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24.

ASTEROIDEA

WITH A SURVEY OF THE ASTEROIDEA OF THE CHILEAN SHELF

BY

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CON RESUMEN EN ESPAÑOL

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Introduction

The Asteroidea is one of the best known groups within the marine fauna of Chile. This, of course, is due to the fact that sea stars are easily collected, since they are fairly large and practically immobile animals, and are also easily preserved, dried specimens usually being sufficient for systematic purposes. The collection of littoral sea stars made by the Swedish Chile Expedition, under the leadership of Professor, Dr. H. BRATTSTRÖM and Dr. E. DAHL, therefore could not be expected to include much material new to science. It comprised also only one species, *Allostichaster capensis*, not previously known from the mainland coast of Chile, though known from the Juan Fernandez Islands. Otherwise, however, the collection included representatives of almost all valid littoral species known from the Island of Chiloé and northwards, and it has thus contributed much to elucidating the state of the Chilean asteroid fauna.

In addition to the account of the sea stars – 20 species in all – collected by the Swedish Chile Expedition, the present paper also reports upon a small collection made at La Serena by Dr. E. M. POULSEN in 1952 and further gives a survey of the whole fauna of sea stars known from the Chilean shelf, i. e., at depths down to 200 m.

The previous references to Chilean sea stars are fairly scattered in the literature. The first reliable record was given in 1825 by SAY who stated that Chile was the home of LAMARCK's *Asterias helianthus* (*Heliaster h.*). MEYEN in 1834 described two new species from Valparaíso, *Asterias gelatinosus* (*Meyenaster g.*) and *Asterias aurentiaca* (*Stichaster striatus* MÜLLER & TROSCHEL), and records of Chilean sea stars were, in the following years, given by GRAY, 1840, MÜLLER & TROSCHEL, 1842 and 1843, GAY, 1854, PHILIPPI, 1857 and 1858, LÜTKEN, 1857 and 1859, and since then become fairly common in the literature on echinoderms.

The hitherto most comprehensive papers on the Asteroidea of Chile were published by LEIPOLDT in 1895 (the Asteroidea of the Vettor-Pisani Expedition) and by MEISSNER in 1896 (the Chilean Asteroidea collected by PLATE).

A list, as complete as possible, of the literature on the Chilean sea stars is given at the end of this paper.

Zoogeographical survey

The asteroid fauna of the Chilean shelf comprises 33–35 species, according to our present knowledge. Further, there are 3–4 species at present to be regarded as endemic to the Islands of Juan Fernandez. From a zoogeographical point of view these

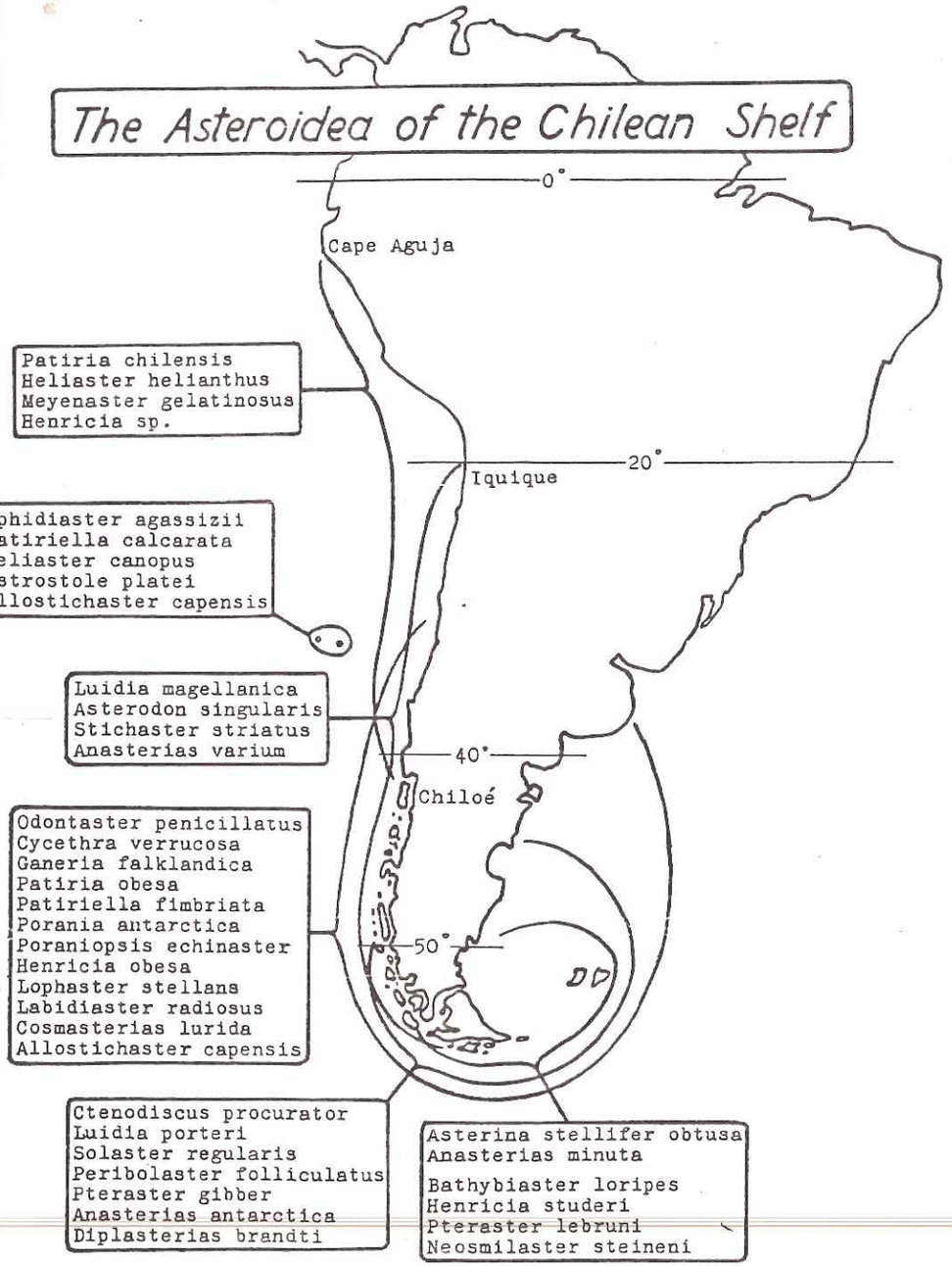

Fig. 1. Chart showing the distribution of the Chilean sea stars.

species can be grouped in three divisions: The warm temperate species, the cold temperate species, and a group of species of a transitional character.

The most marked change in the Chilean littoral fauna of sea stars takes place in the region between Coquimbo, about 30° S, and Puerto Montt at the northern end of the Island of Chiloé, about 42° S. Here is the boundary between the warm temperate fauna element of northern Chile and the cold temperate element of the southern regions. From northern Chile a total of 8 species are known, all of which occur in the littoral zone, and 3–4 of which are exclusively warm temperate. From southern Chile about 29 species are known, but besides the species of the transitional element also occurring north of Chiloé only about 14 of the others live in the littoral zone whereas the remaining ones are known only from sublittoral depths. The littoral forms all occur in the vicinity of Chiloé except 2–3 which have their northernmost limit in a more southerly latitude, in the vicinity of the Island of Wellington or of the Magellan Strait.

The exclusively warm temperate element has its northernmost limit of distribution at Cape Aguja (Peru) about 6° S, and its southernmost limit north of Chiloé, about 42° S. The element comprises:

Patiria chilensis (Lütken), 1–5 m, Cape Aguja to Valparaíso.
Heliaster helianthus (Lamarck), 0–5 m, Cape Aguja to Valparaíso.
Meyenaster gelatinosus (Meyen), 0–5 m, Iquique to Chiloé.

The element may further include a species of *Henricia,* since a specimen of this genus was recorded from Iquique by Meissner in 1896 as *Cribrella hyadesi,* but perhaps does not belong to the Magellanic species described under this name by Sladen in 1889 (= *Henricia obesa* Sladen).

In connection with the warm temperate fauna of sea stars of the mainland coast of Chile the littoral species known from the Juan Fernandez Islands, off Chile at about 33° S, should also be mentioned, viz.,

Ophidiaster agassizii E. Perrier, 35–75 m.
Patiriella calcarata (E. Perrier), 0–20 m.
Heliaster canopus E. Perrier, 0–5 m.
Astrostole platei (Meissner), 1–35 m.
Allostichaster capensis (E. Perrier), 1–100 m.

The last mentioned of these, *Allostichaster capensis,* occurs also off the mainland coast of Chile and in South Africa, whereas the others are not known from any other places hitherto.

The transitional element of sea stars, occurring both north and south of the zoogeographical boundary north of Chiloé, is distributed mainly between Iquique, 20° S, and Tierra del Fuego, 54° S. It comprises:

Stichaster striatus (Müller & Troschel), 1–80 m, Callao (Peru) to Magellan Strait.
Luidia magellanica Leipoldt, 1–10 m, Iquique to Magellan Strait.

Asterodon singularis (MÜLLER & TROSCHEL), 1–80 m, Iquique to Magellan Strait.
Anasterias varium (PHILIPPI), 0–40 m, Iquique to Cape Horn.

To this transitional element may further belong *Henricia obesa* if the specimen rom Iquique, mentioned above, really is of that species. The distribution of the lement in that case extends also somewhat northwards on the Argentinean side of outh America.

From southern Chile are known, besides the 4 species already mentioned above, number of other species, the cold temperate element, which in a zoogeographical espect can be arranged in a few subdivisions.

One group comprises 12 species which all occur at the northern end of Chiloé and ome of which (marked with an asterisk) are known from as far north as Valparaíso, bout 33° S, and La Serena, near Coquimbo, about 30° S. All these species are also distributed round Cape Horn northwards off the Argentinean coast to south of Río de La Plata, and on the Falkland Plateau. In general they have a bathymetrical distribution from littoral depths to the deeper part of the shelf. They are:

°*Odontaster penicillatus* (PHILIPPI), 8–350 m.
°*Cycethra verrucosa* (PHILIPPI), 0–270 m.
Ganeria falklandica GRAY, 7–137 m.
Patiria obesa (H. L. CLARK), 1–8 m.
Patiriella fimbriata (E. PERRIER), 1–300 m.
°*Porania antarctica* SMITH, 20–300 m.
°*Poraniopsis echinaster* E. PERRIER, 30–430 m.
Henricia obesa (SLADEN), 0–400 m.
°*Lophaster stellans* SLADEN, 25–400 m.
Labidiaster radiosus LÜTKEN, 5–200 m.
°*Cosmasterias lurida* (PHILIPPI), 0–650 m.
Allostichaster capensis (E. PERRIER), 1–100 m.

Five of these species are distributed also outside the South American region: There is a single record of *Lophaster stellans* from south of the Antarctic Convergence. *Cycethra verrucosa* has an antarctic circumpolar distribution. *Porania antarctica* occurs round the subantarctic islands of the Indian Ocean (perhaps in a different race) and has further an antarctic circumpolar subspecies. *Poraniopsis echinaster* and *Allostichaster capensis* occur in South Africa.

Henricia obesa has been recorded once from northernmost Chile, as already mentioned, but in view of its distribution elsewhere it is probable that the northern locality recorded refers to another species of *Henricia*.

Of the other cold temperate species some have their northernmost occurrence in the vicinity of the Island of Wellington, about 48°–52° S, and only two of these may be found in the littoral zone. The species are:

Ctenodiscus procurator SLADEN, 50–460 m.
Luidia porteri A. H. CLARK, 110 m.

Solaster regularis SLADEN, 65–330 m.
Peribolaster folliculatus SLADEN, 85–130 m.
Pteraster gibber SLADEN, 27–500 m.
Anasterias antarctica (LÜTKEN), 1–185 m.
Diplasterias brandti (BELL), 0–320 m.

One of these species, *Luidia porteri*, is known only from the type-locality off Chile whereas all the others are known also from the Magellan–Cape Horn region and, with the exception of *Ctenodiscus procurator*, also from the Falkland Plateau. On the Argentinean coast they do not generally reach farther north than to the Gulf of St. George. Only *Diplasterias brandti* is recorded from as far north as Bahía Blanca, and this species is the only one in the group recorded from south of the Antarctic Convergence. Only one of the species is hitherto known with certainty from outside the South American Quadrant, viz., *Peribolaster folliculatus*, which is recorded from Marion Island south of Africa.

A single species is in Chile known only from the Magellan Strait, viz.,

Asterina stellifer obtusa LEIPOLDT 1895, 50–70 m.

The occurrence of a form of *Asterina stellifer* in the Magellan Strait is remarkable. The species has otherwise a wide distribution in the littoral regions, 0–18 m, of the Southern Atlantic, on the American side from the West Indies to off La Plata, and on the African side from the Canary Islands to the Bay of Lüderitz.

A single, somewhat doubtful species is recorded from the Magellan Strait and the Cape Horn region, and also from the Falkland Plateau, viz.,

Anasterias minuta (E. PERRIER), 1–135 m.

The remaining species are in Chile known only from the Cape Horn region and are otherwise distributed on the Falkland Plateau, viz.,

Bathybiaster loripes SLADEN, "shallow" –460 m.
Henricia studeri (E. PERRIER), 75–340 m.
Pteraster lebruni E. PERRIER, 75–450 m.
Neosmilaster steineni (STUDER), 100–160 m.

One of these species, *Pteraster lebruni*, is distributed also south of the Antarctic Convergence, in the South American Quadrant, and is further represented by another subspecies off the subantarctic islands in the Indian Ocean.

Species to be expected on the Chilean shelf

Besides the species already recorded from the Chilean shelf a number of others known from the Falkland Plateau can be expected to occur there too. Some of these are already recorded from Chile, though only in depths of more than 200 m, viz.,

Pseudarchaster discus SLADEN, 140–283 m. Near Wellington Island, 250 m.
Ceramaster patagonicus (SLADEN), 75–850 m. Cape Horn, 340 m.
Pteraster stellifer SLADEN, 80–670 m. Off Magellan Strait, 460 m.
Diplopteraster verrucosus (SLADEN), 75–270 m. Cape Horn, 270 m.

The other Falkland species are:

Ctenodiscus australis LÜTKEN, 70–1100 m.
Leptychaster kerguelensis SMITH, 1–385 m.
Acodontaster elongatus granuliferus (KOEHLER), 75–450 m.
Cladaster analogus FISHER, 150 m.
Henricia diffidens (KOEHLER), 75–460 m.
Anteliaster australis FISHER, 79–340 m.
Lethasterias australis FISHER, 155 m.
Anasterias studeri E. PERRIER, 55–320 m.
Anasterias pedicellaris (KOEHLER), 7–95 m.
Anasterias conferta (KOEHLER), 0–20 m.

The asteroid fauna of the Falkland Plateau has been dealt with in detail by FISHER in 1940, Discovery Report 20, and here further information on the species listed above may be found. FISHER's paper is very important for our knowledge of the southern South American sea stars, most of which occur also on the Falkland Plateau, and has been referred to repeatedly in the following systematic part.

The asteroid fauna to the north of Chile, that of Peru, has been treated by H. L. CLARK in 1910, who writes p. 321 that: "the Peruvian fauna is made up of two quite different elements, that from the Panamic region and that from the Chilean. The latter furnishes all of the echinoderms found south of Aguja Point, 6° S. lat., while the Panamic fauna is practically confined to the shores north of that point." The few species of littoral sea stars known from southern Peru are all known from Chile too. A single species is hitherto recorded only from central Peru, Callao, and may perhaps occur in northern Chile, viz.,

Echinaster cylindricus MEISSNER 1892, p. 184.

Erroneously recorded and doubtful species

Ctenodiscus australis LÜTKEN 1871. — This species was recorded from the Cape Horn region by E. PERRIER 1891 p. 142, but, according to FISHER 1940 p. 77, the material in question was probably of *C. procurator* SLADEN. *C. australis* can, however, be expected to occur in the same region.

Luidia bellona LÜTKEN 1865. — This tropical species has been recorded repeatedly from Chile due to confusion with the Chilean *L. magellanica.*

Luidia phragma H. L. CLARK 1910 p. 328. — The type of this species was labelled "Chile or Sandwich Islands", but CLARK says that he suspects that in reality it came from Paita in Peru, since other material available to him was taken in tropical waters in the Gulf of California.

Pharia pyramidata GRAY. — LEIPOLDT, 1895 p. 633, recorded this species from Valparaíso. Its distribution is, however, otherwise tropical and as pointed out by H. L. CLARK, 1910 p. 335, Valparaíso can not be the finding place, but only the place where it was bought.

Astrogonium fonki PHILIPPI 1858 p. 267. — This species, which has been overlooked in the recent literature, was without doubt based on specimens of the species later described by STUDER, 1876 p. 459, as *Porania magellanica.*

Desmopateria flexilis VERRILL 1913 p. 484. — The type of this species was an unlabelled specimen found in a lot of Chilean species of sea stars. The species has not been recorded since, and there is as yet no reason to consider it Chilean.

Asterina pusilla E. PERRIER 1875 p. 306. — The type was said to come from Talcahuano. There are no other records of the species which, however, may be identical with *Patiriella calcarata* (PERR.) hitherto known only from the Juan Fernandez Islands.

Echinaster cribella LÜTKEN 1871 p. 288. — The type specimen was collected by the Danish zoologist KRÖYER, who had travelled also in South America, and though no statement of locality was given by the collector it was nevertheless supposed to be from Valparaíso. LÜTKEN states, however, in a footnote, that after having seen a specimen of *Echinaster serpentarius* from Vera Cruz he is less certain of the validity of his new species. An re-examination of *E. cribella* confirms also that it may very well belong to MÜLLER & TROSCHEL's *Echinaster* (or *Thyraster*) *serpentarius* from the Gulf of Mexico, and the locality Valparaíso is thus wrong.

Mithrodia bradleyi VERRILL 1867. — H. L. CLARK, 1910 p. 336, mentions an old specimen in the Museum of Comparative Zoology labelled "Arica, Peru" (northernmost Chile). The species is distributed off the American coast from the Gulf of California to the Bay of Panama and is further known from Galapagos and Hawaii (also the Fidji and Chatham Islands?). In view of the general distribution of the species the locality Arica appears to be wrong, but the specimen in question, according to CLARK, is somewhat different from Californian specimens, and there is thus a slight possibility that a form of *Mithrodia* occurs in northernmost Chile.

Heliaster polybrachius H. L. CLARK 1907. — CLARK, 1907 p. 54, mentions a specimen labelled "Chili", but since the species is otherwise distributed in northern Peru and Mexico it cannot be expected to belong to the Chilean fauna.

Heliaster microbrachius XANTUS 1860. — IVES, 1889 p. 170, mentions a specimen from "Chili", which, however, according to H. L. CLARK 1907 p. 51, had been wrongly labelled.

Asteracanthion gemmifer E. PERRIER 1869 p. 237. — The 11-armed type-specimen was stated to be from "Chili", but H. L. CLARK, 1916 p. 74, believes that it belongs to the species *Coscinasterias calamaria* (GRAY 1840) from Southern Australia, New Zealand and Mauritius, in which case the locality Chile must be considered wrong. PERRIER's *A. gemmifer* may, however, be identical with the species described from Juan Fernandez by MEISSNER, 1896, as *Coscinasterias platei.*

Asterias echinata GRAY 1841 p. 179. — The type-locality was "Valparaíso, 4–6 fms." and GRAY's description of the species is as follows: "Rays 8, twice as long as the width of the body, five-sided; central ridge of spines interrupted." VERRILL, 1867, considers the species identical with *Cosmasterias lurida* (PHILIPPI), and SLADEN, 1889 p. 179, states that the type-specimen is lost and that he therefore considers that the name should be discarded. GRAY's description is too incomplete to state anything definite

about his species. It may have been a multiarmed specimen of one of the well known Chilean species, e. g., *Meyenaster gelatinosa*, but the description may also agree with *Astrostole platei*, hitherto known only from Juan Fernandez, and if this species proves to occur also at the main coast of Chile it probable was the species referred to by GRAY.

Asterias solaris SCHREBER 1793 (Naturforscher 27) p. 1 (= *Acanthaster solaris*). — The type-specimen was bought from a dealer in natural history specimens in Paris, who gave its place of origin as "Die Magellanische Meerenge", and *Acanthaster solaris* has thus been mentioned repeatedly in fauna lists of the Magellanic region. SCHREBER's *Asterias solaris* is, however, a specimen of the Indo-Westpacific *Acanthaster planci* (L.), and the locality Magellan Strait is therefore wrong.

Asteracanthion rubens was recorded from Chile by MÜLLER & TROSCHEL 1843 p. 113. Their specimens of course did not belong to this North Atlantic species. They must have been of a species of *Anasterias*, probably *A. varium* (PHILIPPI).

Asterias (Smilasterias) terwieli GOLDSCHMIDT 1924. — Through the courtesy of Dr. H. ENGEL, Director of the Zoological Museum of Amsterdam, I have been able to re-examine the type of this intricate species and thus to ascertain that it has been based merely on a specimen of *Luidia magellanica*, in every respect agreeing with LEIPOLDT's original description of that species.

BERNARDINO QUIJADA in 1911 published a Catalogue of the echinoderms in the Chilean National Museum in Santiago. Some of the names under which a number of Chilean specimens are recorded are, however, museum names only, and without a re-examination of the specimens it is impossible to tell to which species the names belong. They are the following:

Asterias fernandezianus PHILIPPI, J. Fernandez.
Asterias alta PHILIPPI, Chile.
Asterias roseum PHILIPPI, Chile.
Asterias hirtum PHILIPPI, Calbuco.
Asterias reticulatum PHILIPPI, Seno Reloncaví, Calbuco.
Asterias cumpullis, Puerto Montt.
Asterias echinata PHILIPPI, Calbuco.
Cribrella antarctica PHILIPPI, Chiloé.
Asterina laeriusculus PHILIPPI, Mejillones.
Asterina laevigatus PHILIPPI, Mejillones.
Asterina alutaceus PHILIPPI, Mejillones.
Asterina granulatus PHILIPPI, Mejillones.
Goniodiscus frascheli PHILIPPI, Seno Reloncaví.

