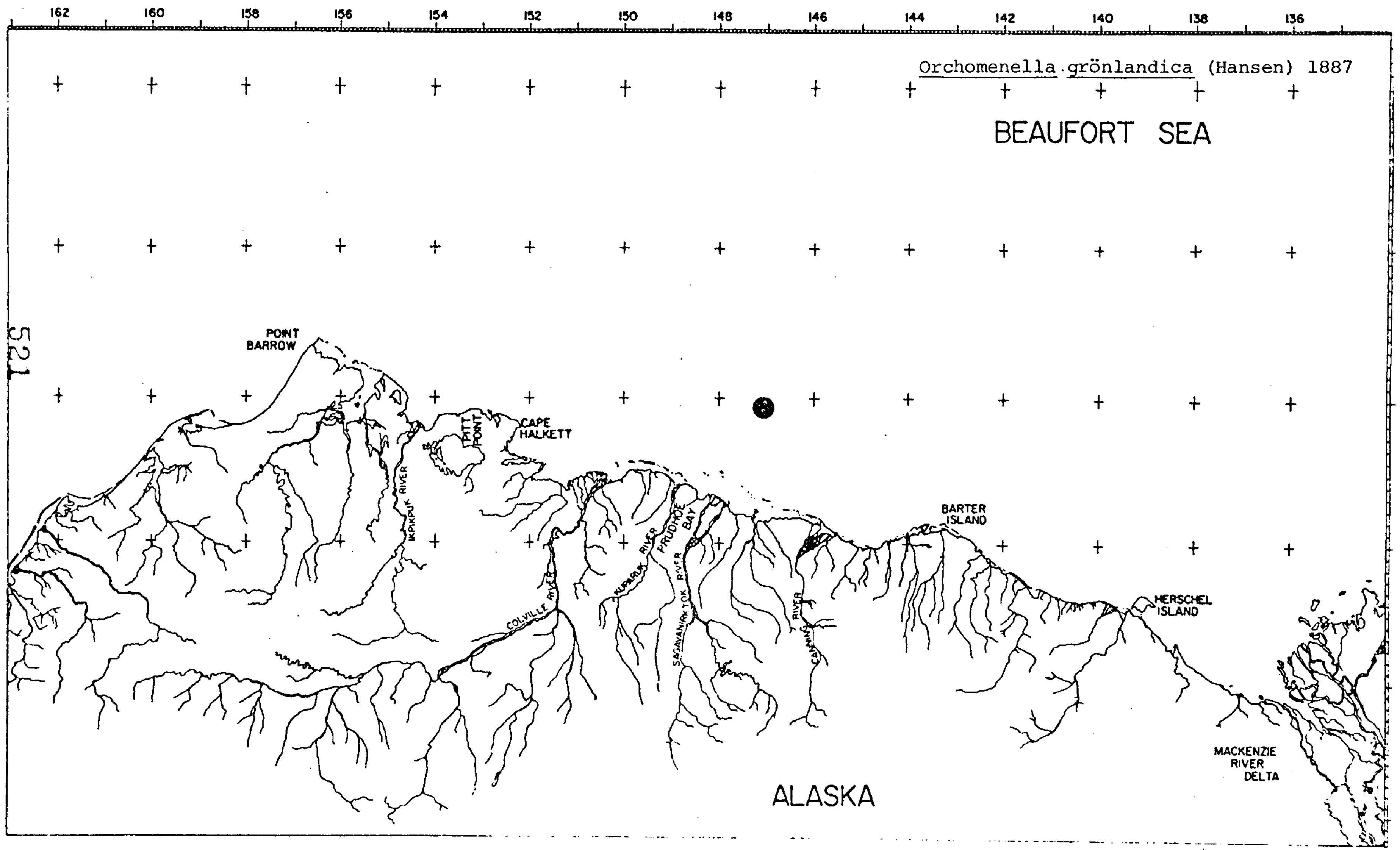
Orchomenella grönlandica (Hansen) 1887
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BEAUFORT SEA
POINT BARROW
CAPE HALKETT
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COLVILLE RIVER
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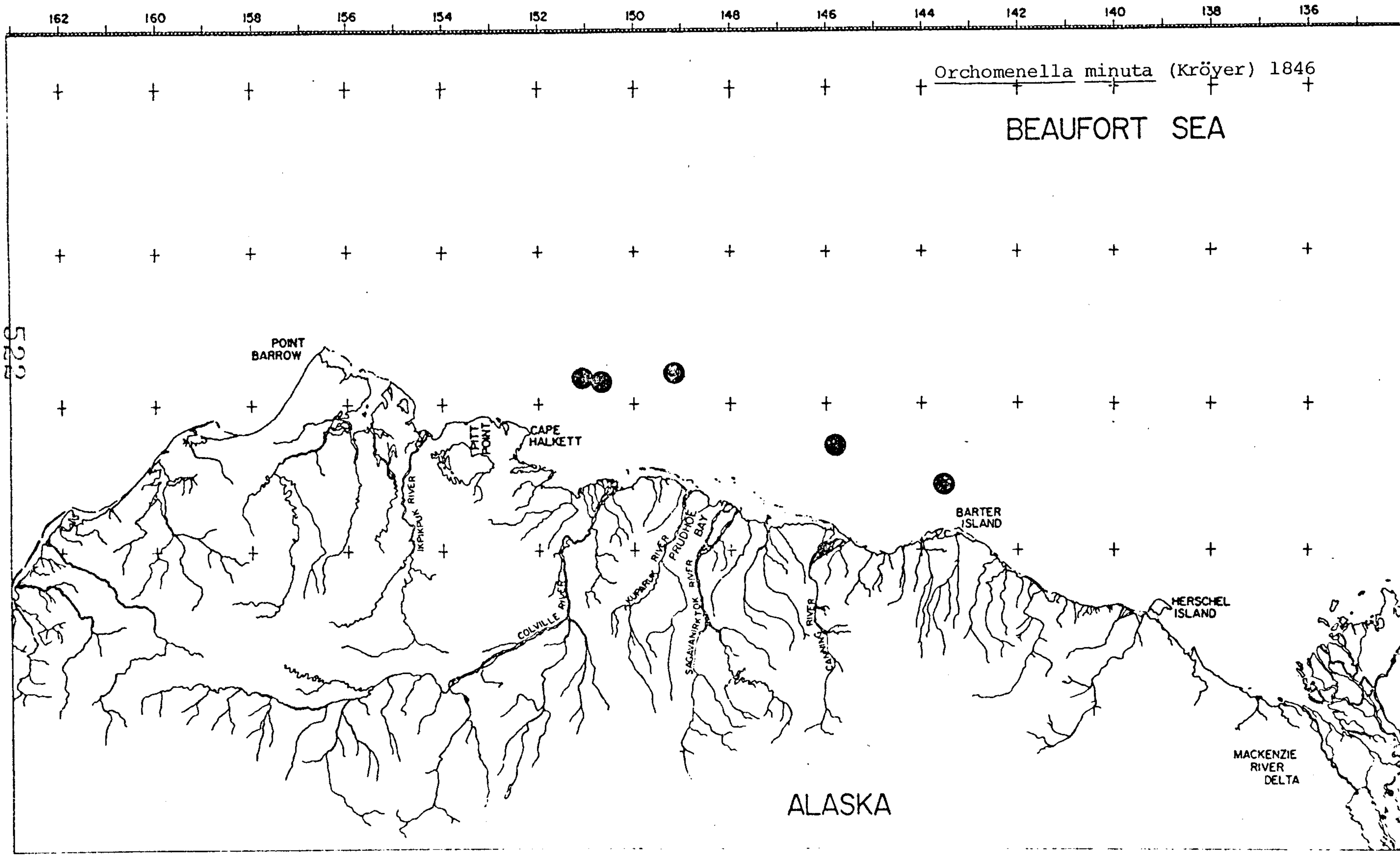
Orchomenella minuta (Kröyer) 1846
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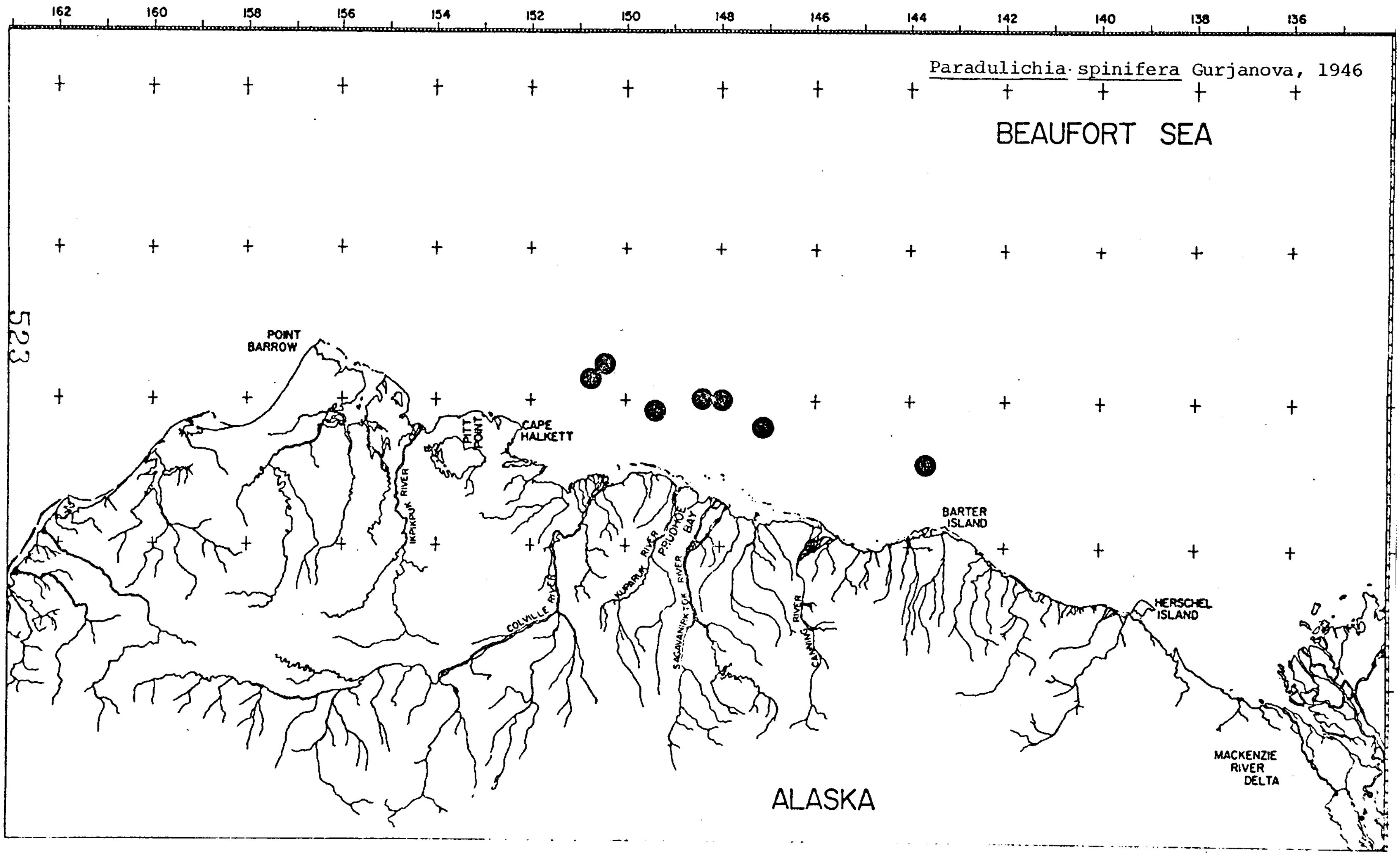
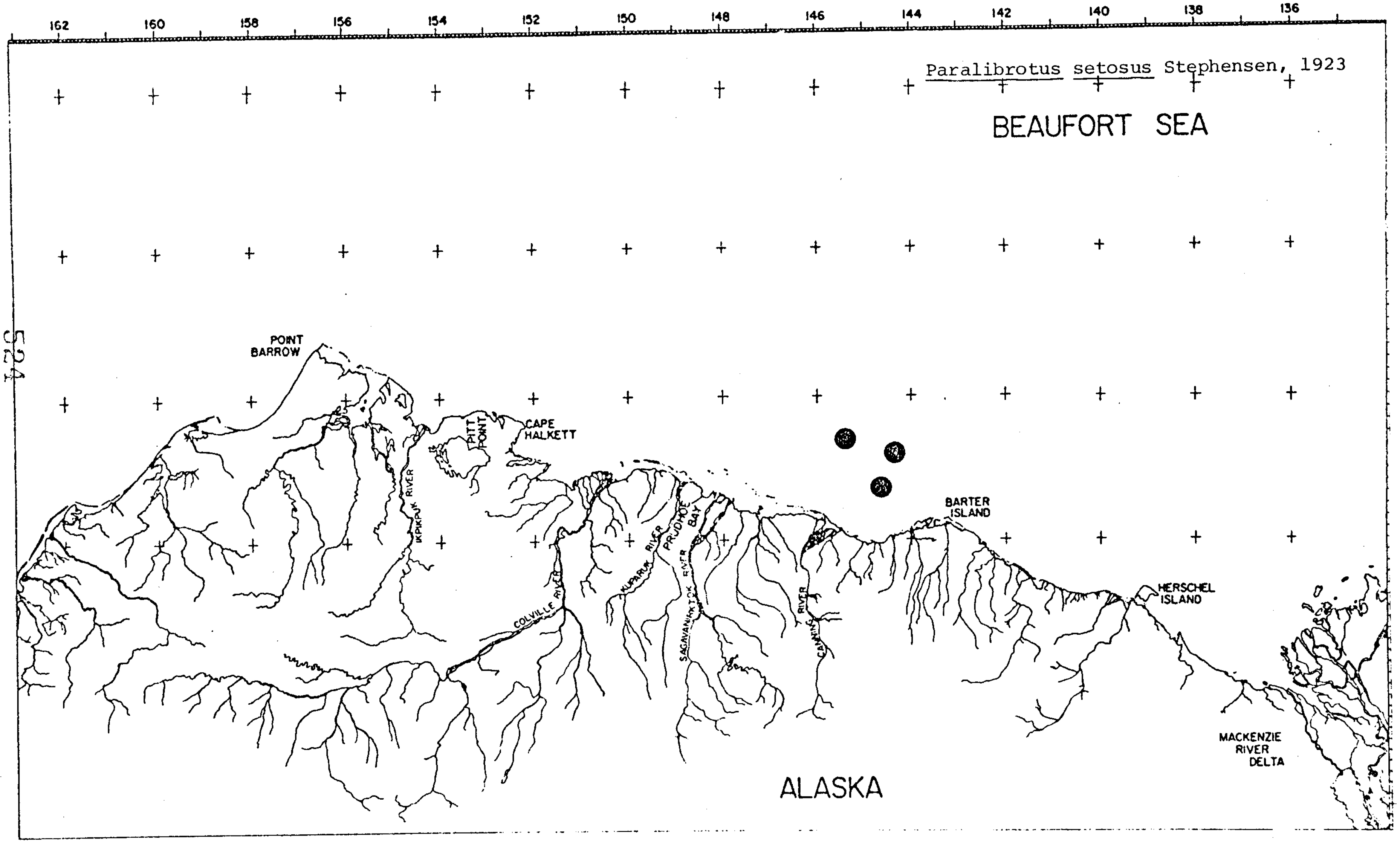


Paradulichia spinifera Gurjanova, 1946


Paralibrotus setosus Stephensen, 1923
BEAUFORT SEA
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POINT BARROW
CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
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KUPARUK RIVER
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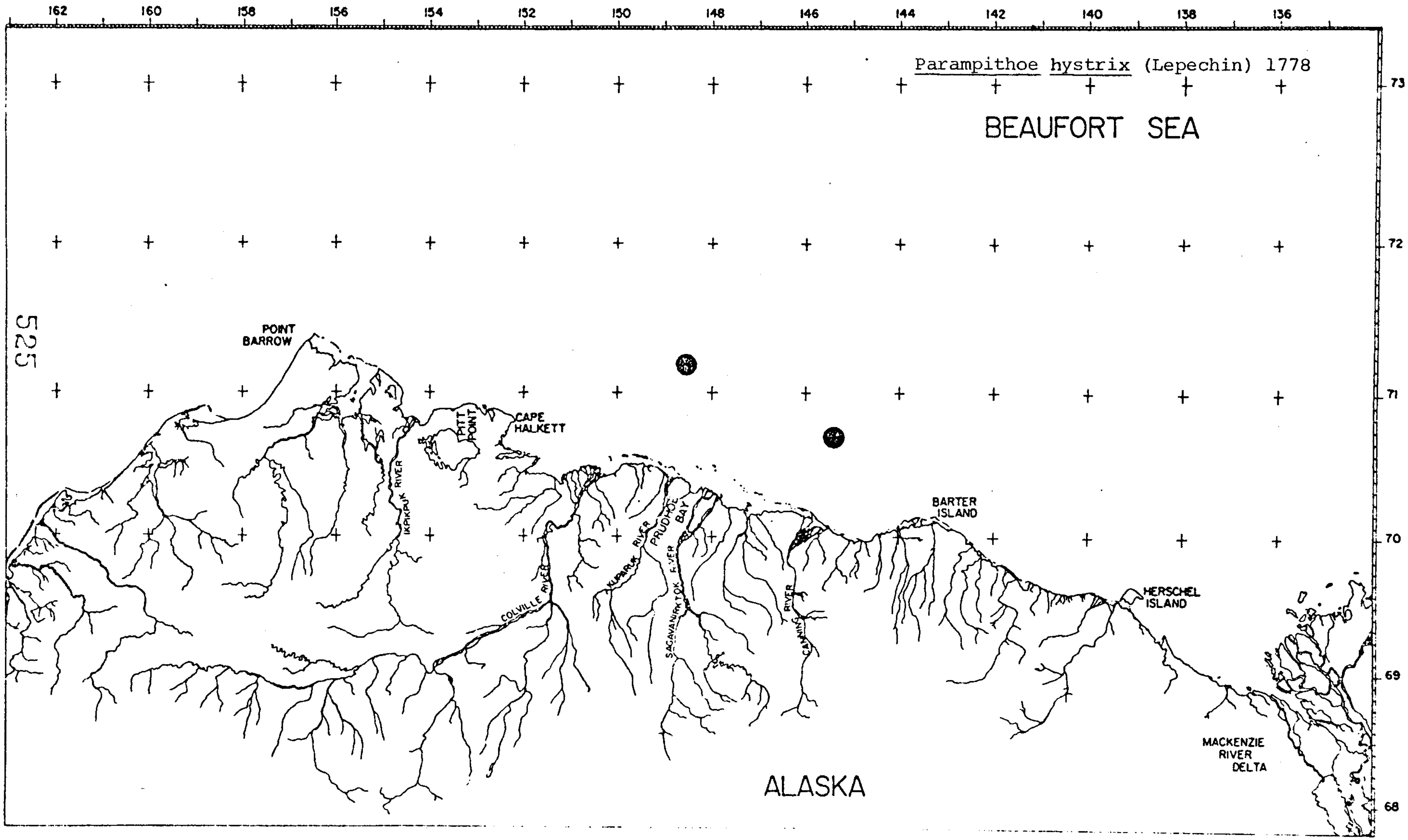
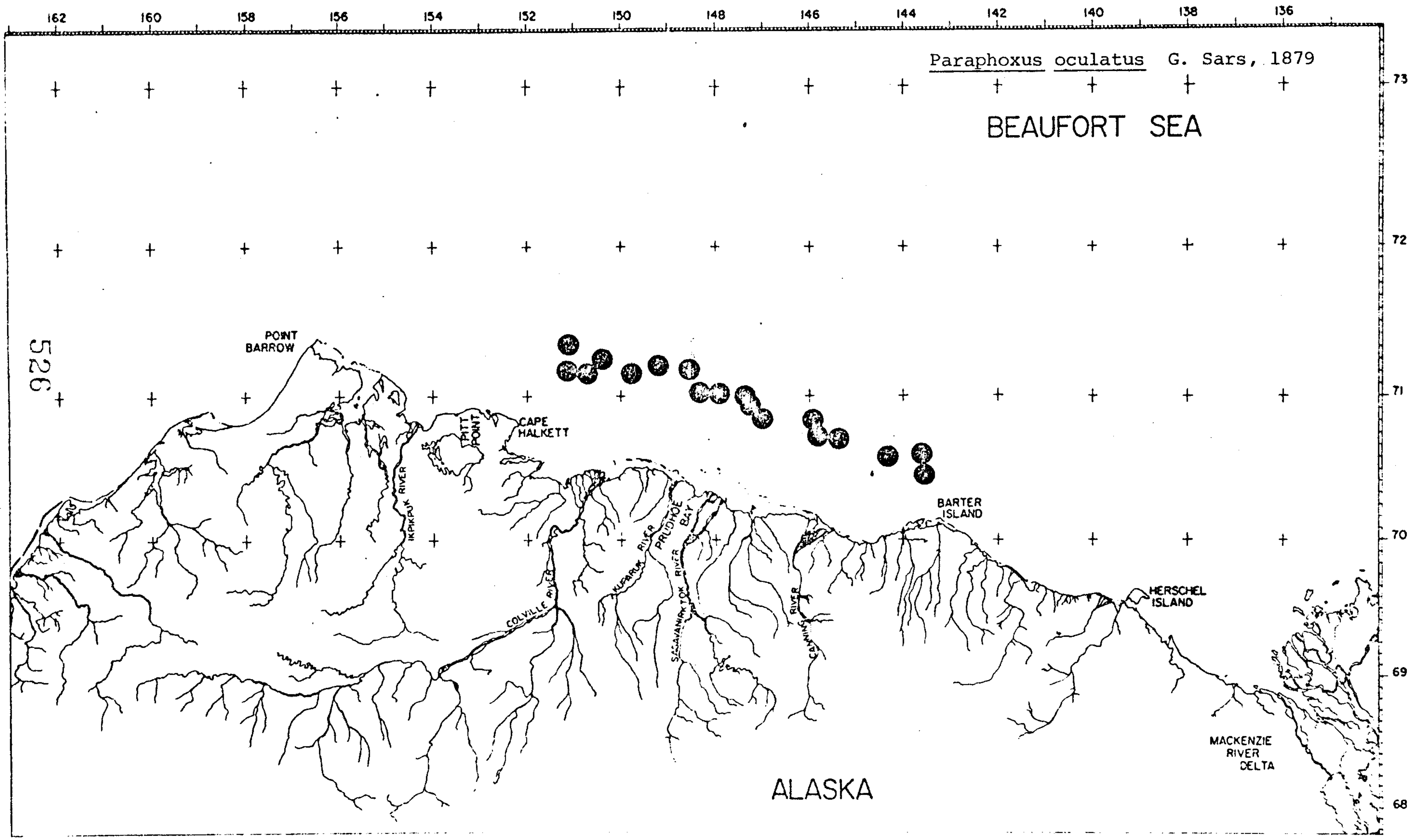
ALASKA



<u>Parampithoe</u> <u>hystrix</u> (Lepechin) 1778


Paraphoxus oculatus G. Sars, 1879
BEAUFORT SEA
POINT BARROW
CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
SAGAVANIRKTOK RIVER
CANNING RIVER
BARTER ISLAND
HERSCHEL ISLAND
MACKENZIE RIVER DELTA
ALASKA
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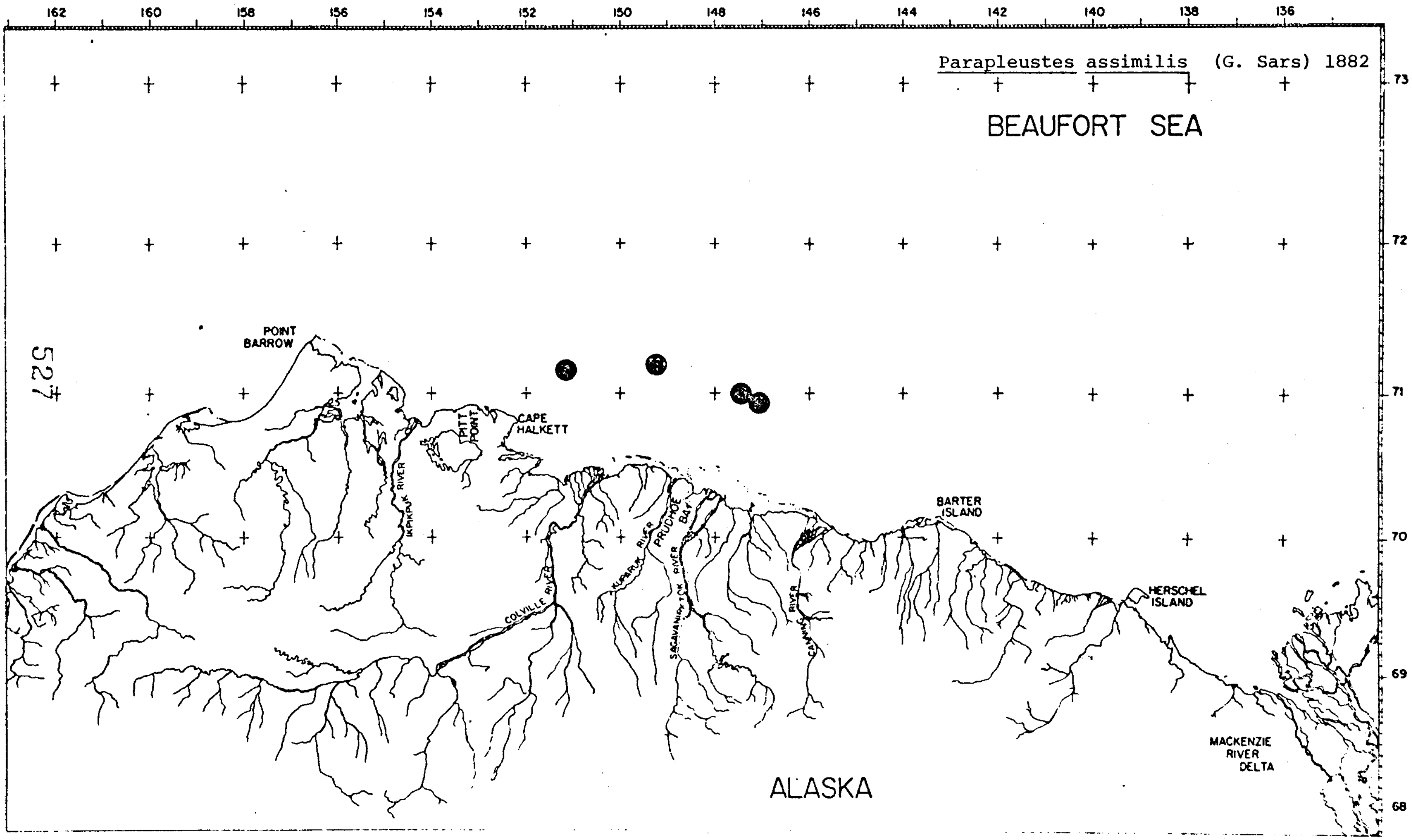
Parapleustes assimilis (G. Sars) 1882
BEAUFORT SEA
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POINT BARROW
CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
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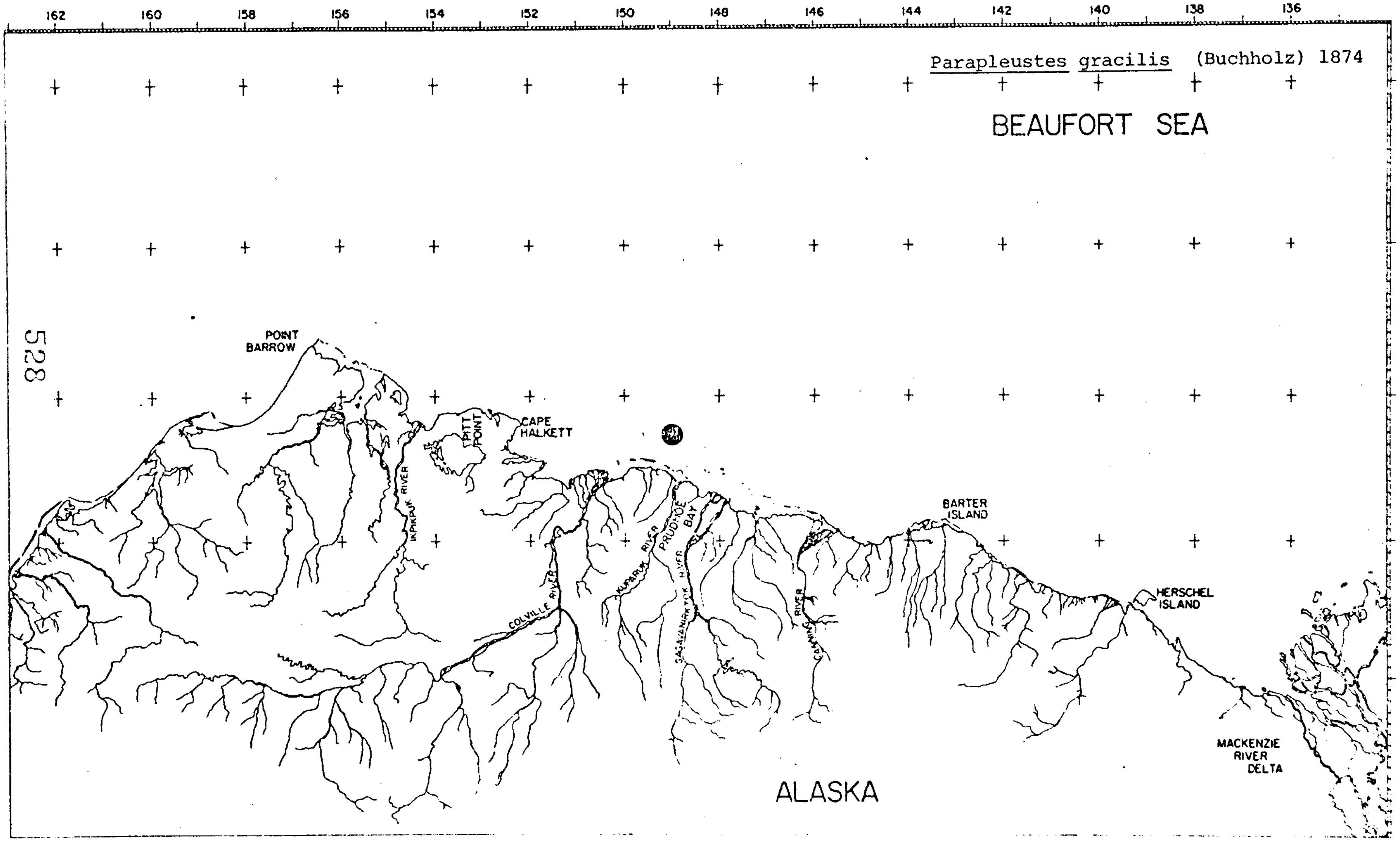
ALASKA


Parapleustes gracilis (Buchholz) 1874
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BEAUFORT SEA
POINT BARROW
PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
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ALASKA

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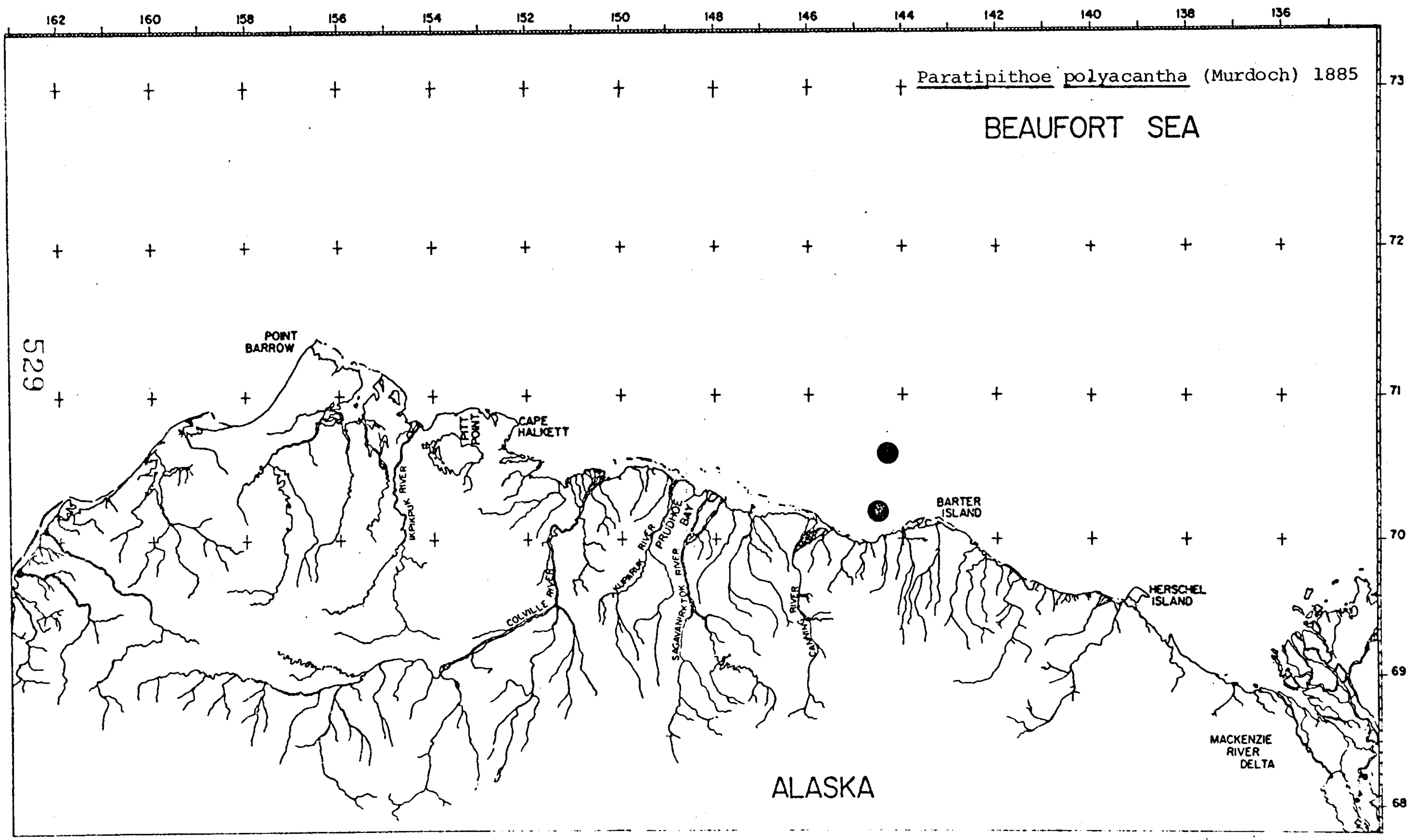

Paratipithoe polyacantha (Murdoch) 1885
BEAUFORT SEA
ALASKA
POINT BARROW
CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
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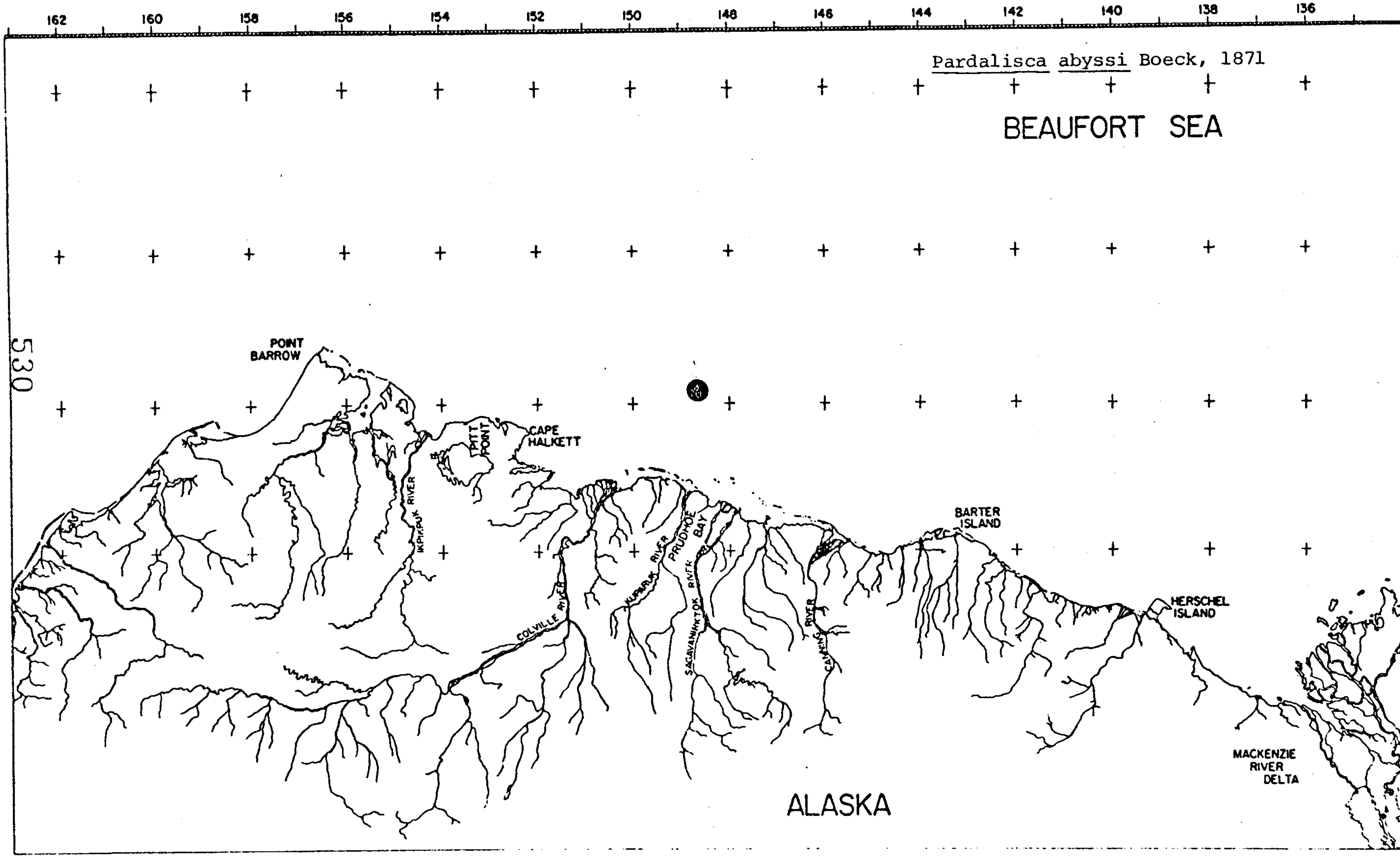
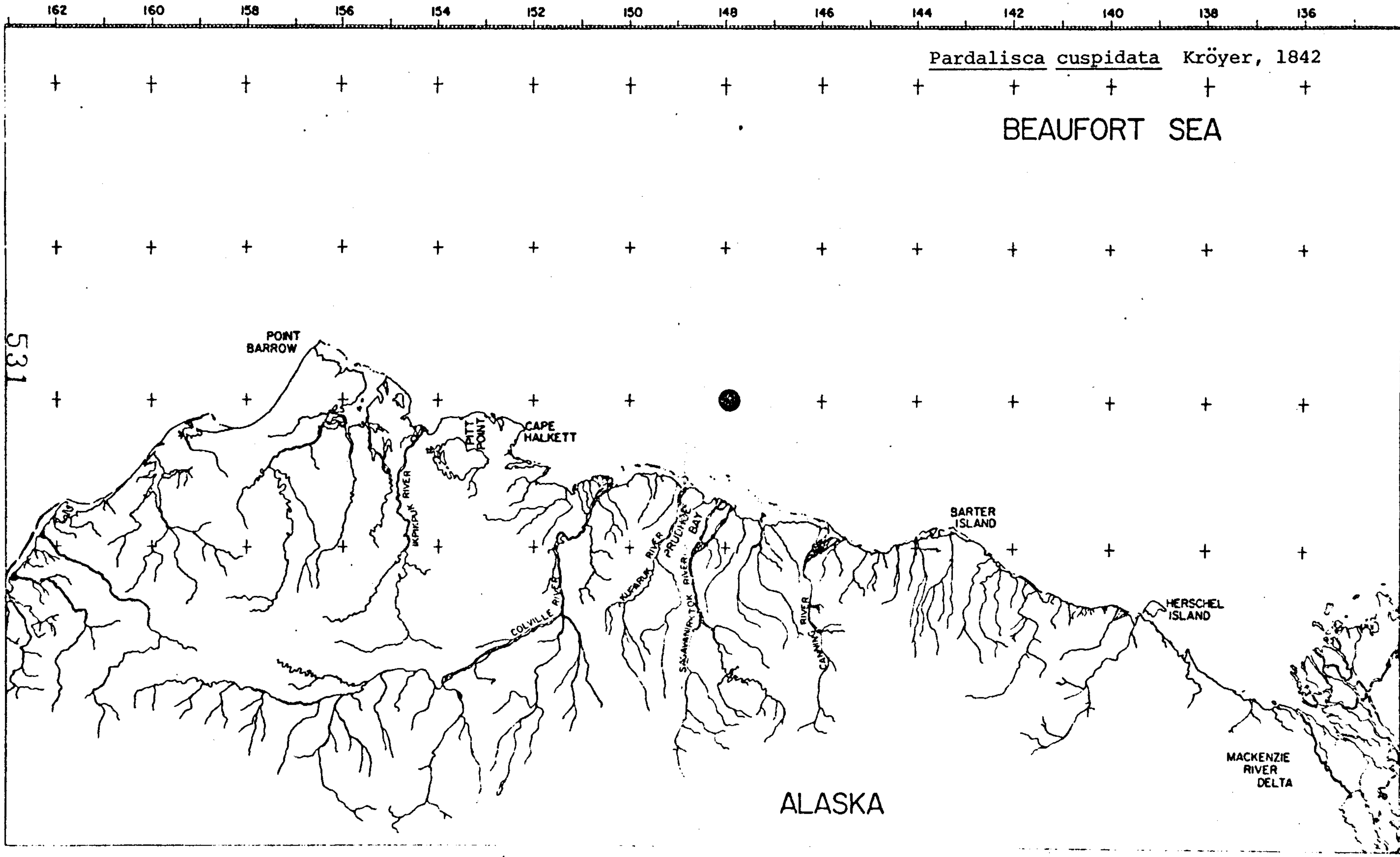


Pardalisca abyssi Boeck, 1871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Pardalisca cuspidata Kröyer, 1842
BEAUFORT SEA
POINT BARROW
PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
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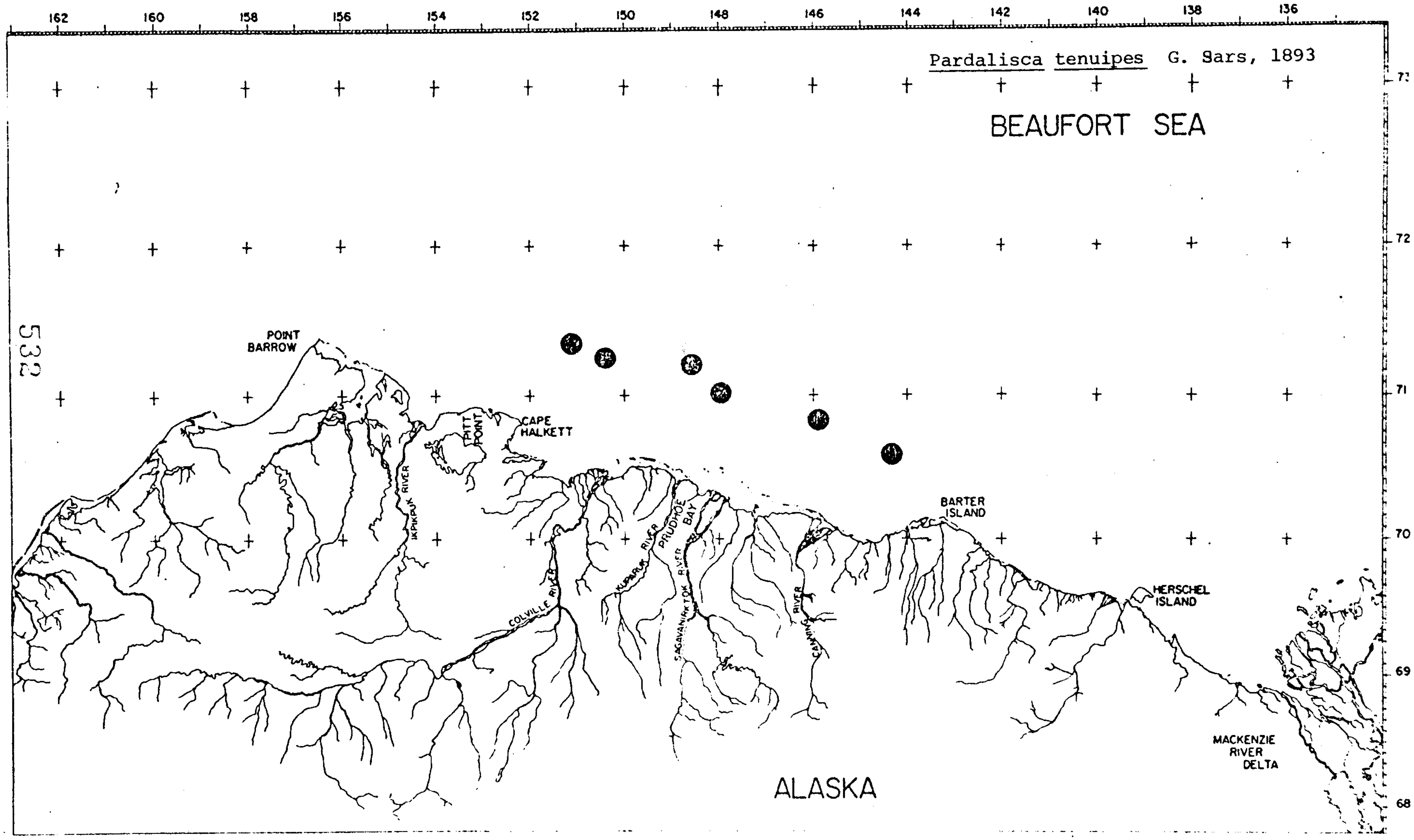
ALASKA


Pardalisca tenuipes G. Sars, 1893
BEAUFORT SEA
ALASKA
POINT BARROW
CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
SAGAVANIRKTOK RIVER
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BARTER ISLAND
HERSCHEL ISLAND
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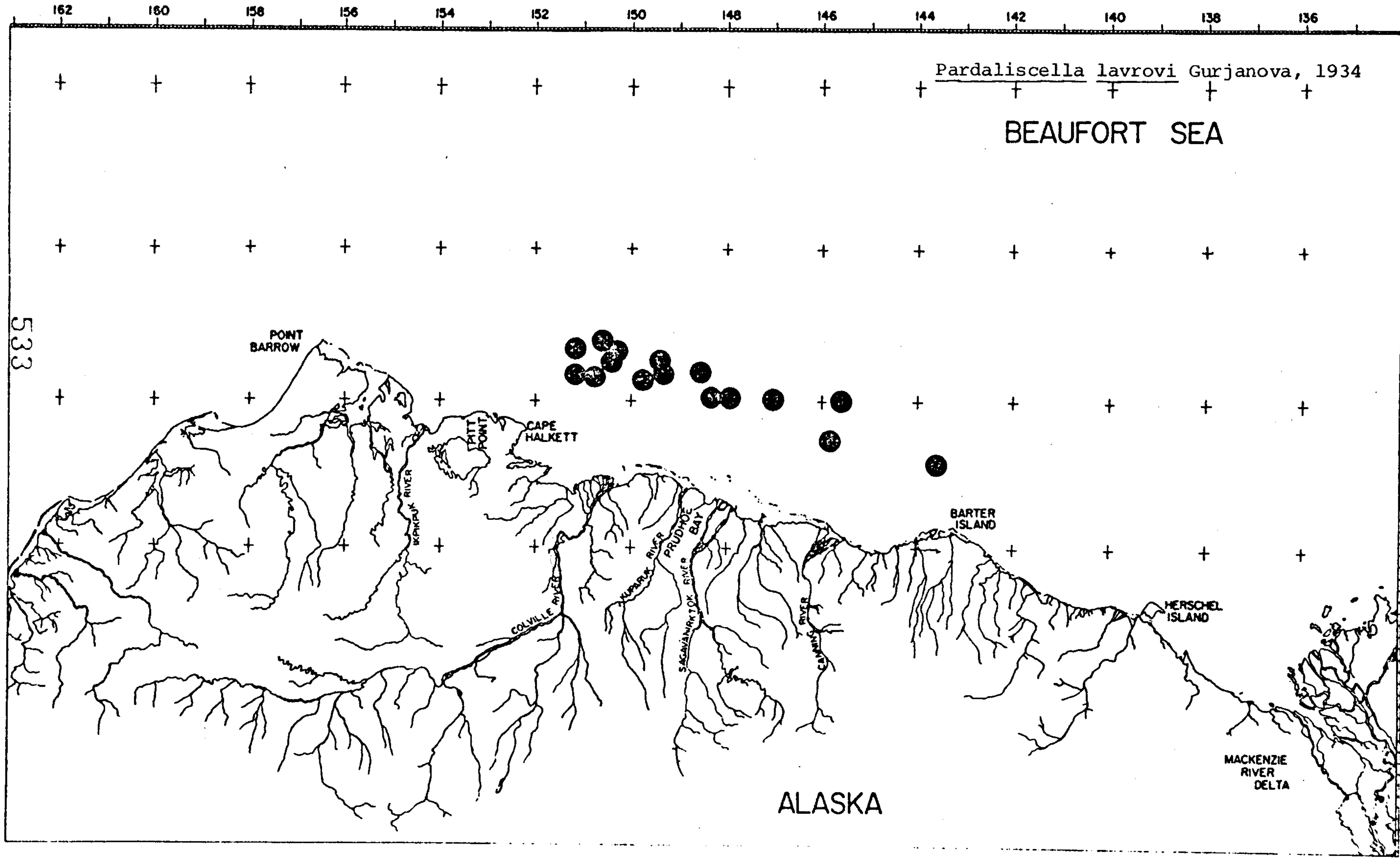
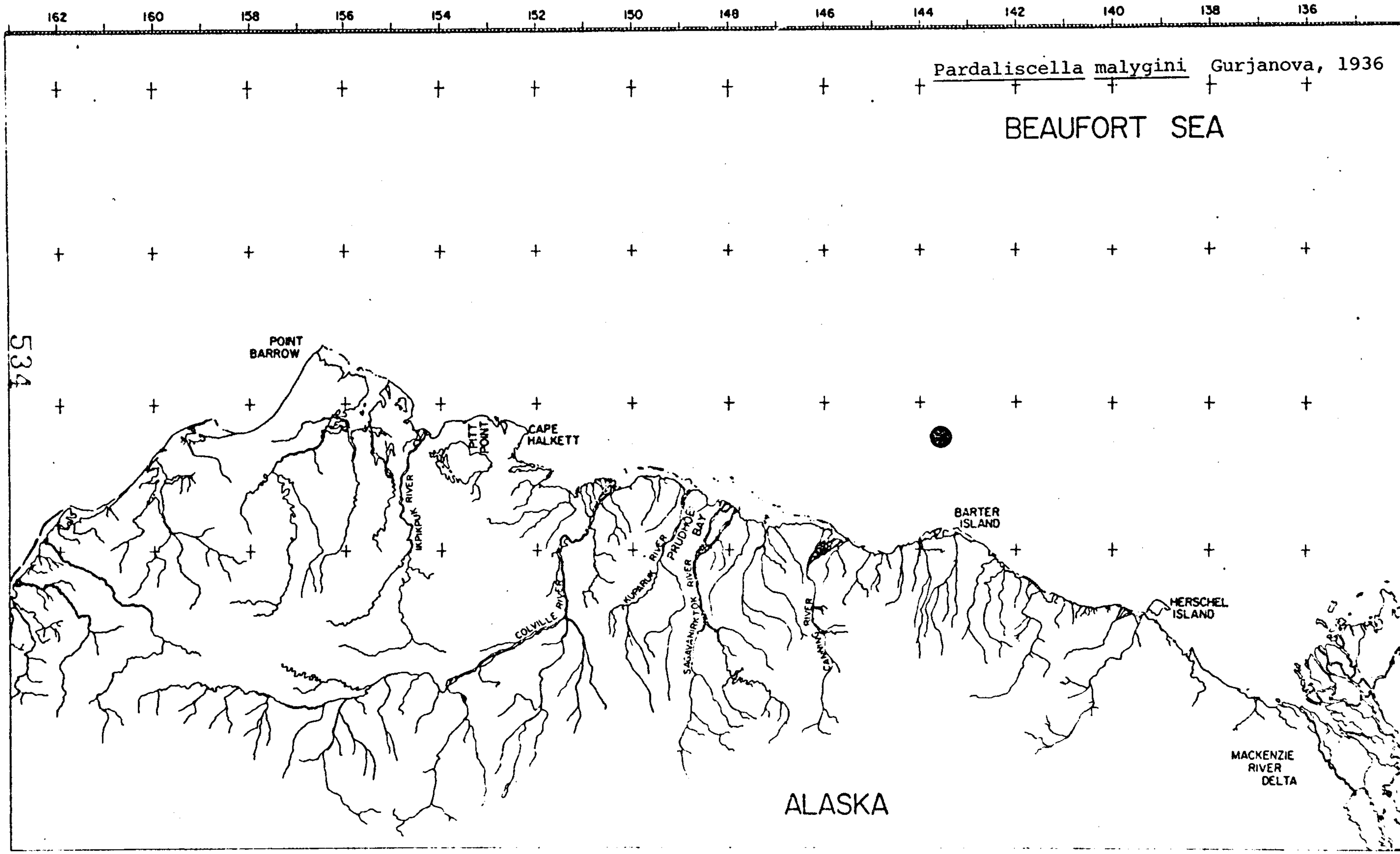
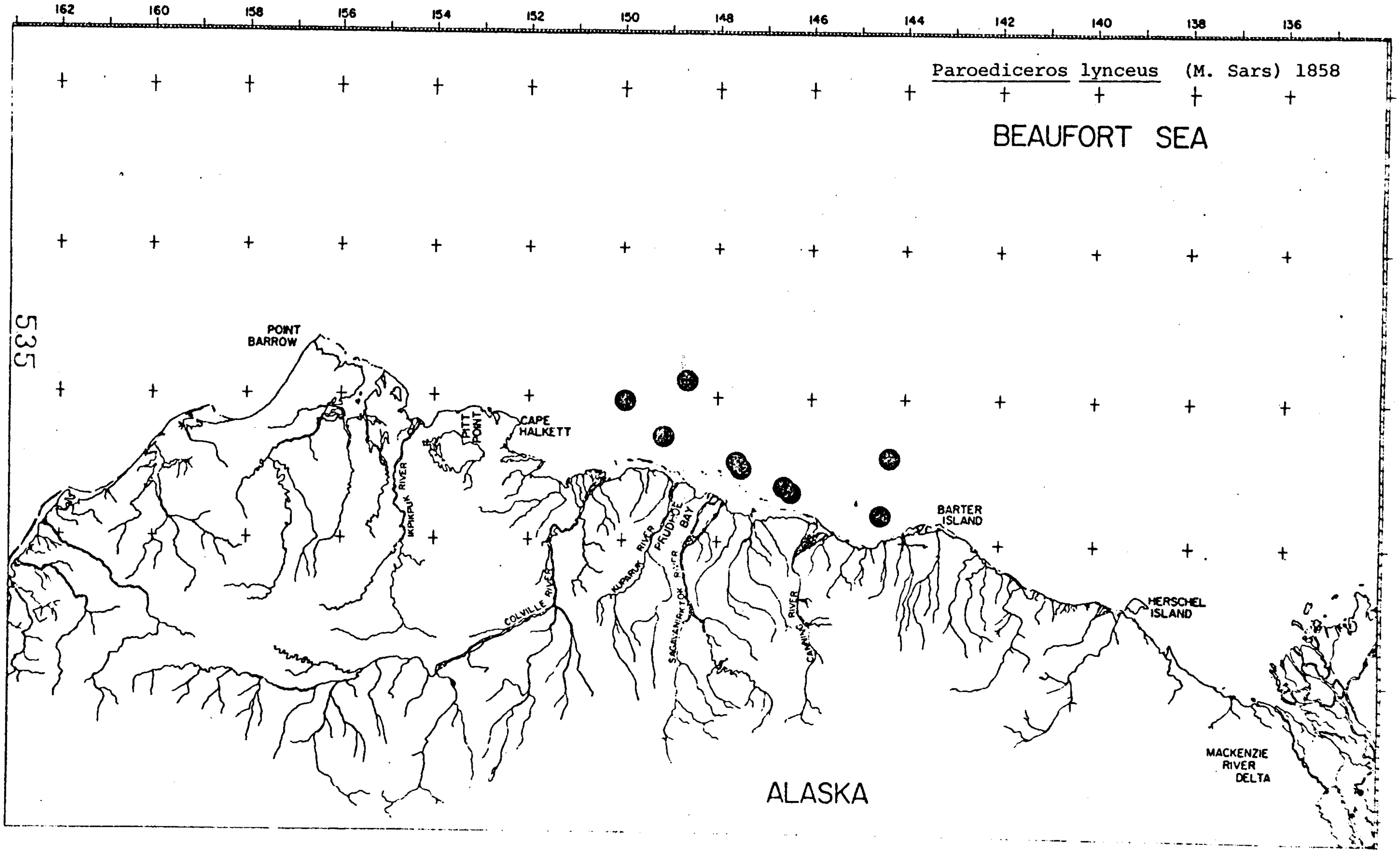


Pardaliscella lavrovi Gurjanova, 1934



Pardaliscella malygini Gurjanova, 1936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Paroediceros lynceus (M. Sars) 1858
BEAUFORT SEA
POINT BARROW
PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
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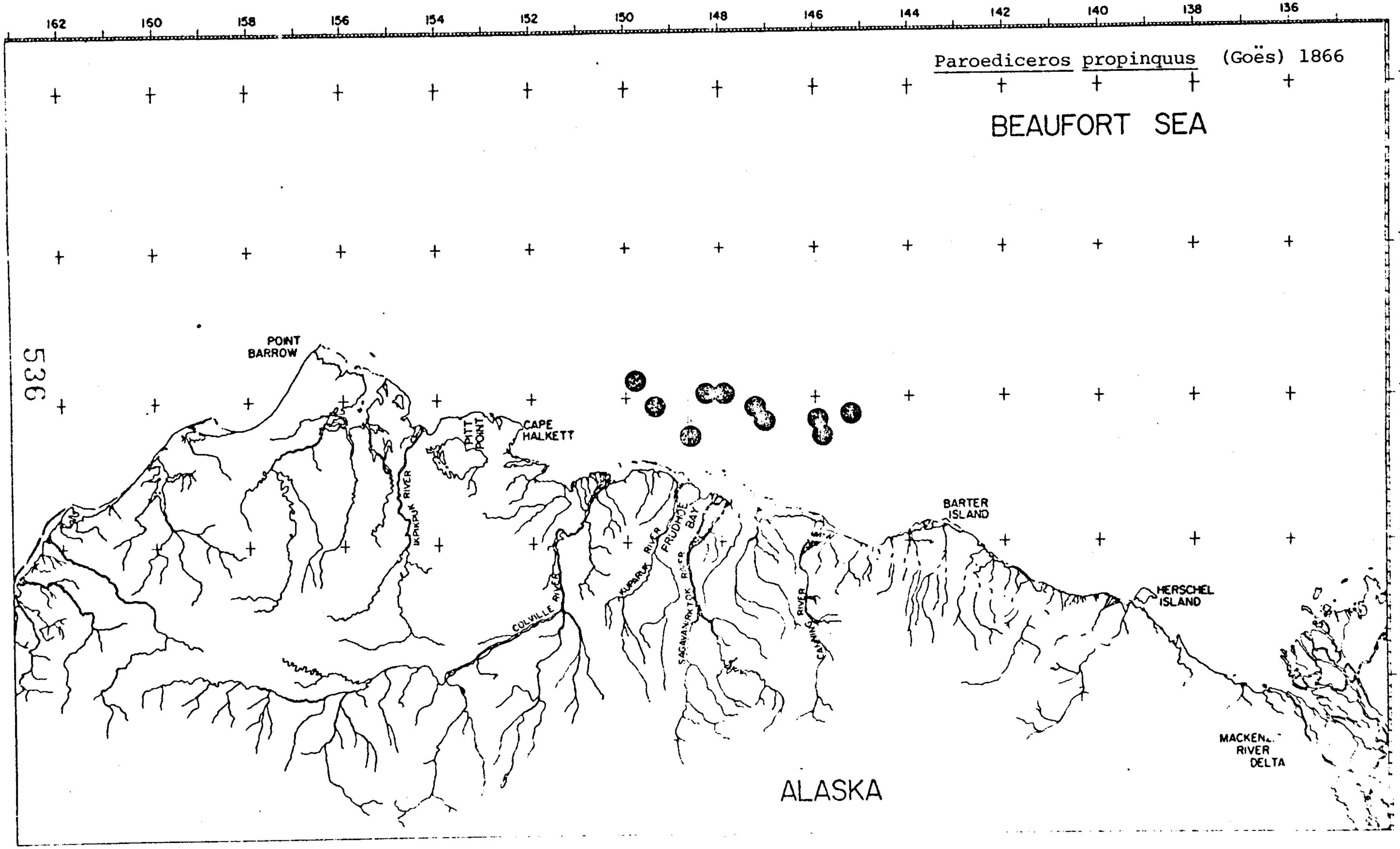
ALASKA


Paroediceros propinquus (Goës) 1866
BEAUFORT SEA
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CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
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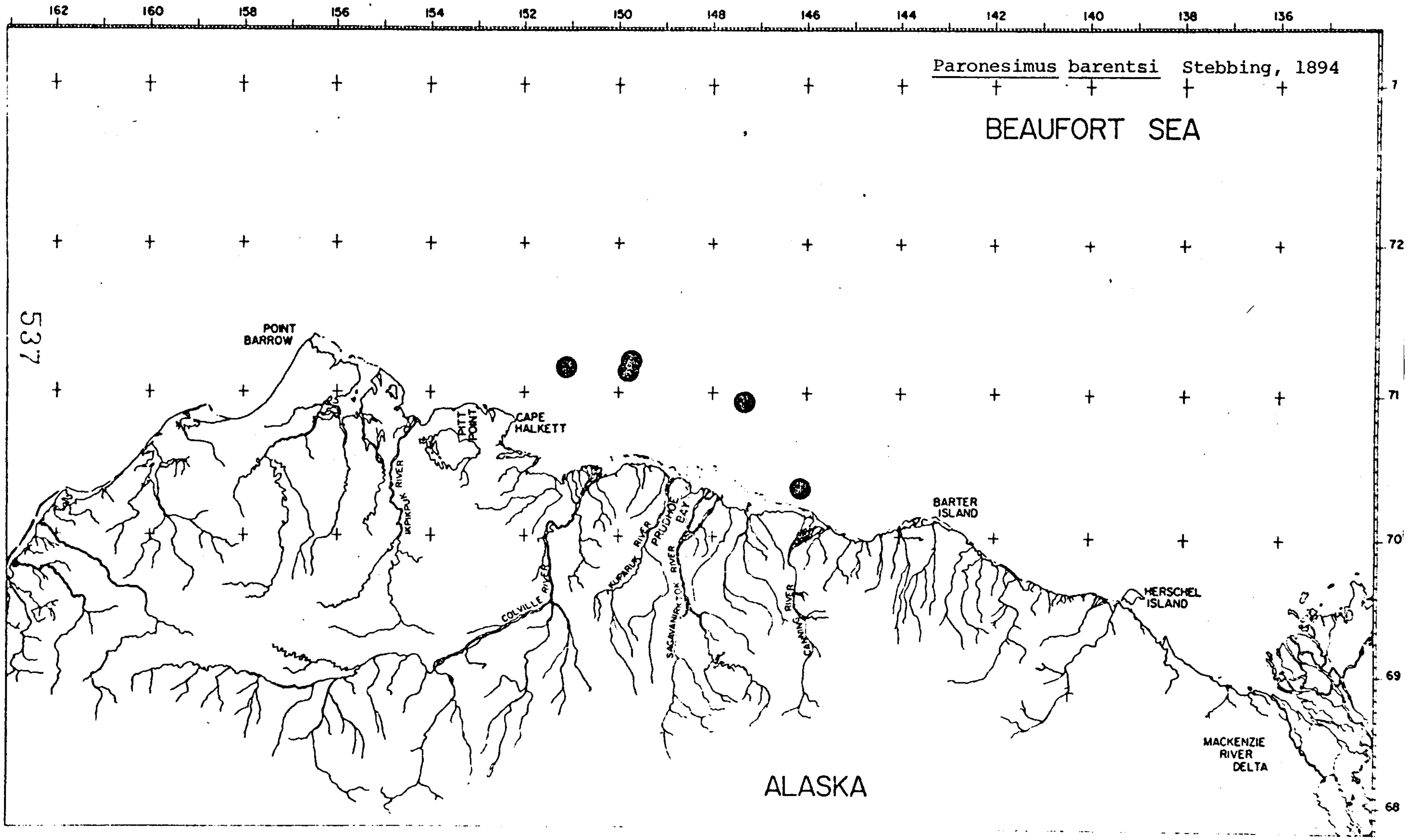
ALASKA


