

INTERTIDAL MOLLUSKS OF IQUIQUE, CHILE

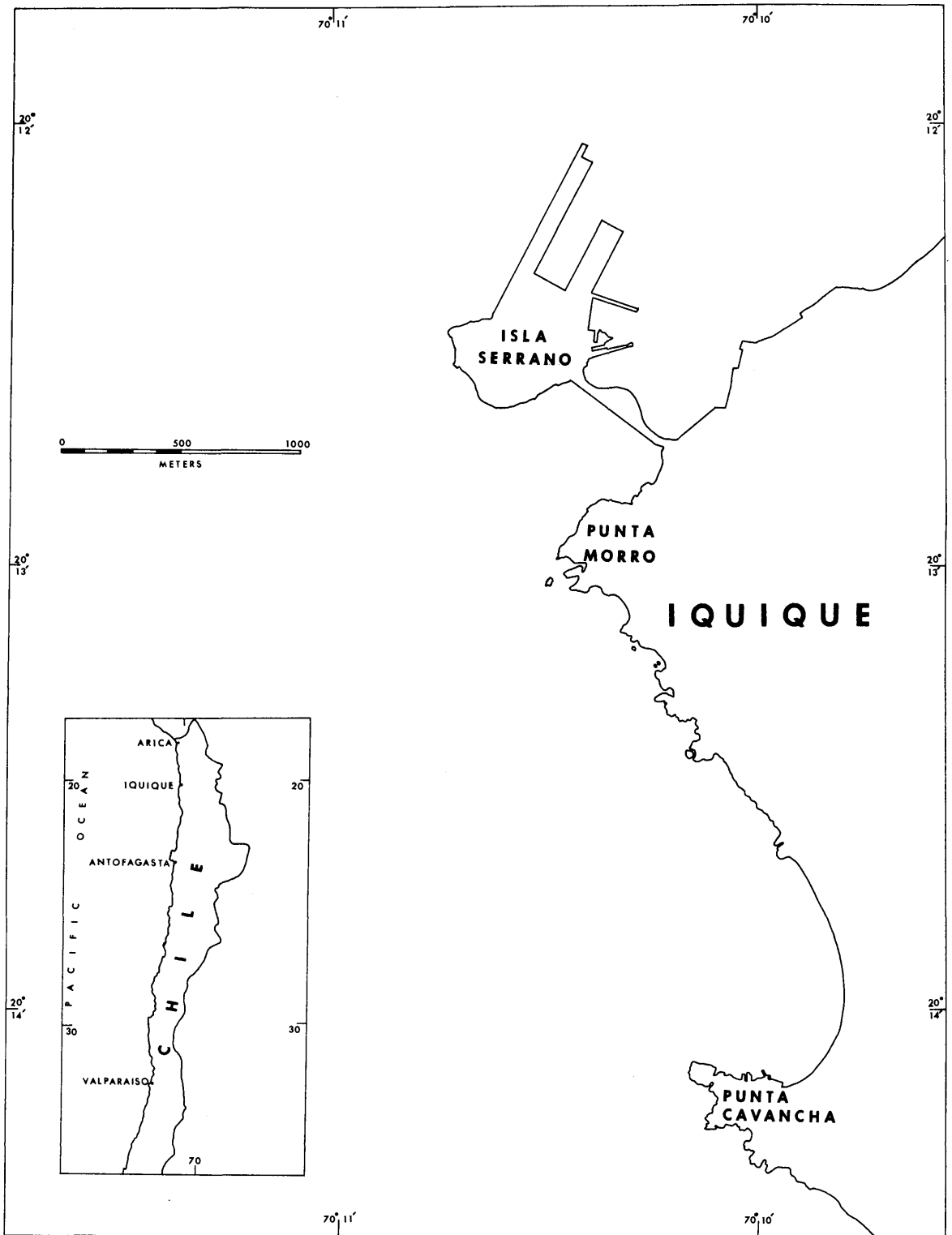
By LOUIE MARINCOVICH, JR.



NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY
SCIENCE BULLETIN 16

FEBRUARY 20, 1973

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Location of Iquique in northern Chile

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INTERTIDAL MOLLUSKS OF IQUIQUE, CHILE¹

By LOUIE MARINCOVICH, JR.²

ABSTRACT: Collections of intertidal mollusks made in the area of Iquique, northern Chile, in 1964 and 1970 were found to contain some new and many poorly known species of mollusks. Because little work has been done on Chilean mollusks, this report gives a synonymy, distribution, habitat, and illustration of each species, with additional remarks about some.

One new genus, *Salitra*, and 10 new species are described: *Nucula (Nucula) interflucta*, *Lyonsia delicata*, *Tricolia macleani*, *Eatoniella (Eatoniella) latina*, *Eatonina (Saginofusca) atacamae*, *Fartulum moorei*, *Aesopus aliciae*, *Salitra radwini*, *Iselica chilensis*, and *Iselica carotica*. Apparently undescribed species of *Bittium*, *Triphora*, and *Cerithiopsis* are only briefly described for lack of good specimens. Two new species of *Marinula* will be discussed by another worker.

INTRODUCTION

Marine invertebrate faunas of the Peruvian province along the west coast of South America are of particular interest because they have not been extensively collected and studied. The steep, rugged coastline throughout much of the province is accessible by road at only a few places, so collecting has mostly taken place at widely scattered ports. One of the localities commonly cited in reports on mollusks of the Peruvian province is Iquique, on the coast of northern Chile at latitude 20° 13'S, but even there the fauna has never been thoroughly described.

The present report is based upon a collection of intertidal mollusks made by me at Iquique from June to September of 1964 and from June to July of 1970. Although most of the species reported here were found by carefully searching the intertidal zone, many of the mollusks are too small to be easily seen. Such small species were collected by using the common micropaleontological technique of flotation in heavy liquids to separate the mollusks and sediment.

Neglect of the Peruvian faunal province by modern molluscan workers is shown by a review of the literature, since the principal works on this region are long out-of-date. The first important work to mention Chilean mollusks was "Saggio sulla storia naturale del Chile" of Molina (1782), in which many of the most common mollusk species were described. The monumental "Voyage dans l'Amerique Meridionale" of Orbigny (1834-1847) is the most useful early work to include Chilean mollusks, giving a brief description and colored drawing of each species, and also cataloging numerous species from Peru and Argentina. The reports by G. B. Sowerby, I. W. J. Broderip and others in the 1830's on the prolific collecting of Hugh Cuming in western South America contain new locality data and descriptions of many new species, but lack the illustra-

tions that make Orbigny's work so valuable. An extensive work on the general zoology of Chile by Gay (1854) includes much descriptive material on mollusks written by Hupé, but illustrates only 39 species. Additional species were described by Philippi (1860) in his account of a natural history trip through the desert of northern Chile. Most later workers have neglected to adequately illustrate their works on Peruvian province mollusks, and the resultant difficulty in identifying specimens has been one major reason for the notable lack of interest in this region.

Dall's (1909) report on a collection of shells from Peru includes a checklist of all known littoral marine mollusks of the Peruvian province, with line drawings of a few common species, and is still the most useful reference for mollusks of this area. The Lund University reports on Chilean mollusks by Leloup (1956) on Polyplacophora, Marcus (1959) on Lamellariacea and Opisthobranchia, and Soot-Ryen (1959) on Pelecypoda include more up-to-date range and locality data, especially for the southern part of the Chilean coastline, plus photographs and line drawings of some species. A review of Panamic-Pacific pelecypods by Olsson (1961) deals mainly with species that occur to the north of the Peruvian province, but does include a few of the more common and widely ranging Chilean forms. Olsson's work also gives a concise historical account of early zoological expeditions to western South America. Illustrations of several species and detailed distributional data are included in a report by Ramorino (1968) on pelecypods from Valparaíso Bay. A recent checklist of Chilean

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pelecypods by Osorio and Bahamonde (1970) is a summary of species reported in the literature. The revised edition of the major work by Keen (1971) on tropical west American mollusks includes several species that range into the Peruvian province. Peña (1970) gives a list of 203 gastropod species collected by him in Peru, and Dell (1971) reports on mollusks of the Royal Society of London Expedition to southern Chile.

A few shorter papers dealing with particular groups of mollusks such as the Fissurellidae (Riveros-Zuñiga, 1951) and the Veneridae (Riveros-Zuñiga and Gonzalez, 1950) or descriptions of new species (Stuardo, 1962) have also appeared, but the Peruvian province still contains the least adequately described molluscan fauna in the eastern Pacific. The high percentage of new species in the present collection, which almost exclusively contains intertidal mollusks, demonstrates the need for more descriptive work in Chile and Peru.

The geographic and bathymetric ranges of mollusks from this region are especially poorly known, owing to sparse modern collecting and imprecise locality data in the early literature. Thus, major changes in our knowledge of the ranges of some species are to be expected as the fauna becomes more thoroughly studied.

In this paper an attempt has been made to refine the northern range limits of Peruvian province species that are frequently cited as occurring in the Panamic province, particularly by Dall (1909). The Hancock collection of mollusks at the LACM contains sufficient material from Ecuador to suggest that absence in the collection of the questioned Peruvian province species is possibly evidence that they do not occur there. Accordingly, some ranges are restricted based on LACM records.

More so than for most other areas, the early literature on Chilean mollusks abounds in bibliographic inaccuracies, providing a serious problem in locating original species citations or constructing synonymies. The obscurity of many of the oldest works adds to the problem and means that an interested worker must devote more time to untangling the literature than to studying specimens. In the present report the synonymies are not intended to be exhaustive, but give works that contain illustrations, name changes, or detailed discussions.

Repositories of type materials described herein are as follows: AMNH, American Museum of Natural History, New York; ANSP, Academy of Natural Sciences, Philadelphia; CAS, California Academy of Sciences, San Francisco; LACM, Natural History Museum of Los Angeles County; SDNHM, San Diego Natural History Museum;

USNM, United States National Museum of Natural History.

ACKNOWLEDGMENTS

Throughout the course of preparing this report I have had the assistance of Dr. James H. McLean, Curator of Invertebrate Zoology at the Natural History Museum of Los Angeles County, and here gratefully acknowledge his part in it. During its early stages the text as a whole has been criticized by Dr. Clarence A. Hall, Jr., of the University of California at Los Angeles, and Dr. William H. Easton of the University of Southern California. I am particularly grateful to Dr. Eugene V. Coan, Research Associate at the California Academy of Sciences, and Dr. William K. Emerson, Curator of Living Invertebrates at the American Museum of Natural History, for their helpful suggestions.

I have benefited greatly from help with identification of some species, through correspondence or discussion, with a number of workers. Dr. Myra Keen of Stanford University was of particular help with bivalves; Dr. James H. McLean with the acmaeid limpets; Dr. Donald R. Moore, University of Miami, with the minute gastropods; and Mr. Spencer R. Thorpe, of El Cerrito, California, with the chitons. Others who assisted with specific problems of determinations are: Dr. S. Stillman Berry, of Redlands, California; Dr. Richard K. Dell of the Dominion Museum, Auckland, New Zealand; Mrs. Eveline Marcus of São Paulo, Brazil; Dr. Joseph P. E. Morrison of the U. S. National Museum of Natural History; Dr. Winston F. Ponder of the Australian Museum, Sydney; Dr. George E. Radwin of the San Diego Natural History Museum; and Dr. Joseph Rosewater of the U. S. National Museum. Their contributions are mentioned in the text.

Mrs. Dorothy Halmos, former librarian of the Allan Hancock Foundation Library, University of Southern California, and Miss Mary Ellen Pippin, the present librarian, greatly assisted in locating older works on Chilean mollusks.

I especially thank my father, Louie Marinovich, Sr., for making possible my first trip to Chile and helping me to collect specimens.

COLLECTING AREAS

Alternating rocky and sandy beaches form the coastline at Iquique (Frontispiece). The rocky beaches are a series of broad shelves and ledges, unprotected from the full force of the sea except for a few large nearshore rocks. I collected intensively in the intertidal zone immediately west of

the town and for one kilometer southward. Since wave action is strong, only coarse sand and gravel are found in the tide pools, and the molluscan assemblage is typical of an open coast. The physical environment affecting intertidal organisms at Iquique has been described by Guiler (1959).

The large brown alga *Lessonia nigrescens* Bory, 1826, is common at Iquique, where its holdfasts are attached in the area exposed at lowest tide and below. The limpet *Scurria scurra* (Lesson) lives exclusively in depressions that it excavates on the algal stipes and holdfasts, and *Hiatella solida* (Sowerby) is commonly nestled in the holdfasts, while *Entodesma cuneata* (Gray) is often attached to holdfasts washed ashore.

The sandy beaches near Iquique are also unprotected and subject to heavy wave action. The only mollusks found on them are *Oliva peruviana* Lamarck, which lives shallowly buried in sand of the swash zone, and *Mesodesma donacium* (Lamarck), which is buried just seaward of the area exposed at low tide. The only protected beach near Iquique was on the rocky headland of Punta Morro, immediately west of the town. It was a small beach, 40 m deep by 15 m wide at low tide, consisting of sandy black silt with interspersed cobbles and boulders. Many of the small gastropods not present elsewhere lived at this locality. When I revisited Iquique in June and July of 1970, this small beach, unique in the Iquique area, had been destroyed by housing construction.

In addition to Iquique, less complete collections were made at Playa Blanca, Punta Gruessa, and Patillos, about 8, 17, and 65 kms south of Iquique, respectively. Playa Blanca is an exposed low rocky shelf of gently dipping shale beds uncovered at low tide. The mollusks most common at Iquique are the only ones present at Playa Blanca, and even these do not occur in large numbers.

Punta Gruessa is a small point consisting of volcanic rocks that are distinctly green when seen from a distance, with outcrops that are massive, steep, and fully exposed to heavy surf. *Scurria viridula* (Lamarck), *Enoplochiton niger* (Barnes), and *Acanthopleura echinata* (Barnes) are common on bare rock surfaces and along wave-cut channels and ledges, especially around the holdfasts of *Lessonia nigrescens*, which seem to afford some protection from the waves. On the south side of the point, a small boulder and gravel beach is semiprotected by rock outcrops on both sides. Many of the mollusks common at Iquique are found here and the small gastropod *Tricolia umbilicata* (Orbigny) is especially abundant.

The fishing village of Patillos is another rocky shore locality, consisting of many massive rocky

fingers projecting seaward and separated by narrow (7-20 m wide) wave-cut channels that have boulder and gravel beaches at their heads. The rock walls bounding the channels are vertical and up to 10 m high. *Acanthopleura echinata* (Barnes) and *Scurria viridula* (Lamarck) are abundant on exposed surfaces and *Diloma nigerrima* (Gmelin) is clustered in crevices and beneath boulders on the gravel beaches.

FAUNAL CONSIDERATIONS

The Peruvian faunal province includes 1800 kms of coastline in Peru (south of 5°40'S) and 2800 kms of coastline in Chile (to about 42°S) (Olsson, 1961). On the basis of published records and personal observations, Olsson (1961:35) estimated a total of 386 species of shell-bearing mollusks from the region between Punta Aguja, Peru, and Chiloe Island, Chile, of which only 292 were considered indigenous to the Peruvian province. At least three times as many species are known from a region of similar size and environmental diversity along the coast of western North America from Alaska to Baja California. This great difference in numbers of species between the two similar regions partly indicates the extent to which the mollusks of the Peruvian faunal province have been neglected.

Garth (1957) has emphasized that the geographical and hydrological similarities between the west coast of South America (below 6°S) and the west coast of North America from Punta Eugenia (28°N) to the Bering Sea are reflected by the generally analogous development of the crustacean faunas. Both the Peruvian province of South America and the combined Californian, Oregonian and Aleutian provinces of North America include long stretches of rugged and exposed coastline with interspersed sandy beaches and occasional embayments. Both regions have relatively cool currents that flow toward the equator, profoundly affecting the faunas. Upwelling cold water and its effects on the coastal faunas of the north temperate region have long been recognized. Upwelling is also common in the south temperate region, but the distribution of the mollusks there is still too imperfectly known to show its effects.

The occurrence of genera common to both northern and southern regions is striking and is well illustrated in the present collection, in which 49 molluscan genera out of a total of 68 are also found in the combined Californian, Oregonian, and Aleutian provinces. Similarities between the molluscan faunas of the two areas can also be seen

TABLE 1

Distribution in eastern Pacific latitudes of mollusks found at Iquique, Chile. Range data based on museum specimens or reliable literature citations are given as solid lines, and less reliable data are given as dotted lines.

Species	Californian Province		Panamic Province			Peruvian Province				Magellanic Province
	40°N	30°N	20°N	10°N	0°	10°S	20°S	30°S	40°S	50°S
<i>Nucula interflucta</i> , sp. nov.										
<i>Barbatia pusilla</i>						—			
<i>Aulacomya ater</i>									—————	
<i>Brachidontes granulata</i>						—————				
<i>Lithophaga peruviana</i>								—————		
<i>Perumytilus purpuratus</i>						—————				
<i>Semimytilus algosus</i>						—————				
<i>Argopecten purpuratus</i>						—————				
<i>Carditella tegulata</i>									—————	
<i>Chama pellucida</i>						—————				
<i>Lasaea</i> cf. <i>L. petitiiana</i>									—————	
<i>Kellia</i> cf. <i>K. tumbesiana</i>								—	
<i>Eurhomalea rufa</i>								—————	
<i>Protothaca thaca</i>									—————	
<i>Petricola rugosa</i>						—————				
<i>Mesodesma donacium</i>						—————				
<i>Gari solida</i>									—————	
<i>Semele solida</i>									—————	
<i>Hiatella solida</i>						—————				
<i>Lyonsia delicata</i> , sp. nov.									—	
<i>Entodesma cuneata</i>									—————
<i>Sinezona rimuloides</i>									—————	
<i>Fissurella costata</i>									—————	
<i>Fissurella crassa</i>								—————
<i>Fissurella latimarginata</i>								—————
<i>Fissurella limbata</i>									—————
<i>Fissurella maxima</i>						—————				
<i>Collisella araucana</i>								—————	
<i>Collisella ceciliana</i>									—————	
<i>Collisella orbignyi</i>								—————
<i>Collisella variabilis</i>								—————
<i>Collisella zebrina</i>									—————	
<i>Scurria parasitica</i>									—————	
<i>Scurria scurra</i>									—————	
<i>Scurria viridula</i>								—————
<i>Diloma nigerrima</i>								—————
<i>Tegula atra</i>								—————
<i>Tegula tridentata</i>								—————
<i>Liotia cancellata</i>									—————	
<i>Prisogaster niger</i>								—————
<i>Tricolia umbilicata</i>								—————
<i>Tricolia macleani</i> , sp. nov.									—————	
<i>Littorina araucana</i>								—————
<i>Littorina peruviana</i>								—————

TABLE 1 (continued)

Species	Californian Province		Panamic Province			Peruvian Province				Magellanic Province
	40°N	30°N	20°N	10°N	0°	10°S	20°S	30°S	40°S	50°S
<i>Eatoniella latina</i> , sp. nov.							-			
<i>Eatonina atacamae</i> , sp. nov.							-			
<i>Rissoina inca</i>									
<i>Omalogyra</i> cf. <i>O. atomus</i>							-			
<i>Cyclostremiscus trigonatus</i>			-			-			
<i>Turritella cingulata</i>						-			
<i>Caecum chilense</i>						-	-			
<i>Fartulum moorei</i> , sp. nov.							-			
<i>Bittium</i> , sp. indet.							-			
<i>Cerithiopsis</i> , sp. indet.							-			
<i>Triphora</i> , sp. indet.							-			
<i>Calyptrea trochiformis</i>						-	-			
<i>Crepipatella dilatata</i>						-	-			
<i>Crucibulum quiriquinae</i>						-	-		
<i>Priene rude</i>						-	-			
<i>Xanthochorus buxeus</i>						-	-			
<i>Crassilabrum crassilabrum</i>						-	-			
<i>Thais chocolata</i>						-			
<i>Thais haemastoma</i>			-	-		-	-			
<i>Concholepas concholepas</i>			-	-		-	-		
<i>Aesopus aliciae</i> , sp. nov.							-			
<i>Mitrella unifasciata</i>							-			
<i>Cilara secalina</i>							-			
<i>Salitra radwini</i> , sp. nov.							-			
<i>Nassarius dentifer</i>							-			
<i>Nassarius gayi</i>							-			
<i>Oliva peruviana</i>						-			
<i>Mitra orientalis</i>						-			
<i>Agathotoma ordinaria</i>						-	-			
<i>Iselica chilensis</i> , sp. nov.							-			
<i>Iselica carotica</i> , sp. nov.							-			
<i>Odostomia chilensis</i>							-			
<i>Onchidella marginata</i>							-			
<i>Marinula</i> , sp. A							-			
<i>Marinula</i> , sp. B							-			
<i>Sarnia frumentum</i>							-			
<i>Siphonaria lessoni</i>						-	-			
<i>Trimusculus peruvianus</i>						-			
<i>Chiton cumingsii</i>						-	-			
<i>Chiton granosus</i>						-	-			
<i>Enoplochiton niger</i>						-			
<i>Acanthopleura echinata</i>						-	-			
<i>Chaetopleura peruviana</i>							-			

in the like number of species of common genera. For example, there are a similar number of species of *Tegula* reported from the Peruvian province and from the western North American provinces, and both areas have abundant and diverse acmaeid limpet assemblages. Fifty-two chitons are listed by Leloup (1956) from Chile alone, with more species living only in Peru, while over 100 are described from the more thoroughly collected coast of western North America.

It is tempting to draw parallels in numbers and species of mollusks common to the cool-temperate regions of western North and South America, but as Garth (1957) has noted for the crustaceans, this would require a more detailed knowledge of the Chilean and Peruvian species than we have at present. It is equally important to keep in mind the differences between the two regions, the most obvious of which is the presence of numerous *Fissurella* species in the south and only one in the north, and the many *Haliotis* species in the north compared to none in the south. In general, however, overall similarity between the two molluscan faunas is apparent and will surely be emphasized as knowledge of the Peruvian province mollusks accumulates.

BIOGEOGRAPHY

Table 1 lists the intertidal mollusks found at Iquique, Chile, and graphically gives their distributions throughout eastern Pacific latitudes. Reliable range data, based on museum specimens or literature citations, are given as solid lines in the table, whereas less reliable data are given as dotted lines. In the case of *Sinezona rimuloides* (Carpenter) the dotted line represents the apparent absence of this species between two verified but widely separate occurrences. Of the 88 species of mollusks in this report, 10 are new species, and five are identified only to the genus level. Of the 73 remaining species, 46 have well-documented ranges entirely within the limits of the Peruvian faunal province, although some of these species have been doubtfully reported from adjoining provinces. Only two of the 73 species are known to occur throughout the entire province, with their northern and southern end-points at the provincial boundaries. Seven of the species overlap significantly into the Panamic province, and 18 overlap into the Magellanic province. Based on reliable data, only seven of the species have their southern end-points at about 42°S latitude, the traditional southern limit of the Peruvian Province, whereas 15 species have their northern end-points near the accepted provincial

limit of about 5°40'S. An additional five species have their southern end-points at 45°S. The southern tip of South America is at about 55°S, and is the known end-point for several Peruvian province mollusks.

Several of the common end-points of ranges are artifacts of collecting, including Callao, Peru (12°S), and Iquique (20°S), Valparaíso (33°S), and Bahía Concepción and Talcahuano (37°S), Chile. These places have been visited more often by collectors, and thus appear commonly as localities in the literature.

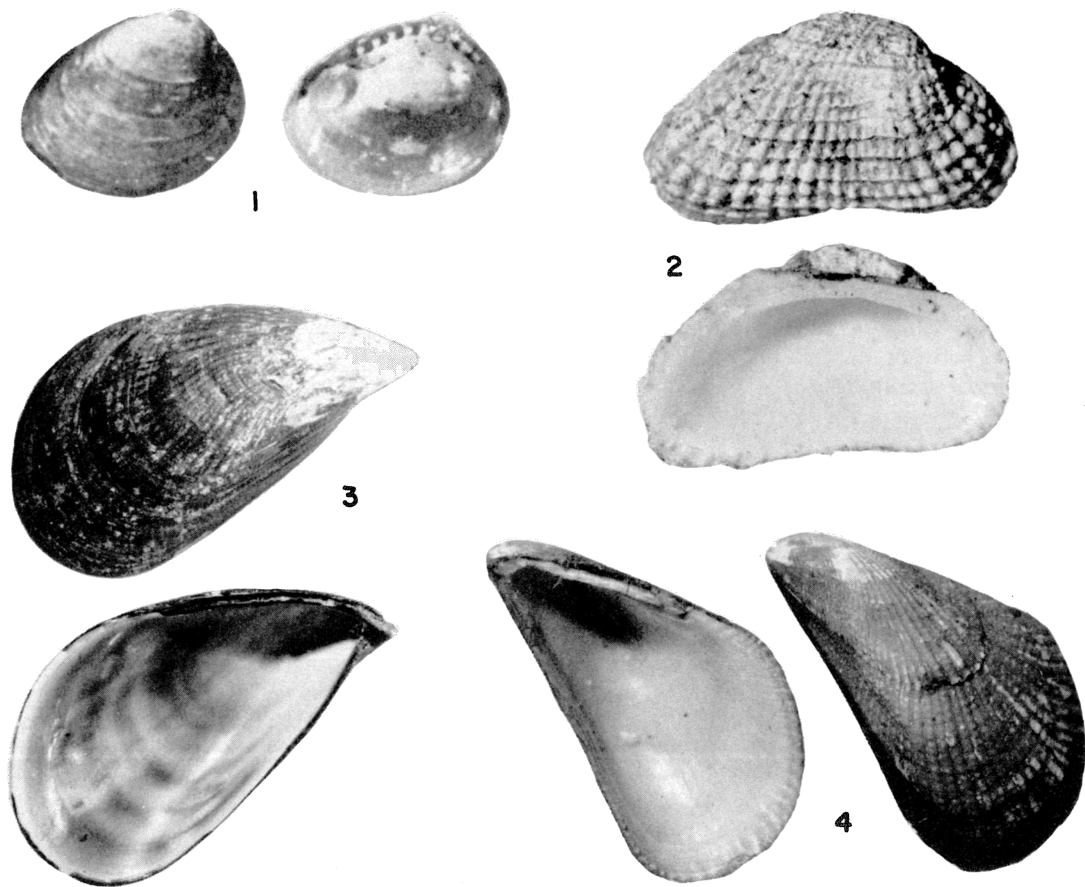
Based on the 73 species discussed above, the following conclusions may be reached: 1) the presently known range end-points of many, and perhaps most, Peruvian province mollusks are the result of limited collecting rather than environmental conditions; 2) the northern limit of the Peruvian province is much better documented than is the southern limit; 3) the transition from cool-temperate to tropical waters at the northern limit of the Peruvian province may be a more effective barrier to species dispersal than is the transition from cool-temperate to subantarctic waters at the southern limit of the province.

