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Medusozoa (Cnidaria: Anthozoa exepted) from the Commander Islands, faunistic composition and biogeography

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Abstract: The medusozoan fauna of the Commander Islands (Komandorsky Ostrova, ca 55°N 167°E) is analysed. Seventy-five species have now been recorded; the geographical distribution of these species indicates that the medusozoan fauna is mainly a cold water fauna. The total number of species so far observed and a comparison with the number observed in adjacent regions justifies the conclusion that the Commander Island medusozoan fauna is still insufficiently known, but that it is closest to that of Alaska and the Aleutian Islands.

Introduction

Literature data on the medusozoan fauna of the Commander Islands (Komandorskye Ostrova, ca 55°N 167°E) are scarce. American publications of the end of the nineteenth and the beginning of the twentieth century give some information on species from this area (Clark, 1877; Nutting, 1899, 1901, etc.). Some species are also mentioned by Jäderholm (1907, four species off Bering Island), Linko (1911, 1912), Kudelin (1914) and later on by Yamada (1959). Naumov (1960) provided evidence for the occurrence of 14 species of hydroids. Scanty information on hydromedusae and scyphomedusae of the Commander Islands is found in papers by Naumov (1960, 1961), Kramp (1961, 1968), and Arai & Brinckmann Voss (1980). Some species of Siphonophora are listed by Stepanjants (1967) and Alvariño (1971).

We examined 198 samples of hydrozoan material from depths between 0 and 500 m (figs 1, 2), collected by scientists from the Laboratory for Benthic Communities of the Institute of Ecology and Nature Treatment of Petropavlovsk-Kamchatskiy (Kamchatka) and the Zoological Institute, Academy of Sciences, St. Petersburg, obtained by SCUBA diving and by research vessels using the dredge "Ocean" and trawls. The material was collected around four islands of the Commander Archipelago: Bering, Medniy, Ariy Kamen and Toporkov (1975, 1985, 1989-1992, 1994).

Results

Both analysis of literature data and study of the available Hydrozoa collection, comprising 41 species, permitted us to compile a list of 75 species of Medusozoa for the Commander Islands, including 61 species of Hydrozoa (33 genera and 14 families), five of Siphonophora (five genera and three families) and nine species of Scyphozoa (seven

genera and six families) (table 1). Amongst these there are no geographically unexpected species.

Thirty-eight percent of the species are Pacific (55% of which high-boreal), 28% are boreal-arctic and amphiboreal (28.5% of which high-boreal), 13% are bipolar (fig. 3). Of the 16% that can be characterized as widely distributed the majority are cold water species, with the exception of *Plumularia setacea* (Linnaeus, 1758), which is a warm water species. All these figures indicate that the Commander Islands medusozoan fauna is mainly a cold water fauna (29.5% high-boreal and 65% boreal, bipolar and widely distributed). Four species are considered east-boreal-arctic: *Sertularia similis* Clark, 1877; *S. cupressoides* Clark, 1877; *Abietinaria turgida* (Clark, 1877), and *Halecium scutum* Clark, 1877. This means that the eastern border zone belongs to the Canadian Arctic Archipelago biogeographically (Calder, 1970) and the western border zone to the East Eurasian seas (Stepanjants, 1989). Other species with this type of distribution can be expected to occur here.

It is interesting to compare the species list of Commander Island Medusozoa with those of nine adjacent regions of the North Pacific: Alaska (120 species), Aleutian Islands (84), East Kamchatka coast (136), Bering Sea (171), Sea of Okhotsk (213), northern part of the Kuril Islands (179), southern part of the Kuril Islands (160), and the northern part of the Sea of Japan (180).

This comparison strongly supports the conclusion that the medusozoan fauna of the Commander Islands is poorer than that of the other regions, indicating primarily that it is still incompletely studied. However, faunistic similarity diagrams (on the level of families and species) indicate that the area investigated is closest to the Aleutian Islands and Alaska (figs 4, 5).