Paronesimus barentsi Stebbing, 1894
BEAUFORT SEA
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POINT BARROW
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IKPIKPUK RIVER
COLVILLE RIVER
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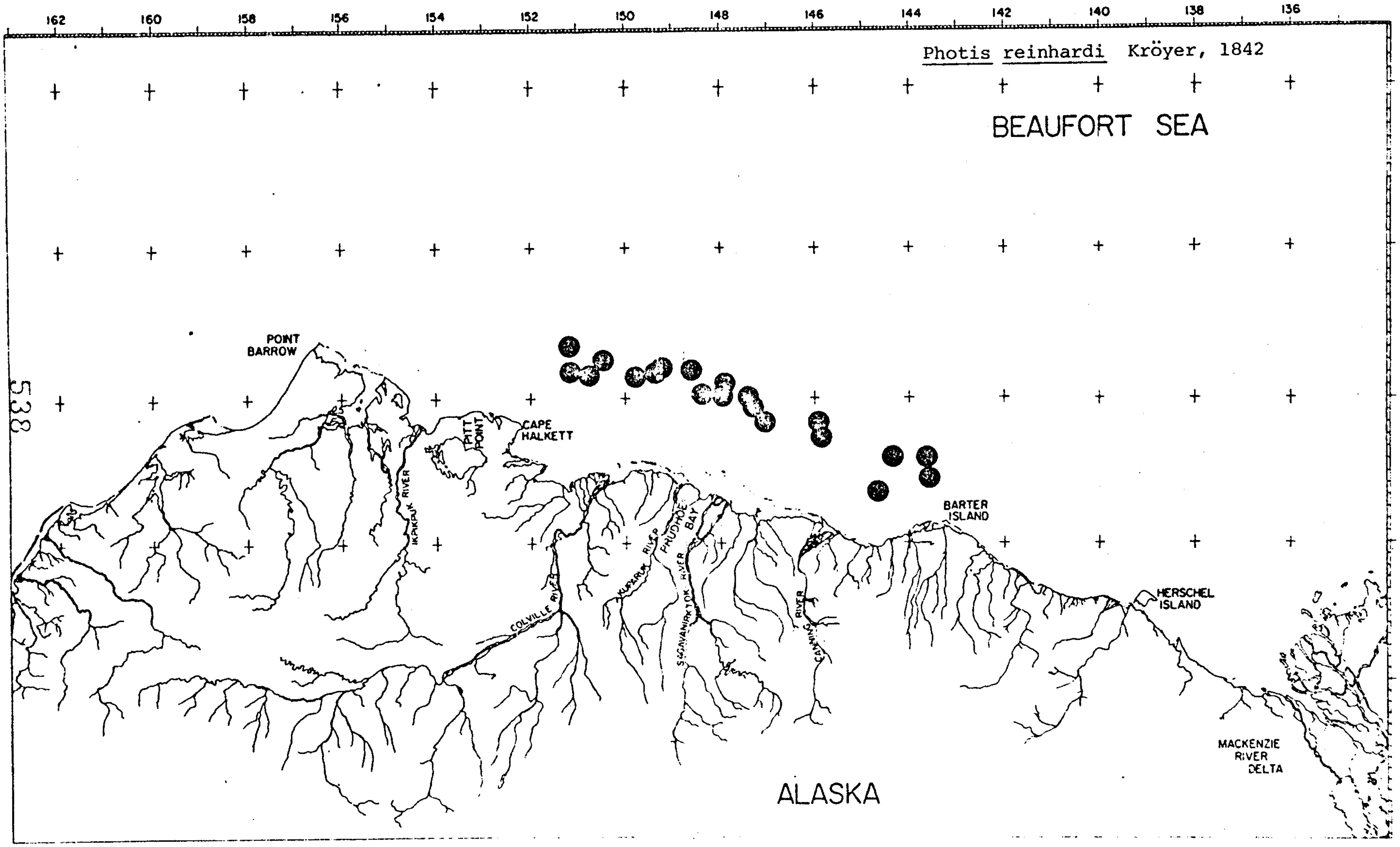
ALASKA


Photis reinhardi Kröyer, 1842
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BEAUFORT SEA
POINT BARROW
PITT POINT
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IKPIKPUK RIVER
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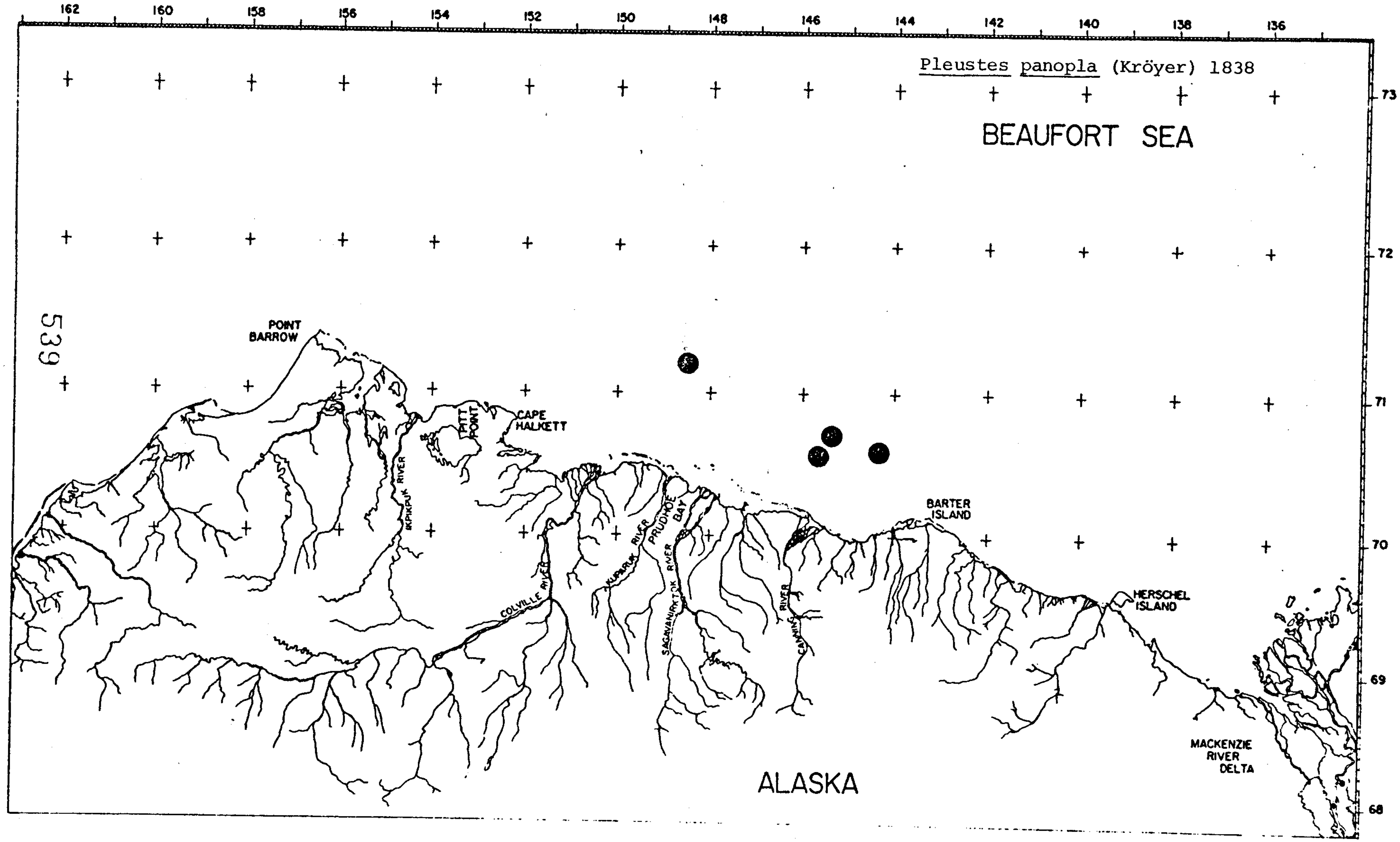
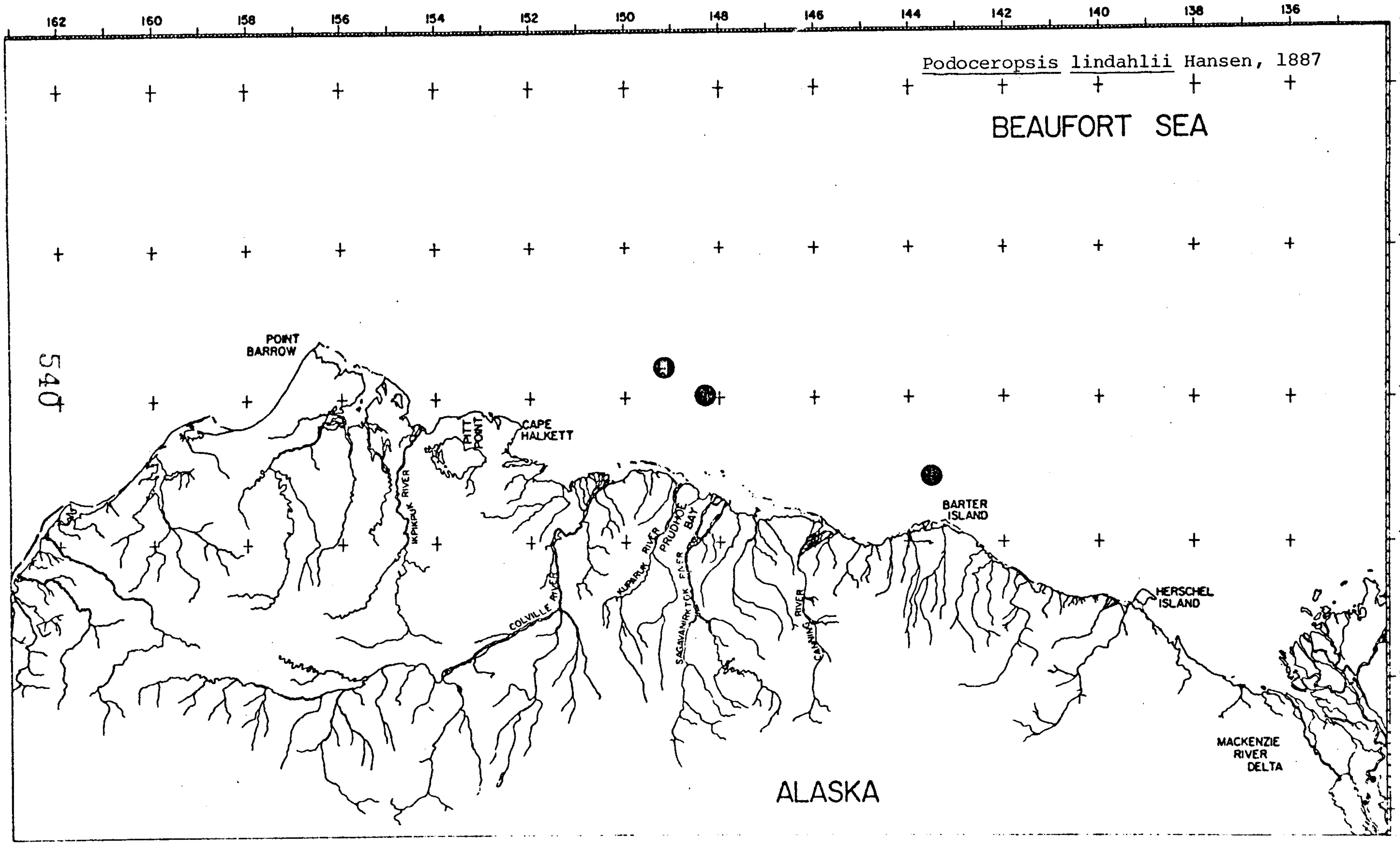


Pleustes panopla (Kröyer) 1838


Podoceropsis lindahlii Hansen, 1887
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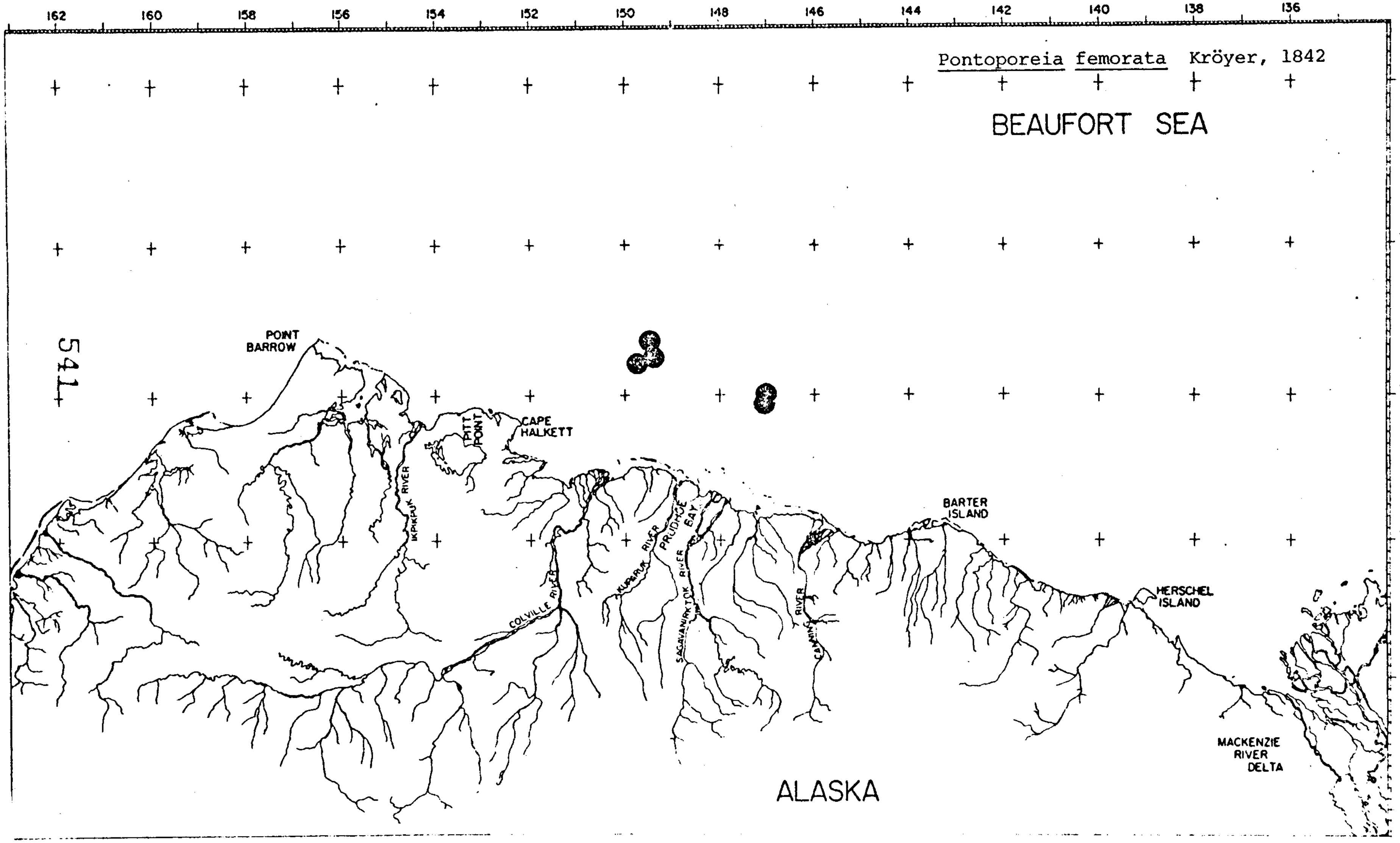
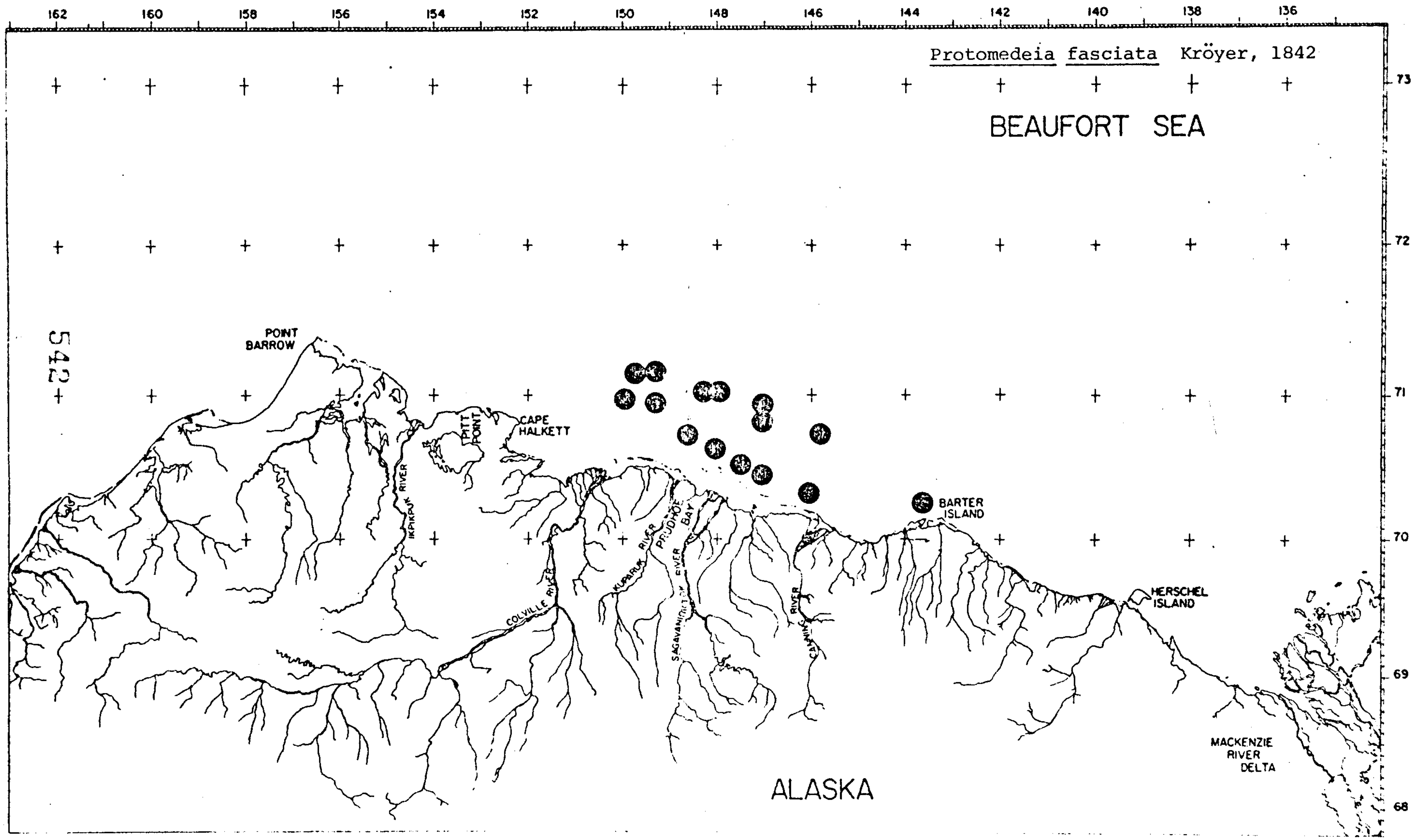


Pontoporeia femorata Kröyer, 1842


Protomedeia fasciata Kröyer, 1842
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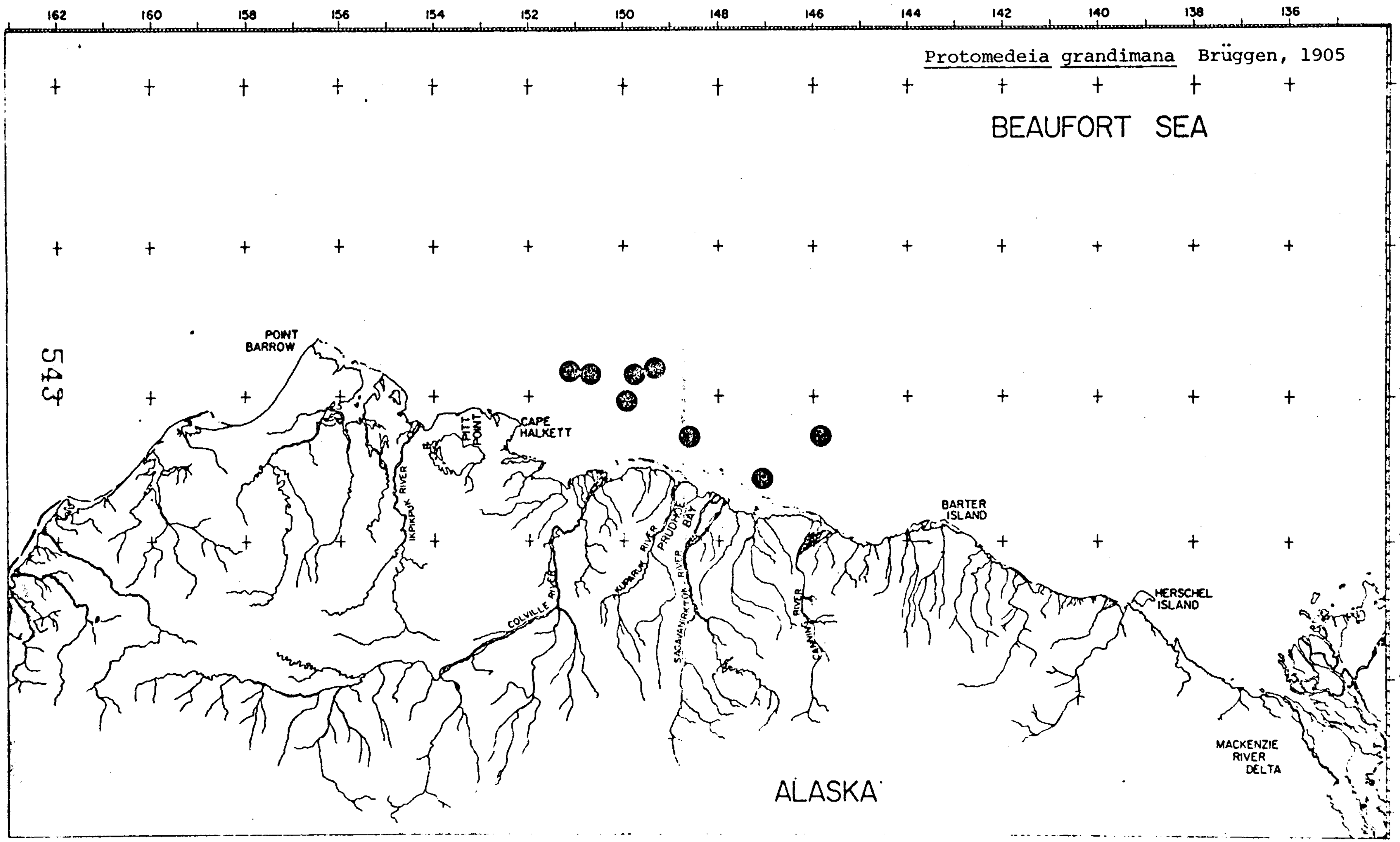
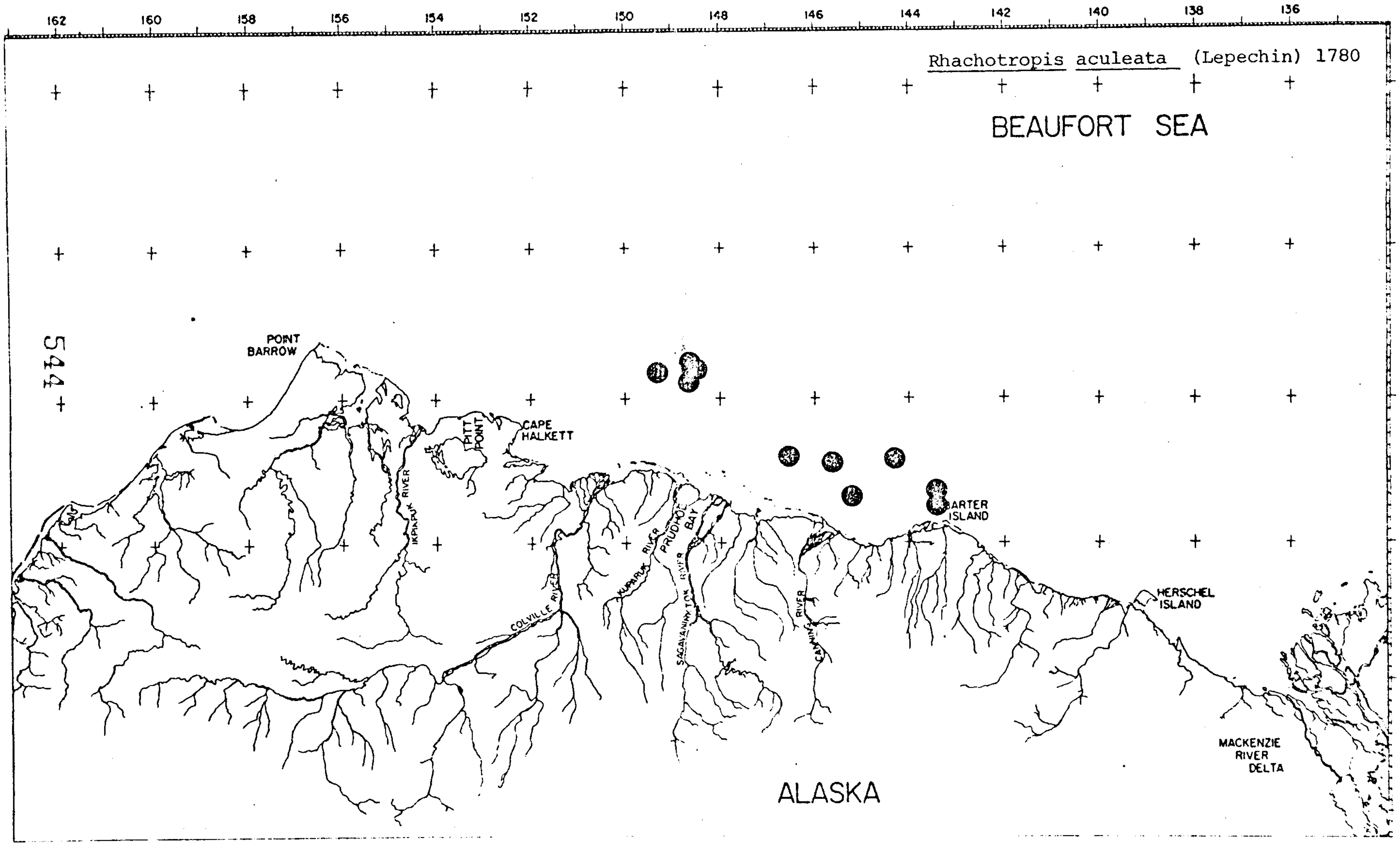


Protomedeia grandimana Brüggen, 1905


Rhachotropis aculeata (Lepechin) 1780
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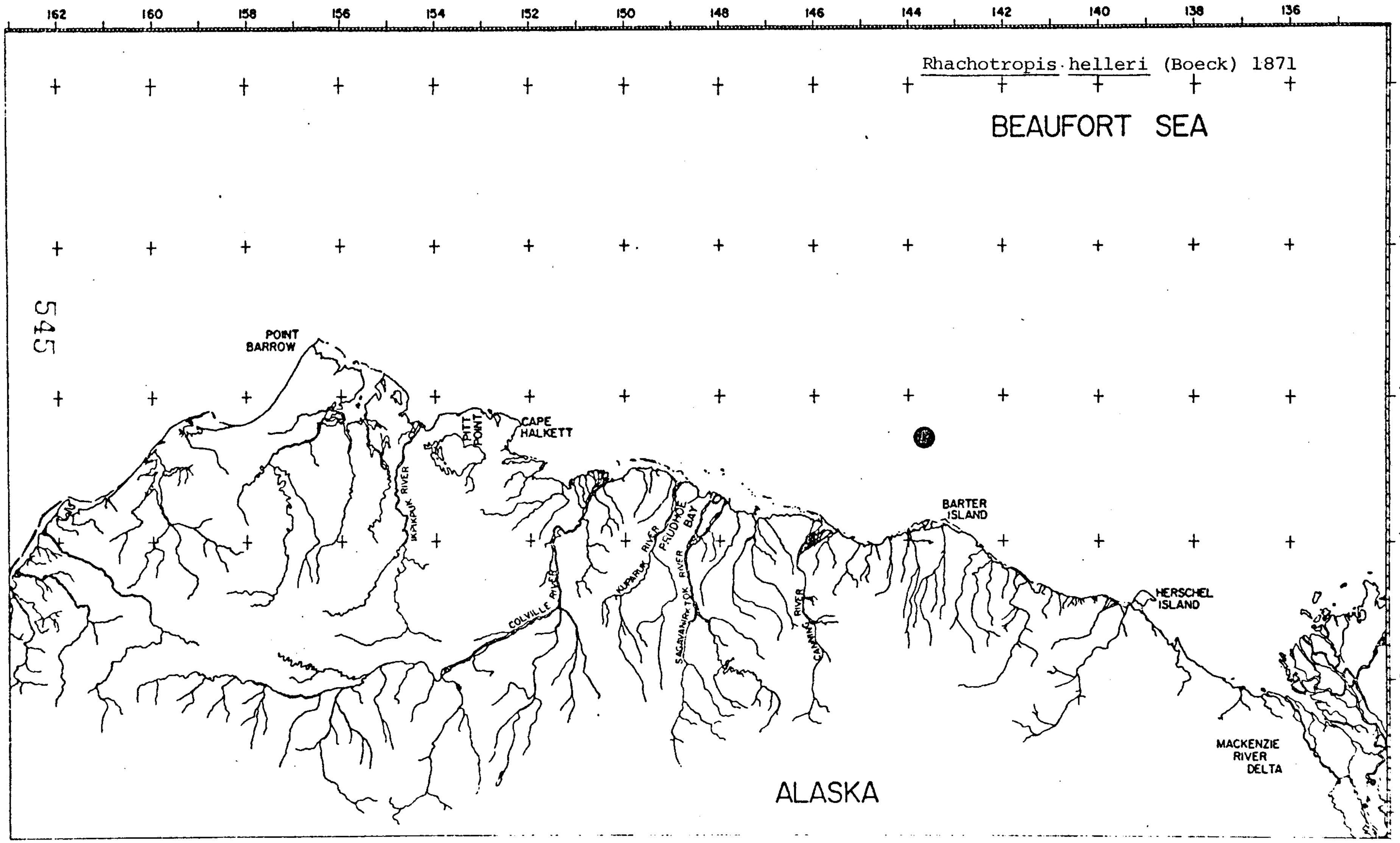
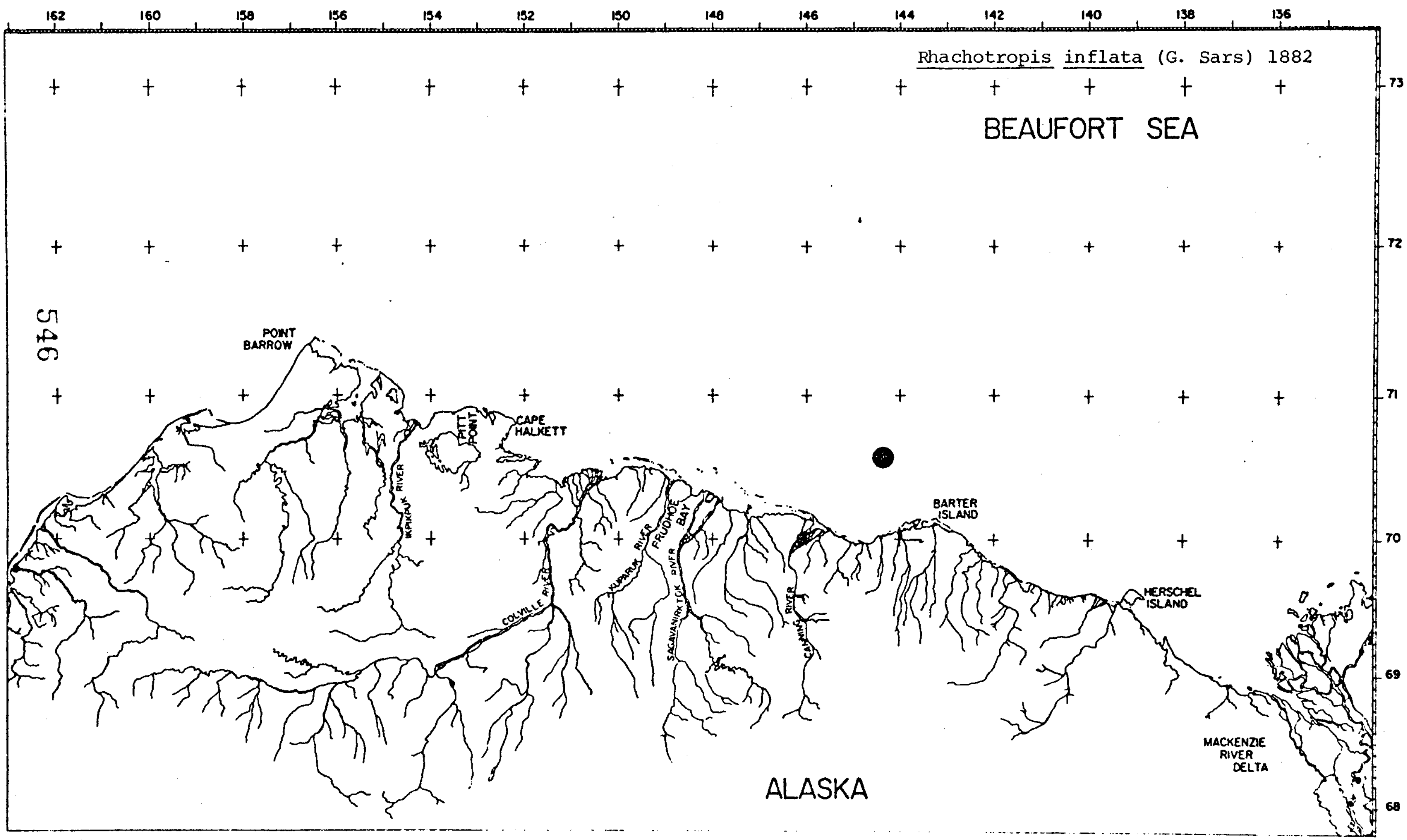


Rhachotropis helleri (Boeck) 1871


Rhachotropis inflata (G. Sars) 1882
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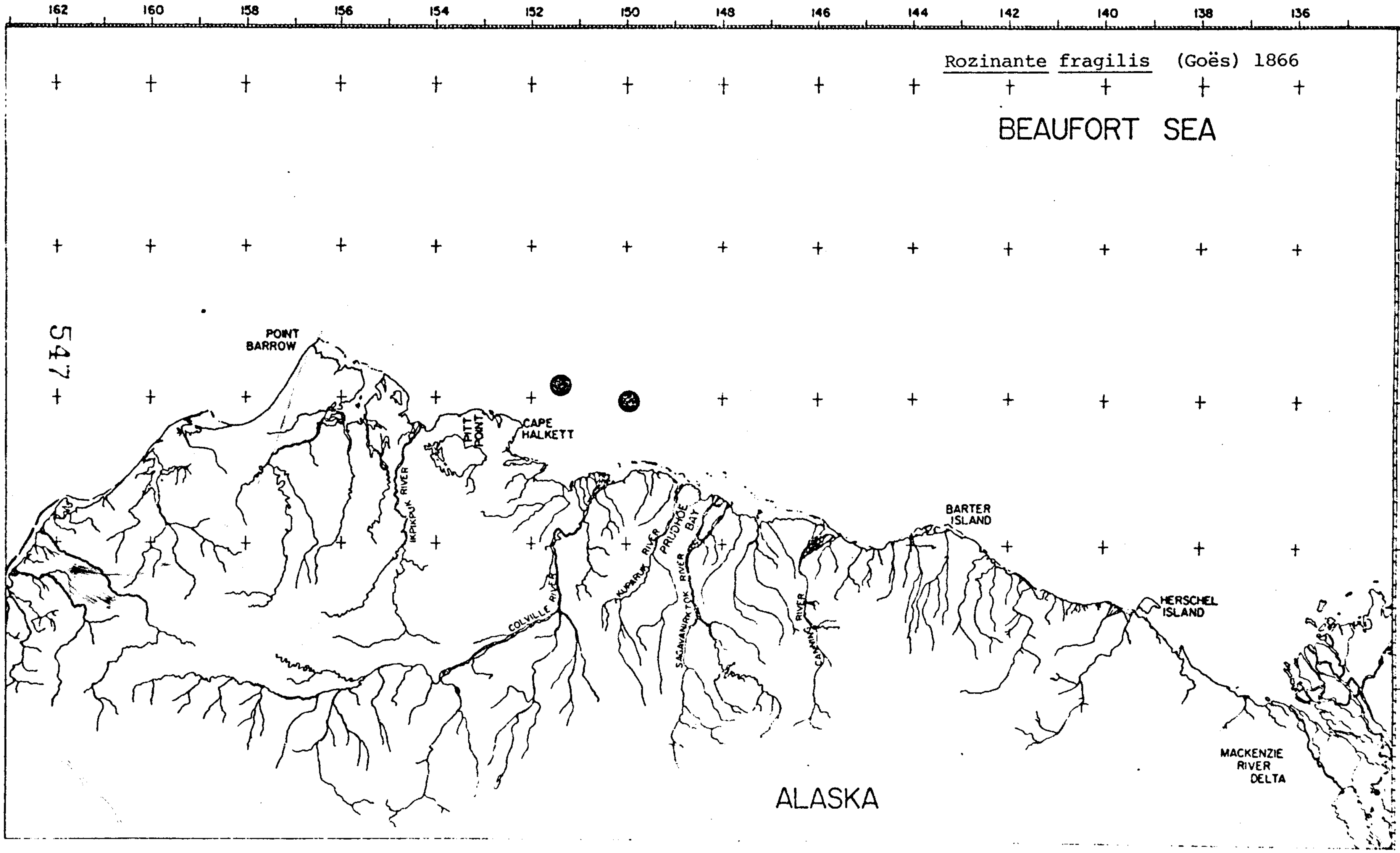
Rozinante fragilis (Goës) 1866
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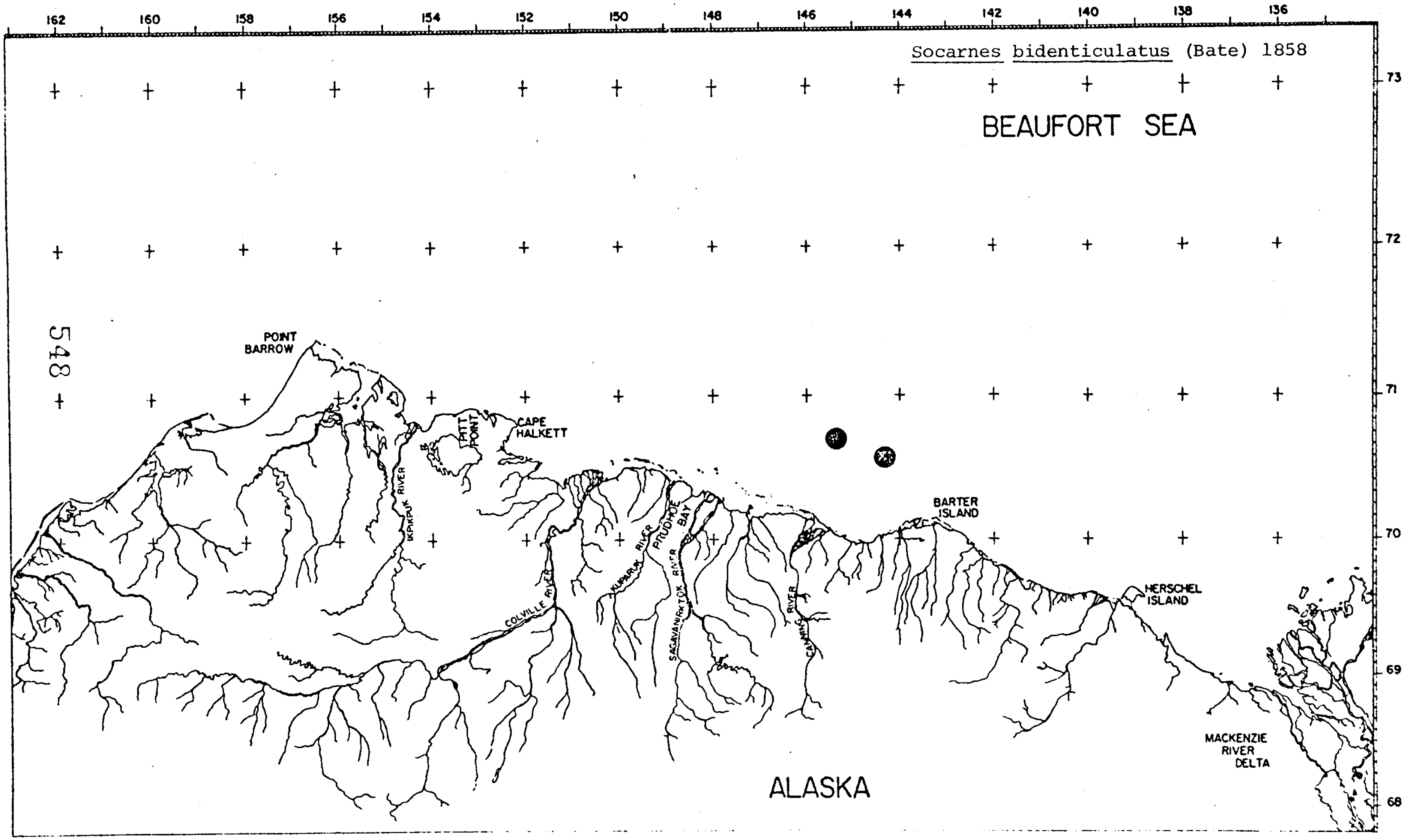
Socarnes bidenticulatus (Bate) 1858
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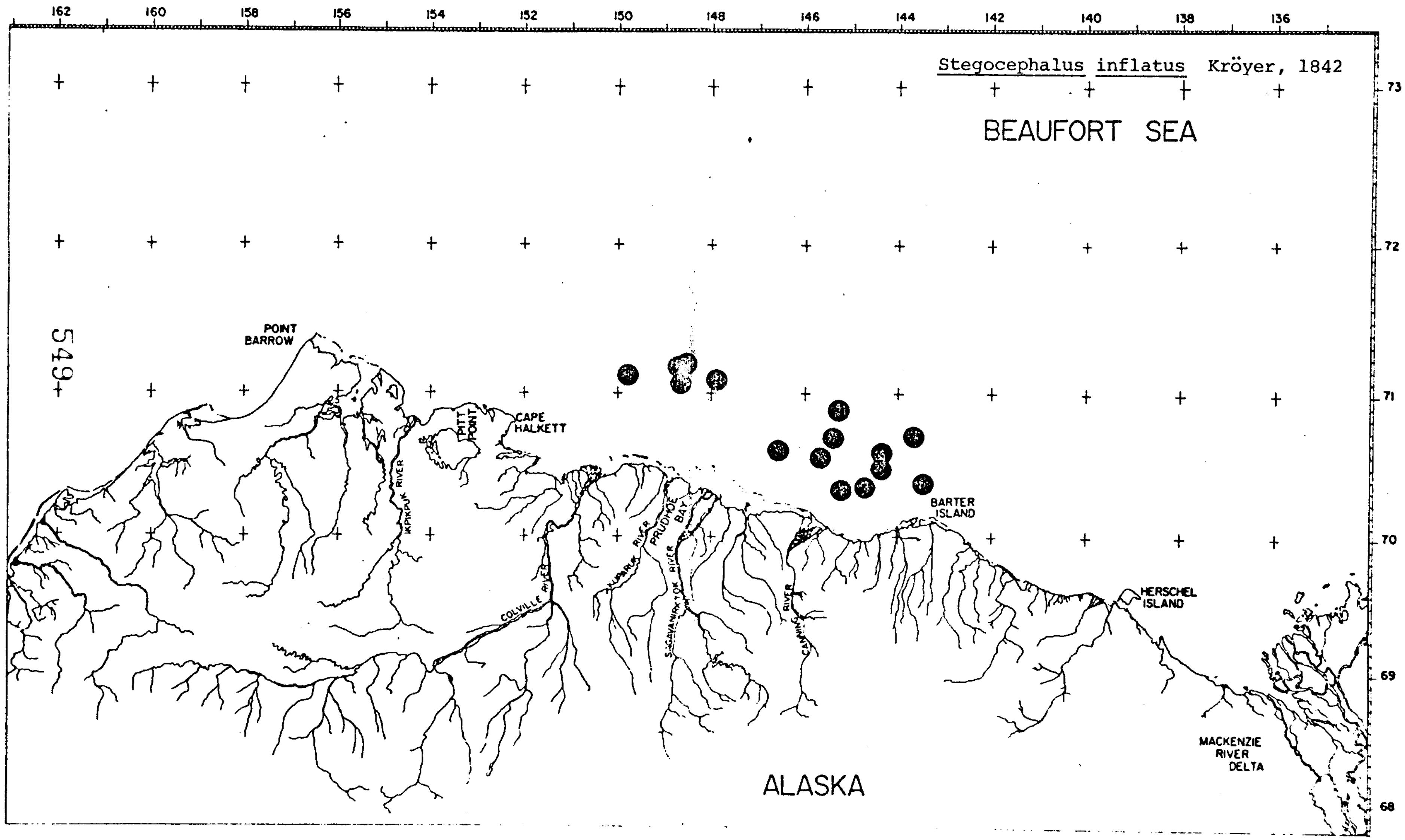
Stegocephalus inflatus Kröyer, 1842
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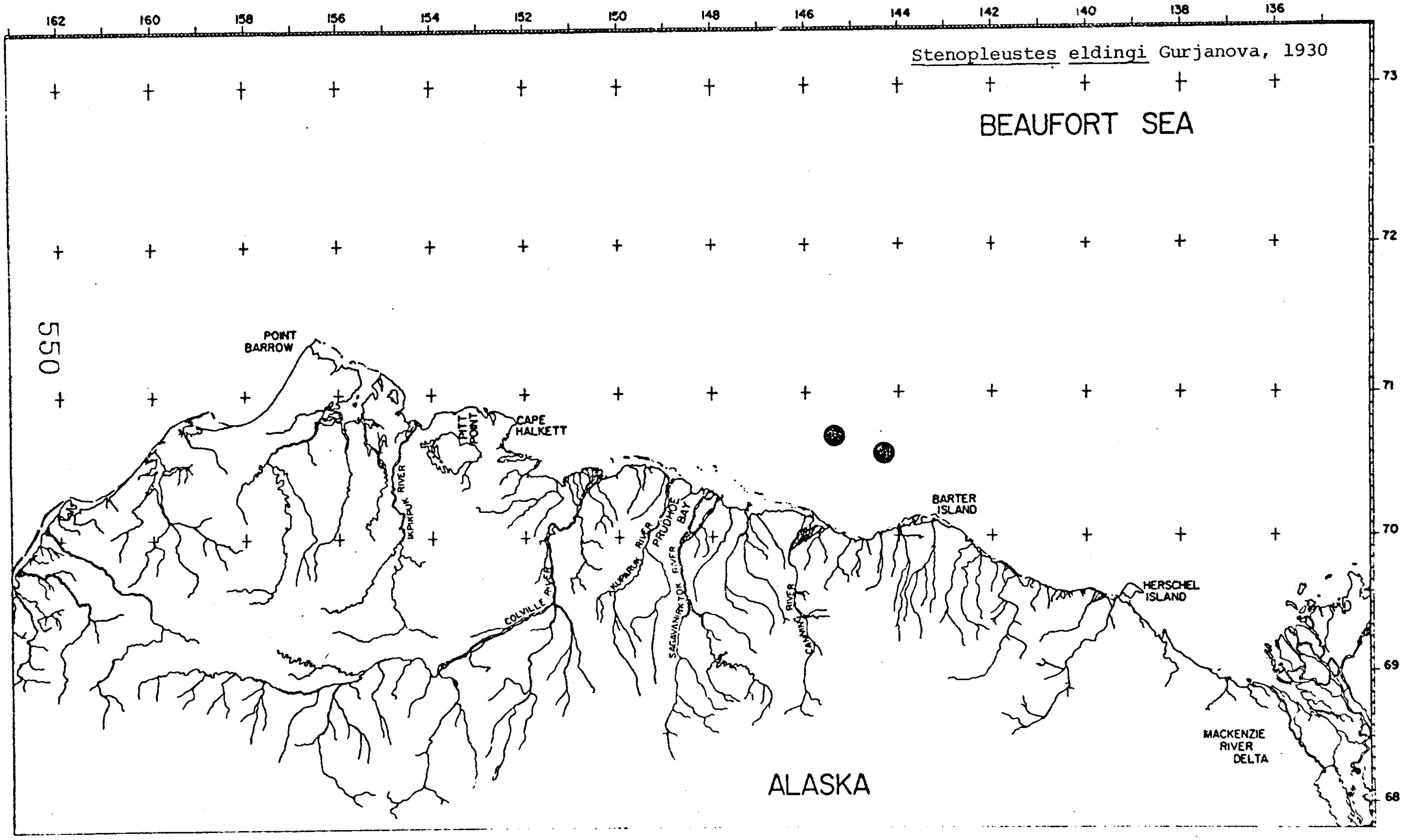
Stenopleustes eldingi Gurjanova, 1930
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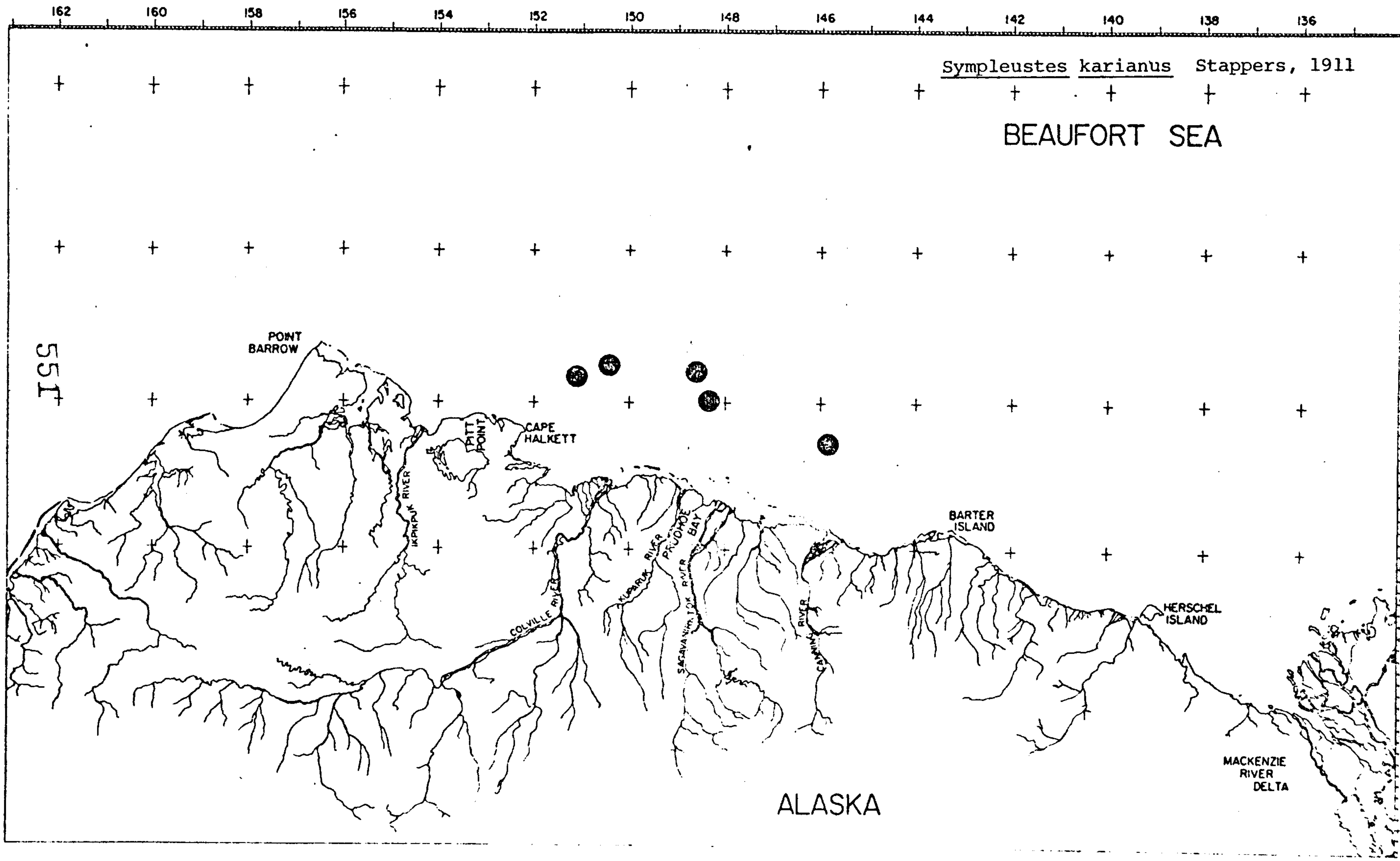
Sympleustes karianus Stappers, 1911
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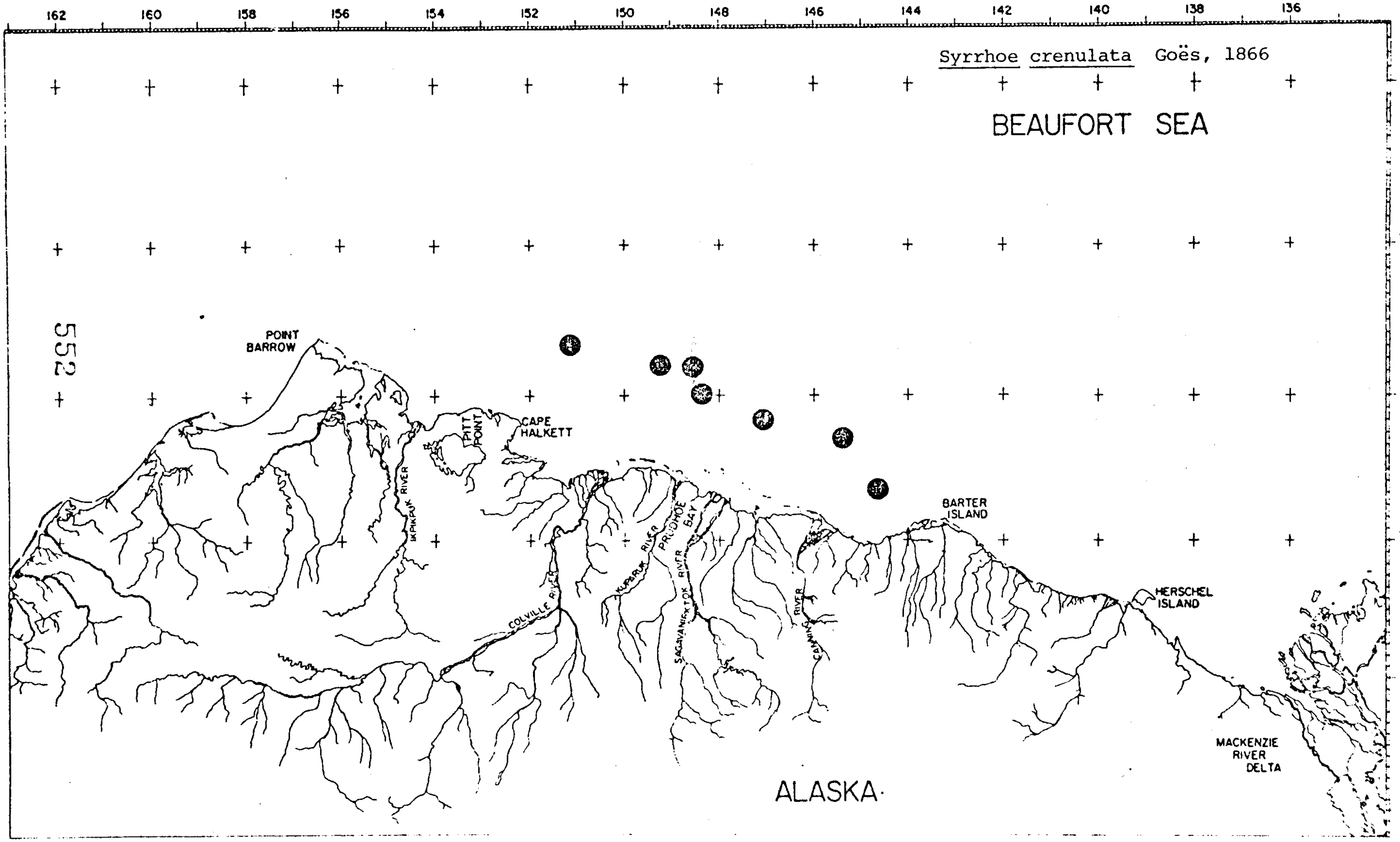
Syrrhoe crenulata Goës, 1866
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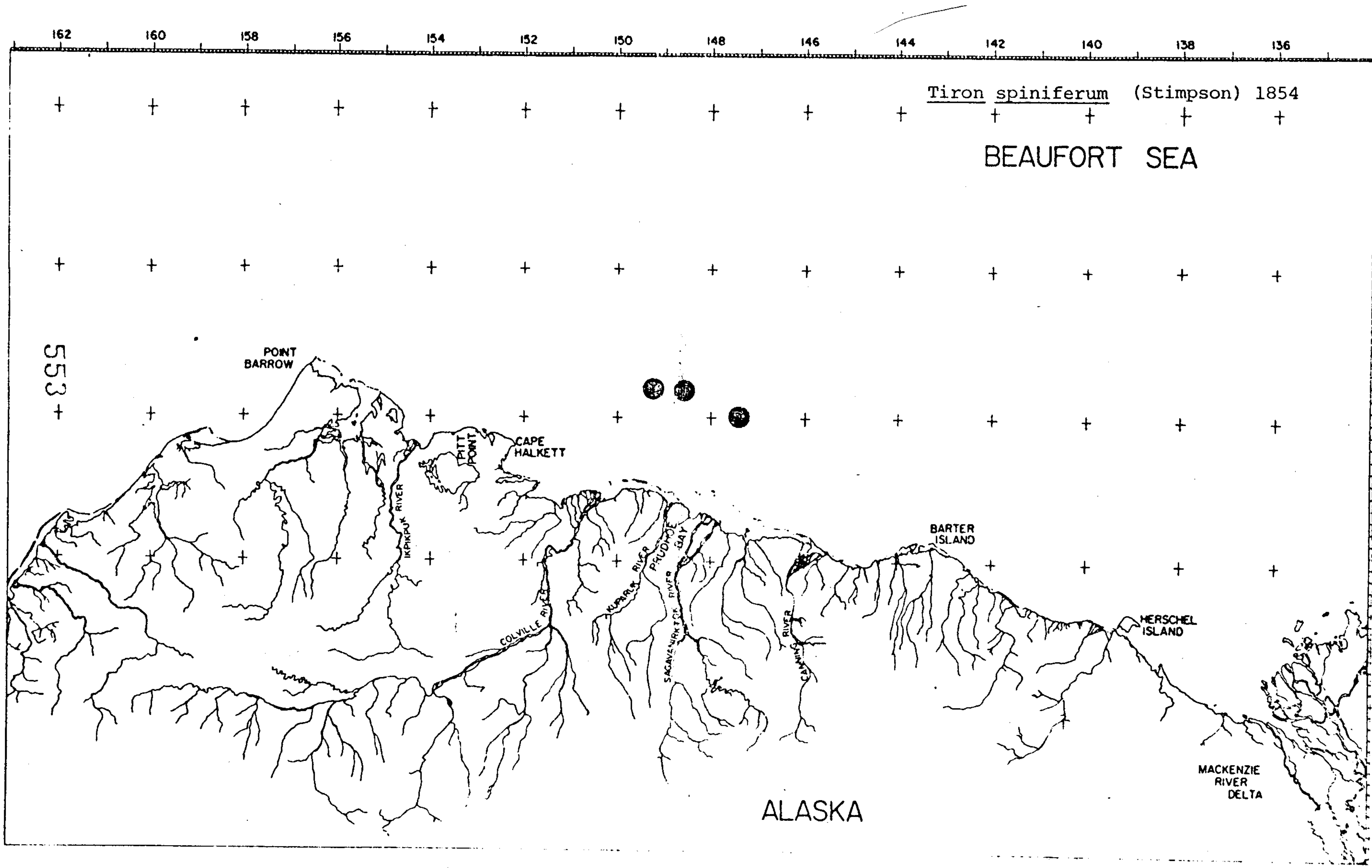
Tiron spiniferum (Stimpson) 1854
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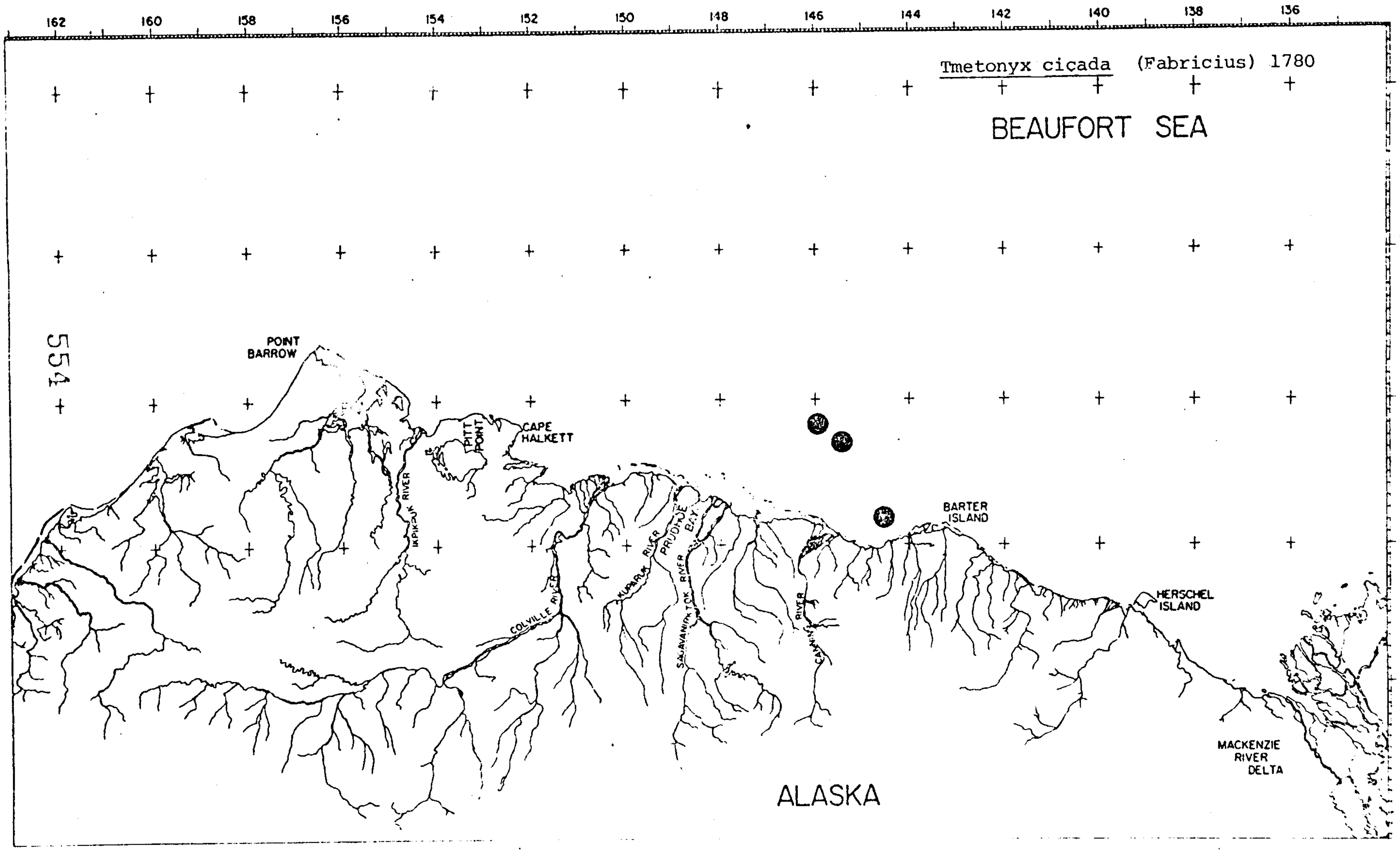
Tmetonyx cicada (Fabricius) 1780
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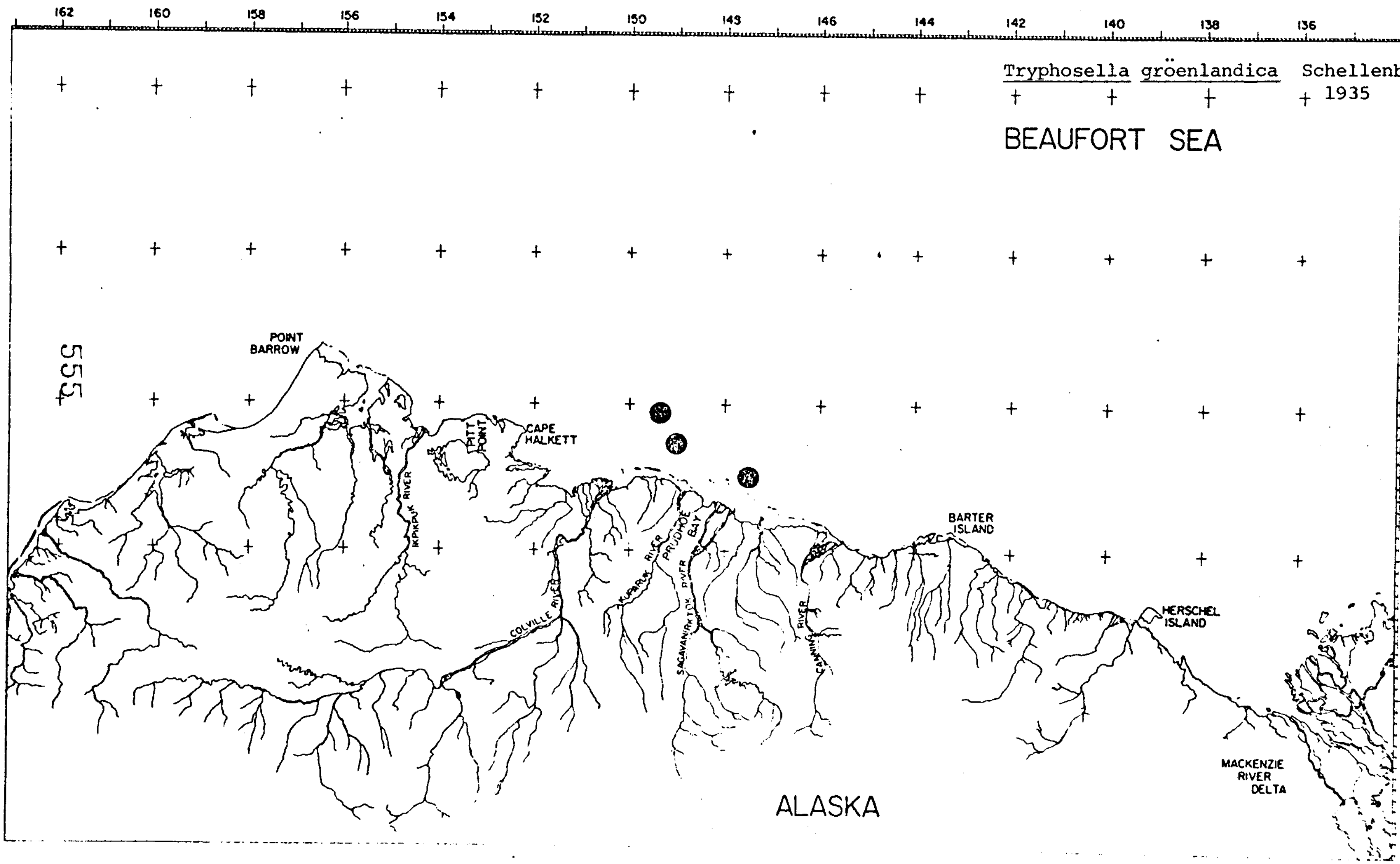
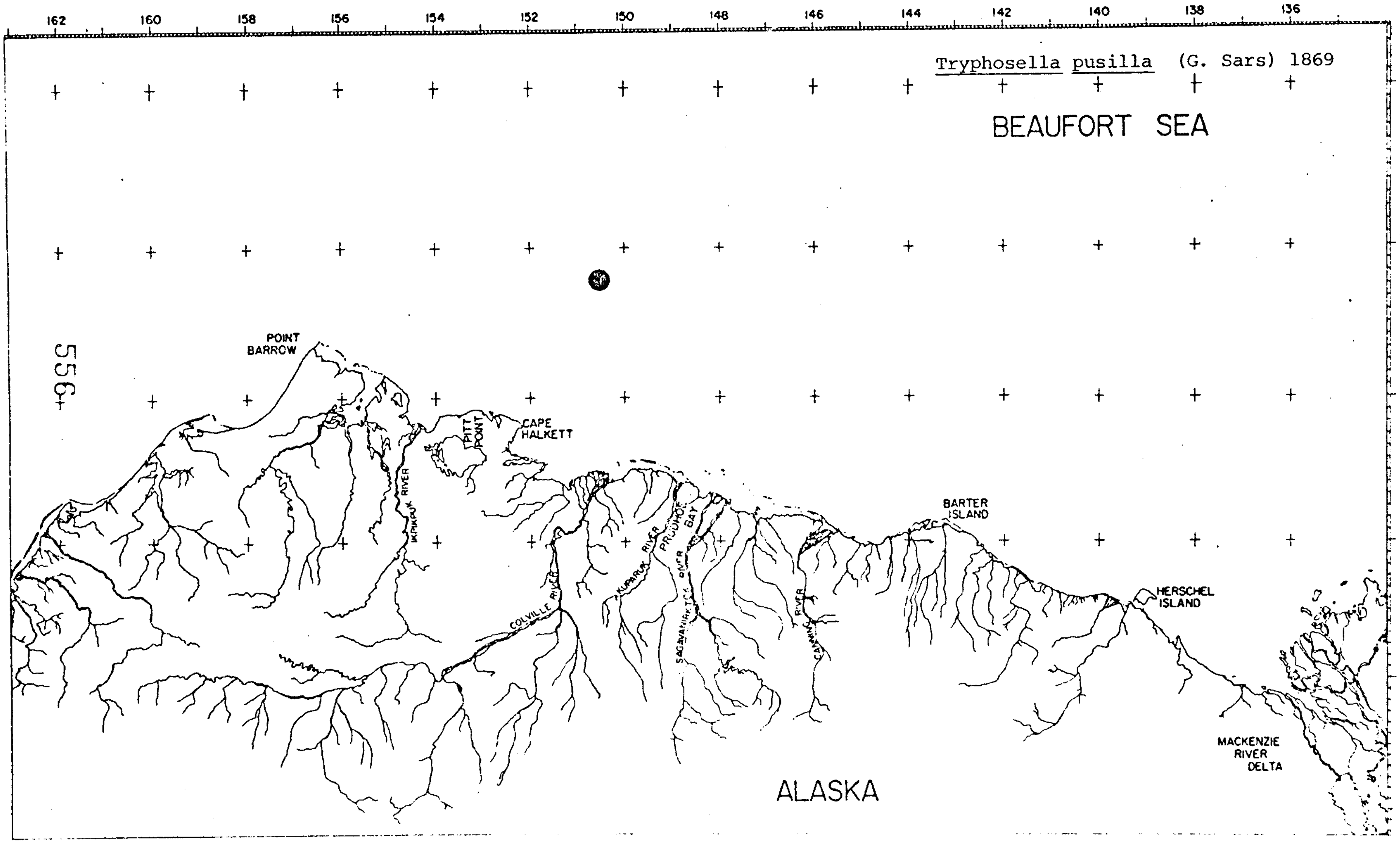
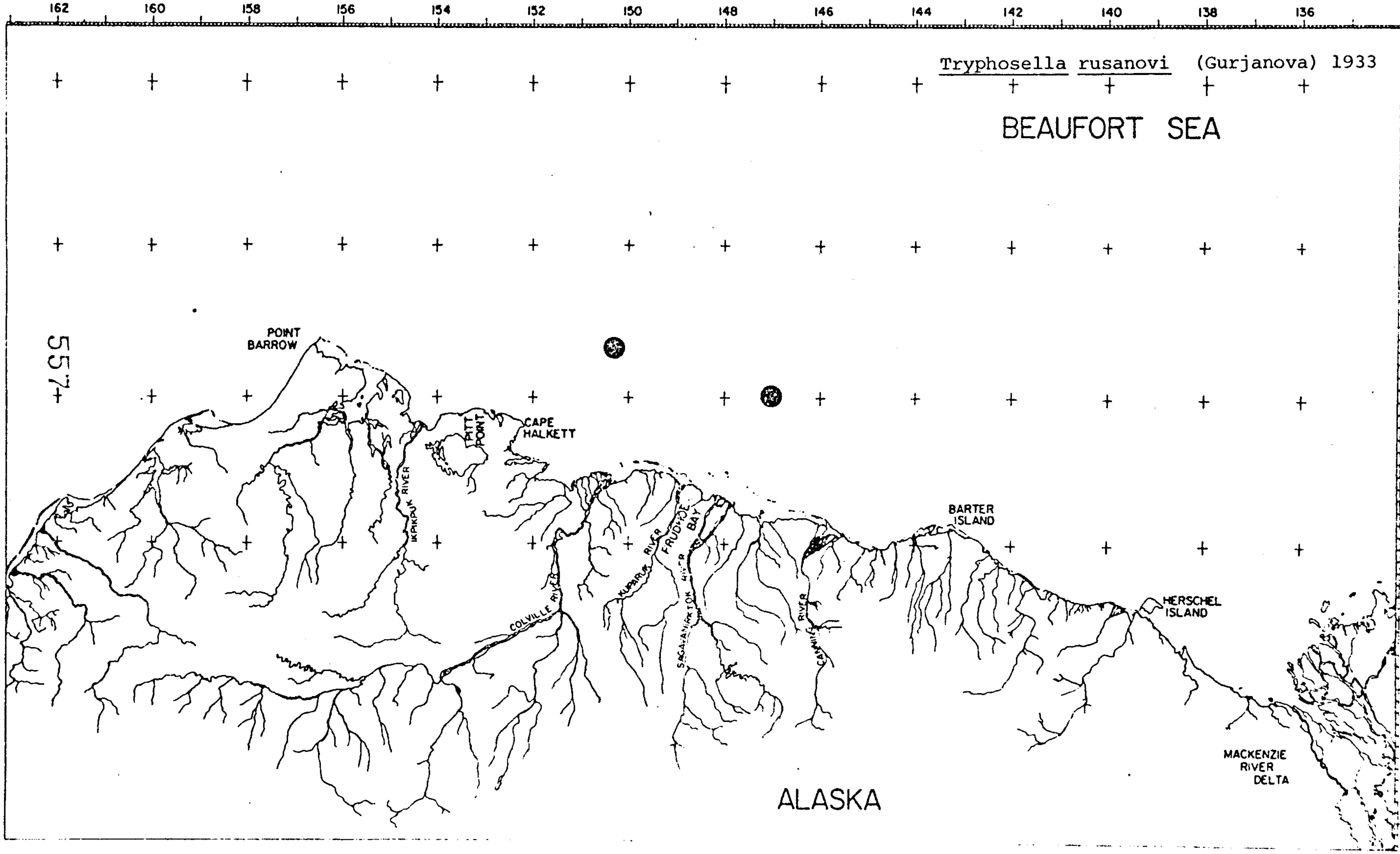
Tryphosella gröenlandica Schellenberg, 1935