LOCAL USE OF MOLLUSKS FOR FOOD

Several species of mollusks are commercially exploited for food in Iquique. *Concholepas concholepas* (Bruguère) is called "loco" and is so popular a food that large specimens cannot be found within 2 kms of Iquique, and discarded shells litter the local beaches. The various species of *Fissurella*, collectively called "lapas", are also popular and always available in outdoor markets. Because even small specimens of these are collected and eaten, they are also hard to find near Iquique. Large individuals of *Scurria viridula* (Lamarck) are occasionally eaten.

Protothaca thaca (Molina), *Semele solida* (Gray), *Gari solida* (Gray) and *Eurhomalea rufa* (Lamarck) are the clams most commonly sold in markets and are all called "almejas." Even though these species are heavily harvested, they are still abundant near Iquique. *Mesodesma donacium* (Lamarck) is referred to as "macha" and appears in the markets occasionally, while the large mussel *Aulacomya ater* (Molina) is sold in large quantities.

Large chitons such as *Acanthopleura echinata* (Barnes) and *Enoplochiton niger* (Barnes) are not sold in markets, but are often eaten raw by people collecting food along the shore. They are not popular because the foot is very tough. Large specimens can still be found near Iquique.



FIGURES 1-4. 1, *Nucula (Nucula) interflucta* sp. nov., Holotype, length 1.12 mm; 2, *Barbatia (Acar) pusilla*, length 10 mm; 3, *Aulacomya ater*, length 70 mm; 4, *Brachidontes granulata*, length 11 mm.

SYSTEMATIC ACCOUNT

Phylum Mollusca
 Class Bivalvia
 Subclass Palaeotaxodonta
 Order Nuculoida
 Family Nuculidae
Nucula Lamarck, 1799
 Subgenus *Nucula*, s.s.

Nucula (Nucula) interflucta, new species
 Figure 1

Diagnosis: Distinguished from other Chilean *Nucula* species by its small size, rounded trigonal outline, and regular concentric ribs, and by having five anterior teeth and three posterior teeth in each valve.

Description of holotype: Shell small for genus, buff to medium brown in color; valves thin, polished and semi-opaque. Anterior end produced and rounded, posterior end shorter and more broadly rounded. Beaks small; anterior dorsal margin

slightly elevated and gently rounded; ventral margin essentially smooth, with trace of crenulations on inner side. Sculpture of closely spaced concentric ribs with somewhat wrinkled appearance, and obsolete on beaks. Interior of shell smooth and glossy, with faint marginal crenulations; pallial line faint; adductor muscle scars subequal; chondrophore deep, elongate, triangular, with oblique axis. Hinge teeth long, well developed, pointed, and slightly curved, with five in anterior series and three in posterior series. Dimensions (in mm): height 1.00, width 1.12.

Type locality: Punta Morro, Iquique, Chile, 20° 13'S, 70° 10' 25"W; lower intertidal zone, in black sandy silt among cobbles and boulders of a protected beach, August, 1964, 2069 specimens.

Type material: Holotype, LACM 1581; 1968 paratypes, LACM 1582; 20 paratypes, USNM; 20 paratypes, CAS; 20 paratypes, AMNH; 20 paratypes, SDNHM; 20 paratypes, ANSP.

Discussion: *Nucula interflucta* is the smallest

recorded species of this genus from the eastern Pacific, and seems to be the only one reported from the intertidal zone. It resembles *N. schencki* Hertlein and Strong, 1940, from the Pacific coast of southernmost Mexico, more closely than it does any other eastern Pacific species. However, the more trigonal outline, smaller size, lack of radiating exterior striae, and fewer hinge teeth of the present species easily separate it from the latter. *N. schencki* also has marginal crenulations better developed than does *N. interflucta*.

The species name is derived from the Latin words *inter*, between, and *fluctus*, flood, referring to the intertidal occurrence of this species.

Subclass Pteriomorpha

Order Arcoïda

Family Arcidae

Barbatia Gray, 1842

Subgenus *Acar* Gray, 1857

Barbatia (Acar) pusilla (Sowerby, 1833)

Figure 2

Byssarca pusilla Sowerby, I, 1833:18-19.

Acar pusilla, Reinhart, 1939:39-45, pl. 3, figs. 2a-b; Rost, 1955:191-192, pl. 12, fig. 13; Soot-Ryen, 1959:20.

Barbatia (Acar) pusilla, Noda, 1966:68-69.

Occurrence: Attached to undersides of rocks and in crevices, usually in clusters of three to five, common. Shells oriented with ventral margins pressed firmly to the substrate by a short, ribbon-like byssus originating from midway along the ventral margin, or slightly anteriorly. Iquique specimens: 94.

Distribution: Dall (1909) records this species from Ecuador south to Isla Blanca, Chile (23°37'S). However, it is not known in the Panamic province, and its northern range limit is probably in northern Peru. Type locality: Iquique, Chile (Sowerby, 1833).

Remarks: *Barbatia pusilla* has been considered a fairly rare species with an imperfectly known habitat. The presence of this species at Iquique confirms that its habitat is at least in part intertidal, and that it is not rare at all locations.

Order Mytiloida

Family Mytilidae

Aulacomya Mörch, 1853

Aulacomya ater (Molina, 1782)

Figure 3

Mytilus ater Molina, 1782:202; Carcelles and Williamson, 1951:329.

Mytilus magellanicus Lamarck, 1819, vol. 6, pt. 1:119; Dall, 1909:151, 258, pl. 25, fig. 4.

Aulacomya ater, Soot-Ryen, 1955:33-34, pl. 1, fig. 6, text-figs. 17, 18; 1959:26-27.

Occurrence: Common in masses within the lower intertidal zone and subtidally, attached by byssal threads to exposed rocks. Iquique specimens: 144.

Distribution: Callao, Peru, to the Magellanic region and north to southern Brazil and the Falkland Islands (Soot-Ryen, 1959). Type locality: Straits of Magellan (Soot-Ryen, 1959).

Remarks: The valves of this mussel commonly bear attached specimens of *Crepipatella dilatata* (Lamarck).

Brachidontes Swainson, 1840

Brachidontes granulata (Hanley, 1843)

Figure 4

Mytilus granulatus Hanley, 1843:246, pl. 24, fig. 33.

Hormomya granulata, Carcelles and Williamson, 1951:330; Soot-Ryen, 1955:40, pl. 3, fig. 12, text-fig. 26; 1959:27-28; Dell, 1971:172.

Occurrence: Attached by short byssal threads to the undersides of rocks in the lower intertidal zone, usually in clusters of 10-20 individuals, sometimes in clusters of several hundred. Iquique specimens: 284.

Distribution: Lobos, Peru, to the northern part of Isla Chiloé (Canal Chacao) and in Seno Reloncaví, Chile (Soot-Ryen, 1959). Type locality: South America (Hanley, 1843).

Remarks: *Hormomya* Mörch, 1853, is considered to be a junior synonym of *Brachidontes* by Ken in Keen (1971:61). Individuals of *B. granulata* almost always have specimens of *Lasaea* cf. *L. petitiana* (Récluz) among their byssal threads.

Lithophaga Röding, 1798

Subgenus *Labis* Dall, 1918

Lithophaga (Labis) peruviana (Orbigny, 1846)

Figure 5

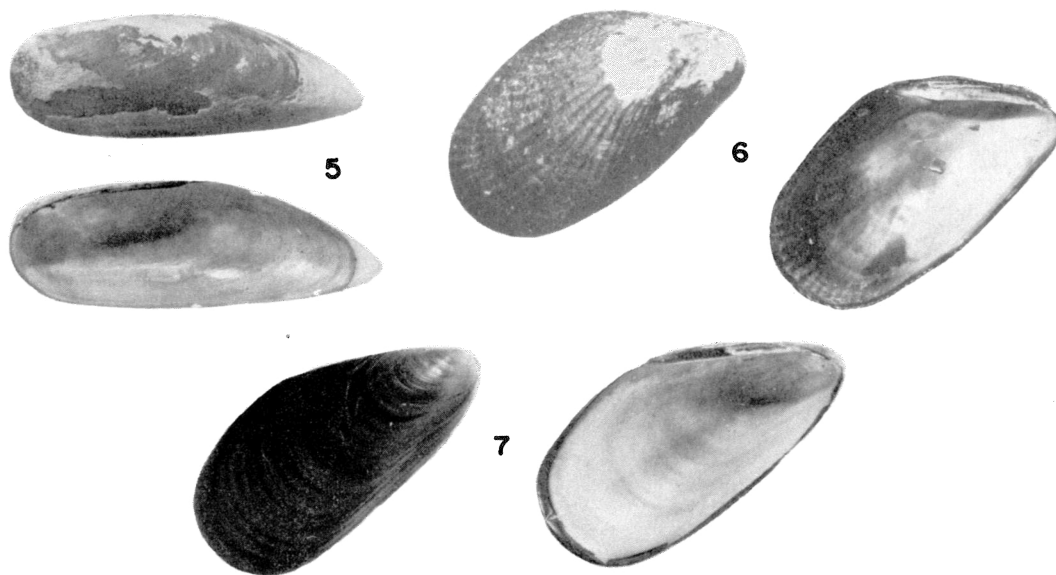
Lithodomus peruvianus Orbigny, 1846, vol. 5:651.

Lithophaga peruviana, Dall, 1909:259; Carcelles and Williamson, 1951:328; Soot-Ryen, 1955:100-101, pl. 10, fig. 58; Olsson, 1961:135, pl. 15, figs. 2, 2a.

Occurrence: Boring into the thick portions of the shell of *Concholepas concholepas* (Bruguière), as many as 8 borers living in the same large gastropod shell. Iquique specimens: 101.

Distribution: Callao, Peru, to Concepción, Chile (Carcelles and Williamson, 1951). Type locality: Callao, Peru (Orbigny, 1846).

Remarks: These specimens confirm the presence of this species in Chile, as Soot-Ryen (1959:23-24,



FIGURES 5-7. 5, *Lithophaga (Labis) peruviana*, length 32 mm; 6, *Perumytilus purpuratus*, length 25 mm; 7, *Semimytilus algosus*, length 21 mm, from Valparaíso.

28) noted that previous records from Chile have unreliable locality data. Since *L. peruviana* is very common at Iquique, its range probably extends farther southward along the Chilean coast. Although *L. attenuata* (Deshayes) has been reported from Chile (Hertlein and Strong, 1946:74-75), I did not find it at Iquique. The spinelike median posterior projection on the Iquique specimens serves to identify them as *L. peruviana*. The largest specimen has the following dimensions (in mm): length 33.5, height 10.5, diameter 10.3.

Perumytilus Olsson, 1961
Perumytilus purpuratus (Lamarck, 1819)
 Figure 6

Modiola purpurata Lamarck, 1819, vol. 6, pt. 1:113.
Modiolus purpuratus, Dall, 1909:153, 258.

Brachidontes purpuratus, Carcelles and Williamson, 1951:328; Soot-Ryen, 1955:45, pl. 4, fig. 18, text fig. 30; 1959:28; Dell, 1971:172.

Perumytilus purpuratus, Olsson, 1961:117, pl. 12, fig. 1, pl. 14, figs. 1, 1b.

Occurrence: Attached by byssal threads, it occurs throughout the intertidal zone, especially on the outer portion of rocky reefs, where it forms densely packed masses. Iquique specimens: 621.

Distribution: Ecuador, south to the Straits of Magellan, and north to Santa Cruz, Argentina (Soot-Ryen, 1959). Type locality: unknown.

Remarks: This is the most common mussel in the area studied and can be observed wherever there is suitable rocky substrate.

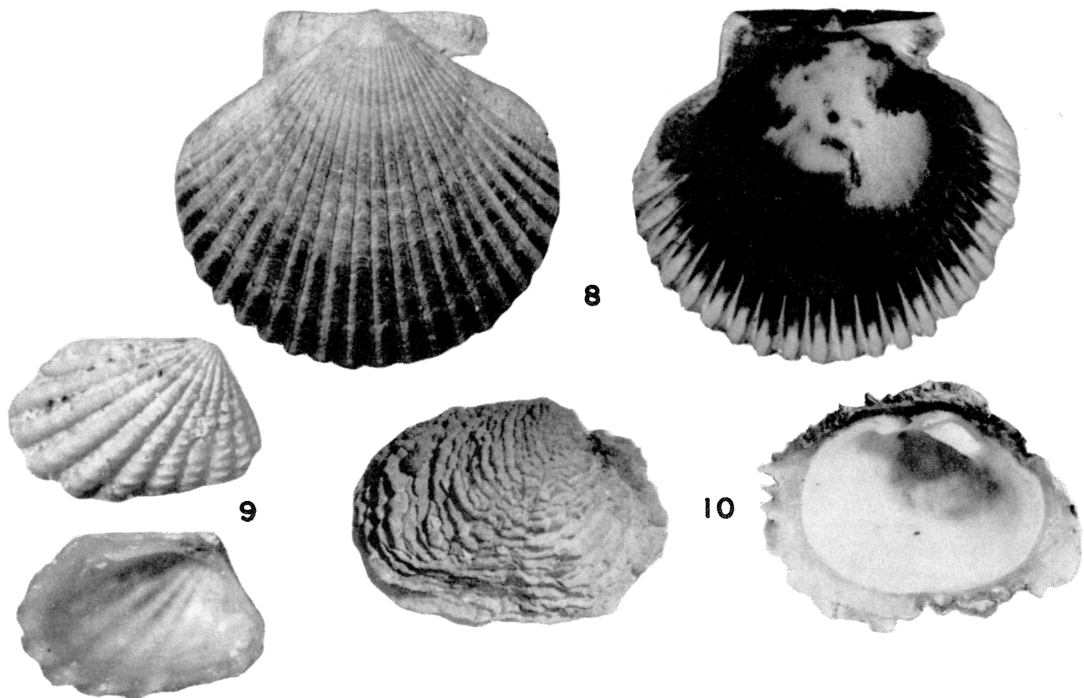
Semimytilus Soot-Ryen, 1955
Semimytilus algosus (Gould, 1850)
 Figure 7

Mytilus algosus Gould, 1850:344.

Semimytilus algosus, Soot-Ryen, 1955:25-29, pl. 4, fig. 17, text figs. 8, 9, 14-16; 1959:25-26; Olsson, 1961:114-115, pl. 14, fig. 8.

Occurrence: Masses of individuals bound together by their interwoven byssal threads are common in semiprotected parts of the lower intertidal zone, especially along the walls of tide pools. Specimens collected at Iquique average about 10 mm in length, while specimens taken from the bottom of a fishing boat in drydock at Valparaíso average about 20 mm in length. One of the Valparaíso specimens is figured. Iquique specimens: approximately 500; Valparaíso specimens: 56.

Distribution: Olsson (1961) indicates that this species is probably confined to waters south of the Panamic province. It is known at Paita, Peru (LACM), and as far south as the Gulf of Arauco (Soot-Ryen, 1959). Type locality: Valparaíso, Chile (designated by Soot-Ryen, 1959).



FIGURES 8-10. 8, *Argopecten purpuratus*, length 100 mm; 9, *Carditella tegulata*, length 4.5 mm; 10, *Chama pellucida*, length 44 mm.

Order Pterioida
Family Pectinidae

Argopecten Monterosato, 1889
Argopecten purpuratus (Lamarck, 1819)
Figure 8

Pecten purpuratus Lamarck, 1819, vol. 6, pt. 1:166;
Reeve, 1852, vol. 8, *Pecten*, pl. 5, sp. 25; Dall,
1909:256.

Pecten (Aequipecten) purpuratus, Grant and Gale,
1931:207-212, pl. 4, figs. 2a-c, pl. 5, figs. 1, 4,
pl. 8, fig. 3.

Chlamys (Argopecten) purpurata, Grau, 1959:103-
105, pl. 34.

Plagioctenium purpuratum, Soot-Ryen, 1959:31.

Aequipecten (Plagioctenium) purpuratus, Olsson,
1961:162-163, pl. 19, figs. 1, 1a-b.

Chlamys (Aequipecten) purpurata, Herm, 1969:
107-109, pl. 4, figs. 1-5.

Argopecten purpuratus, Waller, 1969:48-49, pl. 7,
figs. 7-10.

Occurrence: Sandy bottom, in 5 m depth near
shore. Iquique specimens: 7.

Distribution: Sechura Bay and Paita, Peru
(Olsson, 1961), to Coquimbo, Chile (Dall, 1909).
Grau (1959) gave the northern range limit as
Corinto, Nicaragua, but Keen (1971) does not
mention this species from the Panamic Province.
Type locality: Callao, Peru (designated by Grau,
1959).

Subclass Heterodonta
Order Veneroidea

Family Carditidae
Carditella Smith, 1881
Carditella tegulata (Reeve, 1843)
Figure 9

Cardita tegulata Reeve, 1843 (September), vol. 1,
Cardita, pl. 9, fig. 48; 1843 (December): 194.
Carditella tegulata, Dall, 1909:262; Carcelles and
Williamson, 1951:334; Soot-Ryen, 1959:40, pl.
1, fig. 11.

Occurrence: Attached by a thin byssal thread
to the undersides of rocks in gravel of lower inter-
tidal zone, abundant. Iquique specimens: 959.

Distribution: Callao, Peru, to the Straits of
Magellan (Soot-Ryen, 1959). Type locality: Val-
paraíso, Chile (Reeve, 1843).

Remarks: The byssal attachment of *C. tegulata*
was noted as follows: a single thin and colorless
thread issues from the middle of the ventral shell
margin. This thread is flexible and can be stretched
three to four times its original length before break-
ing. At its attachment point on the substrate the
thread divides into three to five parts that branch
off at different points. I have seen this byssus
in the field, and its more detailed nature was observed
on an individual attached to the inside of a plastic
vial.

Family Chamidae
Chama Linnaeus, 1758
Chama pellucida Broderip, 1835
 Figure 10

Chama pellucida Broderip, 1835b:302-303, pl. 38, fig. 3; 1836:149; Soot-Ryen, 1959:40; Olsson, 1961:225, pl. 33, figs. 2, 2a, pl. 34, fig. 5; Herm, 1969:115, pl. 5, fig. 6.

non Chama pellucida "Sowerby", Keep, 1888:182, fig. 155.

Occurrence: Attached to cobbles firmly wedged into gravel-filled crevices in lower intertidal zone. Iquique specimens: 22.

Distribution: Santa Elena, Ecuador (Olsson, 1961) to Tocopilla, Chile, and the Juan Fernandez Islands (Soot-Ryen, 1959). Type locality: Iquique, Chile (Broderip, 1835).

Remarks: Many previous workers have mistakenly cited Broderip, 1836, as the original species description, but published compilations of dates for the Zoological Society of London (Waterhouse, 1937; Peavot, 1937) show that their Transactions volume appeared before their Proceedings volume. The authorship of this species has also mistakenly been attributed to Sowerby by many authors, beginning with Keep (1888).

A species long identified as *C. pellucida* also occurs in the Californian province of western North America, but not in the Panamic province. How-

ever, the northern species apparently differs from *C. pellucida* in its form (S.S. Berry, personal communication) and shell microstructure (H. Lowenstam, personal communication), and will be re-named by others at a later date.

Family Erycinidae
Lasaea Brown, 1827
Lasaea cf. *L. petitiana* (Récluz, 1843)
 Figure 11

Poronia petitiana Récluz, 1843:175.

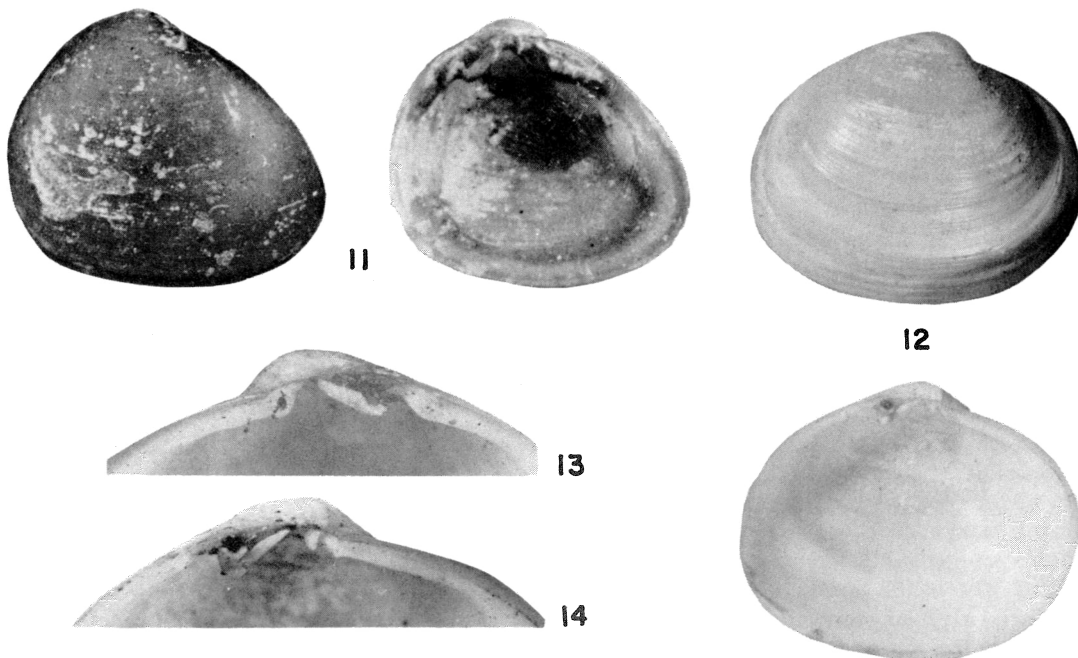
Lasaea petitiana, Dall, 1909:264; Keen, 1938:19, 22; Hertlein and Strong, 1947:136; Carcelles and Williamson, 1951:339; Soot-Ryen, 1959: 51-52, pl. 2, fig. 20; Dell, 1971:174, pl. 1, fig. 5, pl. 2, fig. 7.

Lasaea helenae Soot-Ryen, 1959:52, pl. 2, fig. 21.

Occurrence: Abundant among byssal threads of *Brachidontes granulata* (Hanley), infrequently associated with *Perumytilus purpuratus* (Lamarck). A cluster of *Brachidontes granulata* may have 100-200 *Lasaea petitiana* among the byssal threads. Iquique specimens: 133.

Distribution: Callao, Peru, to the Straits of Magellan and the Juan Fernandez Islands (Dall, 1909), and the Galápagos Islands (Hertlein and Strong, 1947). Type locality: Callao, Peru (Récluz, 1843).

Remarks: The outline of the Iquique specimens



FIGURES 11-14. 11, *Lasaea* cf. *L. petitiana*, length 2.8 mm; 12, *Kellia* cf. *K. tumbesiana*, length 8.9 mm; 13, same specimen, enlargement of right hinge; 14, same specimen, enlargement of left hinge.

varies from oval to quadrate. The minute wrinkling and pitting said to be characteristic of Pacific species of *Lasaea* are not clearly seen in these specimens. The microscopic radial lines on the presumed type specimens in the British Museum (Dell, 1971) are not present on the Iquique specimens.

Lasaea helenae Soot-Ryen, 1959, was described from Iquique specimens that are more quadrate in outline and have more wrinkled sculpture than typical *L. cf. L. petitiana*, but these two forms intergrade completely in the present collection. Hinge dentition is identical between the two forms. Many individuals have somewhat distorted shapes because of their nestling habit and high population density. The Iquique specimens are only tentatively referred to *L. petitiana* for lack of comparative specimens from other localities in Chile and Peru.

Family Leptonidae

Kellia Turton, 1822

Kellia cf. K. tumbesiana (Stempell, 1899)

Figures 12 to 14

Diplodontina tumbesiana Stempell, 1899:232, figs. 18, 19, 19a.

Tellimya (Diplodontina) tumbesiana, Carcelles and Williamson, 1951:340.

Kellia tumbesiana, Dall, 1909:264; Soot-Ryen, 1959:50, fig. 4a; Dell, 1964:213.

Occurrence: Nestling in massive heads of a colonial polychaete worm, middle to lower intertidal zone. Iquique specimens: 48.

Distribution: Iquique (present report) to Cobija, Chile (Stempell, 1899), is the most precise range data known to me. Dell (1964) lists this species from "southern South America." Type locality: Cobija, Chile (Stempell, 1899).

Remarks: The largest Iquique specimen, figured here, is 7.4 mm high and 8.9 mm wide, and several other individuals are near to it in size. The sculpture is of fine, closely set growth lines covered with a thin, glossy, yellowish brown periostracum. The right valve bears a small but prominent, vertically-oriented cardinal tooth. The left valve has a pair of divergent cardinal teeth. Each valve has a low, elongate posterior lateral tooth. The posterior adductor muscle scars are oval, and the anterior muscle scars are slightly larger and more irregularly rounded. The pallial line is broad and indistinct. Indistinct, irregular vertical wrinkling is often present on the dorsal half of the internal shell surface, although this feature is absent in some specimens.

A similar species, *K. suborbicularis* (Montagu,

1803), occurs in Europe, the western Atlantic, and is reported in the eastern Pacific from British Columbia to Peru (Olsson, 1961). However, the maximum size given for *K. suborbicularis* by Olsson (1961) is 5.5 mm, whereas several of the present specimens are larger. In addition, the right valves of the Iquique specimens bear a posterior lateral tooth which is shorter and deflects the hinge-line more than in *K. suborbicularis*. The left valves of the present specimens have cardinal teeth that are more vertically oriented, and have a less prominent cardinal tooth than seen on *K. suborbicularis*.