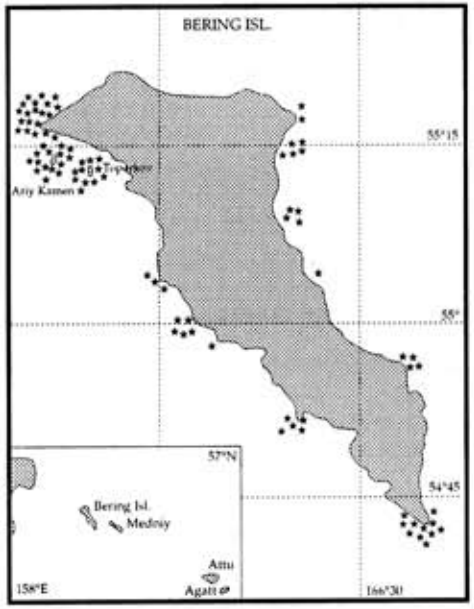

Fig. 1. Map of Bering Island, the largest island of the Commander Archipelago, also showing the islets of Toporkov and Ariy Kamen, situated to the north-west. In the left lower corner the position of the Commander Archipelago is shown between the east coast of Kamchatka and Attu and Agatt, the westernmost of the Aleutian Islands. This and next map are borrowed from "The Commander Islands in 1923" by the famous Russian geographer and Far East investigator V.K. Arsenjev. Stars indicate localities where hydroids were collected.

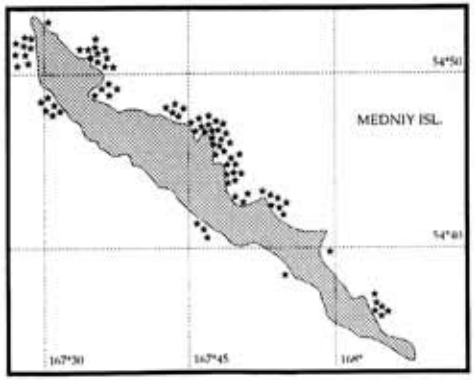

Fig. 2. Map of Medniy Island. Stars indicate localities where hydroids were collected.

Table 1. Medusozoa from the Commander Islands. Index of biogeography: Br = boreal; Ar = arctic; As = Asiatic; BrAr = boreal-arctic; P-Br = Pacific boreal; HBr = High-boreal; AnBr = amphiboreal; B = bipolar; HBrAr = high boreal-arctic; HBrAs = high boreal asiatic; e-HBrAr = east boreal-arctic; W-D = widely distributed; W-D d = widely distributed, deep water; W-D w = widely distributed, warm water; E = endemic; C = cosmopolitan; o = present in our collection.

