

Astropectinidae (Asteroidea) diversity in the Mar del Plata Submarine Canyon: A deep-water exploration

Pamela R. RIVADENEIRA^{1*}, Pablo E. PENCHASZADEH² & Martín I. BROGGER³

¹ Instituto de Investigaciones Marinas y Costeras (IIMyC-CONICET), Juan B. Justo 2250 (CP7600), Mar del Plata, Argentina. ²Laboratorio de Ecosistemas Costeros, Museo Argentino de Ciencias Naturales “Bernardino Rivadavia” (MACN-CONICET), Av. Ángel Gallardo 470 (C1405DJR), Buenos Aires, Argentina. ³ Laboratorio de Reproducción y Biología Integrativa de Invertebrados Marinos, Instituto de Biología de Organismos Marinos (CONICET), Bvd. Brown 2915 (U9120ACD), Puerto Madryn, Argentina.

* Corresponding author: pamer28@gmail.com

Abstract: The family Astropectinidae is one of the most diverse and numerous families of sea stars found in deep waters, particularly well-represented in the Atlantic Ocean. This family comprises 26 genera, with species inhabiting environments ranging from shallow coastal zones to abyssal depths. In this study, the Mar del Plata Submarine Canyon, located off the coast of Argentina, was explored at depths ranging from 200 to 3500 meters. A total of 153 specimens of Astropectinidae were collected, representing six species from five different genera. All species recorded are new occurrences for this region, including three new species described herein: *Dytaster stellamarisae*, *Plutonaster neninae* and *Psilaster pearsei*. Additionally, we report new regional observations of *Bathybiaster loripes*, *Dytaster grandis*, and *Leptychaster kerguelensis*. These findings substantially expand the known distribution and diversity of Astropectinidae in the deep waters of the southwestern Atlantic.

Key words: Asteroidea, Argentina, Deep-sea diversity, South Atlantic, new species

Resumen: “Diversidad de Astropectinidae (Asteroidea) en el Cañón Submarino de Mar del Plata: una exploración en aguas profundas”. La familia Astropectinidae es una de las más diversas y numerosas entre las estrellas de mar presentes en aguas profundas, con una destacada representatividad en el océano Atlántico. Esta familia comprende 26 géneros, con especies que habitan desde zonas costeras someras hasta profundidades abisales. En este estudio, se exploró el Cañón Submarino de Mar del Plata, frente a la costa de Argentina, a profundidades entre los 200 y 3500 metros. Se recolectaron un total de 153 ejemplares de Astropectinidae, representando seis especies de cinco géneros diferentes. Todas las especies registradas constituyen nuevos reportes para la región, e incluyen tres nuevas especies aquí descriptas: *Dytaster stellamarisae*, *Plutonaster neninae* y *Psilaster pearsei*. Además, se reportan nuevos registros regionales de *Bathybiaster loripes*, *Dytaster grandis* y *Leptychaster kerguelensis*. Estos hallazgos amplían significativamente el conocimiento sobre la distribución y diversidad de Astropectinidae en las aguas profundas del Atlántico suroccidental.

Palabras clave: Asteroidea, Argentina, diversidad en aguas profundas, Atlántico Sur, especies nuevas

INTRODUCTION

Sea stars (Asteroidea) are a diverse group of marine organisms, with over 1,900 species distributed across global oceans (Mah & Blake, 2012). In cold-water environments, particularly those at high latitudes and in deep-sea habitats, the diversity of sea stars is especially rich, with nineteen families recorded from these regions (Mah & Blake, 2012). The Caribbean and Atlantic regions host 228 species (Alvarado & Solís-Marín, 2013), while the Southern Ocean alone is home to 176 species (Moreau *et al.*, 2021).

Among these families, Astropectinidae stands out as one of the most ecologically and taxonomically significant in the deep sea. Comprising 26 genera and more than 243 species, members of this family are distributed from shallow waters to abyssal depths, showing remarkable adaptability across diverse marine environments (Mah & Blake, 2012). Astropectinidae are often found in cold, deep-sea ecosystems, where their diversity is not yet fully understood, making them a focal point for deep-sea biodiversity studies.

The South-West Atlantic, particularly its deep-water ecosystems, has been explored

since the HMS Challenger expedition (1872–1876), whose findings were pivotal in shaping our understanding of marine biodiversity in the region (Sladen, 1889). Recent deep-sea sampling including many discoveries of echinoderms, including new species, further enriching the knowledge of this area's biodiversity (e.g., Martínez & Penchaszadeh, 2017; Rivadeneira *et al.*, 2020; Moreau *et al.*, 2021; Pertossi *et al.*, 2021; Hurtado-García & Manjón Cabeza, 2022). However, significant gaps remain in our understanding of deep-sea fauna, particularly within submarine canyons, which are critical hotspots of marine life.

The Mar del Plata Submarine Canyon, located at the continental slope off Argentina, represents an unexplored frontier for biodiversity studies. Situated at approximately 38°S, 54°W, this canyon marks the terminus of the Río de la Plata and is characterized by sandy muds, pebble deposits, and rocky outcrops along its V-shaped walls (Violante *et al.*, 2010). The canyon's unique geomorphology and deep-sea habitat provide a pristine environment for studying Astropectinidae diversity.

The objective of this study is to assess the diversity of the Astropectinidae family in the deep waters of the Mar del Plata Submarine Canyon, contributing to the understanding of the region's previously undocumented biodiversity.

MATERIAL AND METHODS

Sampling

Samples were collected from the Argentine continental slope in the Mar del Plata Submarine Canyon area onboard the B/O *Puerto Deseado* during August 2012 and May/September 2013. Out of a total of 64 sampling hauls, sea stars were collected in 22, at depths ranging from 200 to 3,500 m. A trawl net was used in 16 of these hauls (L5, L8, L10, L14, L21, L24, L26, L33, L34; L41, L44, L45, L52, L53, L59 and L62), while a dredge was employed in 6 (L15, L25, L55, L60, L61 and L64).

Systematics

Specimens were sorted and fixed in 96% ethanol before being studied in the laboratory under a stereoscopic microscope, covering as wide a size range as possible. Identification was based on morphological characters following original descriptions, classifications and distributions according to Bernasconi (1972), Clark (1970), Clark and Downey (1992), Clark & McKnight

(2000), Fell (1958), Koehler (1906, 1907), Müller & Troschel (1842), Perrier (1881, 1884), Sibuet (1975), Sladen (1889), Verrill (1880, 1884), and Wyville Thomson (1873). Taxon names, statuses and distributions were verified in the World Register of Marine Species (WoRMS). Specimens were compared with samples from various collections, including those from the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires (MACN), National Museum of Natural History, Smithsonian Institution, Washington D. C. (USNM), Universidad Nacional Autónoma de México (UNAM), México D. F., Museu Nacional (MNRJ), Rio de Janeiro, and Zoologisches Museum Hamburg.

For scanning electron microscope (SEM) imaging, plates and pedicellariae were macerated in sodium hypochlorite solution, washed several times in distilled water, then in 96% ethanol, air-dried, and finally transferred to aluminum stubs. The specimens were metal sputter-coated and observed under a SEM (Philips XL 30) at the MACN. Digital photos of specimens were taken with a Nikon D-800 and Leica IC 80 HD.

Type material and additional specimens were deposited in the Invertebrate Collection of the Museo Argentino de Ciencias Naturales (MACN-In), the collection of the Instituto de Biología de Organismos Marinos (CNP-Inv), Puerto Madryn, Argentina, and the Invertebrate Zoology Collection of the Museo Nacional de Historia Natural (MNHN), Montevideo, Uruguay.

RESULTS

A total of 153 specimens of the family Astropectinidae were collected: 26 belonged to the genus *Bathybiaster*, 21 to *Dytaster*, 48 to *Leptychaster*, 58 to *Plutonaster*, and one to *Psilaster*.

SYSTEMATICS

Order Paxillosida Perrier, 1884

Family Astropectinidae Gray, 1840

Genus *Bathybiaster* Danielssen & Koren, 1882

Bathybiaster loripes Sladen, 1889 (Fig. 1)

Material examined. Mar del Plata Submarine Canyon: 37°54'S, 54°43'W, 780 m, "R/V Puerto Deseado" L44, 26 May 2013, MACN-In 44702 (4 wet specimens: R= 15 mm, r= 3 mm; R= 9 mm, r= 3 mm; R= 10 mm, r= 3 mm; R= 5 mm, r= 2 mm), CNP-Inv 4108 (3 wet specimens: R=

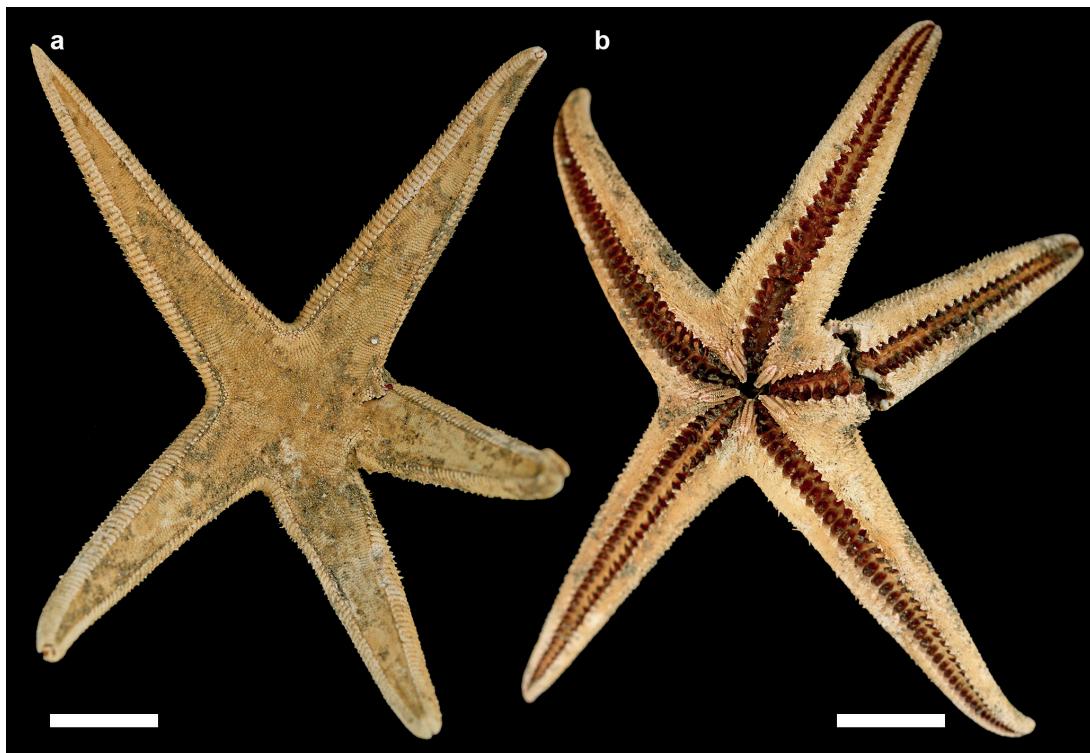


Fig. 1 *Bathybiaster loripes*. Abactinal (a) and actinal surfaces (b). Scale bars = 2 cm.