Alphabetic list of the specific names used for Chilean sea stars with references to which valid species they belong

agassizii: Ophidiaster a.
alba: Cosmasterias lurida
alta, Asterias, (PHILIPPI MS), QUIJADA 1911: Nomen nudum
alutaceus, Asterina, (PHILIPPI MS) QUIJADA 1911: Nomen nudum
antarctica: Anasterias a.
antarctica: Porania a.
antarctica, Cribrella, (PHILIPPI MS), QUIJADA 1911: Nomen nudum
atlantica: Stichaster striatus
aurantiacus: Stichaster striatus
australis: Solaster regularis
australis, Ctenodiscus: Ctenodiscus procurator (pars)
austrogranularis, Pentagonaster: Ceramaster patagonicus
belli, Pentagonaster: Odontaster penicillatus
bellona: Luidia magellanica
bispinosa: Patiriella fimbriata
bradleyi, Mithrodia: probably erroneously recorded from Chile
brandti: Diplasterias b.
calcarata: Patiriella c., pars P. chilensis
canopus: Heliaster c.
capensis: Allostichaster c.
chilensis, Goniodiscus, (TROSCHEL MS): Asterodon singularis
chilensis: Patiria c.
clavatum: Cosmasterias lurida
cribella, Echinaster: Erroneously recorded from Chile, = E. serpentarius
cumpullis, Asterias, QUIJADA 1911: Nomen nudum
cunninghami: Anasterias antarctica
discus: Pseudarchaster d.
echinaster: Poraniopsis e.
echinasteroides: Poraniopsis echinaster
echinata, Asterias, GRAY 1841: Nomen nudum (= Astrostole platei?)
echinata, Asterias, (PHILIPPI MS), QUIJADA 1911: Nomen nudum
electilis: Cycethra verrucosa
falklandica: Ganeria f.
fernandensis: Astrostole platei
fernandezianus, Asterias, (PHILIPPI MS) QUIJADA 1911: Nomen nudum
fimbriata: Patiriella f.
fleuriasi: Bathybiaster loripes
flexilis, Desmopatiria: Probably erroneously recorded from Chile
folliculaster: Peribolaster f.
foncki, Asteracanthion (PHILIPPI MS): Anasterias antarctica
fonki, Astrogonium: Porania antarctica magellanica
frascheli, Gonodiscus, (PHILIPPI MS), QUIJADA 1911: Nomen nudum
fulgens: Anasterias antarctica
fulvum: Cosmasterias lurida
gayi: Patiria chilensis
gelatinosus: Meyenaster g.
gemmifer, Asteracanthion, PERRIER 1869: A doubtful species. Erroneously recorded from Chile? Identical with Astrostole platei?
germaini: Cosmasterias lurida
gibber: Pteraster g.
granulatus, Asterina, (PHILIPPI MS) QUIJADA 1911: Nomen nudum
granulosus: Asterodon singularis
grayi: Odontaster penicillatus
hahni: Ganeria falklandica
helianthus: Heliaster h.
hirtum, Asterias, (PHILIPPI MS), QUIJADA 1911: Nomen nudum

hyadesi, Asterias: Anasterias antarctica
hyadesi, Cribrella: Henricia obesa
inaequalis: Allostichaster capensis
laeriusculus, Asterina, (PHILIPPI MS), QUIJADA 1911: Nomen nudum
laevigatus, Asterina, (PHILIPPI MS), QUIJADA 1911: Nomen nudum
lebruni: Pteraster l.
lorioli: Luidia bellona, confused with L. magellanica
loripes, Bathybiaster l.
lurida: Cosmasterias l.
lütkeni: Diplasterias brandti
lütkeni: Labidiaster radiosus
magellanica: Luidia m.
magellanica: Porania antarctica magellanica
meridionalis: Odontaster penicillatus
microbrachius, Heliaster: Erroneously recorded from Chile
minuta: Anasterias m.
mite: Cosmasterias lurida
mollis: Anasterias studeri
neglecta: Diplasterias brandti
nitida: Cycethra verrucosa
obesa: Henricia o.
obesa: Patiria o.
obtusa: Asterina stellifer obtusa
obtusispinosa: Cosmasterias lurida
pagenstecheri: Henricia obesa
papillosa: Ganeria falklandica
patagonicum, Astrogonium: Pseudarchaster discus
patagonicus: Ceramaster p.
paxillosus: Odontaster penicillatus
pedicellaris: Odontaster penicillatus
penicillatus: Odontaster p.
pentactis: Lophaster stellans
phragma, Luidia: Erroneously recorded from Chile
platei: Astrostole p.
polybrachius, Heliaster: Erroneously recorded from Chile
porteri: Luidia p.
procurator: Ctenodiscus p.
pusilla, Asterina, PERRIER 1875: A doubtful species, perhaps identical with Patiriella calcarata
pyramidata, Pharia: Erroneously recorded from Chile
radiosus: Labidiaster r.
regularis: Solaster r.
reticulatum, Asterias, (PHILIPPI MS), QUIJADA 1911: Nomen nudum
robusta: Ganeria falklandica
roseum, Asterias, (PHILIPPI MS), QUIJADA 1911: Nomen nudum
rubens: Anasterias antarctica or A. varium
rugispina: Anasterias antarctica
rupicola: Anasterias varium
rustica: Meyenaster gelatinosus
selkirki: Patiriella calcarata
simplex: Cycethra verrucosa
singularis: Asterodon s.
solaris, Asterias (= Acanthaster planci (L.)): Erroneously recorded from Chile
spectabile: Cosmasterias lurida
spirabilis: Anasterias antarctica
steineni: Neosmilaster s.
stellans: Lophaster s.
stellifer: Asterina stellifer
stolidota: Anasterias varium
striatus: Stichaster s.
studeri: Henricia s.
subelectilis: Cycethra simplex
sulcifera: Cosmasterias lurida
terwieli: Luidia magellanica
tomidota: Cosmasterias lurida
varium: Anasterias v.
verrilli: Anasterias varium
verrucosa: Cycethra v.

List of stations where Asteroidea were collected by the Lund University Chile Expedition

(Cf. BRATTSTRÖM & DAHL; Chile Report No. 1. 1951 (1952))

St. M 14. Seno Reloncaví, the bay off Puerto Montt, between Isla Tenglo and Pilluco, 41°30'05" S, 72°56'22" W; depth 225 m; small stones and boulders in fine sand. Agassiz trawl; December 1, 1948.

St. M 16. Seno Reloncaví, Piedra Azul, 41°31'30" S, 72°48'15" W; depth 30–35 m; sand; commercial fish trawl; December 4 and 10. 1948, April 1 and 15, 1949.

St. M 17. Golfo de Ancud, Canal Calbuco, E of the church in Calbuco, 41°46'30" S, 73°06'45" W; depth 30 m; grey sand and small stones; triangular dredge, Agassiz trawl; December 14, 1948.

St. M 18. Golfo de Ancud, Estero Huito, N of Punta Yahuecha, 41°45'30" S, 73°07'50" W; depth 35 m; dead algae; triangular dredge, Agassiz trawl; December 15, 1948.

St. M 19. Golfo de Ancud, Estero Huito, inne part, 41°43' S, 73°09'40" W; depth 5–6 m; fine sand, covered with dead algae; triangular dredge and Agassiz trawl; December 15, 1953.

St. M 20 Golfo de Ancud, Estero Huito, Central part, 41°43'50" S, 73°10'15" W; depth 15 m; very fine sand, mixed with mud; triangular dredge and Agassiz trawl; December 15, 1948.

St. M 21. Golfo de Ancud, Canal Calbuco, between Punta Meimen and Punta Pinto, 41°48'50" S, 73°09'40" W; depth 25 m; small stones; triangular dredge and Agassiz trawl; December 15, 1948.

St. M 22. Golfo de Ancud, Isla Quenu, Punta Pinto, western side, 41°49'15" S, 73°10'15" W; tidal belt, rather exposed; boulders and stones in sand; hand sampling; December 16, 1948, May 11, 1949.

St. M 23. Golfo de Ancud, Isla Quenu, Punta Pinto, northern side, 41°49'10" S, 73°10' W; tidal belt, rather sheltered; boulders and stones in sand; hand sampling; December 16, 1948.

St. M 24. Seno Reloncaví, S of Isla Guar, W of Bajo Pucarí, 41°44'25" S, 72°55'45" W; depth abt. 70 m; sand with shells; Agassiz trawl; December 16, 1948.

St. M 27. Golfo de Ancud, between Isla Quenu and Isla Chidguapi, 41°49'40" S, 73°08' W; depth 45 m; coarse sand with shells; triangular dredge and Agassiz trawl; May 3, 1949.

St. M 38. Golfo de Ancud, SW of Isla Quellín, 41°55' S, 72°58' W; depth 300 m; fine clay with fragments of polychaet tubes; triangular dredge and Agassiz trawl; January 22, 1949.

St. M 40. Seno Reloncaví, N of Isla Quellín, 41°51' S, 72°55' W; depth 100 m; small stones, probably on hard sand; triangular dredge, Agassiz trawl; January 23, 1949.

St. M 41. Golfo de Ancud, ESE of Isla Tac, 42°26'40" S, 72°59' W; depth 250–300 m; sand and clay with small stones and shells; triangular dredge; January 23, 1949.

St. M 42. Golfo de Ancud, Paso Tenaun, S of Punta Tenaun, 42°20'50" S, 73°22' W; depth about 70 m; hard bottom; triangular dredge; January 24, 1949.

St. M 46. Golfo de Ancud, Canal Caicaen, W of Calbuco, 41°46'15" S, 73°09' W; depth abt. 13 m; coarse sand, boulders, and dead algae; circular dredge and Agassiz trawl; January 25, 1949.

St. M 47. Seno Reloncaví, Paso Maillén, between Punta Panitao and Punta Puchegui; 41°33'45" S, 73°02'05" W; depth abt. 22 m; coarse sand with *Chaetopterus* tubes, small stones with calcareous algae; triangular dredge; January 25, 1949.

St. M 50. Seno Reloncaví, Canal Tenglo, near "Pontón Sirena", 41°29'33" S, 72°58'38" W; depth 11 m; sand; triangular dredge; February 16, 1949.

St. M 56. Canal Chacao, Península Laqui, Punta Corona, north-eastern point, 41°47' S, 73°53' 07" W; tidal belt, extremely exposed; flat rocks with small holes and very shallow rock pools; hand sampling; February 26 and 28, 1949.

St. M 57. Bahía de Ancud, Península Lacui, Punta Ahui, 41°49'51" S, 73°51'46" W; tidal belt, very exposed; rocks with rock pools; hand sampling; March 1, 1949.

St. M 59. Seno Reloncaví, Canal Tenglo, Isla Tenglo, western point, 41°30′45″ S, 73°00′13″ W; tidal belt, rather exposed; upper part with beds of hard clay, lower parts with boulders and stones in mud; hand sampling; March 13 and 14, 1949.

St. M 64. Golfo Corcovado, light-buoy Vettor Pisani, 42°46′20″ S, 73°28′ W; depth 10 m; the anchor of the light-buoy; hand sampling; February 17, 1949.

St. M 74. Archipiélago de los Chonos, Canal Moraleda, Puerto Lagunas, 45°17′ S, 73°45′ W; depth 5–7 m; rather sheltered; stones with algae and Mytilidae; hand sampling, diver; February 22, 1949.

St. M 81. Seno Reloncaví, Estero Reloncaví, central part, W of Punta Iglesia, 41°41′05″ S, 72°24′30″ W; depth 200–250 m; mud, mixed with sand; Agassiz trawl; March 30, 1949.

St. M 85. Seno Reloncaví, Estero Reloncaví, central part, Bahía Sotomó, 41°38′33″ S, 72°22′50″ W; depth 5–10 m; stones and shells; triangular dredge; March 31, 1949.

St. M 91. Seno Reloncaví, Ensenada de Guatral, SW of Punta Guatral, 41°43′ S, 73°03′15″ W; tidal belt, rather sheltered; boulders and stones on sand; hand sampling; April 13, 1949.

St. M 94. Canal Chacao, W of Rocas Amazonas, 41°46′30″ S, 73°45′45″ W; depth 40 m; small stones; triangular and rectangular dredges; May 4, 1949.

St. M 95. Golfo de Quetalmahué, SW of Punta Aucan, 41°51′ S, 73°57′10″ W; depth 6–7 m; muddy sand, covered with dead algae, shells; triangular and rectangular dredges; May 4, 1949.

St. M 96. Golfo de Quetalmahué, S of Punta Nagle, 41°51′40″ S, 73°55′50″ W; depth 11 m; mud covered with dead algae, Spongiae and shells; rectangular dredge and Agassiz trawl; May 4, 1949.

St. M 97. Golfo de Quetalmahué, S of Punta Arenas, 41°51′57″ S, 73°54′ W; depth 14 m; muddy sand with algae and Spongiae, Agassiz trawl; May 4, 1949.

St. M 98. Bahía de Ancud, SE of Punta Ahui, 41°50′10″ S, 73°51′20″ W; depth 8 m; small stones with algae; triangular and rectangular dredges; May 5, 1949.

St. M 99. Canal Chacao, E of Punta Corona, 41°47′12″ S, 73°52′23″ W; depth 25 m; small stones with calcareous algae; rectangular dredge; May 5, 1949.

St. M 100. Canal Chacao, N of Isla Cochinos, 41°49′25″ S, 73°48′58″ W; depth 10 m; small stones with calcareous algae; rectangular dredge; May 5, 1949.

St. M 103. Canal Chacao, N of Punta Soledad, 41°48′50″ S, 73°31′30″ W; depth 40 m; stones and polychaete tubes; triangular dredge, May 5, 1949.

St. M 104. Golfo de Ancud, SE of Punta Tres Cruzes, NE of Punta Piedras, 41°50′30″ S, 73°28′ 30″ W; depth 50–60 m; stones and clinkers; triangular dredge; May 5, 1949.

St. M 105. Golfo de Ancud, SW of Punta Abtao, 41°49′24″ S, 73°22′30″ W; depth 60 m; stones; triangular dredge; May 5, 1949.

St. M 106. Golfo de Ancud, between Punta Abtao and Isla Abtao, S of the church, 41°48′40″ S, 73°21′ W; depth 36 m; coarse sand and shells; triangular dredge, May 5, 1949.

St. M 108. Golfo de Ancud, Canal San Antonio, 41°44′10″ S, 73°15′15″ W; depth 15 m; coarse shell sand and dead algae; triangular dredge; May 6, 1949.

St. M 110. Golfo de Ancud, SE of Bajo Corvio, 41°50′45″ S, 73°12′10″ W; depth 24 m; stones with calcareous algae; triangular dredge; May 6, 1949.

St. M 113. Estrecho de Magallanes, Punta Santa María, near Agua Fresca, 53°22′ S, 70°57′ W; tidal belt, exposed (shelter: kelp); sand, gravel, and muddy clay, covered with boulders; hand sampling, May 2, 1949.

St. M 114. Estrecho de Magallanes, Punta Santa María, near Aqua Fresca, 53°22′ S, 70°57′ W; holdfasts of kelp thrown up on the shore during gale; May 2, 1949.

St. M 115. Estrecho de Magallanes, near the estuary of Río los Ciervos, S of Punta Arenas 53°11′ S, 70°55′ W; tidal belt, exposed (shelter: kelp); gravel and clay, mixed with mud and covered with boulders; hand sampling; May 3, 1949.

St. M 120. Bahía San Vicente, the Ramuntcho bay, SE of Punta Gualpén, 36°44′45″ S, 73°11′ 02″ W; tidal belt, exposed; hard rocks and boulders. Between the lower boulders coarse sand; hand sampling; June 8, 1949.

St. M 121. Bahía San Vicente, Punta Liles just W of San Vicente, 36°43′36″ S, 73°08′10″ W; tidal belt, rather exposed; rocks with small rock pools; boulders; hand sampling, June 9, 1949.

St. M 122. Golfo de Arauco, Bahía de Lota, small promontories SE of Punta Fuerte Viejo, 37°06′17″ S, 73°09′15″ W; tidal belt, extremely exposed; hard rocks and boulders in coarse sand; hand sampling; June 10, 1949.

St. M 123. Montemar (N of Valparaíso), "Estación de biología marina", 32°57′24″ S, 71°33′25″ W; tidal belt, exposure varying in different parts of the station; rocks with rock pools; hand sampling; September and October 1948, June 15, 1949.

St. M 124. Bahía Herradura de Guayacán, northern part, SW of the factory "Melon", W of Guayacán, 29°57′55″ S, 71°22′17″ W; tidal belt, rather sheltered; hard rocks; hand sampling, June 21, 1949.

St. M 125. Bahía Herradura de Guayacán, south-western corner, NW of Herradura, 29°58′51″ S, 71°22′56″ W; tidal belt, rather sheltered; boulders, stones, and sand; hand sampling; June 22, 1949.

St. M 126. Bahía Herradura de Guayacán, south-western corner, NW of Herradura, 29°58′57″ S, 71°22′54″ W; tidal belt, rather sheltered; sand beach with fine grey sand; hand sampling; June 22, 1949.

St. M 127. Península Coquimbo, headland S of Roca Pelícanos, N of Coquimbo ("Fuerte"), 29° 55′56″ S, 71°21′08″ W; tidal belt, very exposed; yellow rocks; hand sampling; June 24, 1949.

St. M 131. Iquique, southern part of the town, 20°13′10″ S, 70°10′19″ W; tidal belt, extremely exposed; red rocks with rock pools; hand sampling; July 1, 4 and 6, 1949.

St. M 132. Iquique, the harbour, 20°12′30″ S, 70°10′21″ W; depth 1–5 m; sand and black mud; hand sampling, diver; July 1, 1949.

St. M 133. Iquique, the harbour, 20°12′30″ S, 70°10′19″ W; tidal belt, very sheltered; rocks and boulders; hand sampling; July 2, 1949.

St. M 135. Cavancha, S of Iquique, 20°14′07″ S, 70°10′05″ W; tidal belt, exposure varying in different parts of the station; rocks with rock pools; hand sampling; July 5, 1949.

St. M 136. Iquique, southern part of the town, 20°13′08″ S, 70°10′19″ W; tidal belt, very exposed; sand beach; hand sampling; July 6, 1949.

St. M 139. Estero Reloncaví, at El Milagro, 42°42′10″ S, 72°39′30″ W; tidal belt, very exposed; steep rocks; hand sampling; July 14, 1949.

St. M 159. Antofagasta, at the cold storage plant, 23°39′ S, 70°25′ W; tidal belt, extremely exposed; rocks; hand sampling; January 3, 1949.

St. M 161. San Antonio, 33°34′ S, 71°37′ W; tidal belt, extremely exposed; rocks and boulders; hand sampling; December 29, 1948.

Systematic part

Goniopectinidae

Ctenodiscus procurator SLADEN 1889

Chile records:

Ctenodiscus procurator SLADEN 1889 p. 173, pl. 30_{7-12}. Off Puerto Bueno, 75 m.
Ctenodiscus australis E. PERRIER 1891 p. 142. Cape Horn region: Franklin Canal, 51 m; Beagle Canal, 198 m; Murray Narrows, 200 m.

The species *C. procurator* was described by SLADEN on specimens from southernmost Chile, 75—460 m. FISHER in 1911, p. 31, considered it, together with the other species described from South America, *C. australis* LÜTKEN, identical with the arctic *C. crispatus* (RETZIUS). In 1940 he recognized, however, both species as valid, but stated that apparently the specimens recorded from the Cape Horn region by PERRIER under the name of *C. australis* must have been *C. procurator*.

The distribution of *Ctenodiscus procurator* comprises the southernmost end of Chile, from south of the Wellington Island to Cape Horn, at depths of about 50 to 460 m.

Another species of *Ctenodiscus* occurs in the region of southern South America, viz., *C. australis* LÜTKEN, which is common on the Falkland Plateau and also found off the Argentinean coast from the entrance to the Magellan Strait to Río de Janeiro, 70 to 1100 m. It is to be expected that this species is to be found off Chile too, at least in the Cape Horn region, but as yet there are no certain Chilean records.

The genus *Ctenodiscus* has a worldwide distribution: One species, *C. crispatus* (RETZIUS), occurs in the Arctic, the North Pacific, and North Atlantic, 10 to 1860 m, and two species occur in the Indomalayan Archipelago, viz., *C. orientalis* FISHER, 600 to 1300 m, and *C. caudatus* DÖDERLEIN, 69 to 959 m.

Luidiidae

Luidia magellanica LEIPOLDT 1895

Pl. 1. Fig. 1–2.

Chile records:

Luidia magellanica LEIPOLDT 1895 p. 610, pl. 32_{11}. Magellan Strait.
Luidia bellona MEISSNER 1896 p. 93. Iquique; Tumbes, Talcahuano.
Luidia bellona H. L. CLARK 1910 p. 330. Talcahuano.
Luidia bellona DÖDERLEIN 1920 p. 269. Iquique.
Asterias (Smilasterias) terwieli E. GOLDSCHMIDT 1924 p. 499, figs. 1–3. Chile.
Luidia bellona BERNASCONI 1943 p. 13. Magellan Strait.

Material: *St. M 132*, Iquique, 1–5 m. 1 specimen.

It has been customary, since the publication of MEISSNER's paper of 1896, to record the Chilean shallow-water species of *Luidia* under the name *L. bellona* in the belief that it was identical with the *L. bellona* described by LÜTKEN in 1865, p. 133, on a specimen from Equador. A re-examination of the literature and of the type-specimen of *Luidia bellona* shows, however, that this is not correct.