The Iquique specimens are tentatively referred to *Kellia tumbesiana* on the basis of the hinge sketch given by Soot-Ryen (1959) which, however, lacks the prominent anterior cardinal tooth and has a straighter hinge than the left valve shown in the type drawing of Stempell (1899). Dell's comments on the difficulty of identifying *Kellia* species certainly apply to the present specimens, and no Chilean *Kellias* can be identified with confidence until the group has been reviewed.

Family Veneridae

Eurhomalea Cossmann, 1920

Eurhomalea rufa (Lamarck, 1818)

Figure 15

Venus rufa Lamarck, 1818, vol. 5:593.

Marcia rufa, Dall, 1909:269.

Protothaca rufa, Riveros-Zuñiga and Gonzalez, 1950:148-150.

Eurhomalea rufa, Keen, 1951:7; 1954:54; Soot-Ryen, 1959:59; Herm, 1969:129, pl. 6, figs. 5, 6.

Occurrence: In black sandy silt among cobbles and boulders intertidally at Iquique, and in sand in 1-2 m depth at Patillos. Iquique specimens: 2; Patillos specimens: 25.

Distribution: The northern range limit of this species is not known, but is probably within the cool waters of the Peruvian province. It is reported as far south as Concepción, Chile (Soot-Ryen, 1959). Type locality: Peru (Lamarck, 1818).

Protothaca Dall, 1902

Subgenus *Protothaca*, s.s.

Protothaca (Protothaca) thaca (Molina, 1782)

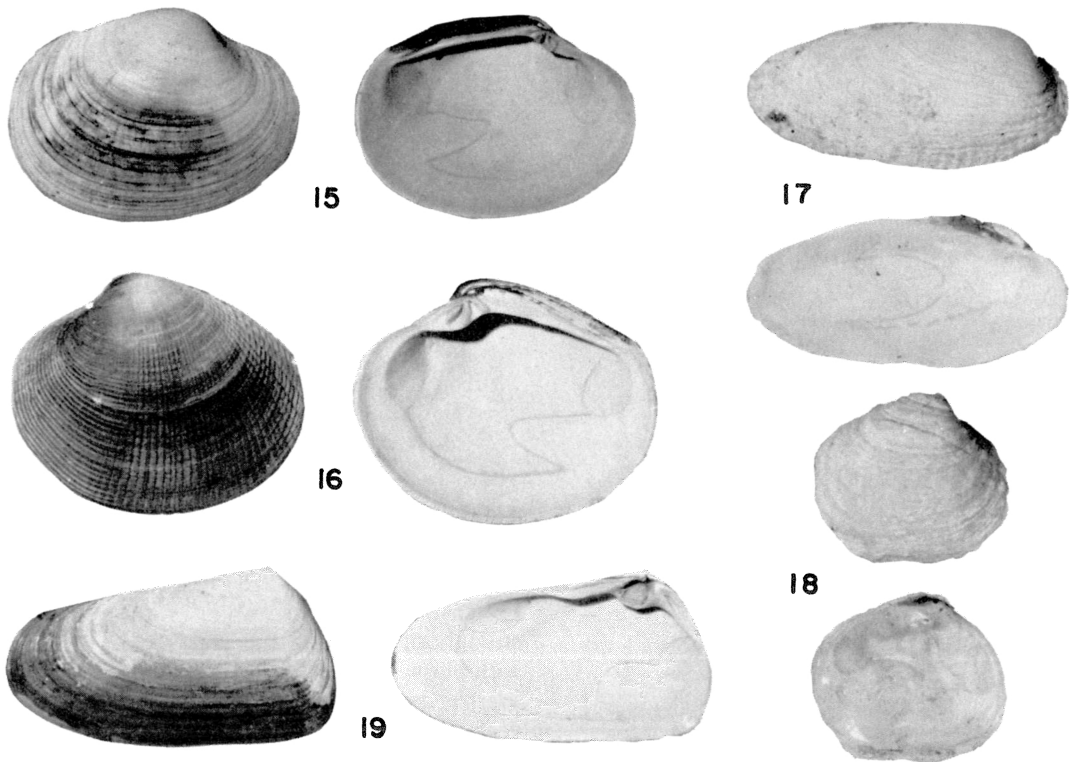
Figure 16

Chama thaca Molina, 1782:178.

Venus dombeii Lamarck, 1818, vol. 5:590-591; Philippi, 1844, vol. 1, *Venus*:127, pl. 2, *Venus*, fig. 1.

Paphia thaca, Dall, 1909:169.

Protothaca thaca, Carcelles and Williamson, 1951:342; Soot-Ryen, 1959:57-58; Olsson, 1961:304-



FIGURES 15-19. 15, *Eurhomalea rufa*, length 62 mm; 16, *Protothaca (Protothaca) thaca*, length 63 mm; 17, *Petricola (Petricolaria) rugosa*, length 8.4 mm; 18, *P. (P.) rugosa*, specimen distorted by nestling, length 5 mm; 19, *Mesodesma donacium*, length 86 mm.

305, pl. 41, fig. 1, pl. 53, figs. 1, 1a; Herm, 1969: 122-123, pl. 10, figs. 11, 12.

Occurrence: Buried 2-5 cm deep in silt, sand and gravel of lower intertidal zone. Iquique specimens: 212.

Distribution: Callao, Peru, to the Chonos Archipelago, Chile (Soot-Ryen, 1959). Type locality: unknown.

Remarks: *P. thaca* is the type species of *Protothaca*.

Family Petricolidae

Petricola Lamarck, 1801

Subgenus *Petricolaria* Stoliczka, 1871

Petricola (Petricolaria) rugosa (Sowerby, 1834)

Figures 17 and 18

Petricola rugosa Sowerby, 1, 1834:47; Reeve, 1874, vol. 19, *Petricola*, pl. 2, fig. 8; Dall, 1909:270. *Petricolaria rugosa*, Carcelles and Williamson, 1951:343; Soot-Ryen, 1959:60.

Occurrence: Nestling in massive heads of a colonial polychaete worm in middle to lower intertidal zone. Iquique specimens: 6.

Distribution: Lobos Island, Peru, south to the

Chonos Archipelago, Chile (Soot-Ryen, 1959). Type locality: Concepción, Chile (Sowerby, 1834).

Family Mesodesmatidae

Mesodesma Deshayes, 1830

Mesodesma donacium (Lamarck, 1818)

Figure 19

Maetra donacia Lamarck, 1818, vol. 5:479.

Donacilla chilensis Orbigny, 1845, vol. 5, Moll.: 530.

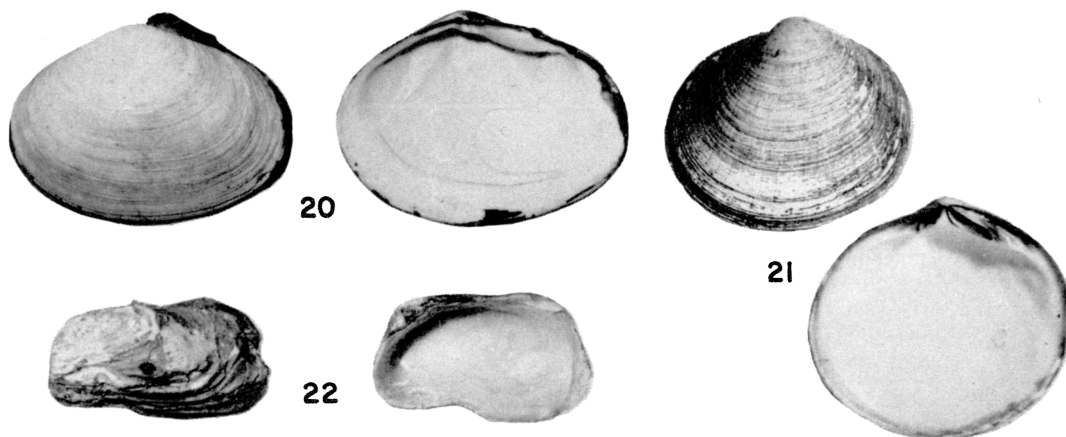
Mesodesma donacium, Hupé in Gay, 1854, vol. 8: 352-353, Atlas, Malacologia, pl. 7, fig. 3; Reeve, 1854, vol. 8, *Mesodesma*, pl. 2, fig. 11; Dall, 1909:161, 257, pl. 27, fig. 1; Soot-Ryen, 1959: 65; Herm. 1969:118-119, pl. 9, figs. 8-11.

Occurrence: Buried at a depth of 1 cm or less in sand on exposed beaches, lowest intertidal zone and subtidally. Iquique specimens: 109.

Distribution: Sechura Bay, Peru, to Valparaíso, Chile (Dall, 1909). Type locality: unknown.

Family Tellinidae

Thirty-five juvenile specimens of a tellinid species were found in the intertidal gravel at Iquique, but are not mature enough to be identified.



FIGURES 20-22. 20, *Gari solida*, length 76 mm; 21, *Semele solida*, length 80 mm; 22, *Hiatella solida*, length 15 mm.

Family Psammobiidae
Gari Schumacher, 1817
Gari solida (Gray, 1828)
 Figure 20

Solen solidus Gray, 1828:7, pl. 3, fig. 12.
Psammobia crassa Hupé in Gay, 1854, vol. 8:364-365, Atlas, Malacologia, pl. 7, fig. 1, 1a-c.
Psammobia solida, Dall, 1909:273; Carcelles and Williamson, 1951:344.
Gari solida, Soot-Ryen, 1959:61.

Occurrence: Buried in sand and gravel of lower intertidal zone. Iquique specimens: 105.

Distribution: Pucusana, Peru (LACM), to the Chonos Archipelago, Chile (Soot-Ryen, 1959). Type locality: Arica, Chile (Gray, 1828).

Family Semelidae
Semele Schumacher, 1817
Semele solida (Gray, 1828)
 Figure 21

Amphidesma solida Gray, 1828:6, pl. 6, fig. 6; Reeve, 1853, vol. 8, *Amphidesma*, pl. 21, fig. 10; Hupé, in Gay 1854:359, Malacologia, pl. 7, fig. 1; Dall, 1909:272; Schröder, 1916:101-129, figs. 1-13.

Occurrence: Buried in sand and gravel among boulders in lower intertidal zone. Iquique specimens: 81.

Distribution: Callao, Peru, to the Chonos Archipelago, Chile (Dall, 1909). Type locality: Arica, Chile (Gray, 1828).

Remarks: This species is close to *Semele corrugata* (Sowerby, 1833), which is recorded from southern Ecuador (Olsson, 1961) to the Chonos Archipelago, Chile (Soot-Ryen, 1959). According to the drawings in Reeve (1853), *S. solida* has a

white interior, a "fawn-white" exterior, and a more strongly developed hinge, whereas *S. corrugata* has an orange interior, white exterior, and a less strongly developed hinge. Both species are shown with purple staining on the hinge. Specimens from Iquique have white exteriors with remnants of a dark brown periostracum, white interiors with purple hinges, and relatively weakly developed hinges.

Order Myoida
 Family Hiatellidae
Hiatella Daudin, 1801
Hiatella solida (Sowerby, 1834)
 Figure 22

Saxicava solida Sowerby, I, 1834:88-89; Reeve, 1875, vol. 20, *Saxicava*, pl. 1, fig. 6; Sowerby, II, 1884, vol. 5:133, pl. 471, fig. 12; Dall, 1909:275; Carcelles, 1944:293, pl. 13, fig. 107.

Saxicava tenuis Sowerby, I, 1834:88; Reeve, 1875, op. cit., pl. 2, fig. 9; Sowerby, II, 1885, op. cit., pl. 471, fig. 11.

Saxicava purpurascens Sowerby, I, 1834:88; Reeve, 1875, op. cit., pl. 2, fig. 14; Sowerby, II, 1885, op. cit., pl. 471, fig. 7; Dall, 1909:275.

Hiatella solida, Carcelles and Williamson, 1951:346; Soot-Ryen, 1959:67-68; Olsson, 1961:425-426, pl. 77, figs. 6, 6a; Dell, 1964:224-226, pl. 7, fig. 11; 1971:177-178; Keen, 1971:271, fig. 698.

Occurrence: Nestling in rock crevices, middle to lower intertidal zone, and in holdfasts of *Lessonia nigrescens* Bory, in lower intertidal zone and subtidally. Iquique specimens: 11.

Distribution: The range of this species is uncertain, but is generally cited as extending from the tropical Pacific coast of South America to

Tierra del Fuego, the Falkland Islands, and north on the Atlantic coast to about southern Brazil. Dell (1964) discusses the distribution of this species at length. Type locality: Santa Elena, Ecuador, and Paita and Isla de Muerte, Peru, are given as localities by Sowerby (1834). Santa Elena is probably the type locality, as indicated by Dell (1964).

Remarks: The disparate range citations in the literature for this species are indicative of the confusion in dealing with *Hiatella*. *Hiatella solida* and the more northern *H. arctica* (Linnaeus, 1767) are very similar and the present specimens from Iquique could be assigned to the latter species. Until this confusing group is thoroughly studied, however, I follow Olsson (1961:425) in considering *H. solida* a distinct South American species.

Subclass Anomalodesmata

Order Pholadomyoidea

Family Lyonsiidae

Lyonsia Turton, 1822

Lyonsia delicata, new species

Figures 23 and 24

Diagnosis: A small shell, characterized by beaded radial ornamentation on the prodissoconch, anterior end narrower than the posterior end, and a lithodesma without a ridge.

Description of holotype: Shell small, elongate, thin, covered with thin brown periostracum extending slightly beyond posterior and ventral margins and thickened at posterior margin. Dorsal margin very slightly convex, anterior margin narrowly rounded, ventral margin slightly concave anteriorly, becoming convex posteriorly, and posterior margin broadly rounded. Umbones positioned near anterior end. Posterior dorsal part of shell narrowly compressed. Surface ornamentation of 15 thin, radiating ridges more distinct toward the shell margins with tufts of minute periostracal hairs localized along them; early portion of exterior surface completely covered with fine, radiating lines consisting of minute raised beads and extending only part way to shell margins. Lithodesma about two and one-half times as long as wide and tapering slightly to anterior. Dimensions (in mm): length 5.5, height 3.2, diameter 1.8.

Type locality: Rocky beach at north end of Playa Cavanha, Iquique, Chile, 20° 13'S, 70° 10'W; lower intertidal zone, on undersides of rocks, August, 1964 (holotype and 33 other specimens) and July, 1970 (3 specimens).

Type material: Holotype, LACM 1583; 29 paratypes, LACM 1584; 2 paratypes, USNM; 2 paratypes, CAS; 2 paratypes, ANSP.

Discussion: The outline and sculpture of this

species separate it from *L. fretalis* Dall, 1915 (Talcahuano, Chile, to Straits of Magellan, 40 m), which tapers posteriorly and lacks beaded ornamentation. Differences between *L. delicata* and *L. elegantula* Soot-Ryen (1957:3; 1959:36, pl. 1, fig. 10; Golfo de Ancud, Chile, 45 m), are even more marked. *Lyonsia delicata* lacks the ridge on the lithodesma possessed by *L. elegantula*; the umbones are set much closer to the anterior end in *L. elegantula*; the posterior margin is truncated on *L. elegantula* and broadly rounded on *L. delicata*. The present species is also much smaller than either of the other two: the type of *L. fretalis* has the following dimensions (in mm): length 10, height 7, whereas *L. elegantula* measures length 15, height 8.

All of the specimens of *L. delicata* have sand grains adhering to their periostraca, especially along the ventral valve margins.

The specific name of *L. delicata* is a Latin adjective meaning delicate, and refers to the nature of the fine, radial beading on the early part of each valve.

Entodesma Philippi, 1845

Entodesma cuneata (Gray, 1828)

Figure 25

Anatina cuneata Gray, 1828:6, pl. 3, figs. 14a-b.

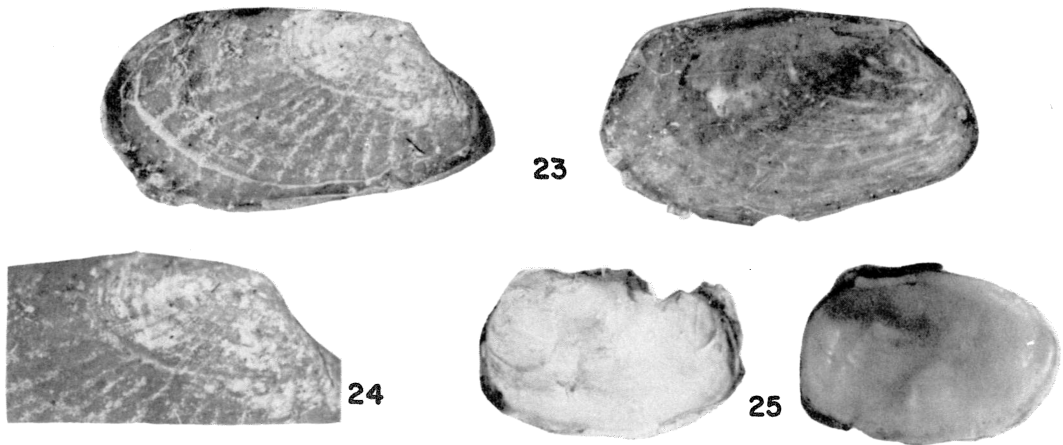
Entodesma cuneata, Dall, 1909:259; Soot-Ryen, 1959:35; Osorio and Bahamonde, 1970:195; Dell, 1972:29-30, fig. 23.

Occurrence: Nestling in holdfasts of *Lessonia nigrescens* Bory; dead specimens only. Iquique specimens: 3 complete specimens and 4 unpaired valves.

Distribution: Ecuador to the Magellanic region (Dall, 1909). Type locality: Arica, Chile (Gray, 1828).

Remarks: The type description and line drawing for this species do not give diagnostic characters. However, the Iquique specimens agree well with the photograph of Gray's type in Dell (1972).

The largest specimen in the present collection, slightly broken off at the posterior end, measures 36.2 mm in length and 17.6 mm in height at the umbo. An average specimen is about 25 mm long and 16 mm high, based on the small sample at hand. The lithodesma of an average specimen measures 5.6 mm long by 1.6 mm wide, is concave dorsally, and straight or concave at its posterior end. The periostracum is thin, smooth and light grayish brown at the anterior end of the valves, but becomes thickened (to about 0.1 mm) toward the posterior end and medium to dark brown in



FIGURES 23-25. 23, *Lyonsia delicata* sp. nov., Holotype, length 5.5 mm; 24, same specimen, enlargement of early part of shell; 25, *Entodesma cuneata*, length 20 mm.

color. The periostracum extends beyond the shell margins and is complete across the dorsal commissure. The valves are inflated and gaping ventrally and posteriorly. Ornamentation consists of broad concentric undulations, as the specific name implies, which become obsolete posteriorly.

The valves are nacreous and translucent within. The posterior adductor muscle scar is slightly larger than the anterior one, and both are oval in shape. Irregular areas on the dorsal half of the valve interiors are minutely roughened by shallow pits. The central portion of the interior of one unpaired valve shows 20-25 shallow, radiating grooves ending ventrally in shallow pits that are nearly round and the same width as the grooves.

Entodesma cuneata seems to differ from *E. chilensis* (Philippi, 1845), which occurs from Valparaíso to Chiloé Island, Chile, by being smaller, lacking a keel on the sides of the resilium, and lacking radiating striae on the exterior of the valves.

Class Gastropoda
Subclass Prosobranchia
Order Archaeogastropoda
Family Scissurellidae

Sinezona Finlay, 1927

Sinezona rimuloides (Carpenter, 1865)

Figure 26

Scissurella rimuloides Carpenter, 1864:548 [*nomen nudum*]; 1865:271 [described].

Sinezona rimuloides, McLean, 1967:408, pl. 56, figs. 13, 14 [complete synonymy]; Keen, 1971:309, fig. 5.

Occurrence: In black sandy silt among cobbles

and boulders, lower intertidal zone. Iquique specimens: 37.

Distribution: Farallon Islands, California, to Mazatlán, Mexico, and Iquique, Chile (McLean, 1967). The southward range extension by McLean is based on the present specimens. Other specimens in LACM collections extend the distribution along the Mexican coast 470 kms southward to Manzanillo (20° N) and to the Chincha Islands, Peru. Type locality: Mazatlán, Mexico (Carpenter, 1865).

Family Fissurellidae

Fissurella Bruguière, 1789

Fissurella costata Lesson, 1830

Figure 28

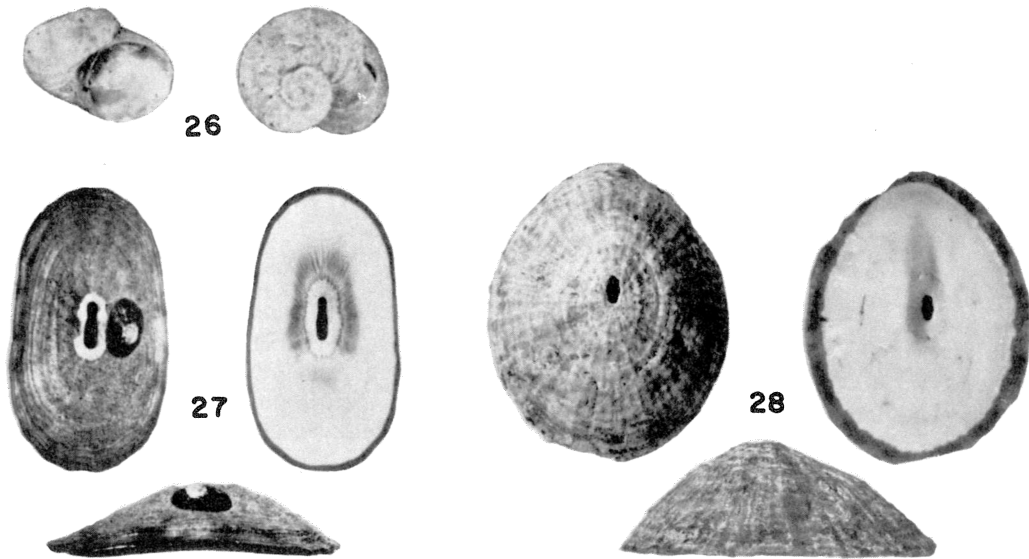
Fissurella costata Lesson, 1830, vol. 2, pt. 1:410-411, no. 170; Orbigny, 1841, vol. 5:474-475; Pilsbry, 1890, vol. 12:148, pl. 30, fig. 10, pl. 35, fig. 11; Dall, 1909:177, 241; Riveros-Zuñiga, 1951:108-111, fig. 21; Dell, 1971: 183-184, pl. 4, figs. 7, 8.

Fissurella chilensis Sowerby, II, 1835 (January), *Fissurella*: 3, fig. 36; Sowerby, I, 1835a (March): 124.

Occurrence: Lower intertidal zone of rocky reefs. Iquique specimens: 3.

Distribution: Mollendo, Peru (Dall, 1909) to Talcahuano and Bahía San Vicente, Chile (Lesson, 1830). Type locality: Talcahuano and San Vicente, Chile (Lesson, 1830).

Remarks: The largest specimen of *F. costata* from Iquique measures 68 mm long, 55 wide and 25 high. The outer surface is light gray, tinted with pink, on its central portion and with violet on its



FIGURES 26-28. 26, *Sinezona rimuloides*, diameter 0.9 mm; 27, *Fissurella crassa*, length 57 mm, with specimen of *Scurria parasitica*; 28, *F. costata*, length 68 mm.

outer third. Ornamentation consists of low, irregular radial ribs that bear slightly raised nodes. The nodes are aligned among the ribs to form concentric sculpture. The sculpture is somewhat eroded in the Iquique specimens. The interior is glossy white with a marginal band of alternating light and dark gray.

Fissurella crassa Lamarck, 1822
Figure 27

Fissurella crassa Lamarck, 1822, vol. 6, pt. 2:11; Orbigny, 1841, vol. 5:472-473; Pilsbry, 1890, vol. 12:154, pl. 34, figs. 51-53; Dall, 1909:177, 241, pl. 24, figs. 5, 6; Riveros-Zuñiga, 1951:93-95, fig. 14; Carcelles and Williamson, 1951:255; Dell, 1971:184.

Occurrence: Lower intertidal zone of rocky reefs. Iquique specimens: 25.

Distribution: LACM collections contain specimens from the Chincha Islands, Peru ($13^{\circ}38'S$ latitude) and from Coquimbo and Talcahuano, Chile. Carcelles and Williamson (1951) record this species from the Galápagos Islands and the Magellanic region. Type locality: unknown.

Remarks: The figured specimen of *F. crassa* measures 57 mm long, 32 mm wide, and 12 mm high, and is of average size for the species. When not tinted green by encrusting algae, the glossy outer surface is caramel brown and ornamented with very fine, closely spaced concentric growth

lines. The interior is glossy white, with the central portion stained violet, and has a narrow brown margin. Most of the interior surface, including the muscle scar, is textured with irregular radial wrinkles.

Fissurella latimarginata Sowerby, 1835
Figure 29

Fissurella latimarginata Sowerby, I, 1835a:126; Pilsbry, 1890, vol. 12:153, pl. 32, figs. 36-38; Dall, 1909:242; Dell, 1971:187, pl. 3, figs. 12-14. *Fissurella latemarginata* [sic], Riveros-Zuñiga, 1951:125-126, fig. 33.

Occurrence: Lower intertidal zone of rocky reefs. Iquique specimens: 53.

Distribution: Peru (Dall, 1909) to Concepción, Chile (Carcelles and Williamson, 1951). Type locality: Valparaíso and Iquique, Chile (Sowerby, 1835).

Remarks: The figured specimen of *F. latimarginata* is 68 mm long, 47 mm wide, and 12 mm high, and is of average size for an Iquique specimen. However, the largest specimen in the present collection is 101 mm long, 76 mm wide and 24 mm high. These shells are almost always completely covered with red algae. The outer surface is purple and ornamented with low, fine, closely spaced radial ribs and minute concentric growth lines. The interior surface is glossy white with a broad purple border.