135 mm, $r=30$ mm; $R=90$ mm, $r=17$ mm; $R=63$ mm, $r=12$ mm). Mar del Plata Submarine Canyon: 37°59'S, 55°09'W, 528 m, "R/V Puerto Deseado" L5, 10 Aug 2012, MACN-In 44704 (1 wet specimen: $R=111$ mm, $r=25$ mm), CNP-Inv 4109 (1 wet specimen: $R=82$ mm, $r=20$ mm). Mar del Plata Submarine Canyon: 37°58'S, 54°57'W, 647 m, "R/V Puerto Deseado" L8, 10 Aug 2012, MACN-In 44705 (2 wet specimens: $R=107$ mm, $r=23$ mm; $R=105$ mm, $r=20$ mm). Mar del Plata Submarine Canyon: 37°54'S, 54°03'W, 2420 m, "R/V Puerto Deseado" L24, 14 Aug 2012, MACN-In 44706 (6 wet specimens: $R=105$ mm, $r=20$ mm; $R=140$ mm, $r=25$ mm; $R=21$ mm, $r=5$ mm; $R=20$ mm, $r=5$ mm; $R=7$ mm, $r=4$ mm; $R=110$ mm, $r=23$ mm and 2 dry specimens: $R=21$ mm, $r=7$ mm; $R=14$ mm, $r=5$ mm), CNP-Inv 4110 (4 wet specimens: $R=110$ mm, $r=20$ mm; $R=110$ mm, $r=19$ mm; $R=117$ mm, $r=21$ mm; $R=95$ mm, $r=17$ mm). Mar del Plata Submarine Canyon: 37°59'S, 55°12'W, 308 m, "R/V Puerto Deseado" L33, 17 Aug 2012, MACN-In 44707 (2 wet specimens: $R=75$ mm, $r=17$ mm; $R=75$ mm, $r=17$ mm), CNP-Inv 4111 (1 wet specimen: $R=76$ mm, $r=15$ mm).

Diagnosis: Flexible skeleton. Abactinal plates round with large paxillae bearing 5 to 10 thick

spinelets. Madreporic plate smooth and exposed. Epiproctal plate visible. Marginal plates elongated, each with 6 spines. Actinal surface narrow, with scale-shaped spinelets. Five adambulacral furrow spines, the central spine the largest and curved. Oral plates elongated, laterally flattened, with four thick apical spines.

Body brown, with a small disc and long arms.

Distribution: South Atlantic Ocean, South Pacific Ocean and Indian Ocean.

Bathymetric range. 80–4842 m.

Present study: 250–2934.

Remarks: Danis et al. (2012) reported this species at 4842 m, and also recorded it from the Scotia Arc, Antarctic Peninsula, sub-Antarctic islands, Weddell, Ross, and Bellingshausen seas. Moreau et al. (2021) concluded that *B. loripes* is restricted to the Antarctic shelf, while *B. vexillifer* is found in deep waters. However, our new records provide evidence that *B. loripes* also inhabits the deep waters of the Southern Ocean.

Genus *Dytaster* Sladen, 1885
Dytaster grandis Verrill, 1894 (Fig. 2)

Material examined. Mar del Plata Submarine Canyon: 38°02'S, 53°39'W, 2935 m, "R/V Puerto

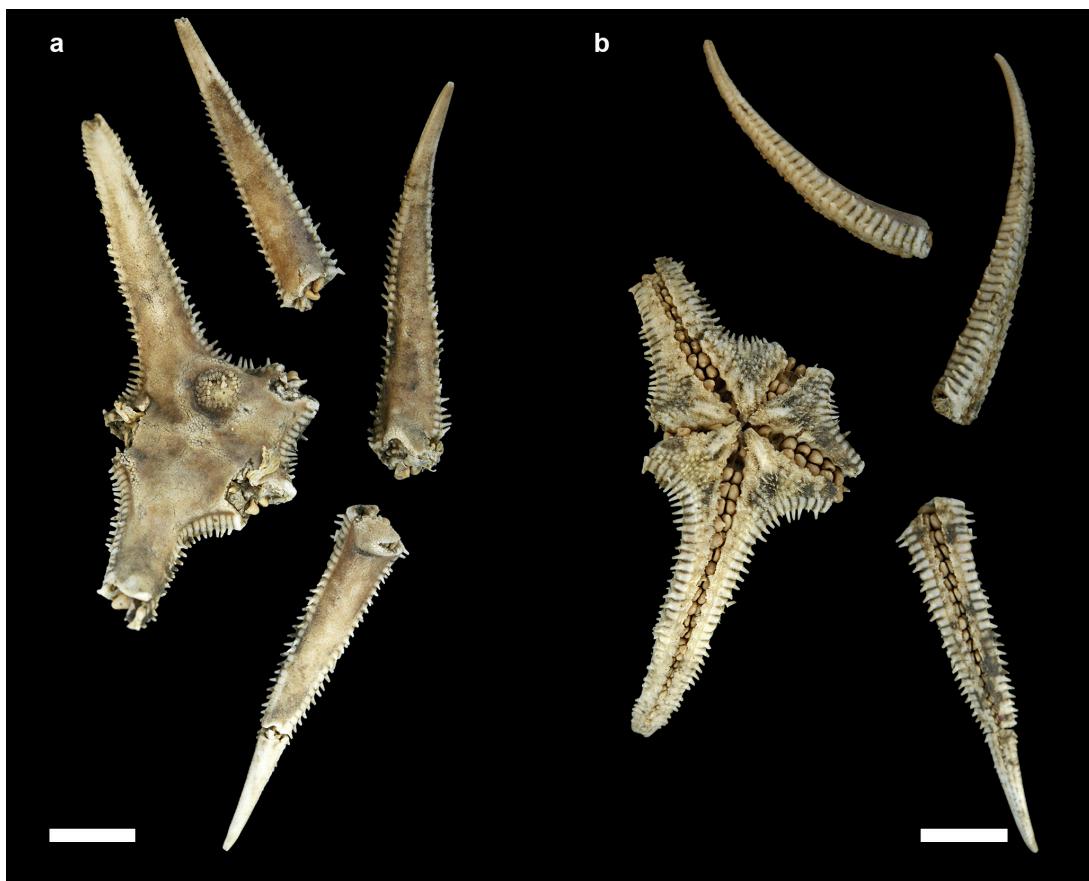


Fig. 2 *Dytaster grandis*. Abactinal (a) and actinal surfaces (b). Scale bars = 2 cm.

Deseado" L45, 5 Sep 2013, MACN-In 44708 (1 dry specimen: R= 95 mm, r= 21 mm).

Diagnosis: Abactinal plates rounded, with short, mattress-shaped spinelets. Madreporite approximately one-third the diameter of the disc. Marginal plates rectangular, equal in size, and aligned, each bearing a prominent superomarginal spine. Inferomarginal plates with 1–2 spines, and short, broad spinelets. Actinal plates round, with small, square paxillae, each bearing an enlarged central spinelet. Adambulacral plates short and rectangular, with 11 furrow spines. Oral plates enlarged, with two larger, central, laterally flattened spines followed by 2–3 additional spines.

Body light brown, tending towards yellow.

Distribution: Caribbean Sea, Gulf of Mexico, Bay of Biscay, Azores, SW Africa, North Atlantic Ocean and South Atlantic Ocean.

Bathymetric range. 1000–4846 m.

Present study. 2935 m.

Remarks: Two subspecies have been described

for this species, differing only in number and shape of the adambulacral spines, and its distribution (Clark & Downey, 1992). *Dytaster grandis grandis* has 6–12 truncate adambulacral furrow spines and is found along the east coast of the USA, Gulf of Mexico, Bay of Biscay, Azores, and SW Africa. In contrast, *Dytaster grandis nobilis* has 5–7 acuminate furrow spines and is recorded off Buenos Aires (Argentina) at depths of approximately 4800 m and at 3305 m in Uruguay. The specimen in this study has 11 adambulacral furrow spines, yet its distribution closely matches that of *Dytaster grandis nobilis*. There is little doubt that these specimens belong to *Dytaster grandis*, with a higher likelihood of correspondence to *D. grandis nobilis*. However, the sole differentiating character between the two subspecies is highly variable and based on limited samples (two specimens in the case of *D. grandis nobilis*). Notably, the original description of *D. grandis* lists a range of 8–10 furrow spines. An exhaustive study, involving sampling from

the Gulf of Mexico to Argentina, is necessary to determine whether these represent two separate subspecies or a single, wide-ranging species with plastic characters, such as furrow spine count.

Dytaster stellamarisae sp. nov. (Fig. 3)

HOLOTYPE: Mar del Plata Submarine Canyon: 37°52'S, 58°52'W, 1712 m, "R/V Puerto Deseado" L55, 8 Sep 2013, MACN-In 44709 (1 dry specimen: $R= 140$ mm, $r= 30$ mm).