The type-specimen of *Luidia bellona* was from Guyaquil in Equador, and later *L. bellona* was recorded from Callao, Peru, by VERRILL, 1867, and MEISSNER, 1892, and from Mazatlan, Mexico, by LORIOL in 1891, p. 22, pl. 3_1, with latter author is the first to give figures and a detailed description of the species in a world-language. The original description included a short diagnosis in Latin, but was otherwise in Danish, and this in part accounts for the misunderstanding of the true *L. bellona* which later arose.

The first record of a Chilean *Luidia* was given by LEIPOLDT in 1895, who described a specimen from the Magellan Strait as representing a new species, *Luidia magellanica*, stating, however, that he would have referred his specimen to LÜTKEN's *L. bellona* if it had not been for LORIOL's description of that species. This statement, probably, led MEISSNER in 1896 to consider the Chilean specimens of *Luidia* the true *L. bellona* and to regard *L. magellanica* as a synonym of that name, whereas he, as a consequence, renamed LORIOL's specimen *L. lorioli*. DÖDERLEIN in 1920 in his monograph of the genus *Luidia*, followed MEISSNER in regarding the Chilean *Luidia* as the true *bellona*, but did not consider the Mexican form as more than subspecifically different, recording it, therefore, under the name of *L. bellona* var. *lorioli*. Also H. L. CLARK in 1910 had recorded a *Luidia* from Chile (Talcahuano) as *L. bellona* holding that Peruvian (and Chilean) specimens could not be specifically separated from Mexican specimens as described by LORIOL.

In fact, LORIOL's description of his *Luidia* from Mexico agrees with the type-specimen of *L. bellona* from Equador, preserved in the Zoological Museum of Copenhagen (Pl. 1 fig. 3), and MEISSNER's new name, *L. lorioli*, for the Mexican form is thus a simple synonym of *L. bellona*.

Luidia bellona as it is described by LÜTKEN and LORIOL is characterized among other things by having many enlarged paxillae with high pointed cones. Such high cones were not found in the Magellanic specimen described by LEIPOLDT, and this was one of his reasons for considering it a new species. The presence or absence of enlarged paxillar spines with or without high cones is usually a very unreliable systematic character in the genus *Luidia*; but between the two forms discussed here there are also other differences. The spines of the inferomarginal plates are e. g., in the southern Chilean specimens spatulate, and those defining the margin the shortest, whereas in typical *L. bellona* they are spiniform and those along the margin by far the largest. According to our present knowledge the two forms should, therefore, rank as distinct species, but it is possible that future investigations on larger material may show that they intergrade and thus should be considered only subspecifically different. The Chilean specimens hitherto recorded were all large and some of the differences between these and the smaller specimens known from Equador—Mexico

may be due to age. The short marginal spines and the low enlarged central paxillar spines in the Chilean specimens reported upon may thus owe their appearance to the fact that they are worn down.

All the specimens which I have examined from Equador and northwards (region of Panama) are typical *bellona* as the specimen described by LORIOL. The present specimen collected at Iquique by the Swedish Chile Expedition (Pl. 1. Fig. 1–2) is a typical *L. magellanica* and so were also, judging from the description, DÖDERLEIN's specimen from Iquique, no doubt also BERNASCONI's specimen from the Magellan Strait, and no doubt also MEISSNER's specimens from Iquique and Talcahuano, otherwise he would not have assigned a new name to LORIOL's specimen. The littoral sea star from Chile described by E. GOLDSCHMIDT as *Asterias (Smilasterias) terwieli* has likewise proved to be a typical *L. magellanica*. The very large size, 50 cm diameter, of the *Luidia* from Talcahuano recorded by H. L. CLARK in 1910 indicates that it was a typical *magellanica*. Apparently, also DÖDERLEIN's specimen from Callao, Peru, should be assigned to *magellanica*, whereas it does not seem quite clear to which form the Peruvian specimens recorded by H. L. CLARK in 1910 belong. CLARK, as mentioned above, was of the opinion that the Chilean *Luidia* and the Mexican *L. bellona* was of the same species and some Peruvian specimens may thus show intermediate characters. So long as such possible intermediate specimens have not been described the Chilean *Luidia* must, however, be regarded as a distinct species. This point of view is further supported by the fact that no Chilean asteroid is known hitherto to occur also in the Panamic region.

The present specimen (pl. 1, fig. 1–2) has R. 175 mm and r. 30 mm. Its colour when alive was black. It agrees with the description given by LEIPOLDT, only the inferomarginal spines are slightly larger than the adambulacral ones, which is the reverse of the condition in LEIPOLDT's specimen. The adambulacral plates in the proximal half of the arms are closely connected in pairs which push the corresponding tube-feet out in the middle of the furrow, separating the adjoining tube-feet which superficially regarded become successive. Proximally in the furrows there are thus apparently four rows of tube-feet. This may be a noteworthy character of the species. Pl. 1, fig. 2.

Luidia magellanica is distributed in the eulittoral waters (depths of a few metres) off the South American west coast from the Magellan Strait to Peru, where it becomes replaced by *Luidia bellona*, which is found northwards to Lower California and in the Galapagos Islands. The genus *Luidia* has otherwise a worldwide occurrence in warm and temperate waters.

Luidia porteri A. H. CLARK 1917

Chile record:

Luidia porteri A. H. CLARK 1917. 46°47'30" S, 75°15' W, 61 fms.

This species is known only from the type-locality in 110 m depth off Chile, between the Chonos Archipelago and the Island of Wellington. It seems to be related to the Californian *L. asthenosoma* FISHER 1906.

Astropectinidae

Bathybiaster loripes SLADEN 1889

Bathybiaster loripes FISHER 1940 p. 89.

Chile record:

Goniopecten fleuriasi E. PERRIER 1891 p. 140, pl. 12_2. Beagle Canal, 198 m.

This species is distributed round the southern end of South America, having been recorded from near the western entrance to the Magellan Strait, 460 m (SLADEN 1889 p. 240, pls. 36_{1-2}, 42_{1-2}, type-locality), from the Cape Horn region, 198–283 m, and from the Falkland Plateau, 219–342 m. The species has finally been recorded under the name of *B. spinulatus* from shallow water at Kerguelen by KOEHLER, 1917. South of the Antarctic Convergence a distinct subspecies, *B. loripes obesus* SLADEN, circumpolar, 18–500 m, occurs, and the genus includes further one species, *B. vexillifer* (WYV.-TH.), which is widely distributed in the Atlantic, from the Arctic to off South Africa, 225–3110 m.

Odontasteridae

Odontaster penicillatus (PHILIPPI 1870)

Odontaster penicillatus FISHER 1940 p. 105.

Chile records:

Goniodiscus penicillatus PHILIPPI 1870 p. 268. Puerto Montt.
Pentagonaster paxillosus BELL 1881 a p. 95. Sandy Point (Punta Arenas).
Calliderma grayi BELL 1881 a p. 95 pl. 8_5. Sandy Point, 9–10 fms.
Pentagonaster belli STUDER 1884 p. 31. Punta Arenas.
Asterodon pedicellaris E. PERRIER 1891 p. 135, pl. 13_1. Punta Arenas, 18 m; Beagle Canal, 10–30 m; Gretton Bay, 24–30 m; Orange Bay, 26–28 m.
Odontaster penicillatus LUDWIG 1905 p. 46, pl. 5_{4-5}. Cap Valentyn, Magellan Strait, 183 m.
Odontaster grayi LUDWIG 1905 p. 48, pl. 5_{6-9}. Magellan Strait: Puerto Condor; Puerto Harris, 27 m. Beagle Canal, tidal – 27 m.
Odontaster meridionalis LEIPOLDT 1895 p. 620, pls. 31_8, 32_8. Puerto Lagunas, 50–80 m; Puerto Bueno, 50–80 m.
Odontaster meridionalis MEISSNER 1896 p. 93. Lagartija Islands, 8 fms; Calbuco.
Odontaster penicillatus MEISSNER 1904 p. 19. Long Island, Smyth Channel; Punta Arenas, 11 fms; Uschuaia, Beagle Canal, 10 fms.
Goniodiscus penicillatus QUIJADA 1911 p. 163. Puerto Montt.
Material: *Sts. M 16; M 17; M 21; M 24; M 27; M 40; M 41; M 42; M 47; M 98; M 110.* In the area north and east of Chiloé, at depths from 8 m to 250–300 m.
La Serena (E. M. Poulsen 1952).

The about 30 specimens at hand range in size from R. 7 mm with r. 4 mm to R. 40 mm with r. 17 mm, the latter specimen with 21 superomarginal plates. All the specimens may be referred to the forma *penicillatus* (cf. FISHER 1940 p. 106) except one with R. 13 mm, r. 8 mm, and 9 superomarginal plates, which specimen may be referred to the forma *grayi* (cf. FISHER 1940 p. 106). The latter specimen is the one taken at the shallowest depth, 8 m, whereas the other specimens are from depths exceeding 22 m.

The colour of some of the specimens when alive was noted as: greyish orange, yellow-brown, yellow-brown grey, and yellow-brown orange.

Odontaster penicillatus is distributed round the southern end of South America, from Cape Horn to La Serena, about 30° S, on the Chilean side, and to about 36° S on the Argentinean side (a specimen in the Zoological Museum of Copenhagen), and on the Falkland Plateau. Depths: 8 to 350 m.

The genus *Odontaster*, with about a dozen species, is otherwise distributed in the Antarctic, in South Africa, in New Zealand, and also in the North Atlantic, off Southern Europe and the U. S. A., and in the Pacific, off California (O. *crasus* FISHER which is nearly related to *O. penicillatus*).

Asterodon singularis (MÜLLER & TROSCHEL 1843)

Asterodon singularis FISHER 1940 p. 116

Chile records:

Goniodiscus singularis MÜLLER & TROSCHEL 1843 p. 116. Reloncaví.
Pentagonaster singularis BELL 1881 a p. 95. Tom Bay, Magellan Strait, 0–30 fms.
Asterodon granulosus E. PERRIER 1891 p. 132, pl. 11_4. Punta Arenas.
Asterodon singularis E. PERRIER 1891 p. 134 pl. 3_3. Magellan Strait.
Asterodon singularis LUDWIG 1903 p. 19. Baie du Torrent, Londonderry Island.
Asterodon singularis LUDWIG 1905 p. 40, pl. 5_{1-3}. Puerto Harris, Magellan Strait, 27 m; Puerto Pantalon, Beagle Canal, tidal belt.
Odontaster singularis LEIPOLDT 1895 p. 614 pl. 31_7. Iquique–Pisagua; Puerto Lagunas, 50–80 m.
Odontaster singularis MEISSNER 1896 p. 92, pl. 6_{5-6}. Calbuco; Chonos Archipelago; Bahia Park, Magellan Strait.
Odontaster singularis MEISSNER 1904 p. 19. Punta Arenas, tidal belt; Basket Island, southern Tierra del Fuego.
Goniodiscus singularis QUIJADA 1911 p. 162. Chonos; Calbuco.
Asterodon singularis KOEHLER 1923 p. 84. Fitzroy Canal, 13–14 m.
Odontaster singularis FISHER 1940 p. 116. 53°39′ S, 70°54′ W, 14–78 m.

Material: *St. M 98.* Northern end of Chiloé, 8 m.

The 6 specimens present measure from R. 36 mm with r. 20 mm to R. 64 mm with r. 32 mm. The number of superomarginal plates varies from 13 to 20. Like so many species of sea stars this one too varies between a short-armed, rather pentagonal form, f. *granulosus*, and a more long-armed, stellate form, f. *singularis*, (cf. FISHER 1940 p. 116). The specimens at hand are all representatives of the stellate form.

Asterodon singularis is distributed in South America from Iquique in Chile, abt. 20° S., to Cape Horn and on the Argentinean coast extends northwards to the Magellan region. Bathymetrical range: tidal zone to 80 m.

The only other species recognized in the genus, *A. miliaris*, occurs in New Zealand.

Linckiidae

Ophidiaster agassizii E. PERRIER 1881

The type-locality of this species was originally given as Chile without further particulars. The species is, however, apparently endemic to the Island of Juan Fernandez, from where it has been recorded by MEISSNER 1896 p. 99, LIEBERKIND 1920 p. 79, and FISHER 1931 p. 1, at depths from the tidal zone to 75 m.

Ganeriidae

Cycethra verrucosa (PHILIPPI 1857)

Cycethra verrucosa FISHER 1940 p. 129

Chile records:

Goniodiscus verrucosus PHILIPPI 1857 p. 132. Between Valparaíso and Río Maipu.
Cycethra simplex BELL 1881 a p. 96, pl. 9_{5-6}. Trinidad Channel, 30 fms.
Cycethra simplex E. PERRIER 1891 p. 122. Magellan Strait, 18 m. S. of Tierra del Fuego: Naturalist Bay, 35 m; Hoste Island, 28 m; Picton Island, 23 m; Gable Island; Orange Bay, 22 m, 26 m, 28 m.
Cycethra nitida LEIPOLDT 1895 p. 602, pl. 31_4. Puerto Lagunas, 50–80 m.
Cycethra electilis LEIPOLDT 1895 p. 605. Puerto Lagunas, 50–80 m.
Cycethra simplex MEISSNER 1896 p. 95. Bahia Park, Magellan Strait; Lagartija Islands; Calbuco.
Cycethra verrucosa MEISSNER 1904 p. 14. Smyth Channel: Eden Harbour; Chacabuco Bay; Puerto Bueno; Long Island, 8 fms. Punta Arenas, 13 fms; Uschuaia, Beagle Canal, tidal belt.
Cycethra verrucosa LUDWIG 1905 p. 53, pl. 6_{2-3}. Magellan Strait: Punta Arenas, tidal belt – 27 m; Puerto Harris, 27 m; Río Condor, 91 m; Borja Bay, 18 m; Fortescue Bay, 18–22 m. Beagle Canal, Harberton Harbour, 15 m; Puerto Toro, Navarin Island, tidal belt; Isla Nueva, 15 m.
Goniodiscus verrucosus QUIJADA 1911 p. 162. Algarrobo.

Material: *Sts. M 21; M 22; M 27; M 42; M 46; M 95.* All the stations north and east of Chiloé, tidal belt to 70 m.

The 12 specimens at hand range from R. 12 mm to R. 52 mm. R. is about 2 r. in the smallest specimens and in the larger specimens varies from 2.5 to 3.1 r. The colour of some living specimens was orange-yellow, orange-red, and vermilion.

FISHER in 1940 states about this species that "Probably no known sea star is more variable than *Cycethra verrucosa*, which is scarcely a species in the accepted sense of the term. Rather it is a complex of a considerable number of intergrading small species and formae, which may be likened to an asymmetrical net."

The list of synonyms given by FISHER in 1940 is the same as that given by KOEHLER 1923, only it includes also *Lebrunaster paxillosus* of E. PERRIER 1891. In the genus *Cycethra* is further described two nominal species, *C. lahillei* LORIOL 1904, from the Gulf of San Matias, and *C. macquariensis* KOEHLER 1920, from the Macquarie Island, which may both be included in the polymorphic *C. verrucosa*, and finally the species *C. cingulata* KOEHLER 1923, from the Falkland Islands, which latter species appears well distinguished from the forms of *C. verrucosa*.

Cycethra verrucosa is distributed round the southern end of South America, on the Chilean side northwards to Valparaíso, 33° S, and on the Argentinean side to abt. 38° S, on the Falkland Plateau, in South Georgia, South Orkneys, South Shetlands, and Marguerite Bay (Graham Land). In the Antarctic it is also recorded from Victoria Land, abt. 170° E, (BELL 1902), from Kerguelen (DÖDERLEIN 1928), and is probably also found in Macquarie Island (*C. macquariensis* KOEHLER 1920). The bathymetrical range is from low tide to 270 m.

Ganeria falklandica GRAY 1847

Ganeria falklandica FISHER 1940 p. 127

Chile records:

Ganeria robusta E. PERRIER 1891 p. 119, pl. 11_1. Gregory Bay, Magellan Strait, 28 m; Gable Island, Beagle Canal.
Ganeria papillosa E. PERRIER 1891 p. 121 pl. 12_1. Orange Bay, S. of Tierra del Fuego.
Ganeria falklandica MEISSNER 1896 p. 94. Lagartija Islands, Calbuco.
Ganeria falklandica KOEHLER 1923 p. 71. Fitzroy Channel, Magellan Strait, 13–14 m.

Material: *St. M 47.* Seno Reloncaví, east of northern end of Chiloé, 22 m. 1 specimen.

The single specimen collected is juvenile with R. about 12 mm and r. about 4 mm. Full-grown specimens recorded have R. up to 74 mm.

The aboral skeleton of the specimen at hand is a delicate open meshwork, where each plate bears 1 to 4 (usually 2) small spines imbedded in a common sheat. The superomarginal plates are each provided with a transverse comb of 4 spinelets connected by a web. The inferomarginal plates – defining the margin of the disk – bear a transverse comb of usually 5 spines, 2–3 times the length of the superomarginal ones. On the proximal inferomarginal plates there may, however, be 7 spines partly placed in double transverse rows. There are about 16–17 superomarginal and about 13–14 inferomarginal plates. Papulae are found singly in the meshes of the dorsal skeleton, but are absent on the marginal area and ventrally. Each mouth plate bears on its free margin 4–5 spines connected by a web and on the distal suboral surface 3 free spines. The adambulacral armature consists of 2 (exceptionally 3) subequal furrow spines in a more or less oblique row and of 2 slightly smaller spines in a parallel row on the aboral margin of the plate. The ventrolateral plates with one spine each are arranged in transverse rows with 4 plates between the mouth plates and the margin and outwards thereof a gradually smaller number of plates until they disappear half way out on the arms. The tube-feet are in a double series.

The young facies of this species has a remarkable likeness to the antarctic genus *Rhopiella* of FISHER 1940.

Ganeria falklandica is distributed round the southern end of South America from the northern end of Chiloé round Cape Horn to Cape Tres Puntas, Argentina, and on the Falkland Plateau, at depths of 7 to 137 m.

The single other species now recognized in the genus, *G. attenuata* KOEHLER 1908, is known from near the South Orkney Islands, 3246 m.

Asterinidae

The family Asterinidae includes a great number of species now assigned to a number of different genera. The taxonomy of the group seems far from clear and a detailed revision is badly needed. I have not attempted any revision here, however, but have simply used the generic names which I think most appropriate, viz., *Patiria* for *Asteriscus chilensis* LÜTKEN, and for *Parasterina obesa* H. L. CLARK, though possibly the latter species should rather be referred to the genus *Callopatiria* VERRILL 1913, if

this should be maintained, *Patiriella* for *Asteriscus calcaratus* PERRIER, and also for *Asterina fimbriata* PERRIER. The latter species, however, probably should not be referred to that genus, but I have not been able to make a better suggestion among the asterinid genera named.

In addition to these four good species from Chile, including the Juan Fernandez Islands, a nominal species is recorded, viz., *Asterina gayi* PERRIER 1875 p. 305, from Valparaíso, which as suggested by LEIPOLDT in 1895 must be identical with *P. chilensis*, and a problematic species, *Asterina pusilla* PERRIER 1875 p. 306, from Talcahuano, which perhaps is identical with *P. calcarata*, hitherto recorded only from the Juan Fernandez Islands.

Another species of Asterinidae, *Desmopatiria flexilis*, was described by VERRILL 1913 p. 484 on an unlabelled specimen found in a lot of Chilean sea stars such as *Heliaster helianthus* and *Meyenaster gelatinosus*. VERRILL consequently thought the place of origin of this species to be Chile, of which there is of course no proof.

The family Asterinidae has a worldwide occurrence in the littoral zone of the warm and temperate seas.

Patiria chilensis (LÜTKEN 1859)

Pl. 4. Fig. 2–3.

Patiria chilensis FISHER 1931 p. 2 pl. 3

Chile records:

Asteriscus calcaratus (pars) GAY 1854 p. 427. "Varias partes dē la República [hasta á Calbuco]."
Asteriscus chilensis LÜTKEN 1859 p. 61. Valparaíso.
Asterina gayi E. PERRIER 1876 p. 305. Valparaíso.
Asterina chilensis MEISSNER 1896 p. 96. Cavancha.
Asterina chilensis H. L. CLARK 1910 p. 334 pl. 2_{2-3}. Talcahuano.
Asterina calcaratus QUIJADA 1911 p. 162. Algarrobo.
Patiria chilensis FISHER 1931 p. 2 pl. 3. Antofagasta.

Material: *Sts. M 120; M 123; M 125; M 126; M 127; M 133; M 135.* These stations are all in the tidal zone of the Iquique, Coquimbo, Valparaíso and Talcahuano areas respectively.

The present 36 specimens range in size from R. 5 mm to R. 30 mm. The colour of one living specimen was recorded as reddish brown with green arm tips.

The first adequate description of this species was given by LÜTKEN in 1859 under the name of *Asteriscus chilensis*. The species had, however, already previously been recorded from Chile by GAY in 1854 (and PHILIPPI in 1857) under the name of *A. calcaratus*, but without a sufficient description, and, unfortunately, the first time when a such was published under that name, viz., by PERRIER, 1869 p. 100, a species, hitherto known with certainty only from the Juan Fernandez Islands, was described, instead of this one from northern Chile.

As has been customary for so many years the common Chilean mainland species ought, however, still to be known under the name of *chilensis*, whereas the Juan Fernandez species should be known as *calcaratus*, but with PERRIER and not GAY

as author. A further discussion of the matter is found under the remarks on *Patiriella calcarata*.

Patiria chilensis is distributed in the tidal zone of western South America from Payta in northern Peru to Talcahuano in Chile, abt. 37° S. Gay's record of the species from Calbuco probably is due to confusion with *Patiriella fimbriata*.