Fissurella limbata Sowerby, 1835

Figure 30

Fissurella limbata Sowerby, I, 1835a:123-124; Orbigny, 1841, vol. 5:474; Pilsbry, 1890, vol. 12:149-150, pl. 32, figs. 26, 39; Riveros-Zuñiga, 1951:114-116, fig. 24; Dell, 1971:188, pl. 5, fig. 5.

Occurrence: Lower intertidal zone of rocky reefs. Iquique specimens: 11.

Distribution: Laguna Grande, Peru (LACM), to Valparaíso, Chile (Dall, 1909) and the Straits of Magellan (Dell, 1971). Type locality: Valparaíso (Sowerby, 1835).

Remarks: The figured specimen of *F. limbata* is 50 mm long, 34 mm wide and 14 mm high, and is of average size for an Iquique specimen. The central and outer portions of the exterior surface are white and separated by an irregular band of purple. Rays of purple emanate from the purple band and extend faintly to the shell margin. The inner surface is glossy white and the margin has an inner purple band and an outer white one.

Fissurella maxima Sowerby, 1835

Figure 31

Fissurella maxima Sowerby, I, 1835a:123; Pilsbry, 1890, vol. 12:145-146, pl. 30, figs. 8, 9, pl. 33, figs. 46, 47; Dall, 1909:242; Riveros-Zuñiga, 1951:102-104, fig. 18; Dell, 1971:188, pl. 4, figs. 1-3.

"*Fissurella maxima* Young, 1834, Sowerby," Orbigny, 1841, vol. 5:475-476; vol. 9, Moll., pl. 64, figs. 4-7.

Occurrence: Lower intertidal zone of rocky reefs. Iquique specimens: 93.

Distribution: LACM collections contain specimens from localities ranging from Laguna Grande, Peru, to Valparaíso, Chile. Type locality: Valparaíso (Sowerby, 1835).

Remarks: The figured specimen is the largest in the present collection and measures 62 mm long, 36 mm wide and 10 mm high. Several other specimens are near to it in size. However, several specimens in LACM collections from Coquimbo and Valparaíso are much larger and one measures 134 mm long, 93 mm wide and 42 mm high. The outer surface is covered with alternating cream colored and purple rays and ornamented with numerous noded radial ribs and minute concentric growth lines. The inner surface is glossy white, and the margin has an inner cream colored band and an outer cream and purple band. The muscle scar is very faint.

Family Acmaeidae

This review of Acmaeidae has been prepared with the collaboration of Dr. James McLean, who has further work in progress on the eastern Pacific species of the family. The systematics of the Peruvian province species have not been reviewed since the treatment by Pilsbry in the "Manual of Conchology" in 1891. The collections available to us are not adequate to give a clear picture of species distributions, nor is sufficient anatomical material on hand. On the basis of LACM material, we feel that the following eight species, which are all known at Iquique, include all of the Chilean representatives of this family. As in acmaeids from other provinces, the species are highly variable and several unallocated names remain in the literature, particularly some described by Philippi.

Generic allocation of the species presents problems that are not fully resolved at this time. The genus *Scurria* Gray, 1847 [type species *S. scurra* (Lesson, 1830)], is characterized by a branchial cordon, which is a secondary gill structure of leaf-like flaps located just inside the mantle margin. The branchial cordon is absent in *Collisella* Dall, 1871, the type of which is the west American *C. pelta* (Rathke, 1833). Unlike North American *Collisellas*, Chilean species show partial development of a branchial cordon, consisting of a swollen ridge. This ridge is best developed in *C. zebrina* (Lesson, 1830), which has evenly spaced constrictions along the ridge, instead of projecting leaflike flaps as in true *Scurrias*. The assignment of the Chilean species to one of these two genera is arbitrary.

Scurria and *Collisella* have a similar radular formula consisting of three pairs of lateral teeth, of which the middle lateral is the largest, and one pair of vestigial marginal teeth or uncini. In *Acmaea* Eschscholtz in Rathke (1833) the three laterals are of equal size and the marginals are absent. No radular distinction is apparent between *Scurria* and *Collisella*.

Collisella Dall, 1871*Collisella araucana* (Orbigny, 1839)

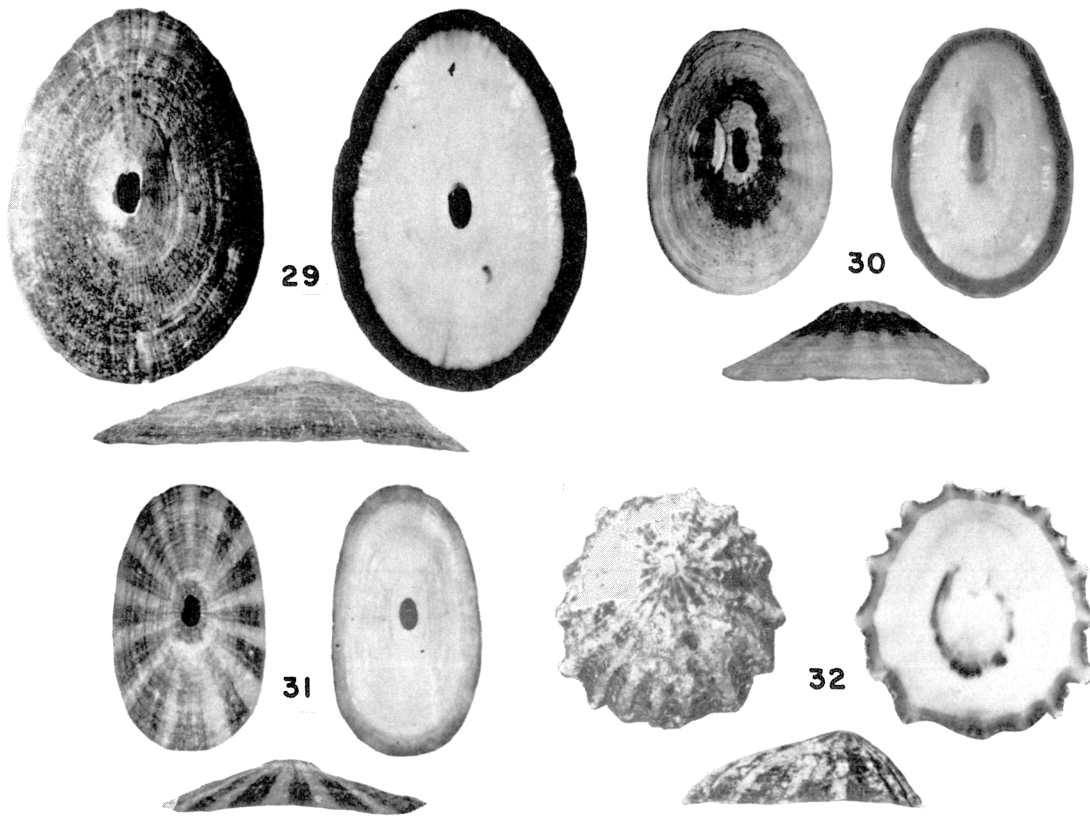
Figure 32

Patella araucana Orbigny, 1839, vol. 5:482 (1841), vol. 9, pl. 65, figs. 4-6 (1839); Reeve, 1855, vol. 8, *Patella*, pl. 26, figs. 66a-c; Keen, 1966:2.

Collisella araucana, Dall, 1871:257.

Acmaea araucana, Pilsbry, 1891, vol. 13:35, pl. 16, figs. 21-23 [copy of Orbigny]; Dall, 1909:237.

Occurrence: Middle and lower intertidal zone,



FIGURES 29-32. 29, *Fissurella latimarginata*, length 68 mm; 30, *F. limbata*, length 50 mm; 31, *F. maxima*, length 62 mm; 32, *Collisella araucana*, length 35 mm.

on upper sides of rocks and beneath ledges. Playa Blanca specimens: 75.

Distribution: Iquique to Viña del Mar, Chile (LACM collections) and the Falkland Islands (Orbigny, 1841). The range of this species is no doubt much greater; the Peruvian record of Dall (1909) at Paita needs verification. Type locality: Valparaíso, Chile (Orbigny, 1841).

Remarks: This moderately large species is characterized by strong radial ribs that project at the shell margin, particularly in large specimens. Ribs are light colored, white, and tinged with gray or brown in wedge-shaped spots. Interspaces are colored brownish gray and are faintly tessellated with white. The interior is whitish, and the margin is offset with grayish blue. The central area is usually streaked with irregular brown markings, and is occasionally entirely dark brown. The largest specimen from Playa Blanca measures (in mm): length 37.8, width 34.5, height 11.6. There is considerable variation in height, because many specimens have a strongly depressed apex. In overall appearance, this species resembles the Californian *C. scabra* (Gould, 1846), differing

chiefly in having a more sharply defined, bluish internal margin.

Collisella ceciliana (Orbigny, 1841)

Figure 33

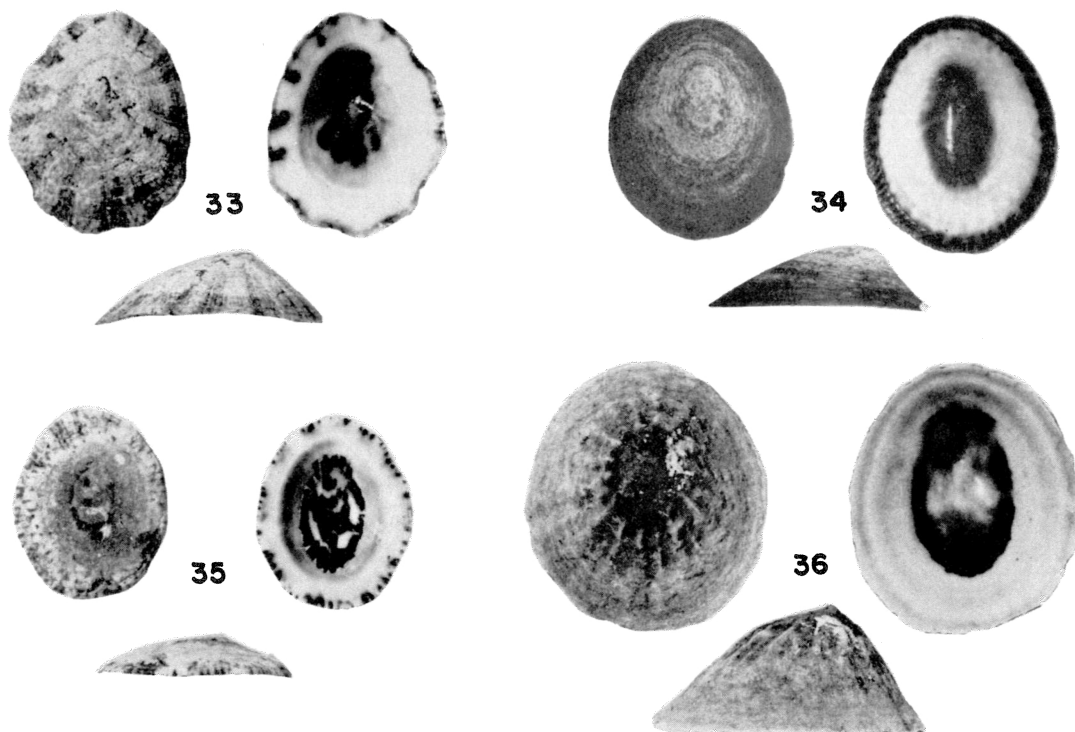
Patella ceciliana Orbigny, 1841, vol. 5:482, vol. 9, pl. 81, figs. 4-6 [as "*P. cecilliana*" in plate caption]; Hupé in Gay, 1854, vol. 8:260; Keen, 1966:2.

Acmaea ceciliana, Pilsbry, 1891, vol. 13:33-34, pl. 34, figs. 14-21 [17-19, copy of Orbigny]; Dall, 1909:237; Thiem, 1917:616, pl. 25, figs. 24-25.

Patelloida ceciliana, Carcelles and Williamson, 1951:258; Dell, 1971:199-200.

Occurrence: Middle and lower intertidal zone, on upper sides of rocks and ledges. Iquique specimens: 782.

Distribution: In addition to Iquique, LACM collections contain material from Coquimbo and Valparaíso, Chile, and Pucusana, Peru. Dall (1909) gave the range as Antofagasta to Valparaíso, and Carcelles and Williamson (1951) included the Straits of Magellan, Tierra del Fuego, southern



FIGURES 33-36. 33, *Collisella ceciliana*, length 18 mm; 34, *C. orbignyi*, length 32 mm; 35, *C. variabilis*, length 29 mm; 36, *C. zebrina*, length 60 mm.

Patagonia, and the Falkland Islands. Dell (1971) reports this species intertidally at several localities in southernmost Chile between 42°S and 55°S. Type locality: Falkland Islands (Orbigny, 1841).

Remarks: The shell is relatively small, thin, moderately elevated, and sculptured with low radial ribs that project slightly at the margin in mature shells. Color, medium to dark brown and gray; ribs lighter in color, rib interspaces with fine, lighter flecking. Interior with variable markings, usually green tinged, with the whitish external ribs visible internally; central area often with a yellowish tinge, internal margin indistinct. This species reaches only about half the size of *C. araucana* and is thinner shelled. Length 18 mm.

Collisella orbignyi (Dall, 1909)

Figure 34

"*Acmaea scutum* Eschscholtz," Orbigny, 1841, vol. 5:479, vol. 9, pl. 64, figs. 8-10 [not Eschscholtz, 1833]; Keen, 1966:3.

"*Acmaea scutum* Orbigny," Pilsbry, 1891, vol. 13:32, pl. 4, figs. 71-81.

Acmaea orbignyi Dall, 1909:179, 237.

Patelloida orbignyi, Carcelles and Williamson, 1951:259.

Occurrence: Middle and lower intertidal zone, on undersides of smooth rocks and beneath overhanging ledges. Iquique specimens: 272.

Distribution: LACM collections contain this species ranging from Paita, Peru, to Talcahuano, Chile. Dall (1909) gave the range as Salaverry, Peru, to the Magellanic region. He also recorded it from the Galápagos Islands, probably in error. Type locality (based on Orbigny's specimens examined by Keen, 1966): Cobija and Arica, Chile.

Remarks: The shell is moderately large, low, thin, and sculptured with fine radial ribbing. Color, dark greenish brown, juveniles often spotted with white. Interior bluish white, with irregular brown markings in the central area, margin dark and sharply offset. Length 35 mm.

Collisella variabilis (Sowerby, 1839)

Figure 35

Lottia variabilis Sowerby, I, 1839:147, pl. 39, fig. 5 [figs. 3, 4 may be *C. zebrina*].

Patella variabilis, Reeve, 1855, vol. 8, *Patella*, pl. 25, figs. 25a-c.

Acmaea variabilis, Pilsbry, 1891, vol. 13:34-35, pl. 34, figs. 1-8 [figs. 1, 2, copy of Reeve]; Dall,

1909:237; Thiem, 1917:617, pl. 25, figs. 9a-c; 614-615, pl. 24, figs. 4a-b [as *Acmaea coffea*].

Occurrence: The LACM collection contains one specimen from Iquique collected by the late Dr. Harvey McMillan in 1966.

Distribution: Dall (1909) gave the range as "whole Peruvian province, and the Galápagos Islands." The Galápagos record is probably in error. An additional LACM lot of 15 specimens was collected at Valparaíso, Chile. Type locality: "Chile" (Sowerby, 1839).

Remarks: The shell is low, outline irregular, sculptured with faint, broad radial ribs superimposed upon minute, closely spaced, narrow, rounded, light colored ribs, the narrow interspaces with dark penciling. Interior with a dark central area characterized by irregular dark streaking, the muscle scar and immediately adjacent area usually deeply stained with yellowish brown, the margin and remaining area bluish white, the margin not deeply offset, but reflecting the fine penciling of the outer surface. As the name suggests, this is a highly variable form, having features suggesting a number of other species. No preserved specimens are available. This species is provisionally assigned to *Collisella*, but may prove to have the branchial cordon of a *Scurria*.

Collisella zebrina (Lesson, 1830)

Figure 36

Patella zebrina Lesson, 1830:417; Hupé in Gay, 1854, vol. 8:258; Reeve, 1855, vol. 8, *Patella*, pl. 25, figs. 65a, b.

Acmaea zebrina, Orbigny, 1841, vol. 5:480-481, vol. 9, pl. 65, figs. 1-3.

Scurria zebrina, Dall, 1871:264; Pilsbry, 1891, vol. 13:62-63, pl. 1, figs. 10, 11; Dall, 1909:235; Thiem, 1917:613-614, pl. 24, figs. 2a, c, ?2b.

Patelloida zebrina, Carcelles and Williamson, 1951: 259; Dell, 1971:200-201.

Occurrence: Upper intertidal and splash zones, most common on smooth, vertical rock walls exposed to strong surf. Patillos specimens: 9, Playa Blanca specimens: 4.

Distribution: LACM collections have 7 lots of this species ranging from the Chincha Islands, Peru (13°37'S, 76°24'W), to Valparaíso, Chile. Dall (1909) gave the range as Mollendo, Peru, to the Magellanic region, and Dell (1971) reports this species from Tierra del Fuego. Type locality: Talcahuano, Chile (Lesson, 1830).

Remarks: Shell large, thick, high, with sculpture of weak to strong, radial ribs that do not project strongly at the margin. Color, greenish brown, ribs

lighter colored, rib interspaces with dark triangular markings. Interior white, the owl-shaped central area usually well defined and darkly stained. Length 60 mm.

Large eroded shells may be difficult to distinguish from *Scurria viridula*, which differs in having a less elevated apex and different color pattern. The branchial cordon of *C. zebrina* consists of a tubular structure with evenly spaced constrictions (based on the only preserved specimen available, from Valparaíso), thereby making assignment to either *Scurria* or *Collisella* somewhat arbitrary.

Scurria Gray, 1847

Scurria parasitica (Orbigny, 1841)

Figures 37 and 38

Patella parasitica Orbigny, 1841, vol. 5:481, vol. 9, pl. 81, figs. 1-3; Reeve, 1855, vol. 8, *Patella*, fig. 136 [looks like juvenile *C. zebrina*]; Keen, 1966:2.

Lottia cymbiola Gould, 1846:151-152; 1852, vol. 12:350-351, pl. 29, figs. 453, 453a-c; Johnson, 1964:65.

Patella coffea Reeve, 1855, vol. 8, *Patella*, pl. 41, figs. 139a,b.

Acmaea coffea, Pilsbry, 1891, vol. 13:35, pl. 4, figs. 88, 91; Dall, 1909:237; Thiem, 1917:614-615, pl. 24, figs. 4a,b [looks like *C. variabilis*].

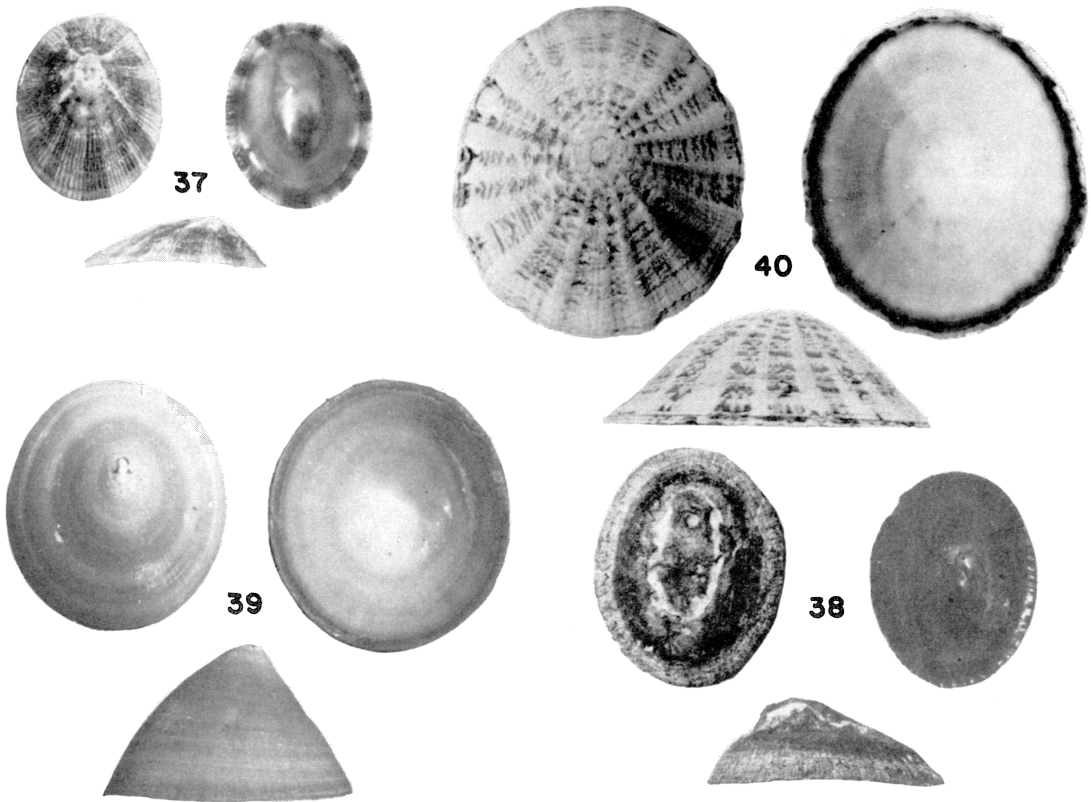
Scurria parasitica, Pilsbry, 1891, vol. 13:63, pl. 4, figs. 74-76; Dall, 1909:179, 237.

Acmaea parasitica Thiem, 1917:616, pl. 25, figs. 12a,b [synonym and homonym].

Occurrence: In shallow excavations made on shells of *Scurria viridula* and *Fissurella* species. Iquique specimens: 50. The dark form named *coffea* occurs in excavations on the shells of the chitons *Acanthopleura echinata* and *Enoplochiton niger*, with as many as five specimens on a single large chiton. Iquique specimens: 20.

Distribution: LACM collections contain this species from localities ranging from the Chincha Islands, Peru, to Talcahuano, Chile. Type locality: Valparaíso, Chile (Orbigny, 1841).

Remarks: The shell is oval in outline, small to moderately large, of moderate height, and with its ends elevated relative to the sides. It is sculpted with fine, even radial ribs. Externally the shell is broadly rayed with brown and white; the internal margin shows corresponding light and dark markings, the central area has irregular brown markings, the muscle scar is bluish, and the area between the scar and the margin is blue with a brown cast. The form *coffea* (Fig. 38) is always eroded on the exterior, but the fine ribbing shows on the growing



FIGURES 37-40. 37, *Scurria parasitica*, length 17 mm; 38, *S. parasitica*, length 19 mm, dark *coffea* form; 39, *S. scurra*, length 25 mm; 40, *S. viridula*, length 65 mm.

edge. Internally, the margin is solid dark brown, the muscle scar is blue, and the rest of the interior is darkly stained. Length 20 mm.

Although previous authors have treated the form *coffea* as a full species, it is here regarded as a dark colored *situs* form of *S. parasitica* (Fig. 37), deriving its dark color from the dark brown valves of the two large chitons upon which it lives. The size, shape, fine sculpture, radula, branchial cordon and habit of attaching only to other shells argues for consideration of the two as the same species. Differences are the eroded surface of the *coffea* form, which may be attributed to the more exposed habit of the chitons, and the lack of the broad white rays in the *coffea* form. The question could easily be resolved experimentally by transferring specimens to differing host shells and watching for a color change.

Scurria scurra (Lesson, 1830)
Figure 39

Patella scurra Lesson, 1830, vol. 2, pt. 1:421-422,
no. 189.

Acmaea scurra, Orbigny, 1841, vol. 5:478, vol. 9,
pl. 64, figs. 11-14.

Scurria scurra, Dall, 1871:263-264; Pilsbry, 1891,
vol. 13:62, pl. 39, figs. 16, 23-27; Dall, 1909: 237;
Thiem, 1917:615, pl. 24, figs. 1a-d; Carcelles,
1950:52, pl. 1, fig. 15; Carcelles and Williamson,
1951:259; Dell, 1971:201.

Occurrence: Lowest intertidal zone and subtidally, in depressions excavated into the stipes and holdfasts of the brown alga *Lessonia nigrescens* Bory. Iquique specimens: 139. This species can be found wherever *L. nigrescens* grows, some plants having as many as 100 specimens of *S. scurra*.

Distribution: Callao, Peru (Dall, 1909) to 46°S in Chile (Dell, 1971). Type locality: Talcahuano, Chile (Lesson, 1830).

Remarks: The yellowish white shell is thick, high, with sculpture of microscopic radial ribbing that faintly crenulates the margin. The juvenile apex is mottled with brown and white. The interior is white and the margin narrow but well defined. Length 28 mm.

Scurria viridula (Lamarck, 1819)

Figure 40

Patella viridula Lamarck, 1819, vol. 6, pt. 1:334.*Acmaea preteri* Orbigny, 1841, vol. 5:481, vol. 9, pl. 78, figs. 15, 16; Keen, 1966:2.*Acmaea viridula*, Pilsbry, 1891, vol. 13:32-33, pl. 1, figs. 1-6; Dall, 1909:178-179, 238, pl. 24, figs. 1, 2; Dell, 1971:199.*Scurria viridula*, Thiem, 1917:614, pl. 24, figs. 3a,b.

Occurrence: Upper intertidal and splash zone, most common on smooth vertical rock walls exposed to strong surf and devoid of all else but green algae and the large chitons *Enoplochiton niger* and *Acanthopleura echinata*. Juveniles occur on the undersides of cobbles and boulders, protected from direct wave action near the adult living sites. One or two *S. parasitica* are found commonly on the shells of *S. viridula*. Iquique specimens: 47.

Distribution: Paita and the Lobos Islands, Peru, to Valparaíso (Dall, 1909) and Punta Choros, Chile (42° S; Dell, 1971). Type locality: unknown.

Remarks: The shell is large, thick, and medium to high; the radial ribs are broad, whitish, and project at the margin only in young shells. Con-

centric bands of grayish green and white are superimposed upon the whitish ribs, with an overall pattern of white and green flecking. Interior of mature specimens white, sometimes with faint brown markings, and often with a dark brown center in juveniles. Length 70 mm.