Tryphosella pusilla (G. Sars) 1869


Tryphosella rusanovi (Gurjanova) 1933
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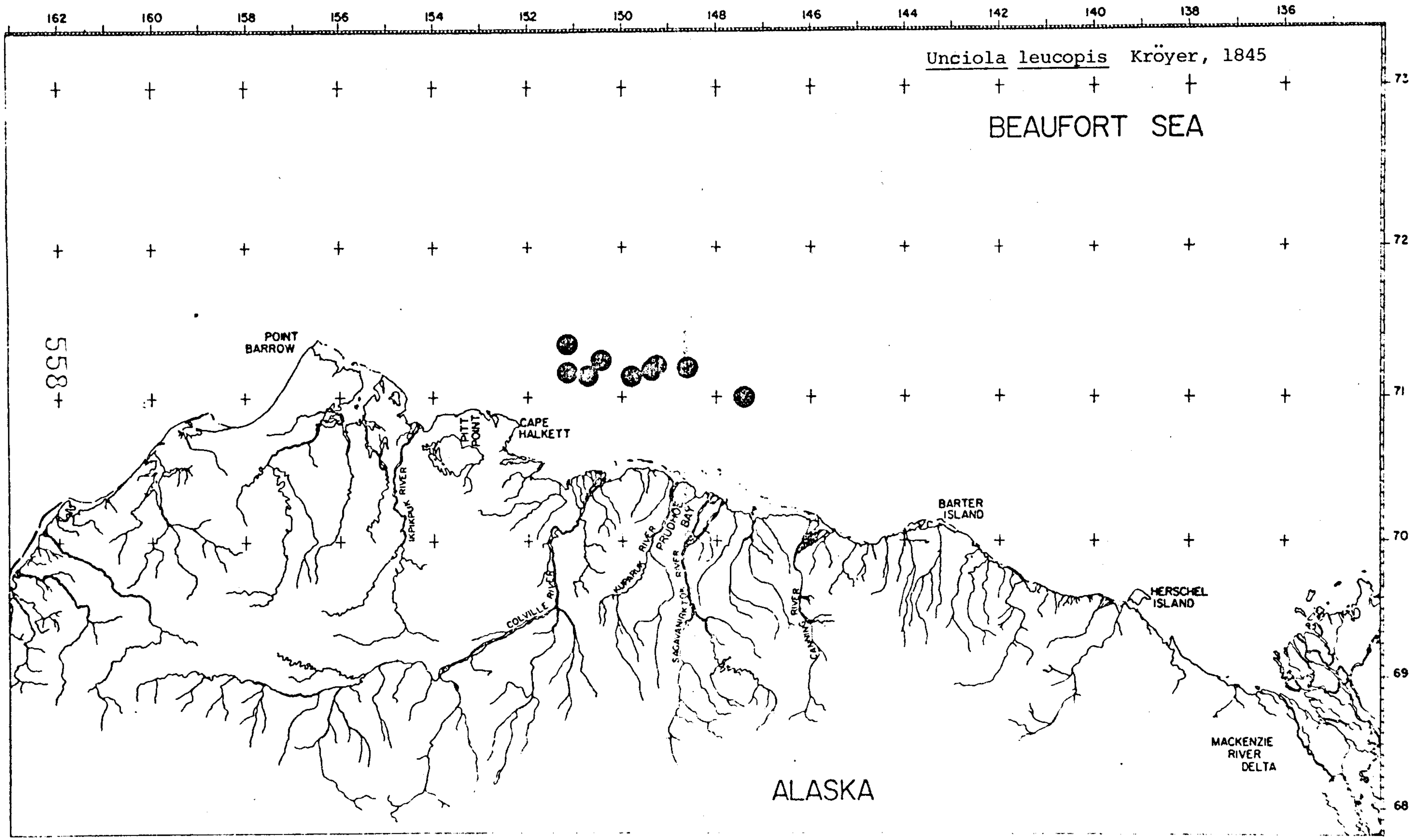
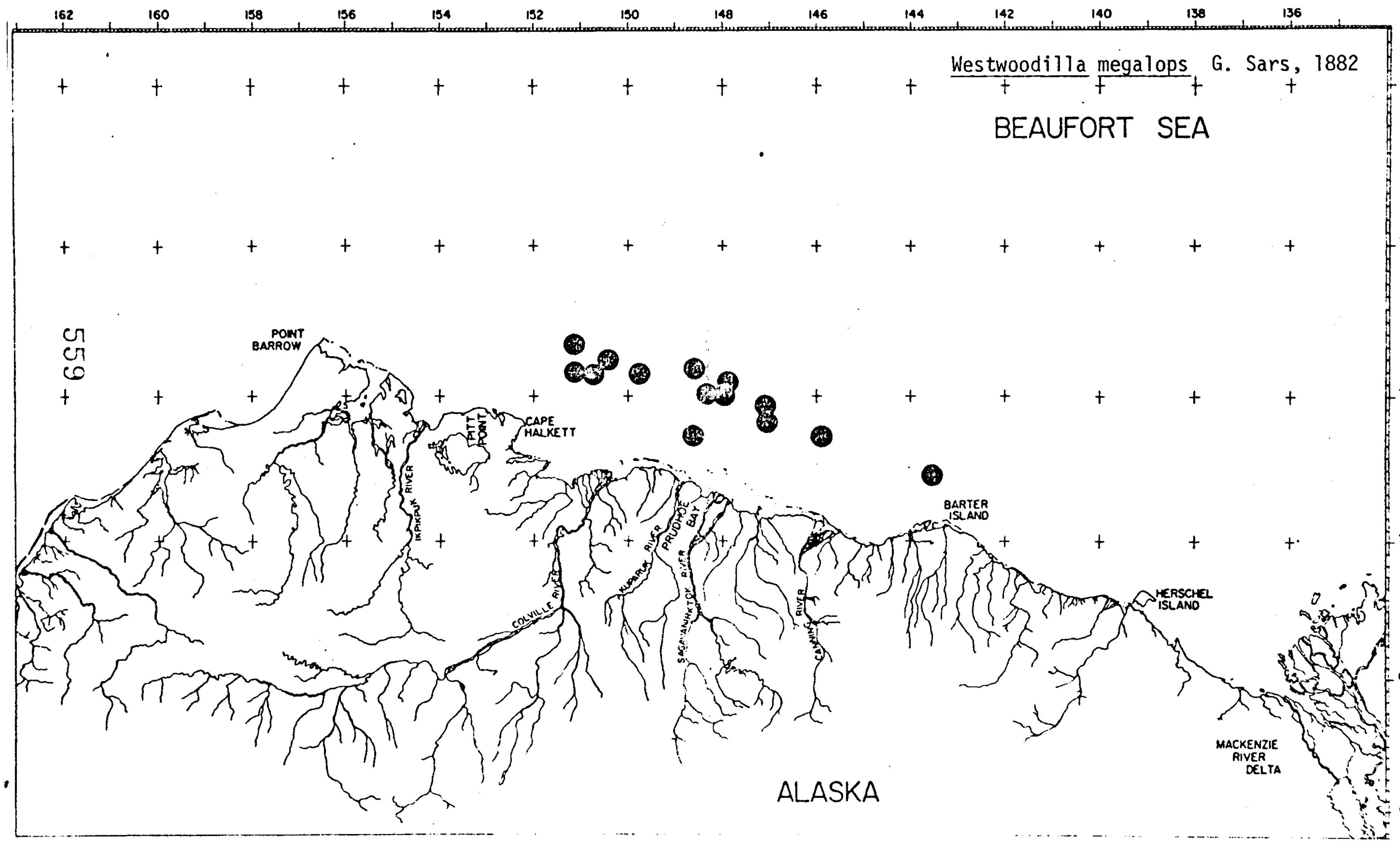


Unciola leucopis Kröyer, 1845


Westwoodilla megalops G. Sars, 1882
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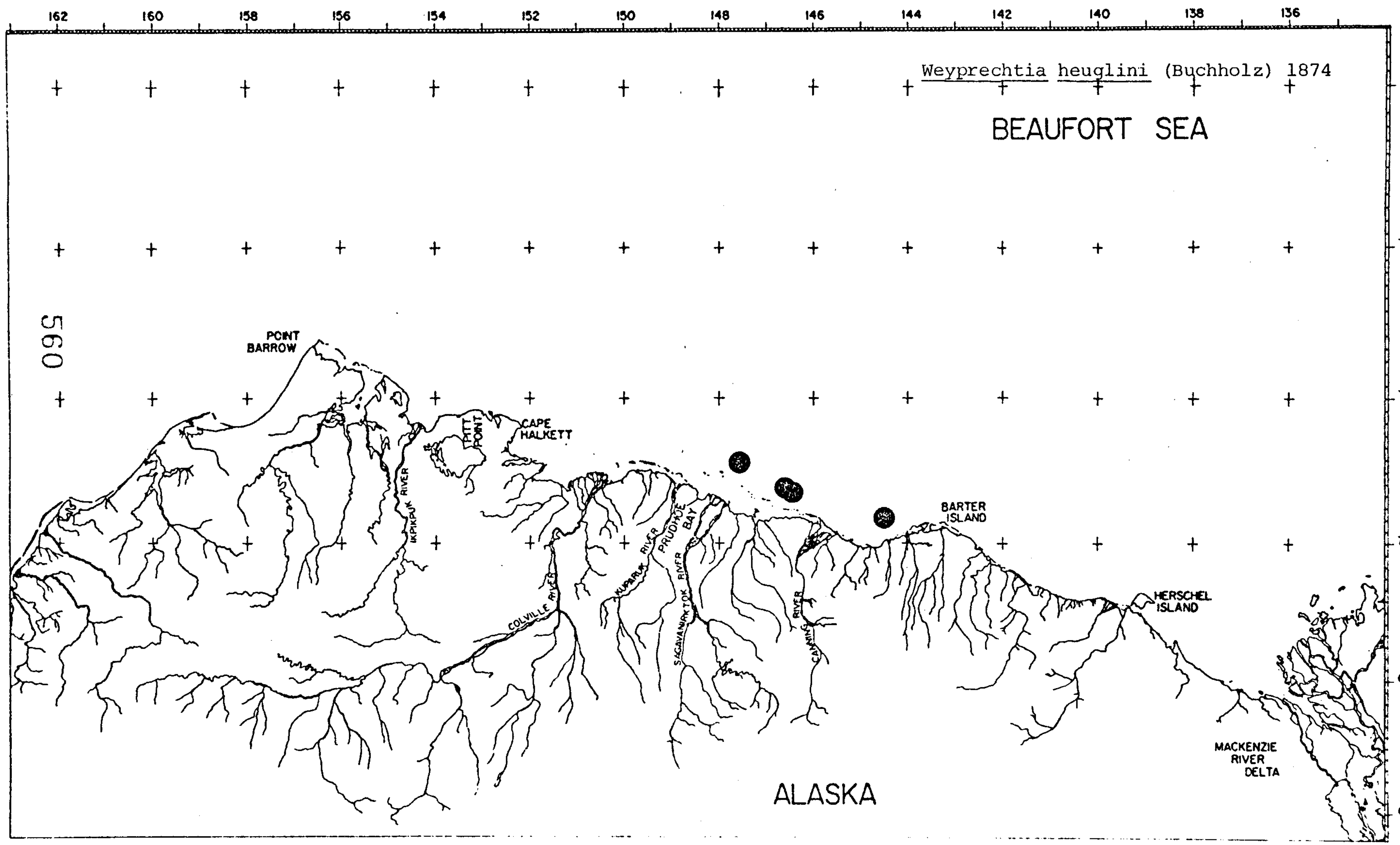
Weyprechtia heuglini (Buchholz) 1874
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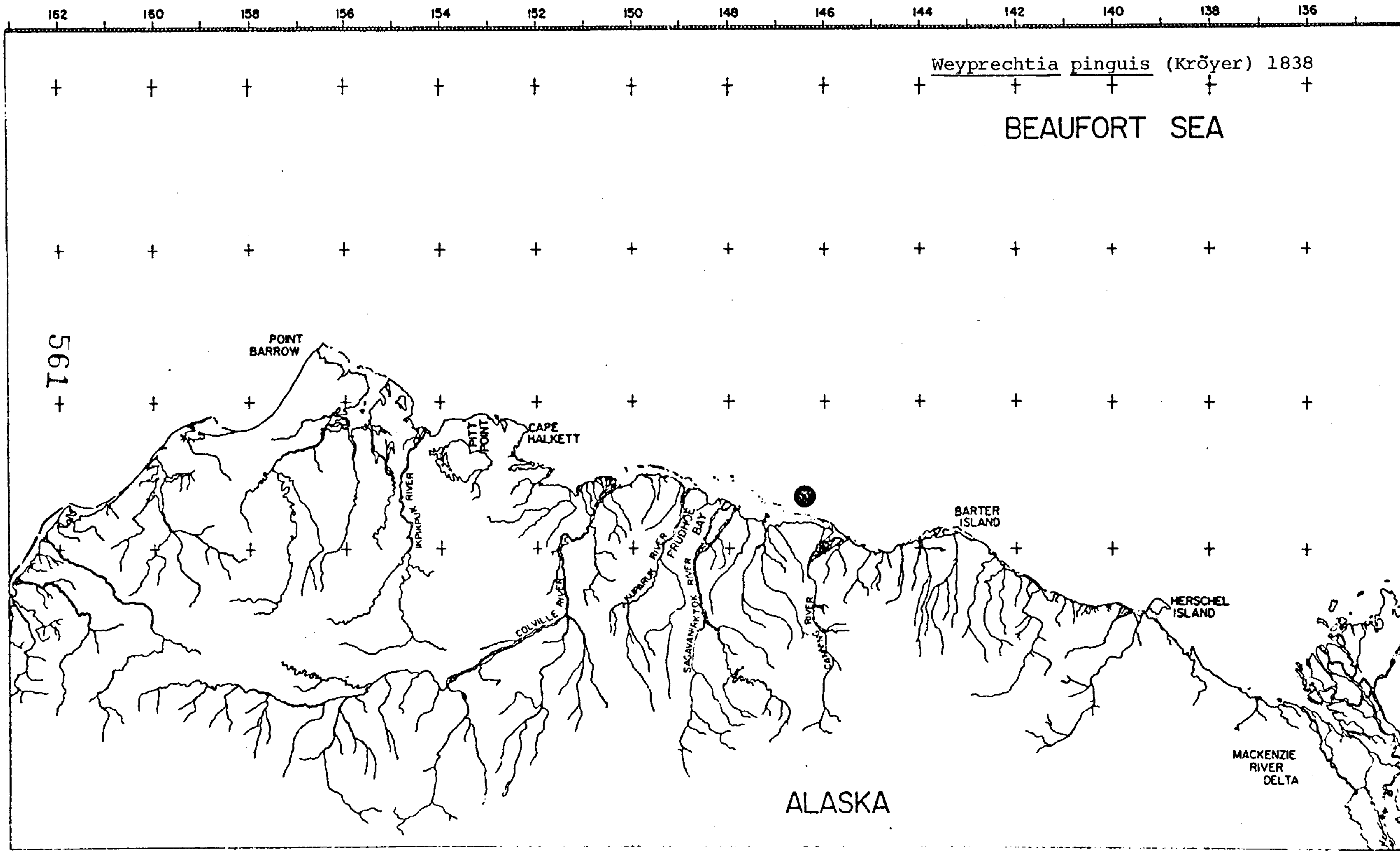
Weyprechtia pinguis (Kröyer) 1838
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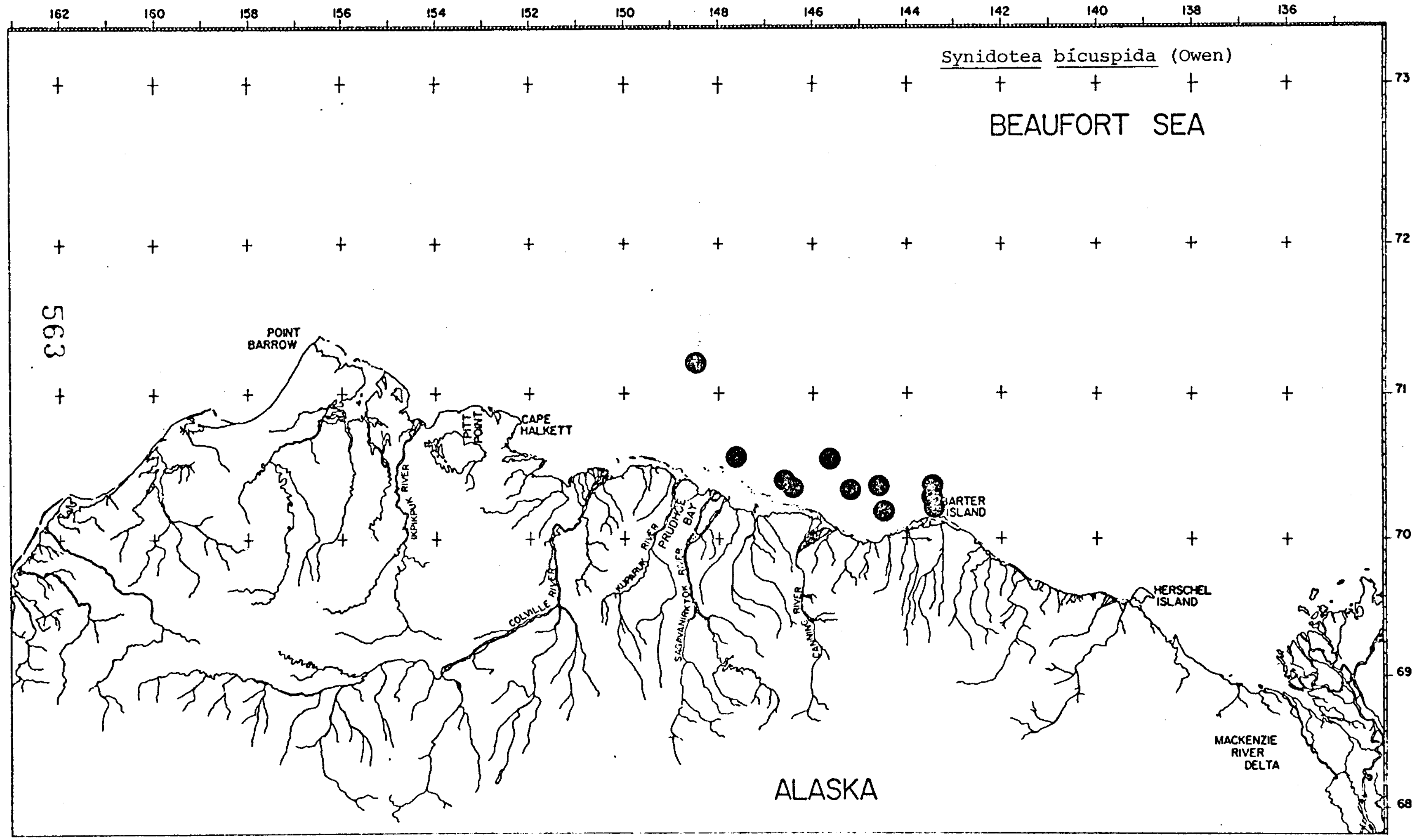
Synidotea bícuspida (Owen)
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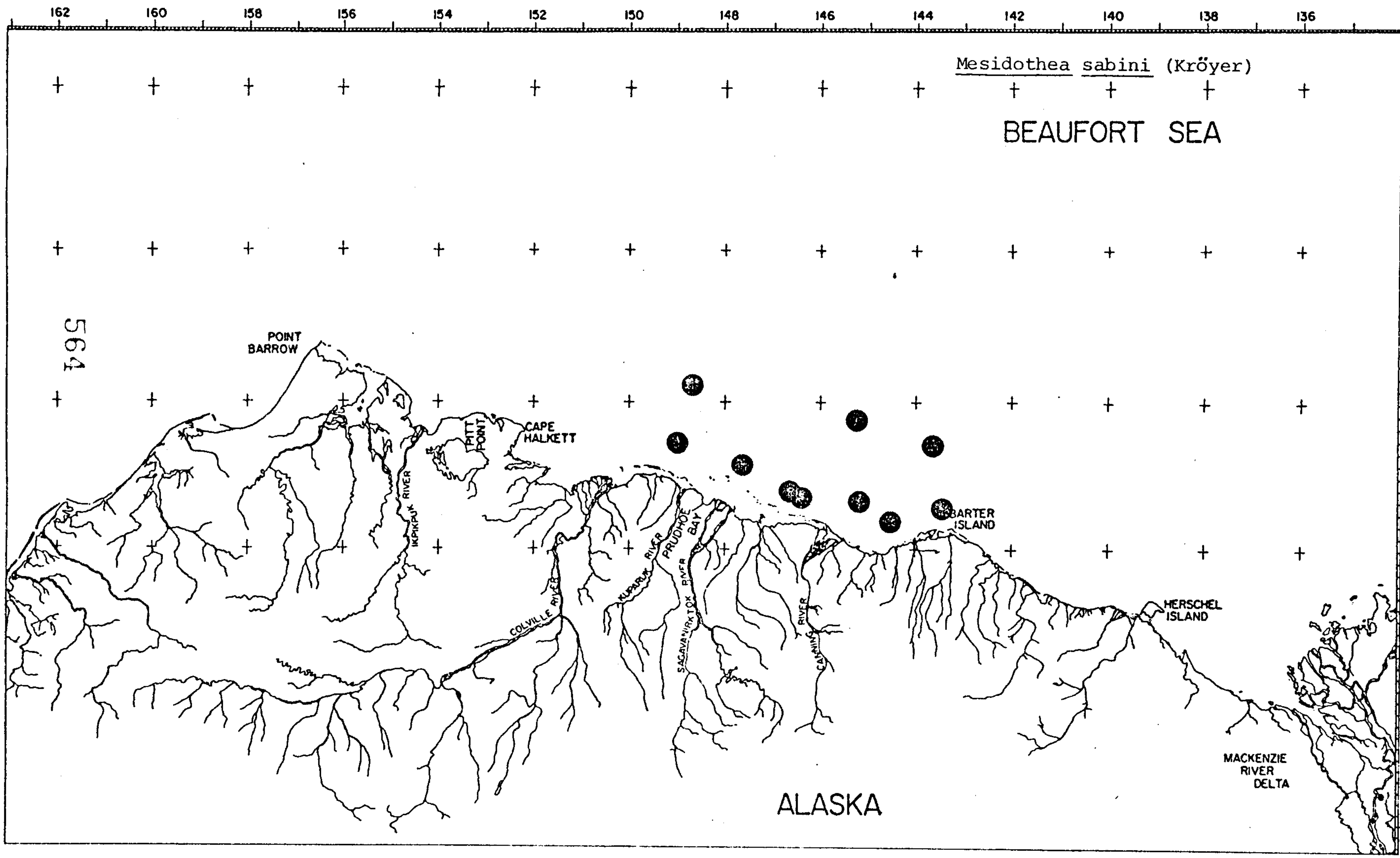
Mesidothea sabini (Kröyer)
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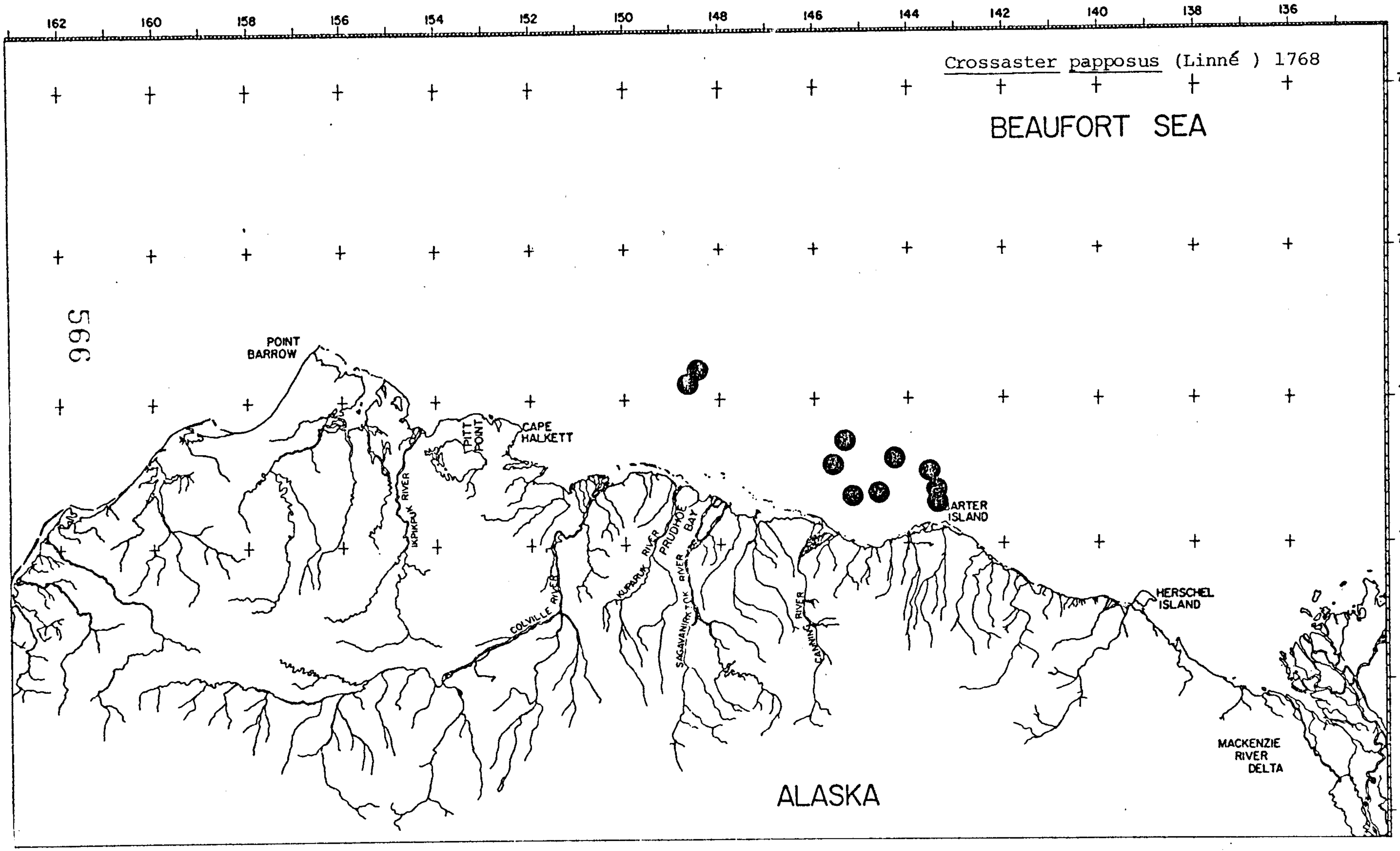

Crossaster papposus (Linné) 1768
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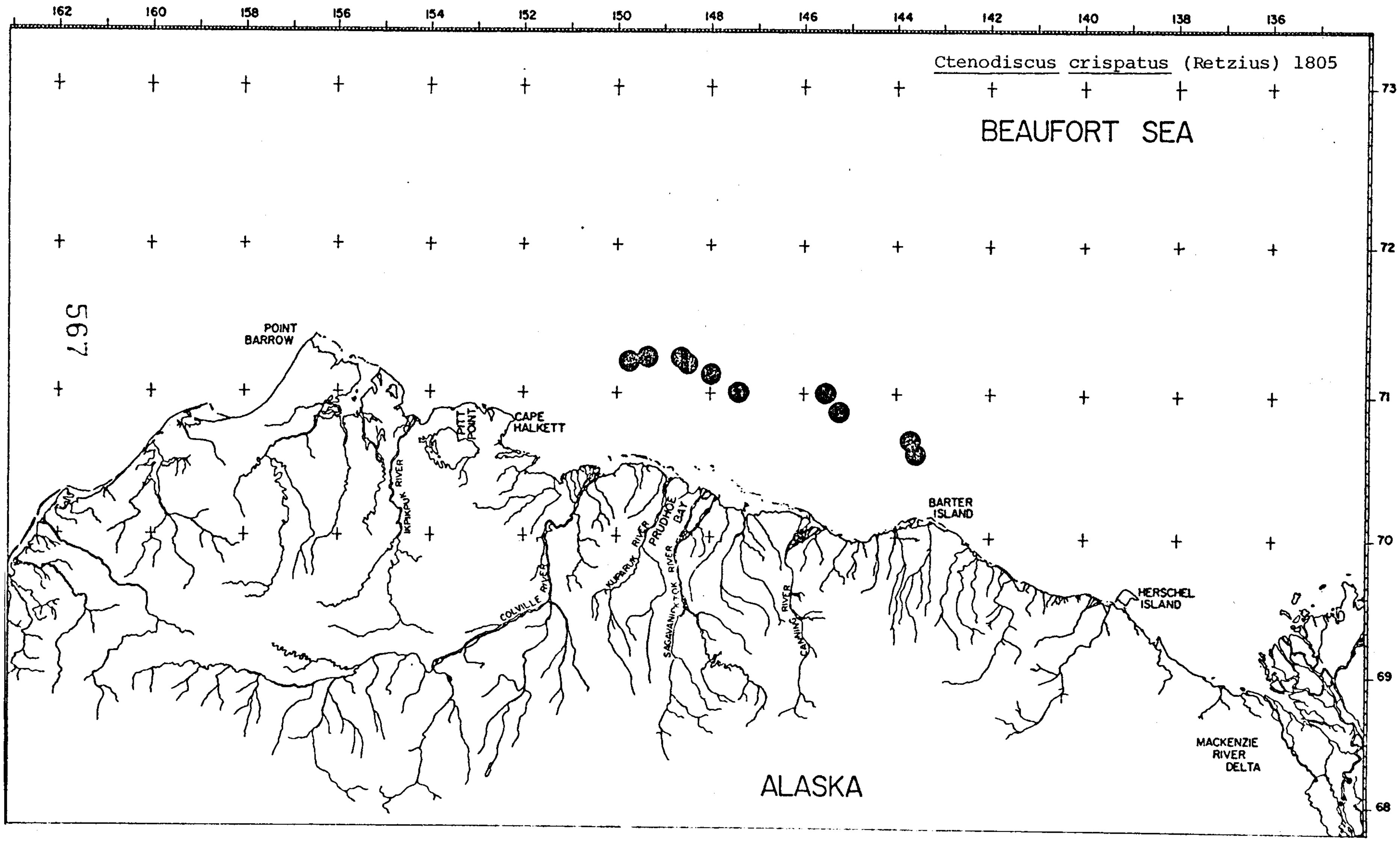
Ctenodiscus crispatus (Retzius) 1805
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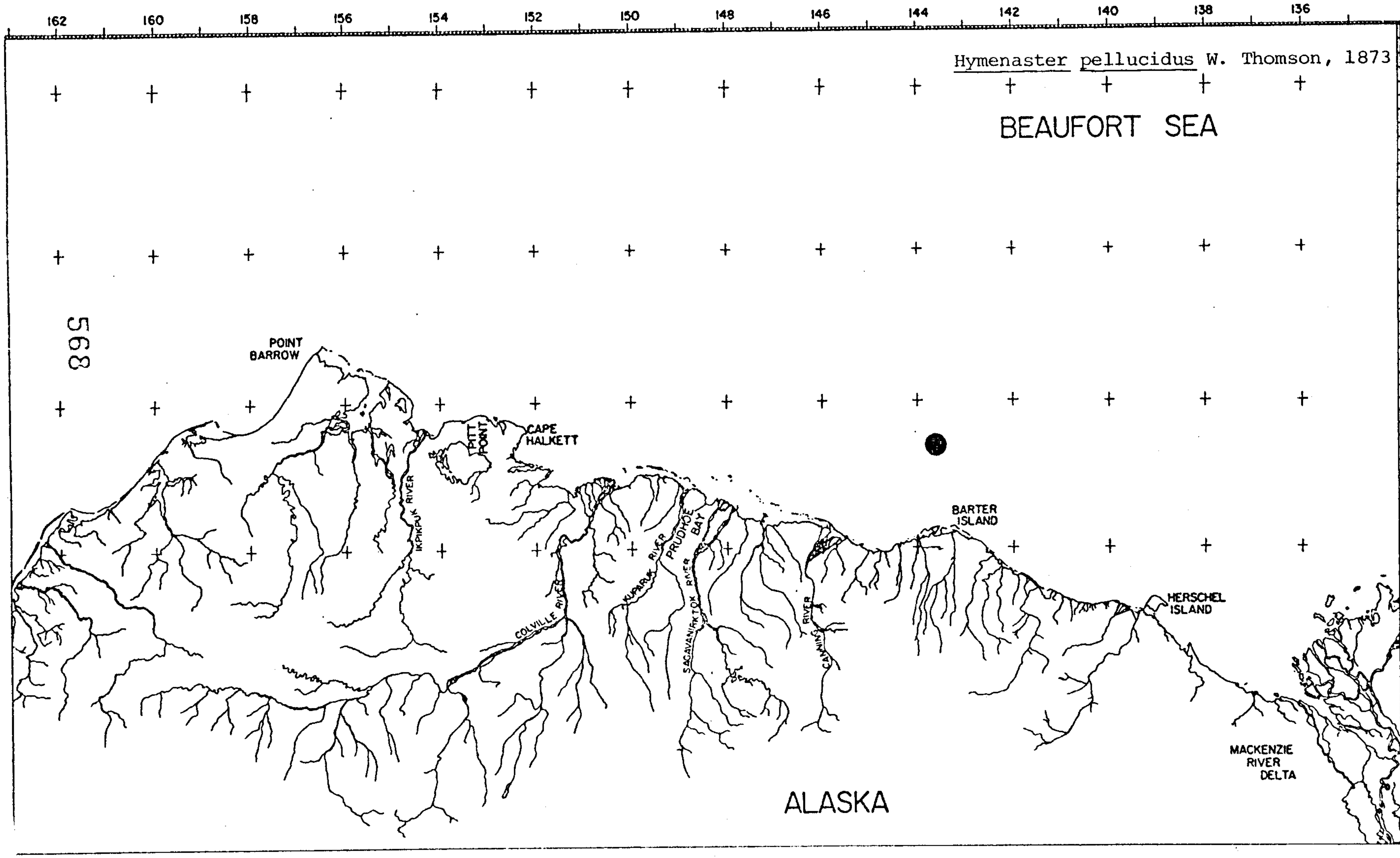
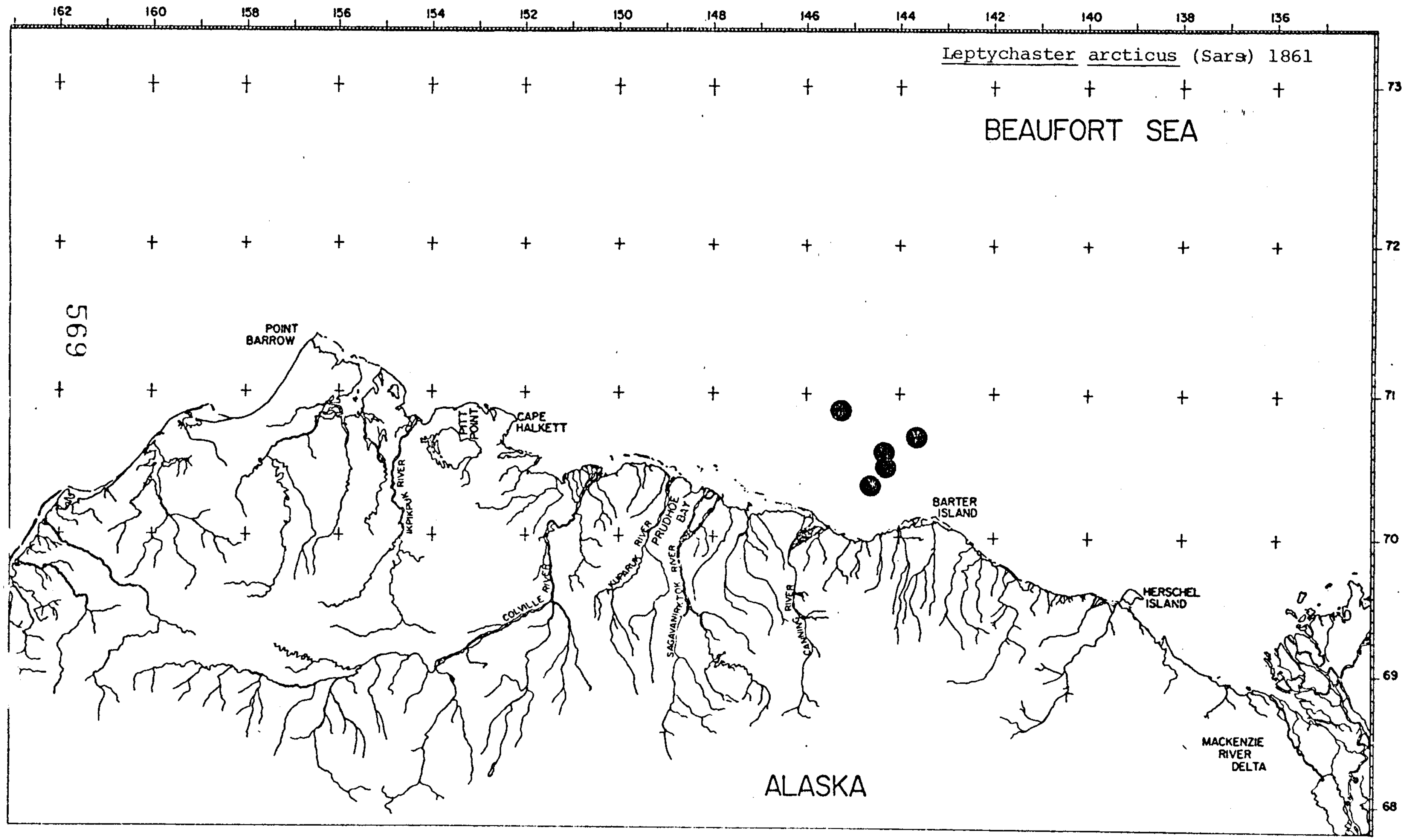


Hymenaster pellucidus W. Thomson, 1873


Leptychaster arcticus (Sars) 1861
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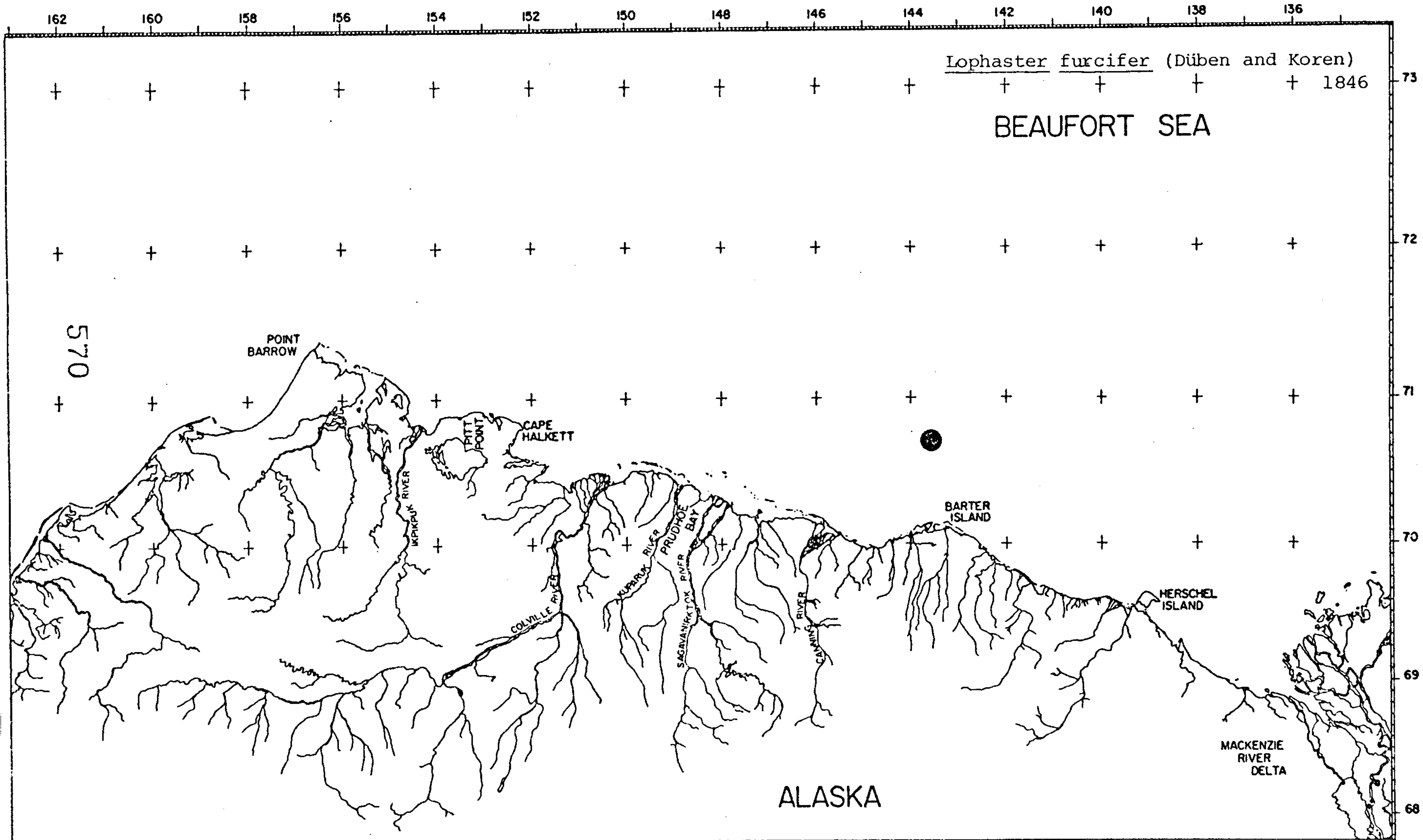
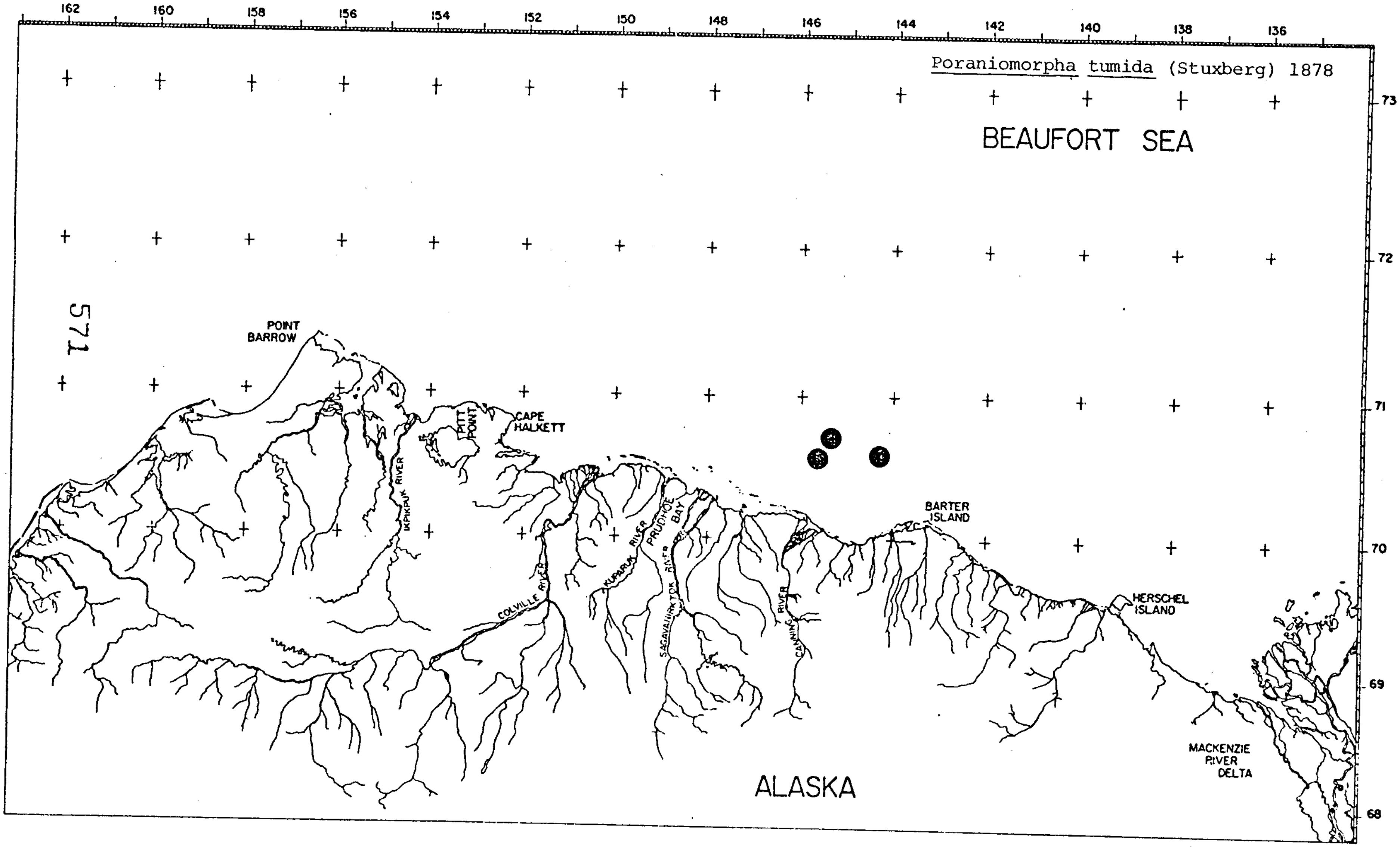


Lophaster furcifer (Düben and Koren) 1846


Poraniomorpha tumida (Stuxberg) 1878
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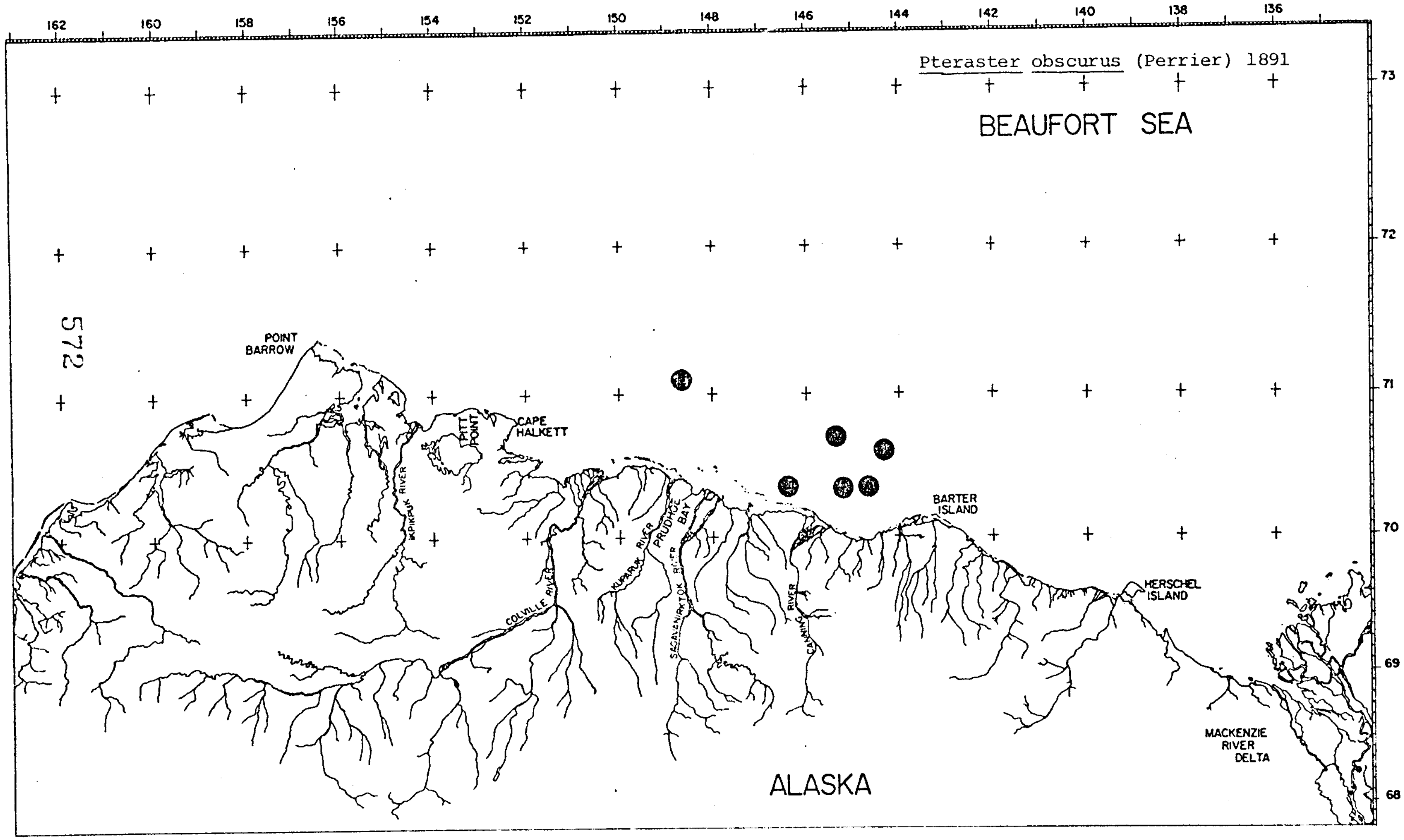
Pteraster obscurus (Perrier) 1891
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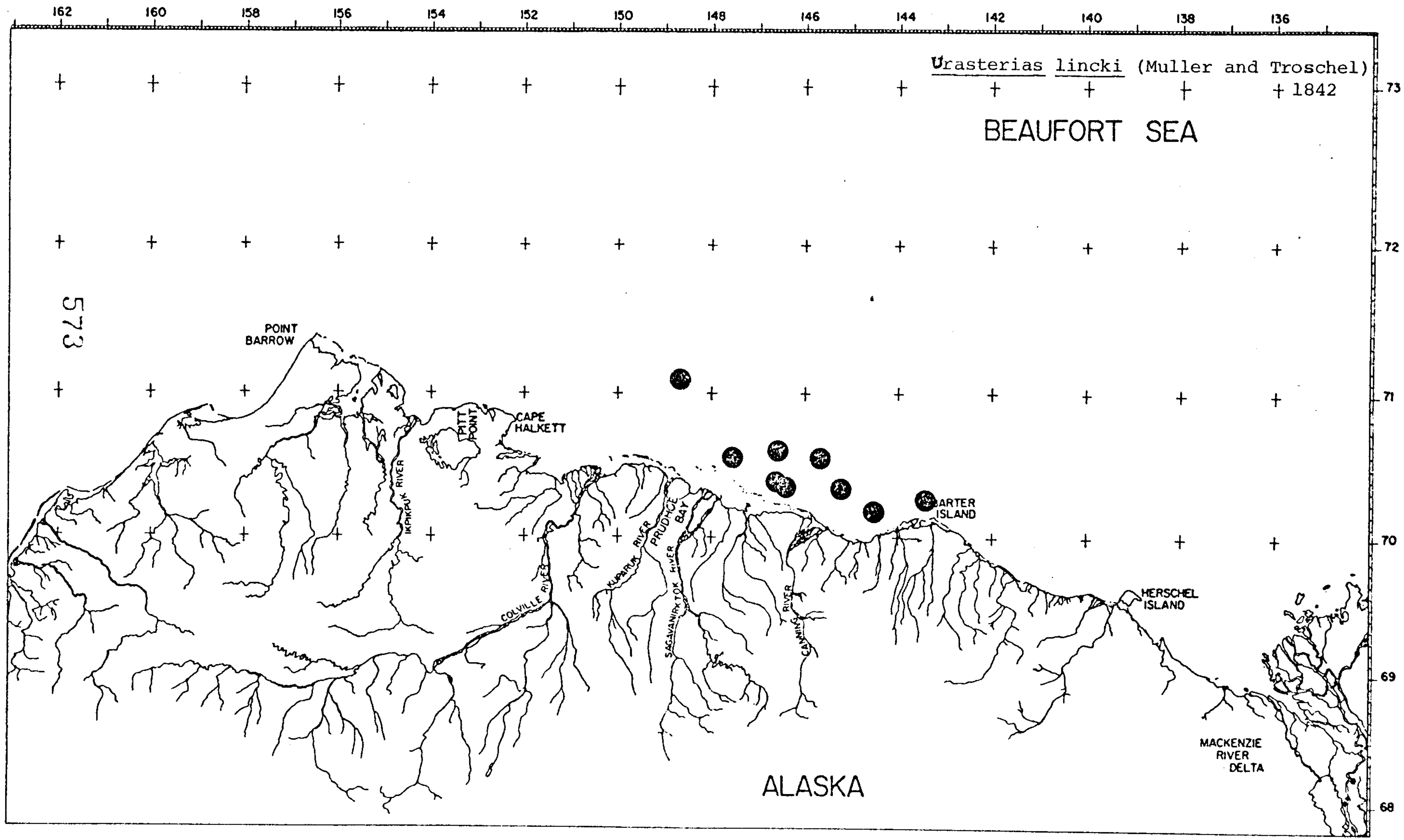