PARATYPES: Mar del Plata Submarine Canyon: 38°08'S, 58°51'W, 2082 m, "R/V Puerto Deseado" L21, 13 Aug 2012, MACN-In 44712 (1 wet specimen: $R= 145$ mm, $r= 30$ mm). Mar del Plata Submarine Canyon: 37°52'S, 54°11'W, 1950 m, "R/V Puerto Deseado" L25, 15 Aug 2012, MACN-In 44711 (2 dry specimens: $R= 165$ mm, $r= 40$ mm; $R= 110$ mm, $r= 28$ mm). Mar del Plata Submarine Canyon: 38°02'S, 53°39'W, 2934 m, "R/V Puerto Deseado" L45, 5 Sep 2013, MACN-In 44703 (5 wet specimens: $R= 10$ mm, $r= 2$ mm; $R= 85$ mm, $r= 22$ mm; $R= 102$ mm, $r= 23$ mm; $R= 76$ mm, $r= 21$ mm; $R= 80$ mm, $r= 18$ mm). Mar del Plata Submarine Canyon: 37°53'S, 53°54'W, 1763 m, "R/V Puerto Deseado" L53, 8 Sep 2013, MACN-In 44710 (4 wet specimens: $R= 145$ mm, $r= 35$ mm; $R= 125$ mm, $r= 25$ mm; $R= 140$ mm, $r= 30$ mm; $R= 150$ mm, $r= 22$ mm and 2 dry specimens: $R= 125$ mm, $r= 30$ mm; $R= 135$ mm, $r= 28$ mm), CNP-Inv 4183 (3 wet specimens: $R= 140$ mm, $r= 35$ mm; $R= 155$ mm, $r= 26$ mm; $R= 132$ mm, $r= 27$ mm), CNP-Inv 4184 (1 dry specimen: $R= 156$ mm, $r= 35$ mm), MNHN-4328 (1 dry specimen: $R= 156$ mm, $r= 35$ mm).

Etymology: This species name is dedicated to a wonderful woman. The name is used as a noun in apposition.

Diagnosis: Madreporite occupying half of the disc radius. Up to 33 spiniform spinelets, with the largest positioned centrally. 1–6 superomarginal and inferomarginal spines. 6–7 flattened, compressed furrow spines. Actinal spinelets large and thin, with an enlarged central spinellet. Simple, bivalve pedicellariae on abactinal and actinal surfaces.

Description: Long arms with a thick disc.

Abactinal plates covered with round paxillae, some larger than others, each bearing numerous large, spiniform spinelets (7–33) arranged around a central, largest spinelet. Simple bivalve pedicellariae are located between the paxillae or occupying the position of the largest spinelet, though these are not evident in adult forms.

Papulae are visible on the disc. A large madreporite, up to 23 mm in diameter in larger specimens, is readily distinguishable, sometimes in contact with marginal plates. It is covered with paxillae whose spinelets are more widely spaced than those on the disc, occupying half of the disc radius (or a quarter of the disc diameter).

Marginal plates are large and visible from both actinal and abactinal surfaces, extending to the arm tips. The number of superomarginal plates ranges from 14 to 42 from the mid-interradial line to the arm tip. These plates are square, bearing 1 to 6 clustered spines. The longest spines range from 0.3 to 2.8 mm in length. Inferomarginal plates align with the superior series and also bear 1 to 6 spines, though the number does not necessarily correspond between the two series. Inferomarginal spines may be aligned.

The actinal surface is reduced, with rectangular plates with rounded tips that are clearly distinguishable. Paxillae follow the same pattern as on the abactinal surface but have thinner, longer spinelets. Simple bivalve pedicellariae are present on the disc and arms, more numerous than on the abactinal surface, and are distinguishable in adult specimens.

Adamambulacral plates are square, with 5–7 flattened furrow spines aligned in parallel, compressed and aligned to the furrow. These spines are similar in length to those on the superomarginal plates. Oral plates are elongated, each with two laterally flattened spines with broad bases.

The body is pale orange, with a pronounced stellate shape (R/r up to 7.7).

Distribution: South Atlantic, Argentina, Mar del Plata Submarine Canyon.

Bathymetric range. 1700–3400 m.

Remarks: *Dytaster stellamarisae* sp. nov. differs from other species (Table 1) in the shape and maximum number of paxillar spinelets, which are more numerous and morphologically distinct. In *D. stellamarisae* sp. nov., the pedicellariae are simple and bivalve, contrasting with the granuliform, multi-valved pedicellariae of *D. grandis* (3–4 obtuse valves) and *D. cherbonnierii* (2–5 blunt, rounded valves). Additionally, the maximum R/r ratio is higher in *D. stellamarisae* specimens. The madreporite size also differs, occupying a quarter of the disc diameter (or half of the disc radius), distinguishing it from other species.

The number of marginal spines overlaps only with *D. grandis nobilis*, the only other species reported from the Southwestern Atlantic. However, all other characteristics of *D. grandis* differ

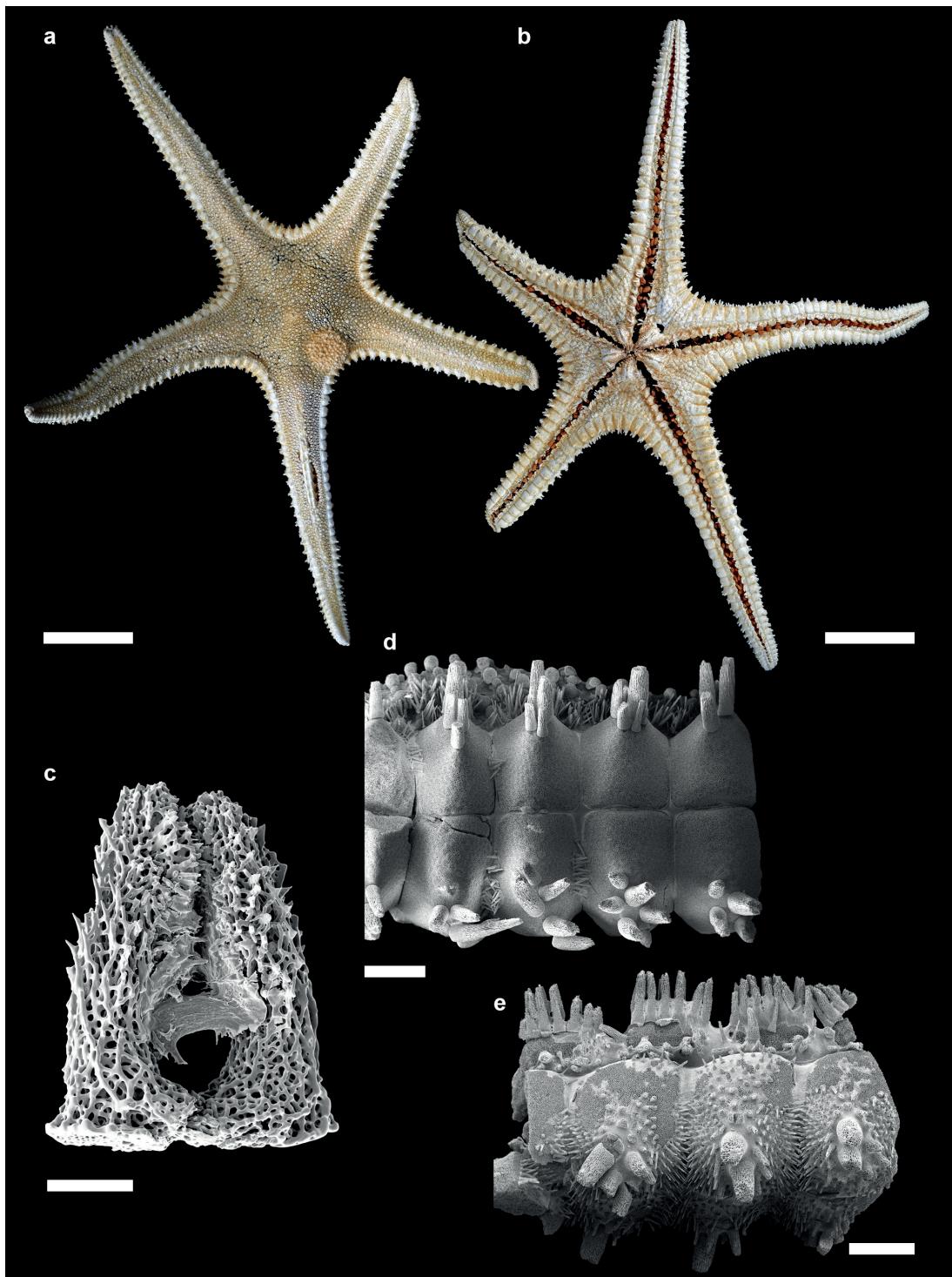


Fig. 3 *Dytaster stellamarisae* sp. nov. Holotype. Abactinal (a) and actinal surfaces (b). Detail of pedicellariae (c), marginal plates and spines (d) and ambulacral plates and spines (e). Scale bars a-b = 3 cm; d-e = 2 mm; c = 200 μm .

significantly from those of *D. stellamarisae*.

The specimen description generally conforms to the genus *Dytaster*, with one notable exception. The genus is typically characterized by a single prominent marginal spine, absent in juveniles. The new specimens, however, show 1–3 spines in juveniles and 4–6 spines in adults on both superomarginal and inferomarginal plates. This discrepancy suggests a need to revise the genus diagnosis to account for these observations.

Therefore, the diagnosis of the genus *Dytaster* (modified from Clark and Downey, 1992) stands: An abyssal genus of Astropectinidae with a moderately small disc, long and narrow carinate arms, and rounded interbrachial arcs. Abactinal membrane thin, flexible, and inflated. Abactinal paxillae very small and irregular. Marginal plates thin, rectangular, opposite, bearing 1–6 prominent, acute spines. Actinal interradial areas moderately small, with imbricate plates. Adambulacral plates relatively long, with furrow spines arranged in straight, subequal series. Madreporite large, conspicuous, covered with paxillae. Simple pedicellariae frequently present.