		Source of information	Biogeographical status
Subphylum Medusozoa			
Class Hydrozoa			
Order Athecata			
Suborder Filifera			
Family Calycopsidae			
1. *Bythotiara depressa* Naumov, 1960		Arai & Brinckmann-Voss, 1980	P-HBr
2. *Heterotiara anonyma* Maas, 1905		id.	W-D
3. *Calycopsis nematophora* Bigelow, 1903		id.	P-HBr
Family Bougainvilliidae			
4. *Rhizorhagium roseum* M. Sars, 1877	o	(present study)	HBrAr
Family Eudendriidae			
5. *Eudendrium vaginatum* Allman, 1863	o	(present study)	HBrAr
6. *Eudendrium* spec.	o	id.	PHBrAs
Suborder Capitata			
Family Tubulariidae			
7. *Tubularia indivisa* Linnaeus, 1758	o	id.	B
Order Thecaphora			
Family Campanulariidae			
8. *Campanularia volubilis* (Linnaeus, 1758)	o	id.	W-D
9. *Orthopyxis compressa* (Clark, 1877)	o	id.	P-Br
10. *Orthopyxis integra* (McGillivray. 1842)	o	id.	B
11. *Tulpa crenata* (Allman, 1876)	o	id.	BrAr
12. *Obelia longissima* (Pallas, 1766)	o	id.	B
13. *Rhizocaulus verticillatus* (Linnaeus, 1758)	o	id.	BrAr
Family Lafoeidae			
14. *Lafoea grandis* Hincks, 1874	o	id.	W-D
15. *Lafoea dumosa* (Fleming, 1820)	o	id.	C
16. *Grammaria abietina* (M. Sars, 1851)	o	id.	B
17. *Grammaria* spec.	o	id.	E As
18. *Filellum serpens* (Hassall, 1848)	o	id.	B
19. *Cryptolarella* cf. *flabellum* (Allman, 1888)	o	id.	?
Family Campanulinidae			
20. *Modeeria plicatile* (M. Sars, 1863)	o	Linko, 1912	BrAr
21. *Calycella syringa* (Linnaeus, 1767)	o	(present study)	B
Family Laodiceidae			
22. *Ptychogena lactea* A. Agassiz, 1865	o	Arai & Brinckmann-Voss, 1980	BrAr
Family Sertulariidae			
23. *Sertularella gigantea* Mereschkowsky, 1878	o	(present study)	BrAr
24. *Sertularella albida* Kirchenpauer, 1884	o	id.	P-HBr
25. *Sertularella rugosa* (Linnaeus, 1758)	o	Kussakin, 1978	BrAr
26. *Sertularella complexa* Nutting, 1904	o	(present study)	P-HBrAs
27. *Sertularella flabella* (Nutting, 1904)	o	Naumov, 1960	P-HBr
28. *Sertularella reticulata* Kirchenpauer, 1884	o	Naumov, 1960	?
29. *Sertularella tenella* (Alder, 1857)	o	(present study)	BrAr
30. *Symplectoscyphus tricuspidatus* (Alder, 1856)	o	id.	B

31. *Symplectoscyphus pinnatus* Clark, 1877	o	id.	AmBr
32. *Sertularia similis* Clark, 1877	o	id.	e-HBrAr
33. *Sertularia cupressoides* Clark, 1877	o	id.	e-HBrAr
34. *Abietinaria abietina* (Linnaeus, 1758)	o	id.	B
35. *Abietinaria variabilis* (Clark, 1877)	o	id.	P-HBr
36. *Abietinaria filicula* (Ellis & Solander, 1786)	o	id.	AmBr
37. *Abietinaria costata* (Nutting, 1901)	o	id.	P-Br
38. *Abietinaria labrata* (Murray, 1860)	o	id.	P-Br
39. *Abietinaria gigantea* (Clark, 1877)	o	Naumov, 1960	P-HBr
40. *Abietinaria gracilis* Nutting, 1904	o	id.	P-Br
41. *Abietinaria turgida* (Clark, 1877)	o	(present study)	e-HBrAr
42. *Abietinaria derbeki* Kudelin, 1914	o	id.	P-HBr
43. *Thuiaria? carica* Levinsen, 1913	o	id.	BrAr
44. *Thuiaria thuja* (Linnaeus, 1758)		id.	BrAr
45. *Thuiaria obsoleta* (Nutting, 1901) (= *T. hartlaubi*)		Naumov, 1960	BrAr
46. *Thuiaria cylindrica* Clark, 1877		id.	HBrAr
Family Haleciidae			
47. *Halecium beringi* Naumov, 1960		(present study)	P-HBr
48. *Halecium scutum* Clark, 1877	o	id.	e-HBrAr
49. *Halecium corrugatum* Nutting, 1899	o	id.	BrAr
50. *Halecium curvicaule* Lorenz, 1886	o	id.	HBrAr
51. *Halecium densum* Calkins, 1899	o	id.	P-HBr
52. *Halecium washingtoni* Nutting, 1901	o	id.	P-W-D
Family Plumulariidae			
53. *Plumularia setacea* (Linnaeus, 1758)	o	id.	W-D w
54. *Nuditheca tetrandra* Naumov, 1960	o	Naumov, 1960	P-BrAs
55. *Schizotricha? cf. divergens?* Naumov, 1960	o	id.	P-BrAs
56. *Plumularia? microtheca* Naumov, 1960	o	id.	P-HBrAs
Order Trachylina			
Family Rhopalonematidae			
57. *Crossota rufobrunnea* Kramp, 1913	o	Arai & Binckmann-Voss, 1980	AmBr
58. *Aglantha digitale* (O.F. Müller, 1766)	o	id.	BrAr
Family Aeginidae			
59. *Aegina rosea* Eschscholtz, 1829	o	id.	W-D
60. *Aeginopsis laurentii* Brandt, 1835	o	Kramp, 1968	HBrAr
Family Cuninidae			
61. *Solmissus incisa* (Fewles, 1886)	o	id.	W-D
Class Siphonophora			
Order Siphonanthae			
Suborder Calycophorae			
Family Hippopodiidae			
62. *Vogtia serrata* (Moser, 1925)		Alvariño, 1971	W-D
Family Prayidae			
63. *Rosacea plicata* Quoy & Gaimard, 1827		id.	W-D
Family Diphyidae			
64. *Lensia conoidea* Keferstein & Ehlers, 1861 (= ?*L. c. pacifica* Stepanjants, 1967)		id.	P-Br
65. *Muggiaea bargmannae* Totton, 1954		Stepanjants, 1967	B
66. *Dimophyes arctica* (Chun, 1897)		id.	B
Class Scyphozoa			
Order Coronatae			
Family Collaspidae			
67. *Atolla wyvillei* Haeckel, 1872		Naumov, 1961	W-D d