Patiria obesa (H. L. Clark 1910)

Pl. 3. Figs. 1–5.

Chile record:

Parasterina obesa H. L. Clark 1910 p. 334 pl. 3_{1-2} Talcahuano.

Material: *Sts. M 21; M 98; M 120.* These stations are in the Talcahuano area, tidal zone, at the northern end of Chiloé, and east of Chiloé, tidal zone to 8 m depth.

The six specimens present have the following measurements:

R.	35–40	28–42	35	48	40	45–46 mm.
r.	15	12–15	13	18	12	17–18 mm.

(One of the arms is extraordinarily short in both the two first-mentioned specimens and has been disregarded in the measurements).

The dorsal paxillae usually have up to about 20–25 granular spinelets, but in one specimen the number of granules is up to 40 on the largest paxillae. The ventral interradial paxillae have up to about 15 spinelets. In one specimen the marginal plates are difficult to distinguish, as was the case in the type-specimens, but otherwise they are very distinct (cf. pl. 3, fig. 1). There are from 2 to 5 adambulacral and from 3 to 9 subambulacral spines. In one specimen the oral plates bear only 1–2 suboral spines, and 2–3 marginal spines, otherwise the number of suboral spines varies from 4 to 9 and the number of marginal spines from 3 to 6. Living specimens are recorded as orange coloured.

Fisher, 1940 p. 270 and 1941 p. 451, has discussed his genus *Parasterina* of 1908 and shown that the type-species, *Patiria crassa* Gray 1847, should be referred to *Nepanthia*, whereas, e. g., *P. bellula* (Sladen 1889), to which species *P. obesa* is probably most nearly related, should be referred to the genus *Patiria* Gray (diagnosis: Fisher 1940 p. 269). I have here consequently recorded Clark's species *obesa* under the genus name *Patiria*, though I am not convinced that this is correct. Verrill in 1913 made *P. bellula* the type of a new genus, *Callopatiria*, and perhaps this genus ought to be retained and also include the species *obesa*.

Patiria obesa was known previously only from Talcahuano. The Swedish Chile Expedition found it besides here also at the northern end of Chiloé, and in the Zoological Museum of Copenhagen is a specimen from Argentina, near Mar del Plata, 37°30'S. In a zoogeographical respect the species thus seems to belong to the cold temperate element and therefore can be expected to be distributed round the southern part of South America. The known bathymetrical range is from the tidal zone to 8 m.

Patiriella calcarata (E. Perrier 1869)

Asteriscus calcaratus E. Perrier 1869 p. 100.
Asterina calcarata var. *selkirki* Meissner 1896 p. 97 pl. 6_3.
non *Asteriscus calcaratus* Gay 1854 p. 427, = *Patiria chilensis* (Lütken 1859).

The name *Asteriscus calcaratus* was introduced in the literature for the first time by Gay in 1854 in his Historia Fisica y Politica de Chile, and the distribution of the asterinid referred to was stated to be "varias partes de la República hasta á Calbuco". A few years later, in 1859, Lütken described a new species of asterinid from Chile, *Asteriscus chilensis*, noting its possible identity with *Asteriscus calcaratus* Gay, which species he at that time knew only from Philippi's reference to it in 1857. The first adequate description given in connection with the name of *calcaratus*, by E. Perrier 1869, showed, however, that *calcaratus* as described by Perrier was another species than Lütken's *chilensis*.

Perrier gave the locality of his specimen as Valparaíso, but since his time the species *calcaratus* in his sense has never been recorded with certainty from the mainland coast of Chile, but has proved to be common in the Juan Fernandez Islands (Meissner 1896 p. 97, Lieberkind 1920 p. 383, Fisher 1931 p. 2). – Other records of the species, viz., from Africa, are erroneous, due to confusion with, e. g., *Asterina exigua*. – It seems, therefore, that the record of *A. calcaratus* sensu Perrier from the mainland coast of Chile must be erroneous. We are also informed by Lieberkind, 1920 p. 385, that when Perrier gave his description of *calcaratus* there were in the Natural History Museum of Paris three specimens named in this way, viz., one from Valparaíso, donated by Gay in 1828, and two from Juan Fernandez, collected in 1841 during the voyage of the Astrolabe. Probably Perrier's description of the species thus was based solely on the specimens from Juan Fernandez, so that it was a lapse when this locality was not stated, but only the locality Valparaíso of the other specimen, which almost certainly belonged to the species *A. chilensis* of Lütken, since as yet *calcaratus* Perrier appears endemic to the Juan Fernandez Islands in depths from the tidal zone to about 20 m. It should be noted, however, that the specimen from Talcahuano described by E. Perrier in 1875 as *Asterina pusilla* may be a specimen of *P. calcarata*.

The asterinid from Juan Fernandez ought to be known also in the future under the name of *calcaratus*, but with Perrier 1869 as author, whereas Gay's *calcaratus* should be disregarded as identical with Lütken's *chilensis*. Meissner, 1896 p. 96, also referred Gay's and Philippi's records of Chilean *Asteriscus* to Lütken's *chilensis*, and he may have seen the original specimens.

Quijada, 1911, records some sea stars from Algarrobo, San Felix, and Chiloé under the name of *Asterina calcarata*. His material from Algarrobo almost certainly was of *P. chilensis*, that from Chiloé of *Patiriella fimbriata*, whereas that from San Felix probably was correctly named. Nothing definite can be stated about this, however, without a re-examination of the original specimens.

Patiriella fimbriata (E. Perrier 1876)

Patiriella fimbriata Fisher 1940 p. 148

Chile records:

?Asteriscus calcaratus (pars) Gay 1854 p. 427. Calbuco.
Asterina fimbriata E. Perrier 1875 p. 307. Chiloé.
Asterina fimbriata Bell 1881 a p. 97. Cockle Cove; Sandy Point.
Asterina fimbriata Studer 1884. p. 41. Tuesday Harbour, Desolation Island, Magellan Strait.
Asterina fimbriata var. *bispinosa* E. Perrier 1891 p. 111. Orange Bay, S. of Tierra del Fuego.
Asterina fimbriata Leipoldt 1895 p. 594. Chiloé–Chonos Archipelago, 8 m; Puerto Bueno, 50 m; Puerto Lagunas, 50–80 m.
Asterina fimbriata Meissner 1896 p. 97. Calbuco; Punta Arenas.
Asterina fimbriata Meissner 1904 p. 16. Puerto Charrua, Magellan Strait; Puerto Toro, Navarin Island; Harberton Harbour, 7 fms; Puerto Pantalon; western Beagle Canal; Picton Island, 4 fms.
Asterina fimbriata Ludwig 1905 p. 59, pls. 5_{10-13}, 6_{1-5}. Magellan Strait: Punta Arenas, 9–36 m; Cape Valentyn, 183 m; Puerto Harris, 27 m; Bahía Inutil, 20–27 m; Fortescue Bay, 18–22 m; Puerto Churruca, 36 m. Beagle Canal: Harberton Harbour, 11 m.
Patiriella fimbriata Fisher 1931 p. 3, pl. 5. Punta Arenas.

Material: *Sts. M 19; M 20; M 41; M 46; M 91; M 95; M 96; M 97; M 98; M 103; M 115.* One of these stations is in the tidal zone of the Magellan Strait, the others are situated north and east of Chiloé, from the tidal zone to 250–300 m.

The more than 100 specimens at hand range in size from R. about 3 mm to R. about 22 mm. A single specimen is six-armed. The colour of the living specimens is various tints of red, from faint red to dark-red.

The Chilean sea star known under the name of *Patiriella fimbriata* is common in the regions of Tierra del Fuego and the Magellan Strait and reaches on the Chilean side of South America northwards to the northern end of Chiloé and on the Argentinean side northwards to the Gulf of San Matias, and occurs also on the Falkland Plateau. The bathymetrical range is from the tidal zone to 250–300 m depth. Koehler in 1923 further records the species from south of the Antarctic Convergence, Graham Land 64° S, 360 m, but the occurrence here seems to need further verification.

E. Perrier in 1875, when describing his new species *Asterina fimbriata*, gave as type-locality "île Bourbon" (Réunion) and further mentioned some small specimens from the Island of Chiloé. Considering the great distance between these two localities Perrier thought that one of them was probably erroneous. The species of Asterinidae are usually rather restricted in their distribution, and if the type-locality île Bourbon, does not rest on a wrong label, the Chilean species is probably not at all the same species as described by Perrier in 1875. The name *fimbriata*, however, ought to be retained for the South American species, but in that case with Perrier 1891 as author.

Asterina stellifer var. *obtusa* Leipoldt 1895

Chile record:

Asterina stellifer var. *obtusa* Leipoldt 1895 p. 592. Magellan Strait 50–70 m.

The record of a form of *Asterina stellifer* (Moebius) from the Magellan Strait is rather remarkable. The species is otherwise distributed in the littoral zone (1–20 m)

of the southern warm Atlantic, from off Rio de Janeiro to Mar del Plata on the South American coast and from the Canary Islands to the Bay of Lüderitz on the African coast.

Poraniidae

Porania antarctica Smith 1876

(*Porania antarctica magellanica* Studer 1876)

Chile records:

Astrogonium fonki Philippi 1858 p. 267. Puerto Montt.
Porania magellanica Studer 1876 p. 459. Tuesday Bay, Magellan Strait.
Porania magellanica Sladen 1889 p. 363, pl. 59_5. Gulf of Penas, 85 m.
Porania antarctica E. Perrier 1891 p. 107. Punta Arenas. Southern Tierra del Fuego: Bourchier Bay, 140 m; Naturalist Bay, 20 m; Vauverlandt, 143 m; Washington Canal, 80 m; Murray Narrows, 200 m; Grévy Island.
Porania antarctica Leipoldt 1895 p. 588. Puerto Lagunas, 50–80 m.
Porania antarctica Meissner 1896 p. 99. Calbuco, 10 fms.
Porania antarctica Meissner 1904 p. 17. Puerto Bueno.
Porania antarctica Ludwig 1905 p. 51; pl. 6_1. Magellan Strait: Cape Valentyn, 183 m; Bahía Inutil, 36–55 m. Beagle Canal: Ushuaia, 22–27 m.
Porania antarctica Fisher 1931 p. 3, Punta Arenas.

Material: *Sts. M 16; M 17; M 21; M 24; M 38; M 40; M 47; M 81; M 104.* North and east of the northern end of Chiloé, 22 to 300 m.
La Serena (E. M. Poulsen 1952).

The about 30 specimens at hand vary from juvenile ones with R. less than 4 mm to adults with R. about 70 mm. The colour of the living specimens is recorded as various tints of dark-red.

The genus *Porania* includes the following species: *P. pulvillus* (O. F. Müller) distributed in the North-East Atlantic, *Porania insignis* Verrill distributed in the North-West Atlantic, and *P. antarctica* distributed round the southern end of South America, north to about 30° S on the Chilean side and 35° S on the Argentinean side, and in the Antarctic. The last species is very polymorphic and, according to Fisher 1940, falls into two subgroups with constantly different characters, distributed north and south of the Antarctic Convergence respectively, viz., *P. antarctica* Smith 1876 s. str. which occurs round the southern end of South America, on the Falkland-Magellan Plateau, at Kerguelen (the type-locality), at South Georgia, at Crozet, and Marion Island, in depths from 15 m to 3000 m, and *P. antarctica glabra* Sladen 1889 which is distributed round the Antarctic Continent, 10–575 m, and meets the other form in South Georgia and in the Marion-Kerguelen Area (the type-locality likewise being Kerguelen).

Koehler in his papers of 1911 and 1912 regarded all the southern specimens of *Porania* as belonging to one single species, but in 1917 described himself a new species from Kerguelen, *P. armata*, characterized by very broad marginal and outer subambulacral spines. This form is by Fisher 1940 p. 155 included in *P. antarctica glabra*, but should in my opinion, cf. below, be referred to *P. antarctica* s. str.

The present specimens have the same sparse dorsal tuberculation as the specimen figured by SLADEN, 1889 pl. 59, fig. 5, or even sparser. The usual number of marginal spines is one to each plate, but often the marginal spine seems composed of two, maybe three spines, and two and, more rarely, three marginal spines may actually be present on each plate, usually in the distal part of the arms. In one specimen marginal spines were absent from a considerable part of the arms though present most distally. Some few spines similar to the marginal ones may occur on the ventral side, and in one specimen there is, parallel to the margin, an almost complete row of such spines. Microscopic spinelets occur in varying number on both the ventral and dorsal sides. Distally in the arms there may be three adambulacral spines instead of the usual two.

FISHER, 1940 p. 155, thinks that the antiboreal *Porania antarctica* s. str. (as distinct from the antarctic *P. a. glabra*) falls into two distinguishable stocks, from the American and the African Quadrant respectively. The present material seems to support the supposition that at least the Chilean specimens should be ranged in a group of their own, and thus be referred to as *P. antarctica magellanica* STUDER.

In the material of *Porania* from the southern hemisphere available to me only a couple of specimens from Kerguelen, 88 m, could be referred to P. *antarctica glabra*. It seems to me that this antarctic form is distinguished from the forms north of the Antarctic Convergence mainly by the sparser development of dorsal tubercles, and the absence of marginal spines from the distal parts of the arms. As to these characters it seems that KOEHLER's *P. armata* should be referred to *P. antarctica* s. str., and not to *P. antarctica glabra*, as done by FISHER 1940. I have also had occasion to examine a specimen of *Porania*, which agrees perfectly with KOEHLER's description of *P. armata*, and which is from the east coast of South America, 36°02′S, 53°25′W, 73 fms, thus from a locality well north of the Antarctic Convergence and outside the otherwise known range of the forma *glabra*.

Astrogonium fonki PHILIPPI 1858 p. 267. – The two specimens on which this species was based were collected at Puerto Montt and were large, dark-red sea stars (8 cm in diameter). MEISSNER in 1898 in his note on the sea stars of PHILIPPI does not mention *Astrogonium fonki*, and the types are thus probably lost. It is evident from PHILIPPI's description, however, that his specimens were of the same species as described from the Magellan Strait by STUDER in 1876 as *Porania magellanica* and from Kerguelen by SMITH in 1876 as *P. antarctica*. But, of course, the two forms of *Porania* from the South American and the African Quadrants respectively ought also in the future to be known under the names of *P. antarctica antarctica* and *P. a. magellanica* under which names they have been repeatedly referred to in the last 80 years.

Echinasteridae

Poraniopsis echinaster E. PERRIER 1891

Pl. 2. Figs. 1–4.

Poraniopsis echinaster FISHER 1940 p. 158

Chile records:

Poraniopsis echinaster E. PERRIER 1891 p. 106, pl. 10_2. Nassau Bay, S. of Tierra del Fuego, 95 m.
Poraniopsis echinasteroides LEIPOLDT 1895 p. 589 pl. 31_6. Puerto Lagunas, 50–80 m.

Material: *Sts. M 14; M 16; M 17; M 18; M 27; M 41.* All the localities east of northern part of Chiloé, depths from 30 m to about 300 m.
La Serena (E. M. Poulsen 1952).

The 9 specimens at hand range from R. 33 mm with r. 11 mm to R. 60–65 mm with r. 20–25 mm. R. = 2 1/2–3 r. As to their spine-armature these specimens show some variation. The number of inferomarginal spines is usually 1 to each plate, but is also often 2 or 3, and distally in the arms of one specimen there is even 5 inferomarginal spines in an oblique row. The ventral interradial area may be naked, or there may be a varying number of spines, in the most armed specimens arranged in two distinct and one indistinct row parallel to the margin, 2 spines in the outer row often corresponding to one marginal plate. The armature of the dorsal side is also varying. There may be only comparatively few spines, and in one of the small specimens these dorsal spines are only up to 2 mm long, whereas in another specimen of a similar size they are up to 3 mm, but in that case they are very slender. In the large specimens the dorsal spines attain a length of 5 mm with a diameter of 2 mm at the base. One dorsal spine to each tubercle is the usual, but in some of the large specimens there may be 2, 3 or even 4 spines on some of the tubercles, and a few of such were found with 6 spines. The dorsal armature is more or less orderly arranged, in the large specimens in up to about 10 rows across the arms, and in about 7 longitudinal rows, which latter rows, however, are clearly distinct in only one of the specimens.

The colour of the living specimens is recorded as dark-red with the spines light-red or yellowish-white.

The distribution of *Poraniopsis echinaster* comprises the southern parts of South America and of Africa. The type-specimen was taken near Cape Horn, 95 m. LEIPOLDT's two Chilean specimens were from 45°20′ S, and the present material shows that the species occurs in Chile as far north as 30° S, depths 30–300 m. FISHER in 1940 recorded a specimen from Gough Island in the South Atlantic, 140–100 m, and a few specimens have been recorded by H. L. CLARK, 1923 and 1926, from the Cape region of South Africa, 160–230 fms, under the name of *P. capensis*.

CLARK himself suspected that his *Poraniopsis capensis* was identical with PERRIER's *P. echinaster*, and the present material has now shown that the South African specimens fall well within the range of variation of the South American form, the main difference stated by CLARK being that there was only 1 marginal spine to each plate in his form as against 2 in the type of *P. echinaster*.

The genus *Poraniopsis* besides *P. echinaster* (inclusive of *P. capensis*) comprises the following species: *P. inflata* (Fisher 1906) (inclusive of *P. inflata flexilis* (Fisher 1910)), distributed off the west coast of America from the Bay of Panama and the Galapagos Islands to Oregon, 20–600 fms, *P. japonica* Fisher 1939, only known from off Honshu, Japan, 182 fms, and *P. mira* (Loriol 1904) from the Bay of San Matias in Argentina. The differences among the species of *Poraniopsis* are not very pronounced, and it might seem reasonable to suspect that the Argentinean and the Chilean forms were closely related. In fact, however, *P. mira* is the species best distinguished from *P. echinaster*, which I have been able to ascertain by studying a specimen of *P. mira* in the Zoological Museum of Copenhagen from 34°50′ S, 52°50′ W, 58–65 fms, a locality somewhat more northerly than the type-locality.

Henricia obesa (Sladen 1889)

Henricia obesa Fisher 1940 p. 164

Chile records:

Cribrella obesa Sladen 1889 p. 544 pls. 96_{3-4}, 98_{5-6}. Magellan Strait, 245 fms.
Cribrella hyadesi Perrier 1891 p. 100 pl. 9_1. S. of Tierra del Fuego: New Year Sound, 35 m; Washington Canal, 80 m; Franklin Canal, 95 m; Murray Narrows, 200 m.
Cribrella hyadesi Leipoldt 1895 p. 478. Puerto Lagunas, 50–80 m.
Cribrella hyadesi Meissner 1896 p. 99. Calbuco 20 fms; (Iquique ?).
Cribrella pagenstecheri Meissner 1904 p. 13. Punta Arenas.
Cribrella pagenstecheri Ludwig 1905 p. 68. Magellan Strait: Punta Arenas, 9–36 m; Cape Valentyn, 183 m; Puerto Harris, 27 m; Puerto Condor, 91 m.

Material: *Sts. M 21; M 27.* Both stations east of the northern end of Chiloé, depths 25 and 45 m.

The two specimens at hand have R. 30 mm by r. 7 mm and R. 22 mm by r. 5 mm. The colour in life is recorded as sharply yellow.

The genus *Henricia* is an intricate one. A great number of species is described, and they are mostly very difficult to limit. Sladen's type-specimens of *obesa* were rather robust, whereas Perrier's types of *hyadesi* had the arms more slender. The present specimens are similar to *hyadesi* in this respect, but I agree with Fisher, 1940, in the futility of attempting to retain a forma *hyadesi* within the species *obesa*.

Henricia obesa is distributed round the southern end of South America from Cape Horn northwards to the Gulf of St. George on the Argentinean side and on the Chilean side at least northwards to the northern end of Chiloé, but is also recorded from Iquique (Meissner 1896), which latter record, as pointed out by Fisher 1940 p. 161, however, may refer to another species since the locality Iquique may not fit in with the general distribution of the species. *Henricia obesa* further occurs on the Falkland Plateau and is also recorded from Tristan da Cunha (Mortensen 1941). H. L. Clark 1916 (and 1946) records *H. hyadesi* from the south coast of Australia, but Fisher 1940 does not agree in referring the Australian specimens to the South American species. The bathymetrical range is about 10 to 400 m.

One more species of *Henricia* occurs in South America, viz., *Henricia studeri* (E. Perrier 1891), and otherwise the genus has a worldwide distribution.

Henricia studeri (E. Perrier 1891)

Henricia studeri Fisher 1940 p. 163

Chile record:

Cribrella studeri E. Perrier 1891 p. 102 pl. 9_2. South of Cape Horn, 99 m.

This species, besides from the type-locality, Cape Horn, is recorded also from the Falkland Plateau in depths of 75 to 341 m.

Henricia studeri has been regarded as synonymous with *Cribrella pagenstecheri* Studer 1885, with which species also *H. obesa* has been confused. *Cribrella pagenstecheri* would seem, however, to have a purely antarctic distribution. It is not quite clear whether all the records of *Henricia* from the Magellan Strait, cited above under *H. obesa*, really refer to that species; it can not be excluded that specimens also of *H. studeri* have been represented.

Solasteridae

Lophaster stellans Sladen 1889

Lophaster stellans Fisher 1940 p. 170 fig. E_3

Chile records:

Lophaster stellans Sladen 1889 p. 460 pls. 71_{4-14}, 72_{11-12}. Off Puerto Bueno, 75 m.
Lophaster pentactis E. Perrier 1891 p. 112. Murray Narrows, 200 m.

Material: *Sts. M 21; M 24; M 27; M 40.* All localities east of the northern end of Chiloé, 25 to 100 m depth.
La Serena (E. M. Poulsen 1952).