Genus *Leptychaster* E.A.Smith, 1876
Leptychaster kerguelensis Smith, 1876
 (Fig. 4)

Material examined: Mar del Plata Submarine Canyon: 37°60'S, 54°42'W, 852 m, "R/V Puerto Deseado" L10, 11 Aug 2012, MACN-In 44713 (2 dry specimens: R= 11 mm, r= 3 mm; R= 8 mm, r= 3 mm and 32 wet specimens: R= 22 mm, r= 6 mm; R= 12 mm, r= 4 mm; R= 12 mm, r= 4 mm; R= 10 mm, r= 3 mm; R= 7 mm, r= 3 mm; R= 8 mm, r= 3 mm; R= 7 mm, r= 3 mm; R= 7 mm, r= 3 mm; R= 13 mm, r= 3 mm; R= 29 mm, r= 7 mm; R= 14 mm, r= 5 mm; R= 13 mm, r= 4 mm; R= 13 mm, r= 3 mm; R= 10 mm, r= 3 mm; R= 12 mm, r= 4 mm; R= 15 mm, r= 5 mm; R= 13 mm, r= 4 mm; R= 8 mm, r= 3 mm; R= 12 mm, r= 4 mm; R= 8 mm, r= 3 mm; R= 12 mm, r= 4 mm; R= 10 mm, r= 4 mm; R= 8 mm, r= 3 mm; R= 10 mm, r= 3 mm; R= 9 mm, r= 3 mm; R= 12 mm, r= 3 mm; R= 6 mm, r= 2 mm; R= 7 mm, r= 3 mm; R= 11 mm, r= 4 mm; 1 disc), CNP-Inv 4112 (10 wet specimens: R= 8 mm, r= 3 mm; R= 12 mm, r= 3 mm; R= 11 mm, r= 4 mm; R= 13 mm, r= 4 mm; R= 13 mm, r= 4 mm; R= 11 mm, r= 4 mm; R= 6 mm, r= 2 mm; R= 13 mm, r= 5 mm; R= 16 mm, r= 5 mm; R= 14 mm, r= 4 mm). Mar del Plata Submarine Canyon: 38°01'S, 54°30'W, 1006 m, "R/V Puerto Deseado" L14, 11

Aug 2012, MACN-In 44714 (1 wet specimen: R= 22 mm, r= 6 mm and 1 dry specimen: R= 22 mm, r= 5 mm). Mar del Plata Submarine Canyon: 38°02'S, 54°30'W, 997 m, "R/V Puerto Deseado" L41, 26 May 2013, MACN-In 44715 (4 wet specimens: R= 24 mm, r= 7 mm; R= 18 mm, r= 4 mm; R= 13 mm, r= 4 mm; 1 disc).

Diagnosis: Compressed disc with five rays ending in rounded tips. Abactinal paxillae bearing 15–20 rounded spinelets. Madreporite not visible. Superomarginal plates small and rounded; inferomarginal plates rectangular. Actinal area small and triangular, with few plates. Subambulacral spines grouped in bundles of 7–9, with 2 furrow spines curved upward in an "L" shape. Oral plates elongated.

Coloration light, nearly white, with an R/r ratio ranging from 4.3 to 2.3.

Distribution: Southern Indian Ocean shelf (Subantarctic convergence) surrounding Kerguelen and Marion islands. Continental Argentine shelf and slope.

Bathymetric range: 17–1900 m.

Present study: 852–1006 m.

Remarks: *L. kerguelensis* is a sub-Antarctic species which extends along the Argentine continental shelf (Romanelli & Tablado, 2011), and whose depth range has recently been extended below 1000 m (Hurtado-García & Majón-Cabeza, 2022). In this study, we provide specimens that extend its latitudinal range further north.

Genus *Plutonaster* Sladen, 1885
Plutonaster neninae sp. nov. (Fig. 5)

HOLOTYPE: Mar del Plata Submarine Canyon: 37°53'S, 54°15'W, 1451 m, "R/V Puerto Deseado" L34, MACN-In 44716 (1 dry specimen: R= 72 mm, r= 33 mm).

PARATYPES: Mar del Plata Submarine Canyon: 37°53'S, 54°15'W, 1451 m, "R/V Puerto Deseado" L34, 25 May 2013, MHNHM-4327 (1 dry specimen: R= 70 mm, r= 28 mm). Mar del Plata Submarine Canyon: 38°01'S, 54°25'W, 1200 m, "R/V Puerto Deseado" L15, 12 Aug 2012, MACN-In 44717 (1 dry specimen: R= 53 mm, r= 23 mm and 2 wet specimens: R= 55 mm, r= 23 mm; R= 51 mm, r= 20 mm). Mar del Plata Submarine Canyon: 37°52'S, 53°57'W, 1738 m, "R/V Puerto Deseado" L26, 15 Aug 2012, MACN-In 44718 (1 dry specimen: R= 52 mm, r= 19 mm), CNP-Inv 4185 (1 dry specimen: R= 52 mm, r= 20 mm). Mar del Plata Submarine Canyon: 37°53'S, 53°53'W, 1970 m, "R/V Puerto Deseado" L52, 7 Sep 2013, MACN-In 44719 (1 dry specimen: R= 70 mm,

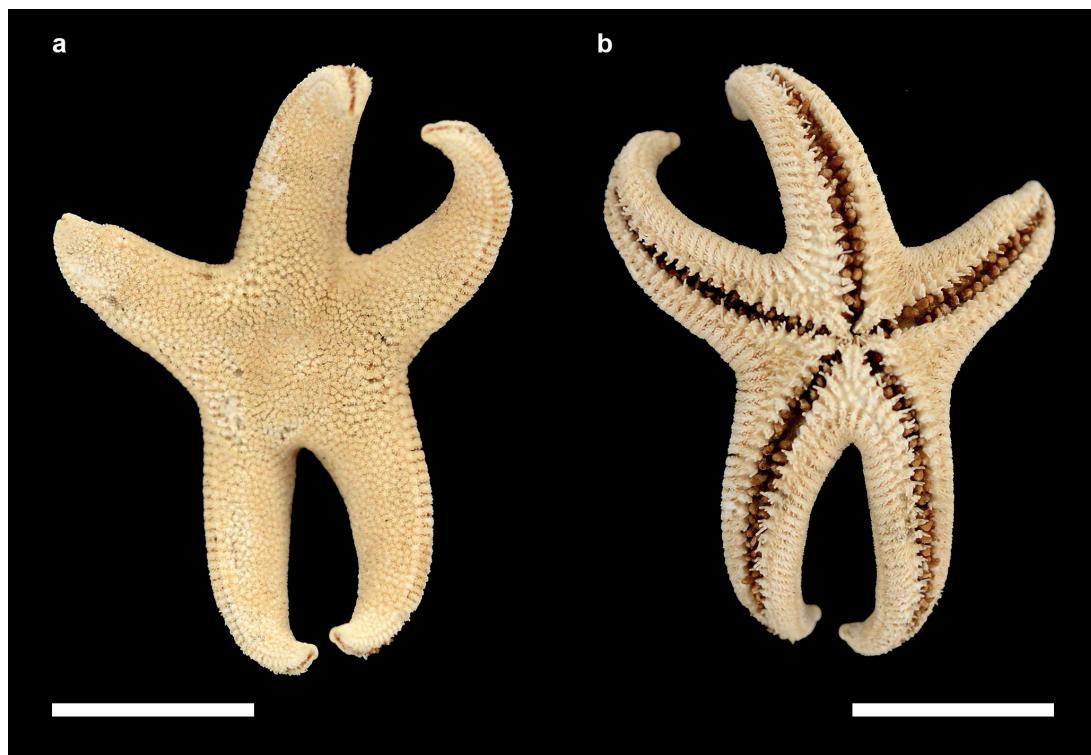


Fig. 4 *Leptychaster kerguelensis*. Abactinal (a) and actinal surfaces (b). Scale bars = 1 cm.

$r=21$ mm). Mar del Plata Submarine Canyon: $37^{\circ}52'S$, $53^{\circ}52'W$, 1712 m, "R/V Puerto Deseado" L55, 8 Sep 2013, MACN-In 44720 (3 dry specimens: $R=51$ mm, $r=18$ mm; $R=24$ mm, $r=9$ mm; $R=11$ mm, $r=5$ mm). Mar del Plata Submarine Canyon: $37^{\circ}59'S$, $54^{\circ}10'W$, 1444 m, "R/V Puerto Deseado" L58, 9 Sep 2013, CNP-Inv 4186 (4 wet specimens: $R=57$ mm, $r=23$ mm; $R=73$ mm, $r=28$ mm; $R=76$ mm, $r=29$ mm; $R=80$ mm, $r=28$ mm). Mar del Plata Submarine Canyon: $37^{\circ}50'S$, $54^{\circ}05'W$, 1398 m, "R/V Puerto Deseado" L59, 10 Sep 2013, MACN-In 44721 (6 wet specimens: $R=44$ mm, $r=17$ mm; $R=70$ mm, $r=22$ mm; $R=70$ mm, $r=25$ mm; $R=21$ mm, $r=9$ mm; $R=15$ mm, $r=7$ mm; $R=20$ mm, $r=7$ mm), CNP-Inv 4187 (3 dry specimens: $R=38$ mm, $r=14$ mm; $R=10$ mm, $r=5$ mm; $R=10$ mm, $r=4$ mm). Mar del Plata Submarine Canyon: $37^{\circ}52'S$, $54^{\circ}05'W$, 1584 m, "R/V Puerto Deseado" L60, 10 Sep 2013, MACN-In 44722 (2 wet specimens: $R=73$ mm, $r=28$ mm; $R=59$ mm, $r=22$ mm). Mar del Plata Submarine Canyon: $37^{\circ}55'S$, $54^{\circ}07'W$, 2161 m, "R/V Puerto Deseado" L61, 10 Sep 2013, MACN-In 44723 (1 wet specimen: $R=66$ mm, $r=20$ mm). Mar del Plata Submarine Canyon: $37^{\circ}55'S$, $54^{\circ}14'W$, 1404 m,