Family Periphyllidae		
68. *Periphylla periphylla* (Péron & Lesueur, 1809)	id.	W-D d
Order Semaeostomeae		
Family Pelagiidae		
69. *Chrysaora helvola* Brandt, 1838	id.	P-Br
70. *Chrysaora melanaster* Brandt, 1838	id.	P-Br
Family Cyaneidae		
71. *Cyanea capillata* (Linnaeus, 1758)	id.	W-D
Family Ulmaridae		
72. *Phacellophora camtschatica* Brandt, 1838	id.	P-Br
73. *Aurelia aurita* Linnaeus, 1758	id.	W-D
74. *Aurelia limbata* Brandt, 1838	id.	P-Br
Order Stauromedusae		
Family Eleutherocarpidae		
75. *Haliclystus stejnegeri* Kishinouye, 1899	Kramp, 1961	P-Br

The analysis of hydroid taxocenoses of the tidal and the high-subtidal zones, represented in our collections by 29 species, shows dominance of Sertulariidae (45%), Campanulariidae (20%), Haleciidae (10%) and Lafoeidae (10%).

There are nine species that can be considered to have a bipolar type of distribution (species with antitropical distribution). Representatives of the bipolar family Candelabridae (= Myriothelidae) may be expected to occur here too. The similarity in hydroid composition of the taxocenoses of Commander Islands and the subantarctic islands supports the view of bionomic bipolarity, i.e. the similarity of unrelated species, taxocenoses and biocenoses occurring under similar ecological conditions (Ushakov, 1958; Andriashev, 1987). In the Kerguelen Island region, for instance, the dominance of Sertulariidae is 26%, of Campanulariidae 12% and of Haleciidae 10%.

Comments on some species

Eudendrium annulatum Norman, 1864, is here regarded as a junior synonym of *Eudendrium vaginatum* Allman, 1863. The pseudohydrothecae that are said to be absent in *E. annulatum* but characteristic for *E. vaginatum*, are present in about 20% of the colonies from this area.

A single colony of *Cryptolarella flabellum* (Allman, 1888) represents the third record for the North Pacific. The type locality of this species is in the Caribbean region, which makes the identification of the present specimen slightly doubtful (see for this question Vervoort, 1972: 47-49, fig. 13a, b, where the species and its gonothecae are redescribed).