The five specimens present range in size from R. 17 mm with r. 6 mm to R. 38 mm with r. 15 mm. R. is about $2\,{}^1/_2$–3 r. The colour of living specimens is recorded as greyish yellow, and light orange with darker arm tips.

Sladen when describing the type-specimen with R. 32 mm gave the number of spinelets on the aboral paxillae as 5–8. In the present specimens, however, this number is greater; in a specimen with R. 21 mm it is up to 18, in one with R. 17 mm up to 10, and in the others up to 16. The usual number of subambulacral spines in the proximal part of the arms would seem to be 4, but is also often 3 or 5; Fisher, 1940, states 6 or 5 for specimens from the Falkland region.

Lophaster stellans is distributed round the southern end of South America, reaching off Chile to about 3° S, and off Argentina to about off Port Desire. It occurs also on the Falkland Plateau and is further recorded from the Antarctic, about 71° S, 87°–89° W, 450 m, but the antarctic form, according to Fisher 1940, is possibly a different race. The bathymetrical range is from 25 m to about 450 m.

Sladen 1889 has also a record of the species from off the Chonos Archipelago, about 2500 m depth, but as noted by Fisher in 1940 p. 171 it is doubtful whether this record really refers to this species.

The genus *Lophaster* has a worldwide distribution. Fisher 1940 refers *L. stellans* to a group including *L. quadrispinosus* H. L. Clark from South Africa, 194–290 fms,

and *L. marionis* Fisher from off the Marion Islands (46°48′ S, 37°49′ E) abt. 100 m. To this group may also be referred Koehler's *L. abbreviatus* described on a juvenile specimen from 62°10′ S, 41°20′ W, 3246 m.

Solaster regularis Sladen 1889

Solaster regularis Fisher 1940 p. 178

Chile records:

Crossaster australis E. Perrier 1891 p. 113, pl. 10_1. S. of Tierra del Fuego: Nassau Bay, 95 m; Bourchier Bay, 140 m; Beagle Canal, 198 m; Vauverlandt, 143 m; Grévy Island, 65 m; South of Washington Canal, 80 m; Franklin Canal, 95 m.

Solaster australis Ludwig 1905 p. 63. Cape Valentyn, Magellan Strait, 183 m.

Sladen, 1889 p. 454, pls. 60_1, 62_{5-6}, described this species on material collected off Chile, south of Wellington Island, about 330 m, and besides from the Magellan Strait and the Cape Horn region *Solaster regularis* is also recorded from the Falkland Plateau, 120–190 m. South of the Antarctic Convergence the species is replaced by a subspecies, *S. regularis subarcuatus*, which has a circumpolar distribution and a bathymetrical range of 240 to 500 m. The genus includes in all 15–20 species and has a worldwide distribution.

Korethrasteridae

Peribolaster folliculatus Sladen 1889

Peribolaster folliculatus Fisher 1940 p. 188, fig. C_5

Chile record:

Peribolaster folliculatus Sladen 1889 p. 464, pl. 73_{4-7}. Off Tres Montes, abt. 85 m.

This species, besides from the type-locality off the Peninsula of Tres Montes, Chile, is recorded from the Falkland Plateau, 80–130 m, and from the Marion Island, south of Africa, about 100 m.

The genus *Peribolaster* includes two other species: *P. macleani* Koehler, from the Antarctic, south of Australia, 190–580 m, and *P. biserialis* Fisher, from the Eastern Pacific, from the Bering Sea to Southern California, about 100–550 m.

Pterasteridae

Pteraster lebruni E. Perrier 1891

Pteraster lebruni Fisher 1940 p. 194

Chile record:

Pteraster lebruni E. Perrier 1891 p. 144, pl. 13_4. Washington Canal, S. of Tierra del Fuego, 80 m.

Pteraster lebruni is distributed, besides in the Cape Horn region, also on the Falkland Plateau and in South Georgia, 75–340 m, and is also recorded from the Antarctic (71° S, 89° W), 450 m. An at least very nearly related form occurs off Argentina, between Bahía Blanca and Río de la Plata, 85–190 m; it was described under the name

of *P. marplatensis* by Bernasconi in 1937 and may perhaps represent a distinct race of *lebruni*. Another subspecies, *P. lebruni brachiatus* Koehler 1917 occurs in Kerguelen and Marion Islands at about 100 m.

The genus *Pteraster* includes a great number of species, about 40, and has a worldwide distribution in depths from the littoral zone to more than 4000 m.

Pteraster gibber (Sladen 1889)

Pteraster gibber Fisher 1940 p. 197

Chile record:

Retaster gibber Ludwig 1905 p. 65, pl. 6_{6-7}. Puerto Harris, Magellan Strait, 27 m.

The type-locality of this species is in Chilean waters, off the entrance to Smyth Channel, 52°45′ S, 460 m, and besides from the Magellan Strait, 27 m, it is known also from the Falkland Plateau, 225 m.

Asteridae

Labidiasterinae

Labidiaster radiosus Lütken 1871

Pl. 4. Fig. 1.

Labidiaster radiosus Fisher 1940 p. 222, fig. I_2

Chile records:

Labidiaster lütkeni Bell 1881 a p. 94. Trinidad Channel, 30 fms.

Labidiaster radiosus E. Perrier 1891 p. 73. Punta Arenas, 18 m; S. of Tierra del Fuego: Orange Bay; Washington Canal, 80 m.

Labidiaster radiosus Meissner 1896 p. 101. Tabon, Calbuco, 15 fms.

Labidiaster radiosus Ludwig 1905 p. 71. Magellan Strait: Cape Valentyn, 183 m; Bahia Inutil, 19–27 m, 36–55 m.

Material: *Sts. M 16; M 104.* Both localities east of northern Chiloé, in 30 and 50–60 m depth respectively.

Two specimens are present, the one measures 23 cm in diameter and has 37 arms, 5 of which are very small, the other one measures about 35 cm in diameter and has 26 arms.

Labidiaster radiosus is distributed round the southern end of South America in depths from a few metres to about 200 m. On the Chilean side it reaches northwards to north of Chiloé, about 41°30′ S, and on the Argentinean side northwards to Mar del Plata, 37°50′ S. It occurs further on the Falkland Plateau.

The genus *Labidiaster* comprises only one other species, *L. annulatus* Sladen 1889, which replaces *L. radiosus* south of the Antarctic Convergence and is probably circumpolar; bathymetrical range: 90 to 450 m.

(*Labidiaster annulatus* has been recorded also from the Arafura Sea, abt. 1500 m, Challenger St. 191 (Sladen 1889 p. 595), but this must be erroneus. Sladen lists from

this station, besides some deep sea species and *L. annulatus*, also another antarctic species, *Porania spiculata* (= *P. antarctica glabra* Sladen), and since both these species were taken also at St. 151 in the Antarctic it seems probable that part of the material was wrongly labelled 191 instead of 151.)

Heliasterinae

Heliaster helianthus (Lamarck 1816)

Heliaster helianthus H. L. Clark 1907 p. 42, pls. 3_1, 7_{1-7}

Chile records:

Asterias helianthus Say 1825 p. 145. Guasco, Chili.
Asterias helianthus Meyen 1834 p. 222. Valparaíso.
Asterias helianthus Gray 1841 p. 181. Valparaíso.
Asteracanthion helianthus Gay 1854 p. 425. Valparaíso, y otras partes de la República.
Heliaster helianthus Cunningham 1871 p. 404. Coquimbo.
Heliaster helianthus E. Perrier 1876 p. 87. Chile.
Heliaster helianthus Leipoldt 1895 p. 547. Iquique; Copiapó; Coquimbo.
Heliaster helianthus Sluiter 1895 p. 64. Chili.
Heliaster helianthus Plate 1896 p. 224. Arica; Iquique; Coquimbo.
Heliaster helianthus Meissner 1896 p. 102. Iquique; Cavancha.
Heliaster helianthus H. L. Clark 1907 p. 42. Mejillones; Caldera.
Heliaster helianthus Quijada 1911 p. 161. Chile.
Heliaster helianthus Porter 1915. (This reference not seen by the present author.)
Heliaster helianthus Fisher 1931 p. 3. Tocopilla.
Heliaster helianthus Tortonese 1936 p. 76. Coquimbo.
Heliaster helianthus Porter 1940 p. 200. (This reference not seen by the present author.)

Material: *Sts. M 123*; *M 124*; *M 127*; *M 131*; *M 135*; *M 159*. In the Iquique, Antofagasta, Coquimbo and Valparaíso areas.

The size of the about 20 specimens at hand ranges from about 5 cm to about 30 cm in diameter. The number of arms varies from 24 to 39. The species was described in detail by H. L. Clark in his monograph of the genus (1907). Clark recorded the largest percentage of arm extending free outside the disk as 43 % in his material. In the present collection the percentage of free arm varies in small specimens (with a diameter of less than 10 cm) from about 31 % to about 50 %, and in the larger specimens, with a diameter of more than 20 cm, from about 30 % to about 48 %.

The armature of the dorsal side is fairly variable: Some specimens have only few and slender spines, and in preserved state these specimens have a darkish, almost black appearance, but usually there are on the arms a prominent median row of crowded reddish spines and some less prominent lateral rows of more yellowish spines. A few specimens have very numerous robust spines which cover the dorsal side almost completely and give the specimens in alcohol a whitish appearance.

The colour of two living specimens was noted. The one was almost black, only with a few yellowish dorsal spines in an irregular median row on the arms and in even less distinct lateral rows. The other one was more variegated, with a prominent median row of crowded red spines and prominent lateral rows of yellowish spines

on the arms, and gives the impression of a black disk with a center with red and yellow spots, and, radiating from this, fairly broad red radii alternating with pairs of more narrow, yellow radii.

A few specimens had small bivalves or barnacles in their stomachs.

Heliaster helianthus is distributed in the tidal zone of western South America. Its southern limit would seem to be just south of Valparaíso at about 33° S and its northern limit, according to H. L. Clark, 1907, should be about 2° N. Clark believed that the older records of the species from Mexico (Mazatlan, Stimpson 1857 p. 529) were due to confusion with *H. microbrachius*, but recently Caso, 1943 p. 111, has given a new Mexican record, from Acapulco. The distribution of *H. helianthus* becomes rather unusual if the record from Mexico holds true, since no other Chilean sea star is hitherto known to occur north of the region of Northern Peru to Equador.

The distribution of the genus *Heliaster* is restricted to the littoral zone of western America from Lower California in the North to Valparaíso in the South, and the outlying islands inclusive of the Galapagos and Juan Fernandez Islands. The group is split up in a number of forms. H. L. Clark 1907 in his monograph of the genus recognized 7 species, but admitted that not all of these were too well defined. These nominal species may be ranged in three taxonomic groups: The first group comprises *H. kubinjii* Xantus 1860 from Mexico to Central America with the Galapagos form *H. multiradiatus* (Gray 1840) (= *H. solaris* nom. nov. A. H. Clark 1920). The second group comprises *H. microbrachius* Xantus 1860, from Mexico to Central America, and *H. polybrachius* H. L. Clark 1907, from Peru and Mexico, with the Galapagos form *H. cumingii* (Gray 1840). — A. H. Clark 1946 erected a new species, *H. morrisoni*, for some specimens from the Panama Bay, which, however, may well be included in *H. microbrachius*. It appears also doubtful whether *H. polybrachius* in reality can be distinguished from *H. cumingii*. The third group of *Heliaster* is formed by *H. helianthus*, from Equador to Chile (Valparaíso), and *H. canopus* Perrier 1875 from the Juan Fernandez Islands.

In outer appearance the genus *Heliaster* forms a very characteristic group within the forcipulate asteroids. Viguier, 1879, erected for it a family of its own, Heliasteridae, which has been almost universally adopted by later authors, e. g., by Fisher in 1928 in his monograph of the North Pacific sea stars. H. L. Clark, however, came to the conclusion, when he monographed the genus in 1907, that its relation to the Asteridae, especially *Labidiaster*, was so close that only a subfamily, Heliasterinae, would be justified for it.

The species of *Heliaster* are remarkably littoral in their occurrence, being found from the lower tidal zone to depths of only a few metres. In the great increase in their number of arms with the accompanying increase in number of tube-feet and thus greater adhering power may be seen an adaptation to the life on the rocks in the turbulent waters of the littoral zone. Nothing seems to have been recorded of the reproduction of *Heliaster*, but it may be assumed that if a free-swimming larval state occurs it can only be of very short duration.

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Heliasterinae

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Heliaster helianthus LEIPOLDT 1895 p. 547. Iquique; Copiapó; Coquimbo.
Heliaster helianthus SLUITER 1895 p. 64. Chili.
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Material: *Sts. M 123; M 124; M 127; M 131; M 135; M 159.* In the Iquique, Antofagasta, Coquimbo and Valparaíso areas.

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The species of *Heliaster* are remarkably littoral in their occurrence, being found from the lower tidal zone to depths of only a few metres. In the great increase in their number of arms with the accompanying increase in number of tube-feet and thus greater adhering power may be seen an adaptation to the life on the rocks in the turbulent waters of the littoral zone. Nothing seems to have been recorded of the reproduction of *Heliaster*, but it may be assumed that if a free-swimming larval state occurs it can only be of very short duration.

Heliaster canopus E. Perrier 1875

Heliaster canopus H. L. Clark 1907 p. 45, pls. 3_2, 8_7.

This species is apparently endemic to the Islands of Juan Fernandez, from where it is recorded by E. Perrier 1875 p. 351, Plate 1896 p. 224, H. L. Clark 1907 p. 45, Quijada 1911 p. 161, and Fisher 1931 p. 4, partly under the name of *H. helianthus*.

Heliaster polybrachius H. L. Clark 1907

Material: Paita, Peru.

The single specimen present measures about 9 cm in diameter and has 35 arms.

H. polybrachius was described by H. L. Clark, 1907 p. 54, pls. 2_2, 7_{12}, 8_8, on material from Peru. Clark noted its close relationship to *H. cumingii* from Galapagos, and without information as to the place of finding it may be impossible to distinguish between these two forms.

The principal area of distribution of *H. polybrachius* is northern Peru, but Caso, 1943 p. 121, records it also from Mazatlan, Mexico, and some specimens in the Zoological Museum of Copenhagen labelled Acapulco, Mexico, must likewise be referred to this species. H. L. Clark, 1907, besides the specimens from Peru, records also a small old specimen labelled "Chili", but there is no reason to expect that the species occurs in Chile proper.

Coscinasterinae

Meyenaster gelatinosus (Meyen 1834)

Asterias gelatinosa H. L. Clark 1910 p. 337, pl. 6_2

Meyenaster gelatinosus Fisher 1928 p. 130, pls. 42_9, 43_7

Chile records:

Asterias gelatinosa Meyen 1834 p. 222. Valparaíso.
Asterias rustica Gray 1840 p. 179. Valparaíso.
Asteracanthion gelatinosus Müller & Troschel 1842 p. 15. Valparaíso.
Asteracanthion gelatinosus Gay 1854 p. 424. Valparaíso, etc.
Asterias gelatinosa E. Perrier 1875 p. 42. Valparaíso.
Asterias gelatinosus Sluiter 1895 p. 64. Valparaíso.
Asterias (Stolasterias) gelatinosa Meissner 1896 p. 103. Cavancha, Iquique; Tumbes, Talcahuano.
Asterias gelatinosus Quijada 1911 p. 160. S. Vicente.
Asterias rustica Quijada 1911 p. 161. Calbuco.
Meyenaster gelatinosus Fisher 1931 p. 5. Antofagasta.
Meyenaster gelatinosus Tortonese 1936 p. 82, pl. 1_3. Puerto Montt.
(Also other authors — e. g., Sladen 1889, Verrill 1914, Fisher 1928 — have recorded this species from Chile, but without definite statements as to localities.)

Material: *Sts. M 56; M 57; M 120; M 123; M 161.* All the stations are in the tidal belts of the northern end of Chiloé, Talcahuano, San Antonio and Valparaíso.

The largest of the 11 specimens at hand measures about 30 cm in diameter, but the largest specimens recorded were about 50 cm in diameter.

Meyenaster gelatinosus is distributed in the tidal zone of Western South America from Iquique to Chiloé. It is the only species in the genus, the nearest relation of which, according to Fisher, is the genus *Astrostole*.

Astrostole platei (Meissner 1896)

?Asteracanthion gemmifer E. Perrier 1869 p. 237.
Asterias (Coscinasterias) platei Meissner 1896 p. 103, pl. 16_2.
Asterias (Polyasterias) fernandensis Meissner 1896 p. 104, pl. 6_1.
non *Asterias fernandensis* De Loriol 1904, = *Allostichaster capensis* (E. Perrier).

This large, multiarmed sea star is hitherto recorded only from the Juan Fernandez Islands — the juvenile form under the name of *A. fernandensis* — at depths down to about 35 m (Meissner 1896, Quijada 1911 p. 160, Lieberkind 1920 p. 387, and Fisher 1931 p. 4). Fisher, 1931, notes, however, the close similarity between this form and the form from the Easter Island described as *A. paschae* by H. L. Clark in 1920. The genus *Astrostole* is otherwise represented in New Zealand, *A. scabra* (Hutton 1872), and its neighbouring islands: Kermadec, *A. rodolphi* (E. Perrier 1875), Lord Howe Island, *A. insularis* H. L. Clark 1938, and Norfolk Island, *A. multispina* A. M. Clark 1950.

E. Perrier in 1869, p. 237, described a species, *Asteracanthion gemmifer*, on a specimen reported to be from Chile and mentioned a second specimen, in bad state, from Australia. H. L. Clark, 1916 p. 74, suggested that this species was identical with the Australian species now known as *Coscinasterias calamaria* (Gray 1840), and in that case the locality Chile should be considered wrong. Possibly, however, Perrier's first specimen (with 11 arms) belonged to the Juan Fernandez species of *Astrostole*. Also another species apparently endemic to the Juan Fernandez Islands, *Ophidiaster agassizii*, was originally described by Perrier without other information of locality than "Chile". A re-examination of the type is, however, necessary for definitely settling the question.

Stichasterinae

Stichaster striatus Müller & Troschel 1840

Chile records:

Asterias aurantiaca Meyen 1834 p. 222. Valparaíso.
Stichaster striatus Müller & Troschel 1842 p. 21. Chili.
Tonia atlantica Gray 1841 p. 180. Valparaíso.
Asteracanthion aurantiacus Gay 1854 p. 426. "Chile en y el sur de San Carlos, etc." (San Carlos = Ancud.)
Stichaster aurantiacus Sladen 1889 p. 431. Valparaíso.
Stichaster aurantiacus Leipoldt 1895 p. 478. Puerto Lagunas 50–80 m, Valparaíso; Iquique–Pisagua.
Stichaster aurantiacus Sluiter 1895 p. 61. Chili.
Stichaster aurantiacus Meissner 1896 p. 101. Cavancha.
Stichaster aurantiacus H. L. Clark 1910 p. 337, pl. 8_1. Talcahuano.
Asterias aurantiacus Quijada 1911 p. 160. S. Vicente.
Stichaster striatus Verrill 1914 p. 362. Chili, south to Talcahuano.
Stichaster striatus Fisher 1931 p. 9. Tocopilla.

Material: *Sts. M 120; M 121; M 122; M 123; M 131; M 135.* These stations are in the tidal belt of the Iquique, Valparaíso, and Talcahuano areas.

The 14 specimens at hand measure up to 22 cm in diameter. Besides the normal five-armed specimens there are also two specimens with six and seven arms respectively. The colour of the living specimens is recorded as red and orange.

FISHER, 1930 p. 241, in the diagnosis of the genus *Stichaster*, of which this species is the genotype, says that the adambulacral plates are devoid of pedicellariae, but in fact such may sometimes be found. As is so often the case in sea stars the number of pedicellariae also in this species is very varying. A small number of very large unguiculate pedicellariae may occur on the base of the jaws and in the interradial area of the oral surface of the disk, but such large unguiculate pedicellariae may also be completely absent. Small unguiculate pedicellariae may be found scattered ventrally and in the furrow, and small crossed pedicellariae are numerous on the dorsal and marginal plates.

Stichaster striatus is distributed in the tidal zone of western South America from Callao in Peru south to the Smyth Canal (about 52° S). The only other species in the genus, *S. australis* (VERRILL 1867), is distributed round New Zealand.

Asteriinae

Anasterias antarctica (LÜTKEN 1856)

Pl. 5. Fig. 1–2.

Anasterias antarctica FISHER 1940 p. 233

Chile records:

Asteracanthion antarcticum LÜTKEN 1857 p. 105. Puntas Arenas.
Asterias rugispina STIMPSON 1861 p. 267. Magellan Strait.
Asterias rugispina E. PERRIER 1875 p. 61. Port Famine, Magellan Strait.
Asterias cunninghami E. PERRIER 1875 p. 75. Sandy Point.
Asterias cunninghami BELL 1881 a p. 93. Tom Bay, Magellan Strait, 0–30 fms.
Asterias antarctica STUDER 1884 p. 7. Punta Arenas.
Asterias rugispina STUDER 1884 p. 7. Tuesday Bay, Desolation Island, Magellan Strait.
Asterias hyadesi E. PERRIER 1886 p. 1146. (Cape Horn region).
Asterias spirabilis E. PERRIER 1891 p. 87. Magellan Strait: Punta Arenas; Ponsonby Bay, 5–6 m. S. of Tierra del Fuego: Orange Bay.
Asterias rugispina (pars) LEIPOLDT 1895 p. 563. Puerto Bueno, 50 m; Kanal von Patagonien.
Asterias (Sporasterias) antarctica MEISSNER 1896 p. 105, pl. 6_7. Punta Arenas; Bahia Park, Magellan Strait.
Sporasterias antarctica LUDWIG 1903 p. 39. S. of Tierra del Fuego: Torrent Bay, Londonderry Island; Beagle Canal.
Asterias antarctica (pars) MEISSNER 1904 p. 10. S. of Tierra del Fuego: Uschuaia, 1–2 fms; Picton Island, 3 fms; Puerto Toro; Lennox Island; Puerto Pantalon. Smyth Channel ?.
Sporasterias antarctica LUDWIG 1905 p. 70. Magellan Strait: Many localities, tidal belt to 183 m. South of Tierra del Fuego: Several localities, tidal belt to 86 m.
Sporasterias antarctica KOEHLER 1923 p. 14. Fitzroy Canal, Magellan Strait, 13–14 m; Navarin Island, S. of Tierra del Fuego, 0 m.
Sporasterias antarctica FISHER 1931 p. 9. Punta Arenas.