"R/V Puerto Deseado" L62, 11 Sep 2013, MACN-In 44724 (10 wet specimens: $R=76$ mm, $r=33$ mm; $R=66$ mm, $r=28$ mm; $R=57$ mm, $r=22$ mm; $R=80$ mm, $r=30$ mm; $R=76$ mm, $r=30$ mm; $R=86$ mm, $r=30$ mm; $R=80$ mm, $r=27$ mm; $R=75$ mm, $r=20$ mm; $R=74$ mm, $r=29$ mm; $R=70$ mm, $r=28$ mm and 1 dry specimen: $R=76$ mm, $r=25$ mm), CNP-Inv 4188 (2 wet specimens: $R=75$ mm, $r=22$ mm; $R=70$ mm, $r=24$ mm). Mar del Plata Submarine Canyon: $37^{\circ}50'S$, $54^{\circ}08'W$, 1395 m, "R/V Puerto Deseado" L64, 11 Sep 2013, MACN-In 44725 (12 wet specimens: $R=67$ mm, $r=27$ mm; $R=51$ mm, $r=21$ mm; $R=63$ mm, $r=23$ mm; $R=67$ mm, $r=27$ mm; $R=70$ mm, $r=23$ mm; $R=65$ mm, $r=23$ mm; $R=77$ mm, $r=26$ mm; $R=42$ mm, $r=15$ mm; $R=74$ mm, $r=25$ mm; $R=76$ mm, $r=25$ mm; $R=66$ mm, $r=26$ mm; $R=75$ mm, $r=26$ mm), CNP-Inv 4189 (6 wet specimens: $R=64$ mm, $r=21$ mm; $R=67$ mm, $r=27$ mm; $R=40$ mm, $r=15$ mm; $R=71$ mm, $r=24$ mm; $R=61$ mm, $r=20$ mm; $R=54$ mm, $r=20$ mm).

Etymology: This species is named in honor of Alicia "Nenina" Carranza, in recognition of her unwavering support for Argentine science. The name is treated as a noun in apposition.

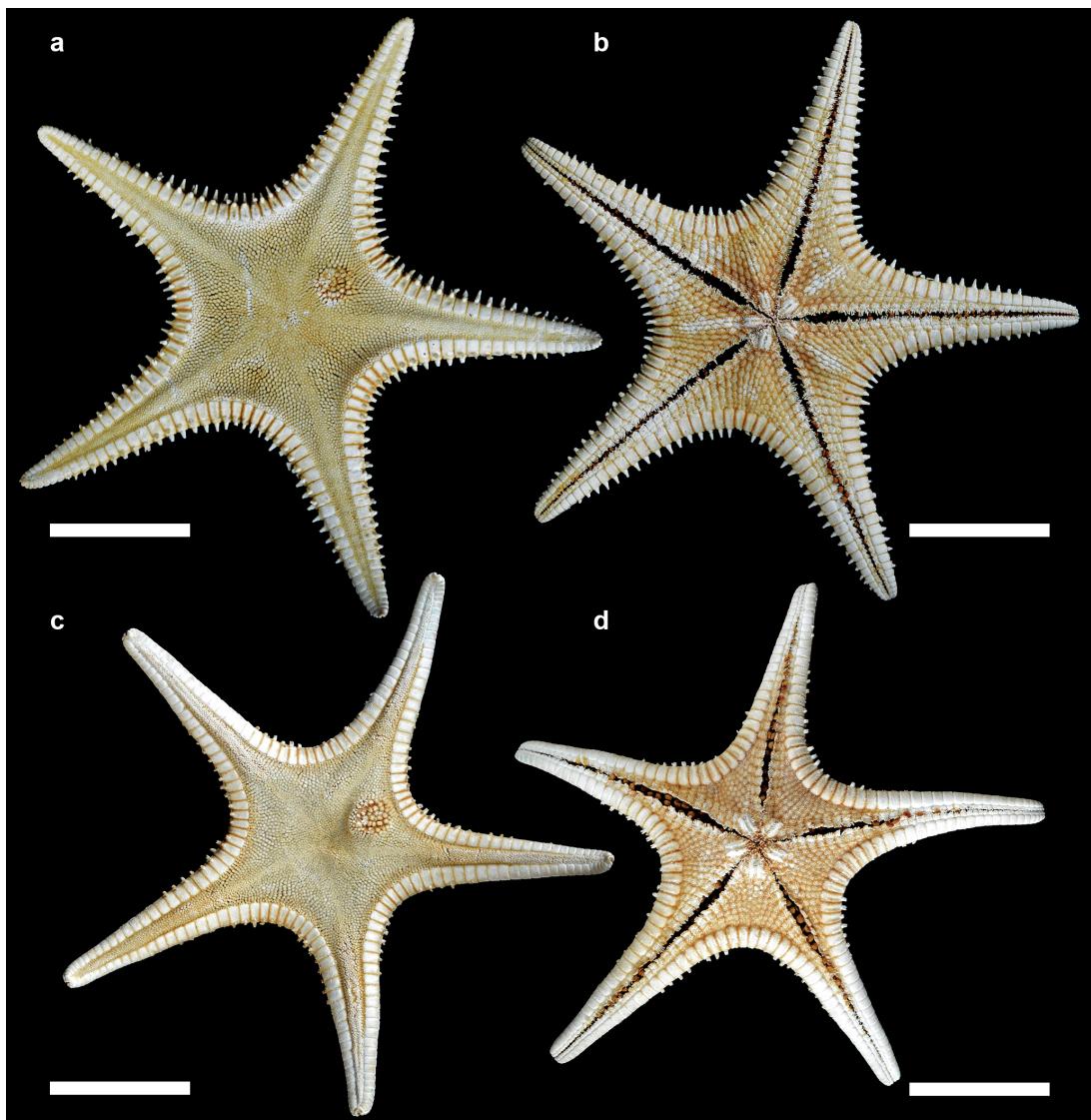


Fig. 5 *Plutonaster neninae* sp. nov. Abactinal (a) and actinal surfaces (b) of short-armed morpho. Holotype. Abactinal (c) and actinal surfaces (d) of long-armed morpho. Paratype. Scale bars = 3 cm.

Diagnosis: Angular abactinal paxillae and oval actinal plates. Superomarginal plates large and rectangular, each bearing one or two inferomarginal spines. Furrow spines number between 5 and 9, and are large, flat, and arranged in parallel.

Description: In the abactinal region, individual plates are not clearly distinguishable; only the angular paxillae are visible. Each paxilla bears an average of 32 short, rounded spinelets. The madreporite is prominent, measuring 6.4 mm in diameter (Fig. 6a).

Marginal plates are square and extend across

both the abactinal and actinal surfaces. Superomarginal and inferomarginal plates are aligned, each bearing a large spine with a broad base (Fig. 6c). In the interradial regions, inferomarginal plates possess two spines.

The actinal surface comprises 29–31 series of plates between the arms, arranged in columns from a single plate near the rays to up to eight stacked plates toward the center. These are well-defined, angular plates. Each paxilla bears an average of 29 granulated spinelets.

Adambulacral furrow spines number between 5 and 9, depending on specimen size (Fig.

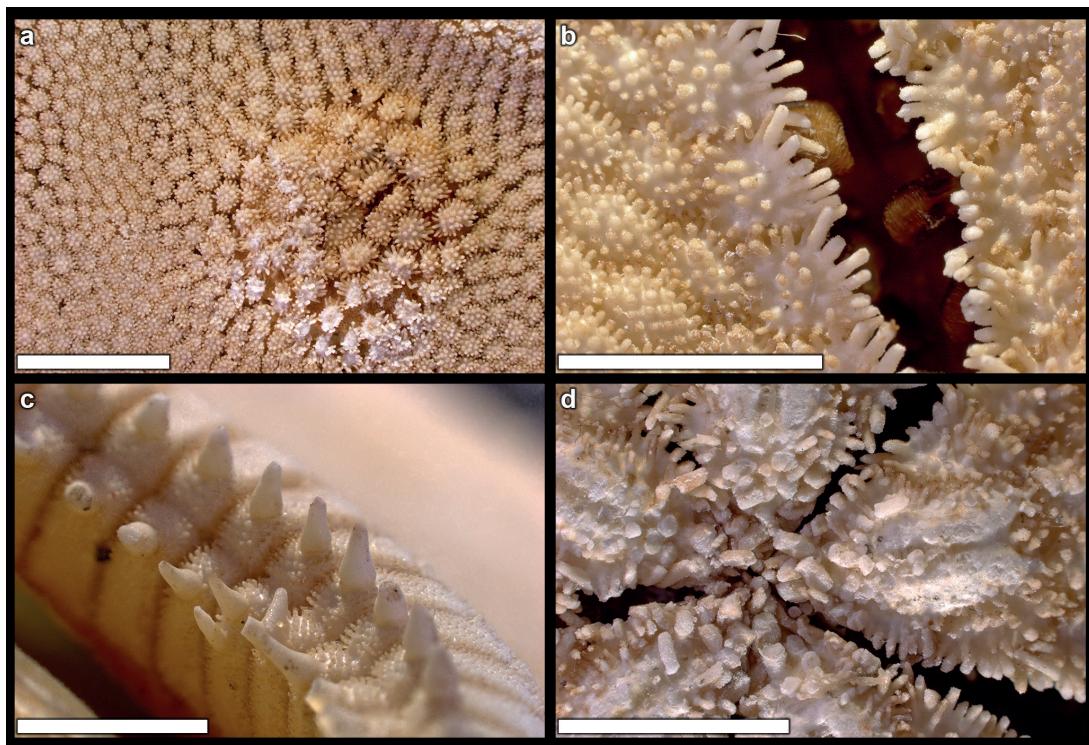


Fig. 6 *Plutonaster neninae* sp. nov. Holotype. (a). Abactinal surface. (b), ambulacratal plates and spines. (c), marginal plates and spines. (d), ambulacratal plates and spines. Scale bars = 5 mm.