Grammaria spec. is of interest because it may represent a new species.

Halecium beringi Naumov, 1960, is here considered a valid species, specifically different from *Halecium scutum* Clark, 1877, with which it was synonymized by Antsulevich (1987), a conclusion we reject. In *H. beringi* colony height is less than the maximal colony width and colonies are branched in various planes, whereas in *H. scutum* colonies are longer and branched mainly in one plane. Moreover, the distance from diaphragm to hydrothecal rim is longer in *H. beringi* than it is in *H. scutum* (fig. 6). Some measurements of both species are given in table 2.

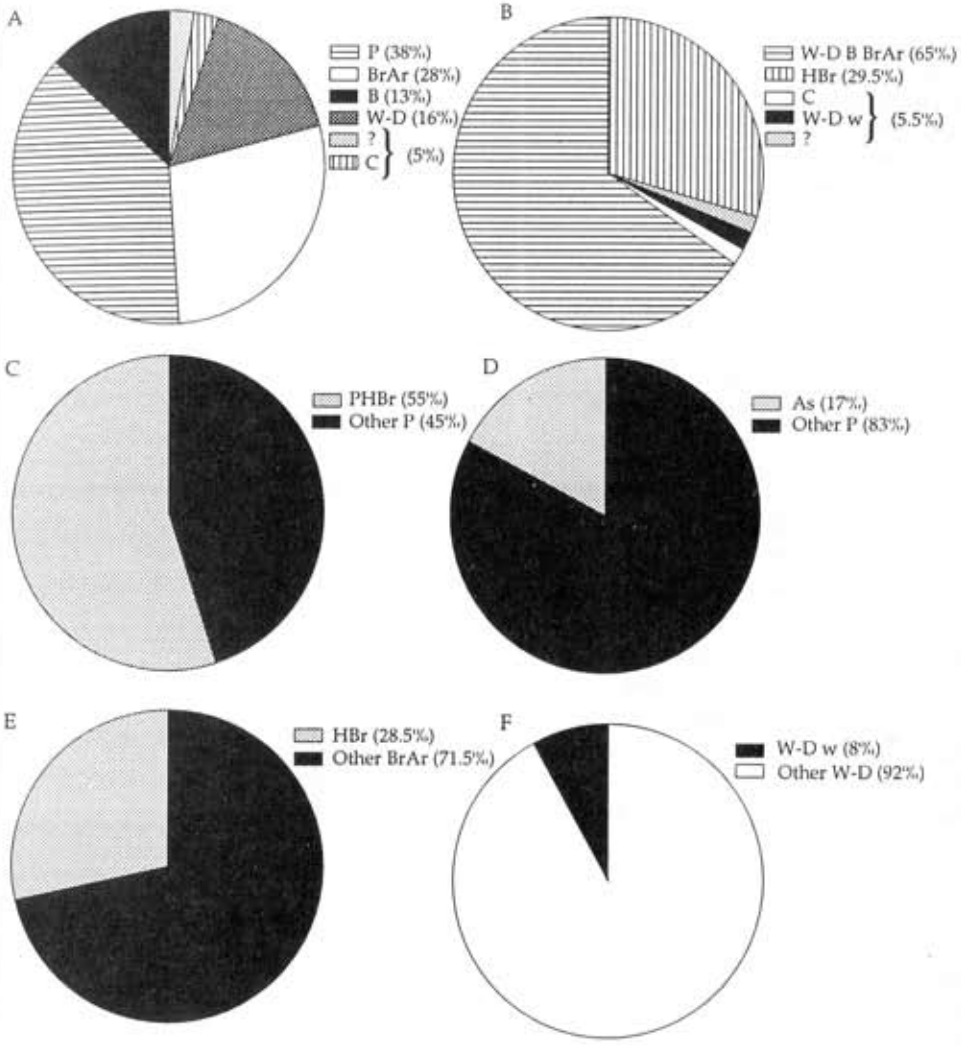

Fig. 3. The faunistic composition of Medusozoa of the Commander Archipelago. The biogeographic abbreviations are the same as in table 1.
Diagrams A and B demonstrate the total species (75) composition: A. Pacific, boreal-arctic, bipolar, widely distributed, and cosmopolitian species; B. High boreal coldwater, boreal-arctic, widely distributed, bipolar cold water, and relatively warm water species.
Diagrams C and D demonstrate the species composition of the Pacific species: C. High boreal and other Pacific species; D. Asiatic and other Pacific species.
Diagrams E and F demonstrate the species composition of the boreal-arctic species (E) and widely distributed species (F).