Urasterias lincki (Muller and Troschel) 1842
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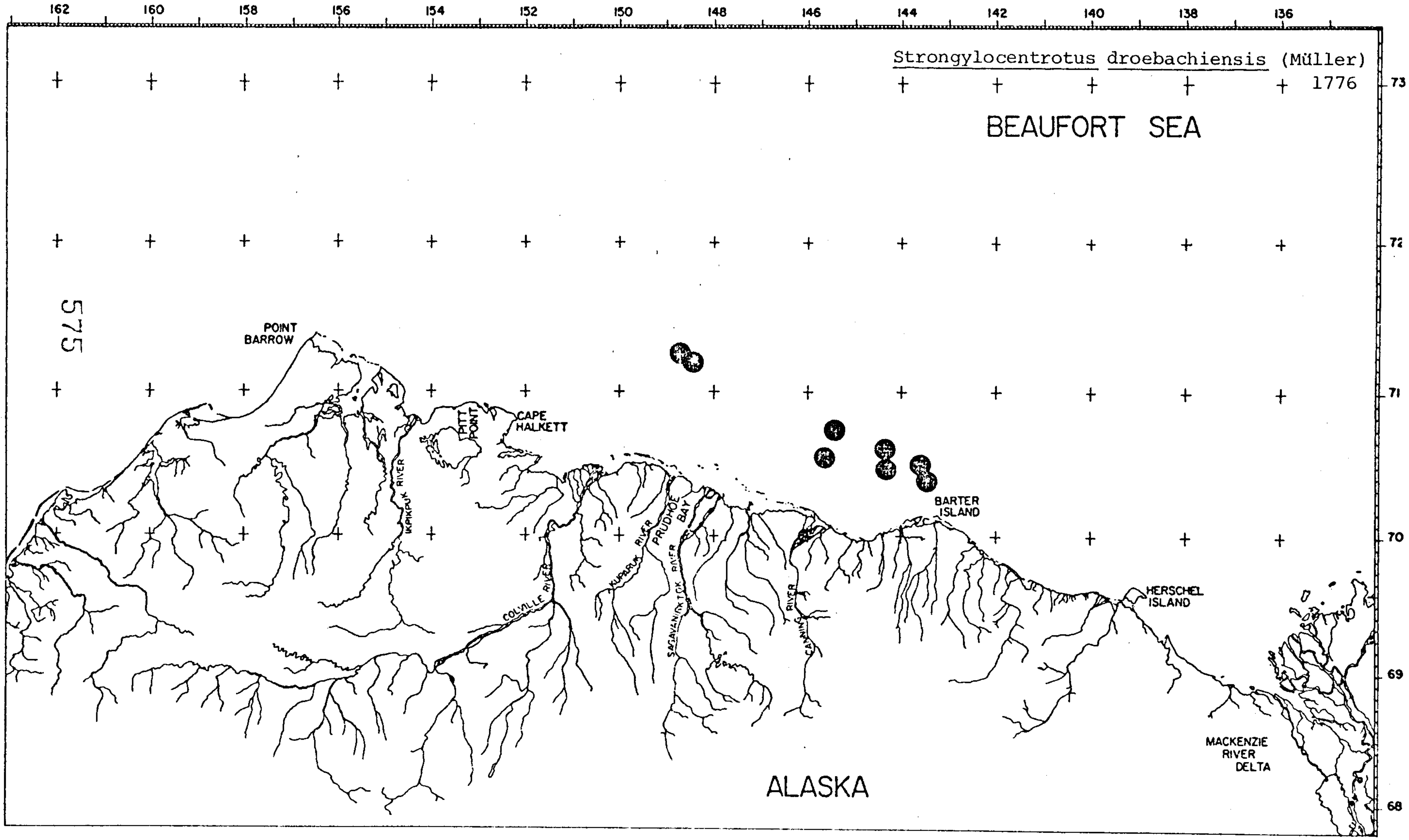
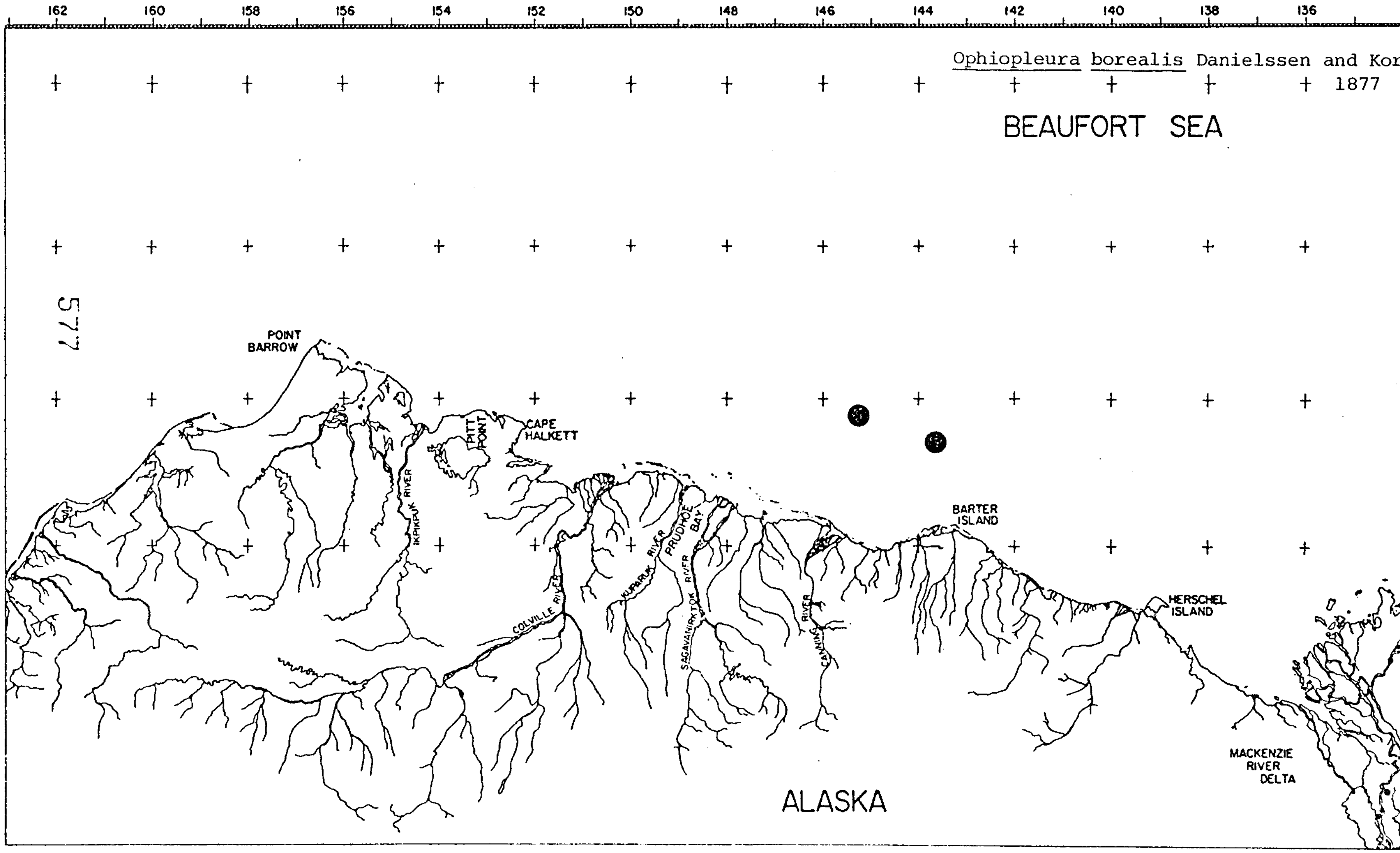


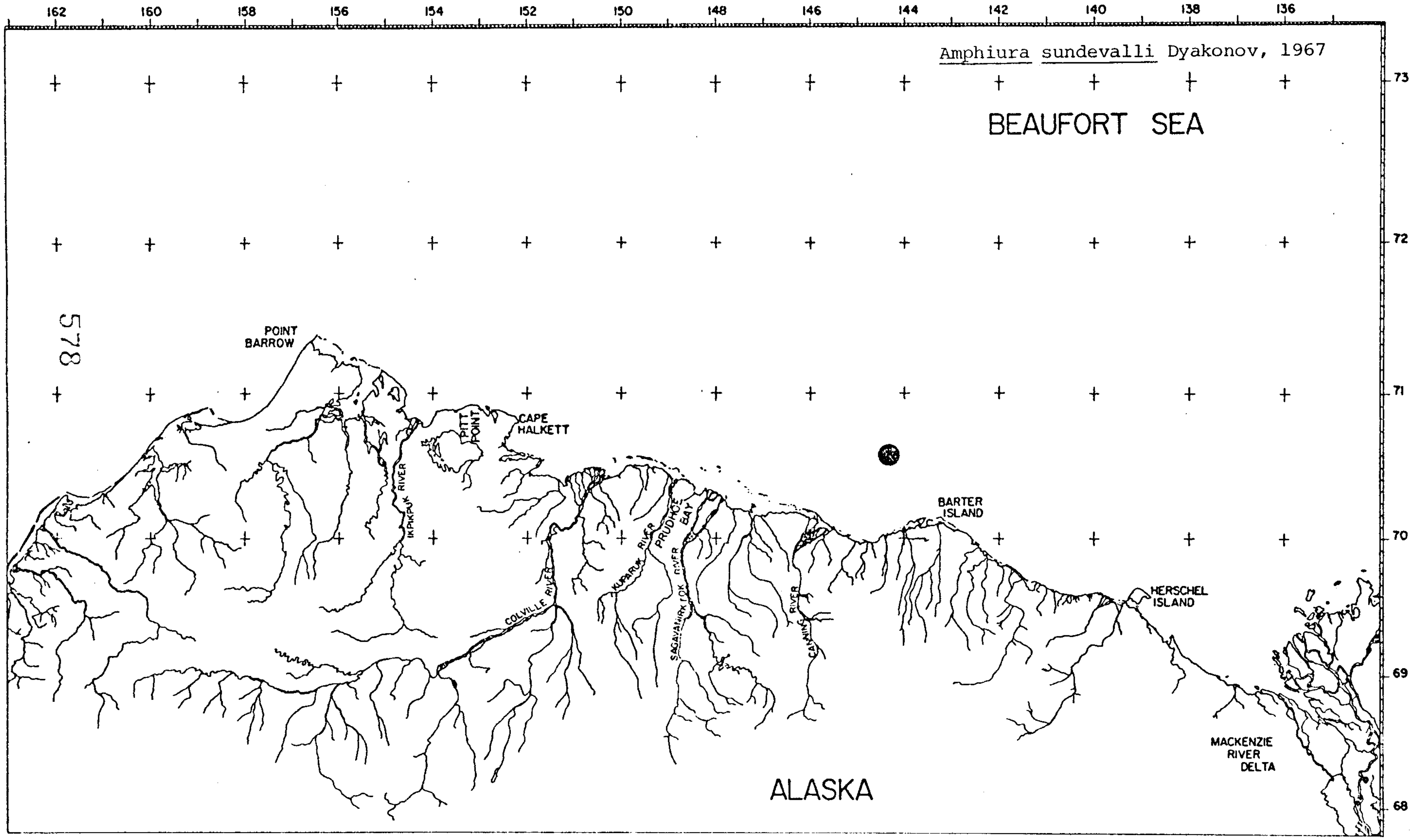
Strongylocentrotus droebachiensis (Müller) 1776

SPECIES DISTRIBUTIONS

ECHINODERMATA - OPHIUROIDEA

Ophiopleura borealis Danielssen and Koren, 1877




Amphiura sundevalli Dyakonov, 1967
BEAUFORT SEA
ALASKA
POINT BARROW
PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
SAGAVANIRKTOK RIVER
CANNING RIVER
BARTER ISLAND
HERSCHEL ISLAND
MACKENZIE RIVER DELTA
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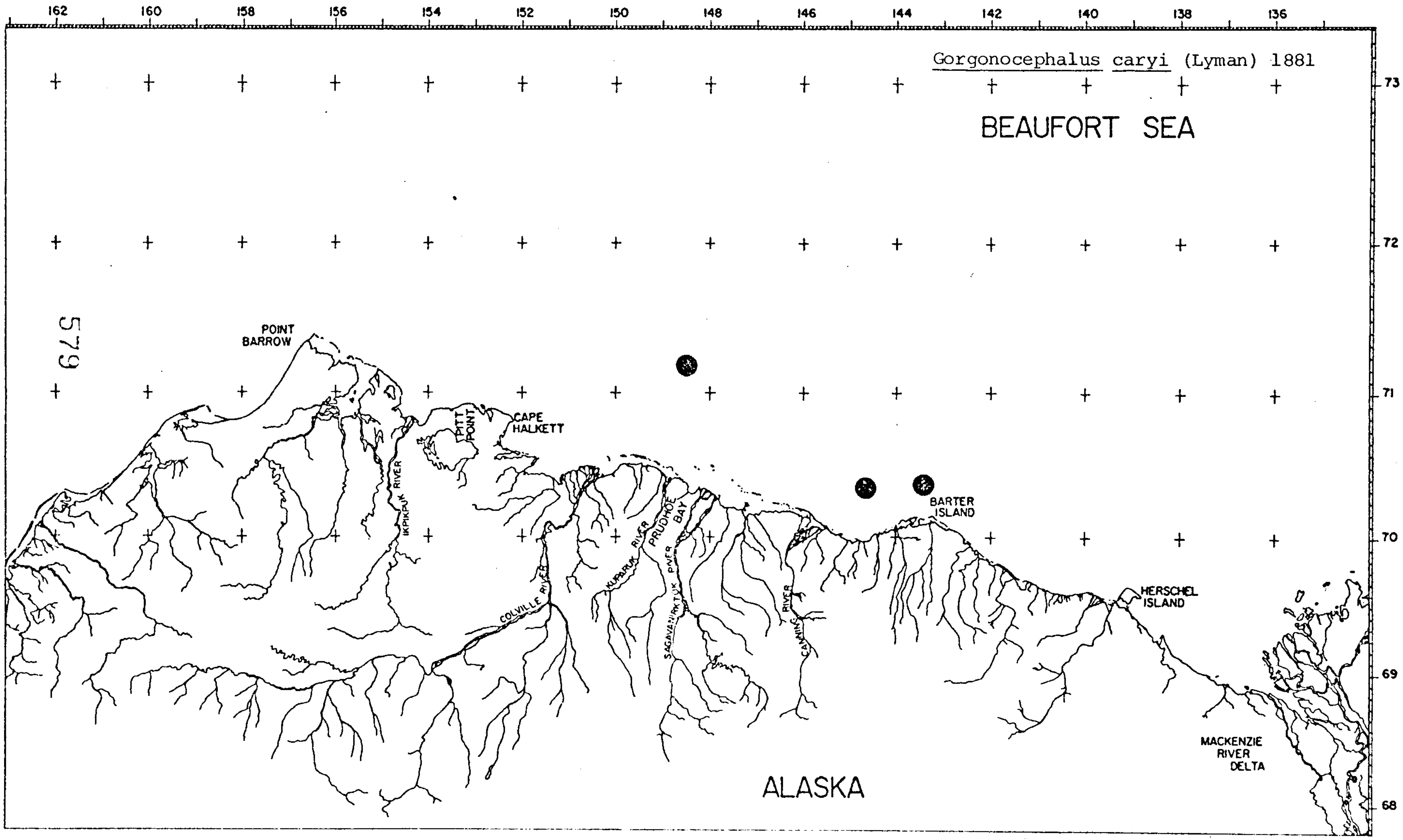
Gorgonocephalus caryi (Lyman) 1881
BEAUFORT SEA
POINT BARROW
CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
SAGAVANIRKTUK RIVER
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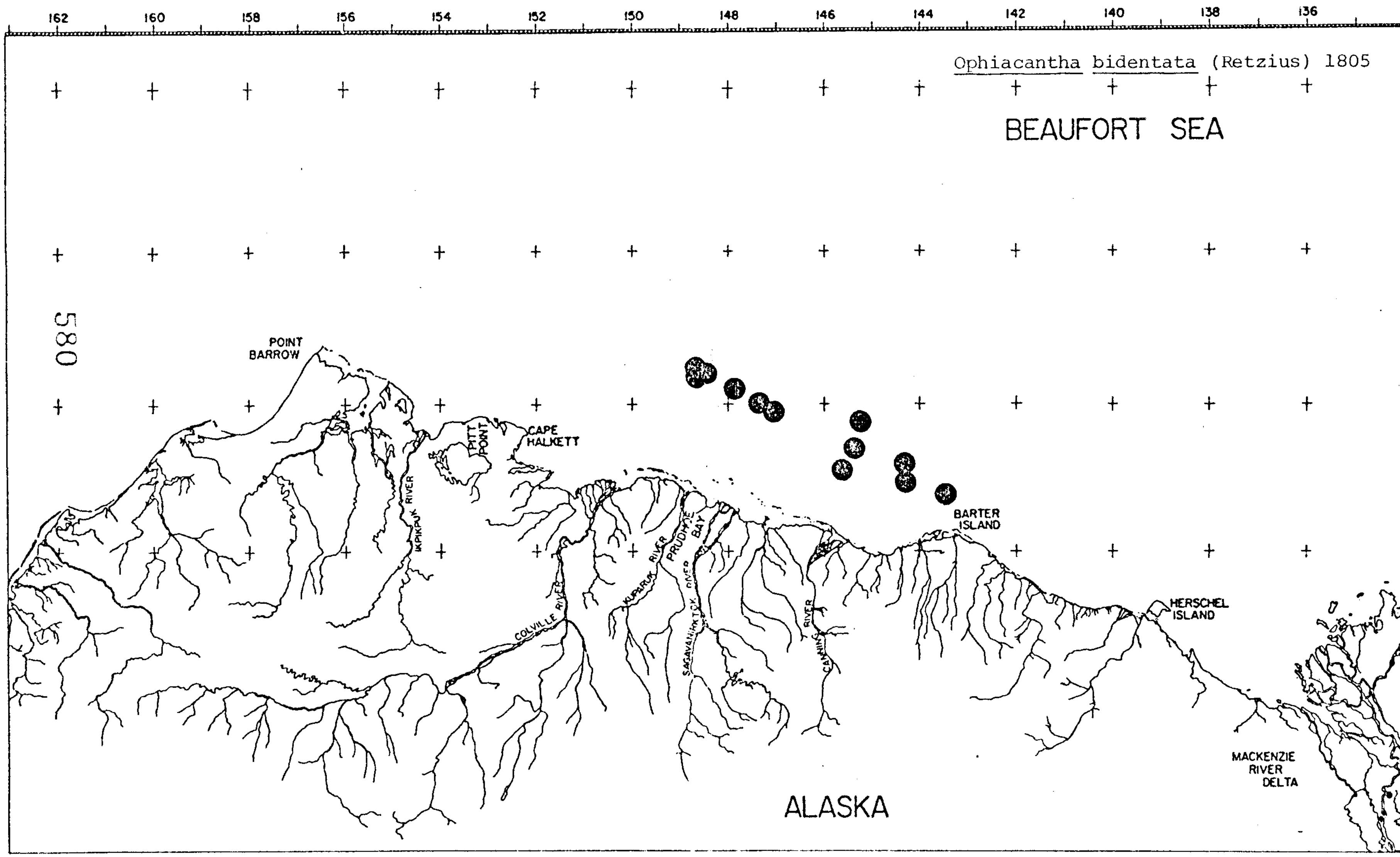
Ophiacantha bidentata (Retzius) 1805
BEAUFORT SEA
POINT BARROW
CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
SAGAVANIRKTOK RIVER
CANNING RIVER
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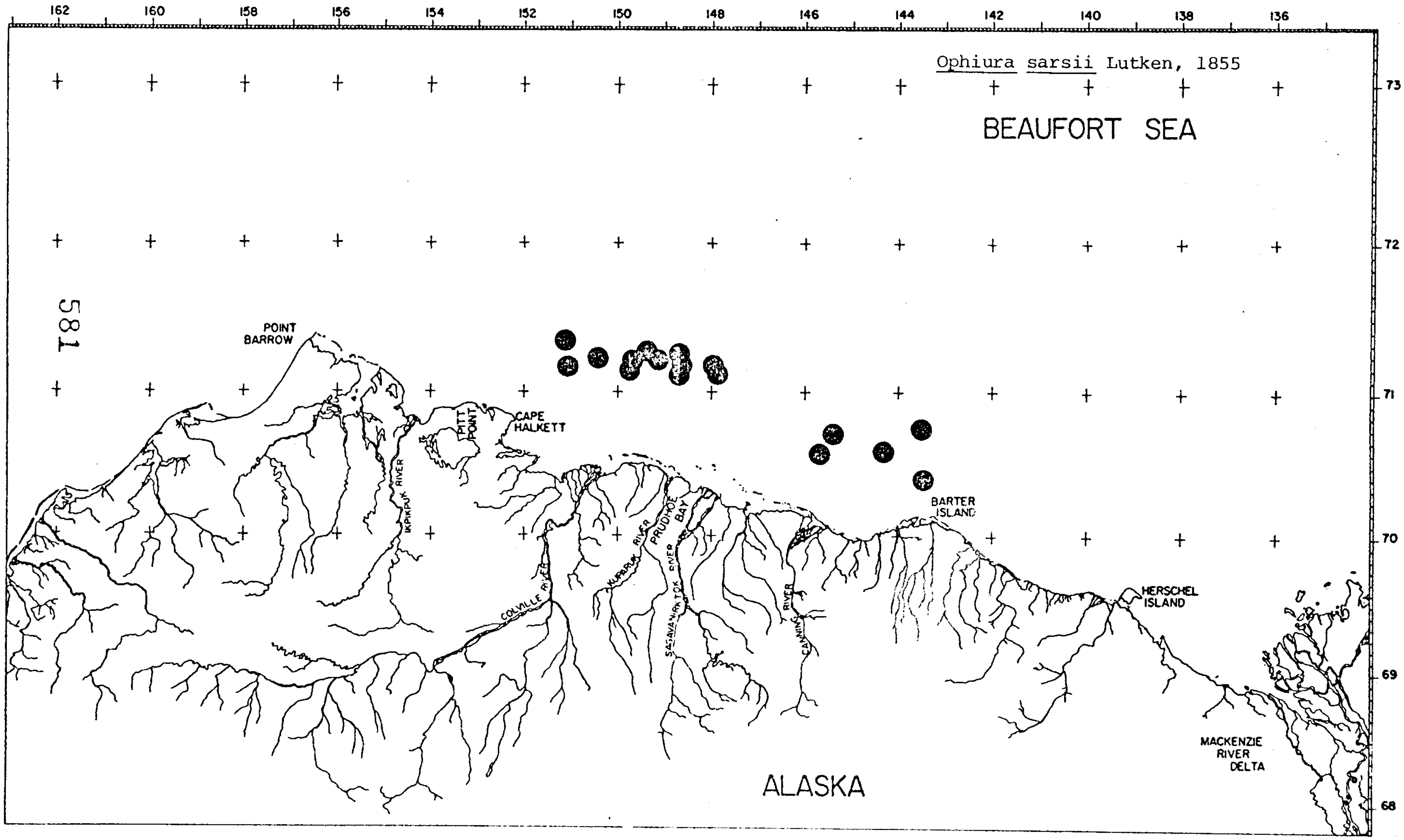
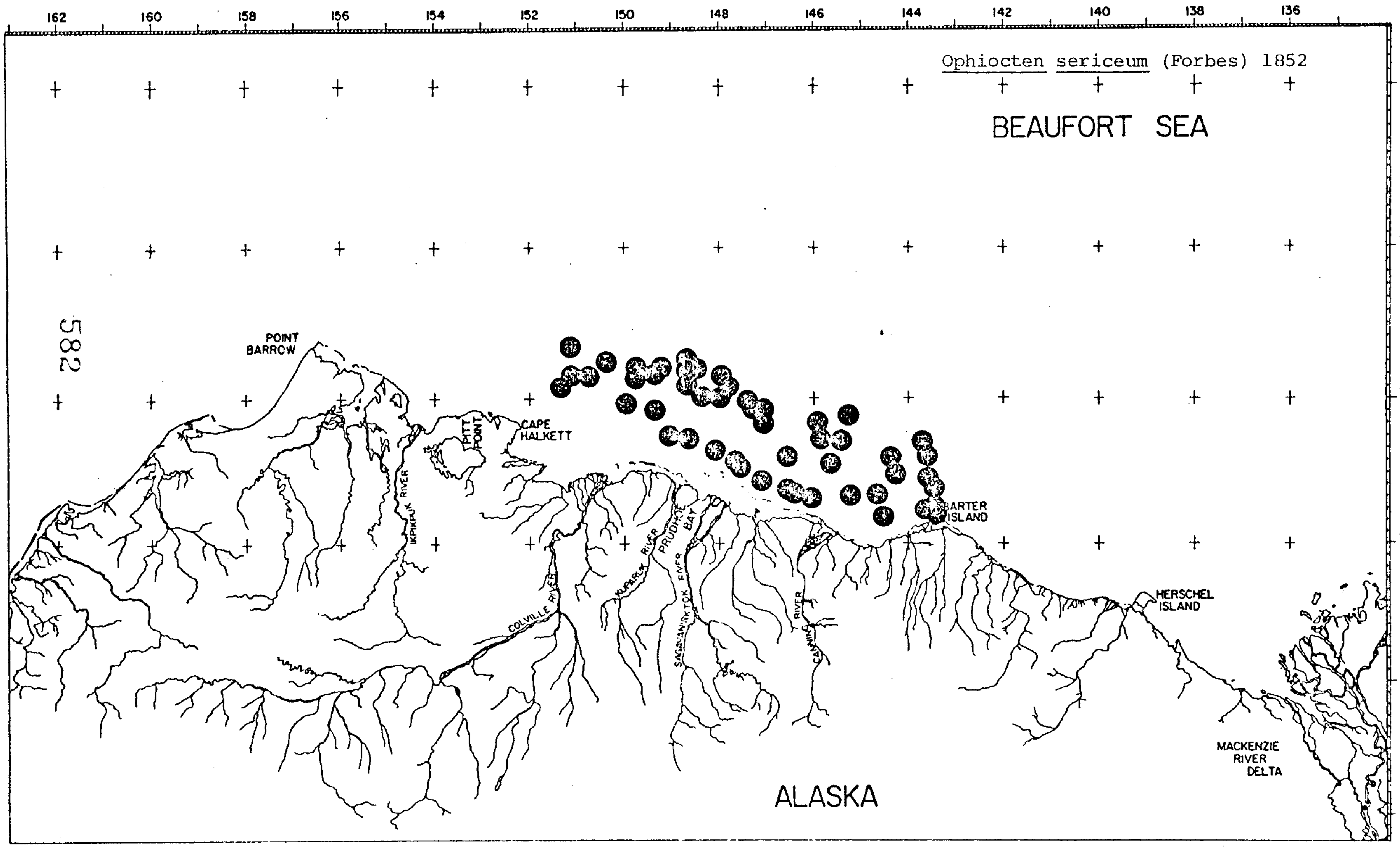
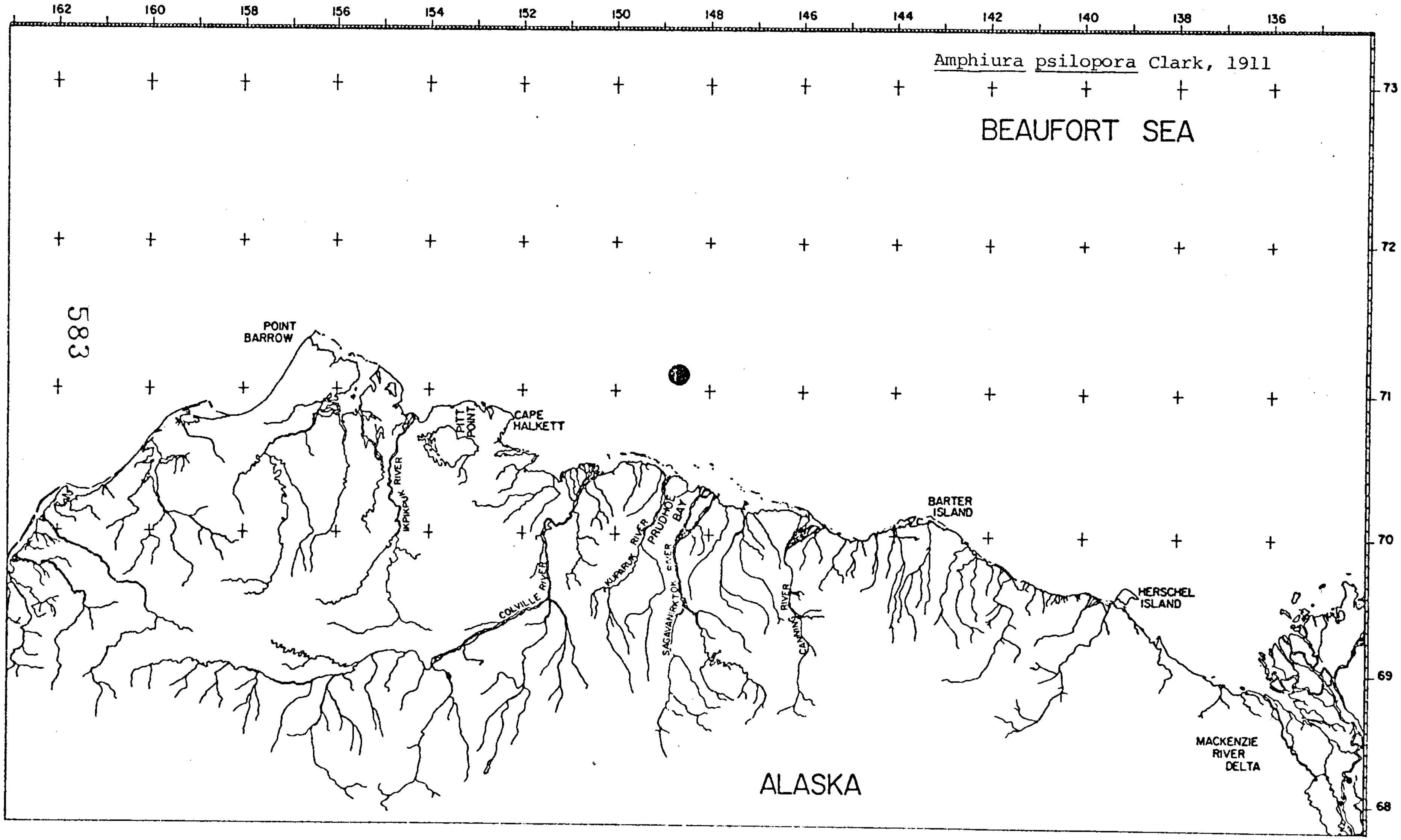


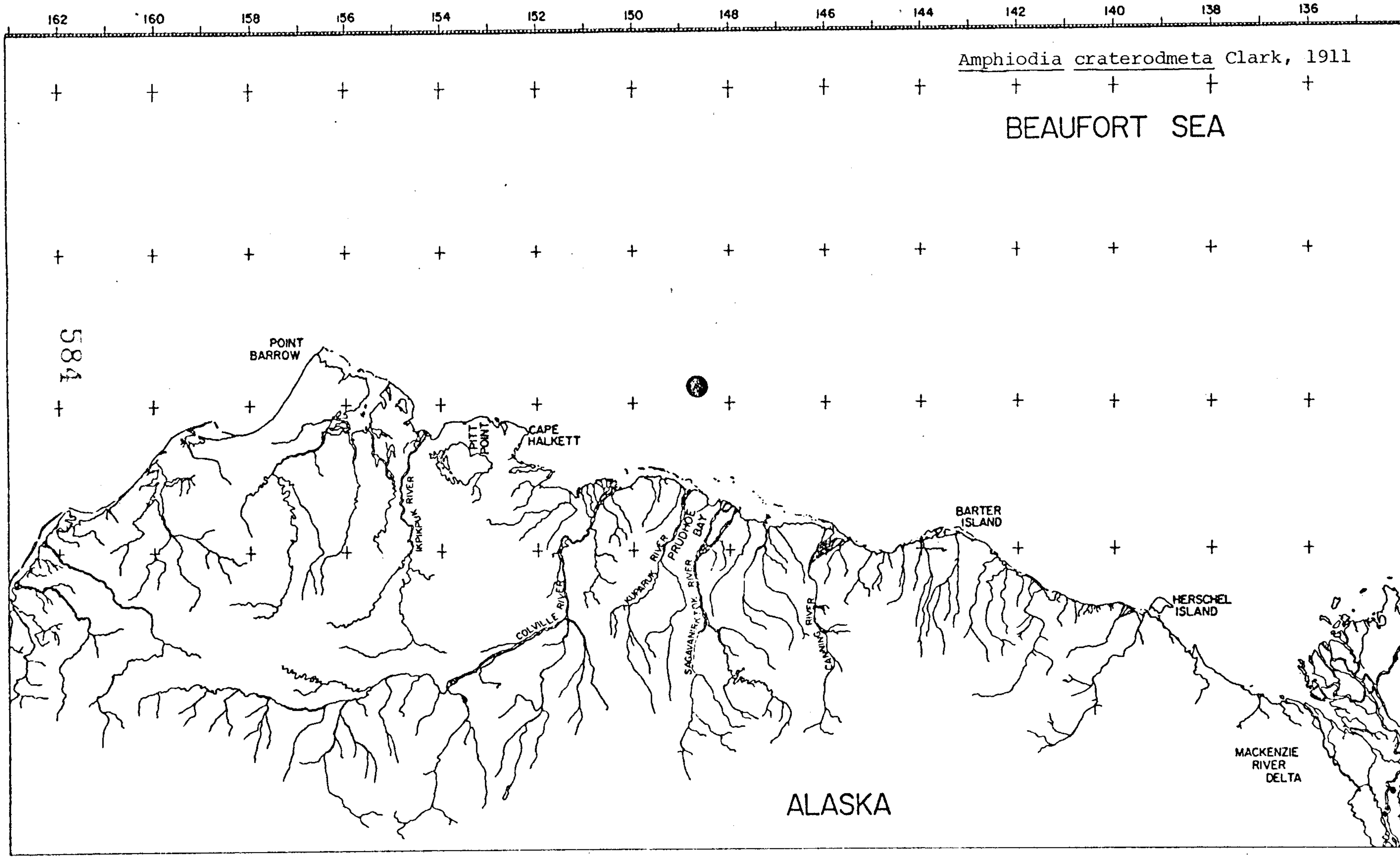
Ophiura sarsii Lutken, 1855



Ophiocten sericeum (Forbes) 1852

Amphiura psilopora Clark, 1911

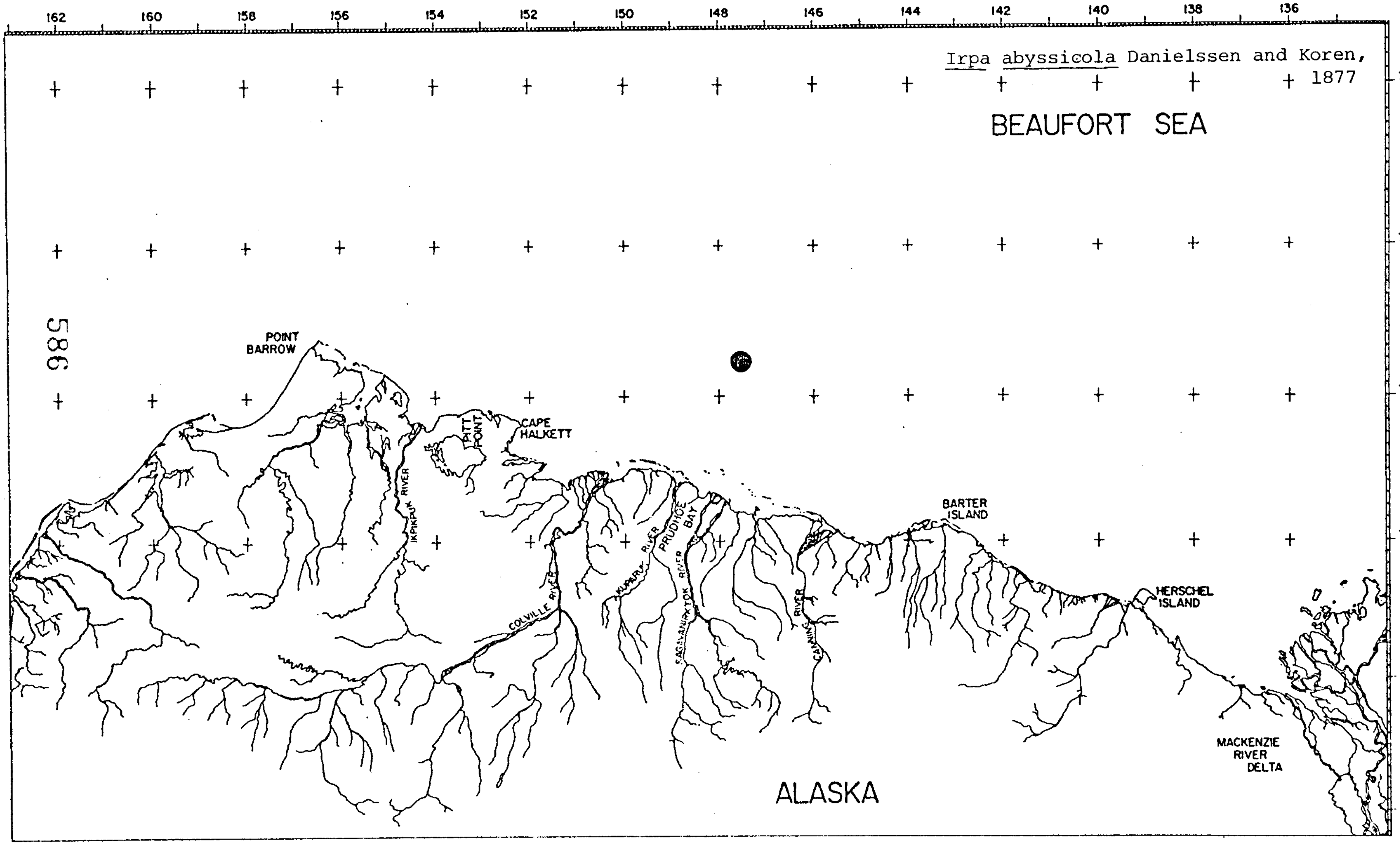




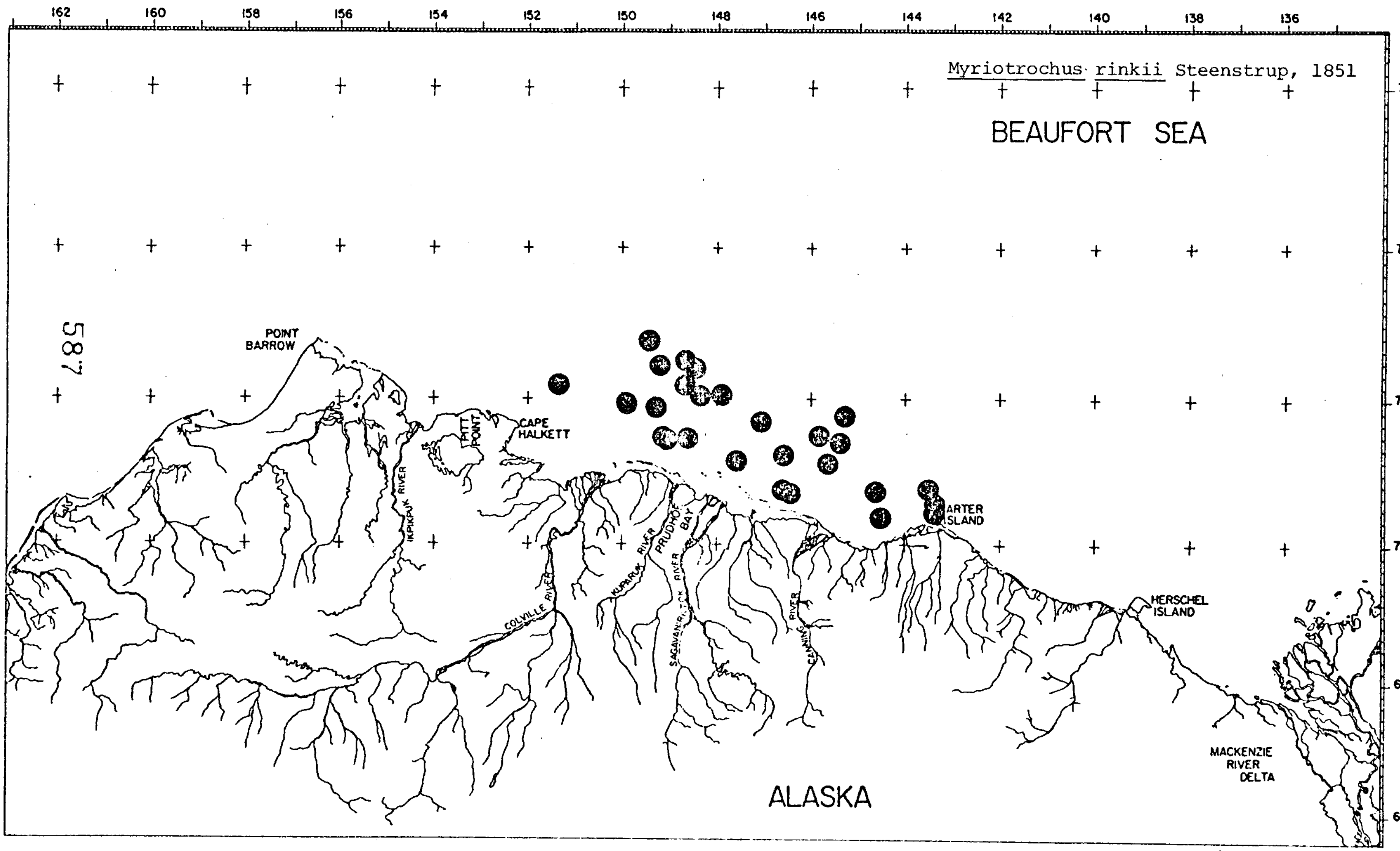
Amphiodia craterodmeta Clark, 1911

SPECIES DISTRIBUTIONS

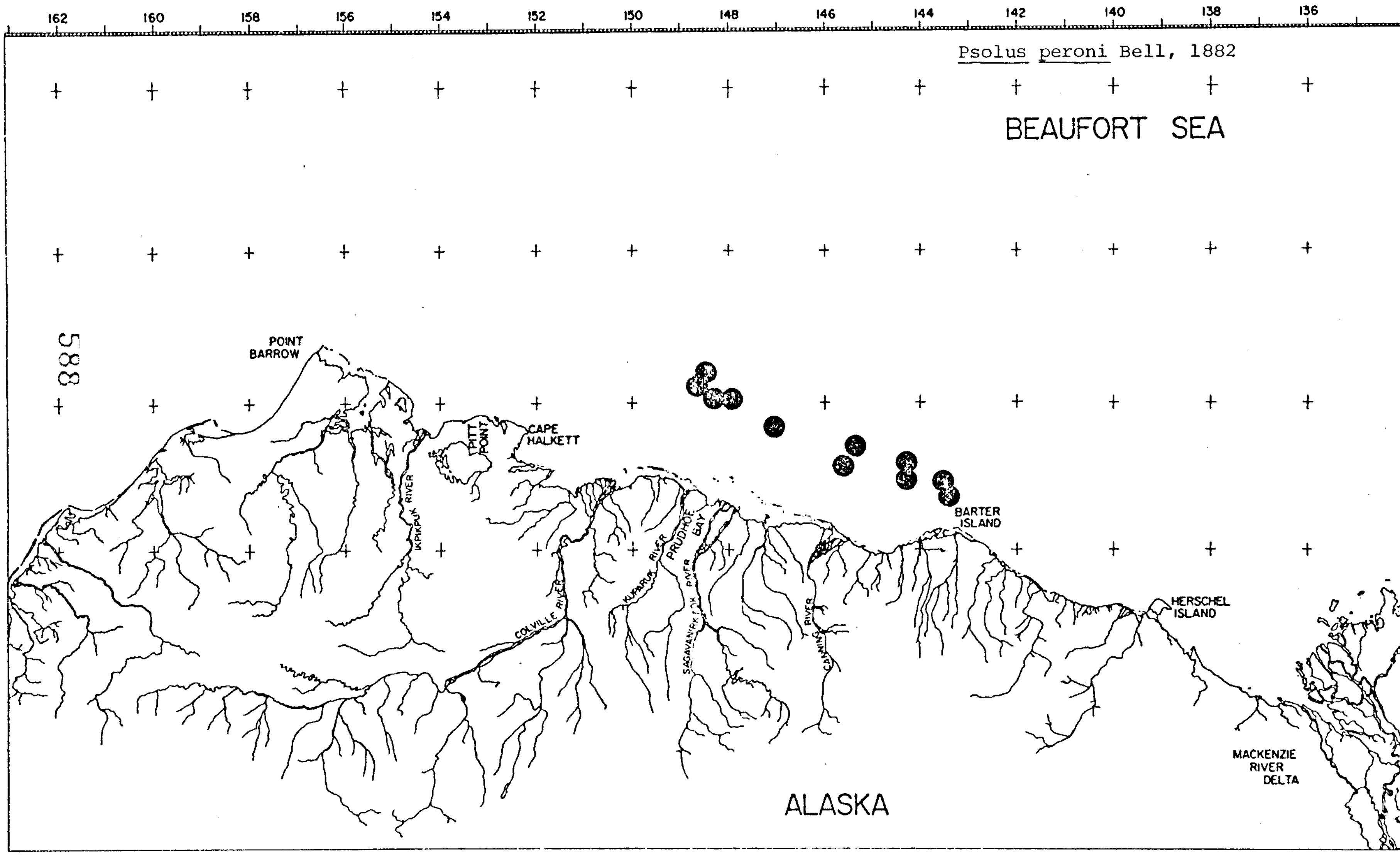
ECHINODERMATA - HOLOTHUROIDEA



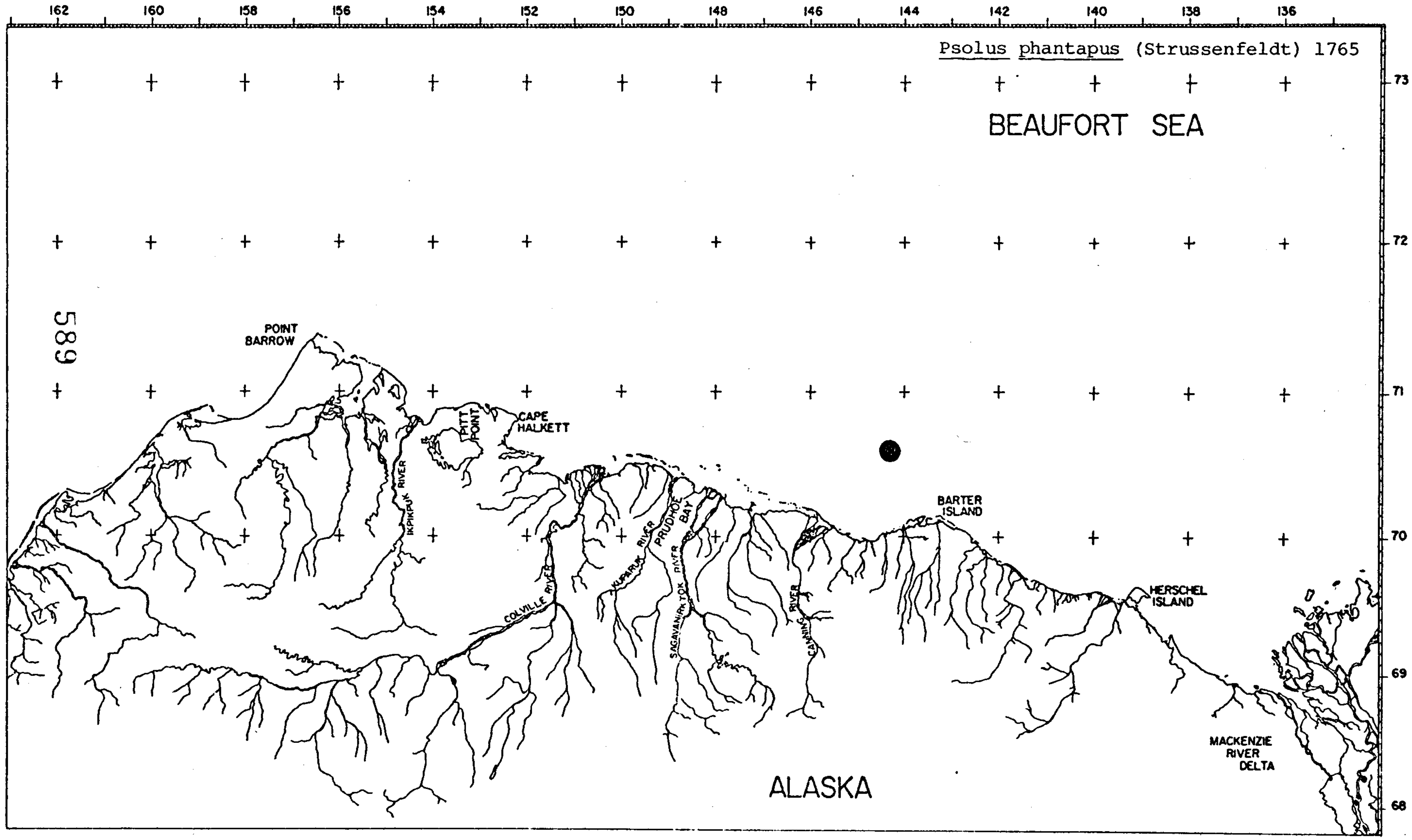
Irpa abyssicola Danielssen and Koren, 1877



Myriotrochus rinkii Steenstrup, 1851



Psolus peroni Bell, 1882


Psolus phantapus (Strussenfeldt) 1765
BEAUFORT SEA
POINT BARROW
PITT POINT
CAPE HALKETT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
SAGAVANIRKTOK RIVER
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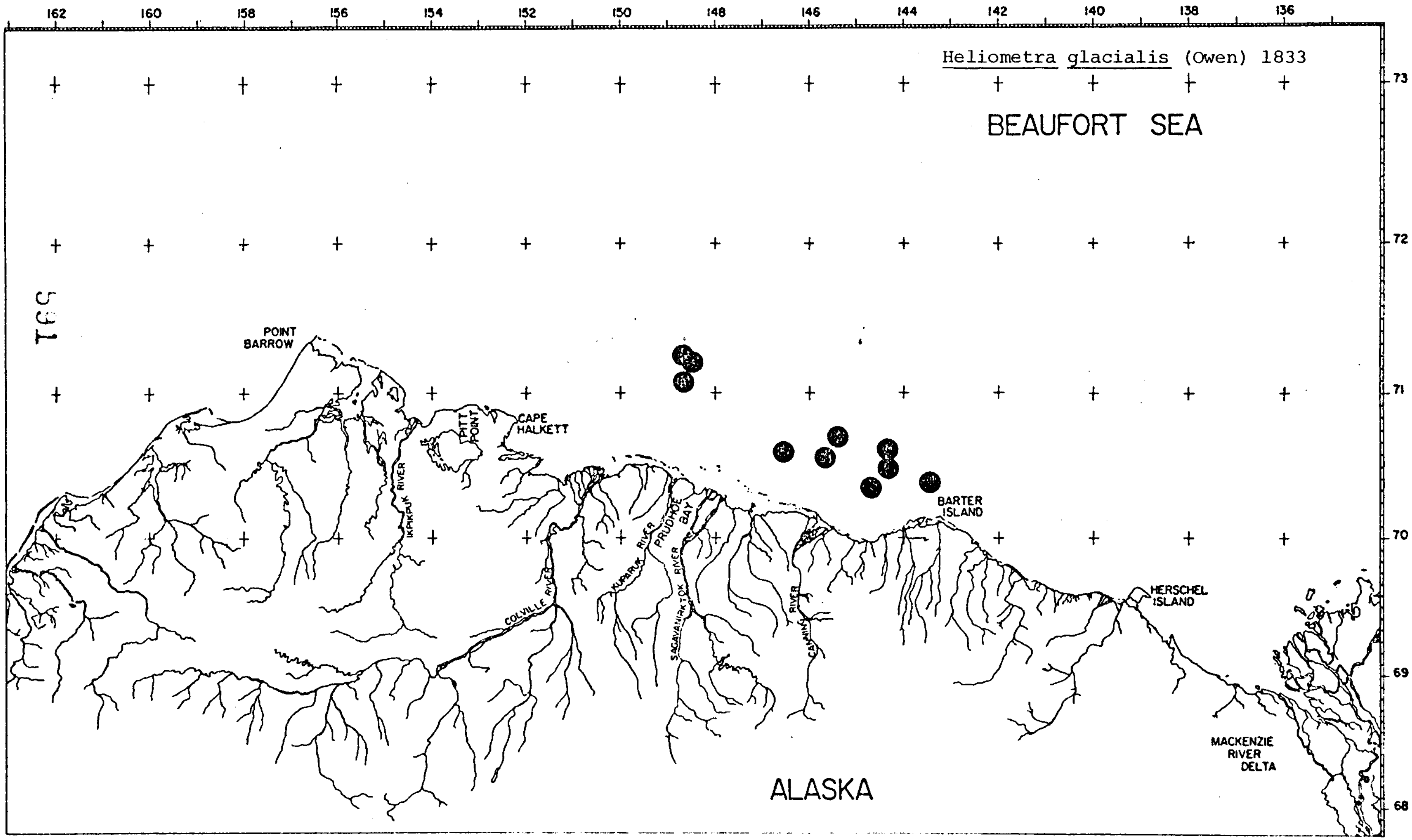
SPECIES DISTRIBUTIONS

ECHINODERMATA - CRINOIDEA


Heliometra glacialis (Owen) 1833
BEAUFORT SEA
ALASKA
POINT BARROW
CAPE HALKETT
PITT POINT
IKPIKPUK RIVER
COLVILLE RIVER
KUPARUK RIVER
PRUDHOE BAY
SAGAVANIRKTOK RIVER
CANNING RIVER
BARTER ISLAND
HERSCHEL ISLAND
MACKENZIE RIVER DELTA
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RU# 7
VOLUME 3

FIRST YEARLY REPORT

Contract No. 03-5-022-68
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April 1, 1975 - March 31, 1976
Pages 1 - 444

Summarization of existing literature and unpublished data on the distribution, abundance, and life histories of benthic organisms

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Corvallis, Oregon 97331

March 22, 1976

This is an interim report which presents preliminary information for the use of the Outer Continental Shelf Energy Program (OCSEP). No material contained may be quoted in external reports without written permission from the OCSEP Project Office and the principal investigator.

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<u>VOLUME III</u>

C. Systematics of the benthic invertebrate fauna

Identifications of fauna from the 1971 and 1972 U.S. Coast Guard cruises to the Beuafort Sea continue as a major objective. As these are the only extensive quantitative infaunal samples available across the continental shelf, plans are underway to achieve as complete and accurate identification of the fauna as possible. Unknown epifauna from the otter trawl collections and if possible the bottom photographs are being worked on also.

The following reports summarize some of the systematic research undertaken in the OSU Benthos Laboratory.

Polychaeta

Taxonomic work on the polychaetous annelids collected during the WEBSEC-71 and WEBSEC-72 cruises is in progress. Polychaetes from all WEBSEC-71 otter trawls (numbering 4) and all WEBSEC-72 otter trawls (numbering 16) have been examined. Specimens representative of the species present have been sorted and identified at the family level. All polychaetes from a selection of 59 grab samples consist of all grabs taken at depth of 500 meters and deeper, plus a subset of grabs from various depths across the continental shelf and upper continental slope.

To date, specimens representing 30 families (subject to further taxonomic revision) have been found in the material examined. The families represented are:

*Ampharetidae	Oweniidae
Apistobranchidae	*Paraonidae
*Capitellidae	Pectinariidae
Chaetopteridae	Phyllodocidae
*Cirratulidae	Pilargidae
Cossuridae	Polynoidae
Dorvilleidae	Sabellidae
Flabelligeridae	Scalibregmidae
*Lumbrineridae	Sigalionidae
*Maldanidae	Sphaerodoridae
Nephtyidae	*Spionidae
Nereidae	Sternaspidae
Onuphidae	Syllidae
*Ophelidae	Terebellidae
Orbiniidae	Trochochaetidae

Taxonomic work is continuing at the genus level.

*Families whose representatives appear (numerically) to be important components of the benthic infauna.

Harpacticoida

A survey has begun of the Harpacticoida (Crustacea, Copepoda) collected during the WEBSEC-71 cruise aboard the USCGC GLACIER. So far only those Harpacticoida present in the macrofauna (collected on a 1.00 mm sieve) have been surveyed. Three hundred seventy-nine Harpactiocoids were found in 74 of the 199 samples taken. It is expected that when the meiofauna (collected on a 0.42 mm sieve) is surveyed, this number will increase by as much as ten-fold.

The distribution of the Harpacticoids seems to be patchy. Most samples contained one or two organisms, but as many as 45 were found in one sample. Types of species found were depth related. *Harpacticus superflexus* (*Harpacticidae*) was very common and predominated shallow water samples, where depths were between 20 and 55 meters. This species was by far the most abundant, comprising 51% of the entire sample. Occurring in a deeper depth range, between 45 and 1000 meters, were members of the Family Cerviniidae. This group consisted of five species and together comprise the second most abundant group (26% of the entire specimens examined). Also occurring within this range were members of the species *Paranannopus* (Cletodidae). *Paranannopus* was the third most abundant group comprising 10% of the entire organisms surveyed so far. Members of the Family Ectinosomidae were found in samples at depths up to 100 meters. Also occurring over a broad range were members of the Family Diosaccidae, which were found in samples at depths up to 300 meters. One species from the Family Laophonitdae is exclusively a deep water form occurring at depths of 750 and 900 meters.

Harpacticoid Species List from the WEBSEC-71 Macrofauna

Harpacticidae
- *Harpacticus superflexus* Willey, 1902

Cletodidae
- *Paranannopus* spp.
- *Argestes* spp.

Ectinosomidae
- *Bradya confluens* Lang 1936
- *Halectinosoma* spp.

Diosaccidae
- *Paramphiascopsis giesbrechti* (Sars 1906)
- *Paremphiascopsis longirostris* (Claus 1863)
- *Typhlamphiascus confusa* (T. Scott 1902)
- *Amphiascus* spp.
- *Paramphiscella* spp.
- Unidentified female

Harpacticoid Species List from the WEBSEC-71 Macrofauna (cont.)

Cerviniidae

Cervinia bradyi (Norman 1878)

Cervinia synartha Sars 1910

Cervinia spp.

2 Unidentified spp.

Laophontidae

Unidentified spp.

D. Meiofauna

Samples taken by 0.1 m^2 Smith-McIntyre grab during the WEBSEC-71 cruise aboard the USCGC GLACIER were separated into two fractions: The macro-infauna, those organisms caught on a 1.00 mm sieve; and the meiofauna, those organisms caught on a 0.42 mm sieve. All the macro-infauna samples have been sorted and many of the taxa identified Processing of the meiofauna fraction has begun with six samples from the Prudhoe Bay transect line.

From station WEBSEC71-29 (depth average 338 meters) three samples were sorted and identified. Of 482 animals found 02% were of the Polychaeta (Annelida), 21% were of the Crustacea (Arthropoda), and 15% were of the Mollusca. From station WEBSEC71-30 (Depth average 100 meters) three samples were processed, and 869 animals were found. Molluscs were in proportions comparable to the deeper station, comprising 12% of the 100 meter community. At both stations Pelecypoda was the dominant molluscan form, 96% at 338 meters and 92% at 100 meters. Unlike the 338 meter station, Crustaceans were the dominant taxa at 100 meters comprising 75% of the fauna compared to only 11% for the Polychaeta. Of the Crustacea at the 100 meter station 72% were of the order Ostracoda, compared to 28% of the deeper community. This increase in the Ostracoda from 28 individuals to 467 individuals, is largely responsible for the dominance of the Crustacea at 100 meters. Other important Crustacean groups are the Tanaidacea (12% of the Crustacean fauna at both stations), and the Harpacticoida (30% at 338 meters and 12% at 100 meters).

In comparing the effect of sieve size on the estimation of the standing stock of a community, it is not likely that the small (between 0.42 and 1.00 mm) organisms of the meiofauna will change estimates of the biomass appreciably. However drastic changes on the numbers of organisms can be expected. In comparison, 549 organisms were found in the macro-infauna of the 383 meter station, hence the increase in numbers is 88%, when the meiofauna is counted. Seven hundred and forty-two individuals were found in the macro-infauna at the 100 meter station, hence an increase of 120% in numbers at this site. When looking at the composition of the community, it is found that the 338 meter station is similar in the two fractions but the 100 meter community composition is different. Again, the Crustaceans are dominant, but comprise only 39% of the community compared to 75% in the meiofauna. Polychaetes and molluscs were more numerous in the macrofauna comprising 30% and 28% of the community respectively.

Roughly, one can estimate a doubling of overall numbers of organisms, with dramatic increases in numbers of certain groups where small size is characteristic. The micro-crustacea illustrate this point well. For example; there were only 379 Harpacticoids found in the entire macrofauna fraction, averaging about 2 per sample. In the six meiofauna samples reported herein, 107 Harpacticoids were found, averaging 18 per sample, a 900% increase. Other micro-crustacean groups demonstrate dramatic increases when the macrofaunal fraction is compared within the stations studied. The Ostracoda contained 300% more individuals in the meiofaunal fraction, and the population of the Tanaidacea increased by 200%.

This increase in numbers of small organisms is significant, when the energetics of the ecosystem is considered. It is well known that the smaller sized organisms have much more rapid energy turnover rates than large sized ones.

E. Environmental correlations

Introduction

A data matrix of 21 environmental parameters was constructed from 86 WEBSEC stations where benthic samples were also obtained in August and September of 1971. As the first step in determining the relationships between parameters, a multiple correlation analysis was performed, and scatter plots of every order independent pair combinations were computed on a Control Data Corporation CYBER 70 computer system at the Oregon State University Computer Center. The scatter plots act as (1) a visual check of how much the parameter pairs deviate from a linear model implicit in the correlation techniques and (2) to detect other strong functional relationships between parameters. The environmental parameters are treated here, but the relationship between them and benthic organisms is the desired goal.

The values for the parameters used were made on a multiple discipline cruise on the USS GLACIER. Stations were occupied for several to twenty-four hours while each group sampled in turn and during which time the ship drifted. The values used for the analysis were collected by other agencies and different sampling procedures which do not compliment each other or our specific needs. But since this was beyond our direct control we can only be conscious of limitations imposed by the sampling procedures and the spatial differences between samples at a station.

Sources and Methods

The original data that was used to construct the data matrix can be found in the U.S. Coast Guard, Oceanographic Report Series 373 No. 64. The bottle depth, temperature, salinity, oxygen, phosphate, nitrite, nitrate, and silicate are reported by Hufford et al. (1972). The actual values for these parameters can be found in the National Oceanographic Data Center (NODC) station data print outs and were selected in the following manner. The last observed depth of the hydrocast and any other parameter that was measured at that depth were considered the best approximation of the conditions that exist at the bottom. The deviation of the bottle depth from the uncorrected soundings ranged from 50 meters below the bottom (Station WBS 029) to 1729 meters above the bottom (Station WBS 057). These were the exception, usually the bottle depth was less than 30 to 20 percent of the bottom depth off the bottom. Both the bottle depth and the bottom depth, discussed later, were included in the analysis to determine how closely the two estimates correlated. At six stations multiple casts were taken and their averages entered into the data matrix. Parameters for which there were no values recorded were considered missing. Bottom depth and the remaining sediment parameters were reported by Barnes (1974) and entered into the data matrix rows with their respective stations. Missing data points were assumed whenever values for any parameter were not included at that station.

To handle correlation analysis a computer program was developed which considered every order independent pair of parameters and printed a scatter plot of the two parameters being condidered, the correlation, sample size (N), and interaction term (uncorrected sums of products). In addition to this, both parameters' minimum and maximum values were printed along with their respective sum, sum of the squares, mean, standard deviation, and number of missing values. A correlation matrix, a matrix of sample sizes, and a despersion (variance-covariance) matrix were then printed in matrix form. When two parameters are to be processed their respective values are checked to verify that neither is a missing value. If either value is missing neither value is included into any of the statistics.

Results

For any correlation analysis there always is the decision of which values to consider significant. In a strict statistical sense the significance of a correlation can be tested when the sample size is known, but this generally leads to considering a larger number of correlations than is practical so a higher arbitrary significance level is chosen. For our work, the correlations whose absolute value is greater than 0.70 will be considered significant. The data matrix has two depth estimates that were derived independently. It is comforting to see that the two estimates of bottom depth have the highest correlation (0.939). Salinity also has a significant correlation with both the bottle depth (0.772) and bottom depth (0.714). The relationship of depth and physical characteristics of the benthic environment is one of the first relationships to examine. Temperature has a very poor correlation to bottle depth (0.020) probably due to the high variability found at the shallower stations that overwhelms the linear model, as well as the fact that the vertical temperature structure is markedly influenced by the three major water masses. The scatter plots show that salinity and oxygen have a strong functional relationship with depth, but since this function is not linear the correlations are not exceedingly high although salinity has a correlation above our significance level. Both salinity and oxygen are relatively constant below 500 meters. The correlation between salinity and oxygen is one of the largest magnitudes (-0.852) and is due to the strong depth dependence of each parameter. Nitrate correlates well with salinity (.845) and oxygen (-.808) but unlike the latter two the scatter plot of nitrate and depth is not very well defined and more variable. Other high correlations can be found between bottom depth and salinity (0.714), which is very similar to the correlation with bottle depth descussed above. Percent gravel is positively correlated with mean phi size (0.854) and the sorting parameter (0.741). Percent sand is negatively correlated to percent silt (-0.714), percent clay (-0.834) and positively correlated with skewness (0.727), while percent clay is negatively correlated with skew parameter (-0.728). The last two high correlations are between zinc concentrations and percent sand (0.748) and zinc and percent clay (.839). The majority of correlations fall below the significance level and unless mentioned above most parameter pairs scatter plots do not show any obvious functional relationships.

Discussion

One of the purposes of this analysis was to determine which parameters could be legitimately fitted to the linear model using correlation, linear regressions, and the majority of the multivariate techniques. What we have found, first of all, is that only a small number of correlations exceed our arbitrary significance level. A total of 210 nontrivial correlations were calculated and only 14 were significant. If we lower acceptance criterion to an absolute value of 0.50 or greater still only 20 percent have significant correlations. In general very few parameter pairs have decernible functional relationships. An examination of the scatter plots and correlations show variations with depth, specifically oxygen, salinity and temperature, are not linear and it would be ill advised to use any statistical method that assumes a linear response of these parameters to a change in depth. Two options are open to avoid the above problem. One would be to transform the depth in a way that would increase the linear response with depth, while the other procedure would be to separate the data into two groups by depth so that the response over the depth interval of the group is more or less linear. All the parameters form an incomplete picture from the biological point of view until the species distributions can be associated with the parameters. The scatter plots and multiple correlation analysis does allow us to gegin to synthesize what information is avialable so that it can be more intelligently combined with species information in the next step in processing the data from the 1971 WEBSEC cruise.