Family Trochidae

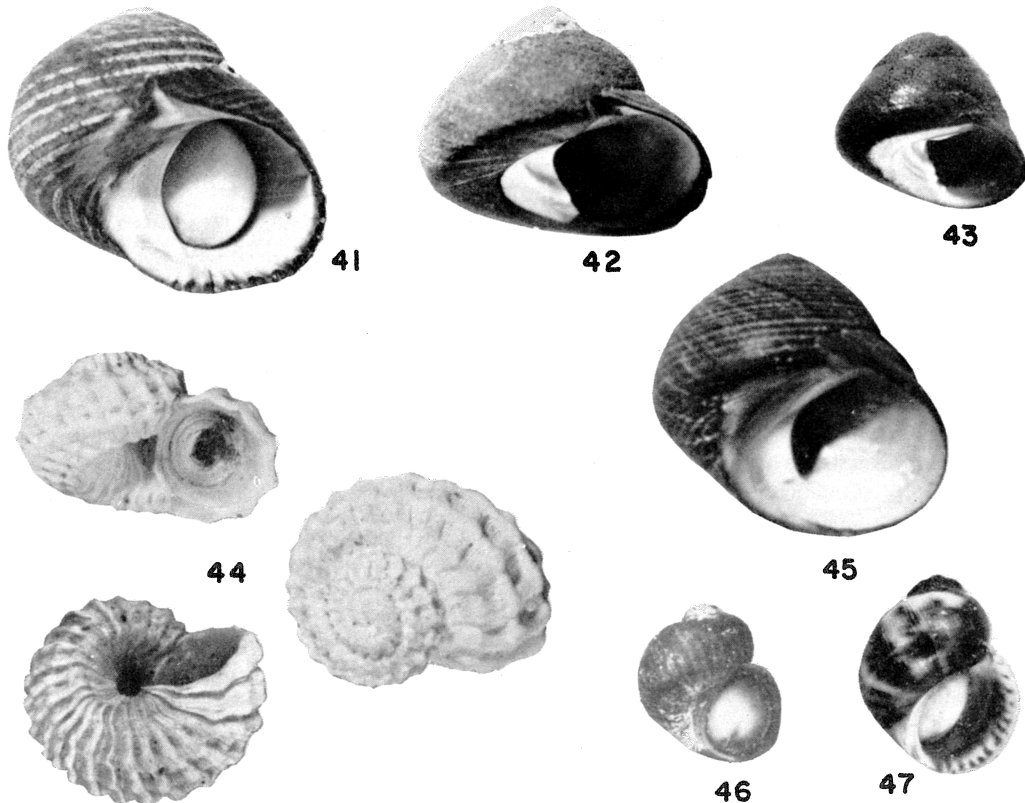
Diloma Philippi, 1845*Diloma nigerrima* (Gmelin, 1791)

Figure 45

Turbo nigerrimus Gmelin, 1791, vol. 1, pt. 6:3597.*Trochus araucanus* Orbigny, 1840, vol. 5:410-411, vol. 9, Moll., pl. 55, figs. 5-8.*Monodonta nigerrima*, Pilsbry, 1889, vol. 11:97, pl. 23, figs. 77, 78, pl. 20, fig. 18; Dall, 1909:240; Carcelles and Williamson, 1951:261.*Diloma nigerrima*, Dell, 1971:195-197, pl. 1, fig. 8, pl. 2, fig. 2.

Occurrence: Throughout lower intertidal zone, often clustered in masses of several hundred individuals. Iquique specimens: 489.

Distribution: Salaverry, Peru, to the Straits of Magellan (Dall, 1909). Type locality: unknown.



FIGURES 41-47. 41, *Prisogaster niger*, diameter 19 mm; 42, *Tegula (Chlorostoma) atra*, diameter 17 mm; 43, *T. (C.) tridentata*, diameter 12 mm; 44, *Liotia cancellata*, diameter 2.3 mm; 45, *Diloma nigerrima*, diameter 19 mm; 46, *Tricolia umbilicata*, height 1.8 mm; 47, *T. macleani* sp. nov., Holotype, height 4 mm.

Remarks: Dell (1971) gives an extensive discussion of this species, noting its close similarity to the New Zealand species *Diloma digna* (Finlay).

Tegula Lesson, 1835

Subgenus *Chlorostoma* Swainson, 1840

Tegula (Chlorostoma) atra (Lesson, 1830)

Figure 42

Trochus ater Lesson, 1830, vol. 2, pt. 1:344, Moll., pl. 16, fig. 2; Orbigny, 1840, vol. 5:409.

Chlorostoma atrum, Pilsbry, 1889, vol. 11:173-174, pl. 28, figs. 40, 41; Dell, 1971:195 [as *atra*].

Tegula atra, Dall, 1909:176, 239, pl. 24, fig. 4; Carcelles and Williamson, 1951:262.

Occurrence: Common in lower intertidal zone, locally abundant; usually with *T. tridentata* (Potiez and Michaud) and *Diloma nigerrima* (Gmelin). Iquique specimens: 890.

Distribution: Pacasmayo, Peru, to the Straits of Magellan and Patagonia (Carcelles and Williamson, 1951). Type locality: Quiriquina Island, Concepción Bay, Chile (Lesson, 1830).

Remarks: Large specimens of *T. atra* are especially abundant at Punta Gruessa, 17 kms south of Iquique, where they occur on rocks among seaweed holdfasts and are encrusted with a pink calcareous alga.

Tegula (Chlorostoma) tridentata
(Potiez and Michaud, 1838)

Figure 43

Monodonta tridentata Potiez and Michaud, 1838, vol. 1:321, pl. 29, figs. 16, 17.

Chlorostoma tridentatum, Pilsbry, 1889, vol. 11:175, pl. 28, figs. 47, 48.

Tegula tridentata, Dall, 1909:176-177, 240; Carcelles and Williamson, 1951:262.

Occurrence: Common in lower intertidal zone, locally abundant, usually with *T. atra* (Lesson) and *Diloma nigerrima* (Gmelin). Iquique specimens: 940.

Distribution: Sechura Bay, Peru, to Chonos Archipelago, Chile (Dall, 1909). Type locality: Peru (Potiez and Michaud, 1838).

Family Liotiidae

Liotia Gray, 1847

Liotia cancellata (Gray, 1828)

Figure 44

Delphinula cancellata Gray, 1828, pt. 1:3, pl. 6, fig. 8.

Delphinula cobijensis Reeve, 1843, vol. 1, *Delphinula*, pl. 5, figs. 23a-b.

Liotia cancellata, Tryon, 1888, vol. 10:109, pl. 36, fig. 2; Dall, 1909:239; Pilsbry, 1934:375-381, pl. 13, figs. 7, 7a-b.

Occurrence: On undersides of rocks in gravel, middle and lower intertidal zone. Iquique specimens: 121.

Distribution: Arica to Coquimbo, Chile (Dall, 1909). Type locality: Arica, Chile (Gray, 1828).

Remarks: *Liotia cancellata* is the type species of *Liotia*, differing from the only other described species, the Californian *L. fenestrata* Carpenter, 1864, by its smaller size, broader umbilicus, and less pronounced spiral and axial cords that do not form deep, square pits.

Family Turbinidae

Prisogaster Mörch, 1850

Prisogaster niger (Wood, 1828)

Figure 41

Turbo niger Wood, 1828, pl. 6, fig. 1; Orbigny, 1840, vol. 5:411-412, vol. 9, Moll., pl. 55, figs. 9-11.

Turbo niger Gray, 1839:143, pl. 36, fig. 1 [synonym and homonym]; Reeve, 1848, vol. 4, *Turbo*, pl. 11, fig. 49; Pilsbry, 1889, vol. 10:219, pl. 42, fig. 42.

Prisogaster niger Wood, Carcelles and Williamson, 1951:268; Dell, 1971:197-198.

Occurrence: On undersides of rocks among gravel, middle and lower intertidal zone, often associated with *Tegula atra* (Lesson) and *T. tridentata* (Potiez and Michaud). Nearly all specimens are from Patillos, 65 kms south of Iquique; rare at Iquique. Patillos specimens: approximately 3000.

Distribution: Pacasmayo, Peru, to the Straits of Magellan (Dall, 1909). Type locality: unknown.

Family Phasianellidae

Tricolia Risso, 1826

Tricolia umbilicata (Orbigny, 1840)

Figure 46

Littorina umbilicata Orbigny, 1840, vol. 5:394, vol. 9, Moll., pl. 76, figs. 1-3.

Phasianella umbilicata, Strong, 1928:200, pl. 10, figs. 16, 17.

non Phasianella umbilicata Orbigny, 1842, vol. 2:77, pl. 19, figs. 32, 34.

Phasianella minima Philippi, 1860:186; Pilsbry, 1888, vol. 10:178, vol. 9, pl. 46, fig. 24; Dall, 1909:238.

Tricolia umbilicata, McLean in Keen, 1971:358, fig. 163.

Occurrence: In lower intertidal zone, especially

along fissures and crevices in rock surfaces. Iquique specimens: 276.

Distribution: Paita, Peru, to Chimba Bay, Chile (Dall, 1909). Type Locality: Cobija and Arica, Chile (Orbigny, 1840).

Remarks: The Iquique specimens are slate gray in color. As noted by McLean, in Keen (1971), the gray color is typical for specimens from the southern end of the range of *T. umbilicata*, while those from the northern end tend to be mottled with red and white.

***Tricolia macleani*, new species**

Figures 47 and 56

Diagnosis: Distinguished from other eastern Pacific Tricolias by its lack of spiral sculpture and its characteristic mottled purplish black and yellowish white coloration.

Description of holotype: Shell small for genus, with one rounded, slightly eroded nuclear whorl; postnuclear whorls three and one-half, moderately rounded, smooth except for wavy incremental growth lines. Body whorl colored by irregular mottling of yellowish white and purplish black, earlier whorls entirely purplish black. Alternating light and dark spots within outer lip have false appearance of apertural teeth. Aperture more than one-half height of shell; inner and outer lips smooth, outer lip thin, inner lip thickened to form narrow callus concealing umbilicus. Dimensions (in mm): height 4.0, diameter 3.1.

Operculum: Calcareous, of about three whorls, outer surface convex with microscopic wrinkles along the outer margin; inner side concave, with a prominent spiral keel, formed on the columellar margin by the raised portion of one opercular whorl.

Radula (Fig. 56): The radula is typical for a *Tricolia*, with the rachidian bordered on each side by four lateral teeth and a large number of marginals. Rachidian basically quadrate and rounded, with smooth borders, and lacking cusps. Each of the lateral teeth bears a prominent cusp having strong denticles. The innermost lateral tooth bears both inner and outer denticles, but the outer laterals bear only outer denticles. There are about 70 similar marginal teeth on each side, which are finely denticulate at their tips.

Type locality: Patillos, Chile, 20° 48" S, 70° 12' W; lower intertidal zone, on walls of tide pools and on undersides of rocks on gravel substrate, July, 1964, 718 specimens.

Type material: Holotype, LACM 1585; 275 paratypes, LACM 1586; 10 paratypes, USNM; 10 paratypes, CAS; 10 paratypes, AMNH; 10 paratypes, SDNHM; 10 paratypes, ANSP.

Referred material: LACM, two worn specimens, Allan Hancock Foundation bottom sample 531, 40 m east of Viejo Island, Independencia Bay, Peru, 13 January, 1935.

Discussion: The coloration of *T. macleani* varies considerably, from nearly all purplish black to nearly all yellowish white. The visible early whorls of most specimens are entirely purplish black, with the characteristic mottled color pattern confined to the body whorl. The apex of most specimens is slightly eroded. Juvenile specimens have a narrow, open umbilicus, and some adults show an umbilical chink when the callus is not fully developed.

Tricolia macleani differs from other eastern Pacific species of *Tricolia* by the combination of its unsculptured whorls and distinctive mottled coloration of purplish black and yellowish white. This species is named in honor of Dr. James H. McLean.

Order Mesogastropoda

Family Littorinidae

Littorina Ferussac, 1822

Subgenus *Austrolittorina* Rosewater, 1970

Littorina (Austrolittorina) araucana Orbigny, 1840
Figures 48 and 49

Littorina araucana Orbigny, 1840, vol. 5:393, vol. 9, Moll., pl. 53, figs. 8-10; Reeve, 1858, vol. 10, *Littorina*, pl. 16, fig. 88; Dall, 1909:231; Keen, 1971:365.

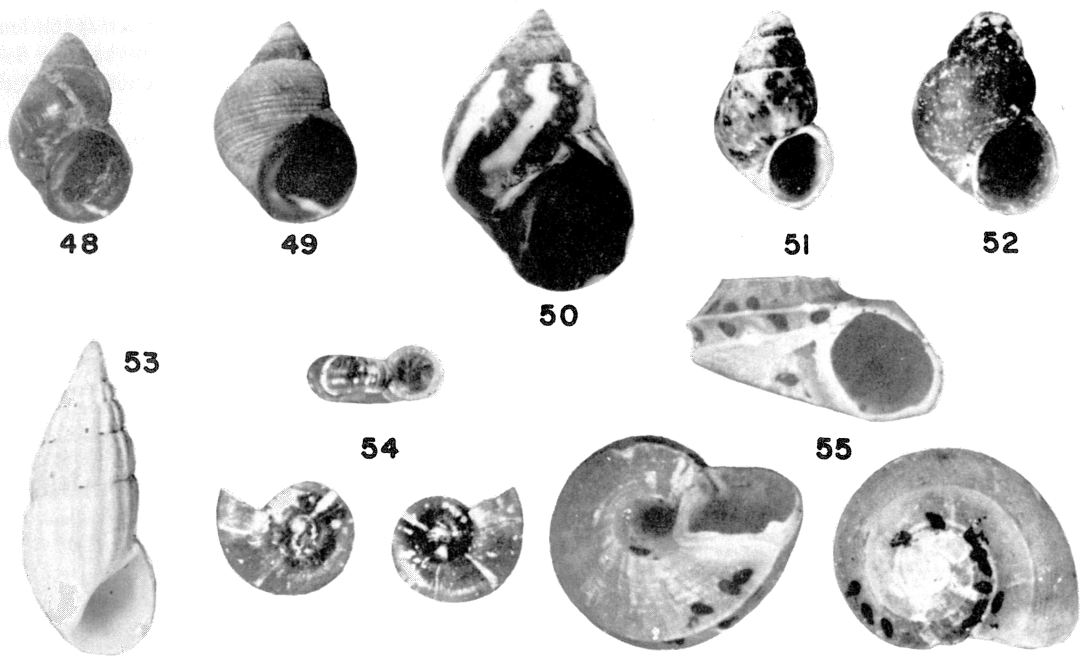
Littorina (Austrolittorina) araucana, Rosewater, 1970:423; Dell, 1971:205.

Occurrence: Abundant in upper intertidal and splash zones of rocky reefs, but less common than *L. peruviana* (Lamarck). Iquique specimens: 1260.

Distribution: LACM collections show this species occurring from Iquique to Laraquete (south of Concepción), Chile. Dell (1971) reports it at 41° S in Chile. The northern range limit of Nicaragua given by Dall (1909) is probably in error. Type locality: Arica and Valparaíso (Orbigny, 1840).

Remarks: *Littorina araucana* is highly variable in color and form. Many individuals are relatively small, predominantly brown and smooth, with a more angulate outer lip (Fig. 48), while others are generally larger, predominantly gray, and have incised spiral sculpture and a less angulate outer lip (Fig. 49). These characters are gradational, however, and most specimens fall somewhere between the two extremes. Dr. Joseph Rosewater confirmed the identification of this species.

Littorina araucana is usually found with *L. peruviana*, but where the surf is especially strong, *L. araucana* is generally absent.



FIGURES 48-55. 48, *Littorina (Austrolittorina) araucana*, brown form, height 9 mm; 49, *L. (A.) araucana*, gray form, height 9 mm; 50, *L. (A.) peruviana*, height 14.5 mm; 51, *Eatoniella (Eatoniella) latina* sp. nov., Holotype, height 1.54 mm; 52, *Eatonina (Saginofusca) atacamae* sp. nov., Holotype, height 1.71 mm; 53, *Rissoina (Rissoina) inca*, height 5.8 mm; 54, *Omalogyra* cf. *O. atomus*, diameter 0.9 mm; 55, *Cyclostremiscus (Cyclostremiscus) trigonatus*, diameter 2.1 mm.

Littorina (Austrolittorina) peruviana
(Lamarck, 1822)
Figure 50

Phasianella peruviana Lamarck, 1822, vol. 7:53.

Littorina peruviana, Orbigny, 1840, vol. 5:395, vol. 9 Moll., pl. 53, figs. 5-7; Tryon, 1887, vol. 9:249, pl. 44, fig. 78; Dall, 1909:172-173, 231, pl. 23, fig. 7; Keen, 1971:366, fig. 185.

Littorina (Austrolittorina) peruviana, Rosewater, 1970:423.

Turbo zebra Wood, 1828:20, pl. 6, *Turbo*, fig. 33.

Littorina zebra, Reeve, 1857, vol. 20, *Littorina*, pl. 12, figs. 6a-b.

Occurrence: Abundant in upper intertidal and splash zones of rocky reefs. Iquique specimens: 8007.

Distribution: LACM collections contain this species from Paita, Peru, south to Valparaíso, Chile, and Dall (1909) cited the southern range as Valdivia, Chile. Keen (1971) mentions one reported occurrence in the Galápagos Islands. Type locality: Callao, Peru (Lamarck, 1822).

Family Eatoniellidae
Eatoniella Dall, 1876
Subgenus *Eatoniella*, s.s.

Eatoniella (Eatoniella) latina, new species
Figures 51, 57 and 58

Diagnosis: A species distinguished by its gray color and thick shell wall, an operculum with extensive muscle insertion area and no internal ridge, and its radular dentition.

Description of shell: Shell small, thick, smooth; four whorls, slightly convex, suture moderately impressed; protoconch smooth, low, not distinctly marked off from adult whorls. Very weak, shallow spiral groove immediately below suture, otherwise shell surface unornamented. Aperture oval; inner and outer lips smooth, slightly thickened; no umbilicus. Shell dark gray outside, medium blue-gray within, peristome gray-white. Dimensions (in mm): height 1.54, diameter 0.98.

Operculum (Fig. 57): Medium yellowish brown, chitinous, ear-shaped, convex outward; no internal ridge, muscle insertion area extensive; only a narrow outer marginal area; spiral sculpture absent;

faint spiral striae on outer surface; peg long, solid, weakly grooved, darker brown than remainder of operculum.

Radula (Fig. 58): The radula was removed from a paratype. Each row of teeth consists of a rachidian flanked on each side by one lateral and two marginals. Rachidian with a quadrate central cusp and two pointed cusps on each side; base of rachidian not discernible. Lateral tooth elongate, with four small cusps along the mid-anterior margin. Inner marginal tooth elongate and curved, with three to four indistinct anterior cusps and a thickened posterior end. Outer marginal slim and curved, with about four small cusps along the anterior margin; posterior end indistinct.

Type locality: Iquique, Chile, 20° 13'S, 70° 10'W; lower intertidal zone, in gravel and coarse sand between rocks, August, 1964, 126 specimens.

Type material: Holotype, LACM 1587; 100 paratypes, LACM 1588; 5 paratypes, USNM; 5 paratypes, CAS; 5 paratypes, AMNH; 5 paratypes, SDNHM; 5 paratypes, ANSP; 5 paratypes, Australian Museum, Sydney.

Discussion: The paratypes have from four to four and one-half whorls. On some specimens, subobsolete, closely and irregularly spaced spiral lineations are visible on the body whorls. In broken specimens, microscopic wrinkling is clearly seen on the interior shell surfaces; the wrinkling is subparallel to the long axis of the shell; wrinkles extend almost to the apertural margin in some specimens, although not in the holotype. The weak spiral groove immediately below the suture of the holotype is not present in all specimens. Most of the specimens were dead when collected, and had weathered to a light gray color.

The radular preparation does not clearly show all of the relevant morphologic details, and no additional preserved specimens are available. Most importantly, it cannot be seen whether the base of the rachidian has the two strong basal processes present among Eatoniellidae. The posterior margins of the lateral and outer marginal teeth are also hidden from view.

The rather solid, dark gray shell, with a yellowish white operculum bearing weak spiral striae, places this species in the subgenus *Eatoniella*, s.s., as described by Ponder, (1965a). The radular dentition, so far as it is known, supports this judgment.

Eatoniella (Eatoniella) latina is the first representative of the family Eatoniellidae to be reported from the eastern Pacific. Its generic placement has been confirmed by Dr. Winston F. Ponder, who has done extensive work on New Zealand eatoniellids (Ponder, 1965a). The Chilean species is only one-half to two-thirds as high as the three New Zealand

species figured by Ponder. Besides shell size, the absence of an internal opercular ridge also distinguishes *E. (E.) latina* from *E. (E.) kerguelenensis chiltoni* (Suter, 1909), whereas the much blunter opercular peg of *E. (E.) latina* helps separate it from *E. (E.) stewartiana* Ponder, 1965.

The specific name of *E. (E.) latina* recognizes the first occurrence of the genus *Eatoniella* in Latin America.

Family Cingulopsidae

Eatonina Thiele, 1912

Subgenus *Saginofusca* Ponder, 1965

Eatonina (Saginofusca) atacamae, new species

Figures 52, 59 and 60

Diagnosis: This species is characterized by its medium to dark orange-brown color, thin shell wall, and ear-shaped operculum having prominent internal ridge and indistinct muscle insertion area.

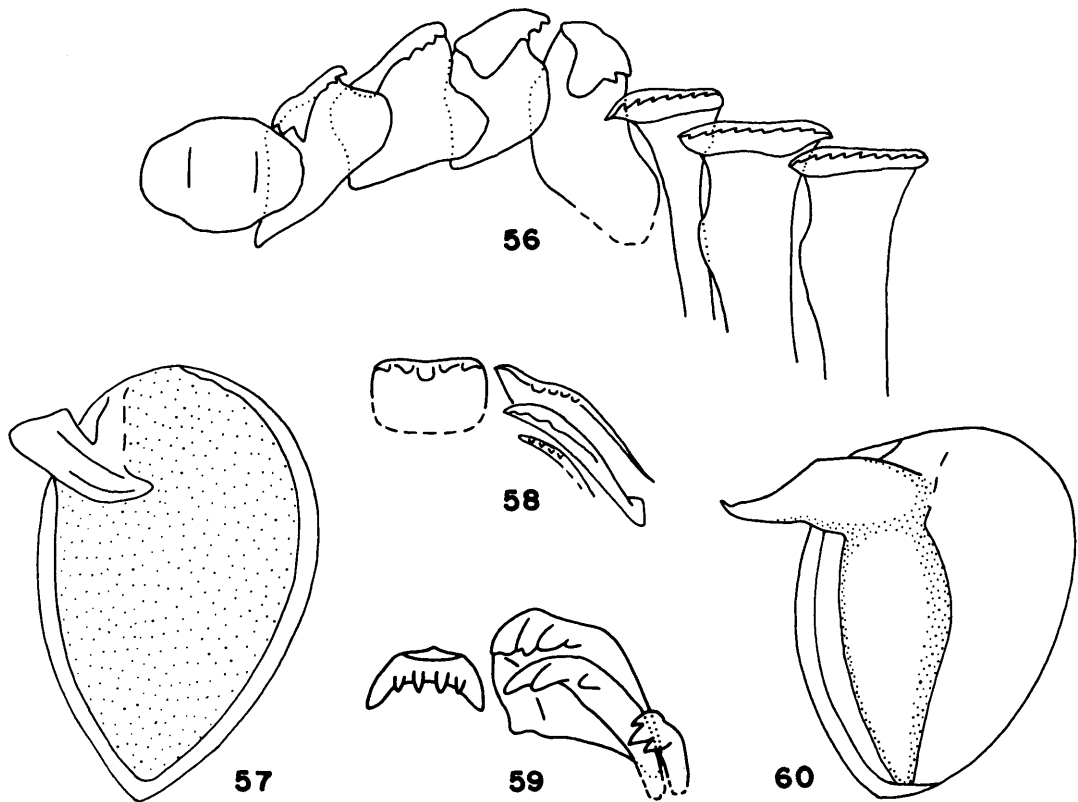
Description of shell: Shell small, thin, smooth, turbinata. Whorls four and one-half, markedly convex, suture impressed; protoconch smooth, not distinctly marked off from adult whorls. Aperture oval; inner lip smooth, slightly thickened; outer lip smooth, thin; umbilicus narrow, deep. Color medium to dark orange-brown. Dimensions (in mm): height 1.71, diameter 1.18.

Operculum (Figure 60): Light yellowish brown, chitinous, ear-shaped, convex outward; internal ridge prominent, broad, coming to a point distally; muscle insertion area indistinct and transparent, incremental growth lines only; peg long, distally pointed, strongly grooved.

Radula (Fig. 59): The rachidian is flanked on each side by one lateral and two marginal teeth. Rachidian has two strong basal processes between which project four basal cusps. Anterior end of rachidian somewhat flattened and produced into a low peak centrally. The lateral tooth is relatively large, roughly quadrate, and produced posterolaterally; it bears four cusps, the most lateral of which is small and indistinct. The inner marginal tooth is elongate and curved, with three large, somewhat rounded cusps. The outer marginal is short, slightly curved and has three cusps that are smaller and more pointed than those on the inner marginal tooth.

Type locality: Iquique, Chile, 20° 13'S, 70° 10'W; middle intertidal zone, on semi-exposed rock surfaces, especially along crevices, August, 1964, 2500 specimens.

Type material: Holotype LACM 1589; 2374 paratypes, LACM 1590; 25 paratypes, USNM; 25 paratypes, CAS; 25 paratypes, AMNH; 25



FIGURES 56-60. 56, *Tricolia macleani* sp. nov., radular dentition; 57, *Eatonella* (*Eatonella*) *latina* sp. nov., inner side of operculum; 58, *E. (E.) latina*, radular dentition; 59, *Eatonina* (*Sagino-fusca*) *atacamae* sp. nov., radular dentition; 60, *E. (S.) atacamae*, inner side of operculum.

paratypes, SDNHM; 25 paratypes, ANSP; 25 paratypes, Australian Museum, Sydney.