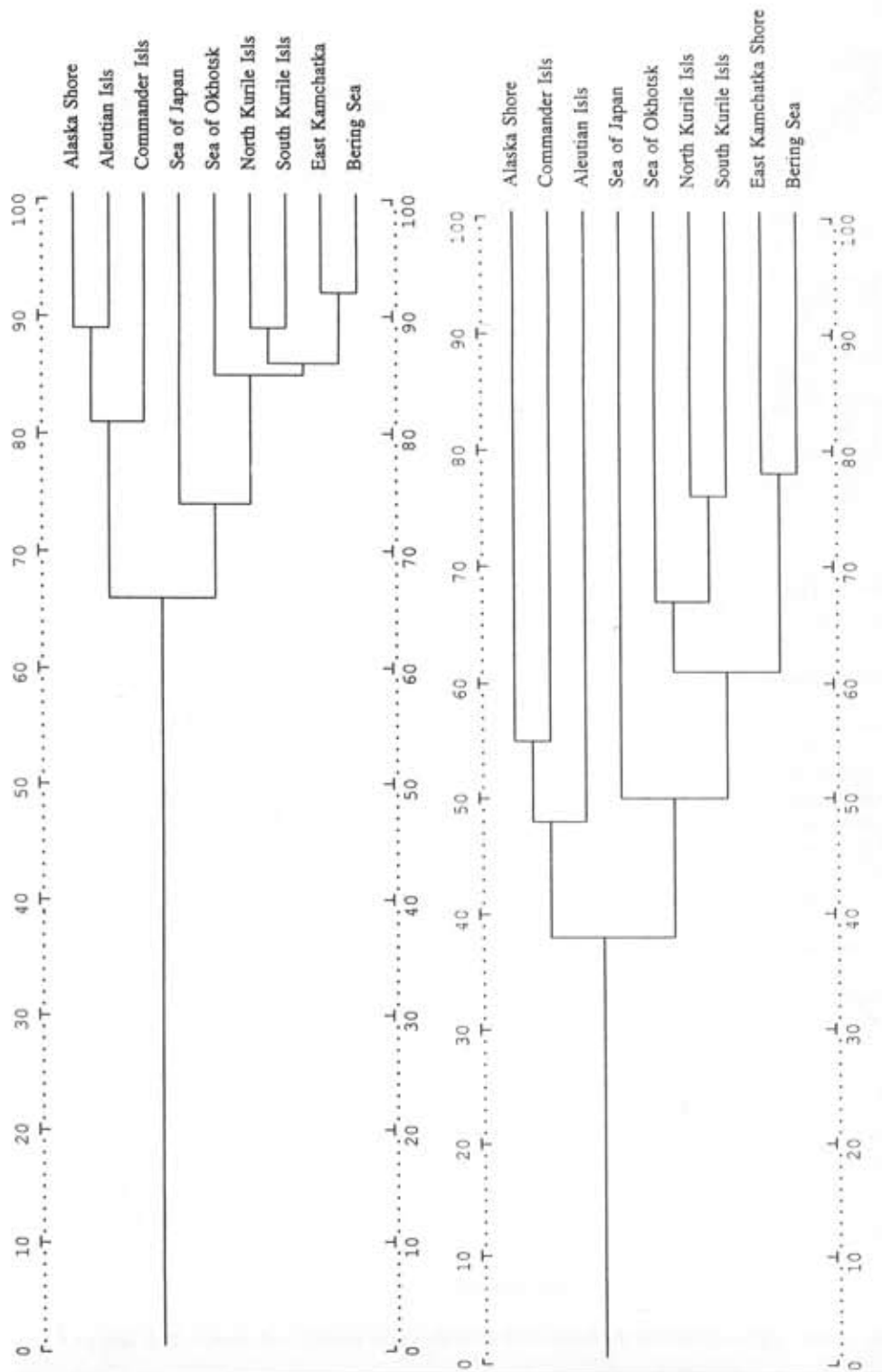

Fig. 4. Similarity of the medusozoan fauna of nine North Pacific areas (index of similarity by Chekanovsky-Soerensen), family distribution.
Fig. 5. The same for the species distribution.

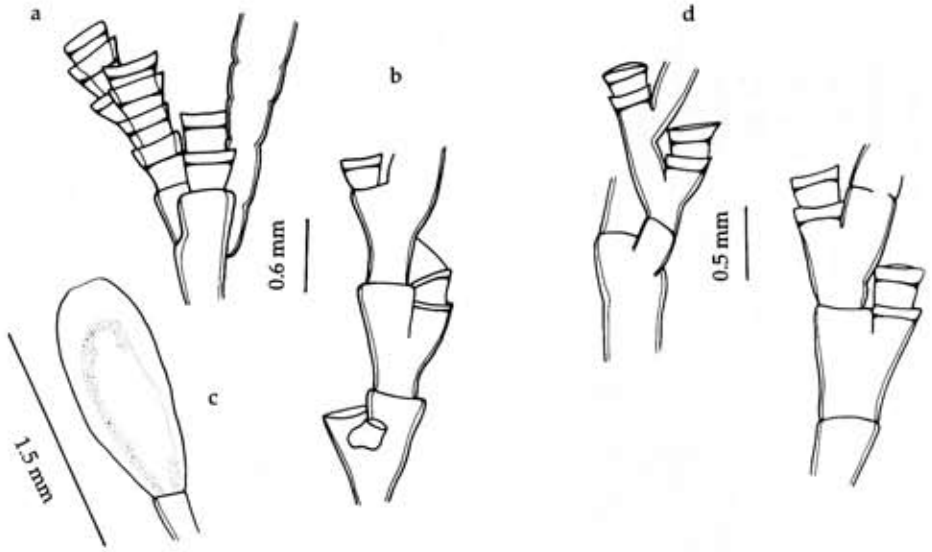

Fig. 6. *Halecium beringi*; a, upper part of colony; b, basal part of colony; c, gonotheca (♂); d, two upper parts of colony; a-c, from the islet Ariy Kamen; d, from Medniy.

Table 2. Some measurements (in mm) of *Halecium scutum* and *H. beringi*.

Parameter	*Halecium scutum*		*Halecium beringi*
	Kurile Is	Commander Is	Commander Is
Branch internodes, length	0.46-1.80	0.31-1.14	0.25-1.00
Branch internodes, diameter	0.25-0.45	0.15-0.31	0.19-0.30
Height : maximal diameter of internodes	0.90-2.50	0.90-2.00	0.60-1.60
Hydrothecae, distance between diaphragm and rim	0.046-0.062	0.025-0.046	0.062-0.130
Hydrothecae, diameter	0.27-0.34	0.16-0.22	0.22-0.30
Female gonothecae, length	2.20-2.60	1.15-1.55	1.30-2.50
Female gonothecae, diameter	1.00-1.20	0.75-0.85	0.70-1.00
Male gonothecae, length	1.80-2.25	1.00-1.10	1.25-1.50
Male gonothecae, diameter	0.50-0.65	0.34-0.43	0.40-0.50

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