6b). These are large, thin, and flat, arranged in parallel rows, and are accompanied by 4 or 5 similarly shaped secondary spines. Oral plates are equipped with two large, broad spines and 4–6 smaller lateral spines (Fig. 6d).

The body is orange and flattened, with five rays and a R/r ratio ranging from 2.1 to 3.8.

Distribution: South Atlantic, Argentina, Mar del Plata Submarine Canyon.

Bathymetric range: 1200–3447 m.

Remarks: Differences between these specimens and previously reported species from the South Atlantic (Table 2) are most evident in the spination of the inferomarginal plates. The new species bears two spines, a condition shared only with *P. fragilis*. However, it differs from *P. fragilis* in several characters, including the shape and arrangement of plates, the form of paxillae, and the presence or absence of pedicellariae.

The number of furrow spines is similar across species, but in *P. neninae*, they are large, slender, and aligned parallel to one another, supported by 4–5 large, similarly shaped secondary spines. In contrast, *P. bifrons* exhibits shorter secondary spines, often accompanied by a large distal spine.

Abactinal plates also differ. The new species

has a greater number of plates (approximately 24), compared to *P. agassizi*, which has up to 7. The paxillae are angular in *P. neninae*, while in *P. bifrons*, they are more oval in shape. Notably, *P. neninae* completely lacks pedicellariae.

Among the examined specimens, two distinct morphotypes were observed. Both share the general diagnostic features of the species, but one group (represented by 50 specimens) has shorter arms and a more rounded body compared to the other group (8 specimens). In the former, marginal plates extend further toward the actinal surface and become reduced in size along the arms. Spines are present on both the superomarginal and inferomarginal plates, although they are smaller than those in the second morphotype. Similar variation within the genus has been previously reported by Clark and Downey (1992), who noted that such intraspecific differences are common in this group.

Genus *Psilaster* Sladen, 1885
Psilaster pearsei sp. nov. (Fig. 7)

HOLOTYPE: Mar del Plata Submarine Canyon: 37°52'S, 53°51'W, 1712 m, "R/V Puerto Deseado"

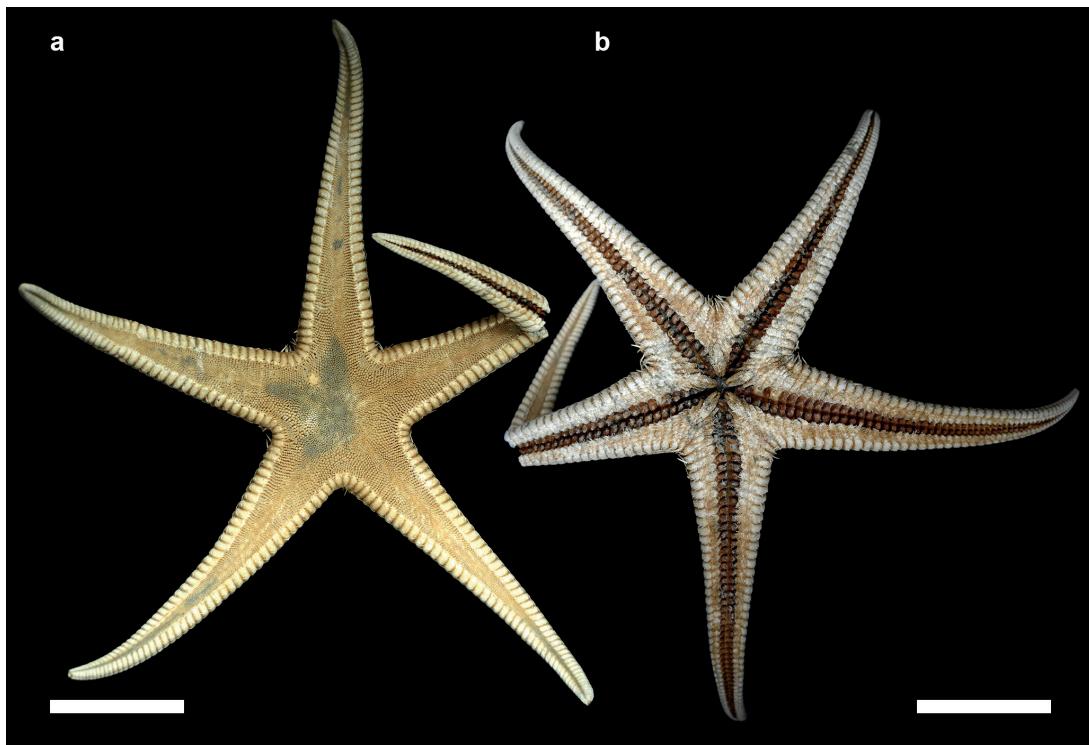


Fig. 7 *Psilaster pearsei* sp. nov. Holotype. Abactinal (a) and actinal surfaces (b). Scale bars = 5 cm.

L55, 8 Sep 2013, MACN-In 44726 (1 dry specimen; R/r = 5.4.).

Etymology: This species is named in honor of John Pearse, in recognition of his extensive work on Asteroidea and his valued friendship. The name is used as a noun in apposition.

Diagnosis: 3–4 inferom marginal spines; 1–2 superom marginal spines; marginal squamiform spinelets; 8 furrow spines.

Description: The disc is relatively small. The abactinal area (Fig.8a) contains a high density of rounded plates arranged in six rows, with 6–7 plates per row. Paxillae are rounded, each bearing an average of nine long spinelets with rounded tips. The madreporite is small, lacking paxillae, and has a diameter of up to 3.5 mm.

Marginal plates are rectangular with squamiform spinelets that become longer and thinner toward the edges. Superom marginal plates (Fig.8d) carry a prominent, acute spine (with two spines in some specimens), while the inferom marginal plates (Fig.8c) bear 3–4 spines of uniform size.

The actinal plates are square and covered with paxillae, each bearing an average of 23 spinelets similar in shape to those on the abactinal surface. The arrangement of paxillae on this surface appears more orderly.

Adamambulacral plates (Fig.8b) are rectangular, each bearing 8–9 furrow spines arranged at an angle, followed by five rows of 7–8 secondary spines, similar in number and shape to the furrow spines. Oral plates (Fig.8 e) are well-defined and elongated, each carrying two large, broad, spatulate spines.

The body is light brown with darker tube feet. R/r = 5.4.

Distribution: South Atlantic, Argentina, Mar del Plata Submarine Canyon.

Bathymetric range. 1712 m.

Remarks: The specimen was compared with descriptions of all species cited for the Atlantic Ocean, as well as with other specimens in the MACN collection, including *Psilaster charcoti* and *Psilaster andromeda*. Specimens of *Psilaster casiope* and *Psilaster acuminatus* from the UNAM were also examined.

The specimen differs from other species in the genus by several diagnostic characters (Table 3), particularly the armament of the superom marginal plates, which is more prominent and present on all plates, unlike in other species. The oral plates also differ, as species without flattened jaws typically have four spines. For *P. herwigi*, although the number is unspecified, two series of rectan-



Fig. 8 *Psilaster pearsei* sp. nov. Holotype. (a), Abactinal surface. (b), ambulacral plates and spines. (c), inferom marginal plates and spines. (d), superom marginal plates and spines. (e), oral plate. Scale bars = 5 mm.

gular suboral spines are described, differing from those in *P. pearsei*. The spinelets in *P. pearsei* are distinctive, being spiniform, large, and scale-like on the marginal plates, while other species have rounded, thin, short, or sparse spinelets. Additionally, this specimen has 8–9 furrow spines, while some others species have a maximum of 8. The R/r ratio is also larger in *P. pearsei*.

DISCUSSION

Our examination of 153 specimens from the Astropectinidae family led to the classification of six species across five genera, all representing new records or range extensions for the Southwestern Atlantic Ocean. Notably, we observed range expansions for *Leptychaster ker-guelensis*, *Bathybiaster lories*, and *Dytaster grandis*, while the other three genera yielded

newly described species.

The close geographic distributions of *Dytaster grandis* and *Dytaster stellamarisae* sp. nov. raised questions of differentiation. However, morphological analysis revealed distinct differences, justifying their classification as separate species. For *D. grandis*, establishing clear subspecies boundaries remains challenging due to limited distributional data and subtle morphological variations.

Among the new species, *Plutonaster neninae* sp. nov. extends the northern distribution of *Plutonaster* in the Southwestern Atlantic compared to *P. bifrons*. Additionally, *Psilaster pearsei* sp. nov., discovered at 37° 52'S, represents an interesting range extension from the nearest known occurrence of *Psilaster herwigi* at 35°48'S, and the second species of *Psilaster* in Southwestern Atlantic Ocean.

Table 1: Morphological characteristics and distribution of *Dytaster* species compared. ND = no data.