Equations Used

Where

x_i is the ith element of a parameter vector

y_i is the ith element of the first of two parameter vectors

z_i is the ith element of the second of two parameter vectors

N is the sample size

$$\text{sum} = \sum_{i=1}^{N} x_i$$

$$\text{sum of the squares} = \sum_{i=1}^{N} x_i^2$$

$$\text{mean} = \text{sum}/N = \bar{x}$$

$$\text{standard deviation} = \sqrt{\frac{\sum_{i=1}^{N} (x_i - \text{mean})^2}{N-1}} = \sigma_x$$

$$\text{interaction} = \sum_{i=1}^{N} y_i z_i$$

$$\text{covariance} = \frac{\sum_{i=1}^{N} (y_i - \bar{y})(z_i - \bar{z})}{N-1}$$

$$\text{correlation} = \frac{\text{covariance}}{\sigma_y \sigma_z}$$

ENVIRONMENTAL DATA FOR 1971 WEBSEC CRUISE

CORRELATION MATRIX

	DEPTH	TEMP	SAL	O2	PO4	NO2	NO3	SI
DEPTH	1.00000	.196506E-01	.771827	-.572815	-.198892	-.286293E-01	.668253	-.202421E-01
TEMP		1.00000	-.113879	.695444E-01	-.143988	.481531E-01	-.142682	-.250821
SAL			1.00000	-.852374	.159529	.612759E-01	.844879	.326953
O2				1.00000	-.304569	-.216048	-.807560	-.437941
PO4					1.00000	.345414	.273469	.600820
NO2						1.00000	.140938	.308763
NO3							1.00000	.367422
SI								1.00000

CORRELATION MATRIX

	BOT DEPTH	% GRAVEL	% SAND	% SILT	% CLAY	MEAN PHI	SORT	SKEW
DEPTH	.938703	-.175977	-.465646	.753818E-01	.600393	-.137549	-.392176	-.422239
TEMP	-.106646E-01	-.167653	-.133363	.155210	.136651	-.518565E-01	-.198134	-.497535E-02
SAL	.714153	-.259876	-.504122	.218054	.581803	-.209170	-.453538	-.345094
O2	-.576542	.182647	.326945	-.129756	-.394384	.159631	.295628	.195057
PO4	-.145828	-.901810E-01	-.521746E-01	.237191	-.770870E-01	-.557786E-01	-.997752E-01	.190271
NO2	.737118E-01	-.222468	-.133044	.252930	.913725E-01	-.155068	-.105162	.208587E-03
NO3	.641173	-.202509	-.382251	.208476	.410293	-.168027	-.390452	-.185061
SI	.867552E-02	-.113525	.596055E-01	.148854	-.117143	-.639142E-01	-.126505	.244514
BOT DEPTH	1.00000	-.166403	-.432159	.114882	.543094	-.130515	-.357008	-.378628
%GRAVEL		1.00000	.291372	-.593169	-.532087	.854470	.740918	.140266E-01
% SAND			1.00000	-.713503	-.834133	.339778	.506242	.726650
% SILT				1.00000	.450877	-.551784	-.559533	-.211113
% CLAY					1.00000	-.528410	-.665533	-.728277
MEAN PHI						1.00000	.479597	.180583
SORT							1.00000	.117280
SKEW								1.00000

CORRELATION MATRIX

	MERCURY	COPPER	LEAD	ZINC	ARSNIC
DEPTH	.163546	.262215	.246101	.525280	.267500
TEMP	-.153569	-.413518E-01	-.105690	.827794E-01	.110754
SAL	.266007	.275496	.273226	.559294	.693352E-01
O2	-.129455	-.133307	-.195382	-.304099	.112068E-01
PO4	-.188323	.228985E-01	-.426768E-01	.126475	-.143733
NO2	-.367556	.191266E-01	-.284677	.132988	-.523729E-01
NO3	.154443	.210325	.123244	.353614	-.855285E-01
SI	-.172870	-.152871	-.330621E-01	.169411	-.561462E-01
BOT DEPTH	.351209E-01	.259563	.226315	.489080	.235833
% GRAVEL	.124250	-.222973	-.887789E-01	-.533313	-.348908
% SAND	-.541069E-01	-.683636	-.353307	-.748200	-.173913E-01
% SILT	-.157141	.449275	.220438E-01	.536935	.222839
% CLAY	.125999	.628193	.480158	.839138	.712106E-01
MEAN PHI	.371252E-01	-.316393	-.163846	-.495472	-.247331
SORT	.461419E-01	-.322776	-.220223	-.649596	-.237526
SKEW	-.514452E-01	-.629963	-.413037	-.545610	.472876E-01
MERCURY	1.00000	.156446	.772114E-01	.128662	-.867952E-01
COPPER		1.00000	.305981	.532046	.695874E-01
LEAD			1.00000	.509105	.202842
ZINC				1.00000	.153310
ARSNIC					1.00000

ENVIRONMENTAL DATA FOR 1971 WEBSEC CRUISE

DISPERSION MATRIX

	DEPTH	TEMP	SAL	O2	PO4	NO2	NO3	SI
DEPTH	155608.	9.14804	447.657	-170.263	-30.0758	-1.88952	1093.76	-60.9650
TEMP		1.35511	-.192830	.659361E-01	-.635213E-01	.102192E-01	-.741541	-2.15438
SAL			2.07107	-.914332	.872432E-01	.148737E-01	5.08587	3.55440
O2				.635829	-.100111	-.312800E-01	-2.87923	-2.86973
PO4					.156079	.245963E-01	.480729	1.84562
NO2						.310736E-01	.108607	.440014
NO3							19.1105	12.7530
SI								60.8673

DISPERSION MATRIX

	BOT DEPTH	% GRAVEL	% SAND	% SILT	% CLAY	MEAN PHI	SORT	SKEW
DEPTH	204145.	-556.921	-2926.64	315.141	3156.49	-4304.81	-158.253	-5.47545
TEMP	-6.89693	-1.69784	-2.64693	2.01886	2.29615	-6.01853	-.216281	-.210074E-03
SAL	576.283	-3.13121	-12.1796	3.49105	11.7900	-29.1829	-.707087	-.173676E-01
O2	-254.682	1.26258	4.29287	-1.15018	-4.38450	12.6427	.255595	.541592E-02
PO4	-32.3792	-.312247	-.326342	1.04472	-.426339	-2.25369	-.445222E-01	.249193E-02
NO2	7.18211	-.357477	-.413918	.527271	.238271	-2.86412	-.215326E-01	.135747E-05
NO3	1549.05	-7.51206	-27.2957	9.97509	24.5570	-71.2318	-1.83498	-.277735E-01
SI	38.7075	-8.02207	7.47538	13.0300	-12.9620	-51.7551	-1.13116	.650607E-01
BOT DEPTH	240664.	-701.862	-3347.52	591.870	3446.73	-5210.39	-195.360	-5.85427
% GRAVEL		84.2250	45.4683	-61.7546	-67.8553	689.328	8.19592	.436898E-02
% SAND			287.244	-136.315	-196.309	503.009	10.1816	.416845
% SILT				127.070	70.5764	-543.309	-7.50939	-.805774E-01
% CLAY					192.823	-640.921	-10.7425	-.341949
MEAN PHI						7629.75	50.1186	.533570
SORT							1.41572	.446731E-02
SKEW								.113170E-02

DISPERSION MATRIX

	MERCURY	COPPER	LEAD	ZINC	ARSNIC
DEPTH	1.21484	641.228	243.728	3970.26	455.627
TEMP	-.544545E-02	-.333373	-.493586	2.87763	.880081
SAL	.992267E-02	2.61652	1.38626	20.9707	.589700
O2	-.283311E-02	-.718836	-.570819	-6.27528	.549404E-01
PO4	-.211150E-02	.611594E-01	-.636702E-01	1.35017	-.361458
NO2	-.164607E-02	.236607E-01	-.170111	.570664	-.522425E-01
NO3	.183217E-01	6.02232	1.95083	40.1950	-2.25997
SI	-.367622E-01	-8.29545	-.940244	34.4616	-2.61890
BOT DEPTH	.274447	772.462	250.984	3939.04	427.989
% GRAVEL	.288290E-01	-12.3045	-3.08730	-137.955	-19.9429
% SAND	-.234363E-01	-72.4660	-21.2402	-331.084	-1.75568
% SILT	-.474095E-01	31.7755	.923065	165.493	15.6690
% CLAY	.443661E-01	53.2060	23.4661	301.859	5.84395
MEAN PHI	.829730E-01	-176.985	-50.8247	-1131.28	-128.832
SORT	.149667E-02	-2.37232	-.972107	-21.2426	-1.70276
SKEW	-.443753E-04	-.124319	-.495484E-01	-.432636	.954378E-02
MERCURY	.722837E-03	.271333E-01	.792067E-02	.958534E-01	-.145673E-01
COPPER		39.7838	7.63881	96.6584	3.46873
LEAD			14.5587	53.8276	4.83149
ZINC				767.848	26.5200
ARSNIC					38.9637

ENVIRONMENTAL DATA FOR 1971 WEBSEC CRUISE

N MATRIX

	DEPTH	TEMP	SAL	O2	PO4	NO2	NO3	SI
DEPTH	66.0000	64.0000	63.0000	58.0000	56.0000	59.0000	59.0000	55.0000
TEMP		64.0000	61.0000	56.0000	54.0000	57.0000	57.0000	53.0000
SAL			63.0000	58.0000	56.0000	59.0000	59.0000	55.0000
O2				58.0000	53.0000	56.0000	56.0000	52.0000
PO4					56.0000	55.0000	55.0000	55.0000
NO2						59.0000	59.0000	54.0000
NO3							59.0000	54.0000
SI								55.0000

N MATRIX

	BOT DEPTH	% GRAVEL	% SAND	% SILT	% CLAY	MEAN PHI	SORT	SKEW
DEPTH	64.0000	57.0000	58.0000	58.0000	58.0000	58.0000	58.0000	57.0000
TEMP	62.0000	55.0000	56.0000	56.0000	56.0000	56.0000	56.0000	55.0000
SAL	61.0000	56.0000	57.0000	57.0000	57.0000	57.0000	57.0000	56.0000
O2	56.0000	51.0000	52.0000	52.0000	52.0000	52.0000	52.0000	51.0000
PO4	54.0000	49.0000	50.0000	50.0000	50.0000	50.0000	50.0000	49.0000
NO2	57.0000	52.0000	53.0000	53.0000	53.0000	53.0000	53.0000	52.0000
NO3	57.0000	52.0000	53.0000	53.0000	53.0000	53.0000	53.0000	52.0000
SI	53.0000	48.0000	49.0000	49.0000	49.0000	49.0000	49.0000	48.0000
BOT DEPTH	84.0000	77.0000	78.0000	78.0000	78.0000	78.0000	77.0000	77.0000
% GRAVEL		77.0000	77.0000	77.0000	77.0000	77.0000	76.0000	76.0000
% SAND			78.0000	78.0000	78.0000	78.0000	77.0000	77.0000
% SILT				78.0000	78.0000	78.0000	77.0000	77.0000
% CLAY					78.0000	78.0000	77.0000	77.0000
MEAN PHI						78.0000	77.0000	77.0000
SORT							77.0000	76.0000
SKEW								77.0000

N MATRIX

	MERCURY	COPPER	LEAD	ZINC	ARSNIC
DEPTH	47.0000	53.0000	47.0000	47.0000	47.0000
TEMP	45.0000	51.0000	45.0000	45.0000	45.0000
SAL	46.0000	52.0000	46.0000	46.0000	46.0000
O2	43.0000	47.0000	43.0000	43.0000	43.0000
PO4	42.0000	46.0000	42.0000	42.0000	42.0000
NO2	43.0000	49.0000	43.0000	43.0000	43.0000
NO3	43.0000	49.0000	43.0000	43.0000	43.0000
SI	41.0000	45.0000	41.0000	41.0000	41.0000
BOT DEPTH	65.0000	72.0000	65.0000	65.0000	65.0000
% GRAVEL	63.0000	70.0000	63.0000	63.0000	63.0000
% SAND	64.0000	71.0000	64.0000	64.0000	64.0000
% SILT	64.0000	71.0000	64.0000	64.0000	64.0000
% CLAY	64.0000	71.0000	64.0000	64.0000	64.0000
MEAN PHI	64.0000	71.0000	64.0000	64.0000	64.0000
SORT	63.0000	70.0000	63.0000	63.0000	63.0000
SKEW	63.0000	70.0000	63.0000	63.0000	63.0000
MERCURY	65.0000	59.0000	65.0000	65.0000	65.0000
COPPER		72.0000	59.0000	59.0000	59.0000
LEAD			65.0000	65.0000	65.0000
ZINC				65.0000	65.0000
ARSNIC					65.0000

F. Bibliography of benthos in the Arctic Basin

The following bibliography demonstrates the progress toward a complete annotated bibliography of benthic research in the north polar basin. The literature search was extended to the entire basin, as the organisms are generally found throughout the region. The usefulness of the bibliography will thus be greatly extended.

In final form, the references will be ordered by zoogeographic area. Comments, when appropriate, and abstracts will be included. Foreign lanquage abstracts translated into English will be incorporated whenever available.

Oceanic Abstracts, Biological Abstracts, and the National Technical Information Service were searched for references through OASIS and the Arctic Bibliography was also searched. Further searches for past and recent references will continue to complete the bibliography.

Abbott, D.P. 1961. The Ascidians of Point Barrow, Alaska; Part 1. Suborder Phlebobranchia, Enterogona. Pacific Science 15(1):137-143.

Presents data on collections of ascidians made in this north coast area. Eight species of the order Enterogona are described and details of anatomy and habitat are tabulated. (Arctic Biblio.).

Abbott, D.P. 1966. The Ascidians. *In:* Wilimovsky, N.J. and J.N. Wolfe (eds.). Environment of the Cape Thompson Region, Alaska. United States Atomic Energy Commission, Division of Technical Information. p. 839-841.

Lists 23 species of ascidians and tabulates these by station collected, with a brief introduction. (Arctic Biblio.).

Adams, A. 1855. Descriptions of Two New Genera and Several New Species of Mollusca from the Collections of Hugh Cuming, Esq. Zoological Society of London. Proceedings. 23:119-124.

Contains descriptions of 21 molluscs (19 described as new) from various seas. *Bela arctica*, native to arctic seas, is included. (Arctic Biblio.).

Adey, W.H. 1970. The Effects of Light and Temperature on Growth Rates in Boreal-Subarctic Crustose Corallines. Journal Phycology 6(3):269-276.

Adey, W.H. 1971 The Sublittoral Distribution of Crustose Corallines on the Norwegian Coast. Sarsia 46:41-58.

Agatep, C.P. 1967. Holothurians of the Genera *Elpidia* and *Kolga* from the Canadian Basin of the Arctic Ocean. Southern California Academy of Sciences. Bulletin. 66(2):135-141.

Describes two species of elasipodid holothurians, *Elpidia glacialis glacialis* and *Kolga hyalina*, specimens of which were collected by Menzie's trawl from drifting station ARLISS II. Drawings and taxonomic notes are included. (Arctic Biblio.).

Akademiia Nauk SSSR. 1955. Atlas Bespozvonochnykh Dal'nevostochnykh Morei SSSR. (Atlas of Invertebrates from the Far Eastern Seas of the U.S.S.R.). Izd-vo Akademii Nauk SSSR, Moskva-Leningrad. 243p.

Contains a general part (p. 5-21) dealing with the history of faunistic research of these seas; their physioco-geographical characteristics; nature and type composition of fauna; fauna of the various marine zones (littoral, continental shelf, etc.). This is followed by an account and description of types, classes, etc., down to and including species (p. 22-229) with notes on biology and ecology, distribution, economic value, etc. The "Atlas" proper consists of 66 plates at the end of the book with illustrations of some 600 species described in the text. An alphabetic index (p. 230-40) of both Russian and Latin names in included. Some 30 specialists (listed) participated in the study under the general editorship of P.V. Ushakov. (Arctic Biblio.).

Akademiia Nau, SSSR. 1956. Konferentsiia po Issledovaniiu Fauny Dalnevostovhnykh Morei. 3rd. Trudy. Moskva, Leningrad, Izd-vo Akademii Nauk SSSR, 1956. (Transactions of the Third Conference on Fauna of the Far Eastern Seas, 1954). Akademiia nauk SSSR. Zoologicheskii Institut. Trudy Problemnykh i Tematicheskikh Soveshchanii. 6.

Contains 27 of the 40 papers presented (some in brief, to be pub. in full elsewhere); several dealing with northern forms or areas. (Arctic Biblio.). See: Ivanov, A.V. 1956. Lomakina, N.B. 1956. Skarlato, O.A. 1956; Shchedrina, L.A. 1956; Zenkevich, L.A. 1956. (Arctic Biblio.).

Aleksandrov, A.I. 1915. Spisok Stantsii i Sborov, Proizvendennykh v Kovdenskom Zalivie s 24 Iiunia po 5 Avgusta 1912 Goda. (List of Stations and Specimens Collected in Kovda Bay from June 24 to Aug.5, 1912. Akademiia Nauk SSSR. Zoologicheskii Muzei. Ezhegodnik. 19(4):xxix-xlvii.

Contains a general description of the geography and natural history of Kovda Sound (about 66°40' N 33°E) Kandalashskiy Gulf, White Sea; and a list of 84 stations established there in 1912, with their locations, depth, bottom samples and names of marine plants and animals collected on each station. (Arctic Biblio.).

Allen, J.A. 1959. On the Biology of Pandalus borealis Kroyer, with Reference to a Population off the Northumberland Coast. Marine Biological Association of the United Kingdom. Journal 38(1):189-220.

Andersen, M. 1971. Echinodermata from Joergen Broenlund Fjord, North Greenland. Meddeleser om Groenland 184(12):18.

Anderson, G.J. 1962. Distribution Patterns of Recent Foraminifera of the Bering Sea. University of Southern California, Dept. Biology. 1-8.

Anderson, A. 1974. Musculature and Mucle Scars in the Cytherid Ostracode Cytheridea papillosa (Bosquet). Zoologica Scripta 3(2):83-90.

Andriiashev, A.P. 1944. Preryvistoe Rasprostranenie Morskoi Fauny v Severnon Polusharii. (Discontinuous Distribution in the Northern Hemisphere). Priroda 1:44-52.

Contains a study of faunistic relations of northern sections of the Pacific and Atlantic Oceans as typified by disjoint distribution of the common herring (Culpea harengus), some other fishes (Gadus morrhua, Salmo, Hippoglossus hippoglossus, etc), some Decapoda (Lithodes maja) and many other marine organisms. A scheme of the development of amphiboreal areas of marine fauna in the Northern Hemisphere is represented (sketch maps 8-11). It is concluded that the contemporary disjoint amphiboreal areas were formed in the Pleiocene epoch through Bering Strait. The migration of the fauna was from the Pacific into Atlantic Ocean along the northern coast of North America. (Arctic Biblio.).

Androsova, V.P. 1962. Foraminifery Donnykh Otlozhenii Chasti Poliarnogo Basseina. (Foraminifera from Bottom Sediments of the Western Polar Basin.). Moskva. Vsesoiunnyi Nauchno-issledovatelskii Institut Morskogo Rybnog Khoziaistva i Okeanografii. Trudy. 46:102-117.

Study on material from the upper 20 cm of sediments, collected in 1937-1938 by the North Pole-1 drifting station, with a general introduction by T. Gorshkova. Location and horizon as well as nature of bottom, are included in the records of species found. A poverty of species is noted in all samples and horizons with fam. Globigerinidae predominating. Most of the species were carried in by the Atlantic current. (Arctic Biblio.).

Angel, M.V. 1968. Cochoecia skogsbergi (Iles) a Halocyprid Ostracod New to the Norwegian Sea. Sarsia 33:1-5.

Annenkova, N.P. 1922. Apercu de la Famille des Chloraemidae (Annelida Polychaeta) de la Collection du Musee Zoologique de l'Academie des Sciences de Russie. [A revision of the Family Chloramedae (Annelida Polychaeta) from the Collection of the Zooligical Museum of the Academy of Sciences of the U.S.S.R.]. Akademiia Nauk SSSR. Comptes Rendus. Doklady. 1922A:38-40.

Contains a list of 11 species of marine polychaetous worms inhabiting all seas along the northern coast of the USSR, Bering Sea and Okhotsk Sea; diagnoses of Brada ochotensis, B. sachalina, B. nuda and B. arctica n. spp. are included. (Arctic Biblio.).

Annenkova, N.P. 1923. Rod Brada. (The Genus Brada) In: Vserossiiskii s"ezd Zoologov, Anatomov i Gistologov, 1, Petrograd, 1922. Trudy. p.15.

Contains a critical revision of polychaetous genus Brada, with Russsian diagnoses of four new species: B. arctica from Novo-Sibirskeye Islands waters, B.nuda native to Beaufort Sea and B. ochotensis and B. sachalinica found in southern part of Sea of Okhotsk. (Arctic Biblio.).

Annenkova, N.P. 1924. Neus uber die verbreitung einiger Arten der Polychaeten. (New Data on the Distribution of Some Species of Polychaeta). Akademiia Nauk SSSR. Comptes Rendus. Doklady. Ser. A:125-128.

Contains descriptions of fi e new species of marine polychaetous worms including Terebella hesslei (White Sea), Polycirrus eous (Okhotsk Sea) and Flabelligera similis (Beaufort Sea); together with additional data on distribution of other polychaetes occurring in all seas along the northern coast of the USSR, and in Bering and Okhotsk Seas. (Arctic Biblio.).

Annenkova, N.P. 1925. Beitrage zur Kenntniss der Polychaeten-Fauna Russlands, I. (Contributions to the Knowledge of the Polychaeta Fauna of Russia, I.) Akademiia Nauk SSSR. Comptes Rendus. Doklady. Ser. A:125-126.

Descriptive notes and data on distribution of marine polychaetous worms, Pallasina pennata from Okhotsk Sea and Sternapsis fossor, native to Laptev Sea (77°20'N.) and Bering Sea. (Arctic Biblio.).

Annenkova, N.P. 1925. Neues uber die verbreitung einiger Arten der Polychaeten nebst Beschreibung Neuer Arten. (New Data on the Distribution of Some Species of Polychaeta and Description of New Species. Akademiia Nauk SSSR. Comptes Rendus. Doklady. Ser. A:26-28.

Pista sachsi n. sp. and Neoamphitrite figulus pacifica n. subsp. are described from the specimens obtained in the Okhotsk Sea, and additional distributional data are given on four other species, occuring in the seas along the northern coast of the USSR. (Arctic Biblio.).

Annenkova, N.P. 1926. Zur Anatomie einer Kiemenlosen Terebelliden-Art (Terebella hesslei mihi). [On the Anatomy of a Terebella Species without Gills (T. hesslei Annenkova)]. Zoologischer Anzeiger 68(5-6):131-136.

Contains a study of the external anatomy and morphology of a marine polychaetous worm, native to the White Sea, previously described by the author as Terebella hesslei n. sp., in her paper Neues uber die Verbreitung einiger Arten der Polychaeten, 1924, q.v. (Arctic Biblio.).

Annenkova, N.P. 1929. Beitrage zur Kenntnis der Polychaeten-Fauna der U.S.S.R. I. Fam. Pectinariidae Quatrefages (Amphictenidae Malmgren) und Ampharetidae Malmgren. [Contributions to the Knowledge of the Polychaete Fauna of the U.S.S.R. I. Fam. Pectinariidae Quatrefages (Amphictenidae Malmgren) and Ampharetidae Malmgren.] Akademiia Nauk SSSR. Zoologicheskii Muzei. Ezhegldnik. 30(3):477-502.

Contains a study of the families Pectinariidae and Ampharetidae of polychaetous marine worms of Russia with a systematic list of 25 species, including descriptions of six new species, critical notes and data on distribution in the waters along the northern coast of European and Asiatic Russia in Bering and Okhotsk Sea, with lists of localities. (Arctic Biblio.).

Annenkova, N.P. 1934. Paraonidae Dal'nevostochnykh Morei SSSR. Meeres-Paraoniden in Fernen Osten der USSR. (Paraonidae of the Far Eastern Seas of the USSR.). Akademiia Nauk SSSR. Doklady. Nov. Ser. 3(8-9):656-661.

Contains Russian and German descriptions of three new species of annelid worms of the fam. Paraonidae, including Paraonis ivanovi n. sp. obtained in northern Bering Sea and Aricidea antennata n. sp. native to Chukchi (71°19'N. 178°12'W.) and Okhotsk Seas. Summary in German. (Arctic Biblio.).

Annenkova, N.P. 1952. Novye vidy Mnogoshchetinkovykh Chervei (Polychaeta). (New Species of Polychaete worms). Akademiia Nauk SSSR. Zoologicheskii Institut. Trudy. 12:148-154.

Descriptions of eight new species of polychaetes native to Greenland Sea, all arctic seas along the northern coast of USSR and to Okhotsk Sea (Arctic Biblio.).

Ashworth, J.H. 1910. The Annelids of the Family Arenicolidae of North and South America; Including an Account of *Arenicola galclalis* Murdoch. U.S. National Museum. Proceedings. 39(1772):1-32.

Contains a key, followed by descriptions of the genus Arenicola and five species. *A. marina* (Labrador), *A. claparedii* (Aleutian Islands), and *A. glacialis* (Point Barrow) are included. (Arctic Biblio.).

Augener, H. 1928. Die Polychaeten von Sptizbergen. Fauna Arctica. 5.

Aurivillius, C.W.S. 1887. Ofversigt Ofver de af Vega-Expeditionen Insamlade Arktiska Hafsmollusker. II. Placophora och Gastropoda. (Survey of Arctic Marine Molluscs Collected by the Vega Expedition. II. Placophora and Gastropoda.) *In*: Nordenskiold, N.A.E. Vega-Expeditionens Vetenskapliga Iakttagelser. 4:311-383.

Contains list with synonymy, localities and remarks upon the specimens of one hundred twenty-one (including nine new) species from Kara, Laptev, East Siberian and Chukchi Seas, Bering Strait and Bering Sea; descriptions of new species and new varieties and a list of stations. (Arctic Biblio.).

Baker, J.H. and J.W. Wong. 1968. *Paradoxostoma rostratum* Sars (Ostracoda, Podocopida) as a Commensal on the Arctic Gammarid Amphipods *Gammaracanthus Loricatus* (Sabine) and *Gammarus wilkitzkii* Birula. Crustaceana 14(3):307-311.

Twenty-sex genera of podocopid ostracods are now known to be commensal. Of these 26 genera, three are members of the Paradoxostomatidae (McKenzie, 1967). These three genera are Aspidoconcha De Vos, 1953; Laocoonella De Vos and Stock, 1956; and Redekea De Vos. 1953. All of the commensal Ostracoda cling to the appendages of other crustaceans to obtain food from currents of water. Since species of Paradoxostoma such the juices of plants (Morkhoven, 1962), this is believed to be the first report on commensalism within the genus. (Author).

Balakshin, L.L. 1957. Vysokoshirotnaia Okeanograficheskaia Ekspeditsiia na Ledoreze "F. Litke" 1955 g. (High Latitude Oceanographic Expedition on the Ice-Breaker *F. Litke* in 1955. Problemy Arktiki 1:123-135.

This expedition, sponsored by the Arctic Institute and headed by the author, left Murmansk on Aug. 24, sailed to Dikson Island, then north across the Kara Sea and explored the Arctic Basin north of Franz Joseph Land. The vessel reached 83°21'N. 53°11'E. on Sept. 11, the farthest north for a freesailing ship, refuelled twice at Barentsburg, made two trips in area north from Spitsbergen, and on Oct. 28th returned home. Taking advantage of favorable ice conditions, the expedition studied the hydrology, chemistry, biology and geology of the little known area of the Arctic Basin, 80-83°N. 15-65°E; 57 deep water stations were made, 84 bottom samples, including a 412 cm. core, were taken, 27 trawls were made, including 12 in deep water. A depth of 5449 m. was found at 82°23'N. 19°31'E., the deepest spot so far known. The great number of polar bears (50-60) on edge of the ice pack is noted. Route of expedition is shown on map (p. 124). (Arctic Biblio.).

Banner, A.H. 1947. A Taxonomic Study of the Mysidacea and Euphausiacea (Crustacea) of the Northeastern Pacific, Part I. Royal Canadian Institute. Transactions. 26:345-399.

Includes that part of the North Pacific Ocean north of 45° N and east of 180°, and the adjacent sections of the Bering Sea and Arctic Ocean. Contains Mysidacea from family Lophogastridae through tribe Erythropini. In parts I and II, to the sixteen species of mysids previously reported, sixteen more are added here, seven species and one genus of which are described as new. (Arctic Biblio.).

Banner, A.H. 1948. A taxonomic Study of the Mysidacea and Euphausiacea (Crustacea) of the Northeastern Pacific, Part II. Royal Canadian Institute. Transactions. 27:65-125.

Includes that part of the North Pacific Ocean north of 45° N and east of 180°, and the adjacent sections of the Bering Sea and the Arctic Ocean. Contains Mysidacea from tribe Mysini through subfamily Mysidellinae. In parts I and II, to the sixteen species of mysids previously reported, sixteen more are added here, seven species and one genus of which are described as new. (Arctic Biblio.).

Baranova, Z.I. 1964. Iglokozhie (Echinodermata), Sobrannye Ekspeditsiei na l/r "F. Litke" v 1955 g. (Echinoderms Collected by the F. Litke Expedition in 1955). Leningrad. Arkticheskee i Antarkticheskii n. -issl. Inst. Trudy. 259:355-372.

Reports of material collected north of Franz Joseph Land and Spitzbergen, half of it from depth of more than 1000m. Thirty-three species are listed with notes on location and depth of find, morphology, vertical and geographic distribution. Some forms are described in detail. A general and zoogeographic characteristic of the material is included. (Arctic Biblio.).

Barr, L. 1970. Alaska's Fishery Resources, the Shrimps. U.S. Fish Wildlife Serv., Fisheries Leaflet 631:1-10.

Beliaev, G.M. 1950. Normal'nye Pokazateli Osmoticheskogo Davleniia Polostnoi Zhidkosti Bezpozvonochnykh Barentsova Moria. (Normal Indicators of the Osmotic Pressure of Body Liquid of the Invertebrates of the Barents Sea.) Akademiia Nauk SSSR. Doklady. Nov. Seriia 71(3):569-572.

An investigation of the osmotic concentration of the body liquid of 48 species of invertebrates was carried out on the Murman Biological Station in 1947. It shows that the view of a so-called osmotic balance of pressure of the body liquid with that of the sea water is not valid. Only two species out of 48 were found to be isotonic with sea water; the rest have either higher or lower osmotic concentration of the body liquid; some groups of crustaceans are hypotonic, the rest of the invertebrates are hypertonic. (Arctic Biblio.).

Bergstrom, E. 1914. Zur Systematik der Polychaeten-familie der Phyllodociden. (On Systematics of the Polychaeta Family Phyllodocidae). Zoologiska Bidrag Fran Uppsala 3:37-224.

Contains notes on the systematic position of this family of marien polychaete worms together with its diagnosis and systematic characteristics, p. 38-76; a discussion of the genera, with a key, p. 76-116, a discussion of the species with keys and diagnoses of 51 species from various waters (11 genera and 3 species described as new), list of localities and data on total distribution; a bibliography (200 items). Includes species distributed along the northern coast of Europe and Asia, in Greenland Waters and Bering Sea. (Arctic Biblio.).

Berkeley, E. and C. Berkeley. 1942. North Pacific Polychaeta, Chiefly from the West Coast of Vancouver Island, Alaska, and Bering Sea. Canadian Journal of Research. 20(D):183-208.

List, with localities, of one hundred seventy-five species, of which about forty-six occur in the Gulf of Alaska, Aleutian waters, Bering Sea and Chukchi Sea. (Arctic Biblio.)

Berkeley, E. and C. Berkeley. 1956. On a Collection of Polychaetous Annelids from Northern Banks Island, from the South Beaufort Sea, and from Northwest Alaska, Together with Some new Records from the East Coast of Canada. Canada. Fisheries Research Board. Journal. 13(2):233-246.

Contains notes on 37 species collected mostly by Dr. Ferris Neave from the Northwind in 1954 off Banks Island and off Icy Cape, Alaska; 27 are new for the area. Six species collected off Nova Scotia and New Brunswick are included. Extent of Northern American and European distribution is given. (Arctic Biblio.)

Berkeley, E. and C. Berkeley. 1958. Polychaeta of the Western Canadian Arctic. Canada. Fisheries Research Board. Journal. 15(5):801-804.

Berrill, M. 1970. Benthic Life in the Fjords of Norway. Natural History 79(9): 52-59.

Boone, P.O. 1920. Isopoda of the Canadian Arctic and Adjoining Regions. Canadian Arctic Expedition, 1913-1918. Report. Vol. 7: Crustacea, Pt.D. King's Printer, Ottawa. 40 p.

List, with comprehensive synonymy and circumpolar distribution, of thirty-three species of marine isopods from the Bering Sea waters of Alaska across the Canadain arctic coast to Davis Strait at the 60°N. lat. parallel; based on the collections of this expedition and on other sources. (Arctic Biblio.)

Bowman, T.E. and R.B. Manning. 1972. Two Arctic Bathyal Crustaceans, the Shrimp Bythocaris cayonesus New Species, and the Amphipod Eurythenes gryllus, with in situ Photographs from Ice Island T-3. Crustaceana 23(2):187-201.

Brahm, C. and S.R. Geiger. 1966. Additional Records of the Scyphozoan Stephanoscyphus simplex Kirkpatrick. Southern California Academy of Sciences. Bulletin. 65(1):47-52.

Reports wide distribution of this coelenterate species; of 32 bottom samples from the Arctic Ocean, Stephanoscyphus simplex was present in fifteen. These new records are from collections made from ARLIS I, ARLIS II, and the icebreaker USNS Burton Island, at depths of 110-1440m. This data suggests that S. simplex is found at shallower depths in the Arctic Ocean than elsewhere. (Artic Biblio.)

Brahm, C. and J.L. Mohr. 1962. Report of a Scyphozoan Stephanoscyphus simplex Kirkpatrick from the Arctic Ocean. Southern California Academy of Sciences. Bulletin 61(1):64

A single specimen from a depth of 1540 m. at 71°45'N 144°55'W in the Beaufort Sea, and a colony from a depth of 471m at 74°54'N 165°48'W in the Chukchi Sea, extend the distribution of this species into the Arctic, and the range of its temperature tolerance to -0.4°C. (Arctic Biblio.)

Brahm, C. and J.L. Mohr. 1962. Report of an Echiuroid Worm Hamingia arctica Danielsen and Koren from the Beaufort Sea. Southern Californai Academy of Sciences. Bulletin. 61(2):123.

A complete specimen of this worm was recovered from clayey silt at a depth of 110m in the Beaufort Sea in bottom samples taken by the USNS Burton Island, 1960. This is a first regional report of this species in normal substrate; it had previously been washed ashore at Pt. Barrow after a storm. (Arctic Biblio.)

Brattegard, T. 1964. Hydale pontica Rathke Amphipoda from Western Norway. Sarsie 15:23-25.

Brattegard, T. 1966. Ecological and Biological Notes on Calocarides coronatus Crustacea, Thalassinidea. Sarsia 24:45-52.

Breitfus, L.L. 1898. Note sur la Faune des Calcaires de l'Ocean Arctique. (Note on the Calcareous Fauna of the Arctic Ocean.) Akademiia Nauk SSSR. Zoologicheskii Muzei. Ezhegodnik. 3(1):12-38.

Contains historical notes on the study of sponges, a critical survey of the fauna of the arctic calcareous sponges with lists of the species occurring in the White and Barents Seas, geographic distribution of 42 calcareous sponges in the Greenland, White, Kara and other arctic seas, bathymetric distribution of the arctic species. (Arctic Biblio.)

Breitfus, L.L. 1930. Biogeographischer Beitrag zur Kenntnis der Spongienfauna der Arktis. (Contribution to Knowledge of the Distribution of Arctic Sponges.) Gesellchaft Naturforschender Freunde zu Berlin. Sitzungsberichte 1929: 274-282.

Tabular presentation of sponges collected in 1906 aboard the Andrei Pervozvannyi in Barents and Kara Seas, with location, depth and type of bottom of each station and the temperature and salinity of the ocean water. (Arctic Biblio.)

Broderip, W.J. and G.B. Sowerby. 1828. Observations on New or Interesting Mollusca Contained, for the Most Part, in the Museum of the Zoological Society. Zoological Journal 4(15): 359-379.

Contains a list, with descriptions and discussion, of molluscs, some new, collected by Lieut. Betcher of the Beechey voyage, 1825-1828, including several from the northwest coast of Alaska near Icy Cape, and at least one from Avacha Bay, Kamchatka. (Arctic Biblio.)

Brotskaja, V.A. and L.A. Zenkevich. 1971. Quantitative Evaluation of the Bottom Fauna of the Barents Sea. Newfoundland. Memorial University, St. John's. Library Bulletin, 5(6):48pp.

Brotskaja, V.A. and L.A. Zenkevich. 1972. Quantitative Evaluation of the Bottom Fauna of the Barents Sea. Part II. Newfoundland. Memorial University, St. John's. Library Bulletin, 6(1): 1-10, Jan. 1972.

Brotskaya, V.A., Zhdanova, N.N. and Semyonova, N.L. 1963. (Bottom Fauna of the Velikaya Salma and the Adjoining Regions of the Kandalasksha Bay of the White Sea.) Belomorskoi Biologicheskoi Stantsii Moskovskogo Gosudarstvennogo Universiteta. Trudy. 2: 159-181.

Bryazgin, V.F. 1968. On the Biology and Distribution of Pandalus borealis in the Offshore Waters of the Barents Sea. Annales Biologiques 24:204.

Bulycheva, A.I. 1957. Morski Blokhi Morei SSSR i Sopredelnykh vod; Amphipoda-Talitroidea. (Marine Amphipods of Soviet and Adjacent Seas: Amphipoda-Talitroidea.) Akademiia Nauk SSSR. Zoologicheskii Institut. Opredelitel po Faune SSSR, No. 65.

Monograph in two parts, the first (p. 3-74) dealing with the taxonomic position and morphology of these crustaceans; their phylogeny and evolution; geographic distribution (including arctic waters); methods of their collection. Pt. 2 presents descriptions of these forms in taxonomic order with synonyms, data on morphometry and anatomy, sexual development, geographical distribution. A list of latin names of the forms described is appended. (Arctic Biblio.)

Burt, W.V. 1963. Oregon Oceanographic Studies. Dept. of Oceanography Final Rept., October. 62-September 63. Oregon State University, Corvallis.

Summaries are given of studies in the following areas: offshore chemistry, chemistry of upwelling, conductometric analyses of salinity and alkalinity, gas chromatographic determination of dissolved gasses in sea water, physical chemistry of sea water, benthic fauna of the Chukchi Sea, benthic fauna off Oregon, benthic ecology, primary production, Yaquina Bay studies, oceanic nekton and macroplankton, marine microbiology. (NTIS.)

Burukovsky, R.N. 1966. A New Species of Shrimp of the Genus Bythocaris. Zoologicheskii Zhurnal 45:536-542.

Calman, W.T. 1920. Cumacea. Canadian Arctic Expedition, 1913-1918. Report. V.7: Crustacea, Pt. C. King's Printer, Ottawa. 4p.

List, with locations and remarks on synonymy of five species from the Beuafort Sea (Collinson Pt., Alaska), Bathurst Inlet, and Dolphin and Union Strait, N.W.T. (Arctic Biblio.).

Carey, A.G., Jr. and R.E. Ruff. In Press. Benthic ecological studies on WEBSEC-72. U.S. Coast Guard Oceanography Report Series.

Carey, A.G., Jr., R.E. Ruff, J.G. Castillo and J.J. Dickinson 1974. Benthic Ecology of the Western Beaufort Sea Continental Margin: Preliminary Results. In: Reed, J.X. and J.E. Sater (eds.). The Coast and Shelf of the Beaufort Sea. Proceedings. Symposium Beaufort Sea Coast and Shelf Research, Jan. 1974. Arctic Institute of North America, Arlington. p. 665-680.

The relationships between benthic organisms and the polar marine environment of the continental shelf and slope of the western Beaufort Sea are being defined by statistical anaylses of faunal and environmental data. Of particular interest are the ecological effects on benthic community structure of the uniformly low bottom temperatures, the low and unpredictable input of food, and the scouring of the shallower continental shelf by ice. Preliminary results based on data from 20 bottom trawl samples, 70 grab samples, and bottom photographs demonstrate that species are restricted in their distribution within depth zones.

Calrgren, O.H. 1902. Die Actiniarien. Zoologishe Ergebnisse einer Untersuchungsfahrt (etc.) nach der Bareninsel und Westspitzbergen, Ausgefuhrt im Sommer 1898 auf S.M.S. "Olga"IV. [The Actiniarians. Zoological Results of a Research Expedition (etc.) to Bear Island and West Sptizbergen in the summer of 1898 on S.M.S. "Olga" IV]. Wissenschaftliche Meeresuntersuchungen. Neue Folge. 5, Abt. Helgoland:31-56.

Contains an anatomical and taxonomic treatment of the eight species of sea anemones, collected on the voyage, with a list arranged by station number, giving position, depth, and type of bottom, and a bibliography. (Arctic Biblio.)

Carlgren, O.H. 1912. Ceriantharia. Ingolf-Expedition, 1895-1896. Reports. V.5, Pt. 3. B. Luno, Copenhagen. 76p.

Deals with the small collection of these coelenterates brought home by the cruiser Ingolf, and northern species from several museum collections. Contains discussion of the literature and geographic distribution, list with descriptions, of six (including three new) species and one larval form, only one of which occurs in European arctic waters; classification, and a section on morphology of the group; bibliography (62 items). (Arctic Biblio.).

Carlgren, O.H. 1913. Zoantharia. Ingolf-Expedition, 1895-1896. Reports. V.5, Pt. 4. B. Luno, Copenhagen. 63p.

Based on small collection made by the cruiser Ingolf and on northern and arctic specimens from several museums, this paper contains (1) literature and summary; (2) contribution to the systematic classification of Zoantharia; and (3) a list, with synonyms, references, occurrences, and descriptions of twenty-two (including twelve new) species of corals and sea anemones; bibliography (27 items) (Arctic Biblio.).

Carlgren, O.H. 1917. Actiniaria and Zoantharia of the Danmark Expedition. Danmark-Ekspeditionen til Gronlands Nordostkyst, 1906-1908. Bd.3, nr.19. Meddelelser om Groenland 43:505-507.

List, with localities, of four sea anemones and one zoanth, from the waters in the Kanmark Havn region of Dove Bay, East Greenland. (Arctic Biblio.).

Carlgren, O.H. 1932. Die Ceriantharien, Zoantharien und Actiniarien des Arktischen Gebietes. (Ceriantharia, Zoantharia and Actiniaria of the Arctic Region). Fauna Arctica 6:253-266.

Contains a list, with synonymy, references, distribution, and some descriptive notes, of fifty-eight species of sea anemones from circumpolar seas; a station list for those collected by the German Expedition to the Arctic Ocean, 1898, giving positions and depths; and a bibliography (10 items). (Arctic Biblio.).

Carlgren, O.H. 1934. Some Actinaria from Bering Sea and Arctic Waters. Washington Academy of Sciences. Journal. 24:348-353.

Results of an examination of a small collection in the U.S. National Museum, taken by R.A. Bartlett during several years, to which were added some specimens from the Swedish expedition to Kamchatka and the Aleutian Islands, 1920-22. Atuhor gives an annotated list, with species of coelenterates from waters off western and northern Alaska, Greenland Labrador, Canadian Arctic Islands, Franz Josef Land, and Kamchatka. (Arctic Biblio.).

Calrgren, O.H. 1940. Actiniaria from Alaska and Arctic Waters. Washington Academy of Sciences. Journal. 30(1):21-27.

Contains account of five species of actinians collected by the MS Stranger in 1937 on the coast of Alaska and north of Bering Sound [sic]. Two of the species seem to be new; one of them, Epiactis polaris, n. sp., develops its embryos in a circular brood chamber, located in the uppermost part of the body, a way hitherto unknown from the Arctic. A bathypelagic species from the Sea of Japan is also included. (Arctic Biblio.).

Carlgren, O.H. 1942. Actiniaria, Part II. Ingolf-Expedition, 1895-1896. Reports. V.5, pt. 12. B. Luno, Copenhagen. 92p.

Similar in plan to the author's Actiniaria, part 1, 1921, q.v., this paper includes also forms of sub-tribe Acontiaria, which occur in the same areas. It contains description of forty-four (including eight new) species and one new genus; discussion of distribution of the species; contributions to the anatomy, genealogy, and a classification of the Actiniaria, a bibliography (256 items) and an index to part 1-2. (Arctic Biblio.).

Carlgren, O.H. 1949. A Survey of the Ptychodactiaria, Corallimorpharia, and Actiniaria; with a Preface by T.A. Stephenson. Svenska Vetenskaps-Akademien Handlingar, ser. 4, 1(1).

Systematic classification of known sea anemones by one of the two leading authorities on the subject, with a preface by the other, who discusses their present agreement on the systematics and clarifies their earlier differences. All major groups os sea anemones are believed to be known but the classification is still to be enlarged. In the three orders described, 67 of the species representing 41 general have arctic locations which range from the intertidal and littoral to depths of 3500 m. Several species are circumpolar. All the main polar areas are represented. (Arctic Biblio.).

Carsola, A.J. 1955. Formaninfera from the Beaufort and Chukchi Seas. Journal of Paleontology 29(4):738. Also in: Journal of Sedimentary Petrology 25(2):144.

Contains abstract of paper presented at the Annual Meeting of the Society of Economic Paleontologists and Mineralogists, New York, Mar. 28-31, 1955. Foraminifera populations in 62 sediment samples are small. Planktonic foraminifera are rare; principle species is Globigerina pachyderma Ehrenberg. The benthonic assemblage in the Chukchi differs from that of the Beaufort. Three zones of benthonic fauna exist: above 65m., 65-450 m., below and organic production. (Arctic Biblio.).

Castillo, J.G. 1975. Analysis of the Benthic Cumacea and Gammaridean Amphipoda from the Western Beuafort Sea. Theses submitted to Oregon State University, Corvallis, June 1975.

Chamberlin, J.L. and F. Stearns. 1963. A Geographic Study of the Clam, Spisula polynyma (Stimpson). American Geographical Society. Serial Atlas of the Marine Environment, folio 3, 12p.

Discusses, and maps on a scale of 1:4,000,000 and 1:10,000,000 the geographic distribution of this reef clam, also bottom temperatures and bottom sediments in the western North Atlantic postulated as suitable for its survival and/or reproduction. Spisula polynyma occurs in the continental shelf regions of Bering and Chukchi Seas, Aleutian waters and the Gulf of Alaska; also in the Gulf of St. Lawrence and southward to Georges Bank. Examined specimens (110 from the Pacific waters noted) and located and identified; including pertinent data. Partial analyses of the distribution of its Pacific locality records indicates temperatures 5.3° - 1.3°C and medium grade sediments suitable for survival and reproduction. This species is reportedly palatable, commonly dug for food in southern Alaska (Pink neck clam), but is of not commercial importance. (Arctic Biblio.).

Chamberlin, R.V. 1920. Polychaeta. Canadian Arctic Expedition, 1912-1918. Report. Vol.9: Annelids, Parasitic Worms, Protozoans, etc., Pt. B. King's Printer, Ottawa. 40p.

List, with some descriptions, locarions and distribution noted, of forty-nine (including nine new) species of marine worms from the coastal waters of Alaska and Northwest Territories, and a few from Hudson Bay. Addendum and emendations on one of these species appear in Ashworth, J.H. Polychaeta (supplementary), 1924, q.v. (Arctic Biblio.).

Chia, F.S. 1970. Reproduction of Arctic marine Invertebrates. Marine Pollution Bulletin 1(5):78-79.

Chislenko, L.L. 1963. On the Existence of a Relationship between the Fecundity and Population of Marine Harpacticoida (Crustacea, Copepoda.). Akademiia Nauk SSSR. Doklady. 155(2):451-453.

Christiansen, M.E. 1968. Notes on the Occurrence of Some Brachyura (Crustacea Decapoda) in Norway and Sweden. Sarsia 36:45-48.

Clark, A.H. 1920. Echinoderms. Canadian Arctic Expedition, 1913-1918. Report. Vol.8: Mollusks, Echinoderms, Coelenterates, etc., Pt. C. King's Printer, Ottawa. 13p.

List, with locations and discussion of distribution, of twenty species from waters between Bering Strait and Bathurst Inlet, with additional list of fifteen species from Hudson Bay area; based on specimens from Eastern Arctic expeditions. (Arctic Biblio.).

Clarke, A.H., Jr. 1960. Arctic Archibenthal and Abyssal Mollusks from Drifting Station Alpha. Breviora 119:1-17.

Record of 17 species taken during summer 1958 while drifting northeasterly some 800 miles north of Point Barrow and 300 miles from the North Pole. Three of the species: Colus hunkinsi, Nucula zophos and Malletia abyssopolaris are new, and described in detail. Some of the material was probably transported from shallow waters. (Arctic Biblio.).

Clarke, A.H. Jr. 1962. Arctic Archibenthal and Abyssal Molluscs II, Molluscs Dredged from Drifting Station Charlie, Alpha II. Canada. National Museum. Bulletin. 1963: No. 185, Contributions to Zoology 1962:90-109.

Reports the 1959 and 1960 collections, 2068 specimens, dredged near the western flank of the Chukchi Rise about 800 mi. north of Bering Strait. Included are one scaphopod, 12 gastropod, and 11 pelecypod species, one gastropod, Alvania karlini n. sp., described as new; other finds represent substantial bathymetric and geographic range extensions. Some samples also eight species described by Borbunov are illus. (Arctic Biblio.).

Clarke, A.H., Jr. 1962. On the Composition, Zoogeography, Origin and Age of the Deep-Sea Mollusk Fauna. Deep-SEa Research 9:291-306.

Presents some conclusions from analysis of information on this fauna at 1000 fm. and deeper: its differences from typical shallow-water mollusc fauna in composition and feeding, the latter most striking in bivalves. The abyssal and shallow-water bivalve faunas at Point Barrow, Alaska, have greater similarity than do those of New England or Puerto Rico. Off East Greenland, filter-feeding bivalves have declined to secondary importance in the 100-200 m. interval. Data from Kuril-Kamchatka Trench at 6000-9000 m. indicate that in favorable localities deep-sea plankton may constitute a more important food source for filter-feeding mollusks than previously realized. (Arctic Biblio.).

Clarke, A.H. 1972. The Arctic Dredge, a Benthic Biological Sampler for Mixed Boulder and Mud Substrates. Canada. Fisheries Research Board. Journal. 29(10):1503-1505.

Clark, A.H. and A.M. Clark. 1967. A Monograph of the Existing Crinoids. Vol. I, The Comatulids. Part 5, Suborders Oligophreata (Concluded) and Macrophreata. U.S. National Museum. Bulletin. 82:1-860.

Clausen, C. 1963. The Hydrozoan Halammohydra Found in Norway. Sarsia (11):17-20.

Cleaver, F.C. 1963. Bering Sea King Crab (Paralithodes camtschatica) Tagging Experiments. International Commission Northwest Atlantic Fisheries. Special Publication. No. 4:59-63.

Coan, E.V. 1971 The Northwest American Tellinidae. Veliger 14 (Suppl):1-63.

Coe, W.R. 1905. Nemerteans of the West and Northwest Coast of America. Harvard University. Museum of Comparative Zoology. Bullitin. no. 47, 318p.

Contains general characters of nemerteans, anatomical and histological structures, development, geographical distribution, systematic position. Distribution of the Pacific coast species, keys to groups and species, and a systematic account of 86 species (in 20 genera) are given; 24 of the species are new; 33 recorded on the Alaskan coast, nine in Aleutian waters, nine in the Bering Sea and one in Arctic Ocean. (Arctic Biblio.).

Coe, W.R. 1952. Geographical Distribution of the Species of Nemerteans of the Arctic Ocean Near Point Barrow, Alaska. Washington Academy of Sciences. Journal. 42:55-58. Also issued as: Scripp's Institute of Oceanography. Contribution. no. 557.

Contains an account of the worldwide distribution of the 24 species belonging to nine genera of nemertean worms which occur from shallow water to depths of 250 meters on the north Alaskan coast near Point Barrow. (Arctic Biblio.).

Corgan, J.X. 1966. Mya on the Alaska Peninsula. Nautilus 80(1):13-16.

Reports several new localities where species of the molluscan genus Mya have been observed in Alaska, on both coasts of the Alaska peninsula from Pavlov Bay to Wide Bay. Notes on the general distribution of Mya in the Arctic are included. The genus is considered an unexploited economic resource. (Arctic Biblio.).

Corgan, J.X. 1969. Marine Mollusks of Port Moller Bay, Alaska Peninsula. Nautilus. 83:65-66.

Cowan, I. Mct. 1968. The Interrelationships of Certain Boreal and Arctic Species of Yoldia Moller, 1842. Veliger 11(1):51-58.

Cromie, W.J. 1960. Preliminary Results of Investigations on Arctic Drift Station Charlie. Columbia University. Lamont Geological Observatory. Scientific Report No. 3. 33p.

The station drifted east-west across a shallow peninsula of the Chukchi Shelf (Approx. 77°35'N. 160°-165°W.) during July-Aug. 1959. Continuous soundings were taken within an accuracy of one meter across the feature and is adjacent deep water. A bathymetric profile has been constructed and the angles of slope computed from seismoc reflections. Piston cores (22) were taken, ranging in penetration to 250 cm. Over a hundred bottom photographs show rocks and abundance of life. Geological and Biological specimens were samples by trawl. An attempt at dating by radiocarbon analysis of pelagic forms is in progress. Work was done in seismology (dip and strike of bottom sediments, long-range sound transmission); one earthquake was recorded. Relative and continuous absolute values of the magnetic field were measured. Small variations in atmospheric pressure were recorded continuously on a micro-variobarograph. (Arctic Biblio.).

Crosse, H. 1877. Catalogue des Mollusques qui Vivent dans le Detroit de Behring et dans les Parties Voisines de l'Ocean Arctique. (Catalog of Molluscs of Bering Strait and Neighboring Parts of Arctic Oeean). Journal de Conchyliologie. Ser. 3. 17:101-128.

List, with synonyms, records of occurrence, and southern limits of range of one hundred sixteen species of molluscs and two brachiopods, from Chukchi Sea to Okhotsk Sea, the Aleutian waters and Gulf of Alaska. (Arctic Biblio.).

Curtis, M.A. 1969. Synonymy of the Polychaete Scoloplos acutus with S. armiger. Canada. Fisheries Research Board. Journal. 26(12):3279-3282.

Curtis, Mark A. 1970. Depth Distributions of Benthic Polychaetes in Harefjord and Tanquary fjord, Ellesmere Island, N.W.T. McGill University, Marine Sciences Centre. Manuscript Report no. 16, 76p.

Curtis, M.A. 1972. Depth Distributions of Benthic Polychaetes in Two Fjords on Ellesmere Island, N.W.T. Canada. Fisheries Research Board. Journal. 29(9):1319-1327.

Cushman, J.A. 1920. Foraminifera. Canadian Arctic Expedition, 1913-1918. Report. Vol. 9: Annelids, Parasitic Worms, Protozoans, etc., Pt. M. King's Printer, Ottawa. 13p.

List, with locations and notes on synonymy and distribution, of twenty-six species form the waters between Bering Sea and Bernard Harbour, N.W.T. (Arctic Biblio.).

Cushman, J.A. 1948. Arctic Foraminifera. Cushman Laboratory for Foramininfera. Cushman Laboratory for Foraminiferal Research. Special Publication No. 23. Sharon, Mass. 79p.

Taxonomic list, (With data on known arctic distribution, descriptions and synonymy) of one hundred eighty-two species, based on collections made by R.A. Bartlett, 1925-32 in the Greenland and Canadian Arctic Seas, and Hudson Bay, also on earlier records of forms from the arctic regions. (Arctic Biblio.).

Dall, W.H. 1875. Catalogue of Shells from Bering Strait and the Adjacent Portions of the Arctic Ocean, with Descriptions of Three New Species. California Academy of Sciences, Proceedings. 5: 246-253.

Catalog based on previous explorer's, on the author's, and on whalers' collections, ranging from the North Alaskan coast to the Aleautians, and including the Siberian side of Bering Sea. Includes three tunicates, two brachiopods, and one hundred and sixteen mulluscs. (Arctic Biblio.)

Dall, W.H. 1879. Report on the Limpets and Chitons of the Alaskan and Arctic Regions, with Descriptions of Genera and Species Believed to be New. U.S. National Museum. Proceedings. 1: 281-344.

Discussion of the comparative morphology and nomenclature of the chitons, and a systematic list, with descriptions, synonymy, habitats and distribution, of twenty-nine species of chitons and nineteen (including one new) species of limpets, ranging from Pt. Barrow waters to southeastern Alaskan waters and Okhotsk Sea. Includes circumpolar distribution and species outside Alaskan waters. (Arctic Biblio.)

Dall. W.H. 1885. New or specially Interesting Shells of the Point Barrow Expedition. U.S. National Museum. Proceedings. y: 523-526.

List of fourteen species with notes on specimens, and descriptions of three new species. (Arctic Biblio.)

Dall, W.H. 1896. Illustrations and Descriptions of New, Unfigures, or Imperfectly Known Shells, Chiefly American, in the U.S. National Museum. U.S. National Museum. Proceedings. 18(1034): 7-20.

With Dall, 1902, contains a critical revision of 11 American land shells and about 150 marine species from the Atlantic and Pacific coasts. Two genera, one section and 39 species are described as new. At least 40 of the species, including some new ones, are native to the Chukchi and Bering Seas, Aleutian Island waters, Baffin Bay-Davis Strait and Labrador Sea. (Arctic Biblio.)

Dall, W.H. 1902. Illustrations and Descriptions of New, Unfigures, or Imperfectly Known Shells, Chiefly American, in the U.S. National Museum. U.S. National Museum. Proceedings. 24(1264): 499-566, plates 27-40.

With Dall, 1896, contains a critical revision of 11 American land shells and about 150 marine species from the Atlantic and Pacific coasts. Two genera, one section and 39 species are described as new. At least 40 of the species including some new ones, are native to the Chukchi and Bering Seas, Aleutian Island waters, Baffin Bay-Davis Strait and Labrador Sea. (Arctic Biblio.)

Dall, W.H. 1903. Synopsis of the Family Astartidae with a Review of the American Species. U.S. National Museum. Proceedings. 26(1342): 933-951, plates 62-63.

Contains a discussion of this molluscan family and its subdivisions, brief descriptions of 32 species, and full descriptions of six newly-named forms. At least five of the new species and 15 described earlier are listed as native to arctic seas, Greenland waters, Canadian Arctic Islands waters, Bering Sea, Bering Strait, and Chukchi Sea (Arctic Biblio.)

Dall, W.H. 1921. Summary of the Marine Shell-bearing Mollusks of the Northwest Coast of America, from San Diego, California, to the Polar Sea, Mostly Contained in the United States National Museum, with Illustrations of hitherto Unfigured Species. U.S. National Museum. Bulletin 112. U.S. Govt. Printing Office, Washington, D.C. 217 p.

Contains a systematic list of 2122 species of the marine bivalve mollusks, excluding the Cephalopoda and Nudibranchiata. Among them are 148 arctic species and 291 of the Aleutian subfauna (p.4). The names of a few new species are included without descriptions but with references to the proposed vehicle of publication. (Arctic Biblio.)

Dall, W.H. 1925. Illustrations of Unfigured Types of Shells in the Collection of the United States National Museum. U.S. National Museum. Proceedings. 66(2554): 1-41, plates 1-36.

Contains an alphabetical list and illustrations of nearly two hundred shells from the northern waters of the Pacific Ocean; seventeen of them are described as new. More than a hundred shells are from the Sea of Okhotsk, Bering Sea, Aleutian Waters, Gulf of Alaska, and a few from the Arctic Ocean north of Bering Strait. An index of genera is supplies. (Arctic Biblio.)

Dearborn, J.H., and D. Dean. 1969. Arctic Invertebrate Studies. Antarctic Journal of the United States 4:194-195.

Dendy, A., and L.M. Frederick. 1924. Porifera. Canadian Arctic Expedition, 1913-1918. Report. Vol. 8: Mollusks, Echinoderms, Coelenterates, etc., Pt. J. King's Printer, Ottawa. 8 p.

List, with descriptions and locations noted, of six species of sponges from waters between Bering Strait and Hudson Bay (Arctic Biblio.)

Deriugin, K.M. 1927. Otritsatel'nye Cherty Fauny Belogo Moria i Prichiny Etogo Iavleniia. (Negative Characteristics of the fauna of the White Sea and the Causes of this Phenomenon.). In: Vserossiiskii s"ezd Zoologov, Anatomov i Gistologov. 2, Moskva, 1925, Trudy. p. 268-269.

Contains a comparative study of the marine faunas of the White and Barents Seas and a discussion of the poverty of the White Sea fauna. The latter is explained as due to the turbulent hydrological regime of its mouth which prevents the penetration of the Barents Sea elements (Arctic Biblio.)

Deriugin, K.M. 1928. Fauna Belogo Moria i Usloviia ee Sushchestvovaniia. (Fauna of the White Sea and its Life Conditions). Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 7-8: 1-511.

A conprehensive biological and hydrographic study based largely on exploration conducted during 1922-1926 by the State Hydrological Institute and the Institute for Exploration of the North with the Murman. Deriugin himself carried out the work with his colleagues and students. These investigations are outlines year by year (p. 10-34) with an introductory account (p. 1-9) of the topography and history of the White Sea. Results of the hydrological and biological investigations of 1922 and 1923 are presented (-. 35-89): temperature, chlorinity, salinity, etc., with depth; benthonic forms collected at stations, and depth and bottom character of them. Chap. 5 (p. 90-181) covers the hydrography of the White Sea; Thermic conditions and salinity, oxygen and Co_2, pH, transparency, ice, currents. The bottom deposites are outlines (p. 182-97). An extensive treatment of the fauna (p. 198-362_ reviews past faunistic research and continues with descriptions of the forms collected (in taxonomic order, from protozoans to mammals), including notes on occurrence, geographic distribution, taxonomic position, etc. The general characteristic of this fauna and its negative traits are outlines. Phyto and zoo plankton collected, its character, origin, etc. (p. 363-78), and the seaweeds (p. 379-82), are dealt with briefly. Zonation and ecological aspects, from the littoral down the "pseudoabyssal" are discussed (' 383-426). Quantitative aspects of the benthos are presented and xonation of the area is dealt with (p. 427-40) on the basis of the benthonic population. Finally the geographic origins of the studied fauna are considered, and an alphabetic list appended of the names of species and genera described, some 1,500 forms. (Arctic Biblio.)

Deriugin, K.M. 1930. Gidrologiia i Biologiia. (Hydrology and Biology). Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 11: 37-45.

After reference is made to the relation between hydrography, expecially temperature, and life in the sea, the author points to the recent warming of the Barents Sea and the biological changes thus brought about. The latter include penetration of northern Norwegian planktonic and benthonic forms into the Kola Fjord and the Central Murman. Cod moved as far east as Novaya Zemlya with a corresponding benefit to fisheries (Arctic Biblio.)

Deriugin, K.M. 1932. Bentos Estuariia r. Leny. (Benthos of the Lena Estuary). Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 15: 63-66.

Report on the benthos collected by P.K. Khmyzhnikov at 12 stations whilst on an upstream journey in 1926. The material contained typical estuarine forms with some local elements. Temperature and salinity are also noted. (Arctic Biblio.)

Deriugin, K.M. 1932. Iglokozhie i Molliuski iz Moria Laptevykh. (Echinoderms and Molluscs from the Laptev Sea). Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 15: 147-156.

Description of 19 species of molluscs and two echinoderms, the latter so scarce because of the brackish condition of the area. A new species of mollusc Bela amundseni n. sp. is described in detail. As to the other forms, location of finds, nature of bottom, water temperature, geographic distribution, etc., are noted. The material was collected by P.K. Khmyzhnikov and A. Popov in 1926 and 1927. (Arctic Biblio.)

Deriugin, K.M. 1935. Raboty Tikhookeanskoi Ekspeditsii Gos. Gidrologicheskogo Instituta v 1933 Godu. (Activities of the Pacific Expedition of the State Hydrological Institute in 1933). Leningrad. Godudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 22:5-24.

A report on investigations of three groups of this expedition, one of which under G.E. Ratmanov on the Krasnoarmeets, covered the Bering and Chukchi Seas (;. 17-24). Interesting results were obtained from the study of the "cold spot" in Anadyr Bay, and the effects of the hydrological conditions upon the plankton, benthos and the distribution of fishes were elucidated. Currents in the Bering Strait, ice conditions, and some hydrological as well as biological problems were also studied. (Arctic Biblio.)

Deriugin, K.M. 1937. Osnovnye Cherty Sovremennykh Faun Morei SSSR i Veroiatnye Puti ikh Evoliutsii. (Main Characteristics of the Present-Day Faunas of the Seas of the USSR and Probable Ways of their Evolution). Leningrad. Universitet. Uchenye Zapiski. 17(3): 237-248.

Contains a bio-geographical and hydrological characteristization of the various seas of the USSR, including the White, Barents, Kara, Okhotsk and Bering Seas. Their Origin, geological age, biological and ecological features of their faunas, and the latter's probably course of evolution are discussed in light of the recent studies of Soviet scientists, to which the author contributed by his expeditions of 1931-35, and 1937. (Arctic Biblio.)

Deriugin, K.M., and A.Ivanov. 1937. Predvaritel'nyi Obzor Rabot po Izucheniiu Bentosa Beringova i Chukotskogo Morei. (Preliminar Review of studies on the Benthos in the Bering and Chukchi Sea.) Leningrad. Gasudarstveniia Morei SSSR. 25: 247-249.

An account based on the work of several expeditions active since 1929. A series of areas both in the shallow and deep sea are outlined and their more common forms listed. The distribution and occurrence of the latter are viewed as determined by the nature of the bottom, temperature, depth, etc. (Arctic Biblio.)

D'aikoniv, A.M. 1923. Iglokozhica, Echinodermata t.1,vyp.1. Morskie ezhi, Echinoidea. (Echinoderms, Echinodermata, v. 1, pt. 1. Sea Urchins, Echinoidea.) IN: Fauna SSSR. Echinodermata, t. 1, vyp. 1. Petrograd. 362 pp.

Contains in the introductory part (p. 1-105), data on the type of echinoderms and a table for the determination of the classes; external morphology of ecninoids; glossary of terms, a synopsis and a table for determination of families and subfamilies of echinoidea; historical notes; and a bibliography. In the special part(p. 106-301) are keys to the families, genera and species, and an enumeration of 12 species of sea urchins, with synonyms, Latin diagnoses, descriptions, comparative notes, also data on their ecology and geographic distribution. A few species native to Greeenland, Barents, Kara and Bering Seas are included (Arctic Biblio.)

D'iakoniv, A.M. 1929. Eine Neue Amphiuride aus dem Kola-Djord nebst Bemerkungen uber das Vorkommen Anderer Amphiuriden im Barentsmeer. (A New Amphiurid from Kola Bay, together with Comments on the Occurrence of Other Amphiurids in Barents Sea). Leningradskoe Obschestvo Estestviospytatelei. Murmanskaia Biologicheskaia Stantsiis. Raboty. 3(5): 1-6.

Contains a description of a new species of starfish, Amphipholis murmanica, sp. n., together with brief notes on the occurrence of a few other species of this family. Summary in Russian. (Arctic Biblio.)

D'iakoniv, A.M. 1929. Neue Seesterne aud dem Ochotskischen Meer, I. Leptasterias fisheri sp. n (New Starfishes from the Okhotsk Sea, I. Leptasterias fisheri n. sp.). Akademiia Nauk SSSR. Doklady. Seriia A(10): 233-238.