Discussion: *Eatonina* (*Sagino-fusca*) *atacamae* is the first species of this genus reported from the eastern Pacific. Its generic placement was suggested by Dr. Winston F. Ponder. The globose form of this species, plus its orange-brown color, and its radula with quadrate lateral teeth and paw-shaped outer marginals, clearly places it in the subgenus *Sagino-fusca* Ponder, 1965. The transparent operculum, with a prominent internal ridge and indistinct muscle-insertion area reinforces this judgment. Two New Zealand species are included in *Sagino-fusca* by Ponder (1965b), both of which are much smaller than *E.(S.) atacamae*. The New Zealand species *E.(S.) atomaria* (Powell, 1933; height 1.2 mm) and *E.(S.) maculosa* Ponder, 1965 (height 0.775 mm), also have blunter opercular pegs and different radular morphology than *E.(S.) atacamae*.

The specific name of *E.(S.) atacamae* refers to the presence of this species on the coastal edge of the Atacama Desert in northern Chile.

Family Rissoinidae

Rissoina Orbigny, 1840

Subgenus *Rissoina*, s.s.

Rissoina (*Rissoina*) *inca* Orbigny, 1840

Figures 53 and 83

Rissoina inca Orbigny, 1840, vol. 5:395, vol. 9, Moll., pl. 53, figs. 11-16; Tryon, 1887, vol. 9:369, pl. 55, fig. 15; Dall, 1909:232; Bartsch, 1915:42, pl. 31, figs. 6, 8; Carcelles and Williamson, 1951:272; Keen, 1966:3, figs. 6a-c; 1971:374, fig. 260.

Occurrence: On undersides of rocks and in gravel and sand of middle and lower intertidal zone, abundant. Iquique specimens: 636.

Distribution: Peru south to Chiloé Island, Chile (Dall, 1909). Type locality: Arica and Cobija, Chile (Orbigny, 1840).

Remarks: *Rissoina inca* is the type species of its genus. Each row of radular teeth (Fig. 83) consists of a rachidian flanked on each side by one lateral and two marginals. The rachidian is broad, with an

indented anterior margin, broadly curved anterior flanks, and sharply pointed lateral terminations. The middle portion of the anterior margin bears nine denticles. The median denticle is largest and the others become progressively smaller away from it. The basal margin is sinuous and nearly parallels the line of the anterior margin, and bears two widely spaced cusps. The lateral tooth is elongate and expanded medially. Its median anterior margin bears a broad cusp that has about three denticles along its posterolateral edge. The marginal teeth are elongate and sharply pointed medially. They bear numerous denticles along their anterior margins.

Family Omalogyridae
Omalogyra Jeffreys, 1860
Omalogyra cf. *O. atomus* (Philippi, 1841)
 Figure 54

Truncatella atomus Philippi, 1841:54.
Homalogyra atomus, Johnson, 1934:100.
Omalogyra atomus, Bullock, 1969:70-71.

Occurrence: In black sandy silt among cobbles and boulders of a protected beach, lower intertidal zone. Iquique specimens: 226.

Distribution: *Omalogyra atomus* is best known from the northeastern Atlantic and Mediterranean. It is reported rarely in New England as far south as Rhode Island (Bullock, 1969). Type locality: Sorrento, Italy (Philippi, 1841). I have examined 13 specimens (10 loaned from USNM, no. 184968, ex Jeffreys collection; 3 from Dr. Donald Moore, University of Miami) from Balta Sound, Shetland Islands.

Remarks: The Iquique specimens are minute, discoidal, semitransparent, and of about two and one-half whorls, the first one nuclear. The apex is slightly depressed, with the shell increasing regularly in size. The body whorl is well rounded, and the whorls are separated by a strongly impressed suture and marked only by very fine incremental growth lines. The base is very broadly and openly umbilicate, exposing the nuclear whorls. The aperture is subcircular and interrupted at its inner margin by the preceding whorl. The periostracum is thin and medium brown to yellowish brown in color. The operculum is chitinous, yellowish white, opaque, and with about two whorls with a central nucleus. Dimensions of figured specimen (in mm): greatest diameter 0.90, height 0.30.

No species referable to *Omalogyra* has previously been reported from the eastern Pacific. The Iquique species is not similar to any reported from the south Atlantic, but is extremely close to *O. atomus* of the northern Atlantic and Mediterranean. The Shetland

Island specimens of *O. atomus* differ from the Iquique shells only in having a slightly thinner and more translucent shell wall. Specimens from both regions display "quarter lines" ("Viertel-linie" of Philippi, 1841:54) as their only ornamentation, although the original description clearly says these are not present on *O. atomus*. These lines are white, very shallowly incised, and radially traverse each whorl. The lines may occur on all whorls of a given specimen, but are not continuous from whorl to whorl. Seen in apical or basal view, the lines often, but not always, occur at about 90° increments, although I have not seen four such lines 90° apart on one individual.

Omalogyra atomus burdwoodianus Strebel, 1908, from Burdwood Bank, east of Tierra del Fuego (Strebel, 1908:52-53, pl. 6, figs. 85a-c), has a strongly noded keel on its body whorl that separates it from the Iquique specimens.

Dr. Donald R. Moore provided helpful suggestions for comparison of the Iquique specimens with *Omalogyra* species known from the north and south Atlantic, in addition to loaning me specimens of *O. atomus*. Dr. Joseph Rosewater provided comparative specimens from the U.S. National Museum collections.

Family Vitrinellidae
Cyclostremiscus Pilsbry and Olsson, 1945
 Subgenus *Cyclostremiscus*, s.s.
Cyclostremiscus (Cyclostremiscus) trigonatus
 (Carpenter, 1857)
 Figures 55 and 84

Vitrinella exigua C. B. Adams, 1852:184; Turner, 1956:48, pl. 15, figs. 2, 2a,b.

non Delphinula exigua Philippi, 1849:25.

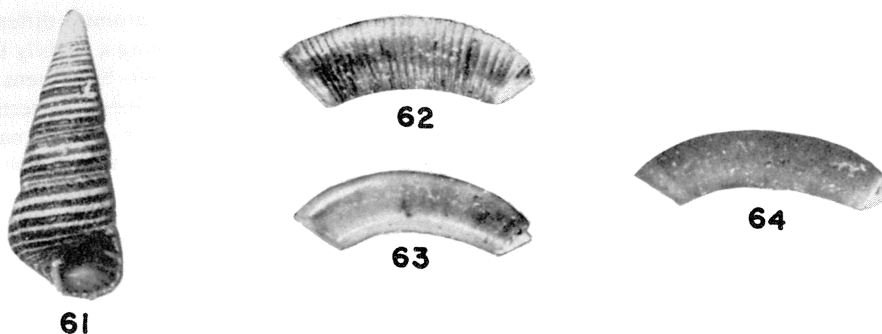
Vitrinella trigonata Carpenter, 1857:244 [as synonym of *V. exigua* C. B. Adams].

Cyclostremiscus trigonatus, Pilsbry and Olsson, 1945:268-269, pl. 27, figs. 2, 2a,b.

Occurrence: In gravel among rocks, lower intertidal zone. LACM specimens from Peru were found in depths to 13 m. Iquique specimens: 60.

Distribution: Mazatlán, Mexico (Carpenter, 1857) to Iquique, Chile (present specimens). LACM collections also contain specimens from Pucusana (12°30'S) and the Chincha Islands (13°38'S), Peru. Type locality: Mazatlán, Mexico (Carpenter, 1857).

Remarks: The Iquique specimens closely match the description and figures of *Cyclostremiscus trigonatus* given by Pilsbry and Olsson (1945). However, the largest specimen of *C. trigonatus* mentioned by Pilsbry and Olsson was 1.25 mm in diameter, whereas the Iquique specimens average over 2.0 mm in diameter and the largest specimen



FIGURES 61-64. 61, *Turritella cingulata*, height 25 mm; 62, *Caecum chilense*, annulate form, length 2 mm; 63, *C. chilense*, smooth form, length 2 mm; 64, *Fartulum moorei* sp. nov., Holotype, length 1.55 mm.

has a greatest diameter of 2.4 mm and a height of 1.5 mm. Spiral striae on the Iquique specimens precludes placement in *C. peruvianus* Pilsbry and Olsson, 1945 (p. 269, pl. 30, fig. 6; Zorritos, Peru).

A radular mount made from one of the Iquique specimens (Fig. 84) shows that the rachidian is bilobed anteriorly and bears a relatively large central cusp flanked on each side by four smaller cusps that decrease in size laterally. The lateral tooth is trigonal and its anterior margin bears four equal cusps on its outer half. The inner marginal tooth is long, scythe-shaped, and bears numerous denticles along its anterior margin. The shape of the outer marginal is not plainly visible, and this tooth and the inner marginal may actually be parts of a single tooth.

Family Turritellidae

Turritella Lamarck, 1799

Turritella cingulata Sowerby, 1825

Figure 61

Turritella cingulata Sowerby, I, 1825:56, appendix p. xiii; Reeve, 1849, vol. 5, *Turritella*, pl. 6, fig. 23; Tryon, 1886, vol. 8:200, pl. 62, fig. 71; Dall, 1909:231; Carcelles and Williamson, 1951:273; Herm, 1969:132-133, pl. 14, figs. 12-15; Keen, 1971:392, fig. 436.

Occurrence: In sand and gravel of semiprotected rocky area 10 kms by road south of Iquique, lower intertidal zone. Number of specimens: 81.

Distribution: Dall (1909) gave the range as from Manta, Ecuador, to Chiloe Island, Chile, but Keen (1971) does not list this species from the Panamic province. LACM collections contain specimens from no farther north than Iquique, although this species probably ranges northward into Peru. Type locality: unknown.

Remarks: This species was found living at only one locality, an unnamed beach 10 kms by road south of Iquique, where there were hundreds of

living specimens per square meter. The shells were lying on the surface or partly buried in the gravel and showed no directional orientation. Dead shells are commonly seen in the Iquique area.

Family Caecidae

Caecum Fleming, 1817

Caecum chilense Stuardo, 1962

Figures 62 and 63

Caecum chilense Stuardo, 1962:5-6, figs. 1, 2.

Occurrence: Common to abundant, locally prolific, on undersides of rocks in lower intertidal zone, often in loose grouping of several hundred. Iquique specimens: approximately 6000.

Distribution: Concepción and Iquique, Chile. Similar specimens are in LACM collections from Pucusana (12°30'S) and the Chincha Islands (13°38'S), Peru. Type locality: Concepción, Chile (Stuardo, 1962).

Remarks: Teleoconchs of *Caecum chilense* range from entirely annulated to entirely smooth, with all gradations present in a local population. On partially ornamented specimens of *C. chilense*, the annulations occur on the posterior portion of the teleoconch.

Fartulum Carpenter, 1857

Fartulum moorei, new species

Figure 64

Diagnosis: Shell small for genus, distinguished by smooth teleoconch, prominent septum, broadly pointed mucro, and diminutive size.

Description of holotype: Teleoconch cylindrical, slightly tapered posteriorly, broadly curved for its whole length, curvature increasing slightly near aperture. Septum slightly depressed, strongly projecting, basically hemispherical but with broadly pointed dorsal mucro, angled nearly 90° to right. Aperture circular, somewhat oblique. Surface sculp-

ture lacking. Teleoconch light buff colored, septum white. Dimensions (in mm): total length 1.55, diameter in middle of teleoconch and at aperture 0.38, diameter at posterior end 0.32.

Operculum: Circular, light to dark brown, multispiral.

Type locality: Iquique, Chile, 20° 13'S, 70° 10'W; lower intertidal zone, on undersides of rocks on gravel substrate, August, 1964, 1186 specimens.

Type material: Holotype, LACM 1591; 1050 paratypes, LACM 1592; 20 paratypes, USNM; 20 paratypes, CAS; 20 paratypes, AMNH; 20 paratypes, SDNHM; 20 paratypes, ANSP.

Discussion: Color of the teleoconch varies from buff to medium brown on the paratypes. The septum is strongly projecting on all the specimens, but the mucro varies from prominent and broadly pointed to nearly lacking.

Fartulum moorei differs from the other known Chilean caecid, *C. chilense* Stuardo, by being smaller, always lacking annular rings on the teleoconch, and having its mucro angled to the right. *Fartulum orcutti* Dall, 1885, of western North America is distinct from *F. moorei* by being thicker for its length, having a more oblique aperture, and a nearly hemispherical septum lacking a pointed mucro, while *F. occidentale* (Bartsch, 1920), also from western North America, is much larger than *F. moorei*, with a slightly constricted aperture and a less projecting posterior septum.

Caecum moorei is named in honor of Dr. Donald R. Moore.

Family Cerithiidae
Bittium Gray, 1847
Bittium sp. indet.

Ten dead specimens of a *Bittium* species were collected from intertidal gravel, and all are very poorly preserved. The most complete specimen is 6.8 mm in height and 2.7 mm in diameter, and composed of five and one-half whorls. The nuclear whorls and earliest postnuclear whorls are eroded away. Sculpture is of three rows of beaded spiral cords; the middle spiral cord is placed slightly closer to the posterior cord than to the anterior one. The nodes are prominent and hemispherical in the early whorls but become quadrate and flattened on the final whorl. The aperture is broken.

Family Cerithiopsidae
Cerithiopsis Forbes and Hanley, 1851
Cerithiopsis sp. indet.

There is at least one species of *Cerithiopsis* present at Iquique, although none is listed from the

Peruvian province. There may be more than one species among the 65 specimens collected at Iquique, but the shells are all too worn to be certain; in most cases, diagnostic apertural and nuclear whorl characters have been lost. The best preserved specimen, somewhat worn, has three apparently smooth nuclear whorls and five postnuclear whorls. Sculpture is of three spiral rows per whorl bearing rounded nodes. The nodes of the posterior row are smaller and less prominent than those of the other rows, and the middle spiral row is set closer to the posterior row than to the anterior row. The apertures of all the specimens are worn or broken. Dimensions (in mm): height 2.5, diameter 0.95.

Family Triphoridae
Triphora Blainville, 1828
Triphora sp. indet.

A single species of *Triphora*, represented by 49 specimens, was found at Iquique in gravel of the intertidal zone. No species of this genus are reported from the Peruvian province but the specimens are too worn and broken to describe as new. An average specimen is 3.5 mm in height and 1.4 mm in diameter, comprised of three and one-half nuclear and six and one-half post-nuclear whorls. The nuclear whorls are too worn to show distinct sculpture, but have suggestions of widely spaced axial riblets. The sculpture of the first five postnuclear whorls is of two spiral axial rows of raised, rounded nodes. On the fifth whorl another row of granules appears between the first two and is positioned slightly nearer to the posterior row. Just behind the mature lip, a fourth row of nodes appears anteriorly, and is much smaller than any of the other three. There are two strong, smooth spiral cords on the base. The color is medium orange-brown.

Family Calyptraeidae
Calyptraea Lamarck, 1799
Subgenus *Trochita* Schumacher, 1817
Calyptraea (Trochita) trochiformis (Born, 1778)
Figure 65

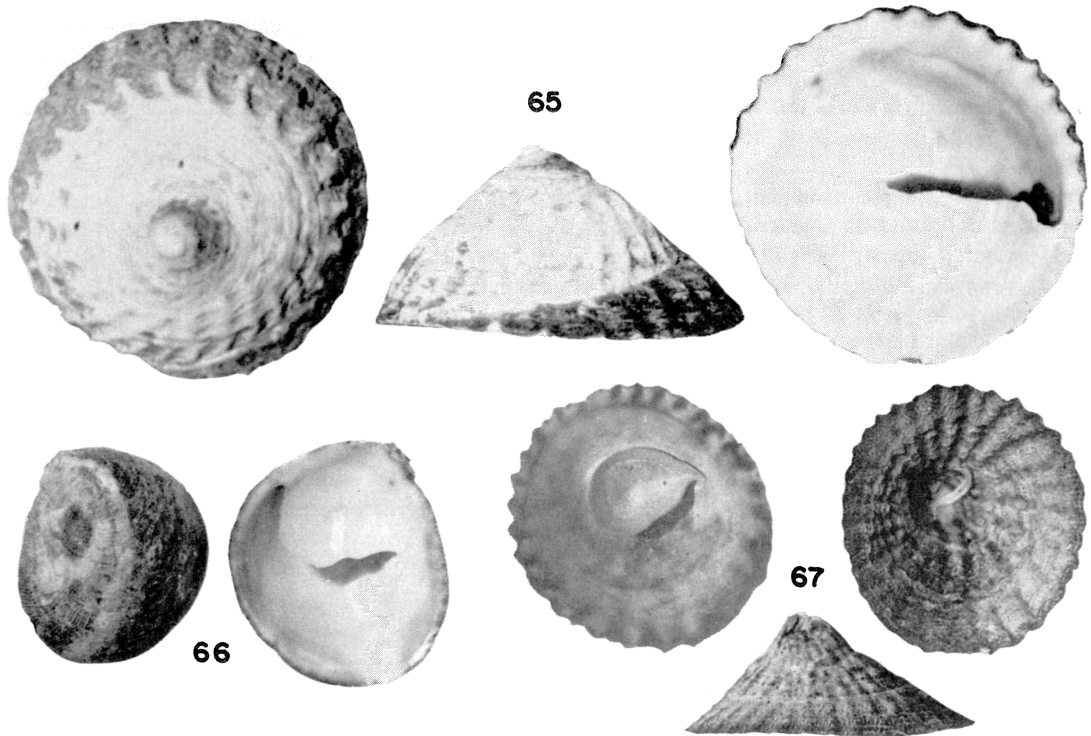
Turbo trochiformis Born, 1778:355.

Patella trochiformis, Gmelin, 1791, vol. 1, pt. 6:3693-3694.

Calyptraea trochiformis, Orbigny, 1841, vol. 5: 461-462, vol. 9, Moll., pl. 59, fig. 3 [as "*C. radians*" in illustration caption]; Carcelles and Williamson, 1951:279.

Trochita trochiformis, Dall, 1909:175, 233, pl. 23, fig. 1.

Calyptraea (Trochita) trochiformis, Keen, 1958: 312; 1971:456, fig. 804.



FIGURES 65-67. 65, *Calyptraea (Trochita) trochiformis*, diameter 48 mm; 66, *Crepipatella dilatata*, length 26 mm; 67, *Crucibulum (Crucibulum) quiriquinae*, diameter 27.5 mm.

Occurrence: Worn shells are not uncommon in beach drift in the Iquique area. I saw no living specimens, but beach shells occur most commonly where the alga *Lessonia nigrescens* Bory is common. *Calyptraea trochiformis* possibly lives on exposed rocky substrate among these plants in intertidal and shallow depths. Iquique specimens: 6.

Distribution: Manta, Ecuador, to Valparaíso, Chile (Keen, 1971). Type locality: unknown.

Remarks: The nomenclatural history of this species is very complex and is discussed by Rehder (1943), Palmer (1963a, 1963b), Robertson (1962), and Keen (1971).

Crepipatella Lesson, 1830

Crepipatella dilatata (Lamarck, 1822)

Figure 66

Crepidula dilatata Lamarck, 1822, vol. 6, pt. 2:25; Orbigny, 1841, vol. 5:465-467, vol. 9, Moll., pl. 58, fig. 6; Reeve, 1859, *Crepidula*, pl. 1, figs. 3a, b; Tryon, 1886, vol. 8:127-128, pl. 37, figs. 31-34, figs. 31-34, pl. 38, fig. 42; Dall, 1909:174, 234. *Crepipatella dilatata*, Dell, 1971:205-206.

Occurrence: Attached to the mussel *Aulacomya ater* (Molina), often piled three deep. Iquique specimens: 251.

Distribution: LACM collections contain specimens from Lorenzo Island, Peru ($12^{\circ}06'45''S$, $77^{\circ}11'45''W$, near Callao) to Punta Arena, Chile ($53^{\circ}S$). Dell (1971) mentions this species from the Falkland Islands. The northern limit of the range given by Dall (1909) of California to the Galápagos Islands and Straits of Magellan is in error. This species is unknown in the Panamic province (Keen, 1971). Type locality: unknown.

Crucibulum Schumacher, 1817

Subgenus *Crucibulum*, s.s.

Crucibulum (Crucibulum) quiriquinae
(Lesson, 1830)

Figure 67

Calyptraea (Calypeopsis) quiriquinae Lesson, 1830: 161.

Calyptraea quiriquinae, Hupé, 1854, vol. 8:228-229.

Crucibulum scutellatum var. *quiriquina*, Tryon, 1886, vol. 8:118, pl. 32, figs. 30, 31.

Crucibulum quiriquinae, Dall, 1909:233.

Occurrence: Specimen found in beach drift. Iquique specimens: 1.

Distribution: Pucusana, Peru (LACM), to Concepción, Chile (Hupé, 1854). Dall (1909) placed the southern range limit at the Straits of Magellan.

Type locality: Isla Quiriquina and Talcahuano, Chile (Lesson, 1830).

Remarks: Dr. S. Stillman Berry identified the present specimen and his personal collection includes other specimens from Iquique.

Family Cymatiidae

Priene H. and A. Adams, 1858

Priene rude (Broderip, 1833)

Figure 68

Triton rudis Broderip, 1833a:6; Reeve, 1844, *Triton*, pl. 14, fig. 53; Tryon, 1881, vol. 3:34, pl. 16, fig. 169.

Argobuccinum rude, Dall, 1909:226.

Priene rude, Smith, 1970:517-518, pl. 43, figs. 1, 5, 6.

Occurrence: Dead shells in beach drift. Iquique specimens: 2.

Distribution: Callao, Peru, to Valparaíso, Chile, at 5-10 fms depth (Smith, 1970). Type locality: Iquique, Chile (Broderip, 1833).

Order Neogastropoda

Family Muricidae

Xanthochorus Fischer, 1884

Xanthochorus buxea (Broderip, 1833)

Figure 69

Murex buxeus Broderip, in Broderip and Sowerby, 1833:194; Reeve, 1845, vol. 3, *Murex*, pl. 33, fig. 170.

Polia buxea, Sowerby, 1834, *Murex*, pl. 61, fig. 28.

Cantharus buxeus, Tryon, 1881, vol. 3:166.

?*Cantharus buxeus*, Vokes, 1971:27.

Tritonalia buxea, Dall, 1909:219.

Ocenebra buxea, Keen, 1958:359, fig. 352; 1971:533, fig. 1031.

Occurrence: Found in beach drift. Iquique specimens: 2.

Distribution: Pacasmayo, Peru (Keen, 1971) to Iquique, Chile (Broderip, 1833). Type locality: Iquique, Chile (Broderip, 1833).

Family Thaididae

Crassilabrum Jousseaume, 1880

Crassilabrum crassilabrum (Sowerby, 1834)

Figure 70

Murex labiosus Gray, 1828:4, pl. 6, fig. 9.

non *Murex labiosus* Wood, 1828:15, pl. 5, fig. 18.

Purpura crassilabrum, Sowerby, II, 1834, *Murex*, fig. 14.

Murex crassilabris, Potiez and Michaud, 1838, vol. 1:414-415, pl. 33, figs. 10, 11.

Murex crassilabrum, Reeve, 1845, vol. 3, *Murex*, pl. 3, fig. 146.

Crassilabrum crassilabrum, Jousseaume, 1880:335 [not seen]; Vokes, 1971:37.

Tritonalia crassilabrum, Dall, 1909:219.

Occurrence: In crevices and under ledges of rocky reefs, lower intertidal zone. Iquique specimens: 829.

Distribution: Pucusana, Peru (LACM), to 46°S in southern Chile (Dell, 1971). Type locality: Valparaíso (Gray, 1828).

Remarks: Nearly all specimens were collected during a three-day period in July, 1964, when they were observed depositing egg masses on intertidal rocks; most individuals were on top of clusters of orange, elongate eggs when collected. After that time, *C. crassilabrum* was still fairly common in the intertidal zone at Iquique.

Thais Röding, 1798

Subgenus *Stramonita* Schumacher, 1817

Thais (Stramonita) chocolata (Duclos, 1832)

Figure 71

Purpura chocolatum Duclos, 1832, vol. 26:108-109, pl. 2, fig. 7; Kiener, 1835, vol. 4, pt. 1, "Pourpre": 98-99, pl. 26, fig. 70; Orbigny, 1841, vol. 5:436-437, vol. 9, Moll., pl. 61, figs. 1-3.

Thais chocolata, Dall, 1909:169, 221, pl. 22, fig. 22; Carcelles and Williamson, 1951:221; Keen, 1958:372; 1971:550, fig. 1077.

Occurrence: Lower intertidal zone, on rocky substrate, uncommon. Iquique specimens: 5.

Distribution: Although this species is reported occurring from Ecuador (Keen, 1971) to Valparaíso, Chile (Dall, 1909), LACM collections contain specimens from no farther north than Paita, Peru. Type locality: Peru (Duclos, 1832).

Thais (Stramonita) haemastoma (Linnaeus, 1767)
Figure 72

Buccinum haemastoma Linnaeus, 1767, vol. 1, pt. 2:1202.

Purpura biserialis Blainville, 1832, vol. 1:238, pl. 11, fig. 11.

Thais biserialis, Dall, 1909:220.

Thais (Stramonita) biserialis, Keen, 1958:372, fig. 398; 1971:549-550, fig. 1076.