AREA	<i>Dytaster nobilis</i> Sladen, 1889	<i>Dytaster grandis</i> (Verrill, 1884)	<i>Dytaster exilis</i> Sladen, 1889	<i>Dytaster felix</i> Koeniger, 1907	<i>Dytaster carbonnieri</i> Sibuet, 1975	<i>Dytaster insignis</i> (Perrier, 1884)	<i>Dytaster pedicellariae</i> H.E.S Clark & D.G. McKnight, 2000	<i>Dytaster stellamarisae</i> sp. nov.
Paxilar spinelets	Area and plates	Large paxillae.	Small paxillae with Area on the disk more or less minute spinules.	Small and rounded paxillae. Enlarged plates.	Small paxillae.	With a small round swelling centrally, occupying most of plate. Paxillae do not seem to form very regular rows.	Rounded paxillae, some larger than others.	
Abactinal	Paxilar spinelets	Few, with a central granuliform spinelet.	Up to 15 tiny, obtuse spinelets.	Granular spinelets arranged in circles enclosing 2-6 larger spinelets. central spinelets	Up to 25 tiny granules, granuliform in shape.	5-8 distinct slender, tapering, sharp-tipped spinelets.	Up to 33 spiniform spinelets, arranged around a central, largest one.	
Madreporite	1/4 of disc radius.	1/3 of disc diameter with paxillae and pedicellariae.	6 mm.	Large and oval.	2/3 of disc radius with enlarged paxillae.	Interradial, more or less oval.	1/2 of disc radius with paxillae.	
Pedicellariae	ND	Scattered and granuliform, with 3-4 obtuse valves.	Absent.	ND	Numerous, with 2-5 blunt, rounded valves.	Absent.	Pedicellariae formed by 2-4 very enlarged, thick rather flattened spines.	Simple bivalve.
Superomarginal plates	Length and height subequal, confined entirely to the lateral wall of the ray.	Squarish.	Confined to the lateral wall. Length slightly greater than the height.	Narrow, a little longer than wide. Covered with series granules, rounded.	Vertical, except at the tip of the arms.	Large and broad, mostly confined to the abactinal slightly raised edge to disc and arms.	Forming a distinct and Large and square.	
Superomarginal spines	ND	Moderately large spine, 5-12 in number.	Single, short, conical sharply pointed spine.	Absent.	One large spine.	Large acuminate spine with no smaller secondary spines.	1-3 rather short, tapering, thorny round tipped enlarged spines.	1-6 prominent, large spines.
Marginal	Inferomarginal plates	Similar to superomarginal.	Correspond to the superior series.	Correspond exactly to superomarginals.	Similar to superomarginal.	Similar to superomarginal.	Corresponding with superomarginals.	Big and square, extending to the actinal surface.
	Inferomarginal spines	Similar to superomarginal.	Single, short, conical spine.	Short, conical, tight spines.	One large spine with 1-2 smaller spines near the lower edge.	Similar to superomarginal.	1-2 enlarged conspicuous spines similar to, but slightly larger than, that of superomarginals.	1-6 prominent spines.
Pedicellariae	ND	Minute.	ND	Three acute valves, thick, elongated and sometimes arched.	ND	ND	ND	Short, squat round-headed.
Actinal	Paxilar spinelets	Row of papilliform granules along the outer margin.	Triangular area with an enlarged central spine.	Numerous plates ND	Few plates.	Moderately large areas with small plates arranged in regular rows.	Area well defined. Conspicuous regular row of large square or rectangular plates bordering oral and adambulacral plates.	Rounded plates.
		Small papilliform, rather widely spaced.	Small and divergent, with a larger central spine.	Small and papilliform, in groups, with a centrally conspicuous pedicellaria.	Scattered.	Granules and granuliform, with a few occasionally bearing a central obtuse spine or, rarely, a pedicellaria.	With a few spines.	Large and thin, 12-20 in number with an enlarged central spine.

Table 1: Morphological characteristics and distribution of *Dytaster* species compared. ND = no data.

AREA	<i>Dytaster nobilis</i> Sladen, 1889 (<i>Verrill, 1884</i>)	<i>Dytaster grandis</i> Sladen, 1889	<i>Dytaster exilis</i> Sladen, 1889	<i>Dytaster felix</i> Koehler, 1907	<i>Dytaster therbonnieri</i> Sibuet, 1975	<i>Dytaster insignis</i> (Perrier, 1884)	<i>Dytaster pedicellaris</i> H.E.S Clark & D.G. McKnight, 2000	<i>Dytaster stellarisae</i> sp. nov.
Adanbulacral plates	ND	ND	Long and very narrow.	ND	Slightly longer than broad.	ND	Distinct, more or less rectangular with narrow edge to furrow and actinal plates.	Rectangular and short.
Actinal furrow spines	6-7, one very small. Compressed laterally and slightly curved. Secondary series behind.	5-8 flattened, compressed, and truncate.	12 short cylindrical and papilliform spinelets, no spines.	8-10 elongated spines, arranged in comb shape, the medians a little longer than the others. Outside, two irregular rows of 3-6 larger, lanceolate and pointed spines.	7-12 flattened and truncate.	7-9 straight, nearly equal, blunt, slightly compressed; subambulacral spines shorter, blunt, scattered or arranged in irregular rows.	5 proximally, narrow and rounded basally. 6-7 out along arms, curving back over adambulacral plates. 2-3 sturdier, longer, upright subambulacral spines.	6-7 flattened and parallel to each other.
Pedicellariae	Absent.	Granuliform, with 3-4 obtuse valves. One centrally thickened and conspicuous formed by 4 enlarged spinelets.	Present.	Present.	ND	Occasionally an incipient straight. Broad-headed 2-4 valved obvious and frequent pedicellaria per plate.	Simple and bivalve.	
R/r	4.55 36°44'S, 46°16'W Off the coast of Buenos Aires. Depth: 4846 m.	4.5-6.8 Between Juan Fernandez Island Sea and Weddell Sea. Depth range: 750 m.	6.5 Off Argentina and SW Azores. SW Africa, West of Tristan da Cunha. Depth range: 2514-3475 m.	4-5.14 Off Angola and SW Africa. Depth range: 2864-3431 m.	4.5-6.8 Known from the Gulf of South Africa, Campbell in the Hikurangi, north of the Three Kings Islands. Depth range: 1137-2677 m.	4.2-5.9 Up to 7.7	3.58-3.66 Known from the Gulf of South Africa. Depth range: 2864-3431 m.	3.58-3.66 Up to 7.7
Distribution	Sladen, 1889	H.E.S Clark & D.G. McKnight, 2000	H.E.S Clark, 1970 (Perrier, 1881)	H.E.S Clark, 1970 (Perrier, 1881)				
Plutonaster <i>Plutonaster egazzesi</i> (Verrill, 1880) AREA	<i>Plutonaster bifrons</i> (Wyllie Thomsen, 1873)	<i>Plutonaster complexus</i> H.E.S Clark & D.G. McKnight, 2000	<i>Plutonaster hikurangi</i> H.E.S Clark & D.G. McKnight, 2000	<i>Plutonaster fragilis</i> H.E.S Clark, 1970 (Perrier, 1881)	<i>Plutonaster jonicae</i> H.E.S Clark, 1970 (Perrier, 1881)	<i>Plutonaster knoxi</i> H.E.S Clark, 1970 (Perrier, 1881)	<i>Plutonaster nennenii</i> sp. nov.	
Area and plates	Plates in a series, up to 7, covered with large paxillae.	Paxillae with oval columns of moderate height.	Paxillae very minute and crowded.	Plates narrow, 8-9 plates in a row, out area present between plates broaden and 5-7 in a row. Gently lobed, forming a close cover.	Plates oval.	Plates oval or faintly Paxillae lobed. Paxillae small, similar to crowded.	Crowded paxillae, coarser on the disc than on the arms.	
Paxillae	Numerous, short, blunt, and granule-like spinelets.	Each paxilla with median crown of 5-6 small, equal papilliform spinelets.	Short sturdy trunk that ends in a round or oral convex head, crowned by slender, generally untapering flat-tipped spinelets.	12-25 slender, well-separated, finely thorny, blunt-tipped marginal spinelets, enclosing a number of slightly shorter, very round headed, finely thorny well-spaced spinelets.	ND	20-30 slender, thorny spinelets of more or less uniform size, the central spinelets not differing obviously from the outer ones.		

m.

Table 2: morphological characteristics and distribution of *Plutonaster* species compared. ND = no data.

AREA	<i>Plutonaster agassizii</i> (Verrill, 1880)	<i>Plutonaster bifrons</i> Plutonaster us H.E.S Clark & D.G. Sladen, 1889	<i>Plutonaster complexus</i> H.E.S Clark & D.G. McKnight, 2000	<i>Plutonaster hikurangi</i> H.E.S Clark & D.G. McKnight, 2000	<i>Plutonaster ionae</i> H.E.S Clark & D.G. McKnight, 1970	<i>Plutonaster intermedius</i> Fell, 1958	<i>Plutonaster fragilis</i> (Perrier, 1881)	<i>Plutonaster knoxii</i> nov. nov.
Abactinal Pedicellariae	Large. ND	ND	Large, almost circular.	Large interradial. 6. Quite large 7 mm wide.	Large about 10 mm. ND	ND	Visible, with a diameter of 6.4 mm.	Absent.
Abactinal Pedicellariae	Smaller than the abactinals and crowded, with small rounded spinelets.	As long as broad, covered with milliary grains.	Plates narrow, with slightly rounded, stumpy, generally well spaced round granules. Covered with small papilliform granules and one small tubercle like granule.	With round on slightly angular granules that form almost regular rows.	18-21 rectangular plates well-defined, mid and rectangular, conspicuous. Covered by round or slightly angular well-spaced granules.	35 or 36 plates, tufted, granular, covered with small spinelets.	About 70 plates. The large and broader than long, slender; spiniform granules.	Densely crowded by abactinal and actinal surfaces.
Superomarginal plates	One short, stout, and blunt spine (not always present).	One prominent, rigid central spine.	1-3 enlarged fast-tapering short spines.	Very sturdy spine stands upright.	1-2 enlarged, sturdy, short, sturdy tapering, elongated spine with a rounded tip.	1-2 enlarged, sturdy, tapering, broad-based spines.	1 large spine as they are long in inferomarginal plates.	1 large spine with a broad base.
Inferomarginal plates	Smaller than the abactinals and crowded, with small rounded spinelets.	Square, covered with milky grains with superomarginal.	Correspond with superomarginal, wider than long.	Correspond with superomarginal, raised, superomarginal, narrowly rectangular.	Correspond with superomarginal, plates separated by deep fascicles.	Correspond with superomarginal plates.	About twice as broad as they are long in inferomarginal plates, wider the proximal part of the ray; beyond, they both the gradually become squarer in outline.	Large and rectangular, extending to both the abactinal and actinal surfaces.
Marginal	One short, stout, and blunt spine (not always present).	One prominent, rigid central spine.	Breath twice as their length. One short, tapering, pointed spinelet.	Minute conical Enlarged spines short, almost conical; similar to, a single spine may be but considerably present, or interradially 2-4 small spines may form a vertical row.	1 enlarged conspicuous spine, this similar to, but larger than enlarged spines of superomarginal spines. Occasionally, a marginal plate, second much smaller spine is also present.	1-2 enlarged, broad-based tapering spines.	A coating of fine spines with a broad base.	1-2 large spines with a broad base.
Inferomarginal spines	One short, stout, and blunt spine (not always present).	One prominent, rigid central spine.	Thornlets	This 1 enlarged spines similar to, but larger than enlarged spines of superomarginal spines. A second very small enlarged spine is present behind and on actinal side of larger spines.	1 enlarged spines, this similar to, but larger than enlarged spines of superomarginal spines. A second very small enlarged spine is present behind and on actinal side of larger spines.	1 isolated oblique spine.	A coating of fine spines with a broad base.	A coating of fine spines with a broad base.
Pedicellariae	Present. ND	ND	Enlarged tips of 3 or 4 spines that bend over and meet 2 on a plate.	Enlarged tips of 3 or 4 spines that bend over and meet 2 on a plate.	Incipient, formed by enlarged and clavate heads of 3 or 4 spines, near superomarginals.	ND	ND	Absent.