Material: *Sts. M 113; M 114; M 115.* In the tidal belt of the Magallanes area.

Sea stars of the genus *Anasterias* are very common in the littoral waters of southernmost South America. They have been ranged in a number of species since they show considerable variation, but the grouping of them is difficult and uncertain. LEIPOLDT, 1895, proposed that all the South American Asteridae with monacanthid adambulacral plates would prove to belong to one species only, viz., *Asterias rugispina* STIMPSON (which is a synonym of LÜTKEN's *Asteracanthion antarcticum*), and he gave an extensive list of synonyms and possible synonyms. MEISSNER in 1896 thought that LEIPOLDT had gone too far in his enumerations of synonyms, but in 1904 he adopted LEIPOLDT's view. This has not been entirely followed by other authors, however, and both the two great authorities on sea stars, KOEHLER and FISHER, list a number of separate species of southern South American monacanthid Asteridae: *studeri* PERRIER, *pedicellaris* KOEHLER, *minuta* PERRIER, *conferta* KOEHLER, and *stolidota* SLADEN (= *varium* PHILIPPI). A discussion of these species can be found in FISHER's papers of 1930 and 1940.

The type-specimens of *Anasterias antarctica* were from Punta Arenas, Magellan Strait, and are distinguished by having numerous pedicellariae on their dorsal side. The about half a hundred specimens collected by the Swedish Chile Expedition are mostly small, about 10–40 mm in diameter. The largest have a diameter of 62 mm, and the largest recorded in the literature were about 90 mm in diameter (FISHER 1940). According to FISHER it is very difficult, if not impossible, to distinguish the species of *Anasterias* on juvenile specimens alone. The present material, however, includes several specimens which agree completely with the type-specimens, other specimens have fewer pedicellariae, and most have arms slightly more slender than the types, but with a similarly well developed skeleton. It may also be noted that otherwise normal specimens may have some diplacanthid adambulacral plates.

The colour of some of the specimens when alive was recorded as dark green. The specimens recorded by MEISSNER, 1896 p. 105, however, apparently were pale yellowish when alive.

The species is brood-protecting and some of the larger specimens present carry a mass of embryos orally between the arms.

Anasterias antarctica is distributed round the southern end of South America and is especially common in the Magellanic region. It is not known with certainty how far north it reaches along the Chilean coast, but it is probably not much north of the Magellan Strait. On the Argentinean side it reaches at least north to Puerto Desedao (ca. 47° S) from where a specimen is represented in the Zoological Museum of Copenhagen, but STUDER, 1884 p. 7, also records the species (*A. rugispina*) from 38°10′ S, 56°26′ W, 30 fms. The species occurs also on the Falkland Plateau. The bathymetrical range is from about 1 to 185 m.

A single other species of monacanthid Asteridae occurs at Chile in the region south of Puerto Montt, viz., *Anasterias varium*, and some of the records of *Anasterias* cited above may have referred to this species and not to *A. antarctica*. Some records may also have referred to *Anasterias minuta*.

The genus *Anasterias* (*Anasterias* and *Sporasterias* of authors) includes about 10 species and has a circumpolar distribution in the subantarctic and antarctic regions.

Anasterias minuta (E. PERRIER 1875)

Anasterias minuta FISHER 1940 p. 237, pl. 19_4

Chile records:

Anasterias minuta E. PERRIER 1875 p. 81. (Port Famine, Magellan Strait ?).
Anasterias minuta (pars ?) E. PERRIER 1891 p. 93. Punta Arenas, 18 m. S. of Tierra del Fuego: Hoste Island, 15 m; Franklin Canal, 51 m; Orange Bay, 6 m, 26 m; Scott Island, 80 m; Vauverlandt, 143 m; New Year Sound; Rade de Gorée, 16 m; Beagle Canal, 12 m.

This species is recorded, besides from the Magellan Strait and the Cape Horn region, also from the Falkland Plateau. Bathymetrical range: 1 to 143 m. The type-specimen was collected by the Astrolabe but had no statement of locality. PERRIER, 1891 p. 93, notes, however, that it was probably collected at Port Famine in the Magellan Strait.

From PERRIER's description one would be inclined to regard his specimens as a form of *Anasterias antarctica*. FISHER in 1940 p. 237, however, recognized *A. minuta* as a distinct species, but notes that PERRIER's material of 1891 only in part belonged to it, and mentions also, p. 238, the possibility that *A. minuta* is the juvenile stage of a weak-skeleton forma of *A. pedicellaris* (KOEHLER 1923).

Anasterias minuta together with *A. antarctica* and the Falkland species *A. studeri* and *A. pedicellaris* are difficult to distinguish, and it is therefore not always certain to which species the records actually belong.

Anasterias varium (PHILIPPI 1870)

Pl. 5. Figs. 3–9.

Anasterias stolidota FISHER 1940 p. 239, pl. 19_6

Chile records:

? *Asteracanthion rubens* MÜLLER & TROSCHEL 1843 p. 113. Chili.
Asteracanthion varium PHILIPPI 1870 p. 272. Chiloé.
Asteracanthion fulgens PHILIPPI 1870 p. 274. Southern Chile.
Asterias verrilli BELL 1881 b p. 513, pl. 48_3. Magellan Strait: St. Martin's Cove; Peckett Harbour; Gregory Bay; Elizabeth Island.
Calvasterias stolidota SLADEN 1889 p. 590, pls. 101_{3-4}, 103_{11-12}. Messier Channel.
Asterias rugispina pars LEIPOLDT 1895 p. 564, 571. Chiloé; Chonos Archipelago; Puerto Lagunas; Darwin Canal.
Asterias antarctica var. *rupicola* MEISSNER 1896 p. 106. Puerto Montt.
Sporasterias antarctica var. *rupicola* LUDWIG 1903 p. 40. S. of Tierra del Fuego: Torrent Bay, Londonderry Island; Harberton Harbour, Beagle Canal; Magdalena Sound, Clarence Island, tidal belt.
Asterias antarctica pars MEISSNER 1904 p. 10. Smyth Channel; Punta Arenas; Beagle Canal.
Asterias antarctica QUIJADA 1911 p. 160. Seno Reloncaví.
Asterias rubens QUIJADA 1911 p. 160. Chonos.

Material: *Sts. M 18; M 22; M 23; M 47; M 59; M 64; M 74; M 91; M 94; M 95; M 99; M 100; M 103; M 136; M 139.* All stations in the regions of Chiloé and the Chonos Archipelago, tidal belt to 40 m, except *M 136* which is at Iquique, tidal belt.

The about 70 specimens at hand range in size from R. 4 mm to R. 55 mm. Their colour when alive is usually recorded as dark green, but one specimen apparently was orange.

The collections of the Swedish Chile Expedition show that this species is very common in the vicinity of Chiloé and Chonos, and specimens belonging to it have also been recorded several times in the literature. The species was, however, not recognized as distinct by the principal authors on the Chilean sea stars, LEIPOLDT and MEISSNER, who confused it with the Magellanic *Anasterias antarctica*.

It is probable that MÜLLER's and TROSCHEL's *Asteracanthion rubens* from Chile belonged to the present species. The first certain record of it was, however, given by PHILIPPI in 1870 who described a specimen from Chiloé under the name of *Asteracanthion varium*, in such a way that there can be no doubt that he had the present species before him. Also PHILIPPI's *Asteracanthion fulgens*, BELL's *Asterias verrilli*, and SLADEN's *Calvasterias stolidota* belong to *Anasterias varium*. LEIPOLDT, as mentioned above, did not recognize the species as distinct, but recorded specimens thereof together with *A. rugispina* (= *A. antarctica*). Notably that part of his material which came from Chiloé and the Chonos Archipelago must have been of *A. varium*, and he refers also repeatedly to what he calls *Calvasterias*-specimens. MEISSNER in 1896 recorded the species as *A. antarctica* var. *rupicola*; in 1904 he included it in *A. antarctica*, but in the enumeration of the material he for part of it notes: *rupicola*-form. Both KOEHLER, 1923, and FISHER, 1940, recognized *Calvasterias*, or *Anasterias, stolidota* as distinct but add no new localities.

Though the present species has so often been confused with *A. antarctica* the two species are in reality usually easy to distinguish, as is also evident from the original descriptions of *varium* and *stolidota* when compared with *A. antarctica*.

A. varium has in general a thick pustulate skin. The dorsal skeleton is an open mesh-work, in some specimens almost completely degenerated on the disk, and there are only few and small dorsal spines. Pedicellariae are sometimes fairly numerous on the arms, but on the disk they are few and often totally absent. The papulae are prominent and found either singly in the skeletal meshes or in groups of up to about 20. The superomarginal plates each carry a single spine and usually form a prominent ridge. The inferomarginal plates which define the margin of the oral side usually carry 2 spines each, but the number may vary from 1 to 4. The number of marginal plates are smaller in *A. varium* than in *A. antarctica*, which among other things gives the two species a quite different appearance. In specimens with R. 22 mm there are only 16–18 inferomarginal plates in *A. varium*, but 23–25 plates in *A. antarctica*. Specimens of *A. varium* usually have fairly broad arms and thus a much more prominent ventrointerradial area than *A. antarctica*, but some specimens have very slender arms. These have also more slender and longer spines than is usual. In specimens of *A. varium* with R. about 40 mm R. may vary from 3 r. to 5 r.

Perhaps also the colour of the animals when alive may help to distinguish the two species, *A. varium* is dark green in general, *A. antarctica* probably yellowish brownish, but these colours are not without exceptions.

The juvenile specimens at hand from Iquique, R. 4–5 mm, are without dorsal pedicellariae and have more dorsal spines than the juvenile specimens from the Chiloé area. There may thus be a slight doubt as to its correct identification.

Anasterias varium is distributed in the littoral and the upper sublittoral zone (0–40 m) of the west coast of southern South America; it is very common in the region of Chiloé and Chonos, and apparently reaches as far north as Iquique and south to Cape Horn. SLADEN recorded also a juvenile specimen from the Falkland Islands, but, according to FISHER 1940, this was probably a specimen of *A. conferta* (KOEHLER 1923), which, however, may prove to be the same species as *A. varium*. Due to the confusion with *A. antarctica* it is often impossible to state with certainty which species was obtained in the different localities recorded in the literature.

Diplasterias brandti (BELL 1881)

Diplasterias brandti FISHER 1940 p. 249

Chile records:

Asterias brandti BELL 1881 a p. 91, pl. 9_1. Trinidad Channel, 30 fms.
Asterias neglecta BELL 1881 a p. 94, pl. 9_4. Gregory Bay, Magellan Strait.
Diplasterias lütkeni E. PERRIER 1891 p. 81. S. of Tierra del Fuego: Vauverlandt, 143 m; Franklin Canal, 95 m; Nassau Bay, 95 m.

The type-locality of this species is Trinidad Channel, off Chile at 50° S. Otherwise the species is recorded from the Magellan Strait, the Falkland Plateau (by MEISSNER 1904 p. 7 also off Argentina, 38° S, 52 fms), and South Georgia. South of the Antarctic Convergence the species has been found in the South Shetland and Alexander I Islands. Bathymetrical range: low tide to 320 m.

Cosmasterias lurida (PHILIPPI 1858)

Pl. 6. Figs. 1–2.

Cosmasterias lurida FISHER 1940 p. 263

Chile records:

Asteracanthion luridum PHILIPPI 1858 p. 265. Castro (Chiloé).
Asteracanthion germaini PHILIPPI 1858 p. 266. Castro.
Asteracanthion sulcifer E. PERRIER 1869 p. 43. Port Famine, Magellan Strait.
Asteracanthion clavatum PHILIPPI 1870 p. 269. Southern Chile.
Asteracanthion fulvum PHILIPPI 1870 p. 270. Puerto Montt.
Asteracanthion spectabile PHILIPPI 1870 p. 271. Chiloé.
Asteracanthion mite PHILIPPI 1870 p. 272. Southern Chile.
Asterias sulcifer E. PERRIER 1875 p. 58. Port Famine, Magellan Strait.
Asterias alba BELL 1881 a p. 92. Sandy Point, Magellan Strait.
Asterias obtusispinosa BELL 1881 a p. 92. Sandy Point 9–10 fms.
Asterias sulcifera STUDER 1884 p. 10. Desolation Island, Magellan Strait.

Asterias (Cosmasterias) tomidota SLADEN 1889 p. 576, pl. 105_{8-10}. Gulf of Penas, 85 m.
Cosmasterias tomidota LEIPOLDT 1895 p. 552. Darwin Canal; Puerto Bueno, 50 m; Puerto Lagunas, 50–80 m.
Cosmasterias sulcifera LEIPOLDT 1895 p. 553. Magellan Strait; Chonos Archipelago.
Diplasterias sulcifera E. PERRIER 1891 p. 77. Magellan Strait: Western entrance, 143 m; Punta Arenas, 18 m, 25 m. Southern Tierra del Fuego: Franklin Canal, 51 m; Gretton Bay, 24 m, Orange Bay, 26 m; Fleuriais Bay, 33 m; Vauverlandt, 143 m; Washington Canal, 80 m; Scott Island, 80 m; Gable Island, 111 m; Naturalist Bay, 20 m; Gretton Bay, 30 m; Carfort Bay, 30 m; Grevy Island, 65 m.
Asterias (Cosmasterias) sulcifera MEISSNER 1896 p. 102. Puerto Montt; Calbuco; Magellan region.
Cosmasterias lurida LUDWIG 1903 p. 40. Magellan Strait.
Diplasterias lurida MEISSNER 1904 p. 6. W. Patagonia; Magellan Strait: Punta Arenas; Puerto Charruca. Southern Tierra del Fuego; Ushuaia; Navarin Island; Harberton Harbour.
Cosmasterias lurida LUDWIG 1905 p. 69. Magellan Strait: Río Seco, 18–36 m; Porvenir, 13–18 m; Puerto Harris, 27–36 m; Bahía Inutil, 36–55 m; Puérto Angosta, tidal belt. Southern Tierra del Fuego: Puerto Pantalon, tidal belt; Romanche Bay, 20–27 m.
Asterias luridum QUIJADA 1911 p. 160. Castro.
Asterias germaini QUIJADA 1911 p. 160. Castro.
Cosmasterias lurida KOEHLER 1912 p. 22 pls. 2_{1-7}, 5_8. Tuesday Bay, Desolation Island, Magellan Strait, 8 m.
Cosmasterias lurida FISHER 1931 p. 7. Punta Arenas.

Material: *Sts. M 16; M 21; M 24; M 27; M 40; M 41; M 42; M 47; M 50; M 85; M 91; M 104; M 105; M 106; M 108; M 115; M 139.* These stations are all in the area north and east of Chiloé, with the exception of one in the Magellan Strait. The depths are from the tidal belt to 300 m. La Serena (E. M. Poulsen 1952).

The about 35 specimens at hand range in size from juveniles with R. 7 mm and R. about $3\,^1/_2$ r. to large ones with R. up to 158 mm and R. varying from about 5 to about 8 r. (e. g., R. 158 mm with r. 18 mm, and R. 135 mm with r. 28 mm). The colour of the living specimens is usually recorded as violet, but also as reddish brown, grayish, brownish, and greenish. A small specimen seems to have been orange.

Cosmasterias lurida is distributed in the southern part of South America from the region of Tierra del Fuego and northwards on the Chilean side to La Serena, about 30° S, and on the Argentinean side to the Gulf of San Matias, also on the Falkland Plateau and in South Georgia. The bathymetrical range is from 0 m to about 650 m.

PHILIPPI's *Asteracanthion luridum* was based on specimens from Chiloé, and most of the other nominal species which he described were also from that region. The specimens at hand show some variation in the development of their skeletal armature, but they are clearly all of the same species. FISHER in 1940 recorded all South American specimens of *Cosmasterias* under the name of *C. lurida*, but stated that a revision based on a really large material is necessary to decide whether there is only one polymorphic species or several species in the Magellan-Falkland region. Probably, however, the genus is represented in South America with one species only. Further the genus includes a South African species, *C. felipes* (SLADEN), and an Australian species, *C. dyscrita* H. L. CLARK.

Allostichaster capensis (E. Perrier 1875)

Asterias capensis E. Perrier 1875 p. 73.
Asterias fernandensis Loriol 1904 p. 41, pl. 3_{1-8}.
Cosmasterias sp. Lieberkind 1920 p. 388.
Allostichaster inaequalis Koehler 1923 p. 50, pls. 1_{7-8}, 7_{1-3}.
Cosmasterias capensis Mortensen 1933 p. 276, pl. 15_{11-12}, text-fig. 14 a.
Allostichaster inaequalia Mortensen 1941 p. 4, pl. 1_1.
Allostichaster inaequalis Bernasconi 1941 p. 41, pl. 1_{5-6}.

Chile record:

A. capensis was hitherto not known from the main coast of Chile, but has been recorded by Lieberkind from the Juan Fernandez Islands as *Cosmasterias* sp.

Material: *St. M 98*, Chanal Chacao, north of Chiloé, 8 m. 1 specimen.

The single specimen present has 6 arms, the longest of which measures about 7 mm.

Lieberkind in 1920 mentioned from Juan Fernandez, Masatierra, 10—35 m, some young sea stars under the name of *Cosmasterias* sp. I have been able to re-examine one of these specimens and find that this and the specimen at hand agree with Perrier's *Asterias capensis* redescribed and figured by Mortensen 1933.

Lieberkind noted that his specimens agreed completely with the specimens from the Gulf of San Matias which Loriol in 1904 recorded under the name of *A. fernandensis*, but not with the original specimens of *A. fernandensis* described by Meissner (which latter are juveniles of *Astrostole platei*).

To *Allostichaster capensis* must also be referred *A. inaequalis* described by Koehler, 1923, on specimens from the coast of Argentina, 51°33′ S, and 37°50′ S, and recorded from the same region by Bernasconi, 1941, who also notes that Loriol's *A. fernandensis* belongs to the same species, and further from Tristan da Cunha by Mortensen, 1941.

Mortensen, 1941 p. 4, when discussing *A. inaequalis*, mentioned its great resemblance to and possible identity with Perrier's *Asterias capensis*, but thinks that this latter species should be left out of consideration since he doubts that it actually came from the Cape region. A distribution comprising besides the littoral regions of southern South America also those of South Africa is not extraordinary, however, and even subspecific differences do not seem to occur between the specimens from these two regions.

The distribution of *A. capensis* as known at present is thus: Cape, South Africa; Tristan da Cunha; coast of Argentina from 37°50′ S to 51°33′ S; coast of Chile, north of Chiloé, 41°50′ S, and Juan Fernandez. The bathymetrical range is from the tidal zone to about 100 m.

Leptasterias hartii Rathbun 1879 from "Patagonia" and *Stephanasterias hebes* Verrill 1915 from the east coast of South America, 36°47′ S, are referred to the genus *Allostichaster* by Fisher, 1930. They are poorly described and may belong to the present species. One species, *A. polyplax* (Müller & Troschel), is distributed in southern Australia, Tasmania, and New Zealand, and also another species, *Allostichaster insignis* (Farquehar) occurs in New Zealand.

Neosmilaster steineni (Studer 1885)

Neosmilaster steineni Fisher 1940 p. 259

Chile records:

Diplasterias steineni E. Perrier 1891 p. 84. South of Cape Horn, 99 m.
Podasterias steineni Koehler 1923 p. 30. Beagle Canal, 100 m.

This species is distributed besides in the Cape Horn region on the Falkland Plateau and in South Georgia, in depths of about 100 to 160 m.

The only other species in the genus, *N. georgianus* Studer 1885, is antarctic and known from South Georgia, South Orkney Islands, and the Palmer Archipelago, in depths of about 1 to 300 m.

Summary

The present paper deals with the 20 species of sea stars collected by the Swedish Chile Expedition 1948—49, including one species new to the fauna of the mainland coast of Chile, *Allostichaster capensis* (Perrier). The paper further surveys the whole fauna of sea stars known from the Chilean shelf, i. e., at depths down to 200 m.

The sea stars were among the best known of the Chilean marine invertebrates. They have been mentioned in many papers, a list of which is given p. 49, and under many different names, more than two thirds of which, however, are synonyms only. All the different specific names hitherto used for Chilean sea stars are listed p. 11 with references to which valid species they belong.

A zoogeographical survey of the Chilean fauna of sea stars is given pp. 3—7 and fig. 1.