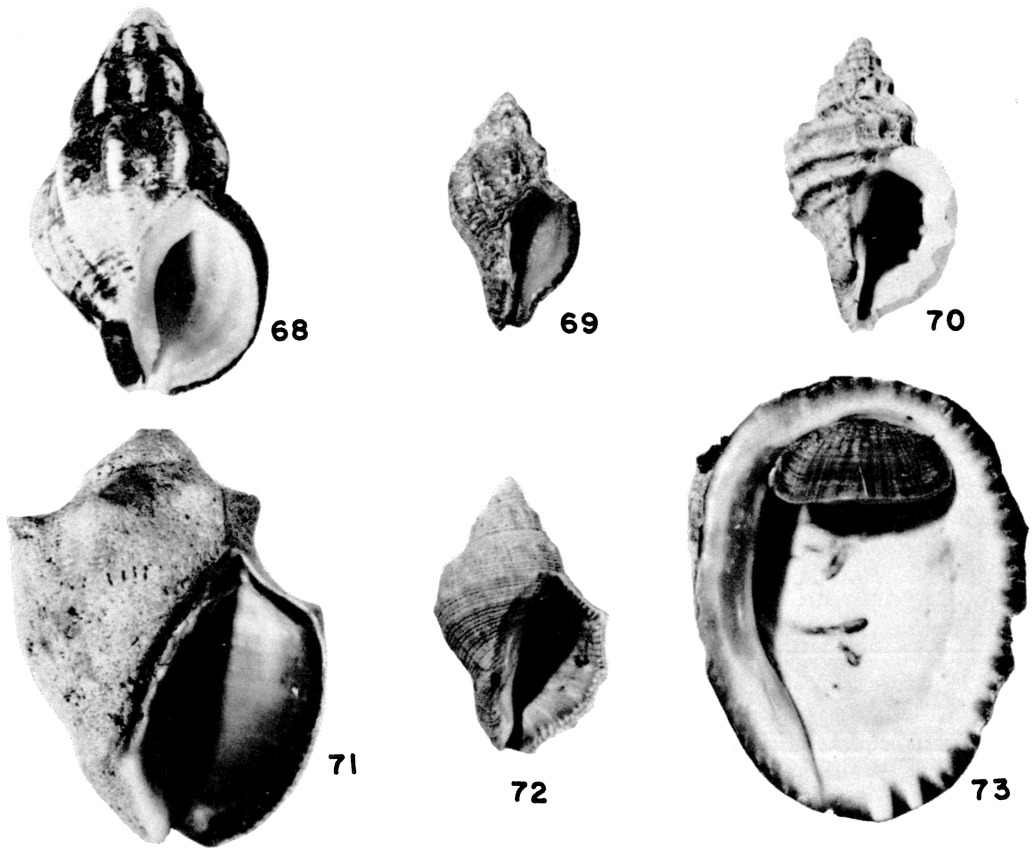
?*Purpura delessertiana* Orbigny, 1841, vol. 5:439, vol. 9, Moll., pl. 77, fig. 7.

?*Thais (Stramonita) delessertiana*, Keen, 1958:372, fig. 400; 1971:550, fig. 1078.

Thais (Stramonita) haemastoma, Clench, 1947:73-76, pl. 36, figs. 1-6 [extensive synonymy].

Occurrence: Beneath rocks and ledges in lower intertidal zone, common. Iquique specimens: 77.

Distribution: Eastern Atlantic — France, western



FIGURES 68-73. 68, *Priene rude*, height 52 mm; 69, *Xanthochorus buxeus*, height 15 mm; 70, *Crassilabrum crassilabrum*, height 25 mm; 71, *Thais (Stramonita) chocolata*, height 56 mm; 72, *T. (S.) haemastoma*, height 37 mm; 73, *Concholepas concholepas*, height 73 mm.

Mediterranean, to West Africa; Western Atlantic — Trinidad to Uruguay; Eastern Pacific — Cedros Island, Baja California, Mexico, to Valparaíso, Chile (Clench, 1947). Type locality: Teneriffe, Canary Islands (designated by Clench, 1947).

Remarks: Eastern Pacific specimens of this species have often been referred to *Thais biserialis*, which some authors consider to differ in having a less strongly noded shoulder on the whorls and having the margin of the aperture colored brownish rather than orange-red. However, LACM specimens from throughout the Panamic province, Chile, and West Africa support the opinion of Clench (1947) that eastern Pacific specimens should be referred to *Thais haemastoma*.

Iquique specimens have relatively high spires with subdued to moderately elevated nodes on the shoulder of the whorls. The exteriors are light to dark gray in color, and the apertures are stained with pale orange-brown. The form and ornamentation of these specimens are identical to that seen on many individuals from the tropical eastern Pacific and West Africa in LACM collections, even though

the tropical specimens tend to be more ornate. The strongly noded West African and Caribbean forms are accorded subspecific ranking by Clench (1947). The orange-brown color of the Iquique specimens is paler than I have seen on specimens from any other locality in the Pacific or Atlantic. On most individuals the orange-brown color is present only along the columellar lip, although most specimens of *T. haemastoma* from other places have the entire aperture darkly tinted. However, the difference is one of degree and the pattern of coloration is the same, because tropical specimens also have their darkest coloration along the apertural margin. Numerous LACM specimens from the tropical eastern Pacific and eastern Atlantic show an identical range of coloration. On the basis of form and color the Iquique specimens are thus referred to *Thais haemastoma*.

It is possible that *T. delessertiana* (Orbigny), which is reported from Ecuador to Paita, Peru (Keen, 1971), is also included within the broad form and color range of *T. haemastoma*, but adequate specimens are not at hand for comparison.

Concholepas Lamarck, 1801*Concholepas concholepas* (Bruguière, 1789)

Figure 73

Buccinum concholepas Bruguière, 1789, vol. 1:252.*Concholepas peruvianus* Lamarck, 1801:69 [not seen]; 1822, vol. 7:252-253; Reeve, 1863, vol. 14, *Concholepas*, pl. 1, figs. 1a-d; Tryon, 1888, vol. 2:199, pl. 192, figs. 314-316.*Purpura concholepas*, Orbigny, 1841, vol. 5:437-438, vol. 9, Moll., pl. 61, figs. 5-7.*Concholepas concholepas*, Dall, 1909:168-169, 222, pl. 22, fig. 1; Carcelles and Williamson, 1951:291; Herm, 1969:136-137, pl. 18, figs. 4a, b; Beu, 1970:44, pl. 4, figs. 10-12; Dell, 1971:210-211.

Occurrence: On rocky substrate, often under low overhanging ledges, lower intertidal zone and subtidal. Iquique specimens: 158.

Distribution: Callao, Peru, south to the Straits of Magellan (Dall, 1909). Type locality: Peru (Bruguière, 1789).

Remarks: This species is commonly collected by commercial divers in 3-5 m depth near shore.

Family Columbelloidea

Aesopus Gould, 1860*Aesopus aliciae*, new species

Figures 74 and 85

Diagnosis: A small shell, characterized by its orange- to purple-brown color, fine spirally incised lines, and microscopic axial lineations.

Description of holotype: Shell of moderate size for genus, fusiform, orange- to purple-brown in color. Nuclear whorls one and one-half, rounded; postnuclear whorls three and one-half, broadly rounded, with greatest diameter of each whorl located slightly anteriorly; suture simple, slightly impressed. Spiral sculpture of weakly incised lines, closely set and separated by much wider interspaces; axial sculpture of microscopic, closely set incised lines separated by interspaces of similar width; axial lines more deeply impressed where they cross the incised spiral lines than where they cross spiral interspaces. Aperture simple; outer lip thickened, reflected posteriorly, posterior angle broad; columella smooth, callus thin and narrow. Dimensions (in mm): height 4.0, diameter 1.7.

Operculum: Chitinous, brown, with an anterior origin.

Radula (Fig. 85): The rachidian is flanked on each side by a single lateral tooth. Rachidian slightly arched anteriorly, laterally elongate, and pointed at its ends. Lateral teeth tricuspid; two of

the cusps are produced together anteriorly, and the third cusp is less sharply pointed and produced posteromedially.

Type locality: Iquique, Chile, 20° 13'S, 70° 10'W; lower intertidal zone, on sides and undersides of rocks on gravel and coarse sand substrate, August, 1964, 85 specimens.

Type material: Holotype, LACM 1593; 5 paratypes, LACM 1594; 5 paratypes, USNM; 5 paratypes, CAS; 5 paratypes, AMNH; 5 paratypes, SDNHM; 5 paratypes, ANSP.

Discussion: *Aesopus aliciae* is not similar to any species of *Aesopus* reported from the eastern Pacific. It is closest to *A. myrmecoon* (Dall, 1916), from California, but the latter species is more slender, white, and has axial sculpture of axially-elongate microscopic pits that do not continue as grooves across the interspaces of the spiral sculpture. *Aesopus aliciae* is named for Señora Alicia Moreno of Viña del Mar, Chile. She and her husband Oscar have made my visits to Chile more enjoyable with their kindness and hospitality.

Mitrella Risso, 1826*Mitrella unifasciata* (Sowerby, 1832)

Figure 75

Columbella unifasciata Sowerby, I, 1832, pt. 2:114;Reeve, 1859, vol. 11, *Columbella*, pl. 19, fig. 107; Tryon, 1883, vol. 5:116, pl. 47, figs. 40-44.*Columbella unizonalis* Gray, 1839:129.*Astyris unifasciata*, Dall, 1909:217.*Mitrella unifasciata*, Carcelles, 1950:60-61, pl. 2, fig. 36; Carcelles and Williamson, 1951:293.

Occurrence: Common on undersides of rocks in gravel, locally abundant. Iquique specimens: 1070.

Distribution: Pucusana, Peru (LACM), to Valparaíso, Chile (Dall, 1909). Type locality: Valparaíso, Chile (Sowerby, 1832).

Cilara Thiele, 1924*Cilara secalina* (Philippi, 1846)

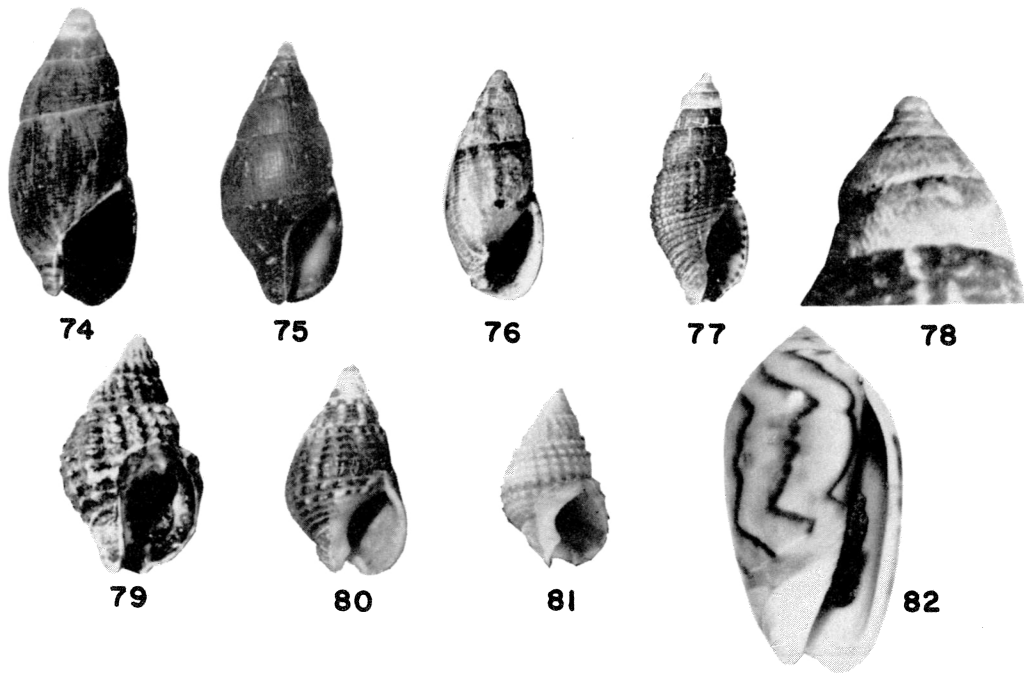
Figure 76

Buccinum secalinum Philippi, 1846:53.*Pyrene* (*Cilara*) *secalina*, Thiele, 1929:302, fig. 331.

Occurrence: Dead specimen in intertidal gravel. Iquique specimens: 1.

Distribution: Pisco, Peru (USNM 655655) and Iquique, Chile. Type locality: Chile (Philippi, 1846).

Remarks: The present specimen was identified by Dr. George E. Radwin, who also allowed me to examine a specimen of *C. secalina* on loan from the United States National Museum.



FIGURES 74-82. 74, *Aesopus aliciae* sp. nov., Holotype, height 4 mm; 75, *Mitrella unifasciata*, height 9 mm; 76, *Cilara secalina*, height 6.4 mm; 77, *Salitra radwini* sp. nov., Holotype, height 6 mm; 78, same specimen, enlargement of protoconch; 79, *Nassarius dentifer*, height 19.5 mm; 80, *N. gayi*, height 14 mm; 81, *N. gayi*, height 12 mm; 82, *Oliva (Oliva) peruviana*, height 37 mm.

Salitra, new genus

Diagnosis: Shell elongate, fusiform, with predominant sculpture of closely spaced spiral cords and more subdued axial ribs; characterized by diagonally cancellate sinusigerid protoconch, typically columbellid radula with tricuspid lateral tooth, and low columellar fold near anterior end of aperture.

Type species: *Salitra radwini*, new species.

Discussion: The diagonally cancellate sinusigerid protoconch of *Salitra* is reminiscent of the turrid subfamily Daphnellinae, and unlike that of any other eastern Pacific columbellid, although the radular morphology unmistakably places this new genus in the Columbellidae. The small columellar fold suggests an affinity with *Zafrona* Iredale, 1916. Superficially, *Salitra* is close to *Nassarina* Dall, 1889, but differs in having its spiral ribs equal to or wider than the interspaces, having less deeply impressed sutures, and possessing a sinusigerid protoconch. An Atlantic species, *Amphissa haliaeti* Jeffreys, 1867, has protoconch ornamentation similar to *Salitra radwini*, but different shell and radular morphology (G. E. Radwin, personal communication).

The generic name is derived from the Chilean word "salitre," which refers to the widespread

nitrate deposits in northern Chile that extend to the shore in places.

Salitra radwini, new species

Figures 77, 78 and 86

Diagnosis: This rather small shell is characterized by combination of its diagonally sinusigerid protoconch, fusiform shape, dominant axial sculpture of closely spaced ribs, and single low columellar fold.

Description of holotype: Shell small for family, nuclear whorls four and one-half, rounded, slightly inflated, of diagonally cancellate sinusigerid type; postnuclear whorls three, moderately rounded. Spiral sculpture of strong, closely spaced ribs; five ribs on earliest postnuclear whorl, increasing to seven ribs by bifurcation of posteriormost rib and gradual addition of another rib anteriorly; interspaces between ribs equal to or slightly less than width of rib; undulations on ribs produce rounded nodes aligned from whorl to whorl to form closely spaced axial ribs, these being very weak on earliest postnuclear whorl and on last quarter of body whorl. Suture simple, slightly undulating; shoulder slightly tabulate. Color of spiral ribs medium to dark maroon-brown; color of spiral interspaces same as ribs for most of their length, becoming

flesh colored as they approach outer lip, to form spiral banding at outer lip margin that is also visible on inside of aperture. Aperture simple; outer lip thin but body wall prominently thickened just behind it; inner lip with single low columellar fold about one-third of length of aperture from anterior shell extremity; inner lip with thin, narrow callus. Dimensions (in mm): height 6.0, diameter 2.5.

Radula (Fig. 86): The radula is typically columbellid, with each transverse row of teeth comprised of a single rachidian plate and one lateral tooth on each side. The rachidian is simple, subrhomboidal, slightly concave on its longest side, and lacking any cusps. The lateral teeth are roughly sickle-shaped, with three strong curved cusps, the most proximal of these being dorsoventrally flared and somewhat cuplike in appearance.

Type locality: Iquique, Chile, 20° 13'S, 70° 10'W; lower intertidal zone, beneath rocks on gravel substrate, August, 1964, 5 specimens.

Type material: Holotype, LACM 1595; 3 paratypes, LACM 1596; 1 paratype, USNM.

Discussion: Two of the paratypes show a somewhat irregular placement of the suture on the protoconch, so that the apex appears to tilt slightly to the left. Immature specimens lack the thickening of the shell wall behind the outer lip and the lip margin is slightly crenulated by the ends of the spiral cords. The columellar fold is indistinct on juvenile specimens.

This species is named for Dr. George E. Radwin, who has done extensive research on Columbellidae. The radular drawing of *S. radwini* was done by Anthony D'Attilio.

Family Nassariidae

Nassarius Dumèril, 1805

Nassarius dentifer (Powys, 1835)

Figure 79

Nassa dentifera Powys, in Sowerby and Powys, 1835:95; Reeve, 1853, vol. 8, *Nassa*, pl. 19, fig. 130; Tryon, 1882, vol. 4:46-47, pl. 14, figs. 243-245.

Buccinum dentiferum, Orbigny, 1841, vol. 5:432; vol. 9, pl. 61, figs. 22, 23.

Alectrion (Hima) dentiferus, Dall, 1909:214.

Nassarius dentifer, Keen, 1971:906.

Nassa tschudii Troschel, 1852:173, pl. 5, figs. 4a-c.

Occurrence: LACM specimens from Peru and Chile were found in depths from intertidal to 38 m, on sand, gravel, and shell debris. Iquique specimens: 2.

Distribution: LACM collections contain specimens from Pucusana, Peru (12°30'S), to Iquique, Chile. Dall (1909) reported this species ranging

from Panama (probably in error) south to Valparaíso, Chile. Type locality: Arica, Chile (Powys, 1835).

Remarks: The thin periostracum is medium to dark brown. Coarse spiral and axial sculpture forms spirally elongate nodes. The aperture is medium to chocolate brown in color and there are denticles within the outer lip. Heights of the two Iquique specimens are 19.5 and 22.4 mm.

Nassarius gayi (Kiener, 1835)

Figures 80 and 81

Buccinum gayi Kiener, 1835, *Buccinum*:71-72, pl. 21, fig. 79.

Nassa gayi, Orbigny, 1841, vol. 5:432; Reeve, 1855, vol. 8, *Nassa*, pl. 13, sp. 87; Tryon, 1882, vol. 4:56, pl. 17, figs. 324-325.

Alectrion gayii, Dall, 1909:215.

Alectryon gayi, Carcelles and Williamson, 1951:300.

Nassarius gayi, Herm, 1969:141, pl. 14, figs. 5-9.

Occurrence: On undersides of rocks in gravel, middle and lower intertidal zone. Iquique specimens: 129.

Distribution: Lobos de Afuera Islands, Peru (LACM collections), to the Straits of Magellan (Dall, 1909). Type locality: Chile (Kiener, 1835).

Remarks: Specimens collected at low tide (Fig. 80) have flattened spiral cords on the final whorl. Those from offshore on sandy bottoms tend to have more pustulose cording, according to material in the LACM collection from Peru and Chile. The specimen in Figure 81 was collected at Iquique by Brian Williams in 1966 and probably represents an offshore specimen.

Family Olividae

Oliva Bruguière, 1789

Subgenus *Oliva*, s.s.

Oliva (Oliva) peruviana Lamarck, 1811

Figure 82

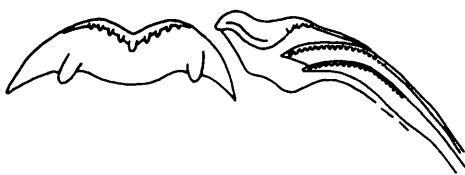
Oliva peruviana Lamarck, 1811, vol. 16:317-318; Orbigny, 1840, vol. 5:419-420; Reeve, 1850, vol. 6, *Oliva*, pl. 9, figs. 14a-e; Tryon, 1883, vol. 5:74, pl. 18, figs. 55-58; Dall, 1909:165, 210, pl. 23, fig. 4.

Agaronia peruviana, Carcelles and Williamson, 1951:300.

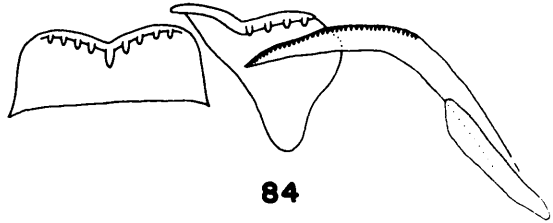
Oliva (Oliva) peruviana, Ziegler and Porreca, 1969:31, pl. 6, fig. 3.

Occurrence: Dead specimens on exposed sandy beach. Iquique specimens: 5.

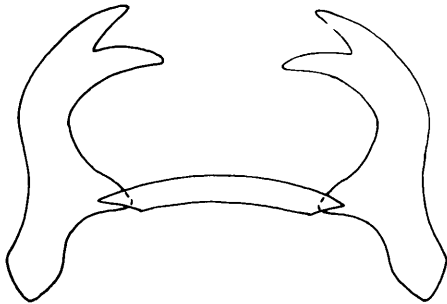
Distribution: LACM collections contain this species from localities ranging from Sechura Bay,



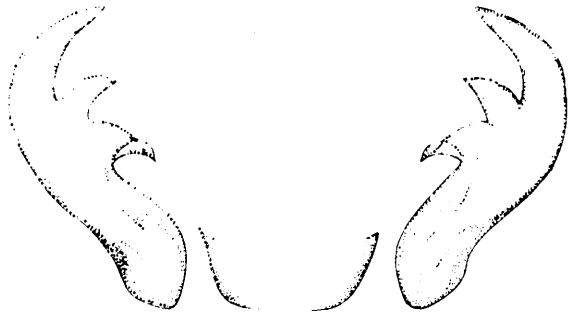
83



84



85



86

FIGURES 83-86. 83, *Rissoina (Rissoina) inca*, radular dentition; 84, *Cyclostremiscus (Cyclostremiscus) trigonatus*, radular dentition; 85, *Aesopus aliciae* sp. nov., radular dentition; 86, *Salitra radwini* sp. nov., radular dentition.

Peru, to Valparaíso, Chile. Dall (1909) includes the Galápagos Islands and Lota (near Concepción), Chile, in the range limits. Type locality: Peru (Lamarck, 1811).

Family Mitridae

Mitra Röding, 1798

Subgenus *Atrimitra* Swainson, 1840

Mitra (Atrimitra) orientalis

Griffith and Pidgeon, 1834

Figure 87

Mitra orientalis Griffith and Pidgeon, in Griffith, 1834, vol. 12, pl. 40, fig. 5; Reeve, 1844, *Mitra*, vol. 2, pl. 5, fig. 34; Tryon, 1882, vol. 4:121, pl. 36, fig. 67; Dall, 1909:212; Keen, 1971:907.

Mitra maura Swainson, 1836:193; Orbigny, 1841, vol. 5:427.

"*Mitra mauva* Sowerby," Orbigny, 1841, vol. 9, Moll, pl. 60, figs. 9, 10.

Occurrence: Dead specimens from intertidal gravel. Iquique specimens: 3.

Distribution: Lobos Islands, Peru (LACM), to Iquique, Chile (Dall, 1909). Type locality: unknown.

Family Turridae

Agathotoma Cossmann, 1899

Agathotoma ordinaria (E. A. Smith, 1882)

Figures 88 and 93

Pleurotoma (Mangilia) ordinaria E. A. Smith, 1882:216.

Mangilia ordinaria, Tryon, 1884, vol. 6:250, pl. 34, fig. 97; Dall, 1909:209.

Occurrence: Beneath rocks on gravel substrate, lower intertidal zone. Iquique specimens: 6.

Distribution: Pucusana, Peru (12°30'S) to Iquique (LACM). Type locality: Peru and Chile (Smith, 1882).

Discussion: This is the first report of this species since the original description. The shell is of average size for the genus, color orange-brown to buff. Nuclear whorls two and one-half, the first one smooth and the following one and one-half whorls with reticulate sculpture made up of two raised spiral threads, one at the shoulder and the other one below, and numerous axial riblets.; postnuclear whorls four and one-half. Axial sculpture of 12 slightly sinuous, evenly rounded ribs, somewhat continuous from whorl to whorl; spiral sculpture of numerous very fine, raised threads, becoming indistinct where they crest the axial ribs. Suture undulating; axial ribs becoming weaker as they approach the suture. Aperture with prominent posterior sulcus; anterior canal broad; callus narrow, only slightly thickened; outer lip smooth within, nearly parallel to the columella, somewhat thickened anteriorly by the final axial rib. Dimensions of figured specimen (in mm): height 8.3, diameter 2.8.

The radula (Fig. 93) was dissected from one specimen. The radular bundle contains 14 teeth, although additional teeth may have been lost during dissection. Each tooth is dagger-shaped and has a projecting hook at one-third of the length from the base to the tip. The tip is sharply pointed and is slightly expanded just behind its termination in

some views. There is a row of 8-10 of what appear to be shallow pits along opposite sides of each tooth. Some of the pits may have raised rims around them, because they commonly produce a perceptible bump on the tooth surface. It is possible that these pits are actually cavities completely enclosed within the tooth.

This species is placed in *Agathotoma* on the basis of shell form, close but not exact alignment of the axial ribs from whorl to whorl, and the fine spiral sculpture without a prominent keel at the shoulder.

Subclass Opisthobranchia
Order Entomotaeniata
Family Pyramidellidae
Iselica Dall, 1918

Iselica chilensis, new species
Figure 89

Diagnosis: A small shell, nearly devoid of sculpture except for single low spiral cord below suture, and with somewhat inflated aperture.