D'iakoniv, A.M. 1929. Neue Seesterne aud dem Ochotskischen Meer, II. Leptasterias orientalis sp. n. (New Starfishes from the Okhotsk Sea, II. Leptasterias orientalis sp. n.). Akademiia Nauk SSSR. Doklady. Seriia A (11): 277-281

D'iakonov, A.M. 1930. Zur Frage der Artberechtigung der Mulleri-Groenlandica-Gruppe der Asteridengattung Leptasterias mit Beschreibung einer Neven Art aus dem Sibirischen Eismeer. (On the Question of the Revision of the Mulleri-Groendandica Group of the Asteridae Genus Leptasterias with a Description of a new species from the Siberian Arctic Ocean.) Zoologischer Anzeiger 91: 27-50.

Based on a study of the starfishes in the Leningrad Academy of Sciences, Zoological Museum collected in waters from Bering Sea westward to West Spitsbergen; a comparison of the Starfishes. L. mulleri, L. hyperborea, and L. groenlandica, and full description of Leptasterias sibirica, sp. nov., from Chukchi Sea; bibliography (25 items). (Arctic Biblio.)

D'iakonov, A.M. 1933. Iglokozhie Severnykh Morei. (The Echinoderms of the Arctic Seas). Akademiia Nauk SSSR. Opredeliteli po Faune SSSR. No. 8. Izd-vo Akademiia Nauk, Moskva-Leningrad. 166 p.

Contains general characteristics of Echinodermata and tables for the determination of classes, orders, families, genera and species of echinoderms of all arctic seas along the northern coast of European and Asiatic USSR, with descriptions of the species and data on distribution; bibliography (40 items); index of Latin names. (Arctic Biblio.)

D'iakonov, A.M. 1938. Monograficheskii Ocherk Morskikh Zvezd Severo-Zapadnykh Chastei Tikhogo Okeana, Echinodermata, Asteroidea, 1. Rod Leptasterias Fisher. [Monographie survey of starfishes of the northwest Pacific (Echinodermata, Asteroidea), 1. The Genus Leptasterias Fisher.] Akademiia Nauk SSSR. Zoologicheskii Institut. Trudy. 4(5): 749-914.

Contains a monographic treatment of he genus Leptasterias of North-western Pacific, including Okhotsk Sea, Bering Sea, Bering Strait and Adjoining parts of Arctic Ocean (Chukchi Sea); with a key to the species and subspecies, a monographic description of 24 species (10 new), with synonymy, list of stations, critical notes, biological and ecological data and distribution. A small part of this work (introduction and keys, p. 749-60) is in Russian, the remainder in German. (Arctic Biblio.)

D'iakonov, A.M. 1946. Individual'naia Izmenchivost i Vozrastnye Izmeneniia u Nekorykh Grupp Iglokozhikh. (Individual and age variability in some groups of Echinoderms). Akademiia Nauk SSSR. Zoologicheskii Institut. Trudy. 8(1): 145-193.

Contains an ecological study of some marine starfishes, including Strongylocentrotus droebachiensis a circumpolar species of the northern Hemisphere, Poraniomorpha tumida also having wide distribution in arctic waters (all Russian northern seas and Greenland waters), and Trophodiscus, Leptasterias, and Asterias species (Bering and Okhotsk Seas). Data are given on ecological factors influencing the extent and character of individual and age variability and its importance in the evolutionary process. Summary in English. (Arctic Biblio.)

D'iakonov, A.M. 1950. Monograficheskii Ocherk Morskikh Zvezd Severo-Zapadonoi Chasti Tikhogo Okeana, Echinodermata, Asteroidea, II-lv. [A monographic survey of the starfishes of the northwestern Pacific (Echinodermata, Asteroidea) II-14]. Akademiia Nauk SSSR. Zoologicheskii Institut. Issledovaniia Dal'nevostochnykh Morei. 2:58-139.

Contains section II, Pedicellaster M. Sars (4 species); III, Erasterias Verrill (3 species); IV, Asterias (L.) Fisher (6 species). Data for each species (or form) include: synonyms, morphology and morphometry, comparative morphology, occurrence and geographical distribution. Generic characteristics and data are given at the beginning of each chapter. Species of these genera inhabit arctic seas. Bibliographical footnotes. (Arctic Biblio.)

D'iakonov, A.M. 1950. Morskie Zvezdy Morei SSSR. (Starfishes of the seas of the USSR). Akademiia Nauk SSSR. Opredeliteli po Faune SSSR. No. 34. Izd-vo Akademiia Nauk, Moskva-Leningrad. 202 p.

Contains (in the general part, p.1-16) brief characteristics of Echinodermata, history of the study, phylogenetic relationship of classes, a morphological sketch of the starfishes (Asteroidea), their ecology and geographic distribution in the arctic seas, Okhotsk, Bering and Japanese Seas. In the systematic part are: keys for the determination of orders, families, genera and species and brief diagnosis of about 150 species and 50 lower forms of starfishes (in 46 genera and 15 families) native to USSR waters, with synonymy and data on Russian and total distribution; index of Latin names, p. 199-202. (Arctic Biblio.)

D'iakonov, A.M. 1954. Ofiury (Zmeekhvostki) Morei SSSR. The Ophiuroidea (Brittle-stars) of the seas of the USSR). Akademiia Nauk SSSR. Zoologicheskii Institut. Opredeliteli po Faune SSSR. No. 55. Malai Fauna. Vyp. 24. Moskva-Leningrad. 135 p.

Contains a systematic index of the species, follwed (p. 9-18) by an introductory part with general characteristics of the brittle stars, their morphology, life habit, and geographic distribution. In the systematic part (p. 19-132) are tables for the determination of the orders (Euryalae and Ophiurae), families, genera and species; a systematic list of 114 species and subspecies, with diagnosis of 15 new species and two new forms, synonyms, and data of Russian and total distribution. An index of latin names is appended. Many species native to Arctic Seas, Bering Sea and Sea of Okhotsk are included. This paper is a continuation of the study of Echinodermata of the Russian Seas published in 1950. (Arctic Biblio.)

D'iakonov, A.M. 1955. O Sposobnosti Iglokozhikh Vyderzhivat' Ponizhenie Normal'noi Okeanischeskoi Solensote. (On Echinoderms' toleration of the low salinity of sea water). Akademiia Nauk SSSR. Doklady 105(2): 373-374.

Contains observations on the ability of certain representatives of Echinodermata, such as Ophiocten sericeum, Solaster papposus and Stegophiura nodosa of the Chukchi Sea, and Echinarachnius parma of Kamchatka waters, to withstand fluctuation of salinity. The younger animals expecially prefer the upper layers of the sea water where the salinity is less than on lower levels. (Arctic Biblio.)

Drzycimski, I. 1968. Drie Neue Harpacticoida aus Westnorwegen. Sarsia 36: 55-64.

Drzycimski, I. 1968. Metahuntemennia Smirnov und Apodella Por (Copepoda Harpacticoida); mit Beschreibung einer meun Art aus dem Westnorwegischen Kustengebeit. Sarsia 31: 127-130.

Drzycimski, I. 1968. Neue Harpacticoida (Copepoda) aus dem Westnorwegischen Kustengebeit. Sarsia 31: 15-23.

Dunbar, M.J. 1953. Arctic and Subarctic Marine Ecology. Immediat Problems. Arctic 6(2): 75-90.

The Arctic and Sub-Arctic are defines in terms of marine environment. Differences in biological productivity between the areas are discussed, with consideration of the chemical and physical factors involved. Plankton production and biology, benthonic and littoral fauna, and fishes and marine animals present problems related to North Americas fisheries and Eskimo needs. In each case problems are listed for future study, a discussion of systematic and zoogeographic problems closing the report. Maps show (1) zones of marine environment, (2) bathymetry, and (3) major currents of northern seas. Diagram illustrates the biological cycle in arctic and subarctic marine zones. (Arctic Biblio.)

Dunbar, M.J. 1960. The Evolution of Stability: Natural Selection at the Level of the Ecosystem. In: Royal Society of Canada. Studia Varia 4, Evolution Symposium, p. 98-109.

Considers the evolution of stability through natural selection in high latitude ecosystems, i.e., complexes of interacting and interdependent organisms and physical factors of the environment. In contrast to the stable (ideal) systems of tropical areas, those in polar and temperate regions are oscillating, a sympton of non-adaptation attributed to the shorter period during which they have evolved. The high latitude systems are evolging toward greater stability however, and some examples are given among marine fauna and sea birds in cold climats. Selective mechanisms tend toward survival of the system rather than the individual or species. (Arctic Biblio.)

Dybern, B.I. 1969. Distribution and Ecology of Ascidians in Kviturdvikpollen and Vagsboepollen on the West Coast of Norway. Sarsia 37: 21-40.

Echols, R.J. 1975. Benthic Foraminifera of the Alaskan Shelf and Slope of the Beaufort Sea. In: Reed, j.c. and J.E. Sater (eds.). The Coast and Shelf of the Beaufort Sea. Symposium. San Francisco, Calif. Ja. 7-9, 1974. Arctic Institute of North America, Arlington. p. 491.

Ellis, D.V. 1956. Some Observations on the Shore Fauna of Baffin Island. Arctic 8(4):224-236.

A study of shore animals made in the summer 1953, covering Frobisher Bay, Cumberland Sound and Padloping Island. Thirty species of invertebrates and four of fishes are recorded from the area; their habitat and distribution are described and compared with those in Greenland. A detailed itinerary and review of earlier work precede the account. (Arctic Biblio.)

Ellis, D.V. 1959. The Benthos of Soft Sea-Bottom in Arctic North America. Nature 184(4688):79-80.

Ellis, D.V. 1960. Marine Infaunal Benthos in Arctic North America. Arctic Inst. N. Amer. Tech. Pap. 5:5-53.

Study of the fauna living in or on soft bottoms, made in northern Baffin Island during 1954-1955, in Greenland 1956 and in Foxe Basin 1957. Both quantitative and qualitative detrminations were conducted, and depth-range with geographic distribution of the collected forms considered. Factors affecting the composition and the standing crops, as well as productivity are analyzed and discussed. An annotated list of species collected is appended together with tables of collecting grounds, and quantitative data for the fauna studied. Despite variable distribution of species, lamellibranches, foraminifera, polychaetes, echinoderms, etc., the surveys showed the bottom communities present and enabled rough estimates of standing crops within the communities. (Arctic Biblio.)

Elofsson, R. 1961. The Larvae of Pasiphaea multidentata (Esmark) and Pasiphaea tarda (Kroyer.) Sarsia 4:43-53.

Erseus, C. 1974. Grania pusilla sp. n. (Oligochaeta, Enchytraeidae) from the West Coasts of Norway and Sweden with Some Taxonomic Notes on the Genus Grania. Sarsia 56:87-93.

Faas, R.W. 1974. Inshore Arctic Ecosystems with Ice Stress. In: Odum, H.T., and B.J. Copeland, and E.A. McMahan (eds.) The Conservation Foundation, Washington, D.C. p. 37-54.

Fagerlin, S.C. 1971. Pleistocene and Recent Foraminifera from the Chukchi Rise and Canada Basin areas of the Arctic Ocean. Masters Thesis, Wisconsin Univ. Madison.

Two cores of Arctic Ocean sediments were studied to determine their faunal content. Emphasis was placed on the benthonic Foraminifera and their usefulness in paleoecologic considerations. Relative abundances were determined and species were identifed. (NITS.)

Fauchald, K. 1963. Nephtyidae (Polychaeta) from Norwegian Waters. Sarsia 13:1-32.

Filativa, Z.A. 1957. Nekotorye Novye Predstaviteli Semeistva Astartidae, Bivalvia, Dal'nevostochnykh Morei. (Some New Representatives of the Family Astartidae, Bivalvia of the Far Eastern Seas. Akademiia Nauk SSSR. Institut Okeanologii. Trudy. 23:296-302.

Description of forms collected by the research vessel VITIAZ' 1949-1954, from the Okhotsk and Bering Seas, including two new species Astarte (Astarte) multicostata and A. (A.) derjugini. Morphometry, location, color of valves, etc. are noted. (Arctic Biblio.)

Filatova, Z.A. 1957. Obshchii Obzor Fauny Dvustvorchatykh Molliuskov Severnykh Morei SSSR. (General Review of the Bivalve Molluscs of the Northern Seas of the U.S.S.R.) Akademiia Nauk SSSR. Institut Okeanologii. Trudy. 20:3-59.

Account of the composition and geographic distribution of this fauna, based on materials of Zoological Institute of the Academy of Sciences and the author's collections during 1934-38 and 1945. The coastal seas, west to east, and the abyssal molluscs of the Arctic Ocean proper are treated in turn; 145 species and 45 subspecies are recorded and their quantitative and qualitative distribution analyzed. For each erea, the physical and ecological conditions are outlined, the molluscan fauna and characteristics are presented and general descriptions given in conclusion. (Arctic Biblio.)

Filatova, Z.A. 1957. Zoogeograpficheskoe Rainirovanie Severnykh Morei po Rasprostraneniiu Dvustvorchatykh Molliuskov. (Zoogeographic Zonation of the Northern Seas According to the Distribution of Vivalve Molluscs.) Akademiia Nauk SSSR. Institut Okeanologii. Trudy. 23:195-215.

Attempt based on qualitative and, where data available, quantitative distribution of bivalves. Author distinguishes two regions (oblast'), boreal and arctic, the latter further divided into low-arctic and high-arctic sub-regions. Further zonation is based on a depth distribution of these molluscs (e.g. littoral, abyssal) and on geographic provinces, as Polar-Greenland province, etc. (Arctic Biblio.)

Filatova, Z.A. 1959. General Review of the Bivalve Mollusks of the Northern Seas of the U.S.S.R. American Institute of Biological Sciences. 44 p. (Translation from Akademiia Nauk SSSR. Institut Okeanologii, Trudy. 20.)

Filatova, Z.A. and N.G. Barsanova. 1964. Communities of Benthic Fauna in the Western Bering Sea. (Soovshchestva Donnoi Fauny Zapadnoi.) Slessers, M. (trans). 1969. Naval Oceanographic Office, Washington, D.C. 119 p. (Translation of Akademiia Nauk SSSR. Institut Okeanologii. Trudy. 69:6-97.

The data on the composition and distribution of the bottom fauna in the western Bering sea were received in 1950-1952. During that period 256 stations were occupied. One hundred seventy-three quantitative samples of the bottom fauna were taken with large bottom-sampler "Ocean-50" and Petersen grab and 64 samples were gathered with Sigsbye trawl. Forty-six of the stations were occupied at the depths exceeding 1000m and 38 of them--at depths exceeding 2000m. Eighteen

communities of the bottom fauna were established in western Bering Sea. True oceanic deep-sea species are dominant in the abyssal bottom-fauna communities of the western Bering Sea. Some species living presumably on the slope of the shelf are the leading forms of bathyal communities. A great many arctic-cirumpolar, arctic-boreal, and north-boreal Pacific species of the bottom fauna are part of the composition of the shallow-water communities of the western Bering Sea. (Author.) (NITS.)

Filatova, Z.A. and A.A. Neiman. 1963. Biotsenozy Donnoi Fauny Beringova Moria. (Biocoenoses of Bottom Fauna of the Bering Sea.) Ikeanologiia 3(6):1079-1084.

Reports a study of quantitative distribution based on 173 bottom-grab and 64 trawl samples collected at 8-4820m. depth in the western part of the sea, and 280 samples at 20-54m in the eastern part. Sublittoral and abyssal biocoeneses are reported and mapped. Spatial distribution is described. (Arctic Biblio.)

Filatova, Z.A. and L.A. Zenkevich. 1957. Kolichestvennoe Raspredelenie Donnoi Fauny Karskogo Moria. (Quantitative Distribution of the Bottom Fauna in the Kara Sea.) Vsesoiuznoe Gidrobiologicheskoe. Obshchestvo. Trudy. 8:3-67.

Account of quantitative and also qualitative distribution of the main bottom forms of this area are given with information on its relief and sediments; distribution of the total biomass and the biomass of bivalves, polychaetes, echinoderms, etc.; main biocenoses; qualitative and quantitative composition of these biocenoses; some characteristic traits of the bottom fauna of the Kara Sea. (Arctic Biblio.)

Fraser, C.M. 1922. Hydroids. Canadian Arctic Expedition, 1913-1918. Report. Vol. 8: Mollusks, Echinoderms, Coelenterates, etc. Pt. I. King's Printer, Ottawa 5 p.

List with locations and distribution noted, of twenty-five species from the east coastal waters of Hudson Bay, and westward to the Alaskan coast of Bering Sea. (Arctic Biblio.)

Galkin, J. (Yu.) I. 1964. (Perennial Changes in the Distribution of Bivalved Mollusks in the Southern Part of the Barents Sea.) Murmanskogo Morskogo Biologicheskogo Instituta. Trudy. 6(10):22-40.

Galkin, Yu, I. 1965. (Years Long Changes in the Distribution of the Bivalve Molluscs in the Southern Part of Barents Sea.) In: Molluscs, Questions of Theoretical and Applied Malacology. Summaries of Reports. Second Collection. Akademiia Nauk SSSR. Zoologicheskogo Instituta. Trudy. 79.

Gal'tzova, V.V. A Quantitative Characteristics of Meiobenthos in the Chupinsky Inlet of the White Sea. Zoologicheskii Zhurnal 50:641-647.

Geddes, D.C. 1968. Protopsammotopa norvegica, a New Genus and Species of Interstitial Harpacticoid Copepod from Western Norway. Sarsia 36:69-76.

George, R.Y. and A.Z. Paul. 1970. University of Southern California-Florida State University Biological Investigations from the Fletcher's Ice Island T-3 on Deep-Sea and Under-Ice Benthos of the Arctic Ocean. University of Southern California Techincal Report. No. 1:1-69.

The report presents the preliminary relults and tabulated station data on the deep-sea benthic samples and photographs taken during the period between September 1969 and February 1970 from the Fletcher's Ice Island T-3. Descriptions of the new collecting equipment used are also provided with illustrations. Observations of unusual interest and recommendations for future studies on research initiated during this period are also included. T-3 as an ideal oceanographic platform for deep-sea benthic studies is pointed out. The report also contains the preliminary results of physiological studies on thermal tolerance; endurance to super-cooling; salinity tolerance and deep-submergence experiments for observing pressure effects. This document emphasized the added effort to USC project during this period on benthic studies and physiological investigations on Arctic marine biota. (Author)

George, R.Y. and A.Z. Paul. 1971. Univeristy of Southern California-Florida State Univeristy Biological Investigations from the Fletchers Ice Island T-3 on Deep Sea and Under Ice Benthos of the Arctic Ocean. U.S. Government Research and Development Reports. 71(1).

Given, R.R. 1965. Five Collections of Cumacea from the Alaskan Arctic. Arctic 18(4):213-229.

Lists, with detailed morphologic taxonomic information, several species of these crustaceans collected 1948-1950 by various parties. The latter, working in the area described, with pertinent station data and species recovered. Some taxonomically significant variations are noted among the species listed, also some range extensions. (Arctic Biblio.)

Golikov, A.N. 1963. Briukhonogie Molliuski Roda Neptunea Bolten. (Gastropod Molluscs of Genus Neptuaea Bolten.) Fauna SSSR. Molliuski. Vol. I, No. 1. Izd-vo Akademii Nauk SSSR, Leningrad. 218 p.

Outlines earlier work on this largely arcto-boreal group, and discusses its morpho-physiology, variability, phylogeny, geographic distribution, and ecology. A special part p. 97-183, deals with 25 species, incl. keys, synonymy, morphology with differential diagnoses, geographic and depth distribution, reproduction, etc. Appended are 28 plates with excellent photos. (Arctic Biblio.)

Golikov, A.N. 1964. Briukhonogie i Lopatonogie Molluski (Gastropoda et Scaphopoda) Severnoi Chasti Grenlandskogo Moria i Rainov k Severa ot Shpitsbergena i Zemli Frantsa-Iosifa. (Gastropod and Scaphopod Molluscs of the Northern Greenland Sea and the Regions North of Spitzbergen and Franz Joseph Land.) Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skogo Instituta. Trudy. 259:340-354.

Records 59 species collected during warm seasons of 1955-57. Location and number of finds, size, geographic and depth distribution are noted. General ecological and zoogeographic aspects of these molluscs are also discussed. (Arctic Biblio.)

Gonor, J.J. 1964. Egg Capsules and Young of the Gastropod Pyrulofusus deformis (Neptuneidae) at Barrow, Alaska. Arctic 17(1):48-51.

Describes two egg capsules of snails collected in 1963, and compares shell dimensions of three juveniles from one of the capsules with those of subadult and adult animals. The large capsules and few, large, non-pelagic young that develop in them are interpreted as an adaptation for reproduction in cold seas. (Arctic Biblio.)

Gostilovskaia, M.G. 1964. Mshanki (Bryozoa), Sobrannye Ekspeditsiei na l/r "F. Litke" 1955 G. k Severu ot Zemli Frantsa-Iosifa i Shpitsbergena. (Bryozoans Collected by the 1955 F. Litke Expedition North of Franz Joseph Land and Spitbergen.) Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skogo Instituta. Trudy. 259:191-228.

Lists species described by each of the earlier investigators and some 149 forms identified by the author from various collections of the present century. All the material is tabulated in taxonomic order with notes on earlier records and depth of finds. Over 80% of the forms are arctic (Arctic Biblio.)

Gostilovskaya, M.G. 1968. (Bryozoa of the Chesha Mouth in the Barents Sea.) Murmanmanskogo Morskogo Biologicheskogo Instituta. Trudy. 17(21):58-73.

Grainger, E.H. 1966. North American Sea Stars (Echinodermata: Asteroidea) from North Alaska to the Strait of Belle Isle. American Geographical Society. Serial Atlas of the Marine Environment, folio 5.

Gives distributional data for 26 species recorded in the literature, with indication of water depths and substrate. The localities extend from Cape Lisburne-Pt. Barrow in the Chukchi Sea, eastward through Canadian Arctic islands waters, from northeastern most Ellesmere to southern Labrador Sea and Hudson and James Bays. (Arctic Biblio.)

Grainger, E.H. 1966. Sea stars Echinodermata-Asteroidea of Arctic North America. Canada. Fisheries Research Board. Bulletin. No. 152. 70 p.

Gray, J.E. and G.B. Sowerby. 1839. Molluscous Animals and their Shells. In: Beechey, F.W. and others. The Zoology of Captain Beechey's Voyage. p. 103-155.

Contains (1) introductory remarks; and (2) list, with description of fleshy parts and shells, of molluscs, (some new) collected on the Beechey voyage of 1825-28, and on other expeditions of about the same period. Includes several specimens from Icy Cape, Alaska and from other unspecified portions of the Arctic and Pacific Oceans. (Arctic Biblio.)

Green, K.E. 1960. Ecology os Some Arctic Foraminifera. Micropaleontology 6(1):57-78. Also in: Bushnell, V.C. (ed.). 1959. Geophysical Research Paper No. 63. U.S. Air Force. Cambridge Research Center. Bedford. p. 59-81

Presents result of investigation of foraminifera in cores of the bottom sediments collected by Charles Horvath 1952-1955 on ice island T-3. Samples were taken from a rectangular area 82°32' - 86°45'N and 81°20' - 95°40'W at 433 and 2760m. depth and at 24 surface locations. Previous foraminiferal studies are noted. Comparison is made with sediments, bottom topography, water temperature and salinity, and associated organisms. Twenty species were useful in establishing depth zones. Five species and one variety are new. Faunal changes correspond generally to changes in slope. Evidence of displacement of some fauna was found at one station. Systematic description is given. also an annotated list of 105 species collected. (Arctic Biblio.)

Green, R.H. 1973. Growth and Mortality in an Arctic Intertidal Population of Macoma balthica (Pelecypoda, Tellinidae.) Canada. Fisheries Research Board. Journal 30(9):1345-1348.

Greve, L. 1963. The General Spirontocaris, Lebbeus, Eualus and Thoralus in Norwegian Waters. (Crustacea, Decapoda.) Sarsia 11:29-42.

Greve, L. 1968. Tanaidacea from Hardangerfjorden, Western Norway. Sarsia 36:77-84.

Greve, L. and T.J. Samuelsen. 1970. A Population of Chlamys islandica (O.F. Muller) Found in Western Norway. Sarsia 45:17-24.

Gulliksen, B. 1973. The Vertical Distribution and Habitat of the Ascidians in Borgenfjorden, North-Trondelag, Norway. Sarsia 52:21-27.

Gulliksen, B. and S.H. Skjaeveland. 1973. The Sea-star Asterias rubens L., as a Predator on the Ascidian, Ciona intestinalis (L.), in Borgenfjorden, North-Trondelag, Norway. Sarsia 52:15-20.

Gur'ianova, E.F. 1924. Biotsenoz Laminarii Kol'skogo Zaliva. (Laminaria Biocoenose at Kola Fjord.) Leningradskoe Obshchestvo Estestvoispytatelei. Trudy. 53(2):139-172.

Contains a study of the bioceonose of Laminaria overgrowth in Kola Bay, including some notes on L. stenophylla, L. saccharina and L. digitata and sixteen other algae, also data on faunal population of the stays and rhizoids of these Laminaria and a list of one hundred seventy-one species of various marine animals: the Crustacea determined by the author; Mollusca by K.M. Deriugin; Spongia by P.D. Rezvyi; Polychaeta by I.G. Zaks, Nemertini by P.V. Ushakov; Bryozoa by G.A. Kliuge; Nematoda by I.N. Filip'ev; Algae by E.S. Zinova; periodical changes and ontogeny of the biocoenose are discussed. Summary in English. (Arctic Biblio.)

Gur'ianova, E.F. 1925. Fauna "Dvorov" Kol'skogo Zaliva. (Fauna of "Dvory" of Kola Bay.) Leningradskoe Obshchestvo Estestvoispytatelei. Trudy. 54(1):17-46.

Contains results of the study of marine fauna of four "dvory" (small inlets) of Kola Bay, investigated in the summers of 1921-23 by a group of students (including the author) under direction of Prof. K.M. Deriugin; includes data on littoral and sublittoral distribution of marine fauna and a systematic list of one hundred seventy-six marine animals, determined by K.M. Deriugin, the author and some other specialists. Summary in German. (Arctic Bibli.)

Gur'ianova, E.F. 1925. Sravnitel'nyi Obzor Litorali Russkikh Severnykh Morei. (Comparative Review of the Littoral of Russian Northern Seas.) Leningradskoe Obshchestvo Estestvoispytatelei. Murmanskaia Biologicheskala Stantsiia, Polyarnyy. Raboty. 1:110-130.

Contains an analysis of littoral life of Kola Bay and comparisons with conditions at several points on the Barents and White Seas. Three kinds of littoral are distinguished: a high arctic (polar), an arctic and subarctic. Their main characteristics and components are discussed and their part in making up the life of the compared areas reviewed. (Arctic Biblio.)

Gur'ianova, E.F. 1927. K Faune Kol'skogo Zaliva, Barentsova, Karskogo i Belogo Morei i Novoi Zemli. (To the Fauna of the Kola-Fjord, Barents Sea, White Sea, Kara Sea and Novaya Zemlya.) Leningradskoe Obshchestvo Estestvoipytatelei. Trudy. 57(1):23-38.

Contains critical notes on certain marine fauna (mainly Mollusca and Crustacea) collected 1921-26, and determined as new to the European arctic waters in which they were found. Includes thirteen molluscs, eleven crustaceans and nine worms, new to the fauna of Kola Bay; five molluscs and five crustaceans, Barents Sea; two molluscs and two crustaceans, White Sea; and five molluscs and five other marine fauna from Kara Sea and Novaya Zemlya waters; bibliography (26 items). Summary in English. (Arctic Biblio.)

Gur'ianova, E.F. 1928. Fauna Cheshskoi Guby. (The Fauna of Cheshskaya Guba.) In: Vserossiiskii s'ezd Zoologov, Anatomov i Gistologov, 3, Leningrad, 1927. Trudy. p. 362-264.

Contains general notes on the hydrological regime of this arm of Barents Sea, and data on its elements, origin and peculiar features of its fauna. Notes on some typical species and a table of zonal distribution of benthos organisms are included. (Arctic Biblio.)

Gur'ianova, E.F. 1928. K Faune Amphipoda Barentsova Mariia. (Contribution to the Fauna of Amphipoda in the Barnets Sea.) Leningrad. Nauchno-Issledovatel'skii Institut po Izucheniiu Severa. Trudy. 37:43-54.

Results of a study of these crustaceans collected in 1921-24, by the Northern Scientific and Economic Expedition, 1920-1926, listing twenty-eight species, with data on their locations, and distribution. Summary in English. (Arctic Biblio.)

Gur'ianova, E.F. 1929. K Faune Crustacea-Malocostraca Barentsova, Belogo i Karskogo Morei. (On the Fauna of Crustacea-Malocostraca of the Barents Sea, White Sea and Kara Sea.) Leningradskoe Obshchestvo Estestvoipytatelei. Trudy. 59(1): 29-46.

Contains a list of thirty-seven species of crustaceans (Isopoda and Amphipoda) of the Barents, White and Kara Seas, and an enumeration, with critical notes and data on distribution in arctic regions. Summary in English. (Arctic Biblio.)

Gur'ianova, E.F. 1929. K Voprosu o Sostave i Raspredelenii Bentosa Cheshskoi Guby. (Contribution to the Question of the Distribution of Benthos in the Cheshskaya Bay.) In: Leningrad. Nauchno-Issledovatel'skii Institut op Izucheniiu Severa. Its Trudy. Vyp. 43. Chast'2: Ekspeditsiia Cheshskuiu Gubu 1925-1926 gg., p. 58-100.

A study based on observations of the Cheshskaya Bay Expedition, 1925-26, describing the benthos fauna of the region, its relation to conditions peculiar to the bay and distribution in other seas. Bibliography, p. 96-98. Summary in English. (Arctic Biblio.)

Gur'ianova, E.F. 1929. Neue Formen Arktishcher Isopoden and Amphipoden. (New Forms of Arctic Isopoda and Amphipoda.) Zoologischer Anzeiger 81:309-317.

Contains descriptions of one new species and one new variety of isopods and sic new species of amphipods from Eurasian arctic seas. (Arctic Biblio.)

Gur'ianova, E.F. 1930. Beitrage zur Fauna der Crustacea-Malacostroca des Arktischen Gebietes. (Contributions to the Crustacea-Malacostraca of the Arctic Regions.) Zoologishcher Anzeiger 86:231-248.

Based on collections of the Berlin Zoological Museum, the Institute for the Exploration of the North and the State Hydrological Institute in Leningrad. Descriptions of five new species of isopods from Greenland Sea and Svalbard waters, and discussion of the distribution, in all arctic seas and the brackish or fresh waters of the Asiatic Arctic of three other species; descriptions and distribution of seven (including three new) species of Amphipoda of arctic seas. (Arctic Biblio.)

Gur'ianova, E.F. 1931. K Faune Amphipoda i Isopoda Vostochnogo Murmana (Raion Guby Porchnikhi.) [Contribution to the Knowledge of Amphipods and Isopods of Eastern Murman (Porchnikha Bay Region).] Leningrad. Nauchno-Issledovatel'skii Institut po Izucheniiu Severa. Trudy. 48(1):196-204.

> A study of crustaceans inhabiting the waters of, and near Porchnikha Bay (Barents Sea coast about 69°N 36°E.), listing forty-one species of amphipods and eight species of isopods, with some notes on habitats and distribution in other seas. Summary in German. (Arctic Biblio.)

Gur'ianova, E.F. 1932. K Faune Crustacea Moria Laptevykh. (The Crustacean Fauna of the Laptev Sea.) Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Marei SSSR. 15:157-187.

> A study of material collected in 1926 and 1927 by the Hydrographic party of the Academy of Scienes' Yakut Expedition. Fifteen species of amphipods, three isopods and two schizopods are described. Two species, <u>Pseudalibratus birulai</u> n. sp. and <u>Haploops sibirica</u> n. sp. are new. Morphology and taxonomy, location of finds, temperature and nature of bottom, closely related forms, and geographic distribution are dealt with. (Arctic Biblio.)

Gur'ianova, E.F. 1933. Die Marinen Isopoden der Arktis. (Marine Isopoda of the Arctic.) Fauna Arctica 6:391-470.

> Contains definition of the southern limits: Newfoundland to North Cape, Norway, thence across the arctic seas to Bering Strait, Beaufort Sea and Canadian Arctic Islands waters. Classified list, with key, synonyms, references, distribution, and some descriptive notes, of one hundred eighty-two species of these crustaceans. A zoogeographic discussion of Barents, White, Kara, Laptev, East Siberian and Beaufort Seas, Baffin Bay, David Strait, Norwegian and Greenland Seas. (Arctic Biblio.)

Gur'ianova, E.F. 1933. K Faune Crustacea-Malocostraca Ob-Eniseiskogo Zaliva i Obskoi Guby. (The Crustacea-Malocostraca Fauna of the Ob-Yenisey Bay and the Ob Gulf.) Leningrad. Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 18:75-90.

> A description of 25 species with identification keys and comparisons with identical species in adjacent regions. Location, occurrence and geographic distribution are also discussed. Four regions are distinguished in the area ranging in salinity from $33°/_{\circ\circ}$ to $10°/_{\circ\circ}$ or less. Each has its specific forms, the more common of them being listed. Their distribution at present and in geological times is discussed. (Arctic Biblio.)

Gur'ianova, E.F. 1933. K Faune Ravnonogikh Rakov, Isopoda, Tikhogo Okeana, 1: Novye Vidy Valvifera i Flabellifera. (The fauna of Isopod Crustaceans of the Pacific, 1; New Species of Valvifera and Flabellifer.) Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 17:87-106.

> A contribution based on material collected by State Hydrographic and Pacific Fisheries Institutes' expeditions to the Bering Sea and the Seas of Okhotsk and Japan. Seventeen new forms are described including morphology, morphometry and anatomy, size, color, location of find, geographic distribtuion, etc. (Arctic Biblio.)

Gur'ianova, E.F. 1933. K Faune Ravnonogikh Rakov, Isopoda, Tikhogo Okeana, 2; Novye Vidy Gnathiidea i Asellota. (The Fauna of Isopod Crustaceans of the Pacific 2; New Species of Gnathiidea and Asellota.) Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 19:79-91.

Descriptions of 13 new forms, including seven new species; morphology and anatomy, size, color sexual differences, location of finds, geographic distribution, etc., are given. (Arctic Biblio.)

Gur'ianova, E.F. 1933. Zur Amphipodenfauna des Karischen Meeres. (Amphipoda of the Kara Sea.) Zoologischer Anzeiger 103:119-128.

Based on collections of the Russian Hydrological Institute vessel Rusanov, in the summer of 1931; descriptions of seven new species and one new sub-species. (Arctic Biblio.)

Gur'ianova, E.F. 1934. Fauna Rakoobraznykh Karskogo Moria i Puti Proniknoveniia Morskoi Atlanticcheskoi Fauny v Arktiku. (The Crustacean Fauna of the Kara Sea and the Routes of Penetration of the Atlantic Marine Fauna into the Arctic.) Akademiia nauk SSSR. Comptes Rendus. Doklady. Nouv. Ser. 1(2):91-96.

Contains an analysis of the crustacean fauna of the Kara Sea, which the author divides into seven large groups according to origin and geographic distribution; the foreign elements in the Kara Sea fauna are discussed and analyzed and their routes of immigration from the Atlantic traced. (Arctic Biblio.)

Gur'ianova, E.F. 1934. K Faune Amphipoda Barnetsova i Belogo Morei. (The Amphipod Fauna of the Barents and White Seas.) Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR 20:87-89. Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR 20:87-89.

A list of 11 zoogeographically interesting or rare amphipods, with data on location of find(s), occurrence in depth, geographic distribtuion, etc. (Arctic Biblio.)

Gur'ianova, E.F. 1934. Neue Formen von Amphipoden des Karischen Meeres. (New Forms of Amphipoda from Kara Sea.) Zoologischer Anzeiger 108:122-230.

Descriptions of six new species, collected by routine ice-breaker expeditions, 1930-32. (Arctic Biblio.)

Gur'ianova, E.F. 1934. Zoogeograficheskii Ocherk Fauny Isopoda Arktiki. (Zoogeographical Study of the Arctic Isopods.) Artica 2:127-152.

A study of the distribution of 182 species of isopods in the Arctic Ocean, with list and discussion of their occurrence in Barents, White, Kara, Laptev, East Siberian, Chukchi, and Beaufort Seas, Baffin Bay, Davis and Denmark Strait, and Norwegian and Greenland Seas. Summary in English. (Arctic Biblio.)

Gur'ianova, E.F. 1935. K Faune Amphipoda i Isopoda Iuzhnoi Chasti Karskogo Moria. (The Amphipod and Isopod Fauna of the Southern Kara Sea.) Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR 21:65-87.

A study of these crustaceans collected in the summer 1931 from the ice-breaker Rusanov. Ninety-four forms are described, with notes on location and depth of finds, bottom, etc. Zoogeographically the material is divided into six groups. Their distribution in the regions of the area is disoussed. (Arctic Biblio.)

Gur'ianova, E.F. 1935. K Faune Ravnonogikh Rakov, Isopoda, Tikhogo Okeana 3; Novye Vidy v Sborakh Tikhookeanskoi Ekspeditsii Gos. Gidrobiologicheskogo Instituta 1932 g. (The Fauna of Isopod Crustaceans of the Pacific, 3; New Species in the Collection of the Pacific Expedition of the State Hydrological Institute of 1932.)

Description of three new species and four new varieties from the Bering, Okhotsk and Japanese Seas; also a list of isopods hitherto recorded from these areas. Descriptions include morphometry and anatomy, location of find; taxonomic status, etc. (Arctic Biblio.)

Gur'ianova, E.F. 1935. K Zoogeografii Dal'nevostochnykh Morei. (Contribution to the Zoogeography of Far Eastern Seas.) Akademiia Nauk SSSR. Izvestiia, Seriia 7. Otdelenie Matematicheskikh i Estestvennykh Nauk. No. 8-9:12229-1235.

Contains the results of a zoogeographic analysis of isopod fauna (124 species) of the Bering, Okhotsk and Japan Seas, with data on the seven groups into which this fauna is subdivided by the author; their geographic distribution and relationship with the faunas of the Arctic and Pacific Oceans are dealt with. Summary in English. (Arctic Biblio.)

Gur'ianova, E.F. 1935. Komandorskie Ostrova i Ikh Morskaia Pribrezhnaia Fauna i Flora. (The Commander Islands and their Coastal Fauna and Flora.) Priroda 11:64-72.

Contains a general description of these islands in the Bering Sea, with brief notes on their discovery and exploration, and data on their geography, geology, climate, and the hydrological regime of the coastal waters. Their marine fauna and flora (algae) are treated in more detail, with notes on ecology, references to many animals and plants ovserved, and comparison with fauna and flora of other northern regions (the Murman coast of the Barents Sea. (Arctic Biblio.)

Gur'ianova, E.F. 1935. Zur Zoogeographic der Crustacea Malacostraca des Arktischen Gebietes. (On the Zoogeography of the Malacostracan Crustaceal of the Arctic Region.) Zoogeographica 2:555-571.

Contains detailed discussion of the distribution and various groupings of amphipods and isopods designated as truly arctic, found in the Soviet seas east of Novaya Zemlya; based on the rich collections made during 1928-33 by the Arctic Institue U.S.S.R. List of sixty-one species new to Kara Sea, noting location and depth is given. (Arctic Biblio.)

Gur'ianova, E.F. 1936. Beitrage zur Amphipodenfauna des Karischen Meeres. (Contributions to the Amphipoda of Kara Sea.) Zoologischer Anzeiger 116:145-152.

Based on material collected by the SEDOV, 1934, descriptions of three new species, a list, with locations, of twenty-nine additional species new to Kara Sea, and remarks on the presence there of eight North Atlantic forms. (Arctic Biblio.)

Gur'ianova, E.F. 1936. Beitrage zur Kenntnis der Isopodenfauna des Pazifischen Ozeans. IV. Neue Isopodenarten aus dem Japanischen und Beringmeer. (Contributions to Knowledge of the Isopoda of the Pacific Ocean.) 4. New Isopods of the Japan and Bering Sea. Zoologishcher Anzeiger 114:250-265.

Contains descriptions of five new species, only one of which was taken in Bering Sea; a list of all species known to occur in the Okhotsk and Bering Seas, and a discussion distinguishing between the arctic Kamchatka province and the Aleutian province. (Arctic Biblio.)

Gur'ianova, E.F. 1936. K Faune Crustacea-Malacostraca Arkticheskoi Oblasti. (Contribution to the Fauna of Crustacea-Malacostraca of the Arctic Region.) Leningrad. Vsesoiuznyi Arkticheskii Institut. Trudy. 33:31-44.

A study of material collected during the voyages of ice-breaker SIBIRIAKOV and RUSANOV, 1932, and of the ships TAIMYR and VAIGACH, 1911-13, in Kara, Laptev and Chukchi Seas; with lists of species (including description of four new species) and locations. Summary in English. (Arctic Biblio.)

Gur'ianova, E.F. 1936. K Zoogeografii Karskogo Moria. (The Zoogeography of Kara Sea.) Akademiia Nauk SSSR. Izvestiia. Otdelenie Matematicheskikh i Estestvennykh Nauk. Seriia Biologicheskaia. No. 2-3:565-594.

Contains a study of zoogeography of the northern part of the Kara Sea based on the collections of marine amphipods and isopods brought home by the ice-breaker SEDOV in 1929-30 (collector: G. Gorbunov), ship LOMONOSOV in 1931 (collectors: V. Vagin and L. Retovskii), and ice breaker RUSANOV in 1932 (collectors; V. Vagin and N. Kondakov). The material is divided into five zoogeographic groups: circumpolar forms, North Atlantic forms of warmer waters, fauna of polar basin, forms of the eastern Arctic and subarctic forms. Lists of typical forms are given for each zone and a list of all crustaceans arranged by the stations and expeditions; the penetration of various elements into Kara Sea is discussed (see map no. 2). Bibliography (27 items). Summary in English. (Arctic Biblio.)

Gur'ianova, E.F. 1936. Neue Beitrage zur Fauna der Crustacea-Malocostraca des Arktischen Gebietes. (New Contributions to the Crustacea-Malocostraca of the Arctic Regions.) Zoologischer Anzeiger 113:245-255.

Contains an annotated list, with localities, of fifteen (including with descriptions, five new) species of Amphipoda from Eurasian arctic seas. (Arctic Biblio.)

Gur'ianova, E.F. 1936. Rakoobraznye, t. 7, vyp. 3. Ravnonogie Dal'nevostochnykh Morei. (Crustaceans. Isopoda of the Far Eastern Seas.) IN: Fauna SSSR. Crustacea t. 7, vyp. 3, (Nov. Ser. No. 6). Izd-vo Akademiia Nauk SSSR. Moskva-Leningrad. 279 p.

Contains a morphological sketch of the Isopoda (p. 1-11) with data on ecology and biology (p. 12-14); a brief zoogeographic survey of the Bering, Okhotsk and Japanese Seas (p. 14-32). In the special part (p. 37-273) are keys to the sub-orders, families, genera and species, and a systematic list with brief diagnoses, synonyms, critical notes, and data on geographic distribution. Index of Latin names is appended (p. 274-78). This study includes 55 species of isopods native to Bering Sea and 47 species recorded in the Sea of Okhotsk. (Arctic Biblio.)

Gur'ianova, E.F. 1938. On the Question of the Composition and Origin of the Fauna of the Polar Basin Bassalia. Academiia Nauk SSSR. Comptes Rendus. Doklady. Nouv. Ser. 20(4):333-336.

An analysis of deep-sea Crustacea of the Arctic Basin indicating that the abyssal fauna of this basin indicating that the abyssal fauna of this basin is "original, autochthonus and of relative recent age." Based on collections of the SADKO high latitude expedition of 1935. (Arctic Biblio.)

Gur'ianova, E.F. 1946. Individual'naia i Vozrastnaia Izmenchivost' Morskogo Tarakana: ee Znachenie v Evolutsii Roda Mesidothea Rich. (Individual and Age Variability of the Marine Anellid and its Significance in the Evolution of the Genus Mesidothea Rich. Akademiia Nauk SSSR. Zoologicheskii Institut. Trudy. 8(1):105-144.

Contains the results of a study of Mesidothea entomon, a marine species of crustaceans (sometimes called "hog-lice") from various northern (including White, Bering, Okhotsk and Chukchi) seas, Siberian river estuaries and glacial lakes. The author deals with the influence of environmental factors (chiefly salinity) on its variability (arctic material on p. 116-117, 119-120, 124, 128-29). Summary in English. (Arctic Biblio.)

Gur'ianova, E.F. 1946. Novye Vidy Isopoda i Amphipoda iz Severnogo Ledovitogo Okeana. (New Species of Isopoda and Amphipoda from the Arctic Ocean.) Dreifuiu-shclaia Ekspeditsiia Glavsevmorputi na Ledokol'nom Parokhode "G. Sedov" 1937-1940 gg. Trudy. 3:272-297.

Description of twenty-five new species of these crustaceans collected by the ice-breaker SADKO in 1935 and 1937. Station list shows locations and depths. Summary in English (Arctic Biblio.)

Gur'ianova, E.F. 1948. Amphipoda Tikhogo Okeana. II. Stenothoidae Dal'nevostochnykh Morei. (Amphipoda of the Pacific Ocean, II. Stenothoidae of the Far Eastern SEas.) In: Pavlovskii, E.N. 1948. Pamiati Akad. S.A. Zernova. p. 287-325.

Contains a list of 37 species of small crustacean amphipods of the family Stenothoidae, native to the northern Pacific, with data on their distribution in Chukchi, Bering, and Japan Seas and in North American waters. Descriptions are given for 18 new species, including 13 inhabiting the Bering Sea and one from Bering and Chukchi Seas. In a supplement, p. 322-25, is a systematic list of 137 species of Stenothoidea with data on their total distribution. (Arctic Biblio.)

Gur'ianova, E.F. 1949. Fauna Poliarnogo Baseina i Puti ee Obmena s Faunami Sosednikh Rainov Mirovogo Okena. (Fauna of the Arctic Basin and its Exchange with Fauna of Adjoining Regions of the World Ocean.) In: Vseosoiuznyi Geograpficheskii s'ezd 2d, Leningrad, 1947. Trudy. 3:202-203.

Theses of a paper (delivered to the Second All-Union Geographical Congress, Leningrad, 1947) pointing out that the present arctic fauna represents a merger of two ancient arctic faunas originated in Kara Sea (Siberian Center) and in Chukchi and Beaufort Seas (Chukchi-American center), with some added elements from Atlantic and Pacific Oceans. (Arctic Biblo.)

Gur'ianova, E.F. 1950. K Faune Ravononogikh Rakov (Isopoda) Tikhogo Okeana, V. Izopody po Sboram Kamchatskoi Morskoi Stantsii Gosudarstvennogo. Gidrologicheskogo Instituta. [To the Fauna of Isopod Shrimps (Isopoda) of the Pacific Ocean, V. The Isopods form the Collections of the Oceanographic Station of the State Hydro-logical Institute.] Akademiia Nauk SSSR Zoologicheskii Institut, Issledovaniia Dal'nevostochnykh Morei SSSR. 2:280-292.

Contains a description of 18 species of these crustaceans (4 of them new), collected during 1932-35 on the shores of southeastern Kamchatka. The new species described here are: Janiropsis setifera, Gurjanova sp. n.; Nannomiscella vinogradovi Gurjanova sp. n. Idothea spasskii, Gurjanova sp. n. and a fourth species described earlier. In addition to the description (morphology), data are offered on occurrence, geographic distribution, ecology, etc. (Arctic Biblio.)

Gur'ianova, E.F. 1951. Bokoplavy Morei SSSR i Sopredel'nykh Stran (Amphipoda-Gammaridea.) (Gammaridea of the Seas of the U.S.S.R. and Adjacent Waters.) Akademiia Nauk SSSR. Opredeliteli po Faune SSSR. Izd-vo Akademii Nauk SSSR, Moska-Leningrad. 1029 p.

Contains (in the general part p. 5-145) a systematic index of the families and general of marine amphipodous crustaceans of the suborder Gammaridea, followed by data on the systematic position, a morphological sket , remarks on phylogeny and evolotion, details of geographic distribution, notes on the biology and economic importance, and bibliography (125 items). In the systematic part (p. 147-1010) are tables for the determination of families, genera and species with literature citations and data on habitat and geographic distribution. An index of Latin names is appended (p. 1011-1029). Distributional data for the northern waters of the U.S.S.R. are given (p. 69-106), lists of arctic and Far Eastern (Bering and Okhotsk Seas) species (p. 123-33), and diagnoses of several arctic forms. (Arctic Biblio.)

Gur'ianova, E.F. 1952. K Faune Vysshikh Rakoobranznykh. (Crustacea-Malacostraca) Severnoi Chasti Tikhogo Okeana. (A Contribution to the fauna of Higher Crustacea Malacostraca of the Northern Section of the Pacific Ocean.) Akademiia Nauk SSSR. Zoologicheskii Institut. Issledovaniia Dal'nevostochnykh Morei SSSR. 3:113-115.

Contains a systematic list of four species of marine crustaceans collected in 1946, southeast of Kamchatka Peninsula, at a depth of 4100-4200 m.; and a key to the species of the genus Cyphocaris. (Arctic Biblio.)

Gur'ianova, E.F. 1957. Kratkie Rezul'taty Gidrobiologicheskikh Issledovanii Mezenskogo Zaliva Letom 1952 Goda. (Brief Account of Hydro-biological Investigations of the Gulf of Mezen during Summer 1952.) Akademiia Nauk SSSR. Karel'skii Filial, Petrozavodsk. Materialy po Kompleksnomu Izucheniiu belogo Moria. 1:252-281.

Divisions of the White Sea, including the Gulf of Mezen, bottom invertebrates and fishes, physical conditions and their ecological effects are outlined. Zoogeographic nature and origin of the fauna, their marine zones and principal boicenoses are considered. Mezen is compared with other bays of the White Sea; its littoral is dealt with also. (Arctic Biblio.)

Gur'ianova, E.F. 1961. Comparative Research of Biology of the Littoral in the Far Eastern Seas. Pacific Science Congress. 9th, Bangkok, Tahiland, 1957. Proceedings. Zoology 19:75-86.

Discusses some bionomic and biogeographical conclusions based on Russian research (cited in the references) during the past 30 yrs. along the northern and eastern coasts of the Soviet Union. Principles of vertical zonation of the littoral by tidal sea-levels (Vaillant) and by distribution of species and communities (Stephenson) were applied to the various coastal regions studied, and are illustrated by a few examples from northern seas e.g. Commander Islands. The most specific feature of the Far Eastern Seas is the existence of a horizon between the littoral and sublittoral that is exposed only during winter (Oct-April) ebb tides. (Arctic Biblio.)

Gur'ianova, E.F. 1964. Fauna Amphipoda i Isopoda Priatlanticheskoi v Padiny Arkticheskogo Basseina, Kotloviny Nansena. (Amphipoda and Isopoda of a Depression of the Arctic Basin, the Nansen Basin.) Arkticheskii i Antarkicheskii Nauchno-Issledovatel'skogo Instituta. Trudy. 259:255-315.

Reviews earlier faunistic studies in the general area, presents records of some some 50 isopods and 250 amphipods collected during 1934-1956. The material is presented in taxonomic order and each form is dealt with as to date and location of find, depth, water temperature, and geographic distribution. (Arctic Biblio.)

Gur'ianova, E.F. and P.V. Ushakov. 1926. K Ekologii i Geograficheskomu Rasprostraneniiu Balanoglossus v Russkikh Severnykh Moriakh. (On the Ecology and Geographic Distribution of Balanoglossus in Russian Northern Seas.) Gidrobiologicheskii Zhurnal SSSR 5(1-2):11-17.

Contains data on systematics and ecology of the marine burrowing worm of the genus Balanoglossus including B. mereschkowskii native to the White Sea, Murman coast and Novaya Zemlya waters; and another unnamed species of B. found in the central section of the White Sea. Summary in German. (Arctic Biblio.)

Gur'ianova, E.F. and P.V. Ushakov. 1928. K Faune Chernoi Guby na Novoi Zemle. (The Fauna of Chernaya Bay on Novaya Zemlya.) Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 6:5-72.

Investigations of State Hydrographic Institutte 1925, and other on the south west coast 1923-1927, and the topography of this bay (70°41'N 54°v0'E.)are outlined. The nature of the bottom and hydrology of the bay, animal distribtion and faunistic nature of the neighboring sea, of the channel and central bay, also fauna of the shore pools and those furthur inland are described. Trawling and dredging reports from the stations investigated are presented with list of animals found. The closed part of the bay showed signs of stagnation and so did some pools. The fauna is largely arctic with some boreal and warm-water elements. (Arctic Biblio.)

Gur'ianova, E.F. and P.V. Ushakov. 1929. Litoral Vostochnogo Murmana. (The Littoral of the Eastern Murman.) Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR 10:5-40.

A detailed description of the areas investigated: Teriberka, Porchnikha Bay, Rynda and Zolotaya and their fauna. In the first area, the littoral of Lodeynaya Bay was found to be bery rich, that of the others the more depleted the more they are exposed to wave action. Salinity varied from 34-30$^\circ/_{\circ\circ}$ to 0 in the river mouths. The effects of sea action upon animal distribution, horizontal and vertical, and upon the forms of some animals is also discussed as well as the effects of the nature of the bottom. (Arctic Biblio.)

Gustafson, G. 1936. Polychaeta and Sipunculoidea from the Siberain Arctic Ocean. Maud Expedition, 1918-1925. Scientific Reports, V. 5, No. 17. John Grieg, Bergen. 12 p.

List, with localities, notes on distribution and remarks, of twenty-four species of annelid worms collected in the Chukchi, East Siberian and Laptev Seas; with list of stations; bibliography (18 items.) (Arctic Biblio.)

Hagerman, L. 1968. The Ostracod Fauna of Corallina officinalis L. in Sarsia 36:49-54.

Havens, A.D. and W.L. Rork. 1969. Hymenodora glacialis (Decapoda:natantia) from the Arctic Basin. Southern California Academy of Sciences. Bulletin. 68:19-29.

Higgins, R.P. 1966. Echinoderes arlis, a New Kinorhynch from the Arctic Ocean. Pacific Science 20(4):518-520.

The first kinorhynch reported from within the Arctic Circle was Centroderes arcticus (Steiner, 1919) n. comb. This species was originally described in one of several invalid "larval general", gen Centropsis Zelinka, 1907. Fam Echinoderidae Butschli, 1876 has been reported from as far north as Bergen, Norway and the northern Baltic Sea, its southern limit of distribution is South Georgia Island in the Southern Atlantic. Members of the single genus within this family, Echinoderes Claparede, 1863, are widely distributed and are common representatives of the phylum kinorhyncha. The species described in this paper is the first member of the genera Echinoderes reported from within the Arctic Circle and is from the greatest recorded depth for the phylum. (Arctic Biblio.)

Hilton, W.A. 1942. Pantopoda. Pantopoda Chiefly from the Pacific. Jouranl of Entomology and Zoology 34:3-7, 38-41.

Of the thirty-five species of sea spiders described, fifteen (including thirteen new) species, were found in Aleutian waters, Bering Sea, the Gulf of Alaska, and North Alaskan Waters (Arctic Biblio.)

Holmquist, C.M. 1963. Some Notes on Mysis relicta and its Relatives in Northern Alaska. Arctic 16(2):109-128.

Reports studies of mysids on the Arctic Slope and adjacent continental shelf off Barrow in summer 1961. Several localitites, there physical and chemical properties and faunal compositions described, were investigated as possible habitats of Mysis. M. Relicta were found in abundance in a freshwater lake, a marine lagoon, and a metahaline pond; the species apparently prefers shallow inland waters to the open sea. The absence of mysids from several freshwater lakes is attributed to isolation. Dispersal in this unglaciated area is considered, also possible interspecific competition between M. relicta and litoralis. (Arctic Biblio.)

Holmquist, C.M. 1965. The Amphipod Genus Pseudalibratus. Zeitschrift fur Zoologische Systematik and Evolutionforschung 3(1-2):19-46.

Comparative morphological study of own and museum collections, from Alaskan (esp. Nuwuk Pond near Pt. Barrow) and West Greenland waters. Ps. Littoralis, Ps. nanseni and Ps. glacialis are recognized as genuine species, apparently of circumpolar distribution. Ps. birulai could not be definitely classified for lack of Caspian material. (Arctic Biblio.)

Holmquist, C. 1972. Spongilla Lacustris (L.) (Porifera) from Northern Alaska and Northwestern Canada. Zoologischer Anzeiger 191(5/6):300-309.

A fresh-water sponge, found in the area of continuous permafrost in northern Alasks and northwestern Canada, was identified as Spongilla lucustris (L.). The morphology indicates that Sp. arctica Annandale should be considered most properly as a synonym of this species. A discussion of ecological conditions indicates the possibility of the sponge being found to a greater extent than was previously thought on the Arctic Slope of Alaska, as well as in the Arctic as a whole. (Author).

Holmquist, C. 1973. Taxonomy, Distribution and Ecology of the Three Species Neomysis intermedia (Czernizvsky), N. awatschensis (Brandt) and N. mercedis Holmes (Crustacea, Mysidacea). Zoologische Jahrbucher. A bteilung fur Systematik Okologie und Geographie der Tiere. 100:197-222.

On the basis of samples from North American Pacific coasts, from northern Alaska and from Japan, it is stressed that no doubt remains as to the validity of the three mysid species Neomysis intermedia (Czerniavsky), N. awatschensis (Brandt) and N. mercedis Holmes. N. mercedis appears as a North American Pacific species, N. awatschensis as an Asiatic Pacific to Alaskan species. They are all rather euryhaline and eurythermic. (Author).

Holmquist, C. 1974. On Alexandrovia onegensis Hrabe from Alaska, with a Revision of the Telmatodrilinae (Oligochaeta, Tubificidae). Zoologische Jahrbucher. Abteilung fur Systematik Okologie und Geographie der Tiere. 101:249-268.

Finds of the tubificid worm Alexandrovia onegensis Hrabe, 1962 in northern Alaska have led to a revision of the subfamily Telmatodrilinae and the genus Telmatodrilus Eisen, 1879 as grouped by Brinkhurst. A summary of the distribution and ecology of the worms was also given. (Author)

Hufford, G.L., S.H. Fortier, D.E. Wolfe, J.F. Doster and D.L. Noble. 1974. WEBSEC-71-72, An Ecological Survey in the Beaufort Sea. U.S. Coast Guard Oceanographic Report No. 64. United States Coast Guard Oceanographic Unit, Washington, DC 282 p.

The report contains a collection of scientific papers from two successive marine ecological baseline cruises to the Western Beaufort Sea (August-September 1971 and 1972). Preliminary results of the physical, chemical, biological, and geological data are presented and interpreted. The results indicate that the data were collected in a marine ecosystem that is still in a relatively unpolluted State. The data should provide a base for assessing the affects of pollution from future development, especially from petroleum. (NTIS).

Hulsemann, K. 1962. Marine Pelecypoda from the North Alaskan Coast. Veliger 5(2):67-73.

Describes 12 lamellibranchs dredged from shallow waters between Point Barrow and Baxter Island in August 1953. Geographic distribution of the species, four of them new to the area, is discussed. Earlier work is mentioned. (Arctic Biblio.)

Hulsemann, L. and J.D. Soule. 1962. Bryozoa from the Arctic Alaskan Coast. Arctic 15(3):228-230.

Lists 11, mostly common species of brozoans collected in August 1953 between 145°14'N and 155°48'W; manner of occurance and general distribution are noted. Location of each of the 12 stations, depth, and sediment type from which material was collected, also presence of kelp are indicated. (Arctic Biblio.)

Hunkins, K., M. Ewing, B. Heezen and R. Menzies. 1960. Biological and Geological Observations on the First Photographs of the Arctic Ocean Deep-Sea Floor. Limnology and Oceanography 5:154-161.

Hunkins, K., G. Mathieu, S. Teeter and A. Gill. 1970. The Floor of the Arctic Ocean in Photographs. Arctic 23(3):175-189.

Huntsman, A.G. 1922. Ascidiacea. Canadian Arctic Expedition, 1913-1918. Report. Vol. 6: Fishes and Tunicates, Pt. B. Kings Printer, Ottawa. 14 p.

Lists with descriptions, locations and synonymy, of sixteen species of tunicates from fourteen dredging stations off the Alaskan coast and in Dolphin and Union Strait, off the Canadian arctic coast. (Arctic Biblio.)

Hyman, L.H. 1953. The Polyclad Flatworms of the Pacific Coast of North America. American Museum of Natural History, New York. Bulletin. 100(2):265-392.

Contains a critical revision of 67 species of polyclad flatworms, comprising 48 Acotylea and 19 Cotylea native to the Pacific coast of North America; with data on material, form, color, eyes, digestive system, copulatory apparatus, differential characters, distribution, holotype and remarks. Nine new genera, 36 new species and one new variety are recorded, including the following from Alaskan areas: Kaburakia excelsa (Sitka), Notoplane atomate (Pt. Barrow), N. Longastyletta new comb. (Aleutian Islands), N. sanjuania (Pavlov Bay), and Acerotisa arctica n. sp. (Pt. Barrow). (Arctic Biblio.)

Iakovleva, A.M. 1952. Pantsyrnye Molliuski Morei SSSR. (Loricata). [Chitons (loricata) of the Seas of the U.S.S.R.] Izd-vo Akademii Nauk SSSR, Moskva-Leningrad. 107 p.

Contains in the general part, a systematic index to marine species of the class Loricata (p, 5-6); followed by an introduction (p. 7-43) giving a brief characterization and mrophological and anatomical sketch of loricata, biology, Phylogeny, geographic distribution, and methodics of determination; also a bibliography (107 items). In the systematic part (p. 48-104) are given keys to the orders, families, genera and species, and descriptions of 42 species of chitons (one family, two genera and 11 species are new to science), with synonyms, literature references, critical notes and data on ecology and distribution. Index of Latin names in appendix p. 105-107. Many species native to northern waters of the U.S.S.R. and adjoining seas are included in this work (see table 9 on p. 38-39). (Arctic Biblio.)

Ingham, M.C., B.A. Rutland, P.W. Barnes, G.E. Watson and G.J. Divoky. 1972. WEBSEC-70, An Ecological Survey in the Eastern Chukchi Sea. September-October 1970. United States Coast Guard Oceanographic Report No. 50. United States Coast Guard Oceanographic Unit, Washington, D.C. 206 p.

Oceanographic stations were occupied by the USCGC CLACIER in the eastern Chukchi Sea during 25 September-17 October 1970. The currents and distribution of physical and chemical variables are described. Geologic sampling was carried out in the same area, using a variety of field techniques to define the sediment distribution pattern and particle transport processes. Water turbidity, bottom sediments along with current measurements and water mass data are discussed. Pelagic bird and mammal observations were made in the area, providing new fall distributional feeding information for the biologically little known area from Point Barrow to Cape Lisburne. Preliminary results of studies of sedimentation, macrobenthic population and trace metal chemistry of sea water of the east central Chukchi Sea are described. Sixty-two categories of zooplankton were identified from 77 vertical tows with the results of the data summarized in two tables and three charts. Fish were collected on 20 stations. Lists of species captured are presented. (NTIS).

International Polar Year, First. 1888. Lady Franklin Bay Expedition. Report on the Proceedings of the United States Expedition to Lady Franklin Bay, Grinnell Land. U.S. Government Printing Office, Washington D.C. Vol. 2, 738 p.

Scientific appendices (17) are presented in V. 2, accompanied by charts and tables of observations. Echinodermata, Vermes, Crustacea and pteropod Mollusca: notes (edited) and sketches by J.W. Fewkes of marine animals, collected near Fort Congor, May 17-June 3, 1883; identification impossible, but some never observed so far north, p. 47-53. Mollusca: Notes by W.H. Dall on about 14 specimens found near Fort Congor in 1883, p. 57-58. (Arctic Biblio.)

Ivanov, A.V. 1956. Pogonofory Severo-zapadnoi Chasti Tikhogo Okeana. (Pogonophora of the Northwestern Pacific.) Akademiia Nauk SSSR. Zoologicheskii Institut. Trudy. Problemnykh i Tematicheskikh Soveshchanii. 6:20-21.

Discusses briefly Soviet finds of this class (20 species, 5 families) and their body systems, anatomy, sexual conditions, taxonomy, including relations. (Arctic Biblio.)

Ivanova, S.S. 1957. Kachestvennaia i Kolichestvennaia Kharakteristika Bentosa Onezhskogo Zåliva Belogo Moria. (Qualitative and Quantitative Character of the Benthos in the Onega Bay of the White Sea). Akademiia Nauk SSSR. Karelskii Filial, Petrozavodsk. Materialy po Izucheniiu Belogo Moria. 1:355-380.

Account based on material collected in 1952, also repeatedly since 1946. Earlier studies were reviewed and data given on species making up the benthos. Its main faunistic complexes, their biomass and occurrence, species composition of the complexes quantitative distribution of the benthos, and distribution of the species are treated in turn. The bay was found to be rich in benthonic forms (mostly boreal and arcto-boreal) but rather poor in quantity. (Arctic Biblio.).

Johansson, K.E. 1927. Beitrage zur Kenntnis der Polychaeten-Familien Hermellidae, Sabellidae und Serpulidae. (Contributions to the Knowledge of Polychaeta Families Hermillidae, Sabellidae and Serpulidae). Zoologiska Bidrag Fran Uppsala 11:1-183.

Contains in chapters 1-4 (p. 1-63), a study of the biology and anatomy of marine annelid worms of the families Hermellidae, Sabellidae and Serpulidae and in Chapters 5-7 (p. 63-183), data on their systematic position, with a list of about 150 species from various waters (these species and one variety described as new) with synonyms, descriptions of new and more interesting species, critical notes and data on geographic distribution. Includes some species from arctic seas, Greenland and Bering Seas; a general bibliography (236 items). (Arctic Biblio.)