Table 2: morphological characteristics and distribution of *Plutonaster* species compared. ND= no data.

AREA	<i>Plutonaster agassizi</i> (Verrill, 1850)	<i>Plutonaster bifrons</i> Plutonaster us H.E.S. Clark & D.G. McKnight, 2000	<i>Plutonaster complexus</i> H.E.S. Clark & D.G. McKnight, 2000	<i>Plutonaster hikurangi</i> Hani H.E.S. Clark & D.G. McKnight, 2000	<i>Plutonaster jonesi</i> H.E.S. Clark, 1970	<i>Plutonaster fragilis</i> H.E.S. Clark, 1958	<i>Plutonaster intermedius</i> Perrier, 1881	<i>Plutonaster knoxi</i> nov. sp.
Area and plates	Triangular areas with angular Paxillae.	Actinal areas of moderate size with up to seven series of plates, arranged mostly in regular columns.	ND	Large area, well-defined with very regular rows of plates. Rectangular, narrow, each with slender, well-spaced spines.	Well-defined area. Plates forming regular rows, regular rows.	Plates in regular longitudinal rows, one plate corresponding to each adambulacral. Each plate with numerous short spines. Interradially.	Intermediate large areas.	Oval Paxillae.
Paxillar spinelets	Short and rounded.	Coarse granules or short spinelets.	ND	Short, finely thorny-headed spinelets.	ND	Rows of well-spaced thorny headed granules;	ND	Granulated, with a mean of 29 spinelets.
Adamambulacral plates	Bear.	ND	Longer than broad.	Conspicuous.	Straight margin, in the last quarter of the arms the margin often gently rounded.	Rectangular, conspicuous, separated laterally by grooves that continue out between actinal plates	ND	ND
Actinal	Adamambulacral furrow spines.	7-8 slender spines.	7-10 furrow spines, 6-7 delicate, backed by shorter tapering, subambulacral spines and often a large distal spine.	7-11 slender, well-spaced, slightly tapering, round tipped and generally of similar size apart from distalmost and proximal spines, which are shorter; these spines finely thorny.	9-10 spaced, round tipped, finely thorny, the most proximal and distal spines of similar size apart. 1 enlarged, sturdy spine.	8-9 slender, well-spaced, very finely thorny, round-tipped spines. 1 enlarged, sturdy spine.	Furrow comb of about 8 uniform spines, 4 or 5 secondary outside of which lies a single, large and very conspicuous subambulacral spine.	5 to 9 large, thin, and flat, disposed in parallel and carrying arranged in 4 or 5 secondary spines.
Pedicellariae	ND	Present.	ND	Simple pedicellaria, formed by 2 or 3 enlarged spinelets.	1-2 conspicuous incipient.	Formed by enlarged and elevate heads of 3-5 spines.	ND	Absent.
R/r	2.4-3.8	3.4-5.0	3.85	1.5-5.5	1.8-6.3	1.6-5.8	3-3.3	2.1-3.8
Distribution	South of Islas Malvinas to the Florida Strait and Gulf of Mexico; also found at Ascension Island, the Cape Verde Islands, and off Venezuela; and South Africa, Argentina. Depth range: 335-3110 m.	Mediterranean Sea; Tasman Sea. Ocean (from Faroe m. to Gulf of Guinea, including Canary Islands); northwest Atlantic Ocean (from New Jersey, USA, to Islands, and off Venezuela); and South Africa, Argentina. Depth range: 100-3587 m.	New Zealand Exclusive Economic Zone and Campbell Plateau. Depth range: 1700-2460 m.	New Zealand Exclusive Economic Zone and Campbell Plateau. Depth range: 1700-2460 m.	New Zealand Exclusive Economic Zone and Campbell Plateau. Depth range: 1920 m.	New Zealand Exclusive Economic Zone and Campbell Plateau. Depth range: 934-990 m.	West Indian Ocean Exclusive Economic Zone and Campbell Plateau. Depth range: 1647-1693 m.	New Zealand Exclusive Economic Zone and Campbell Plateau. Depth range: 112-985 m.

Table 3: Morphological characteristics and distribution of *Psilaster* species compared. ND = no data.

AREA	<i>Psilaster acuminatus</i> Sladen, 1859	<i>Psilaster andromeda</i> (Müller and Troschel, 1842)	<i>Psilaster cassiope</i> Sladen, 1859	<i>Psilaster herwigi</i> (Bernasconi, 1972)	<i>Psilaster charcoti</i> Koehler, 1906	<i>Psilaster pearsei</i> sp. nov.
Abactinal	Paxilar spinelets Relatively broad.	Paxilar area highly variable. Paxilar area highly variable.	Paxillae small and closely crowded.	Paxillae with oval or polygonal bases.	Covered with small, fine and very tight paxillae, a little larger than on the disc than on the arms edges. and becoming excessively small towards the end of the arms.	Average of 9, elongated with rounded tips.
Madreporite	Small.	ND	8–15 short, blunt. a superficially granuliform appearing.	10–20 short, clavate papilliform spinelets with rugose tips.	ND	Small and naked, with a diameter of 3.5 mm.
Pedicellariae	ND	ND	Small, with a surface grooved by coarse, deep striation furrows.	ND	ND	Absent.
Superomarginal plates	Plates higher than broad, with discrete squamiform and densely crowded spinelets.	Variable in breadth, proportionate to overall size.	More or less massive, encroaching on the upper surface to form a broad border. The superficial face is armed with spaced squamiform granules that transition at the edges to papilliform fascicular spinules. Occasionally, some plates, particularly distally, bear an enlarged laterodistal granule or tubercle. Absent.	Sloping inward on the upper side, with polygonal squamiform granules that transition at the edges to papilliform fascicular spinules. Occasionally, some plates, particularly distally, bear an enlarged laterodistal granule or tubercle. Absent.	No enlarged spines present.	A row of 5–6 small flattened and lying spines.
Marginal spines	Often with an enlarged distal spine, except on the first four or five plates.	The first five or six plates are sometimes armed with a spine.	Similar in contour and armament.	ND	Correspond exactly to the superomarginals.	1–2 prominent, acute spines.
Inferomarginal plates	Plates are higher than broad, forming a gentle, well-rounded curve.	ND	1–4 inconspicuous, spaced spines.	ND	Groups of short, clavate spinelets. Similar in appearance.	Rectangular, with spinelets shaped like scales.
Inferomarginal spines	3–4 spaced, upwardly appressed spines.	1–4 spaced, tapering, slightly flattened spines.	ND	Some proximal spines 4–5 with 1–3 flattened, inconspicuous spines.	ND	3–4 prominent, acute spines.
Pedicellariae	ND	ND	Absent.	ND	Area relatively large. Plates poorly developed, only form a single row. Each carry a small tuft of very short and erect spines.	Absent.
Area and plates	Small to moderate in size. Area small to moderate in size.	ND	Almost uniform and flattened.	ND	Groups of short, clavate spinelets. Similar in appearance.	Square plates.
Paxilar spinelets	In at least one very large specimen, some spinelets are enlarged into small spines, but the armament remains uniform in smaller specimens.	Uniform.	ND	ND	Mean of 23, elongated with rounded tips.	Rectangular.
Actinal Adamambulacral plates	ND	Large.	Moderately long.	ND	ND	Rectangular.
Adamambulacral furrow spines	8.	7 to 8.	7–8 slender, compressed spines, backed by several much shorter subambulacral spines.	6–7 somewhat prismatic spines, erect comb.	5 spines in a single row, large, 8–9 spines arranged and flattened and form a small in angle.	35°48'S, 52°48'W
Pedicellariae	ND	ND	ND	ND	ND	From the Norwegian coast and western Sweden to the Faeroe Channel and south to the Bay of Biscay; also in the Arctic, extending north to the Murman coast.
R _r	3.7–5.0	3.5–5.1	3.3–4.5	2.5–3.5	3.6–5	3.4
Distribution	West and southwest of South Africa, also in temperate Australasia. Depth range: 155–547 m.	From the Norwegian coast and western Sweden to the Faeroe Channel and south to the Bay of Biscay; also in the Arctic, extending north to the Murman coast. Depth range: 70–1500 m.	From the Guyana Trench, in the eastern Atlantic from Uruguay. Depth: 800 m.	From the Gulf of Mexico and Caribbean, east to the just north of Cap Blanc to the Cameroons and Gulf of Guinea. Depth range: 550–1460 m.	Southern Ocean.	35°52'S, 53°52'W, South Atlantic, Argentina, Mar del Plata Submarine Canyon. Depth: 1712 m.

Astropectinidae emerged as one of the most abundant families within the Asteroidea in the Mar del Plata Submarine Canyon, suggesting a strong affinity for the canyon's muddy substrates, similar to those favored by other Paxillosida families. The canyon's location at the mouth of the Río de la Plata likely enhances this habitat's productivity through high organic matter input from river discharge, which may contribute to the high organism abundance observed.

Our findings highlight the connectivity of Argentinian deep-sea ecosystems with sub-Antarctic and Antarctic regions, revealing shared biodiversity patterns and emphasizing the potential for further new records in these depths. This study not only expands our understanding of Astropectinidae distributions but also underscores the importance of continued exploration in these under-sampled deep-water environments.

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