Description of holotype: Shell small for genus, turbanate, with thin yellowish brown periostracum; nuclear whorls one, eroded. Postnuclear whorls one and one-half, broadly rounded, separated by impressed suture. Spiral sculpture of one weakly incised line immediately below suture, producing low spiral cord between incised line and suture; second incised line present below first one; remainder of shell with very low, broad, obsolete spiral

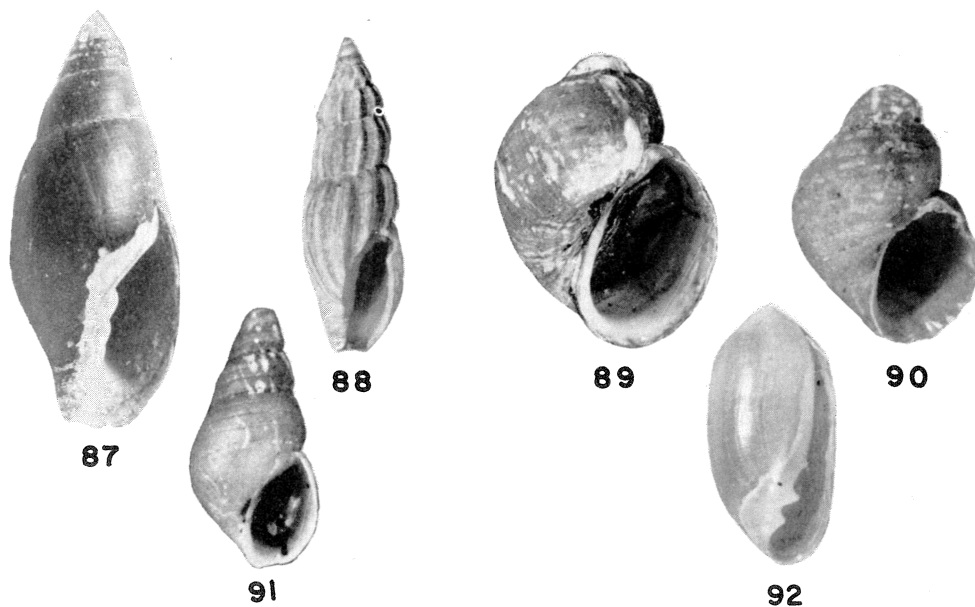
undulations, except for three indistinct incised spiral lines extending from umbilical area to anterior outer lip. Axial sculpture consists only of incremental growth lines. Aperture large for genus, somewhat inflated, and about two-thirds height of shell; outer lip indented by strongest spiral cord near posterior angle; columella with very broad swelling at its midpoint; callus thin; umbilicus open, small. Dimensions (in mm): height 4.8, diameter 3.7.

Operculum: Chitinous, brown, with an anterior origin.

Type locality: Punta Morro, Iquique, Chile, 20° 13'S, 70° 10'25"W; lower intertidal zone, on undersides of cobbles and boulders in black sandy silt of a protected beach, July, 1964, 22 specimens.

Type material: Holotype, LACM 1597; 17 paratypes, LACM 1598; 2 paratypes, USNM; 1 paratype, ANSP.

Discussion: *Iselica chilensis* differs from other *Iselica* species by being nearly devoid of sculpture, except for a single incised spiral line near the suture, and in having a somewhat inflated aperture. The nucleus is partially heterostrophic, smooth. The second spiral line on the shoulder is often absent, while the one nearest the suture is always present, although indistinct in some paratypes. Irregularly and widely spaced, shallow incised lines may occur over the body whorl. Spiral lines in the umbilical area are indistinct to absent in most specimens, especially the juveniles.



FIGURES 87-92. 87, *Mitra (Atrimitra) orientalis*, height 30 mm; 88, *Agathotoma ordinaria*, height 8.3 mm; 89, *Iselica chilensis* sp. nov., Holotype, height 4.8 mm; 90, *I. carotica* sp. nov., Holotype, height 3.3 mm; 91, *Odostomia (Menestho) chilensis*, height 3.4 mm; 92, *Sarnia frumentum*, height 3.3 mm.

Iselica carotica, new species

Figure 90

Diagnosis: A small shell, characterized by prominent spiral cords and weak, protractive axial riblets.

Description of holotype: Shell small for genus, turbinate, light yellowish white, of one nuclear and two postnuclear whorls; nucleus partially heterostrophic, eroded. Postnuclear whorls well rounded and separated by impressed suture; spire moderately elevated; spiral sculpture of seven to nine strong, equal cords, narrower interspaces contain fine, irregularly spaced, protractive axial riblets varying from distinct to obsolete. Aperture oval, about one-half height of shell; outer lip scalloped by ends of spiral cords; inner lip with single low fold in middle of columella, not visible in ventral view of shell; callus thin; umbilicus small, open and bounded on one side by lowermost spiral cord. Dimensions (in mm): height 3.3, diameter 2.4.

Operculum: Chitinous, brown, with an anterior origin.

Type locality: Punta Morro, Iquique, Chile, 20° 13'S, 70° 10'25"W; lower intertidal zone, on undersides of cobbles and boulders in black sandy silt of a protected beach, July, 1964, 9 specimens.

Type material: Holotype, LACM 1599; 5 paratypes, LACM 1600; 2 paratypes, USNM; 1 paratype, CAS.

Discussion: The common western North American species *I. fenestrata* (Carpenter, 1864) is larger and has axial riblets that are retractive and more distinct and widely spaced than *I. carotica*. *Iselica obtusa* (Carpenter, 1864), an intertidal and shallow-water species of western North America, is larger than *I. carotica*, with a proportionately higher shell and less distinct and even spiral cords; the type of *I. obtusa* has a height of 5.5 mm and diameter of 4.0 mm. *Iselica kochi* Strong and Hertlein, 1939, dredged from 3-9 fms in Panama, is smaller than *I. carotica* (height 1.5 mm, diameter 1.2 mm), has retractive axial riblets, and stronger spiral cords. *Iselica ovoidea* (Gould, 1853), from Mazatlán, Mexico, has a shell proportionately higher and much larger (height 8 mm, diameter 5 mm) than *I. carotica*. The specific name is a Latin adjective meaning soporific.

Odostomia Fleming, 1813
Subgenus *Menestho* Möller, 1842
Odostomia (Menestho) chilensis
Dall and Bartsch, 1909

Figure 91

Odostomia chilensis Dall and Bartsch, 1909:189, pl. 21, fig. 6; Dall, 1909:224.

Occurrence: On undersides of rocks in black sandy silt of a protected beach, lower intertidal zone. Iquique specimens: 55.

Distribution: Tomé and Iquique, Chile. Type locality: Tomé, Chile (Dall and Bartsch, 1909).

Remarks: This species was described from a single broken specimen of three whorls taken from the anchor of the American oceanographic vessel *Albatross*. Several of the Iquique specimens have their nuclear whorls intact, and the largest specimen, of four and one-half postnuclear whorls and a heterostrophic nucleus, is 3.4 mm in height and 1.6 mm in diameter, with several other individuals nearly as large. Some of the present shells are relatively more slender than the figure given by Dall and Bartsch. The nuclear whorls are smooth, with an evenly frosted appearance.

Subclass Pulmonata

Order Gymnophila

Family Onchidiidae

Onchidella Gray, 1850*Onchidella marginata* (Gould, 1852)

Peronia marginata Gould, 1852:292-293, Atlas (1856), pl. 22, figs. 386, 386a-e.

Onchidella marginata, Marcus, 1959:16-20, figs. 17-20.

Occurrence: On rock walls bordering tide pools, middle and lower intertidal zone. Iquique specimens: 90.

Distribution: Iquique (present specimens) and Coquimbo to Hoste Island, Orange Harbor, Tierra del Fuego, Chile (Marcus, 1959). Type locality: Orange Harbor, Tierra del Fuego (Gould, 1852).

Remarks: This species was identified by Mrs. Eveline Marcus from a dissection of one of the specimens.

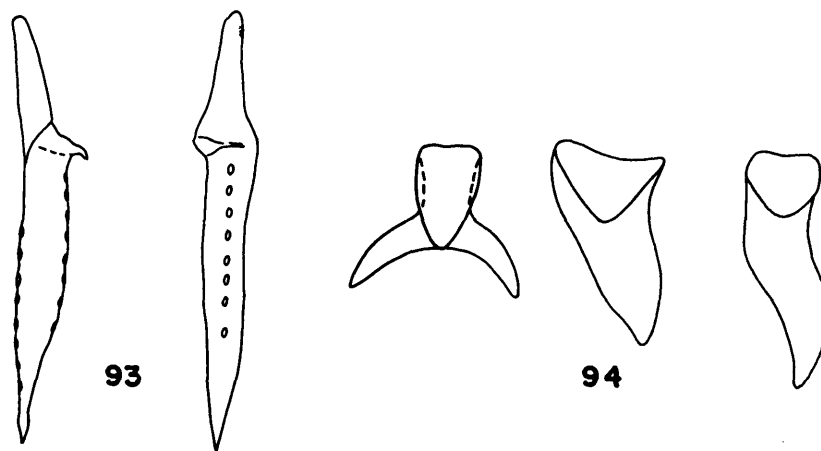
Order Basommatophora

Family Melampidae

Subfamily Pedipedinae

Marinula King, 1831*Marinula* sp. A

This and the following species of *Marinula* seem to be undescribed and will be discussed at a later date by Dr. Joseph P. E. Morrison of the U.S. National Museum. Both species were found in crevices of rock surfaces and on undersides of rocks intertidally. Species A is about 3 mm in height and represented by 409 specimens from Patillos and Iquique.



FIGURES 93-94. *Agathotoma ordinaria*, radular dentition, two views of one tooth; 94, *Sarnia frumentum*, radular dentition, showing representative lateral and marginal teeth.

Marinula sp. B

This species measures less than 2 mm in height and is represented by 216 specimens from Punta Gruessa and Iquique.

Subfamily Ellobiinae

Sarnia H. and A. Adams, 1855

Sarnia frumentum (Petit, 1842)

Figures 92 and 94

Auricula frumentum Petit, 1842:105-106; Reeve, 1878, vol. 20, *Auricula*, pl. 4, fig. 23.

Melampus frumentum, Dall, 1909:204.

Auricula avena Petit, 1842:106; Reeve, 1878, vol. 20, *Auricula*, pl. 4, fig. 24.

Melampus avena, Dall, 1909:204.

Sarnia frumentum, Keen, 1971:850, fig. 2418.

Occurrence: On cobbles and boulders in black sandy silt of a protected beach, lower intertidal zone. Iquique specimens: 10.

Distribution: Callao, Peru, to Chañaral, Chile (J. P. E. Morrison, written communication). Type locality: Callao, Peru (Petit, 1842).

Remarks: The figured specimen of *Sarnia frumentum* is 3.3 mm in height and 1.6 mm in diameter. The shell is pale orange-brown in color and ornamented with minute, slightly wavy, closely spaced incised lines. The nuclear whorls are heterostrophic and slightly elevated. The Iquique specimens are the dwarfed form of *S. frumentum* that was described by Petit, 1842, as *Auricula avena*. Normal specimens are about 8 mm in height and 4 mm in diameter. The dwarfed form is known from Iquique (20° 13'S) to just south of Chañaral, Chile (26° 20'S).

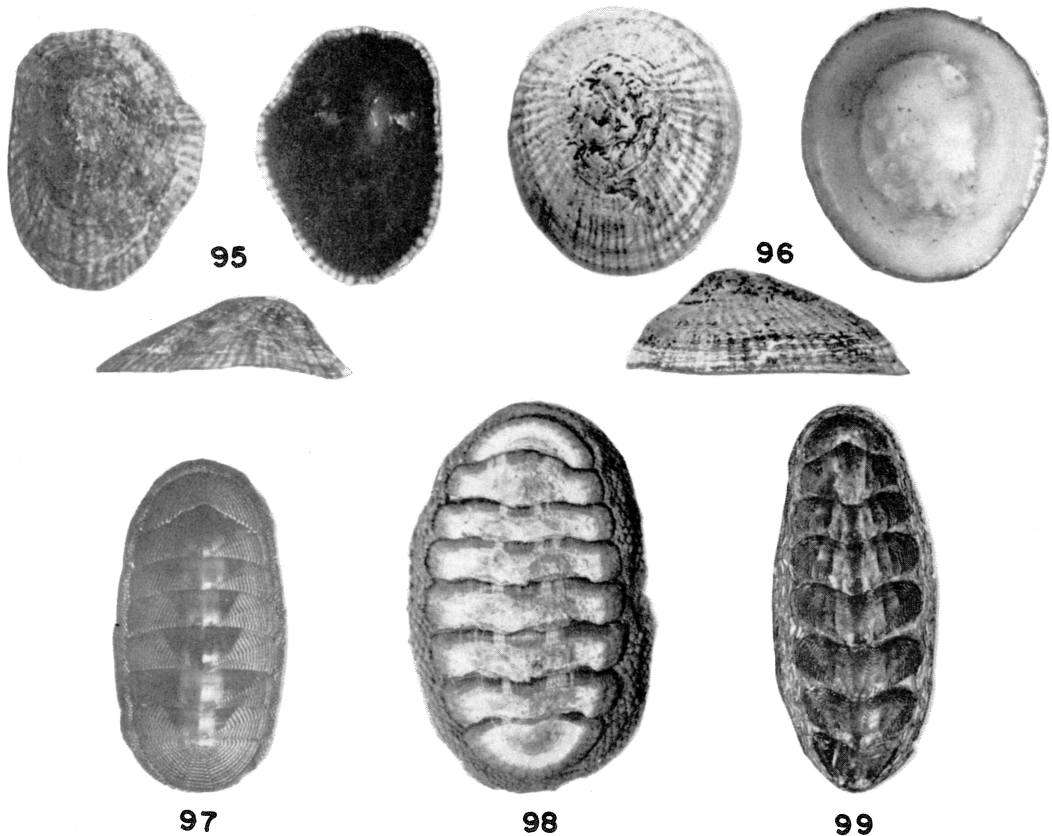
One row of teeth in the radula of *S. frumentum* (Fig. 94) is made up of the rachidian flanked on

each side by 23 similar, but not identical, lateral and marginal teeth. The rachidian is trihedral, with two elongate, curved and sharply pointed basal projections, and a broader and strongly arched anterior process. The lateral and marginal teeth are not differentiated and are all unicuspid.

The radular dentition of *S. frumentum* is distinctly different from that of species in the subfamilies Melampinae and Pedipedinae. The Melampinae radulae figured by Marcus and Marcus, (1965a:34-35, pl. 3, fig. 9, 46, pl. 6, fig. 25), have bicuspid rachidians with strong anterior processes and differentiated lateral and marginal teeth. The marginals are strongly denticulate, with one large basal cusp and several smaller ones. In addition, the anterior processes of the rachidian and lateral teeth are more ornate than those of *S. frumentum*.

Radulae of Pedipedinae species illustrated by Odhner (1925, pl. 2, figs. 11-15) do not show whether the rachidians have bicuspid bases, although presumably they do not. All of the lateral teeth shown have sharply tricuspid anterior processes, plus marginal teeth bearing numerous cusps. The lateral and marginal teeth are well differentiated.

The radula of *S. frumentum* is more similar to those of the *Ellobium* species shown by Marcus and Marcus, (1965b:433, pl. 2, fig. 8), and Odhner, (1925, pl. 2, figs. 26-28), than to the radulae of the species mentioned above. The various *Ellobium* species have rachidians with bicuspid bases and simple anterior processes. The laterals grade almost imperceptibly into the marginals, unlike the Melampinae and Pedipedinae noted above. In addition, the lateral and marginal teeth of the *Ellobium* species have relatively simple basal cusps without elaborate dentition. Radular morphology of *Sarnia*



FIGURES 95-99. 95, *Siphonaria (Talisiphon) lessoni*, length 17 mm; 96, *Trimusculus peruvianus*, length 13.6 mm; 97, *Chiton cumingsii*, length 44 mm; 98, *Chiton granosus*, length 50 mm; 99, *Enoplochiton niger*, length 72 mm.

frumentum thus indicates placement of *Sarnia* in the subfamily Ellobiinae.

Information on the size and distribution of *S. frumentum* and its dwarfed form, and suggestions for the discussion of comparative radular morphology were provided by Dr. Joseph P. E. Morrison.

Family Siphonariidae

Siphonaria Sowerby, 1824

Subgenus *Talisiphon* Iredale, 1940

Siphonaria (Talisiphon) lessoni Blainville, 1824

Figure 95

Siphonaria lessoni Blainville, 1827, vol. 49:269, Atlas, Pls., vol. 8, pl. 61, figs. 2, 2a.; Potiez and Michaud, 1838, vol. 1:55, Atlas, pl. 10, figs. 15-17; Orbigny, 1841, vol. 5:469, vol. 9, Moll., pl. 56, figs. 12-14; Dall, 1909:164, 205; Carcelles, 1950:72, pl. 3, fig. 60.

Siphonaria (Talisiphon) lessoni, Morrison, 1964:7.

Siphonaria (Pachysiphonaria) lessoni, Hubendick, 1946:21-22, pl. 1, figs. 1-3; Dell, 1971:214-215.

Occurrence: On rock outcrops and along tide pool walls throughout intertidal zone, abundant. Iquique specimens: 581.

Distribution: Paita, Peru, south to Orange Harbor, Tierra del Fuego, Chile, the Falkland Islands, and north on the Atlantic coast to Punta del Este, Uruguay (Morrison, 1964). Type locality: Falkland Islands (Blainville, 1827).

Family Trimusculidae

Trimusculus Schmidt, 1818

Trimusculus peruvianus (Sowerby, 1835)

Figure 96

Mouretia peruviana Sowerby, I, 1835b:6.

Gadinia peruviana, Dall, 1909:206; Carcelles and Williamson, 1951:319; Dell, 1971:214.

Trimusculus peruvianus, Keen, 1958:510, fig. 1034; 1971:853, fig. 2426.

Occurrence: In deep rock crevices, middle intertidal zone. Iquique specimens: 110.

Distribution: Central America (Keen, 1971) to

42°S in southern Chile (Dell, 1971). Records from north of Iquique need confirmation. Type locality: Cobija, Chile (Sowerby, 1835).

Remarks: As noted by Keen (1971), the sculpture of *T. peruvianus* is fainter than that of either *T. reticulatus* (Sowerby, 1835) or *T. stellatus* (Sowerby, 1835).

Class Polyplacophora
Order Chitonida
Family Chitonidae
Chiton Linnaeus, 1758
Chiton cumingsii Frembly, 1827
Figure 97

Chiton cumingsii Frembly, 1827:198-199, suppl. pl. 16, fig. 3; Dall, 1909:247.

Chiton cumingii, Sowerby, I, 1833, "Chitones":3, fig. 40; Reeve, 1847, vol. 4, pl. 1, figs. 2a, b.

Chiton cumingi, Pilsbry, 1892, vol. 14:164-165, pl. 30, figs. 29-31.

Chiton cumingsi, Plate, 1902:46-55, pl. 3, figs. 179-184, pl. 4, figs. 185-189; Leloup, 1956:47-48; Dell, 1971:220.

Occurrence: On undersides of rocks, lower intertidal zone. Iquique specimens: 54.

Distribution: Paita, Peru (LACM), to Puerto Montt, Chile (LeLoup, 1956). Type locality: Valparaíso, Chile (Frembly, 1827).

Chiton granosus Frembly, 1827
Figure 98

Chiton granosus Frembly, 1827:200, suppl. pl. 17, fig. 1 [plate not seen]; Reeve, 1847, vol. 4, pl. 5, fig. 27; Plate, 1902:56-59, pl. 4, fig. 190; Dall, 1909:247; Carcelles and Williamson, 1951:248; Leloup, 1956:48-49, figs. 24, 25; Dell, 1971:220.

Occurrence: On undersides of rocks, lower intertidal zone. Iquique specimens: 61.

Distribution: Paita, Peru (LACM), to 42°S in southern Chile (Dell, 1971). Type locality: Valparaíso, Chile (Frembly, 1827).

Enoplochiton Gray, 1847
Enoplochiton niger (Barnes, 1823)
Figure 99

Chiton niger Barnes, 1823:71, pl. 3, fig. 3.

Chiton coquimbensis Frembly, 1827:197-198, suppl. pl. 16, fig. 2.

Enoplochiton niger, Dall, 1909:181, 248, pl. 23, fig. 8; Leloup, 1956:54-55.

Occurrence: On rock outcrops exposed to heavy

surf, especially around the bases of holdfasts of *Lessonia nigrescens* Bory. Iquique specimens: 39.

Distribution: Peru (northern limit unknown) to Valparaíso, Chile (Leloup, 1956). Type locality: Peru (Barnes, 1823).

Remarks: Individuals of *E. niger* usually have one or two specimens of the *coffea* form of *Scurria parasitica* (Reeve) living in shallow excavations on their massive valves. *Enoplochiton niger* and *Acanthopleura echinata* (Barnes) are commonly found together and are especially abundant at Punta Gruessa, 17 kms south of Iquique.

Acanthopleura Guilding, 1829
Acanthopleura echinata (Barnes, 1823)
Figure 100

Chiton echinatus Barnes, 1823:71, pl. 3, figs. 4a, b.

Chiton spiniferus Frembly, 1827:196-197, suppl. pl. 16, fig. 6; Sowerby, I, 1833, "Chitones," pl. 1, fig. 47.

Acanthopleura echinata, Dall, 1909:180, 248, pl. 23, fig. 6; Leloup, 1956:55-57, figs. 28, 29.

Occurrence: On rock outcrops exposed to heavy surf, especially around the bases of holdfasts of *Lessonia nigrescens* Bory. Iquique specimens: 32.

Distribution: Paita, Peru (LACM), to San Vicente, Chile (Leloup, 1956). This species is also recorded from the Galápagos Islands by Leloup (1956), but not by Keen (1971). Type locality: Peru (Barnes, 1823).

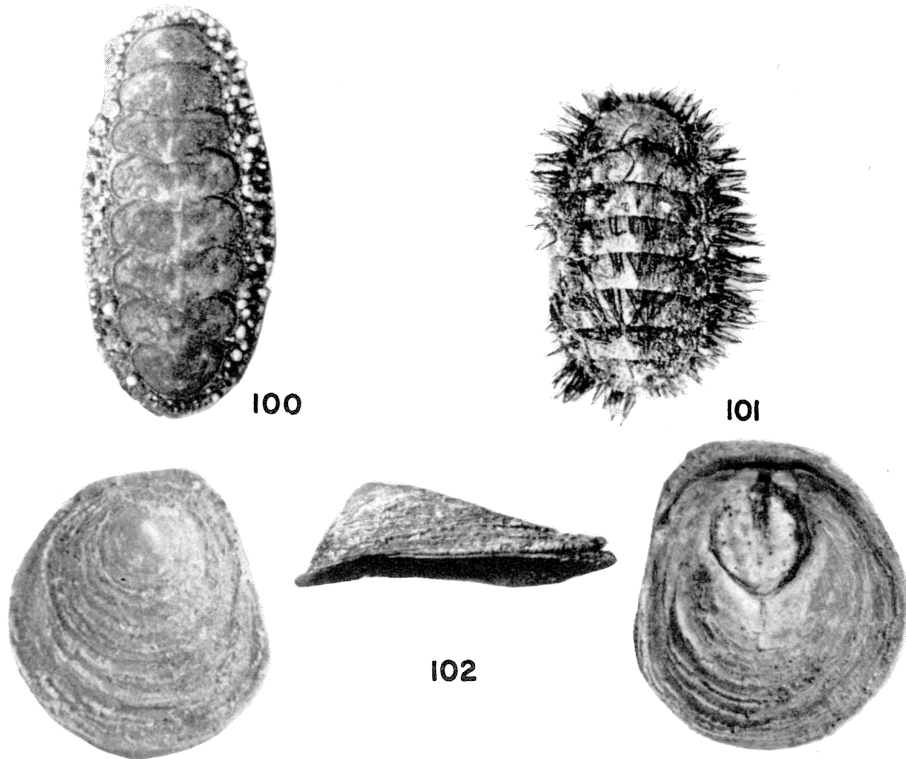
Remarks: As with *Enoplochiton niger* (Barnes), individuals of *A. echinata* often bear one or more specimens of the *coffea* form of *Scurria parasitica* (Reeve) on their valves. *A. echinata* is also common at Punta Gruessa, south of Iquique.

Family Ischnochitonidae
Chaetopleura Shuttleworth, 1853
Chaetopleura peruviana (Lamarck, 1819)
Figure 101

Chiton peruvianus Lamarck, 1819, vol. 6, pt. 1:321; Barnes, 1823:70-71, pl. 3, fig. 2; Sowerby, I, 1833, "Chitones":7, fig. 44.

Chaetopleura peruviana, Plate, 1902:182-194, pl. 2, figs. 141-142, pl. 10, figs. 294-301, pl. 11, figs. 302-303; Dall, 1909:244; Carcelles and Williamson, 1951:246; Leloup, 1956:37-40, figs. 18-20; Dell, 1971:218.

Occurrence: On undersides of rocks, lower intertidal zone. Iquique specimens: 2.



FIGURES 100-102. 100, *Acanthopleura echinata*, length 95 mm; 101, *Chaetopleura peruviana*, length 19 mm; 102, *Discinisca lamellosa*, length 25 mm.

Distribution: Iquique to the Straits of Magellan (Leloup, 1956). Type locality: Peru (Lamarck, 1819).

Phylum Brachiopoda
Class Inarticulata
Order Acrotretida
Family Discinidae

Discinisca Dall, 1871

Discinisca lamellosa (Broderip, 1833)

Figure 102

Orbicula lamellosa Broderip, 1833b:124; 1834: 142, pl. 23, figs. 2-13.

Discinisca lamellosa, Dall, 1909:182, 278; 1920: 275-276.

Occurrence: Attached to undersides of boulders, and in crevices, especially along seaward edges of rocky reefs, common. Iquique specimens: 46.

Distribution: Guayaquil, Ecuador (Dall, 1909), to Valparaíso, Chile (Dall, 1920). Type locality: Iquique, Chile (Broderip, 1833).

RESUMEN

Colecciones de moluscos litorales realizadas en las cercanías de Iquique, norte de Chile, en 1964 y 1970, revelaron la existencia de numerosos moluscos poco conocidos además de algunas especies nuevas. En vista de la escasez de trabajos sobre moluscos chilenos, el presente estudio incluye para cada especie sinonimias, datos de distribución y habitat, e ilustraciones originales, junto a observaciones adicionales en ciertos casos.

Se describe un nuevo género, *Salitra*, y las siguientes 10 nuevas especies: *Nucula interflucta*, *Lyonsia delicata*, *Tricolia macleani*, *Eatoniella* (*Eatoniella*) *latina*, *Eatonina* (*Saginofusca*) *atacamae*, *Fartulum moorei*, *Aesopus aliciae*, *Salitra radwini*, *Iselica chilensis*, y *Iselica carotica*. Otras especies de los géneros *Bittium*, *Triphora* y *Cerithiopsis*, que también parecen ser nuevas, se observaron, pero debido a la falta de buenos especímenes, sólo se describieron brevemente. Dos especies nuevas de *Marinula* serán discutidas por otro investigador.

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