A few (3—4) species belong to, and are peculiar to the fauna of Peru and northern Chile, occurring in depths from 0 to about 10 m. They are *Patiria chilensis, Heliaster helianthus, Meyenaster gelatinosus,* and possibly a species of *Henricia.*

Four species are distributed both north and south of the zoogeographical boundary in the region of Coquimbo to Chiloé — between the warm-temperate and cold-temperate regions. They are all peculiar to the fauna of Chile and occur all from shallow water to depths of almost 100 m. They are *Luidia magellanica, Asterodon singularis, Stichaster striatus,* and *Anasterias varium.*

Twenty-five species are recorded solely from south of the zoogeographical boundary mentioned, and only about half of these occur in shallow water (in depths of less than about 20 m). Seven of the shallow-water species are peculiar to southern South America, from Coquimbo or Chiloé round Tierra del Fuego to La Plata, and on the Falkland Plateau, viz., *Odontaster penicillatus, Ganeria falklandica, Patiria obesa, Patiriella fimbriata, Henricia obesa, Labidiaster radiosus,* and *Cosmasterias lurida.* Together with these are also found two species with a wider distribution, viz., *Cycethra verrucosa,* which is also antarctic, circumpolar, and *Allostichaster capensis,* which also occurs in South Africa. Two of the shallow-water species appear to be

peculiar to the southernmost South America — the Magellan-Cape Horn region and the Falkland Plateau — viz., *Anasterias antarctica* and the somewhat doubtful *Anasterias minuta*.

The Islands of Juan Fernandez seem to have a sea star fauna of their own. Four of the five species recorded are hitherto not known with certainty from any other place, viz., *Ophidiaster agassizii, Patiriella calcarata, Heliaster canopus*, and *Astrostole platei*. The fifth species, *Allostichaster capensis*, occurs also in southern Chile and South Africa.

Resumen

Esta publicación se dedica, principalmente, a las 20 especies de estrellas de mar colectadas por la Expedición de la Universidad de Lund a Chile 1948—49, incluyendo una especie nueva para la costa continental de Chile, *Allostichaster capensis* (PERRIER). Además se señala la totalidad de la fauna de estrelles de mar conocidas para la plataforma continental chilena, es decir hasta una profundidad de 200 metros.

Las estrellas de mar se encuentran entre los invertebrados marinos mejor conocidos de las costas chilenas. Se han mencionado en numerosas publicaciones, una lista de las cuales se dá en la pag. 49, y bajo diversos nombres, más de 2/3 de los cuales son, sin embargo, sinónimos. Todos los diversos nombres específicos usados para las estrellas de mar chilenas se encuentran anotados en la pag. 11 refiriéndolos a las especies válidas a las que pertenecen.

Una visión zoogeográfica de la fauna chilena de estrelles de mar se dá en las pp. 3—7 y fig. 1.

Unas pocas especies (3—4) son características de la fauna de Perú y del Norte de Chile y viven a profundidades entre 0 y alrededor de 10 m. Ellas son: *Patiria chilensis, Heliaster helianthus, Meyenaster gelatinosus* y posiblemente una especie de *Henricia*.

Cuatro especies están distribuídas al Norte y al Sur del límite zoogeográfico (región de Coquimbo a Chiloé) entre la región templada fría y caliente. Estas especies son todas peculiares de la fauna de Chile y se encuentran desde las aguas someras hasta profundidades de casi 100 m. Ellas son: *Luidia magellanica, Asterodon singularis, Stichaster striatus* y *Anasterias varium*. 25 especies han sido encontradas unicamente al Sur del límite mencionado y sólo alrededor de la mitad de ellas se encuentra en aguas someras (a profundidades menores de 20 metros). 7 de las especies de aguas someras son peculiares de la parte sur de Sud-América desde Coquimbo o Chiloé, rodeando Tierra del Fuego hasta La Plata y encontrándose también sobre la plataforma continental de las Islas Falkland. Ellas son *Odontaster penicillatus, Ganeria falklandica, Patiria obesa, Patiriella fimbriata, Henricia obesa, Labidiaster radiosus* y *Cosmasterias lurida*. Junto con éstas se han encontrado también 2 especies con una distribución más amplia: *Cycethra verrucosa* que es también antártica y circumpolar y *Allostichaster capensis*, que también se encuentra en Sud-Africa. Dos especies de aguas someras parecen peculiares del extremo Sur de Sud-América—Región de Magallanes-Cabo de Hornos y plataforma continental de las Islas Falkland: *Anasterias antarctica* y la algo dudosa *Anasterias minuta*.

Las Islas de Juan Fernandez parecen tener una fauna de estrellas de mar propia. 4 de las 5 especies observadas no son conocidas con certeza de ningun otro lugar: *Ophidiaster agassizi, Patiriella calcarata, Heliaster canopus* y *Astrotole platei*. La quinta especie, *Allostichaster capensis*, también se encuentra en el Sur de Chile y en Sud-Africa.

Key to the littoral sea stars of Chile

The key is intended to make it possible for the shore- and shallow-water collector to readily identify his specimens. It is very artificial and can be used only for the species included. The size stated is the maximum-size recorded. The colour is that of the dorsal side and may be more variable than recorded hitherto.

1. More than 15 arms 2
   Less than 15 arms 4
2. (1) The arms about twice as long as the diameter of the disk: ... *Labidiaster radiosus*, red, 35 cm. Pl. 4. Fig. 1.
   The arms shorter than the diameter of the disk 3
3. (2) Free part of arms about 1/4 of the diameter of the disk (mainland coast of Chile): ... *Heliaster helianthus*, blackish with yellow or red spines, 35 cm.
   Free part of arms 1/3 to 1/2 of the diameter of the disk (Juan Fernandez): ... *Heliaster canopus*, 15 cm.
4. (1) More than 5 arms 5
   Arms 5 7
5. (4) Arms 7 or more,* (Juan Fernandez): ... *Astrostole platei*, yellowish-brown, 32 cm.
   Arms 6 6
6. (5) Large form with dorsal tubercles: ... *Meyenaster gelatinosus*, yellowish-brownish with white tubercles, 50 cm.
   Small form without tubercles. Arms 5—6, often of unequal length: ... *Allostichaster capensis*, (reddish?), 6 cm.
7. (4) Form stellate 8
   Form almost pentagonal. The arms shorter than the diameter of the disk 20
8. (7) Free part of arms much longer than the diameter of the disk 9
   Free part of arms about the length of the diameter of the disk 17
9. (8) Arms distinctly flattened: ... *Luidia magellanica*, black, 50 cm. Pl. 1. Figs. 1—2.
   Arms more or less cylindrical 10
10. (9) Ventral arm-furrow narrow, can be closed 11
    Ventral arm-furrow broad, can not be closed 13
11. (10) Arms tapering 12
    Arms not tapering (Juan Fernandez): ... *Ophidiaster agassizii*, red, 14 cm.
12. (11) Covered with small spines: ... *Henricia obesa*, yellow, 15 cm.
    Covered with granules: ... *Stichaster striatus*, orange, red, 33 cm.
13. (10) Dorsal spines in small tufts on a common shaft: ... *Lophaster stellans*, greyish-yellow, orange, 7 cm.
    Dorsal spines single 14

* Seven-armed specimens may be found in normally 5- or 6-armed species, and may thus erroneously lead here.

4. (13) The plates along the furrow with two spines each 15
The plates along the furrow with one spine each 16
5. (14) Dorsal spines more or less granular, numerous, arranged in a few, more or less distinct longitudinal bands °°: ... *Cosmasterias lurida*, purple, greyish, brownish, greenish, red, 35 cm. Pl. 6. Figs. 1–2.
Dorsal spines slender, arranged in a few longitudinal series: ... *Diplasterias brandti*, 17 cm.
6. (14) Dorsal side with a pulpy skin, weak skeleton and few spines: ... *Anasterias varium*, dark green, 12 cm. Pl. 5. Figs. 3–9.
No especially conspicuous pulpy skin, numerous dorsal spines °°°: ... *Anasterias antarctica*, yellowish, greenish, 9 cm. Pl. 5. Figs. 1–2.
7. (8) Dorsal side with scattered, large and conspicuous spines: ... *Poraniopsis echinaster*, dark red, 14 cm. Pl. 2. Figs. 1–4.
Dorsal spines small and numerous 18
8. (17) Spines of the dorsal side granular, partly in large groups of more than 10 and partly in small groups of a few only. Tip of arms blunt: ... *Patiria obesa*, orange, 9 cm. Pl. 3. Figs. 1–5.
Dorsal spines in uniform groups of a few spines. Arms pointed 19
9. (18) Spines on ventral side in groups of a few spines: ... *Cycethra verrucosa*, orange, red, 20 cm.
Spines on ventral side singly on the plates: ... *Ganeria falklandica*, orange-red, 15 cm.
10. (7) The margin with large and conspicuous plates. The form distinctly flattened 21
No conspicuous marginal plates. The form rather cushion-shaped 22
11. (20) Two large recurved spines at each mouth angle: ... *Asterodon singularis*, red, 14 cm.
One large recurved spine at each mouth angle: ... *Odontaster penicillatus*, yellow-brown, orange, 10 cm.
12. (20) Some large tubercles dorsally. A series of distinct spines along the margin. Body covered by a thick tough skin: ... *Porania antarctica*, dark red, 14 cm.
No tubercles and no differently formed marginal spines 23
13. (22) Dorsal side with scattered single spinelets. Ventral side with the spines singly on the plates: ... *Patiriella fimbriata*, red, 5 cm.
Dorsal side with the spinelets in groups 24
14. (23) The spinelets on the dorsal side of uniform appearance. Ventral side with usually 2 spines on each plate: ... *Patiria chilensis*, reddish brown, reddish blue, 5 cm. Pl. 4. Figs. 2–3.
Spinelets on the dorsal side partly fairly robust ones in groups of more than 10, partly slender and smaller ones in groups of less than 10. Only one spine on the central ventral plates, though 2 on the plates near the margin (Juan Fernandez): ... *Patiriella calcarata*, greyish green, 7 cm.

°° Five-armed specimens of the usually 6-armed *Allostichaster capensis* may lead here, but are distinguished by their usually unequally long arms.

°°° The somewhat doubtful *Anasterias minuta* is not considered in the key.

List of the literature including references to Chilean sea stars

Albert, Frederico 1902. Los perjuicios que causan las "estrellas de mar" a la pesqueria. – Actes Soc. Sci. Chili 12. (Not seen by the present author.)

Bell, Jeffrey J. 1881 a. Echinodermata. Account of the zool. coll. of H. M. S. "Alert" in the Straits of Magellan and on the Coast of Patagonia. – Proc. Zool. Soc. London 1881.

– 1881 b. The species of the genus Asterias. – Proc. Zool. Soc. London 1881.

Bernasconi, I. 1943. Los Asteridos Sudamericanos de la Familia Luidiidae. – An. Mus. Argentino Cienc. Nat. 41.

Clark, Austin H. 1917. Three new starfish and one new brittle-star from Chile. – Proc. Biol. Soc. Washington 30.

Clark, H. L. 1907. The starfishes of the genus Heliaster. – Bull. Mus. Comp. Zool. 51.

– 1910. The Echinoderms of Peru. – Bull. Mus. Comp. Zool. 52.

Cunningham, R. O. 1871. Notes on the Natural History of the Strait of Magellan and West Coast of Patagonia. – Edinburgh.

Döderlein, L. 1920. Die Gattung Luidia und ihre Stammesgeschichte. – Siboga-Expd. 46 b.

Fisher, W. K. 1931. Report on the South American Sea Stars collected by Waldo L. Schmitt. – Proc. U. S. Nat. Mus. 78.

– 1940. Asteroidea. – Discovery Rep. 20.

Gay, C. 1854. Historia fisica y politica de Chile. Zoologia 8. (H. Hupé is, according to Philippi, 1892 p. 246, the author of the section on echinoderms.)

Goldschmidt, Emilie 1924. A new Asterias from Chile. – Ann. Mag. Nat. Hist. (9) 14.

Gray, I. E. 1840. A Synopsis of the Genera and Species of the Class Hypostoma (Asterias, Linnaeus). – Ann. Mag. Nat. Hist. 6.

Hupé, H. 1854. See Gay 1854.

Koehler, R. 1912. Echinodermes. – Deuxième Expd. Antarc. Française 1908–1910.

– 1923. Astéries et Ophiures. – Further Zool. Res. Swedish Antarc. Exp. 1901–03. 1.

Leipoldt, F. 1895. Asteroidea der "Vettor-Pisani"-Expedition (1882–1885). – Zeitschr. wiss. Zool. 59.

Lieberkind, I. 1920, in: Deichmann, Lieberkind & Mortensen: Holothurioidea, Asteroidea, and Echinoidea from Juan Fernandez and Easter Island. – In: Skottsberg: The Natural History of Juan Fernandez and Easter Island. Vol. 3.

Ludwig, H. 1903. Seesterne. – Expd. Antarctique Belge.

– 1905. Asterien und Ophiuren der schwedischen Expedition nach den Magellaensländern 1895–1897. – Zeitschr. wiss. Zool. 28.

Lütken, Chr. 1857. Om de ved Danmarks Kyster levende Pighude. – Vid. Medd. nat. Foren. 1856.

– 1859. Bidrag til Kundskab om de ved Kysterne af Mellem- og Syd-Amerika levende Arter af Søstjerner. – Vid. Medd. nat. For. 1859.

Meissner, M. 1896. Die von Herrn Dr. L. Plate aus Chile und Feuerland heimgebrachten Seesterne. – Arch. Naturgesch. 1896.

– 1898. Über chilenische Seesterne. – Zool. Anz. 21.

– 1904. Asteroiden. – Hamburger Magelhaensische Sammelreise.

Meyen, F. I. F. 1834. Reise um die Erde. Vol. 1.

species and has a circumpolar distribution in the subantarctic and antarctic regions.

Anasterias minuta (E. PERRIER 1875)

Anasterias minuta FISHER 1940 p. 237, pl. 19$_4$.

Chile records:

Anasterias minuta E. PERRIER 1875 p. 81. (Port Famine, Magellan Strait?).
Anasterias minuta (pars?) E. PERRIER 1891 p. 93. Punta Arenas, 18 m. S. of Tierra del Fuego: Hoste Island, 15 m; Franklin Canal, 51 m; Orange Bay, 6 m, 26 m; Scott Island, 80 m; Vauxerlandt, 143 m; New Year Sound; Rade de Corée, 16 m; Beagle Canal, 12 m.

This species is recorded, besides from the Magellan Strait and the Cape Horn region, also from the Falkland Plateau. Bathymetrical range: 1 to 143 m. The type-specimen was collected by the Astrolabe but had no statement of locality. PERRIER, 1891 p. 93, notes, however, that it was probably collected at Port Famine in the Magellan Strait.

From PERRIER's description one would be inclined to regard his specimens as a form of *Anasterias antarctica*. FISHER in 1940 p. 237, however, recognized *A. minuta* as a distinct species, but notes that PERRIER's material of 1891 only in part belonged to it, and mentions also, p. 238, the possibility that *A. minuta* is the juvenile stage of a weak-skeleton forma of *A. pedicellaris* (KOEHLER 1923).

Anasterias minuta together with *A. antarctica* and the Falkland species *A. studeri* and *A. pedicellaris* are difficult to distinguish, and it is therefore not always certain to which species the records actually belong.

Anasterias varium (PHILIPPI 1870)

Pl. 5. Figs. 3–9.

Anasterias stolidota FISHER 1940 p. 239, pl. 19$_6$.

Chile records:

? Asteracanthion rubens MÜLLER & TROSCHEL 1843 p. 113. Chili.
Asteracanthion varium PHILIPPI 1870 p. 272. Chiloe.
Asteracanthion fulgens PHILIPPI 1870 p. 274. Southern Chile.
Asterias verrilli BELL 1881 b p. 513, pl. 48$_3$. Magellan Strait: St. Martin's Cove; Peckett Harbour; Gregory Bay; Elizabeth Island.
Calvasterias stolidota SLADEN 1889 p. 590, pls. 101$_{3-4}$, 103$_{11-12}$. Messier Channel.
Asterias rugispina pars LEIPOLDT 1895 p. 564, 571. Chiloé; Chonos Archipelago; Puerto Lagunas; Darwin Canal.
Asterias antarctica var. *rupicola* MEISSNER 1896 p. 106. Puerto Montt.
Sporasterias antarctica var. *rupicola* LUDWIG 1903 p. 40. S. of Tierra del Fuego: Torrent Bay, Londonderry Island; Harberton Harbour, Beagle Canal; Magdalena Sound, Clarence Island, tidal belt.
Asterias antarctica pars MEISSNER 1904 p. 10. Smyth Channel; Punta Arenas; Beagle Canal.
Asterias antarctica QUIJADA 1911 p. 160. Seno Reloncaví.
Asterias rubens QUIJADA 1911 p. 160. Chonos.

Material: *Sts. M 18; M 22; M 23; M 47; M 59; M 64; M 74; M 91; M 94; M 95; M 99; M 100; M 103; M 136. M 139.* All stations in the regions of Chiloé and the Chonos Archipelago, tidal belt to 40 m, except *M 136* which is at Iquique, tidal belt.

The about 70 specimens at hand range in size from R. 4 mm to R. 55 mm. Their colour when alive is usually recorded as dark green, but one specimen apparently was orange.

The collections of the Swedish Chile Expedition show that this species is very common in the vicinity of Chiloé and Chonos, and specimens belonging to it have also been recorded several times in the literature. The species was, however, not recognized as distinct by the principal authors on the Chilean sea stars, LEIPOLDT and MEISSNER, who confused it with the Magellanic *Anasterias antarctica*.

It is probable that MÜLLER's and TROSCHEL's *Asteracanthion rubens* from Chile belonged to the present species. The first certain record of it was, however, given by PHILIPPI in 1870 who described a specimen from Chiloé under the name of *Asteracanthion varium*, in such a way that there can be no doubt that he had the present species before him. Also PHILIPPI's *Asteracanthion fulgens*, BELL's *Asterias verrilli*, and SLADEN's *Calvasterias stolidota* belong to *Anasterias varium*. LEIPOLDT, as mentioned above, did not recognize the species as distinct, but recorded specimens thereof together with *A. rugispina* (= *A. antarctica*). Notably that part of his material which came from Chiloé and the Chonos Archipelago must have been of *A. varium*, and he refers also repeatedly to what he calls *Calvasterias*-specimens. MEISSNER in 1896 recorded the species as *A. antarctica* var. *rupicola*; in 1904 he included it in *A. antarctica*, but in the enumeration of the material he for part of it notes: *rupicola*-form. Both KOEHLER, 1923, and FISHER, 1940, recognized *Calvasterias*, or *Anasterias, stolidota* as distinct but add no new localities.

Though the present species has so often been confused with *A. antarctica* the two species are in reality usually easy to distinguish, as is also evident from the original descriptions of *varium* and *stolidota* when compared with *A. antarctica*.

A. varium has in general a thick pustulate skin. The dorsal skeleton is an open mesh-work, in some specimens almost completely degenerated on the disk, and there are only few and small dorsal spines. Pedicellariae are sometimes fairly numerous on the arms, but on the disk they are few and often totally absent. The papulae are prominent and found either singly in the skeletal meshes or in groups of up to about 20. The superomarginal plates each carry a single spine and usually form a prominent ridge. The inferomarginal plates which define the margin of the oral side usually carry 2 spines each, but the number may vary from 1 to 4. The number of marginal plates are smaller in *A. varium* than in *A. antarctica*, which among other things gives the two species a quite different appearance. In specimens with R. 22 mm there are only 16–18 inferomarginal plates in *A. varium*, but 23–25 plates in *A. antarctica*. Specimens of *A. varium* usually have fairly broad arms and thus a much more prominent ventrointerradial area than *A. antarctica*, but some specimens have very slender arms. These have also more slender and longer spines than is usual. In specimens of *A. varium* with R. about 40 mm R. may vary from 3 r. to 5 r.

Müller, J. & F. H. Troschel 1842. System der Asteriden.
— 1843. Neue Beiträge zur Kenntniss der Asteriden. — Arch. Naturgesch. 9. 1.
Perrier, E. 1869. Recherches sur les Pédicellaires ... — Ann. Sc. nat. zool. Paris (5) 12.
— 1875–76. Révision de la Collection de Stellerides du Museum d'Histoire Naturelle de Paris. — Arch. Zool. Expér. 4–5.
— 1886. Recherches sur l'organisation des Étoiles de mer. — Compt. rend. 102.
— 1891. Stellerides, Echinodermes I. — Miss. Sci. Cap Horn Zool. VI.
Philippi, R. A. 1857. Vier neue Echinodermen des Chilenischen Meeres. — Arch. Naturgesch. 23, 1.
— 1858. Beschreibung einiger neuen Seesterne aus dem Meere von Chiloë. — Arch. Naturgesch. 24, 1.
— 1870. Neue Seesterne aus Chile. — Arch. Naturgesch. 36, 1.
Plate, Ludwig 1896. Zur Kenntnis der Insel Juan Fernandez. — Verh. Gesellsch. f. Erdkunde, Berlin, 23.
Porter, Carlos E. 1915. Los Heliasteridos de Chile. — Rev. Chile Hist. Nat. 19. (Not seen by the present author.)
— 1940. La teratologica en Chile. — Rev. Chile Hist. nat. 44. (Not seen by the present author.)
Quijada, B. 1911. Catálogo de los Equinodermos vivientes conservados en el Museo Nacional. — Boll. Mus. Nac. (Santiago de Chile) 3.
Say, Thomas 1825. On the species of the Linnean Genus Asterias, inhabiting the coast of the United States. — J. Acad. Nat. Sci. 5.
Sladen, P. W. 1889. Report on the Asteroida collected by H. M. S. Challenger during the years 1873–76. — Challenger Rep., Zool. 30.
Sluiter, C. Ph. 1895. Die Asteridensammlung des Museum zu Amsterdam. — Bjdr. Dierkunde. 17.
Studer, Th. 1876. Echinodermen aus dem antarktischen Meere und zwei neue Seeigel von den Papua-Inseln, gesammelt auf der Reise S. M. S. Gazelle um die Erde. — Monatsber. Berlin Akad. 1876.
— 1884. Verzeichniss der während der Reise S. M. S. Gazelle um die Erde 1874–1876 gesammelten Asteriden und Euryaliden. — Abhandl. Kgl. Preuss. Akad. wiss. Berlin. 1884.
Tortonese, E. 1935–36. Asteroidi. Gli Echinodermi del Museo di Torino. — Boll. Mus. Zool. Anat. Comp. Univ. Torino (3) 45.
Verrill, A. E. 1867. On the geographical distribution of the Echinoderms of the west coast of America. — Trans. Conn. Acad. Arts and Sci. 1.
— 1913. Revision of the Genera of Starfishes of the subfamily Asterininae. — Amer. J. Sci. (4) 35.
— 1914. Monograph of the Shallow-water Starfishes of the North Pacific Coast from the Arctic Ocean to California. — Harriman Alaska Series, 14.