Jones, D.J. 1960. Ostracoda from the Central Arctic Basin. Geological Society of America. Bulletin. 71(12, pt. 2):1900.

Reports eight genera (Named) and 16 species, including two new forms, collected from the Basin floor, 1952-1955. Some show evidence of stratigraphic and geographic displacement. Noteworthy are the thin carapaces, extreme development of spines and other ornamentation, also absence of instars in some forms of these crustaceans. (Arctic Biblio.)

Jones, M.B. 1973. Geographical and Ecological Distribution of *Pariambus typicus* (Kroyer) (Amphipoda, Caprellidae). Crustaceana 25(2):204-210.

Joy, J.A. 1974. The Distribution and Ecology of the Benthic Ostracoda from the Central Arctic Ocean. Thesis, Wisconsin Univ., Madison. 125 p.

From the top 3 cm. of 64 central Arctic Ocean sediment cores, 33 samples have been found to contain ostracodes. The cores were taken from depths between 1351 and 3812 m. Of the remaining 31 barren cores, 29 were taken from depths exceeding 3600 m in the Canada Basin. All 19 ostracode species constitute a bathyal fauna which extends to approximately 3000 m. The bathyal fauna is found along Alpha Cordillera and Chukchi Rise. Only *Cytheropteron bronwynae* n. sp. and *Krithe bartonensis* (Jones) occur below approximately 3000 m. These two species compose the abyssal

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fauna. The central Arctic ostracode faunas are more similar to the faunas of Scandinavia than to faunas of the northern Pacific. (NTIS)

Just, J. 1970. Amphipoda from Joergen Broenlund Fjord, North Greenland. Meddelelser om Groenland 184(6):1-39.

Just, J. 1970. Cumacea from Joergen Broenlund Fjord, North Greenland. Meddelelser om Groenland 184(8):1-22.

Just, J. 1970. Decapoda, Mysidacea, Isopoda and Tanaidacea from Joergen Broenlund Fjord, North Greenland. Meddelelser om Groenland 184(9):1-32.

Kennett, James P. 1970. Comparison of Globigerina pachyderma (Ehrenberg) in Arctic and Antarctic Areas. Contributions from the Cushman Foundation for Foraminiferal Research 21(2):47-49.

Populations of Globigerina pachyderma in Arctic bottom sediments exhibit distinct morphological differences from those in Antarctic bottom sediments. Arctic populations are less heavily encrusted, more lobulate, have a higher arched aperture, and have a dominance of 4 1/2-chambered form (umbilical view), compared with a dominance of 4-chambered forms in Antarctic populations. Both are dominated by sinistrally coiling forms and they have similar size characteristics. Because of a shortage of morphological data on G. pachyderma in subArctic and northern hemisphere subtropical areas, it is not possible to determine whether these morphological differences result from phenotypic varitaion or subspeciation. Characteristic ranges of variation of G. pachyderma from both areas are illustrated by scanning-electron micrographs. (Author)

Khodkina, I.V. 1964. [Echinoderms of the Southern Part of the Barents Sea (on the Materials 1957-1959).] Murmanskogo Morskogo Biologicheskogo Instituta. Trudy. 6(10):41-75.

Kliuge, G.A. 1908. Beitrage zur Kenntnis der Bryozoen des Weissen Meeres. (Contributions to the Knowledge of Bryozoa of the White Sea.) Akademiia Nauk SSSR. Zoologicheskii Muzei. Ezhegodnik, 1907. 12(4):515-540.

Contains a systematic list of 81 bryozoans collected by the author in 1897 during his work at the Biological Station in the Solovetskiye Islands, White Sea, including descriptions of Membranipora heterospinosa and Schizoporella ussowi n. sp.; synonymy, critical notes and data on local distribution. (Arctic Biblio.)

Kliuge, G.A. 1908. Zur Kenntnis der Bryozoen von West Gronland. (A Contribution to the Knowledge of Bryozoa of West Greenland.) Akademiia Nauk SSSR. Zoologicheskii Muzei. Ezhegodnik, 1907. 12(4):546-554.

Contains a systematic list of 76 bryozoans collected by Dr. A.E. Ortmann in Inglefield Gulf, northwest Greenland, during the Peary Relief

Expedition in 1899 under Prof. Wm Libbey; includes a description of *Schizoporella ortmanni* n. sp. (Arctic Biblio.)

Kliuge, G.A. 1929. Die Bryozoen des Sibirischen Eismeeres. (Bryozoa of the Siberian Arctic Sea.) Leningradskoe Obshchestvo Estestvoispytalelei. Murmanskaia Biologicheskaia Stantsiia, Murmansk. 3(4):1-33.

Contains a preliminary report on the bryozoans (moss-like, colonial animals) collected by the VEGA (Nordenskiold, 1878-79); SARJA (Toll', 1900-1902), TAIMYR and VAIGACH (Vilkitskii, 1914-15) expeditions. 108 species are listed, nine of them new. The localities where each species was found, are given, together with a description of new forms or variations. The geographical distribution of the species is graphically summarized. (Arcitc Biblio.)

Kliuge, G.A. 1955. Novye i Maloizvestnye Mshanki (Bryozoa) iz Severnogo Ledovitogo Okeana II. (New and Little Known Species of Bryozoa from the Arcitc Ocean, II.) Akademiia Nauk SSSR. Zoologicheskii Institut. Trudy 18:63-99.

Contains description of three new genera, 39 new and a few little known species of bryozoans, mostly from the Russian arctic seas, but covering practically all arctic waters. (Arctic Biblio.)

Kliuge, G.A. 1961. Spisok Vidov Mshanok Bryozoa, Dal'nevostochnykh Morei SSSR. (List of Species of Bryzoa from the Far-Eastern Seas of U.S.S.R.) Akademiia Nauk SSSR. Zoologicheskii Institut. Issledovaniia Dal'nevostochnykh Morei SSSR 7:118-143.

Lists 223 forms from 70 years collections: 1879-1949, with notes on locations and geographic range, and depth of occurrence. The Bering, Okhotsk and Chukchi Seas harbor these invertebrates. (Arctic Biblio.)

Kliuge, G.A. 1962. Bryozoa of the Norhtern Seas of the USSR (Mshanki Severnykh Morei SSSR). Sharma, B.R. (trans.). 1975 Smithsonian Institute, Washington, D.C. 735 p. (Translation from Opredeliteli po Faune SSSR 76, 1962.

The identification key is a presentation of knowledge about the Bryozoan fauna of the northern seas (Polar Basin). This fundamental work is a product of about fifty years of research carried out by the scientist, German Avgustovich Kluge, and is based on sizable collections from several Soviet Arctic expeditions beginning from the first investigations of the expedition for Scientific Fishery Research at the coasts of Murmansk (ENPIM) which was organized at the end of the last century and the beginning of the present one, and the Russian Polar Expedition on the schooner Zarya in 1900-1902, and the subsequent high latitude expedition of recent years on expedition of recent years on expedition ships Sadko, Sibiryakov, Sedov, Litke, and others, as well as the Drifting Polar Stations (SP 1-4), which had collected sizable and extremely rich material from all regions of the northern seas. (NTIS)

Knipovich, N.M. 1891. K Voprosu o Zoogeograficheskikh Bielago Moria. (On the Zoogeographical Zones of the White Sea.) Viestnik Estestvoznaniia 2(6-7):201-206.

Contains a discussion of three zoogeographical zones of the White Sea established by the author, a comparison with subdivisions of other naturalists (S.M. Gertsenshtein and K.I. Khvorostanskii) and with similar zones of the Barents Sea; marine species typical for each zone are listed. (Arctic Biblio.)

Knipovich, N.M. 1900. Zur Kenntniss der Geologischen Geschichte der Fauna des Weissen und des Murman-Meeres. (Post Pliocaene Mollusken und Brachiopoden.) [On the Geologic History of the Fauna of White and Murman Seas (Post-Pliocene Molluscs and Brachiopods).] Vserossiiskoe Mineralogicheskoe Obshchestvo, Leningrad. Zapiski. Seriia 2. 38:1-169.

Based on collections of recent material made in 1898-99, by the Expedition for Scientific and Economic Investigations of the Murman Coast, and on post-Pliocene collections in the White Sea region, Novaya Zemlya and the Mruman coast. Discussion of the water temperature and recent molluscan and brachiopod faunas of the southern Barents and White Seas (p. 4-30); the localities and post-Pliocent collections of (a) Rybachiy Peninsula, Port Vladimir, Kildin Island, the Kola Bay region, the shores of Notozero (lake), and elsewhere along the north coast of Kola Peninsula (p. 31-48); (b) the White Sea coasts (p. 48-105); (c) the Mezen, Cheshskaya and Pechora Bay regions (p. 105-140); and (d) Novaya Zemlya (p. 141-48). Remarks on the 105 species of post-Pliocene fauna, relating them to interglacial, late glacial, and post-glacial subsidence in northern European Russia, and discussing paleoclimatic changes of the hydrologic regimes of the bordering seas. (Arctic Biblio.)

Knipovich, N.M. 1905. Uber das Vorkommen von Mytlius edulis L. in Tiefen Teilen des Weissen Meeres. (On the Occurrence of Mytilus edulis L. in Deep Waters of the White Sea.) Vserossiiskoe Mineralogicheskoe Obshchestvo, Leningrad. Zapiski. Ser. 2. 2(43):271-277.

Contains a report of the find of a mollusc, Mytilus edulis, a common representative of the littoral and warm water faunas in the deep and cold waters of the White Sea; with observations on the temperature and environmental conditions, and a discussion of the vertical distribution of this mollusc. (Arctic Biblio.)

Knox, G.A. 1959. Pelagic and Benthic Polychaetes of the Central Arctic Basin. In: Bushnell, V.C. (ed.). 1959. Geophysical Research Paper No. 63. U.S. Air Force. Cambridge Research Center, Bedford. p. 105-114.

A small but most northerly collection obtained (north of 80° N.), four species of pelagic polychaetes included. (Arctic Biblio.)

Kobiakova, Z.I. 1964. Materialy po Faune Decapoda iz Raionov Zemli Frantsa-Iosifa, Shpitsbergena i Grenlandskogo Moria. (Decapod Fauna from the area of Franz Joseph Land, Spitsbergen and the Greenland Sea.) Leningrad. Arkticheskii

i Antarkticheskii Nauchno-Issledovatel'skogo Instituta. Trudy. 259:322-329.

Records 16 forms of these crustaceans collected by the High Latitude Arctic Expeditions of 1955-1958. Location of finds, water temperature, vertical and geographic distribution, zoogeographic aspects, etc. are considered. (Arctic Biblio.)

Koltun, V.M. 1959. Donnaia Fauna Abissal'nykh Glubin Tsentral'nogo Poliarnogo Bassenina. (Bottom Fauna of the Abyssal Depths of the Central Arctic Basin.) Akademiia Nauk SSSR. Doklady. 129(3):662-665.

Lists bottom animals collected on various recent expeditions (1948-55) from depths down to 4000 m. The animals are listed in three groups: abyssal (40 forms), bathyal (37), and continental-shelf group (65). Occurrence and geographic origin are noted. (Arctic Biblio.)

Koltun, V.M. 1959. Kremnerogovye Gubki Severnykh i Dal'nevostochnykh Morei SSSR, Otriad Cornacuspongida. (Siliceous-horny Sponges of the Northern and Far Eastern Seas of the U.S.S.R.; Order Cornacuspongida.) Akademiia Nauk SSSR. Zoologicheskii Institut. Opredeliteli po Faune SSSR. 67:1-235.

A study of 191 species, 17 families, from various Russian collections and sources. The general part (p. 13-45) deals with the history of Russian study of sponges; anatomy and morphology of siliceous-horny sponges; propagation, embryology and growth; ecology; geographic distribution (largely subarctic and arctic) and vertical distribution. The succeeding, taxonomic part contains keys and information on morphology and anatomy, geographic distribution, synonyms, etc. (Arctic Biblio.)

Koltun, V.M. 1964. Gubki (Porifera), Sobrannye v Grenlandskom More i v Rainone k Severu ot Shpitsbergena i Zemli Frantsa-Iosifa Ekspeditsiiami na l/r "F. Litke" 1955 g., d/e "Ob" 1956 g., i d/e "Lena" 1957 i 1958 gg. (Sponges Collected in the Greenland Sea and in the Region North of Spitsbergen, and Franz Joseph Land, by the F. Litke in 1955, Ob in 1956, and Lena 1957, 1958. Leningrad. Arkticheskii i Antarkticheskii Nauchno-Issledovated'skogo Instituta. Trudy. 259:143-166.

Account of 92 forms, with notes on synonyms, location and depth of finds, morphology and geographic distribution. Data are also tabulated within a taxonomic framework. (Arcitc Biblio.)

Koltun, V.M. 1964. K Izucheniiu Donnoi Fauny Grenlanskogo Moria i Tsentral'noi Chasti Arkticheskogo Basseina. (Study of the Bottom Fauna of the Greenland Sea and the Central Part of the Arctic Basin.)

Kramp, P.L. 1963. Summary of the Zoological Results of the Godthaab Expedition 1928. Meddeleser om Groenland. 81(7):1-15.

Kuderskii, L.A. 1960. On the Assumed Suppression of Invertebrates with a Long Life Cycle in the White Sea. (O Predpolagaemom Ugnetenii Bespozvonochnykh s Dlitelnym Zhizennym Tsiklom v Belom More.) Slessers, M. (trans.). 1968. Naval Oceanographic Office, Washington, D.C. 13 p. (Translation of Zoologicheskii Zhurnal (USSR) 39(6(:826-831.

The material presented in the paper shows that the biomass of some invertebrates with a long life cycle, as well as that of the benthos of separate benthal coenoses (in particular, coenoses of Modiolus modiolus) in the White Sea appears to be higher than the corresponding biomass in the adjacent Barents Sea. This fact proves the incorrectness of V.V. Kuznetsov's opinion on the total depression of organisms of a lasting life cycle in the White Sea. (Author)

Kuderskii, L.A. 1962. Donnoe Soobshchestvo Modiolus modiolus Onezhskogo Zaliva Belogo Moria. (Bottom Biocneosis Modiolus modiolus in Onega Bay of the White Sea.) Akademiia Nauk SSSR. Karel'skii Filial. Trudy. 1962. (33):67-81.

Study of one of the main groupings in the benthos of this area based on over a hundred bottom samples collected in 1950 and 1951. Forms composing this association and their percentage, their biomass and zoogeographic origin, leading forms, total biomass in their associations, etc. are considered. Tables, graph, 14 references. (Arctic Biblio.)

Kuznetsov, V.V. 1948. Bioekologicheskaia Kharakteristika Massovykh Vidov Morskikh Bespozvonochnykh. Biologicheskii Tsikl Laguna vincta (Montagu)-Laguna divaricata (Fabricius) na Vostochnom Murmane. [Bioecological Characteristics of Mass-Species of the Marine Invertebrates. Biological Cycle of Laguna vincta (Montagu)-Laguna divaricata (Fabricius) in the Eastern Murman.] Akademiia Nauk SSSR. Murmanskaia Biologicheskaia Stantsiia. Dal'niye Zelentsy. Trudy. 1"192-214.

The author uses this widely-occurring mollusc as a representitive, typical of animals living on seaweeds. He traces its biological cycles of migration; rate of survival of offspring, and total biomass production of this species per area. Bibliography (25 items). (Arctic Biblio.)

Kuznetsov, V.V. 1948. Bioekologicheskaia Kharakteristika Massovykh Vidov Morskikh Bespozvonochnykh. Chast'2. Biologicheskii Tsikl Margarita helicina (Phipp.) Vostochnogo Murmana i Belogo Moria. [Bioecological Characteristics of Mass-Species of Marine Invertebrates, Part 2. Biological Cycle of Margarita helcina (Phipp.) of the Eastern Murman and the White Sea.)

Contains a biological and ecological study of this mollusc living on Laminaria saccharina abundant in the littoral zone of arctic seas. A general characterization is given of the Laminaria group for various months in Dal'ne-Zelenetskaya Bay on the eastern Murman coast and in Gridina Bay (Kandalaksha) of the White Sea. Then follow observations on the life cycle of Margarita helcina (tables 5-7) and its productivity. (Arctic Biblio.)

Kuznetsov, V.V. 1948. Biologiia i Biologicheskii Tsikl Lacuna pallidula Da Costa v Barentsovom More. (The Biology and Biological Cycle of Lacuna pallidula Da Costa in the Barents Sea.) In: Pavlovskii, E.N. Pamiati Akad. S.A. Zernova. p. 72-93.

Contains a study of this marine mollusc, Lacuna pallidula, carried out at the Murman Biological Station in 1939-41, with data on geographic distribution (horizontal and vertical), biomass and its flucuations, life cycle and productivity. (Arcitc Biblio.)

Kuznetsov, V.V. 1951. O Plodovitosti i Skorosti Rosta Nekotorykh Morskikh Bezpozvonochnykh. (On the Fertility and Growth Rate of Some Marine Invertebrates.) Akademiia Nauk SSSR. Doklady. 76(5):743-745.

Contains a study of the relation between the fertility and the rate of growth of some marine invertebrates, Eualus gaimardi, Hyas araneus and Littorina saxatilis, on the eastern Murman coast of Barents Sea and in Kandalaksha Bay in the White Sea. It is concluded that with the increase in the size of females, their fertility is also increased. but not in the same ratio. The intensity of the growth and fertility is also influenced by environmental conditions. (Arctic Biblio.)

Kuznetsov, V.V. 1953. Vliianie Kolebanii Faktorov Vneshnei Sredy na Nekotorye Biologicheskie Protsessy u Morskikh Bespozvonochnykh. (Effect of Fluctuation in Ambient Factors upon Some Biological Processes of Marine Invertebrates.) Zhurnal Obshchei Biologii. 14(6):413-423.

A study of the barnacle Balanus balanoides of the east Murman waters. Summers with small temperature amplitude produced earlier maturation, greater feritlity and larger animals. Similar conditions were observed in the hermit crab Pagurus pubescens and in a number of molluscs. (Arctic Biblio.)

Kuznetsov, V.V. 1954. Biologicheskie Osobennosti Belomorskoi Fauny. (Biological Peculiarities of the White Sea Fauna). Voprosy Ikhtiologii 2:25-31.

Contains a discussion of life span, body size and productivity of some bottom invertebrates and fishes of the White and Barents Seas; also rate of growth of a series of animals from both seas including cod and herring. A practical application of the findings is suggested. (Arctic Biblio. #40898)

Kuznetsov, V.V. 1957. Mnogoletnie Izmeneniia Biologicheskikh Svoistv Nekotorykh Bespozvonchnykh Belogo Moria. (Long-term Changes in Biological Properties of Some White Sea Invertebrates.) Zoologicheskii Zhurnal. 36(3):321-327.

A study of invertebrates with long life cycles (mainly bivalves and cirripedians) led the author to the conclusion that within the past hundred years or so, there occurred in the White Sea a decline in their range, growth and longevity and the degeneration or disappearance of some species. These changes he attributes to the mouth of this sea becoming shallow, which caused an increase of temperature and salinity ranges, and to an increase of O_2-deficiency due to accumulation of organic sediments. He suggests that these changes may have similarly affected some fish and fisheries. (Arctic Biblio.)

Kuznetsov, V.V. 1958. O Nekotorykh Osobennostiakh Biologicheskoi Produktivnosti Bespozvonochnykh s Dlitel'nym Zhiznennym Tsiklom v Severnykh Moriakh. (Some peculiarities of Biological Productivity among Invertebrates of Northern Seas with a Long Life Cycle.) Zhurnal Obshchei Biologii 19(6):467-471.

Contains discussion of life span among various groups of invertebrates of the Barents and White Seas; length of life of the same species at various latitudes and environments. Biomass and productivity are considered; the productivity of the sea (or its parts) cannot be expressed by its biomass alone (Arctic Biblo.)

Kuznetsov, V.V. 1960. Beloe More i Biologicheskie Osbennosti ego Flory i Fauny. (The White Sea and the Biological Features of its Flora and Fauna.) Izd-vo Akademii Nauk USSR. 322 p.

Comprehensive study based on author's long activity in this area and on other sources. Exploitation of the White Sea resources is reviewed from earlier times (p. 7-30), particularly the herring, navaga and salmon fisheries. The geological character of the basin and adjacent areas is outlined (p. 31-68), and some hydrometeorological particulars given (p. 69-111) including ice conditions and long-term climatic fluctuations and their biological effects. Biological features of phytoplankton and phytobenthos, *Fucus vesiculosus*, *F. inflatus*, and *J. serratus*, *Ascophyllum nodosum*, *Laminaria saccharina*, and other seaweeds and flowering plants. The invertebrates and fisheries are similarly treated (p. 179-291); the latter part of this chapter (p. 276 ff.) dealing with such general features as: size, numbers and whether they are increased or reduced, also growth, life cycles, life span, etc. Appended are alphabetic lists of authors, localities, and scientific names. (Arctic Biblio.)

Kuznetsov, V.V. 1963. O Biologii i Izmenchivosti; Eualus gaimardi Milne-Edwards. (Biology of Variability of Eualus gaimardi Milne-Edward.) Akademiia Nauk SSSR. Karel'skii Filial. Materialy po Kompleksnomu Izucheniiu Belogo Moria. 2:77-89.

Describes in detail the geographic distribution of this arcto-boreal, curcumpolar crustacean, its habitats, population (two) in the White Sea, and geographic races (three). Reproduction, planktonic stage, size and fertility variations in the Barents and White Seas are reported, as are growth, size and sex composition during female maturity in these seas. Age at maturity, number of reproductions, life span and morphology of geographic races are also considered. (Arctic Biblio.)

Kuznetsov, V.V. 1963. Vremia i Temperaturnye Usloviia Razmnosheniia Morskikh Bespozvonochnykh. (Periods and Temperature Conditions of Reproduction of Marine Invertebrates.) Akademiia Nauk SSSR. Karel'skii Filial. Materialy po Kompleksnomu Izucheniiu Belogo Moria. 2:35-52.

Extensive study covering over eightly invertebrates of the arctic arcto-boreal and boreal waters. The high amplitude of temperature tolerated by adult forms is stressed as well as the relationship between temperature, latitude and period of oviposition and hatching. The effect of low temperature in slowing down embryonal and larval development is also discussed. (Arctic Biblio.)

Kuznetsov, V.V. 1964. Biologiia Massovykh i Naibolee Obychnykh Vidov Rakoobraznykh Barentseva i Belogo Morei. (The Biology of Mass Species and Most common Species of Crustaceans in the Barents and White Seas.) Izd-vo Nauka, Moscow. 242p.

Study based on material collected in 1946-1953 and some other sources. The area covered by author's collections is the White Sea and a "tongue" of the Barents extending up to 72°N off southern Novaya Zemlya. Decapoda p. 7-94, Amphipoda p. 95-188, Isopoda p. 189-212, and Cirripedia p. 213-32 are treated in turn. Each species is dealt with as to frequency, horizontal and vertical distribution, seasonal fluctuation in numbers, size range, rate of growth, reproduction and development. An appendix deals with size distribution and fertility in different areas and depths studied. (Arctic Biblio.)

Kuznetsov, A. Distribution of Benthic Fauna in the Western Bering Sea by Trophic Zones and Some General Problems of Trophic Zonation. (Raspredelenie Donnoi Fauny Zapadnoi Chasti Beringova Morya po Troficheskim Zonam i Nekotorye Obshchie Voprosy Troficheskoi Zonalnosti.) Slessers, M. (trans). 1969 U.S. Naval Oceanographic Office, Washington, D.C. 103 p. (Translation of Akademiya Nauk SSSR. Institut Okeanologii). Trudy. 69:98-177.

The paper discusses the predominance of benthos groups within trophic zones and their distribution patterns in the Bering Sea. The trophical zonation of the bottom fauna in the Bering and Okhotsk Sea and the Pacific coastal line of Kamtshathka and North Kurile Islands are compared. A correlation between the trophic zones along the coasts of continents is discussed and charts showing the trophical zonation of the bottom fauna in the Asov and Baltic Sea are given (Author.)

Kuznetsov, V.V. and E.N. Alexandrova. 1969. On the Fauna of Crustacea of the Laptev Sea. Zoologicheskii Zhurnal 48:1095-1096.

Kuznetsov, V.V. and T.A. Matveeva. 1942. Materialy k Bioekologicheskoi Kharakteristike Morskikh Bespozvonovhnykh Vostochnogo Murmana. (Materials toward a Bioecological Characterization of Marine Invertebrates of the Eastern Murman.) Akademiia Nauk SSSR. Murmanskaia Biologicheskaia Stantsiia. Dal'niye Zelentsy. Trudy. 1:242-260.

The authors discuss about 90 species in regard to occurrence, common substrate or medium preferred, reproduction season, depth of habitat and other biological and ecological data. (Arctic Biblio.)

Kuzentsov, V.V. and T.A. Matveeva. 1948. Sezonnye i Sutochnye Izmeneniia Aktivnosti Napadeniia na Primanku u Morskikh Bezpozvonochnykh. (Seasonal and Diurnal Fluctuation in the Reaction of the Marine Invertebrates to Bait.) Priroba 3:66-68.

Contains results of a study carried out in the White and Barents Sea (eastern Murman) on the activity of marine invertebrates in taking bait: the most active species in both seas are *Anonyx nugax* and *Orchomenella minuta*; the diurnal activities of all investigated species are different (tables 1-4); they are not influenced by the tides apparently, but it is quite possible that the chief factor in fluctuation of activity is solar radiation; the results of the study are inconclusive. (Arctic Biblio.)

Lambe, L.M. 1900. Catalogue of the Recent Marine Sponges of Canada and Alaska. Canadian Field Naturalist. 14:153-172.

List, with bibliographic notes and data on distribution of ninety-one species from localities ranging between the Alaskan arctic waters, Bering Sea, Aleutian waters, Gulf of Alaska, Davis Strait, and Hudson Bay. (Arctic Biblio.)

LaRocque, J.A.A. 1953. Catalogue of the Recent Molluska of Canada. Canada. National Museum. Bulletin, No. 129. Biological Series, No. 44. Queens Printer, Ottawa. 406 p.

Marine, fresh-water and terrestrial molluscs found in Canada and adjacent Alaskan and Greenland waters, and Sea of Okhotsk, are listed. References, type locality, and exact range are given for each form. The new species confined to the 'Recent' are included. Tertiary range of living species is given. A selected bibliography (p. 347-77) and alphabetical index of genera and species are appended. (Arctic Biblio.)

Leshchinskaia, A.A. 1962. Biomassa Bentosa Obskoi Guby i ee Kormovoe Znachenie Dlia Ryb. (Biomass of the Benthos in Ob Bay and its Nutritative Value for the Fish.) Akademiia Nauk SSSR. Uralskii Filial. Salekhardskii Statsionar. Trudy. 2:27-40.

Describes fish yields in this inlet including the Taz estuary, earlier studies of their benthos, and the latters' role as fish food. As basis of the present study, over 250 samples collected in 1958-1060 were investigated, and outlined. Fish utilization of benthos and biomass of the latter are discussed. The average biomass of the bottom fauna was not rich during the period studies; the richest area was in the south. Appended (p. 41-75) are tabular date (on hydrological conditions, species, distribution, quantity, biomass, vertical migration, fish food, etc.) as well as the literature applicable to this and to a companion *infra*. (Arctic Biblio.)

Loeblich, A.R. and H. TAppan. 1953. Studies of Arctic Foraminifera. Smithsonian Miscellaneous Collections, V. 121, No. 7. Its Pub. 4105. Smithsonian Institute, Washington, D. C. 142 p.

Contains a study of foraminifera dredged in the summer of 1950 from the ocean bottom off Pt. Barrow northern Alaska, supplemented by material collected by the Albatross in the Arctic and sub-Arctic, and by Capt. R.A. Bartlett in Greenland and Canadian arctic areas. Introductory part (p. 1-10) deals with previous work; collecting stations; character of the Barrow fauna; and factors limiting its distribuiton. This is followed by systematic descriptions and illus. of 110 species belonging to 20 families and 56 genera; six genera and 21 species are new. (Arctic Biblio.)

Lomakina, N.B. 1956. Kumovye Raki, Cumacea, Dal'nevostochnykh Morei. (Cumacean Crustaceans of the Far-Eastern Seas.) Akademiia Nauk SSSR. Zoologicheskii Institut. Trudy Problemnykh i Tematecheskikh Soveshchanii. 6:81-82.

Notes of 50 species so far recorded in this area, 26 of them new, and one genus, Pavlovskeola, new. Species distribution in the individual seas (Bering, Okhotsk), zoogeographical origin, etc. are considered. (Arctic Biblio.)

Lomakina, N.B. 1958. Kumovye Raki, Cumacea, Morei SSSR. (Cumacean Crustaceans of the Soviet Seas.) Moska-Leningrad, Izd-vo Akademii Nauk SSSR. 302 p. (Akademiia Nauk SSSR. Zoologicheskii Institut. Opredilitel po Faune SSSR. No. 66.)

Monograph in two parts, the first (p. 3-79) offers a short description of the group and account of the morphology, anatomy and biology, the latter including movement, food and respiration, multiplication and growth. Geographic distribution and ecology inclusive of the arctic regions (p. 44-58) are discussed, as well as general classification and phylogeny, methods of collection, preservation and study. Pt. 2, the taxonomic part, presents identification tables, synonymy, descriptions of sexual dimorphism and geographic distribution. Some 150-200 forms are treated in turn. An index (scientific names) is appended, and a taxonomic guide to the species precedes the study proper. (Arctic Biblio.)

Lomakina, N.B. 1964. Myzidy, Kumatsei i Evfauzievye Raki (Mysidacea, Cumacea et Ruphausiacea) po Materialam Arkticheskikh Ekspeditsii na l/r "F. Litke" 1955 g., d/e "Ob'" 1956 g., i d/e "Lena" 1957 i 1958 gg. (Mysidacea, Cumacea and Euphausiacea from the Arctic Expeditions of the F. Litke 1955, Ob' 1956, and Lena 1957 and 1958. Leningrad. Arkticheskii i Antarkticheskii Nauchno-Issledovatel'skogo Instituta. Trudy 259:241-254.

Records finds of five, six and four species respectively of these crustaceans, with notes on location, depth, numbers retrieved and geographic distribution. The ecology and biology are also discussed and the four species of euphausids dealt with in detail as to occurrance, size, and reproduction. (Arctic Biblio.)

Lutzen, J. 1970. The Ascidians of Joergen Broenlund Fjord, North Greenland. Meddelelser om Groenland 184(7):15-22.

MacGinitie, G.E. 1954. Survey of Marine Invertebrate Fauna at Point Barrow, Alaska. 1948-50. Polar Record 7(48):137.

Contains notes on work done for U.S. Office of Naval Research by the writer, assisted by his wife and H. Feder. Plankton was sampled up to 20 miles offshore. (Arctic Biblio.)

MacGinitie, G.E. 1955. Distribution and Ecology of the Marine Invertebrates of Point Barrow, Alaska. Smithsonian Miscellaneous Collections. V. 128, no. 9. Publication 4221. Smithsonian Institute, Washington, D.C. 201 p.

Study based on observations and material collected during 1948-50. Earlier investigations, location and facilities of the Arctic Research Laboratory maintained by the U.S. Office of Naval Research at Pt. Barrow are stated. Sections follow on the chemical and physical aspects of the area: climate, geology, ice, currents, salinity and other features of the sea; general biological aspects such as distribution, and abundance of animals, their food, reproduction, adaptation to cold, etc.; methods of collecting, stations and course of dredging. This rather general part is followed by a discussion of animals and phenomena according to phyla (p. 115-87), with data on morphology, occurrence, development and reproduction, ecology, taxonomy, etc. Short notes on some common fishes and mammals are included (p. 183-87). A discussion with synoptic and comparative tables concludes the account. (Arctic Biblio.)

MacGinitie, N. 1959. Marine Mollusca of Point Barrow, Alaska. U.S. National Museum. Proceedings. 109(3412):59-208.

Account of over 110 species and 11 varieties dredged in the course of two summers from depths of less than 225 feet, only six stations being over 400 feet deep. Of the material, 18 species and four varieties are new to arctic America. Synonyms, material examined, location, morphology, geographic distribution, variations, etc., are considered. An alphabetical list, of species and genera and 27 plates with photographs are appended.

Makarov, V.V. 1937. K Faune Rakov-Otshel'nikov, Paguridae, Dal'nevostochnykh Morei. (The Fauna of Hermit-crabs, Paguridae, of the Far Eastern Seas.) Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 23:55-67.

Account of 20 species from material collected since 1926 in the Chukchi, Bering, Okhotsk and Japanese Seas. Synonyms, morphology, size, occurrence and geographical distribution are discussed. (Arctic Biblio.)

Makarov, V.V. 1937. Materialy po Kolichestvennomu Uchetu Donnoi Fauny Severnoi Chasti Beringova Moria i Chikotskogo Moria. (Materials to a Quantitative Estimate of the Bottom Fauna in the Northern Bering Sea and in the Chukchi Sea.) Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Isslodovaniia Morei. 25:260-291.

Description of bottom animal associations found in these areas, and based on sampling at 84 stations. The amount of biomass (weight of living matter per m^3 of water) is calculated both in average and for select animal groups. The northern Bering Sea was found to be the richer in bottom life, Chukchi Sea the poorer. (Arctic Biblio.)

Makarov, V.V. 1938. Fauna of the U.S.S.R. Crustacea, Vol. X, No. 3. Anomura. (Fauna SSSR. Rakoobraznye. Anomura.) Por, F.D. (trans.). 1962. Israel Program for Scientific Translations, Jerusalem. 283 p. (Translation from Izdatel'stvo Akademii Nauk SSSR. Moskva-Leningrad.)

Contains in the introduction (p. 1-44), a morphological sketch of decapod crustaceans, the so-called Anomura, with data on their biology, ecology, and phylogeny; a zoogeographic survey, and a note on their economic importance. (Paralithodes camtschatica, P. platypus, and P. brevipes, edible crabs); bibliography (95 items). In the special part (p. 45-289) are tables for the determination of superfamilies, families, subfamilies, genera and species; descriptions of 88 marine species and one subspecies, with synonyms, dimension and data on geographic distribution in Russian and extra-Russian waters. Many species native to Bering, Chukchi and Okhotsk Seas are included. Summary in English, p. 290-320. (Arctic Biblio.)

Makarov, V.V. 1941. Fauna Decapoda Beringova i Chukotskogo MOrei. (The Decapod Fauna of the Bering and Chukchi Seas.) Issledovaniia Dal'nevostochnykh Morei. 1:111-163.

Study, based on several collections, comprising 70 species of 24 genera. Following an introduction on earlier work, the individual species are recorded, with notes on location(s), depth, and geographic range. A general part (p. 144-57) deals with the character of the decapods of the two seas, distribution over particular areas, routes of spread, etc. From the character of its Decapoda, the Bering Sea is considered a boreal region. (Arctic Biblio.)

Mathews, J.B.L. 1964. On the Biology of Some Bottom-Living Copepods (Aetideidae and Phaennidae) from Western Norway. Sarsie 16:1-46.

McCauley, J.E. 1964. A Preliminary Report of the Benthic Animals Collected on the USCGC Northwind Cruise during 1962. U.S. Coast Guard Oceanographic Report. No. 1, p. 17-22.

McCauley, J.E. 1964. Gastropod Larvae from the Brood Pouch of an Arctic Shrimp. American Microscopical Society 83(3):290-293.

While examining a specimen of the shrimp Argis lar from the Chukchi Sea, author noticed attached egg cases of snail, probably Buccinum. The capsules contained eggs and larvae of all stages of development and then are described and illustrated. (Arctic Biblio.)

McCrimmon, H. and J. Bray. 1962. Observations on the Isopod Mesidotea entomon in the Western Canadian Arctic Ocean. Canada. Fisheries Research Board. Journal. 19(3):489-496.

Study of a great number of this crustacean from the Beaufort Sea. It was found to be most numerous on muddy bottoms where temperature ranged between -1.3 and +10°C.; no specimens were found in depths greater than 24 fathoms. Sexual dimorphism, age and maturation are also considered. (Arctic Biblio.)

McLaughlin, P.A. 1963. Survey of the Benthic Invertebrate Fauna of the Eastern Bering Sea. U.S. Fish and Wildlife Service. Special Scientific Report: Fisheries No. 401.

Reports an investigation in summers of 1958 and 1959 made in connection with king crab surveys. A check list is given of species of pelecypods, gastropods (except nudibranches), barnacles, decapod crustaceans, tunicates and most echinoderms found on the continental shelf; some other invertebrates are also listed. Annotations to each species include areas of occurrence. Catches on stations are also analyzed as to their species composition. Approx. 140 references. (Arctic Biblio.)

Mileikovsky, S.A. 1960. O Sviazi Mezhdu Temperaturnymi Granitsami Neresta Vida i ego Zoogeograpficheskoi. Prinadlezhnost'in v Morskikh Bespozvonochoiykh. (On the Relation between Temperature Spawning Range of a Species and its Zoogeographical Belonging in Marine Invertebrates.) Zoologicheskii Zhurnal 39(5):666-669.

Mileikovsky, S.A. 1968. Distribution of Pelagic Larvae of Bottom Invertebrates of the Norwegian and Barents Sea. Marine Biology. Berlin. 1(3):161-167.

Mileikovsky, S.A. 1968. Larval Development of Spicohaetopterus typicus M. Sars (Polychaeta, Chaetopteridae) from the Barents Sea and the Taxonomy of the Family Chaetopteridae and the Order Spiomorpha. Academii Nauk SSSR. Doklady. (Biological Sciences Section.) 174:423-505.

Mileikovsky, S.A. 1969. Breeding of the Starfish Asterias Rubeno L. in the White, Barents, Norwegian and other European Seas. Oceanology 8(4):553-562. [Translation of Okeanologiia 8(4)]

Mileikovsky, S.A. 1970. Seasonal and Daily Dynamics in Pelagic Larvae of Marine Shelf Bottom Invertebrates in Nearshore Waters of Kandalaksha Bay (White Sea). Marine Biology 5(3):180-194.

Mileikovsky, S.A. 1970. The Relation Between the Breeding and the Spawning of Marine Shallow Shelf Bottom Invertebrates and the Water Temperature. Akademiia Nauk SSSR. Instituta Okeanologii. Trudy. 88:113-149.

Miloslavskaia, N.M. 1958. Nekotorye Soobrazheniia o Bentose Vostochnogo Murmana i ego Roli v Zhizni Pikshi. (Some Considerations on the Benthos of Eastern Murman and its Role in the Life of Haddock.) Akademiia Nauk SSSR. Kol'skii Filial. Murmanskaia Biologicheskaia Stantsiia. Trudy. 4:151-156.

Discusses the abundance of fish and haddock on the Murman coast in historical times, effect of the nature of bottom; the role of benthos in determining the abundance of haddock along the coast; biomass of the benthos in this area; seasonal changes in feeding habits of haddock. (Arctic Biblio.)

Miloslavskaia, N.M. 1958. Novye Teplovodnye Molliuski v Faune Vostochnogo Murmana. (New Warm-water Molluscs in the Fauna of East Murman.) Zoologicheskii Zhurnal 37(6):939-942.

Author describes the occurrence of Propeamussium (Palliolum) vitreum Chemnitz, and Venus (Timoclea) ovata Pennant, and the morphology of their shells. Earlier records, warming of arctic waters, etc. are also discussed. (Arctic Biblio.)

Miloslavskaia, N.M. 1958. Osobennosti Razmeshcheniia Bentosa i Vozmozhnosti ego Ispol'zovaniia Treskovymi Rybami na Vostochnom Murmane. (Peculiarities of Benthos Distribution and Possibilities of its Utilization by Cod Fishes on the Eastern Murman.) In: Akademiia Nauk SSSR. Murmanskaia Biologicheskaia Stantsiia. Zakonomernosti Skoplenii. p. 103-125.

Study based largely on field work conducted during 1953-1955, on the occurrence of the various benthonic invertebrates on different types of bottom (over 150 species and 5 main types of sea bottom); ecological aspects of the benthos studied; specific traits of coastal benthos; utilization of this benthos by the various cod-like fish, largely haddock and cod; distribution of species used as food. (Arctic Biblio.)

Miloslavakaia, N.M. 1958. Temperaturnyi Faktor v Raspredelenii Dvustvorchatykh Molliuskov Vostochnogo Murmana. (Temperature Factor in the Distribution of Bivalve Molluscs in the Eastern Murman.) Akademiia Nauk SSSR. Kol'skii Filial. Murmanskaia Biologicheskaia Stantsiia. Trudy. 4:140-150.

Account based on year-round collection during 1953-1955, combined with measurement ob bottom temperatures. The distribution of 38 forms was established; both warm- and cold-water forms were found, as well as such of wide distribution. Micro-areas in the zone studied were also established. (Arctic Biblio.)

Miloslavskais, N.M. 1970. On the Absense of Thyasira flexuosa (Montagu) (Ungulinidae, Bivalvia, Mollusca) in the Fauna of the Seas of the Extreme North. Zooligicheskii Zhurnal 49:785-786.

Mohr, J.L. 1969. A Study of Marine Biology from Arctic Drift Station. University of Southern California, Los Angeles. 53 p.

This report reviews the activities of 27 marine biological field collectors between November 1959 and May 1969. The collections include the most extensive American collections of central arctic plankton, rather limited but significant arctic benthonic collections, important Northeast Greenland planktonic and benthonic collections, and the most complete and largest collection of cyamids. Special attention has been directed to occurrence of organisms in particular water masses and to relations with confluent seas' populations. For these studies on protozoans, jellyfishes and some crustaceans are significant. State of work on cyclical events, behavior, physiology, and biochemistry, and of affiliated studies on cetaceans and on arctic marine-influenced lakes is reported (Author).

Mohr, J.L. and S.R. Geiger. 1968. Arctic Basin Faunal Precis-Animals Taken Mainly from Arctic Drifting Stations and Their Significance for Biogeography and Water-mass Recognition. Arctic Drifting Stations. 1968:298-313.

The abundance of life in the Arctic ranges from considerable in favored areas of the continental shelf to negligible at the bottoms of deep basins. Even at the surface in the central Arctic Basin life is reduced to a few kinds and not many individuals except sporadically. There are periodic reminders, such as the occurrence of the octopus in the hydro-hole, animals the nets never take, and perhaps more significantly, the whole composition of the high Arctic polychaete fauna, that collection so far is incomplete and probably very incomplete for animals that can avoid catching devices. (Author)

Moiseev, P.A. 1970. Soviet Fisheries Investigations in the Northeastern Pacific, Part V. (Sovetskie Rybokhozyaitvenne Issledovaniya v Severo-Vostochnoi Chasti Tikhogo Okeana). Kaner, N. (trans) 1972. National Marine Fisheries Service, Washington, DC 469 p. (Translation of Vsesoyuznyi Naucho-Issledovatelskii Institut Morskogo Rybnogo Khozyaistva i Okeanograffi, Moscow. Trudy. 70:453 p., 1970.

Contents: Some problems of estimating biological resources of the oceans in the light of the results of the Bering Sea expedition; Principal results of latest investigations of bottom relief and sediments in fishing grounds in the North Pacific Ocean; Bottom relief and sediments and some features of the geological structure of the Continental Slope in the Eastern Bering Sea; Distribution of bottom areas in the Bering Sea suitable for trawling; mineral composition of the coarse silt fraction of recent sediments in the northwestern part of the Gulf of Alaska; Some hydrological characteristics of whale grounds in the Northeastern Pacific and the Bering and Chukchi Seas; Seasonal variations in primary production in the southeastern part of the Bering Sea; Plankton of the Eastern Bering Sea in spring and autumn; Winter and spring plankton in the southeastern part of the Bering Sea; Quantitative distribution of benthos on the Continental Slope of the eastern part of the Bering Sea; Distribution of the Deep-Sea Prawn (Pandalus borealis) in the Bering Sea and Gulf of Alaska; Some data on the distribution of King Crab (Paralithodes camtschatica) in the Southeastern Bering Sea; An estimation of the state of the King Crab (Paralithodes camtschatica) stock in the Southeastern Bering Sea. (NTIS). Also pub. as: Tikhookeanskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva i Okeanografii. Izvestiya. 72:453 p. 1970.

Moore, J.P. 1906. Descriptions of Two New Polychaeta from Alaska. Academy of Natural Sciences, Philadelphia. Proceedings. 58:352-355.

Syllis quaternaria and Ammotrypane brevis are described from the morphological point of view. Specimans of the former were taken by E.A. McIlhenny off Point Barrow, and a single example of the latter by Dr. Benjamin Sharp at Icy Cape, Northern Alaska. (Arctic Biblio.)

Moskalev, L.I. 1961. Pogonogory v Barentsevom More. (Pogonofora in the Barents Sea). Akademiia Nauk SSSR. Doklady. 137(3):730-731.

Reports finds of tubes, a few with the animals in them, of these peculiar invertebrates in the southwestern part of this sea. The finds are identified as belonging to the genus Diplobrachia. (Arctic Biblio.)

Muench, R.D., M.J. Moyniham, E.J. Tennyson, Jr., W.G. Tidmarsh, W. Gordon, and R.B. Theroux. 1971. Oceanographic Observations in Baffin Bay during July-September 1968. U.S. Coast Guard Oceanographic Report No. 37.

Oceanographic conditions in Smith Sound, Norther Baffin Bay, Disko Bay, and southeastern Baffin Bay during the summer of 1968 are described. Vertical sections of temperature and salinity are presented and the relationship of these variables to Baffin Bay-North Water and the general circulation of Baffin Bay is discussed. Zooplankton collections in the Smith Sound region and macrobenthos collections in Disko Bay and several West Greenland Fjords are reported on. Listings on the physical and chemical station date are included. (Author)

Murdoch, J. 1885. Collecting Localities and Dredging Stations. In: International Polar Expedition, 1882-1883. Report of the international Polar Expedition to Point Barrow, Alaska p. 185-190.

Summarizes operations at six collecting localities (Cape Smythe Beach, Elson Lagoon, waters off Cape Smythe, off Franklin Point, off Port Clarence, and head of Norton Sound), listing the species of invertebrates collected, and comparing the abundance of individuals, at each locality. (Arctic Biblio.)

Murdoch, J. 1885. Description of Seven New Species of Crustacea and One Worm from Arctic Alaska. U.S. National Museum. Proceedings, 1884. 7:518-552.

Descriptions based on specimens collected from waters off Point Barrow and Point Franklin, 1883, during the First International Polar Year Expedition to Point Barrow. (Arctic Biblio.)

Murdoch, John. 1885. Marine Invertebrates (Exclusive of Mollusks). In: International Polar Expedition, 1882-1883. Report of the International Polar Expedition to Point Barrow, Alaska. p. 136-176.

Systematic annotated list with synonymy, citations, and localities of 180 species some of which are described. Obtained from tundra pools (four species of crustaceans) and beach near Point Barrow, Point Franklin, Port Clarence, in Norton Sound, Gulf of Alaska, and Plover Bay (Siberia). Includes comments on coelenterates by J. Walker Fewkes. Bibliography (about 100 items). (Arctic Biblio.)

Murina, V. V. 1964. K Voprosu o Bipoliarnom Rasprostranenii Priapulid. (The Bipolar Distribution of Priapulids). Okeanologiia 4(5):873-875.

Of eight species of the phylum Priapulida, each of three pairs is symmetricahly distributed in the Arctic and Antarctic, and closely related. This bipolar distribution is assumed to have taken place via the cold abyssal waters of the tropics. The assumption is supported by the fact that a subspecies of the bipolar forms and the other two species of these marine worms have an abyssal, tropic-subtropic distribution. (Arctic Biblio.)

Murina, V. V. 1964. Novye i Redkie Vidy Glubokovodnykh Sipunkulid Roda Golfingia. (New and Rare Species of Deep-Sea Sipunculids of the Genus Golfingia). Akademiia Nauk SSSR. Institut Okeanologii. Trudy. 69:216-253.

Describes 91 speciment belonging to 12 species of these interesting worms, collected by different expeditions during 1947-1958 from depths of about 1000-6800 m. Two species, G. tasmaniensis and G. vitjazi n. sp. are treated in some detail. Age, sexual, ecological and geographic aspects are considered. Most of the species are arctic, antarctic or bipolar. (Arctic Biblio.)

Murray, J., J. Hjort, A. Appellof, H. H. Gran, and B. Helland-Hansen. 1965. Chapter 8, Invertebrate Bottom Fauna of the Norwegian Sea and North Atlantic. In: Murray, J. and J. Hjort. Depths of the Ocean. London. Original 1912. Reprint 1965. 821 p., p. 457-560.

Naumov, D.V. 1960. Gidroidy i Gidremeduzy Morskikh, Solonovatovodnykh i Presnovodnykh Basseinov SSSR. (Hydroids and Hydromedusae of the Marine, Brackish and Fresh Waters of the U.S.S.R.) Akademiia Nauk SSSR. Zoologicheskii Institut. Opredeliteli po Faune SSSR. 70.

A comprehensive study of the invertebrates covering 26 families with 333 species. Its genera; part (p. 19-164) deals with the morphology and anatomy, development and life cycles, organismal interegation within the colonies, phylogeny and origin, taxonomy, and geographic distribution. In the special part (p. 165-571) are keys and descriptions of taxa, the latter including information on synonyms, anatomy, distribution, etc. The majority of forms dealt with are arctic or subarctic. Plates (30) contain photographic reporductions, some in color. A scientific, alphabetic index it included. (Arctic Biblio.)

Neale, J.W. and H.V. Howe. 1973. New Cold Water Recent and Pleistocene Species of the Ostracod Genus Cytheropteron. Crustaceana 25(3):237-244.

Neiman, A.A. 1960. Quantitative Distribution of Benthos in the Eastern Bering Sea. (Kolichestvennoe Raspredelenie Bentosa V Vostochnoi Chasti Beringova Morya.) Slessers, M. (trans.) 1968. Naval Oceanographic Office, Washington, D.C. 21 p. (Translation of Zoologicheskii Zhurnal 39(9):1281-1292.

In August-September benthos sampling on the shelf and the upper portion of the slope was carried out in the eastern part of the Bering Sea. Altogether, 104 dredge stations were occupied at depths from 20 to 500m. The mean benthos biomass in this region makes up 74.4g/sg. m, the main part consisting of bivalves and echinoderms. Qualitatively, the benthos of the investigated area can be divided into two complexes; low-arctic and boreal ones. Low-arctic complex achieves its greatest development in the northwestern part of the area investigated where it stretches from the shore to the isobath of 100m, while in the southeastern part it is situated in the narrow band at the depth of 50 to 70m. The remaining area of the shelf and upper horizons of the slope are occupied by boreal fauna. Low-arctic complex is characterized by Macoma calcarea and Ophiura sarsi, while the boreal one is characterized by Echinarachnius parma and Yoldia traciaeformis. (Author)

Nesis, K.N. 1959. Raspredpdenie Borealnykh Donnykh Zhivotnykh u Beregov Zapadnogo Shpitsbergena. (Distribution of the Boreal Bottom Animals along the Coasts of Western Spitsbergen.) Akademiia Nauk SSSR. Doklady. 127(3):677-680.

Contains information on the currents of this area; effect of the warming up of the arctic waters; collections (1955-59) of bottom animals made by author, etc. Warm-water (boreal) forms were found in deeper waters along the west coast and were predominant in its southern part. Shallow water forms were exclusively arctic. (Arcitc Biblio.)

Nesis, K.N. 1960. Donnaia Fauna kak Pokazatel Gidrologicheskogo Rezhima Moria; na Primere Severo-Tsentralnogo Raiona Barentseva Moria. (The Bottom Fauna as Indicator of Hydrographic Conditions in the Sea; as Exemplified by the North-Central Region of the Barents Sea.) Murmansk. Poliarnyi Nauchno-

issledovatel'skii Institut Morskogo Rybnogo Khoziaistva i Okeanografii. Nauchno-tekhnicheskii Biulleten 3(13):34-36.

Reports on the benthos of a small (6.2 km^3), representative area as studied before the war and in 1957-58. Temperature, slainity, geographic origin of forms, benthic complexes (three), and their limits are noted in a general way. (Arctic Biblio.)

Nesis, K.N. 1962. Korally i Morskie Peria, Indikatory Gidrologicheskogo Rezhima. (Corals and Sea Pens as Indicators of the Hydrological Regime.) Okeanologiia 2(4):705-714.

Contains a description of currents in the northern and arctic Atlantic, followed by records of corals and sea pens collected in these areas by PINRO expeditions during 1954-1960. Depth and distribution of the finds are noted. An attempt is made to correlate the detailed distribution of these benthonic forms with the ambient water temperature, dependent in their turn on the water masses, their distribution and movements.

Nesis, K.N. 1965. Aspects of the Food Structure of a Marine Biocoenosis. Oceanology. Academy of Sciences, U.S.S.R. 5(4). 1965. English edition publ. July 1966. p. 96-107.

Newell, I.M. 1951. *Copedognathus curtis* Hall, 1912, and Other Species of *Copidognathus* from Western North America (Acari, Halocaridae). American Museum Novitates. No. 1499. American Museum of Natural History, New York. 27 p.

Detailed descriptions of five new species of marine mites, four from Aleutian waters, and one from north of Wainwright in Northern Alaska (with redescription of a California species); a study made possible through aid of the Arctic Institute of North America. (Arctic Biblio.)

Newell, I.M. 1951. Further Studies on Alaskan Halacaridae (Acari). American Museum Novitates, no. 1536. American Museum of Natural History, New York. 56 p.

Describes ten new species and one new subspecies of water mites and adds two new records for Alaskan waters, bringing the total discussed for the region to 27 species. Offers a table of principal specific characters to the genus *Copidognathus*, and a formula key to known species from the Arctic Ocean, Bering Sea, and the adjacent North Pacific. (Arctic Biblio.)

Nicol, D. 1955. An Analysis of Arctic Marine Pelecypod Fauna. Nautilus 68(4):115-122.

Contains a comparative analysis of several collections of these molluscs from circumpolar regions, viz. that of Dr. McGinitie from Point Barrow region, and those reported by Dr. Soot-Ryan, also some from Florida. The author concludes that the main component of this arctic fauna consists of ancient, primitive forms. A second, much smaller component is represented by "the more specialized burrowers". (Arctic Biblio.)

Nikolsky, G.V. 1965. Distant Northern Seas. International Council for the Exploration of the Sea. Annales Biologiques. 1963. 20:9-10.

Reviews temperature distribution in 1963 as compared with two preceeding years, plankton, quantity and quality, benthos and redfish. (Arctic Biblio.)

Nurminen, M. 1970. Records of Enchytraeidae (Oligochaeta) from the West Coast of Greenland. Annales Zoologici Fennici. 7:199-209.

Odh er, N. H. 1921. Norwegian Solenogastres. Bergen. Norway. Museum. Aarbok; Naturvidenskabig Raekke, 1918-1921. No. 3:1-86.

Contains a critical revision of Norwegian species of the Molluscan order Solenogastres, based on the study of collections in the museums of Bergen, Copenhagen, Gothenburg, Kristiania and Trondhjem, with a synopsis of all the forms treated in this paper and a descriptive section, (p. 10-54) dealing with systematics, morphology and distribution of each of 12 Norwegian species, including five native to Gr enland Sea and the Arctic Ocean. A comparative section contains general consideration of the organization and the relations of the Soleogastres, a Bibliography (28 items). (Arctic Biblio.)

Oldevig, H. 1959. Arctic, Subarctic and Scandinavian Amphipods in the Collection of the Swedish Natural History Museum in Stockholm. Goteborgs k. Vetenskaps-och Vitterhets-Samhalle. Handlingar, 6 Foljd., Ser. B. 8(2). 132 p. Also issues as: Goteborg, Sweden. Museum. Zoologiska Avdalningen. Meddelanden, 127.

Contains a systematic list of about 400 amphipods, of which two genera and 14 species are described as new. The data include localities, references to expeditions (chiefly Swedish), temperature, depths, ground frequency, etc. The range of the study includes practically all arctic seas of Eurasia and America. (Arctic Biblio.)

Osburn, R. C. 1923. Bryozoa. Canadian Arctic Expedition, 1913-1918. Report. V. 8: Mollusk, Echinoderms, Coelenterates, etc., Pt. D. King's Printer, Ottawa. 13 p.

List with notes on locations and distribution of fifty-eight species, of which fifty-one are from waters between Bering Strait and Bernard Harbor, N.W.T., and seven from Hudson Bay area. (Arctic Biblio.)

Osburn, R. C. 1955. The Circumpolar Distribution of Arctic-Alaskan Bryozoa. In: Essays in the Natural Sciences in Honor of Capt. Allan Hancock. University of Southern Californai, Los Angeles. p. 29-38.

Contains brief descussion based on the literature and on study by the author of 113 species from Pt. Barrow, northern Alaska. All but 11 of the species were already known from the Greenland to the Kara Sea region. Author concludes that there is no significant difference between bryozoa of the Pacific-Arctic and Atlantic-Arctic areas and that a preponderance of curcumpolar species exists in the Arctic Ocean. Table shows distribution of the 113 species from Alaska south along the Pacific Coast, Greenland south along the Atlantic Coast, and in northern Europe. (Arctic Biblio.)

Pakhomova, H.A. 1966. Decapod Crustacea in the Southern Part of the Barents Sea. Murmanskogo Morskogo Biologicheskogo Instituta. Trudy. 11(15):58-70.

Paul, A.Z. and R.Y. George. 1975. High Arctic Benthis Isopods from Fletcher's Ice Island, T-3, with a description of one new species, Mirabilicoxa fletcheri n. sp. Crustaceanan 29(2) 166-168.

Paul, A.Z. and R.J. Menzies. 1973. Benthic Ecology of the High Arctic Deep Sea. (Final Rept. Apr. 71-Sept. 73) Florida State Univ., Tallahassee. 349 p.

The investigation is an analyses of seventy-five quantitative benthis samples collected by the Mini-LUBS, twenty-eight qualitative benthic samples collected with the Small Biological Trawl, and fifty-two bottom camera stations taken from Fletcher's Ice Island, T-3 while it was drifting over the Alpha Cordillera region of the High Arctic Ocean during October 1969 through February 1970 and in March 1972. The depth range was 1000 to 2500 m. Benthic foraminiferans are responsible for about 53 per cent, bivalves for 27 percent, sponges for 7 percent, and polychaetes for 5 percent of the total biomass. Other groups make up the remaining 8 percent. In numbers, excluding Foraminifera, polychaetes are 42 percent, nematodes 16 percent, sponges 11 percent, and bivalves 8 percent of the total fauna. The reamining 23 percent is composed of thirteen other taxa. (Modified author abstract) Portions of this document are not fully legible. (NTIS).

Pavlovskii, E. N. (Ed.). 1955. Atlas of the Invertebrates of the Far Eastern Seas of the U.S.S.R. (Atlas Bespozvonochnykh Dal'nevostochnykh Morei SSSR). Mercado, A. (trans.). 1966. Israel Program for Scientific Translations. Jerusalem. 457p. (translation of Izdatel'stvo Akademii Nauk SSSR. Akademiia Nauk SSSR. Zoologicheskii Institut. Moskva-Leningrad. 1955.

Contains a brief historical outline of the study of the fauna of far eastern seas. The atlas covers the most common and characteristic invertebrate froms of the far eastern seas of the U.S.S.R. extending from the Korean Coast to the Bering Strait. Includes 66 plates. (Arctic Biblio.)

Pergament, T. S. 1957. Raspredelenie Bentosa v Pribrezhnoi Zone Vostochnogo Murmana. (Distribution of Benthos in the Coastal Zone of the Eastern Murman). Akademiia Nauk SSSR. Murmanskaia Biologicheskaia Stantsiia. Trudy. 3:75-89.

A study of the bottom fauna from a 20-mile-wide zone and 147 samples: distribution according to species or larger taxa, quantitative distribution of the larger groups. distribution per haul, frequency of individual species, zoogeographic origin of forms: circumpolar (47%), North Atlantic (and North Pacific) 16%, Arctic (8%), and of dubious origin 27%. The role of currents, especially those from the Atlantic in the distribution of the local benthos, is discussed. (Arctic Biblio.)

Pettibone, M. H. 1949. Polychaetous Annelids of the Polynoidae from the North-eastern Pacific, with a Description of a New Species. American Museum Novitates No. 1414, American Museum of Natural History, New York. 5 p.

On a reexamination of polychaete worms collected from Alaska in 1924 by R. A. Bartlett, identifications are shown to be incorrect as published in A. L. Treadwell's Polychaetous annelids collected by Captain R. A. Bartlett (etc.) 1926. Gattyana treadwelli is now described as a new species. (Arctic Biblio.)

Pettibone, M. H. 1951. A New Species of Polychaete Worm of the Family Polynoidae from Point Barrow, Alaska. Washington Academy of Sciences. Journal. 41:44-45.

Description of Eunoë clarki, n. sp. from two specimen of this annelid worm which were washed ashore at Point Barrow, Oct. 1949. (Arctic Biblio.)

Pettibone, M. H. 1954. Marine Polychaete Worms from Point Barrow, Alaska, with Additional Records from the North Atlantic and North Pacific. U.S. National Museum. Proceedings. 103(3324):203-356.

Conatins a study of material collected during 1948-50 by G.E. MacGinitie of the Arctic Research Laboratory. Eighty-eight species and 26 families are described with notes on synonymy, keys to families, genera and species, geographic distribution, frequency, etc. Some limited material from earlier collections was also utilized in this monograph. (Arctic Biblio.)

Ponomareva, L. A. 1949. Proniknovenie Arktoboreal'noi Fauny v Karskoe More. (The Penetration of the Arcto-Boreal Fauna into the Kara Sea). Akademiia Nauk. Koklady. Nov. Seriia. 65(6):907-909.

Contains a study of the arcto-boreal elements in the plankton, benthos and fish fauna in the northern section of the Kara Sea; some species are noted and their distribution is given. The penetration of some species from Barents Sea is explained by the warming-up of the climate of the Arctic. (Arctic Biblio.)

Popova, N. M. 1952. Bogatstva Moria. (The Wealth of the Sea). Nauka i Zhizn 19 (1):22-25.

Popular survey of the main resources of the Soviet Seas: algae, crabs, fishes, whales, seals, birds, stressing the richness of arctic marine flora and fauna. (Arctic Biblio.)

Powell, G. C. and R. B. Nickerson. 1965. Aggregations Among Juvenile King Crabs, Paralithodes camtschatica Tilesius, Kodiak, Alaska. Animal Behavior 13(2-3): 374-380.

Reports studies of SCUBA divers during 57 days in 1960 with observations from other sources. Year-old crabs (3-12 mm carapace length) live solitarily in niches of the littoral; 9-19 mm crabs are found on dock pilings; two-yr. olds (24-69 mm c.l.) form aggregations (pods) which persist through the third and part of the fourth year. These pods subsequently change into elongate piles and, at 60-97 mm c.l., into dome-shaped aggragations. (Arctic Biblio.)

Powell, N. A. 1968. Bryozoa (Polyzoa) of Arctic Canada. Canada. Fisheries Research Board, Journal 25:2269-2320.

Prigorovskii, B. G. 1948. Fauna Miagkikh Gruntov Litorali Guby Dal'ne-Zelentskoi. (The Fauna of the Soft Littoral Bottom of the Dal'niye Zelentsy Bay). Akademiia Nauk SSSR. Murmanskaia Biologicheskaia Stantsiia. Dal'niye Zelentsy. Trudy. 1:146-154.

Author gives a quantitative qualitative analysis of the fauna of soft bottoms of the small inlet (Oscar Bay) on which the Murmansk Biological Station is located. (Arctic Biblio.)

Rasmussen, K.J.F. 1973. A New Species of *Pilargis* (Polychaeta, Pilargidae) from the Deep Soft Sediments of Fensfjorden, Western Norway. Sarsia 53:19-24.

Rathbun, M.J. 1902. Descriptions of the New Decapod Crustaceans from the West Coast of North America. U.S. National Museum. Proceedings. 24(1272): 885-905.

Fifty-two new marine species and three subspecies are described, among them about thirty native to Bering Sea, Aleutian Islands and the Gulf of Alaska. (Arctic Biblio.)

Rathbun, M.J. 1919. Decapod Crustaceans. Canadian Arctic Expedition, 1913-1918. Report. Vol. 7. Crustacea, Pt. A. King's Printer, Ottawa. 14 p.

List, with locations and distribution of 21 species of shrimps and crabs from the coastal waters of Alaska and Northwest Territories, with additional records by other Canadian expeditions, and a bibliography. (Arctic Biblio.)

Reid, R.G.B. and A.M. Reid. 1974. The Carnovorous Habit of Members of the Septibranch Genus *Cuspidaria* (Mollusca, Bibalvia). Sarsia 56:47-56.

Reish, D. 1965. Benthic Polychaetous Annelids from Bering, Chukchi and Beaufort Seas. U.S. National Museum. Proceedings. 117(3511):131-157.

Records 67 species, mainly from offshore waters with two new forms *Magelona alata* n. sp. and *Euchone trisegmentata* n. sp. described in detail. Records include synonyms, location(s) of find, nature of bottom, etc. (Arctic Biblio.)

Riemann-Zurnec, K. 1971. Die Variabilitat Taxonomisch Wichtiger. Merkmale Bei *Actinostola callosa* (Anthozoa, Actiniaria). (Variability of the Taxonomically Important Features in the Actinarian, *Actinostola callosa*.) Veroeffentlichungen des Instituts fuer Meeresforschung in Bremerhaven 13(1):153-162.

Roginskaya, I.S. 1963. *Cuthona maris albi* n. sp. A New Nudibranchiate Mollusc from the White Sea. Belomorskoi Biologicheskoi Stantsii Moskovskogo Gosudarstvennogo Universiteta. Trudy. 2:258-265.