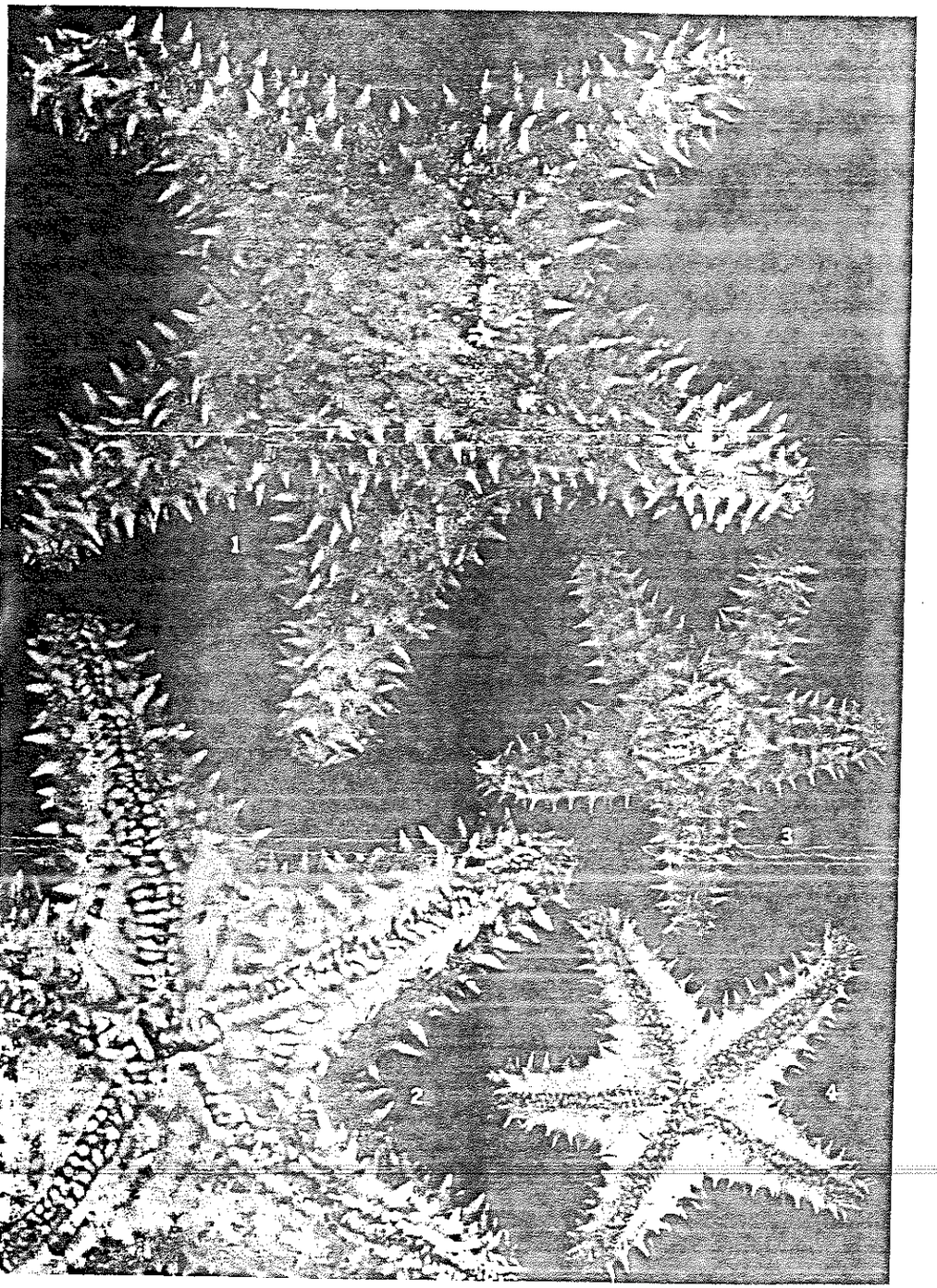
List of additional literature cited

(Papers without Chilean records)

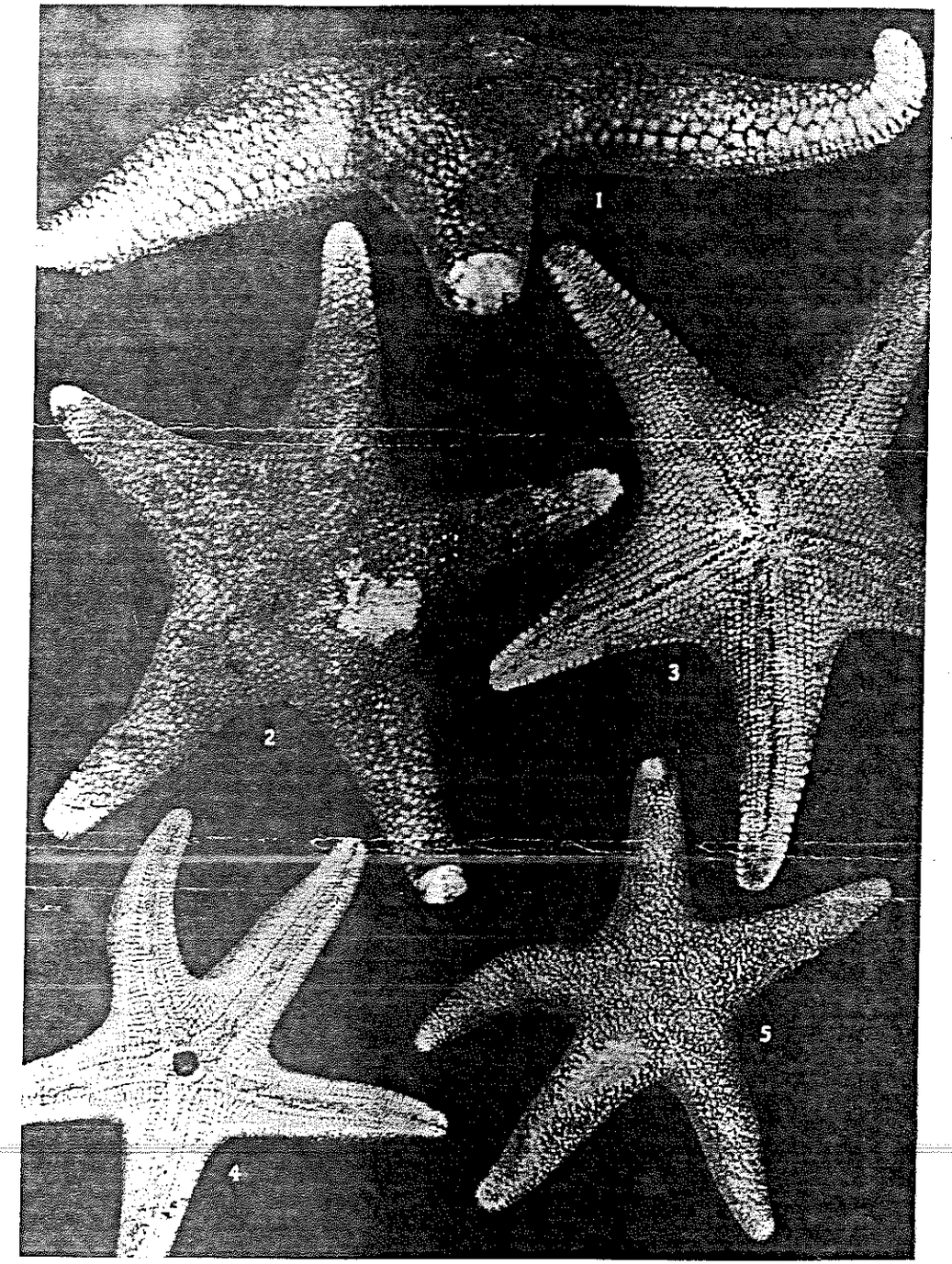
Bell, F. J. 1902. Echinoderma. — Rep. Coll. Nat. Hist. "Southern Cross".
Bernasconi, J. 1937. Asteroideos Argentinos, Pterasteridae. — An. Mus. Argentino Cienc. Nat. 39.
— 1941. Los Equinodermos ... "Comodora Rivadavia". — Physis 19.
Caso Munoz, M. E. 1943. Contribution al Conocimiento de los Asteridos de Mexico. — Univ. Nac. Mexico.
Clark, A. H. 1946. Echinoderms from the Pearl Islands, Bay of Panama. — Smithsonian Miscell. Coll. 106.
Clark, A. M. 1950. A new species of sea-star from Norfolk Island. — Ann. Mag. Nat. Hist. (12) 3.
Clark, H. L. 1916. Report on the Sea-Lilies, Starfishes, Brittle-stars, and Sea-Urchins. — "Endeavour" Biol. Res. 4 pt. 1.
— 1920. Asteroidea. "Albatross" Expd. Eastern Tropical Pacific. — Mem. Mus. Comp. Zool. 39.
— 1923. The Echinoderm fauna of South Africa. — Ann. S. Afr. Mus. 13.
Clark, H. L. 1926. Echinoderms from the South African Fisheries and Marine Biological Survey. — Rep. Fish. Marine Biol. Survey 4.
— 1938. Echinoderms from Australia. — Mem. Mus. Comp. Zool. 55.
— 1946. The Echinoderm Fauna of Australia.
Döderlein, L. 1928. Die Seesterne der Deutschen Südpolar-Expedition. — Deutsche Südpolar Expd. 1901–03, 19.
Fisher, W. K. 1911. Asteroidea of the North Pacific and adjacent waters, pt. 1. — Bull. U. S. Nat. Mus. 76.
— 1928. Asteroidea of the North Pacific and adjacent waters, pt. 2. — Bull. U. S. Nat. Mus. 76.
— 1930. Asteroidea of the North Pacific and adjacent waters, pt. 3. — Bull. U. S. Nat. Mus. 76.
— 1941. A new genus of sea stars ..., with a note on the genus Parasterina. — Proc. U. S. Nat. Mus. 90.
Gray, I. E. 1847. Descriptions of some new genera and species of Asteriadæ. — Proc. Zool. Soc. London 1847.
Ives, I. E. 1889. Catalogue of the Asteroidea and Ophiuroidea in the collection of the Academy of Natural Sciences of Philadelphia. — Proc. Acad. Nat. Sc. Philadelphia 1889.
Koehler, R. 1908. Astéries ... de l'Expédition antarctique Nationale Écossaise. — Trans. Roy. Soc. Edinburgh 46 pt. 3.
— 1911. Astéries, Ophiures, et Échinides. — Brit. Antarc. Exp. 1907–09, 2 pt. 4.
— 1917. Échinodermes recueillis aux îles de Kerguelen. — Ann. Inst. Océan. 7.
— 1920. Echinodermata Asteroidea. — Austral. Ant. Exp. 1911–14, (C) 8.
Loriol, P. de 1891. Notes pour servir a l'étude des Échinodermes. — Mém. Soc. Phys. Hist. Nat. Geneve, Suppl. 1890.
— 1904. Notes pour servir a l'étude des Échinodermes, (2) 2.
Lütken, Chr. 1865. Kritiske Bemærkninger om forskjellige Söstjerner (Asterider), med Beskrivelse af nogle nye Arter. — Vid. Medd. nat. For. 1864.
— 1871. Fortsatte kritiske og beskrivende Bidrag til Kundskab om Søstjernerne (Asterideme). — Vid. Medd. nat. For. 1871.
Meissner, M. 1892. Asteriden gesammelt von Dr. Sander auf der Reise "Prinz Adalbert". — Arch. Naturgesch. 1.
Mortensen, Th. 1933. Echinoderms of South Africa. — Vid. Medd. Dansk. nat. For. 93.
— 1941. Echinoderms of Tristan da Cunha. — Res. Norwegian Sc. Expd. to Tristan da Cunha, 7.
Müller, J. & F. H. Troschel 1840. Über die Gattungen der Asterien. — Arch. f. Naturgesch. 1840.
Schreber, J. 1793. Beschreibung eines Seesternes mit rosenförmigen Verzierungen. — Der Naturforscher 27.
Smith, E. A. 1876. Description of species of Asteriidae ... in the British Museum. — Ann. Mag. Nat. Hist. (4) 17.
Stimpson, W. 1857. On the ... Echinodermata of the Pacific Shores of North America. — Boston J. Nat. Hist. 6.
— 1861. On new genera and species of the family Pycnopodidae. — Proc. Boston Soc. Nat. Hist. 8.
Studer, Th. 1885. Die Seesterne Süd-Georgiens. — Jahrb. wiss. Anst. Hamburg 2.
Vicuier, C. 1879. Anatomie Comparée du Squelette des Stellérides. — Arch. zool. expér. et génér. 7.

Contents

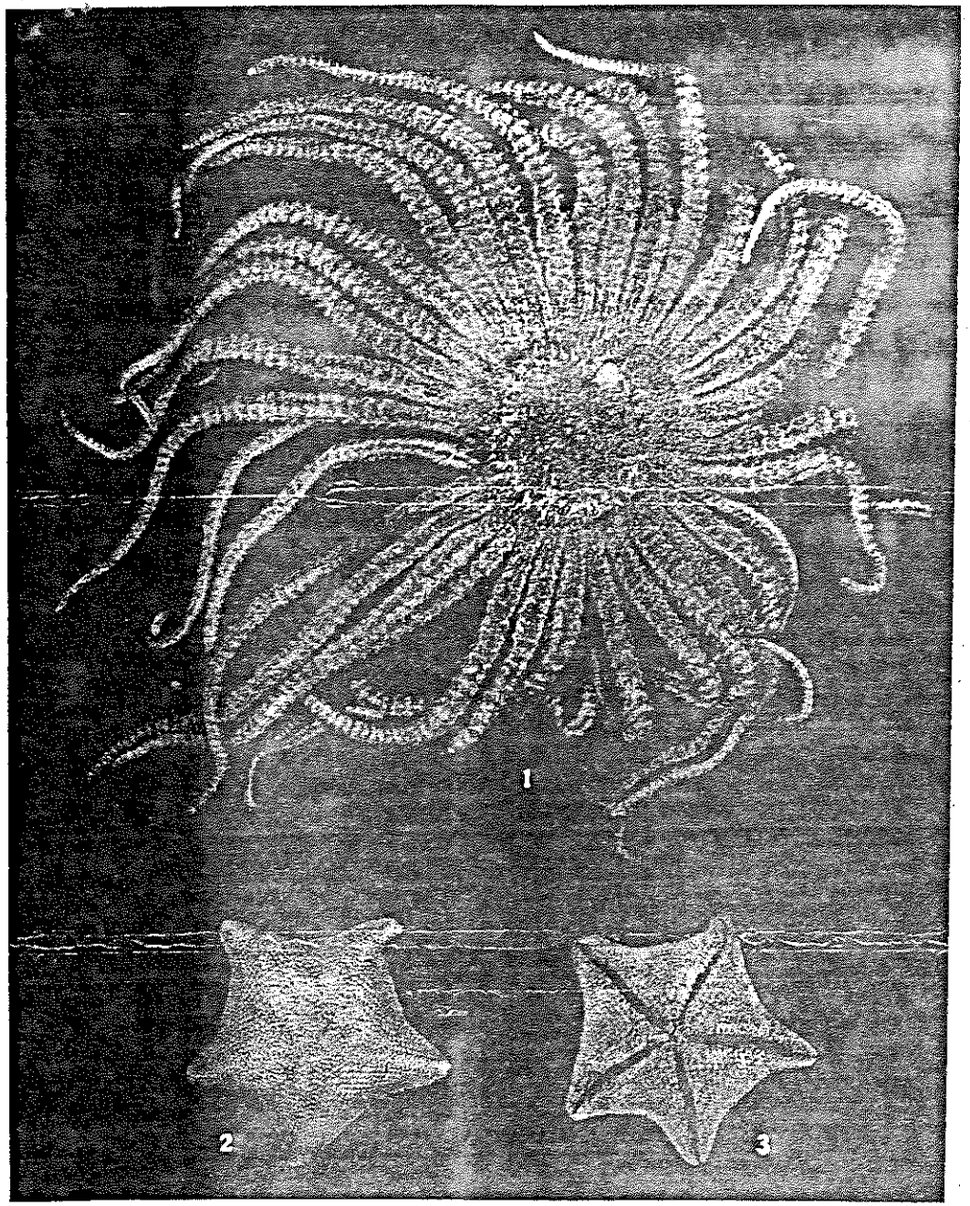
Tryckt den 10 febr. 1956.



Poraniopsis echinaster (Perrier). Two specimens from Seno Reloncaví, 40-55 m (figs. 1-2) and 225 m (figs. 3-4) respectively. About nat. size.

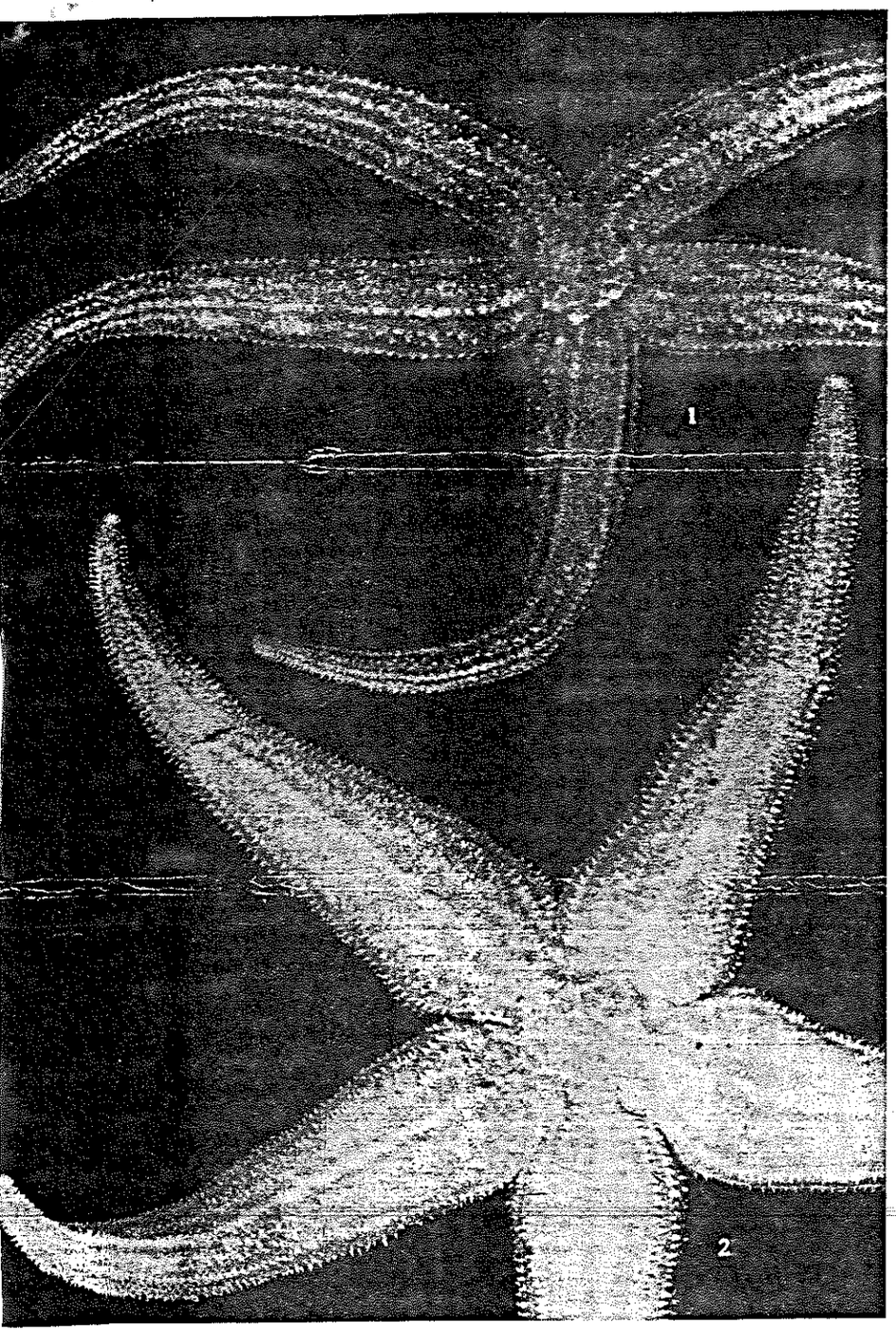


Patiria obesa (H. L. Clark). 1-3. A specimen from Bahía San Vicente. 1. Side view showing the marginal plates. 4-5. A specimen from Golfo de Ancud. 1 about 1 ½ nat. size. 2-5 about nat. size.



1. *Labidiaster radiosus* LÜTKEN, type-specimen, about $^{3}/_{4}$ nat. size. — 2-3. *Patiria chilensis* (LÜTKEN), type-specimen, about nat. size.

1-2. *Anasterias antarctica* (LÜTKEN), type-specimen, about nat. size. — 3-9. *Anasterias varius* (PHILIPPI). 3-4, 5-6, 8-9. Three specimens from Golfo de Ancud, about nat. size. 7. A specimen from Seno Reloncaví, about $1\,^{1}/_{2}$ nat. size.



Cosmasterias lurida (PHILIPPI). Two specimens from Seno Reloncaví, about $^{3}/_{5}$ nat. size.