Rusanova, M.N. 1963. Biologiia i Zhiznennyi Tsikl *Balanus Balanoides* Linne v Belom More. (Biology and Life Cycle of *Balanus balanoides* L. in the White Sea.) Akademiia Nauk SSSR. Karelskii Filial. Materialy po Kompleksnomu Izucheniiu Belogo Moria. 1963(2):66-76.

Comprehensive study of this common barnacle made in 1957-1959 along the southern shores of Kandalaksha Bay. Age composition on different shore formations and mortality at Cape Kartesh due to influx of fresh water are described. Growth and reproduction are considered. (Arctic Biblio.).

Rusanova, M.N. 1963. Kratkie Svedeniia po Biologii Nekotorykh Massovykh Vidov Bespozvonochnykh Raiona Mysa Kartesh. (Notes on the Biology of Some Invertebrate Mass-species in the Cape Kartesh Area.) Akademiia Nauk SSSR. Karelskii Filial. Materialy po Komplesnomy Izucheniiu Belogo Moria. 1963 (2):53-65.

Reports on material collected during Sept. 1957-Dec. 1959, also 1953-1955 at the entrance to Chupa Bay, in the bay proper and in adjacent areas of Kandalaksha Bay. Eleven crustaceans, 19 molluscs and two echinoderms are recorded as to depth of occurrence, biotope, size and age limits, reproduction and embryonic development, hatching, etc, (Arctic Biblio.).

Rygg, B. 1970. Studies on Cerastoderma edule (L.) and Ceratoderma glaucum (Poiret). Sarsia 43:65-80.

Rzhepishevski, I.K. 1966. (On the Distribution of Balanus in the South-eastern part of Barents Sea.) Murmanskogo Morskogo Biologicheskogo Instituta. Trudy. 11(15):50-56.

Sailer, R.I. 1955. Invertebrate Research in Alaska. Arctic 7(3-4):266-274.

Account of invertebrate collections and research in the 19th century; work in present century till 1940 (mostly descriptive and taxonomic); research centers in Alaska; recent and current investigation in entomology, parasitology, terrestrial and marine invertebrates; main research problems. (Arctic Biblio.).

Salvini-Plawen, L. 1970. Die Norweigischen Caudofoveata (Mollusca, Aculifera). (Caudofaveata from Norway.) Sarsia 45:1-16.

Samuelsen, T.J. 1970. The Biology of Six Species of Anomura Crustacea, Decapods) from Rauefjorden, Western Norway. Sarsia 45:25-52.

Samuelsen, T.J. 1974. New Records of Upogebia deltaura and U. stellata (Crustacea, Decapoda) from Western Norway. Sarsia 56:131-134.

Sars, M. 1866. Om Arktiske Syrefomer i Christianiafjorden. (On Arctic Faunal Forms in Christianiafjord. Norske Videnskaps-Akademi, Oslo. Forhandlinger, 1865. p. 196-202.

Contains a systematic list of 32 species of so-called "arctic outliers" (arthropoda, molluscs, worms and echinoderms) in the fauna of Christianiafjord, with data on their distribution in their native arctic regions and the discussion of the reasons of their occurrence in the northern part of Norway. (Arctic Biblio.)

Schalk, Marshall 1957 Beach and Near-Shore Studies, Point Barrow, Alaska. Conducted during the period July 1954-Jan. 1957. Woods Hole Oceanographic Institution Ref. No. 57-43. Woods Hole Oceanographic Institution, Woods Hole, Mass. 50 p.

Progress report on field work at Point Barrow, noting personnel, methods used, preparation and character of profiles, conditions of tides, beach and bottom conditions are described, and explained. (Arctic Biblio.).

Schmitt, W. L. 1919 Schizopod Crustaceans. Canadian Arctic Expedition, 1913-1918. Report. Vol. 7: Crustacea, Pt. B. King's Printer, Ottawa. 8 p.

List of three mysids (including one new species fully described) and three euphausids, showing station where taken in coastal waters and lagoons of Alaska and Northwest Territories. (Artic Biblio.).

Schoepf, R. W. 1974 The Trans-Alaska Pipeline and the Environment. A Bibliography. Department of the Interior, Washington, D.C. 31 p.

The bibliography contains 152 citations to research and conference reports written in English and published between 1970 through mid-1973 concerning environmental problems to be encountered in the construction of the trans-Alaska pipeline. The emphasis is primarily on Alaska marine and terrestrial environment, although a number of items deal with engineering problems related to the Arctic environment. The citations are arranged under ten broad subject categories and an author index is provided. (NTIS).

Shapeero, W. L. 1962 The Distribution of Priapulus caudatus Lam. on the Pacific Coast of North America. American Midland Naturalist. 68(1):237-241.

Notes on the morphology of these vermiform coelomates, taxonomy, occurrence in depth, and distribution, which includes the Chukchi Sea as far east as Point Barrow and Glacier Bay, Alaska. (Arctic Biblio.).

Sharonov, I. V. 1948 Sublitoral'nye Bentonicheskie Gruppirovki Guby. (Sublittoral Benthonic Grouping of Yarnyshnaya Bay). Akademiia Nauk SSSR. Murmanskaia Biologicheskaia Stantsiia. Dal'niye Zelentsy. Trudy. 1:155-163.

Following a brief characterization of this bay on the Murmansk coast (69°05'-69°09'N. 36°00'-36°05'E.) another gives some analysis of the deep-water animal groups living near the shores. (Arctic Biblio.).

Shchedrina, Z. G. 1936 K Faune Kornenozhek Poliarnykh Morei SSSR. (On Foraminifera of U.S.S.R. Polar Seas). Leningrad, Vsesoiuznyi Arkticheskii Institut. Trudy. 33:51-64.

List of species collected during the voyage of the ice-breaker Sibiriakov and Rusanov, 1932 in Kara and Chukchi Seas, with locations and discussion. Summary in German. (Arctic Biblio.).

Shchedrina, Z. G. 1938 On the Distribution of Foraminifera in the Kara Sea. Akademiia Nauk SSSR. Comptes Rendus. Doklady. Nouv. Ser. 19(4): 319-322.

In the northern troughs, Atlantic, Greenland and boreal deep-sea forms were found. The southeast region was an original fauna including brackish forms indicating a possible influence of the Ob-Yenisey waters. There are also indications that Atlantic waters penetrate by way of the polar basin. Based on material collected by ice breakers in 1929-34 and by Sadko 1935-36 in Kara Sea, also in parts of Greenland and Barents Seas and the Arctic Basin. (Arctic Biblio.).

Shchedrina, Z. G. 1939 A New Genus of Sand Foraminifera from the Arctic Seas. Akademiia Nauk SSSR. Comptes Rendus. Doklady. N.S. 24(1):95-96.

Full description of a new species found in the Kara Sea, Greenland Sea, and in the Arctic Basin. (Arctic Biblio.).

Shchedrina, Z. G. 1946 Novye Formy Formainifer iz Severnogo Ledovitogo Okeana. (New Species of Foraminifera from the Arctic Ocean). In: Dreifuiushchaia Ekspeditsiia Glavsevmorputi na Ledokhode Parokhode "G. Sedov" 1937-1940 gg. Trudy. 3:139-148.

A description of twelve new species and varieties taken mostly during the voyages of the ice-breaker SADKO, 1935 and 1937-38. Summary in English. (Arctic Biblio.).

Shchedrina, Z. G. 1948 Foraminifery. (Foraminifera). In: Gaevskaia - Sokolova, N. and Others. Opredelitel' Fauny i Flory. p. 5-20.

Contains a morphological and biological sketch of marine foraminifera of northern seas of the U.S.S.R. with keys for determination of the families, general and typical species of this order (Arctic Biblio.).

Shchedrina, Z. G. 1950 K Raspredeleniiu Morskikh Kornenozhek v Sviazi s Usloviiami ikh Obitaniia. (On the Distribution of Marine Foraminifers in Connection with their Life Conditions). Akademiia Nauk SSSR. Doklady. Nov. Seriia 70(4):711-713.

On the basis of the study of several collections of foraminifers from the arctic seas, the author divides this fauna into the following groups: (1) deep-sea group (1000-3800 m.): (2) sublittoral colwater group (80-200 m.): (3) sublittoral warm-water group; (4) upper sublittoral group (0-80 m.). Oceanographic conditions and typical species for each group are discussed and compared with similar groups of the North Pacific Ocean. (Arctic Biblio.)

Shchedrina, Z. G. 1952 Novye Vidy Foraminifer Roda Rhabdammina M. Sars. (New Species of Foraminifers of the Genus Rhabdammina M. Sars). Akademiia Nauk SSSR. Zoologicheskii Institut. Trudy. 12:25-33.

Description of Rhabdammina parabyscorum n. sp. (southern Okhotsk and Bering Seas), R. pulverulenta n. sp. (southern part of Barents Sea) and R. heteractina n. sp. (Okhotsk Sea). (Arctic Biblio.)

Shchedrina, Z. G. 1952 O Razlichnykh Formakh Foraminifer, Rhabdammina abyssorum Carpenter. (On Various Forms of Foraminifers, Rhabdammina abyssorum Carpenter). Akademiia Nauk SSSR. Zoologicheskii Institut. Trudy. 12:7-24.

Contains a study of the geographic variation of a foraminifer, Rhabdammina abyssorum, together with descriptions of R. a. abyssorum (Greenland Sea and arctic seas), R. a. arctica n. subsp. (arctic seas and Svalbard waters), and R. a. pacifica n. subsp.(northern Okhotsk Sea and Bering Sea). (Arctic Biblio.)

Shchedrina, Z. G. 1953 K Izucheniiu Foraminifer Glubokovodnykh Donnykh Otlozhenii Okhotskogo Moria. (A Contribution to the Knowledge of the Deep-Sea Bottom Foraminifer of the Okhotsk Sea). Akademiia Nauk SSSR. Doklady. Nov. Seriia 90 (2):287-289.

Contains a list of 57 foraminifers (tables 1-2) with their vertical distribution. The material was obtained in 1949 by the Expedition of the Institute of Oceanology of the Academy of Sciences U.S.S.R. in the southern part of the Okhotsk Sea from the bottom sediments at the depth of 3400m. Analysis of the samples shows that the foram bottom fauna is almost identical with benthic fauna of corresponding regions of the Okhotsk Sea, and that the typical fossil forms are lacking. (Arctic Biblio.)

Shchedrina, Z. G. 1956 Fauna Foraminifer Dal'nevostochnykh Morei Sovetskogo Soiuza. (Foraminiferal Fauna of the Far-Eastern Seas of the Soviet Union). Akademiia Nauk SSSR. Zoologicheskii Institut. Trudy Problemnykh i Tematicheskikh Soveshchanii. 6:65-71.

Account based on study of extensive collections made during 20-25 years. The fauna is divided into climatic and geographic forms and such of the deep sea. The main factor determining distribution in one and the same area was found to be depth, at equal depths: temperature, salinity and currents. (Arctic Biblio.).

Shchedrina, Z. G 1956 Itogi Izucheniia Foraminifer Morei SSSR. (Results of the Study of Foraminifer in the Soviet Seas). Voprosy Mikropaleontologii 1956(1):23-36.

Comprehensive review, citing number of identified species for each sea, and outlining species variation in respect to depth, temperature, salinity and hydrographic conditions. Seven groups are distinguished according to ecologic conditions, and are characterized. Overall results of foraminifera study in the Arctic Ocean are summarized. An extensive review is made of the literature for which a reference list is appended. (Arctic Biblio.)

Shimkevich, V. M. 1913 Einige Neue Pantopoden. (Some New Pantopoda). Akademiia Nauk SSSR. Zoologicheskii Muzei. 18(2):240-248.

Contains descriptions of three new species and one new variety of sea spiders, including Nymphon hogdsoni n. sp. native to Okhotsk Sea and N. longitarse var minus n. var. occurring in Okhotsk and the arctic seas. (Arctic Biblio.)

Shimkevich, V. M. 1929-1930 Mnogokolenchatye (Patopoda). (Pantopodes (Pantopoda)). In: Fauna SSSR. Pantopoda, v. 1-2. Izd-vo Akademiia Nauk SSSR, Leningrad. 555 p.

Contains in v. 1, an introduction (cxiv p.) giving terminology; doubtful genera, with descriptions of 14 new species; characteristics of Pantopoda; bibliography (317 items). Then follows (p. 1-224) a monographic treatment of eight families (Pycnogonidae-Phoxichilidiidae), with keys, Latin diagnoses, Russian descriptions, synonyms, critical notes, lists of specimens, and data on geographic distribution. In v. 2 (p. 225-554) the families Pallenidae and Nymphonidae are treated similarly; a supplementary bibliography compiled by D. Fedotox (84 items) and an index of Latin names are appended. Many species native to Russian arctic waters are included, also some from other northern seas because they are important for the study of Russian species. (Arctic Biblio.)

Shoemaker, C. R. 1920 Amphipods. Canadian Arctic Expedition, 1913-1918. Report. Vol. 7: Crustacea, Pt. E. King's Printer, Ottawa. 30 p.

List, with notes on synonymy and distribution of fifty-three (including one new) species of marine and fresh water forms from the Arctic coast, collected by the Expedition; with data from the Neptune collections, and a bibliography. (Arctic Biblio.)

Shoemaker, C. R. 1955 The Amphipoda Collected at the Arctic Laboratory, Office of Naval Research, Point Barrow, Alaska, by G. E. MacGinitie. Smithsonian Miscellaneous Collections 128(1):1-78, figs. 1-20.

Sivertsen, E. 1932 Crustacea, Decapoda and Mysidacea from the East Siberian and Chukotsk Seas. Maud Expedition, 1918-1925. Scientific Results, v. 5, No. 13. John Grieg, Bergen, 14 p.

List with references to literature, remarks on specimens, some descriptions, occurrence and distribution, of ten (including one new) species of crustaceans, decapods and mysids; bibliography (36 items). (Arctic Biblio.)

Skarlato, O. A. 1956 K Biogeografii Dalnevostochnykh Morei Sovetskogo Soiuza na Primere Dvustvorchatykh Molliuskov. (The Biogeography of the Far-Eastern Seas of the Soviet Union as illustrated by the Bivalve Molluscs). Akademiia Nauk SSSR. Zoologicheskii Institut. Trudy Problemnykh i Tematicheskikh Soveshchanii. 6:83-92.

Discusses the zoogeographic origin of the bivalves of these seas; the arctic-boreal forms and others; endemic arctic and other species; conditions in the Okhotsk Sea, and in the northernmost Kuril Islands. (Arctic Biblio.)

Smidt, E. 1967 Deep Sea Prawn (Pandalus borealis Kr.) in Greenland Waters: Biology and Fishery. In: Proc. Symposium on Crustacea, Ernakulam, 1965. Mar. Biol. Assoc. India, Symp. Ser. 2: 1448-1453.

Smirnova, T.S. 1965. Donnaia Fauna Guby Kanda Belogo Moria. (Bottom Fauna of Kanda Bay, White Sea). Gidrobiologicheskii Zhurnal. 1(4):27-33.

Reports on 1962-63 investigations in this western arm of Kandalaksha Bay, with supporting data on area and depth, temp., slainity, pH and O_2. 73 species of invertebrates are recorded. Due to the almost complete isolation of this inlet from the sea, a retreat of marine forms and appearance of freshwater elements is noted. (Arctic Biblio.).

Sneli, J.A. 1970. Archaeogastropoda from Hardangerfjorden, Western Norway. Sarsia 42:63-72.

Soot-Ryen, T. 1924. Faunistische Untersuchungen im Ramfjorde. (Faunal Study of Ramfjord). Tromso, Norway. Museum. Arshefter, 1922. Bd. 45, Nr. 6. Tromso. 106p.

Ecological study based on the molluscs and better known echinoderms, with brief detailed notes on associations, distribution, size and abundance; brief characterization of the fjord (about 69°35'N. 19°15'E.) and mention of its other fauna. Charts: bathymetric and bottom sediment charts. (Arctic Biblio.).

Soot-Ryen, T. 1925. Notes on Some Mollusca and Brachiopoda from Spitzbergen. Tromso, Norway. Museum. Arsehfter, 1924. Bd. 47, Nr. 4. Tromso. 10p.

Contains a list, with localities and depths, of thirty-six species of molluscs and one brachiopod, based on collections made by the Blaafield in 1923 from the coastal bands west of West Sptisbergen. (Arctic Biblio.).

Soot-Ryen, T. 1932. Hydrographical Investigations in the Ramfjord 1924-25. Tromso, Norway. Museum. Aarshefter, 1928. Bd. 51, Nr. 4. K. Karlsen, Tromso. 21p.

Contains the result of hydrographical survey of Ramfjord, Tromso district, carried out by the author in 1924, with data on isotherms, isophalines and isopycnes, bottom fauna and plankton; hydrographical tables, p. 15-21. (Arctic Biblio.).

Soot-Ryen, T. 1932. Pelecypoda with a Discussion of Possible Migrations of Arctic Pelecypods in Tertiary Times. Maud Expedition, 1918-1925. Scientific Results, V.5, No. 12. John Grieg, Bergen. 32p.

List, with references to literature, localities, remarks and distribution, of twenty-one (including two new) species of pelecypods (clams, oysters, mussels) from the Chukchi and East Siberian Seas. Discussion, with table, of distribution and occurrence in the north Siberian seas and of migrations of arctic pelecypods in Tertiary times resulting from alterations of physical conditions; bibliography (74 items). (Arctic Biblio.).

Soot-Ryen, T. 1939. Some Pelecypods from Franz Josef Land, Victoriaoya and Hopen. Norway. Norges Svalbard-og Ishavets-undersokelser. Meddelelse Nr. 43. J. Dybwad, Oslo. 21p.

A systematic list of thirty-five bivalve species reported by expedition prior to, and including the Norwegian Scientific Expedition, 1930; with notes on the hydrographic conditions of the waters surrounding Franz Josef Land and remarks on research needed to establish the effects of temperature on distribution of pelecypods. (Arctic Biblio.).

Soot-Ryen, T. 1941. Northern Pelecypods in the Collection of Tromso Museum. I. Order Anomalodesmacea, Families Pholadomyidae, Thraciidae and Periplomatidae. Tromso, Norway. Museum. Aarshefter, 1938. Bd. 61, Nr. 1. Naturhistorisk Avd. Nr. 17. A.W. Brogger, Oslo. 41p.

Contains a study of systematics and distribution of northern molluscs in the collection of the Tromso Museum, including a key to eight families of the order Anomalodesmaccea, and an enumeration of twelve marine species, including some fossils, with descriptions (Thracia rectangularis n. sp.), brief synonymy, measurements, types, type localities and critical notes; a list of material including an enumeration of specimens, arranged by the species and regions; the principal area of distribution is limited on the south by Great Britain-The Faroes-Iceland-Cape Farewell, Greenland, and to the east and north by Novaya Zemlya and the Arctic Ocean; the total distribution for each species is also given. (Arctic Biblio.).

Soule, J.D. 1951 Two New Species of Encrusting Ctenostomatous Bryozoa from the Pacific. Washington Academy of Sciences. Journal. 41(11):367-370. Also Pub. as: Contribution No. 63, Allan Hancock Foundation, University of Southern California.

Includes a description of Alcyonidium enteromorpha n. sp., collected by G.E. McGinitie of the Arctic Research Laboratory, off Point Barrow, Alaska. (Arctic Biblio.).

Southward, E.C. 1962. A New Species of Galathealinum, Pogonophora, from the Canadian Arctic. Canadian Journal of Zoology. 40(3):385-389.

Describes two incomplete specimens, male and female, of Galathealinum arcticum n. sp. from Thetis Bay, Herschel Island, at a depth of 120 ft. (Arctic Biblio.).

Sparks, A.K. & Pereyra, W.T. 1966. Benthic Invertebrates of the Southeastern Chukchi Sea. In: Wilimovsky, N.J. and J.N. Wolfe (eds.). Environment of the Cape Thompson Region, Alaska. United States Atomic Energy Commission, Division of Technical Information. p.817-838.

Lists 201 species from 11 phyla obtained during a marine survey in 1959, and discusses the general distributions of the main groups of organisms in relation to their habitat. Samplings were made on a pre-plotted 20-mi interval grid from MV *John N. Cobb*. Echinoderms, tunicates, decapods, molluscs, and annelids were the dominant faunal elements encountered and account for approx. 95% of the sampled biomass. The fauna is Pacific boreal in character since the prevailing north-trending current prevents high arctic species from entering the Chukchi Sea and she shallowness of this area eliminates any deep-sea elements. Relatively large areas of littoral zone are sparsely populated owing to scouring of the inshore area by ice. The standing crop of the area studied is considered to be high partly because of the low fish population. (Arctic Biblio.).

Spasskii, N. 1929. K Faune Gidroidov Kol'skogo Zalica i Tugo-zapadnoi Chasti Barentsova Moria. (Contributions to the Hyroid Fauna of Kola Bay and the Southwestern Part of Barents Sea). Leningradskoe Obshchestvo Estesvoispytatelei. Murmanskaia Biologicheskaia Stantsiis. Raboty, t. 3, no. 2. Murmansk. 48p.

Contains result of study of a large collection of hydroids from southwestern Barents Sea particularly Kola Bay. 70 species are listed, some 22 are new for the area and largely warm-water forms. Three new species are reported and described. Bibliography (29 items). Summary in German. (Arctic Biblio.).

Squires, H.J. 1964. *Pagurus pubescens* and a Proposed New Name for a Closely Related Species in the Northwest Atlantic, Decapoda: Anomura. Canada. Fisheries Research Board. Journal. 21(2):355-365.

Comparisons of the type specimens of the hermit crab *Pagurus kroyeri* from Greenland and *P. pubescens*, showed them to be identical. The american species thought to be pubescens is now given the *P. arcuatus*. Both species are compared with *P. trigonocheirus* using a diagnostic character. (Arctic Biblio.).

Squires, H.G. 1968. Decapod Crustacea from the Queen Elizabeth and Nearby Islands in 1962. Canada. Fisheries Research Board. Journal 25:347-362.

Squires, H.J. 1968. Decapod Crustacea of the Beaufort Sea and Arctic Waters Eastward to Cambridge Bay, 1960-65. Canada. Fisheries Research Board. Journal. 26:1899-1918.

Starokadomskii, L.M. 1917. Zoologicheskiia Stantsii Transporta Taimyr v 1913 g. (Zoological Stations of the Transport *Taimyr* in 1913). Akademiia Nauk SSSR. Zoologicheskii Muzei. Ezhegodnik, 1916. 21:xxvii-xiix.

Contains a list of 81 stations established (as part of the Arctic Ocean Hydrographic Expedition) by the *Taimyr* in 1913 in Japan, Okhotsk and Bering Seas and in the arctic seas from Bering Strait to the Taymyr Peninsula of Siberia, with the following data for each station: date, time, location, air and sea temperature, bottom, brief list of marine and terrestial (island and coastal) fauna. (Arctic Biblio.).

Steele, D.H. 1967. New Species of the Genus *Anonyx* (Amphipoda) from the Barents Sea. Crustaceana 13(3):257-264.

Describes *Anonyx bispinosus* n. sp. on the basis of British Museum material collected off the east coast of Kilguyev Island, Barents Sea. (Arctic Biblio.).

Steele, D.H. 1967. The Life Cycle of the Marine Amphipod *Stegocephalus inflatus* Kroyer in the Northwest Atlantic. Canadian Journal of Zoology 45(5): 623-628.

Studies this circumpolar crustacean from arctic areas fnd the Gulf of St. Lawrence. It was found to be protandrous, to reproduce throughout the year, each female having more than one brood. Graphs, tables, illustrated, references. (Arctic Biblio.).

Steele, D.H. and P. Brunel. 1968. Amphipoda of the Atlantic and Arctic Coasts of North America: *Anonyx* (Lysianassidae). Canada. Fisheries Research Board. Journal. 25:943-1060.

Steele, D.H. and P Brunel. 1968. Collections of Amphipods of the Genus *Anonyx*, mainly from the Atlantic and Arctic Coasts of North America. Canada. Fisheries Research Board. Technical Report. No. 47:73p.

Lists specimens of *Anonyx nugax*, *A. pacificus*, *A. sarsi*, *A. laticoxae*, *A. lilljeborgi*, *A. ochoticus* and *A. debruyni*, examined in 15 Canadian, west European and/or American museums. Postion and depth of the station, date and collector (expedition, ship or individual) are stated, as is the museum where specimen(s) may be found. In addition to collections from the entire Canadian coastline, a few are included from Alaskan waters, Sea of Okhotsk, Greenland and Svalbard waters, and the Barents and Kara Seas. (Arctic Biblio.).

Stendell, R. 1968. Echinoderms Collected from a Drifting Ice Island off the East Greenland Coast, with Comments on Their Distribution in Adjacent Waters. Canada. Fisheries Research Board. Bulletin. 24:833-842.

Streltzov, V.E. 1966. Biology of Feeding of the Predatory Polychaete Worm *Harmothoe imbricata* in the Dalnezelenetz Inlet of the Barents Sea. Murmanskogo Morskogo Biologicheskogo Instituta. Trudy. 11(15):115-121.

Streltzov, V.E. 1966. (Quantitative Distribution of Polychaeta in the Southern Part of the Barents Sea.). Murmanskogo Morskogo Biologicheskogo Instituta. Trudy. 11(15):71-91.

Streltzov, V.E. 1966. Relationships in the Postembryonic Development of the Polychaete Worm *Harmothoe imbricata* L. (Polychaeta, Errantia) in the Littoral Zone of the Southern Part of the Barents Sea. Akademiia Nauk SSSR. (Biological Sciences Sect.). Doklady. 169:472-475.

Streltzov, V.E. 1968. Paraonidae (Polychaeta Sedentaria) in the Barents Sea. Murmanskogo Morskogo biologicheskogo Instituta. Trudy. 17(21):74-95.

Stromberg, J.O. 1964. *Eurydice grimaldii* Dollfus in Norway. Sarsia 15:27-32.

Talmadge, R.R. 1971. The Benthic Mollusca Plicifusus, in California (Mollusca: Gastropoda). Veliger 14:42-44.

Tambs-Lyche, H. 1962. Athanas nitescens Leach (Crust. Dec.) in Norway. Sarsia 7:25-28.

Tanasiichuk, N.P. 1926. Materialy k Poznaniiu Fauny Barentsova Moria. (Materials Contributing to the Knowledge of the Barents Sea Fuana). Leningradskoe Obshchestvo Estestvoispytatelei. Murmanskaia Biologicheskaia Stantsiis. Raboty. 3(1):31p.

Contains discussion of the effect of the North Cape current on the rise of the temperature in Kola Inlet. Author analyzes a number of animal species (Corals, echinoderms, polychaetes), known to have been rare or confined to deep waters earlier, and attributes their present abundance to this rise in temperature. The change is largely toward an enrichment with boreal elements. Bibliography (about 50 items). Summary in German. (Arctic Biblio.).

Tanasiichuk, N.P. 1927. O Novykh i Redkikh Dlia Fauny Kol'skogo Zaliva (Murman) Formakh Zhivotnykh. [On Some New and Rare Animal Forms of Kola Bay (Murman)]. Akademiia Nauk SSSR. Doklady, Seriia A, No. 14:213-218.

List of bottom animals collected by trawl in 1926-27. About 40 species are described including five fishes. (Arctic Biblio.).

Tanasiichuk, N.P. 1928. O Nekotorykh Dopolneniiakh k Faune Kol'skogo Zaliva. (Some Additions to the Fauna of Kola Bay). In: Vserossiiskii s"ezd Zoologov, Anatomov i Gistologov, 3, Leningrad, 1927. Trudy. p.382-383.

Contains notes and data on origin and habitat of some species new to this arm of the Barents Sea (Murman coast). Molluscs and Hydroids are included. (Arctic Biblio.).

Tarasov, N.I. 1938. Issledovanie Grenlandskoi Littorali. (Study of the Greenland Littoral). Priroda 5:100-101.

Contains a review of the present-day knowledge of the littoral fauna of East Greenland, with a general description, notes on some typical species and ecological subdivision, based chiefly on works of H. Madsen, H. Brich and some other zoologists; the littoral fauna of West Greenland (53°n.-67°N.) is briefly discussed. (Arctic Biblio.).

Tcherniakovsky, P. 1941. Rapport sur les Travaux Biologiques Effectues au Scoresby Sund. Mission Francaise de l'Anne Polaire Internationale 1932-1933. (Report on Biological Studies Conducted at Scoresby Sund. French International Polar Year Expedition, 1932-1933.). In: International Polar Year. 2d, 1932-1933. Participation Francaise. Observations et Travaux. 3, p. 1-67.

After introductory sections on the scope of biology in this expedition, on equipment and the laboratory, an outline is presented of this part of East Greenland and its bio-geographical peculiarities. Terrestrial and marine mammals encountered are described, (particularly musk ox and sea), with native names, data on occurrence, hunt, economic value, etc. A relatively large section deals with birds (34 species) and is followed by chapters on marine biology (temperature, salinity, pH, etc.; common phyto- and zooplankton, invertebrates, fishes and seaweeds), also terrestrial invertebrates and flora. The concluding chapter (p.51-67) deals with physical anthropology of the "Eskimo race;" blood groups of pure and mixed populations; origin, racial and geographic etc. (Arctic Biblio.).

Tendal, O.S. 1970. Sponges from Joergen Broenlund Fjord, North Greenland. Meddelelser om Groenland 184(7):1-14.

Theisen, B.F. 1973. Thé Growth of *Mytilus edulis* L. (Bivalvia) from Disko and Thule District, Greenland. Ophelia 12(1-2):59-77.

Theroux, R.B. 1971. Major Taxonomic Groups of Macrobenthos in Disko Bay and Several West Greenland Fjords. United States Coast Guard Oceanographic Report No. 37. p.34-40.

Todd, R. and D. Low. 1966. foraminifera from the Arctic Ocean off the Eastern Siberian Coast. U.S. Geological Survey, Professional Paper No. 550-C, p.79-85.

The impoverished fauna (56 species) resulting from subnormal marine conditions on the shallow shelf beneath the Laptev, East Siberian and Chukchi Seas is recorded with notes on its distribution which appears to be haphazard for most species. (Arctic Biblio.).

Trason, W.B. 1964. Ascidians of the Canadian Arctic Waters. Canada. Fisheries Research Board. Journal. 21(6):1505-1517.

Tulkki, P. 1961 *Cardium lamarcki* Reeve in Norwegian Waters. Sarsia 4:55-56.

Tulkki, P. 1963. *Marinogammarus pirloti* Sexton and Spooner (Amphipoda) from the Hardangerfjord, Western Norway. Sarsia:10:23-26.

Contains data on the food and conditions of nourishment of various invertebrate fauna (Eclinodermata, Lamellibranchiata, Crustacea, Tunicata, and Brachiopoda) found on or in the bottom of the Barents Sea; the region of the study includes the central section of this sea, Bear Island waters and the Pechora-Karin-Kolguyev shallows. (Arctic Biblio.).

U.S. Hydrographic Office. 1955. Oceanographic Survey Results, Project 572, July-September 1955. U.S. Hydrographic Office Pub. Pub. No. 16366. U.S. Hydrographic Office, Washington, D.C. 169 p.

Contains summary of a hydrographic-oceanographic survey, conducted, summer 1955, by USS Requisite, in the Western Arctic. Ship's main track, location of oceanographic, current, and bottom sampling stations between Pt. Barrow in Alàska and Shepherd Bay, Northwest Territories, and Special hydrographic survey areas, are shown on maps; tables summarize observations at 99 oceanographic stations, 46 Phleger cores and 85 grab samples, and Ekman current meter observations at 19 locations. Explanation of data is provided in the appendix. Depths in survey areas were shallow; observations were mostly made at 20 meters or less. (Arctic Biblio.).

United States Coast Guard. 1962. Oceanographic Cruise USCGC Northwind Bering and Chukchi Seas. U.S. Coast Guard Oceanographic Report No. 1. 125p.

Contents: Navigation; Weather and ice conditions; cruise narrative and survey procedure; notes on the physical oceanography of the Chukchi sea; a preliminary report of the benthic animals collected on the USCGC Northwind cruise during 1962; notes on bottom sediments of the Chukchi Sea; Bathymetry; reconnaissance magnetic survey of the Chukchi Sea Shelf.

Ushakov, P.V. 1926. K Faune Nemertin Belogo Moria. (The Nemertine Fauna of the White Sea). Leningrad. Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 3:47-71.

Description of 24 forms of these worms from the deep sea and coastal waters. Six of the forms are new species, one of the species also a new genus. Morphology and morphometry, external and internal anotomy, size, color, ecology, etc., are considered. (Arctic Biblio.).

Ushakov, P.V. 1928. Floro-Faunisticheskie Gruppirovki Pribrezhnykh zon Novoi Zemli. (Floro-Faunistic Groups of the Coast Zone of Novaya Zemlya). In: Vserossiiskii s'ezd Zoologov, Anatomov i Gistologov, 3, Leningrad, 1927. Trudy, p.383-385.

Contains a summary of results of the study of flora and fauna of the coastal waters of Novaya Zemlya, based on material from 64 dredging and 290 trawling stations established during 1923-27 by the Hydrological Institute. Characteristics of the faunistic groups and their geographic variations are given. (Arctic Biblio.).

Ushakov, P.V. 1928. K Faune Nemertin Barentsova Moria. (Contributions to the Fauna of Memerteans in the Barents Sea). Nauchno-Issledovatel'skii Institut po Izucheniiu Severa. Trudy. 37:55-66.

Description of eleven (including one new) species of these flatworms taken 1921, 1924 and 1925 by the Northern Scientific and Economic Expedition, 1920-1926, with data on their localities and distribution. Summary in English. (Arctic Biblio.).

Ushakov, P.V. 1931. Bentonicheskie Gruppirovki Matochkina Shara (Benthonic Groupings of Matochkin Shar). Leningrad, Gosudarstvennyi Gidrologicheskii Institut. Issledovaniia Morei SSSR. 12:5-130.

A comprehensive study of the littoral, sublittoral and pseudoabyssal of this strait between the two islands of Novaya Zemlya. It is introduced (p.5-40) with an outline of the scope of the investigation, earlier studies, topography of the area, nature of bottom, hydrological conditions of the strait, and meteorological observations. The biocoenoses of the three zones are described (p. 41-63), the sublittoral showing the quantitavely and qualitatively richest fauna. The seaweeds of the area, distribution of the benthonic forms and general character of the fauna are treated in turn. Tables are presented indicating, in detail, the distribution of the main animal groups over the area, by a list of dredging and trawling stations and the forms found at them. The study is based on field work conducted during 1923-1929. (Arctic Biblio.).

Ushakov, P.V. 1936. K Bentonicheskoi Faune Chukotskogo Moria. (On the Benthonic Fauna of Chukchi Sea). In: Duplitskii, D.S. and G.E. Ratmanov (eds.). Nauchnye Raboty Ekspeditsii na Ledokole "Krasin" v 1935 Godu. 1936. p.74-89.

A biological study of bottom fauna made during the expedition of the ice-breaker Krasin, 1935, with lists of species found in bottom samples from different stations in the Chukchi Sea. (Arctic Biblio.).

Ushakov, P.V. 1937. Materialy po Gidroidam Arkticheskikh Morei SSSR. (Materials on the Hydroids of the Arctic Seas of U.S.S.R.). Leningrad. Vsesoiuznyi Arkticheskii Institute. Trudy 50:5-34.

Lists, with descriptions, discussion and locations of sixty-two species based on collections made during the period 1921-30. Summary in English. (Arctic Biblio.).

Ushakov, P.V. 1940. O Novoi Gruppe Oligomernykh Chervei (Pogonophora) s Abissal'nykh Glubin Okhotskogo Moria i Poliarnogo Basseina. (On a New Group of Oligomere Worms, Pogonophora, from Abyssal Depths of the Okhotsk Sea and the Polar Basin). Priroda 3:76-77.

Deals with a group of deep-sea marine worms, one of which was described from the Okhotsk Sea by the author in 1933, under the name of Lamellisabella zachsi. The same species was found by G.P. Gorbunov, on a trip on the Sadko in 1935 in the Arctic Basin. This species was first referred to the group Polychaeta, but was transferred by K. Johansson in 1937 to a new group, Pogonophora. (Arctic Biblio.).

Ushakov, P.V. 1948. K Nakhozhdeniiu Cladocarpus formosus Allm. (Aglaopheniidae, Hydroida) v Kol'skom Zalive. [On the occurrence of Cladocarpus formosus Allm. (Aglaopheniidae, Hydroida) in Kola Bay]. Akademiia Nauk SSSR. Murmanskaia Biologicheskaia Stantsiia, Dal'niye Zelentsy. Trudy. 1:286-287.

A find of hydroid from the Kola Bay is reported. (Arctic Biblio.).

Ushakov, P.V. 1948. Murmanskaia Biologicheskaia Stantsiia Akademii Nauk SSSR v Guve Dal'ne-Zelenetskoi i ee Pervye Nauchnye Roboty. (The Murman Biological Station of the Academy of Sciences U.S.S.R. in Dal'ne-Zelenetsy Bay and its First Scientific Work). Adademiia Nauk SSSR. Murmanskaia Biologicheskaia Stantsiia, Dal'niye Zelensky. Trudy 1:10-32.

Contains account of the location of the station (69°07'N. 36°05'E.) and description of its surroundings; its main purposes; principal buildings, research vessels, museum and library; account of its research activities during 1936-38; short notes on the deep-water fauna in the vincinity of the new station followed by a list of over 600 species of animals found in this area. (Arctic Biblio.).

Ushakov, P.V. 1948. O Dvukh Novykh Vidakh Scolelepis (Spionidae, Polychaeta) s Poberezh'ia Murmana. [On two New Species of Scolelepis (Spionidae, Polychaeta) on the Shores of Murman]. Akademiia Nauk SSSR. Murmanskaia Biologicheskaia Stantsiia, Dal'niye Zelentsy, Trudy: 284-285.

Two new species of Bristle-worms, Scolelepis derjugini n. sp. and Scolelepis murmanica Zachs, n. sp. are described. (Arctic Biblio.).

Ushakov, P.V. 1949. Osnovnye Cherty i Osobennosti Fauny Dal'nevostochnykh Morei. (Main Features and Peculiarities of the Fauna of the Far Eastern Seas). In: Vsesoiuznyi Geograficheskii s'ezd. 2d, Leningrad, 1947. Trudy. 3:193-201.

Based on Russian investigations by P. IU. Shmidt, Prof. K.N. Deriugin, and others, 1904-1945. Common biogeographical features of the Japan, Okhotsk and Bering Seas are discussed, as well as the faunal character of each sea individually. The difference of their fauna from that of arctic seas is noted. (Arctic Biblio.).

Ushakov, P.V. 1950. Abissal'naia Fauna Okhotskogo Moria. (The Deep-Water Fauna of the Okhotsk Sea). Akademiia Nauk SSSR. Doklady. Nov. Seriia. 7(5): 971-974.

Contains a systematic list of 35 species of marine organisms, inhabiting the Sea of Okhotsk at a depth of 3000m. or more, based on collections of Russian expeditions since 1932, and on data from the voyage of the U.S. Fisheries research vessel Albatross in 1906. Comparison is made with the deeap-sea fauna of the northern Pacific Ocean. (Arctic Biblio.).

Ushakov, P.V. 1957. K Faune Mnogoshchetinkovykh Chervei (Polychaeta) Arktiki i Antarktiki. (The Polychate Fauna of the Arctic and Antarctic.) Zoologicheskii 36(11):1659-1674.

Contains brief descriptions of worms collected during 1950-55 in the central Arctic Basin by the Russian drifting stations, North Pole 2-5. Three out of 16 benthal forms are new species: _Macellicephala longipalpa_, _M. polaris_, and _Melinnexis somovi_. The forms found suggest an Atlantic rather than Pacific origin. A new genus is described from the Antarctic material. (Arctic Biblio.).

Ushakov, P.V. 1958. Faunisticheskie Issledovaniia Zoologicheskogo Instituta an SSSR na Dal'nevostochnykh Moriakh. (Faunistic Studies in Far Eastern Seas by the Zoological Institute of the Academy of Sciences, U.S.S.R.). Akademiia Nauk SSSR. Okeanograficheskaia Komissiia. Trudy, 3:102-108.

Contains information on relevant activities of the Institute from its earliest times (18th century) to present. Its (largely taxonomic) work covering the major animal groups is described in detail, and the scientists performing it are indicated. Studies in populations and their distribution, publications, etc. are also discussed. (Arctic Biblio.).

Ushakov, P.V. 1958. Investigations of Bottom Fauna of the Far Eastern Seas of the U.S.S.R. _In_: Pacific Science Congress, 1957. Proceedings. 16:210-216.

Reports studies on the Vitiaz, since 1949 by the Institute of Oceanology, Academy of Sciences, U.S.S.R. Vertical and horizontal distribution of fauna in the Japan, Bering, and Okhotsk Seas is discussed, also exchanges (mostly northward) of fauna between these seas. Faunistic boundaries between the Japan and Okhotsk Seas occur at La Perouse Strait, Catherine Strait, and the Amur Estuary; and between Bering and Chukchi Seas in the Bering Strait region. Some species penetrating these barriers are noted. (Arctic Biblio.).

Vader, W. 1968. A Specimen of *Hippomedon denticulatus* with Crystalline Eye-linses: With Notes on the Development of the Eyes in Other *Hippomedon* Species (Amphipoda, Lysianassidae). Sarsia33:65-72.

Vader, W. 1968. *Eurydice inermis* (Isopoda, Cirolanidae) in Norway. Sarsia 33:7-12.

Vader, W. 1968. Occurrence of *Hemioniscus balani* (Sp. Bate) in Northern Norway (Isopoda, Cryptoniscidae). Astarte 30:1-3.

Vader, W. 1970. Amphipods associated with the Sea Anemone, *Bolocera tuediae*, in Western Norway. Sarsia 43:87-98.

Vader, W. 1973. *Nebalia typhlops* in Western Norway (Crustacea, Leptostraca). Sarsia 53:25-28.

Vahl, O. 1971. Growth and Density of *Patina pellucida* (L.) (Gastropoda, Prosobranchia) on *Laminaria hyperborea* (Gunnenerus) from Western Norway. Ophelia 9(1):31-50.

Verrill, A.E. 1879. Annelides. *In*: Kumlien, L., and Others. Contributions to the Natural History of Arctic Ameriac. U.S. National Museum. Bulletin. No. 15: 141-143.

List of eleven species of worms with some notes, including location of specimens found on the Howgate Polar Expedition, 1877-78. (Arctic Biblio.).

Verrill, A.E. 1879. Molluscoids. *In*: Kumlien, L. and Others. Contributions to the Natural History of Arctic America. U.S. National Museum. Bulletin. No. 15:147-150.

Annotated list of four species of tunicates and eight species of polyzoans, collected during the Howgate Polar Expedition to Cumberland Sound, 1877-78. (Arctic Biblio.).

Verrill, A.E. 1879. Radiates. *In*: Kumlien, L. and Others. Contributions to the Natural History of Arctic America. U.S. National Museum. Bulletin. No. 15: 151-153.

Annotated list of six species of echinoderms, three hydroids, two anthozoans, and mention of Porifera collected during the Howgate Polar Expedition to Cumberland Sound, 1877-78. (Arctic Biblio.).

Verrill, A.E. 1914. Monograph of the Shallow-Water Starfishes of the North Pacific Coast from the Arctic Ocean to California. Smithsonian Institution, Washington, D.C.V.I, 408p.; V. 2 110 plates.

Contains description (in detail) of the habits, morphology and classification of forms, with a list of forty-three species from the arctic coast of Alaska, the coasts and islands of Bering Sea, south to the Aleutian Islands and Alaska Peninsula, and fifty species from southeastern Alaska. (Arctic Biblio.).

Verrill, A.E. 1922. Alcyonaria and Actinaria. Canadian Arctic Expedition, 1913-1918. Report. Vol. 8: Mollusks, Echinoderms, Coelenterates, etc. Pt. G. King's Printer, Ottawa 164p.

Lists, with descriptions, taxonomic revision, and distribution noted, of thirty-three (including five new) alcyonarian species (soft corals and sea pens) from the waters of Bering Strait, the arctic coast of Alaska and Canada, Hudson Bay and east coast of Canada; also twenty-seven (including five new) actiniarian species (sea anemones) from all coasts of Canada and Alaska. (Arctic Biblio.).

Vinogradov, L.G. 1968. Kamchatskoe Stado Krabov. (Kamchatka's Crabs). Priroda 57(7):43-50.

Considers conservation of crab in these waters. The loaction of the nursery is on the western shore of Shelekhov Bay, from where young crabs desceng to 10-60 m. depth for the first time at the age of 3 yrs, and join the adults traveling north only 7 yrs. Drawings illustrate the developmental stages of the crab. Strict observance of fishing regulations is urged to restore the depleted reserves of crab in Kamchatka. (Arctic Biblio.).

Vinogradova, N.G. 1956. Zooeograficheskoe Raionirovanie Abissali Mirovogo Okeana (Zoogeographical Subdivision of the Abyss of the World Ocean). Akademiia Nauk SSSR. Doklady, III(I):195-198.

Attempt is made at geographic subdivision of the abyssal region (hitherto considered cosmopolitan and homogeneous) on the basis of distribution of Spongia, Coelenterata, Cirripedia, Isopoda, Pantopoda, and Echinodermat. The orders are mostly (85 percent) confined to a certain ocean. The going scheme presented includes the northern Pacific province (Okhotsk and Bering Seas) and the Arctic subprovince (Barents Sea, Svalbard waters, Greenland Sea and Greenland Waters). The latter is connected with the Atlantic Ocean province: 32.5 percent of the Arctic deep-sea species are of Atlantic origin, but it is quite different from the northern Pacific province. (Arctic Biblio.).

Wacasey, J.W. 1975. Zoobenthos of the Southern Beaufort Sea. In: Reed, J.C. and J.E. Slater (eds.). The Coast and Shelf of the Beaufort Sea. Symposium. San Francisco, California, Ja. 7-9, 1974. Arctic Institute of North America, Arlington. p. 697-704.

Wagner, F.J.E. 1961 Faunal Report, Submarine Geology Program, Polar Continental Shelf Project, Isachsen, District of Franklin. Canada. Geological Survey. Paper 61-27. Queen's Printer, Ottawa.

Deals with recent organisms form the surface of the sea bottom at 15 of the 17 off-shore stations along the line 77° 51.5'N 115°36'W. to 80° 04.5'N 97°10'W., and northwest from Cape Isachsen on Ellef Ringnes Island to 80°42' N. 112°50'W. Foraminifera were the most important group, molluscs and Ostracods next in abundance. Some forams have value as depth-indicator species for certain broad bathmetric zones, shelf, slope, etc. Some were also found to be zonally characteristic near ice island T-3; and others apparently serve as indicators only in this project area. The Atlantic or Pacific affinities of the Arctic fauna should be indicated as work continues for some conclusion regarding water circulation, ocean currents, etc. (Arctic Biblio.).

Wagner, F.J.E. 1964. Faunal Report, 2; Marine Geology Program, Polar Continental Shelf Project, Isachsen, District of Franklin. Dartmouth, N.S. Canada. Bedford Institute of Oceanography. Dartmouth, N.S. Report B.I.O. 64-. Unpublished Manuscripts.

Lists and discusses the depth distribution and affinities of invertebrate faunas collected at traverses seaward 115 mi. northwest of Ellef Ringnes and 95 mi. northward of the tip of Borden Islands in 1962, by Geological Survey of Canada personnel connected with the Polar Continential Shelf Project. Of the 133 species recognized, 86 are foraminifera, 25 molluscans, 11 ostracodd, and a few sponges, bryozoans, annelids, and echinoderms. (Arctic Biblio.).

Wahrberg, R. 1930. Sveriges Marina och Lacustra Isopoder. (Sweden's Marine and Lacustrine Isopods). Goteborgs Kungl. Vetenskaps - och Vitterhets - samhalle. Handlingar. 5 foljden, Ser. B, Bd. 1, No. 9. Goteborg. 76p.

Systematic description of isopods includes 25 species known in arctic regions from the Barents Sea to northern Canada. Cited depths of occurrance range to 200 meters. Several species are described as parasitic. (Arctic Biblio.).

Waren, A. 1973. Revision of the Rissoidae from the Norwegian North Atlantic Expedition 1876-78. Sarsia 53:1-13.

Webb, M. 1963. A Reproductive Function of the Tentacle in the Male of Siboglinum ekmani Jagersten (Pogonophora). Sarsia 13:45-49.

Webb, M. 1964. Additional Notes on Sclerolinum brattstromi (Pogonophora) and the Establishment of a New Family, Sclerolinidae. Sarsia 16:47-58.

Wesenberg-Lund, E. 1950. The Danish Ingolf-Expedition. Vol. IV, Part 14. Polychaeta. Copenhagen. 92p.

Williams, M.W. 1940. A New Periploma from Alaska. Journal of Entomology and Zoology 32:37-40.

Description of Periploma alaskana, n. sp., a clam from Chukchi Sea and from Prince William Sound. (Arctic Biblio.).

Yingst, D. 1974. The Vertical Distribution and Reproductive Biology of Pelogobia longicirrata (Annelida) in the Central Arctic Ocean. Biological Bulletin 147(2): 457-465.

Zarenkov, N.A. 1960. Materialy po Sravnitel'noi Ekologii Desiatinogikh Rakoobraznykh Dal'nevostochnykh Moreo. (Materials for the Comparative Ecology of Decapod Crustaceans of the Far Eastern Seas). Zoologicheskii Zhurnal 39(2):188-199.

Study of distribution by depth of 16 forms, and by temperature of 12 forms, in the Chukchi, Bering, Okholsk and Japan Seas. The ranges of distribution by depth and by temperature are formulated for most species. The degree of range variability by depth and by temperature was found to be different in different species. (Arctic Biblio.).

Zarenkov, N.A. 1965. Geographic Distribution of Shrimps of the Family Crangonidae in Relation to the Origin of the Antarctic Genus Notocrangon. Oceanology, Academy of Sciences, USSR. 5(1). English ed. published Feb. 1966, p.112-118.

Zarenkov, N.A. 1965. Geographic Distribution of Shrimps Related to the Crangonidae Family and the Question of the Origin of the Arctic Genus Notocrangon. Okeanologiia 5(1):147-154.

Zatsepin, V.I. and Rittikh, L.A. 1968. Quantitative Distribution of Bottom Fauna and its various Ecological Groups in the Murmansk Coastal Area of the Barents Sea. Mokoskogo Obshchestva Isptatelei Prirody. Trudy. 30:49-82.

Zenkevich, L.A. 1935. Nekotorye Nabliudeniia po Obrastaniiu v Ekaterinenskoi Bukhte, Kol'skiy Zaliv. (Some Observations on Fouling in Ekaterininskaya Bay, Kola Bay). Moskovskoe Obshchestvo Ispytatelei Prirody. Biulletin'. Otdel Biol. Novaia Seriia. 44(3):103-112.

Contains the results of investigations carried out by the author in Kola Bay, Barents Sea, on hard substrata in fresh and sea water "fouled" with molluscan encrustations; data are given on the rate of growth of Balanus balanoides, Mytilus edulis and Hydroidea (number of specimens, weight in grams, total weight of the encrustation, etc.) for every month. (Arctic Biblio.).

Zenkevich, L.A. 1937. Uspekhi Izucheniia Morskoi Fauny SSSR za 20 let. (The Results of the Study of Marine Fauna of the U.S.S.R. for Twenty Years). Zoologicheskii Zhurnal 16(5):830-870.

Contains data on the progress of this study during 1917-37, and on many expeditions in the arctic seas and their achievements; bibliography (about 200 items). (Arctic Biblio.).

Zenkevich, L.A. 1947. Fauna i Biologicheskaia Produktivnost'Moriia. Moria SSSR. Tom. 2. (The Fauna and Biological Productivity of the Sea. Seas of U.S.S.R., Vol. 2). Sovetskaia Nauka, Leningrad. 587p.

An extensive monograph, based on 25 years' work on Russian seas by the author and his students. The first part is devoted to the arctic seas: General characteristics (p. 11-14); Barents Sea (p. 45-138); White Sea (p. 139-66); Kara Sea (p. 167-89); Laptev Sea (p.190-94); and Chukchi Sea (p. 195-99). For each sea is given its general characteristics, history of its exploration; physioco-geographical, hydrological, hydrochemical and geological characteristics; flora and fauna (plankton: composition, distribution, migration, food value, etc.; benthos: kinds, composition, distribution; biomass, etc,; the fish fauna: general composition; commercial fishes, their growth, food, migrations, etc.; fisheries); zoogeography. At the end (p.519-38) is a bibliography for all parts of the volume (over 1000 items), also (p.562-83) an index of species, as well as the usual subject-geographic and author indexes. Vol. 1 of this work has not been located, its scope is indicated (V.2, p.8) as: general oceanography, marine biology, ecology and zoogeography in general. (Arctic Biblio.).

Zenkevich, L.A. 1948. Biologicheskaia Struktura Okeana. (Biological Structure of the Ocean). Zoologicheskii Zhurnal 27(2):113-124.

Contains the results of a general study of the organic life of oceans and horizontal and vertical fluctuations of the marine fauna, with statistical data on quantitative distribution of algae and benthos in various seas including all arctic seas of the U.S.S.R. and some other extra-Russian Seas. (Arctic Biblio.).

Zenkevich, L.A. 1948. Russkie Issledovateli Fauny Morei. (Russian Investigations of Marine Fauna). Akademiia Nauk SSSR. Institute Istorii Estestvozaniia. Trudy. 2:170-196.

Contains an historical review of this work, with emphasis on the achievements during the Soviet regime; includes data on expeditions for the study of the fauna of northern seas (Barents, White and Kara Seas) p.179-83, and the seas of the Far East (Okhotsk and Bering Seas); bibliography (129 items). (Arctic Biblio.).

Zenkevich, L.A. 1958. Glubokovodnye Ekhiuridy iz Severo-Zapadnoi Chasti Tikhogo Okeana. (Deep-sea Echiurids from the Northwestern Part of the Pacific Ocean). Adademiia Nauk SSSR. Instutut Okeanologii, Trudy. 27:192-203.

Description of nine species of these worms seven of them new. Five of the Latter form three new genera: Jacobia, Vitiazema, and Alomasoma. Location and depth of find are noted as well as nature of substrate, ect. The material was collected during cruises of Vitiaz' in the Bering and Okhotsk Seas. (Arctic Biblio.).

Zenkevich, L.A. 1958. Obshchaia Kratkaia Kharakteristika Kachestvennogo Sostava i Kolichestvennogo Raspredeleniia Donnoi Fauny Dal'nevostochnykh Morei SSSR i Severozapadnoi Chasti Tikhogo Okean. (A brief general description of the Bottom Fauna in the Far Eastern Seas of the U.S.S.R. and the Northwestern Part of the Pacific Ocean). Akademiia Nauk SSSR. Institut Okeanologii. Trudy 27:154-160.

Authors draw attention to the diminution of quantity of the benthos from $\pm$ 1000 g./m^2 on the continental shelf to 10 g. on bottoms 1000-2000 m. deep and to a fraction of gram on the abyssal. Qualitative distribution is found to depend on the distance from the coast, degree of isoloation from the ocean and on vertical zonation. More common benthic forms of the area are discussed. (Arctic Biblio.).

Zenkevich, L.A. 1963. Biology of the Seas of the U.S.S.R. (Biologiia Morei SSSR). Bocharskaia, S. (Trans). 1963. Interscience Pub., New York, 955 p. (Translation of Moskva, Izd-vo Akademii Nauk SSSR. 1963. 738p.).

Encyclopedic study by the Nestor of Russian marine biology. Introduction treats the area and other parameters of the 14 Russian (including the Caspian and Aral) seas, their geographic location, orography, geology, and water balance; also research, research institutions, and main serial publications. Pt. 1 (p. 17-210) deals with the arctic seas, their hydrology, fauna and flora including plankton and benthos. This general description is followed by detailed accounts for the six seas, from the Barents eastward to the Chukchi. Each is treated as to general characteristics, exploration and research, physical and geographic traits, flora and fauna, especially plankton, benthos and fishes. Pt. 4 covers the seas of the Far East, including the Okhotsk and the Bering (p. 601-646). Appendix is an extensive literature list, indexes of persons, Latin names and subjects. (Arctic Biblio.).

Zenkevich, L.A. and V.A. Brotskaia. 1937. Materialy po Ekologii Rukovodiashchikh form bentosa Barentsova Moria. (Some Data on the Ecology of Dominants in the Benthos of the Barents Sea). Moskva. Universitet. Uchenye Zapiski. 13, Zoologiia: 203-226.

Contains data on the evaluations of bottom complexes of marine fauna of Barents Sea with the aid of diagrams and density curves of the benthos population; the influence of certain factors on benthos distribution and the method proposed by the author for their evaluation is discussed. This study is based on collections of the State Oceanographic Institute, 1924-33. Summary in English. (Arctic Biblio.).

Znamemskii, Iu. P. Morskie Bespozvonochnye i ikh Ispol'zovanie. (Marine Invertebrates and their Uses). Priroda 9:55-60.

Attempt is made at a rough estimate of the marine invertebrates of the various Russian seas, and possibilities of utilizing commercial molluscs, crustaceans, and echinoderms. The importance of such crustaceans as the Kamchatka crab, Pandalus borealis, Sclerocrangon boreus and edible molluscs (Mytilus edulis, Machaera costata, Haliotis gontschatcara, etc.) is stressed. The study is arranged by the seas, and includes the northern waters of the U.S.S.R., Okhotsk, and Bering Seas. (Arctic Biblio.).

VII. Discussion

From the review of the literature and unpublished data to date, it is evident that available data are sparse. It is difficult to draw firm conclusions concerning the potential effect of man's accelerated oil and gas drilling and exploration on the ecology of the North Slope and adjacent coastal waters. Before any real or potential effects can be evaluated, much basic and long-term information has to be obtained on the structure of the benthic assemblages, on the natural distribution and abundance of the fauna, on the interactions between species populations, and on the interactions of the sea floor with the remainder of the oceanic ecosystem. Any continental shelf natural system north of the equatorial region is variable in space time; this truism pertains directly to the Arctic. Seasonality is accentuated, and the sublittoral benthic environment is marked by contrasts.

The Beaufort Sea continental shelf is highly variable as an environment. Sediments are generally poorly sorted and patchy in distribution (Naidu, 1974; and Barnes and Reimnitz, 1974). Salinity fluctuates seasonally and spatially (Hufford et al, 1974). In the summer months, ice meltwater and river discharge create an estuarine environment in inshore waters. Freshwater dilution effects are felt at the bottom to a depth of 15 meters (Wacasey, 1974), particularly near the Mackenzie River and Alaskan rivers. Sea ice generally melts, breaks up, and is transported off the shelf during the summer months, and the Polar pack ice retreats to the shelf edge. The amount of sea ice present on the continental shelf is highly variable from year to year, however. The keels of pack ice pressure ridges randomly gouging the bottom are a cause of environmental disturbance. There is a direct and marked effect on the sediments (Reimnitz and Barnes, 1974) and probably on the benthic fauna (Carey et al, 1974).

Biologically, these environmental factore significantly effect the ecosystem. The degree of ice cover during the summer has a direct effect on the ambient insolation and on the degree of wind induced turbulent mixing of the surface water layer. This yearly variability undoubtedly results in fluctuations in the degree of primary production.

Low salinity and sediment composition directly affect the distribution and abundance of the benthos. Ice has a major direct effect on the benthic environment and undoubtedly on the benthos. The sediments and associated animals are radically disturbed by ice gouging out to depth of about 40 meters on the continental shelf. It has been long known that sediment type can greatly influence the benthic infaunal organisms and to a large extent control the species composition within a given hydrographic and depth zone. Because of the patchiness of sediment types, it is not surprising that the infauna are patchy in distribution and that it is difficult to define descrete communities within environmental boundaries with the available data.

Trends in faunal abundance across the continental shelf and along the shelf form the basis for several interesting hypotheses. Numerical density and biomass generally increase across the shelf, reaching a maximum on the upper slope at a depth deeper than would be found in temperate waters. These two bio-indices demonstrate an increase from west to east within the depths of 20-30 meters from Cape Halkett to the Mackenzie River (Carey, et al, 1974 and Wacasey, 1974). Ice scour may depress faunal abundance inshore within the above depth zone, while river discharge of detrital material may increase the numerical density and biomass locally. Furthermore, the Mackenzie River may influence much of the south-eastern Beaufort Sea by its influence on turbidity and associated detritus. There may be local nutrient concentration effects caused by coastal upwelling (Hufford, 1974) or by the river discharge. Across the shelf the maximum infaunal abundance may sometimes be located at greater than 600 meters depth, possibly because of along-slope currents at the Arctic surface water and Atlantic water mass boundaries, or because of the movement of Bering Sea, Chukchi Sea water at depth.

VIII. Conclusions

Based on a survey of the existing literature and technical reports concerned with the benthic fauna of the Beaufort Sea, it is evident that the quantitative data necessary for an environmental impact statement for oil and gas exploration and production in the southwestern Beaufort Sea is lacking. Data needed for the description of patterns of distribution and abundance of the sublittoral fauna are scarce. Further research is necessary to provide valid baseline information including a definition of the natural variability in both space and time. What data there are indicate that the inner portion of the continental shelf is physically stressed by salinity changes due to the mixing of runoff and ice melt in the summer, and the formation of brime from freezing ice in the fall and winter. Sediment disturbance by ice gouging is a major geologic agent which contributes to the heterogeneity of the sediment, and species distributions.

Furthur rigorous sampling of the benthos and the correlation of the benthic structure with the environment are necessary to suggest which features of the environment most strongly determine the distribution and abundance of organisms on the sea floor.

Life history data are few and fragmentary. Further information is needed to define the spawning periods of the dominant benthic species and to determine repopulation rates.

IX. Needs for further study

The determination of the species, ecological type, or community critical to the normal functioning of an ecosystem is an extremely difficult set of problems. Ideally information on trophic and competive species interactions are needed to characterize the ecosystem, yet this information is virtually impossible to measure and can only be infered from those parameters that can be measured. Furthermore, statistically valid baseline information describing the present benthic community structure is critical as a "standard" at a point in time against which future community structure can be compared for an evaluation of the degree of change. Thirdly, biological information on life histories is essential for the determination of repopulation rates and the rate of restoration toward the normal range of community structure and function should a benthic assemblage be drastically disturbed.

Research in these three areas have been requested by NOAA for the Beaufort Sea ecosystem. The determination of the structure, function, and basic state (health) of an ecosystem is an extremely long-term project, probably requiring tens of years in such a highly variable, unpredictable environment. It is evident that valid data cannot be obtained in all essential aspects of benthic ecology in the time and with the funds available for this project. Nevertheless, research can be undertaken at least in some of the less complex endeavours to provide enough data for a description of a simplified, basic structure and for the construction of qualified generalities. The Bureau of Land Management can then make better educated decisions on the leasing of undersea lands for exploratory drilling and the eventual production of gas and oil.

Research on the ecology of benthic invertebrates in the southwestern Beaufort Sea requires at least the following objectives to provide any useful information to the Outer Continental Shelf Energy Program:

(1) description of the patterns of species distribution and abundance, including estimates of variance.

a. extensive quantitative sampling on the continental shelf for macrofauna ($\geq$ 1.0 mm) and mega-epifauna (>1.3 cm) with sufficient replicate samples to define natural variability.

b. extensive bottom photography of larger, visible epibenthos when ice conditions prevent trawling to provide data for estimates of fauna numerical density.

c. seasonal sampling to estimate degree, if any, of change in total numerical density, biomass, and species composition, and community structure at representative stations across the width of the continental shelf. Numerically dominant species should be sampled seasonally to estimate possible changes in population size structure.

d. long term sampling, (five to ten years) at characteristic stations is important to establish the natural variability of the communities on a year to year time scale, and how their size and structure changes.

d. cont.

Without this sampling you lack the prospective of seasonal variability and yearly trends.

(2) Statistical analyses of benthic ecological data

a. definition of species groupings, i.e. communities, and determination of their distributions.

b. community structure analysis including diversity.

c. correlation of dominant species and species groups with benthic environmental characteristics. For these studies it is essential complementary water and sediment data be collected during the same period by other research groups.

(3) Biological studies on the abundant, dominant infaunal species

a. analysis of reproductive activity based on seasonal samples from standard stations collected over a period of two years.

b. analysis of recruitment of abundant species into the benthic population.

c. feasibility studies on the analysis of mortality and growth.

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XI. Summary of 4th quarter operations

A. Laboratory Activities

1. Personnel

a. Andrew G. Carey, Jr. — Oregon State University School of Oceanography, Associate Professor Principal Investigator

Responsibilities: coordination, evaluating, analysis, reporting, and holothurian systematics

b. Gail Erskine — Oregon State University School of Oceanography, Research Assistant

Responsibilities to date: sample picking and sorting, gammarid amphipod systematics, annotated Arctic Basin benthos bibliography, taxonomic library, and field collection

c. Paul A. Montagna — Oregon State University School of Oceanography, Research Assistant

Responsibilities to date: sample picking and sorting, harpacticoid and tanaid (Crustacea) systematics, laboratory equipment, reference museum, and field collection

2. Methods and analysis

Research has continued this quarter on the systematics of benthic fauna collected during WEBSEC-71 and 72 in the Western Beaufort Sea. Emphasis has been placed on the polychaete worms and the harpacticoids.

Techniques for the analysis of the large meiofaunal fraction (0.42 - 1.0 mm) of Smith-McIntyre grab samples are being developed. Six samples from the previous WEBSEC grab samples have been analyzed and preliminary data have been produced.

The testing of several non-destructive techniques for the determination of wet-preserved biomass data is underway. A millipore filter-vacuum technique and a more passive plankton mesh-blotting paper method have been under investigation.

Techniques for the statistical treatment and analysis of benthic data are being evaluated by James Gish. A computer program for compilation and transfer of data to NOAA in the appropriate format is in preparation.

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