



Aberranta magnumlanai n. sp. (Annelida: Aberrantidae) a new species from Brazil and first occurrence of the genus in the Southern Hemisphere

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ABSTRACT

Aberrantidae is a small group of polychaetes morphologically homogenous and rarely collected. Adult individuals usually have a few millimeters and about 40 chaetigers. Living specimens are transparent, yellowish-brown with a dark alimentary channel and have reddish eyes. The few records of *Aberranta*, the only described genus in the family, are from mud, sand, sandy-mud, and coarse sand, from four to 3,250 m. All known species have been recorded from the eastern USA, Mediterranean, and China. The examined material is from three projects coordinated by CENPES/Petrobras, the Brazilian oil company. Samples were collected from continental shelf, canyons, and slope depths. Polychaetes and others benthic organisms were sieved from the sediment, fixed in a 4% formalin solution, conserved in 70% alcohol, and then identified. The sampling was carried out from 25 to 3000 m depth, but individuals were collected from 383 to 1312 m. The new species, *Aberranta magnumlanai* sp. nov., is characterized by the absence of eyes, branchiae from chaetiger 3, and by having three types of neurochaetae: a) thick and smooth capillaries, b) capillary of intermediary length and with long marginal serration, and c) lyriform chaetae with spinose shaft and distal projections of same length. This is the first record of the genus in the southern hemisphere.

Keywords: Deep sea, Brazil, Errantia, Aciculata, incertae sedis

INTRODUCTION

Aberrantidae is a small group of polychaetes that are very similar morphologically and rarely observed from benthic samples. Adult individuals usually have just a few millimeters in length and about 40 chaetigers. Living specimens are

transparent yellowish-brown, with a dark alimentary channel and red eyes (Rouse and Pleijel, 2001). The few records of *Aberranta*, the only described genus in the family, are from mud, sandy, sandy-mud, and coarse sand from four to 3,250 m deep (Mackie, 2019). Aberrantidae annelids are considered motile, epibenthic, and interstitial feeders that use ciliated grooved palps for feeding on microbial biofilms, microphytobenthos, and organic detritus (Jumars et al., 2015).

The described species within this genus have been documented solely in the North Atlantic, spanning from the eastern and western coasts

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of the USA to the Mediterranean and even as far as the Pacific, specifically in China (Mackie et al., 2005). Mackie et al. (2005) conducted the latest revision of this taxon, resulting in the recognition of four currently accepted species: *Aberranta enigmatica* Hartman, 1965; *Aberranta sulcata* Mackie, Pleijel & Rouse, 2005; *Aberranta palpata* Wolf, 1987; and *Aberranta banyulensis* Mackie, Pleijel & Rouse, 2005 (Read and Fauchald, 2023). Later, Martinez and Adarraga (2011) provided the first record of *A. banyulensis* in the Iberian Coast.

The possible existence of four or five new species, including the one described here was mentioned by Mackie (2019). He also emphasizes that the knowledge regarding many of these undescribed species has been probably limited by their sparseness and/or fragmentary condition. This author also pointed out that their fragility may as well be a factor for the lack of records in other regions.

Hartman (1965) considered *Aberranta* to belong to an unknown family and closely related to Spionidae, whereas Wolf (1987) suggested the genus could be intermediate between Paraonidae and Spionidae. Wolf (1987) established the new family based on palps position and presence of two achaetous peristomial segments; however, did not discuss the higher relationships of the new taxon.

Fauchald (1977) treated the genus as *incertae sedis*, whereas Mackie (1996), Rouse and Pleijel (2001), Worsaae et al. (2005) and Mackie et al. (2005) suggested close relationships with Neriliidae, based on the presence of a mid-ventral ciliated band, and possible affinities with Eunicida. Zrzavy et al. (2009) suggested that *Aberranta* belongs to a clade including Phyllodocida and Amphinomida, based on a combined morphological and molecular analysis. The phylogenetic position of *Aberranta* remains enigmatic, since the cladistics analysis performed by several authors provided weak support to the indicated relationships. In a recent publication, Rouse et al. (2022) referred to this taxon only as *Aberranta*, considering the family name redundant.

In general, the knowledge about this group is scarce and there is still much to be explored

regarding biological and ecological characteristics, as well as phylogenetic position. However, this study objective is to provide the first southern hemisphere record of this genus, in the Atlantic Ocean, in the greatest recorded depth among the valid species, and describe a new species.

METHODS

The examined material is from two campaigns established during three projects coordinated by CENPES/PETROBRAS: I) “Habitats Project – Campos Basin Environmental Heterogeneity”. The first campaign occurred from May 2, 2008 to July 15, 2008; and the second from January 31, 2009 to March 17, 2009. The samples were collected in the oceanographic vessels R/V “Gyre” and R/V “Miss Emma MacCall”, from different campaigns (Hab 3-11; 13), stations (A-I 1-11; Cang 6-9; Canac 6-9), replicates (1–3), and strata (0–2, 2–5, or 5–10 cm). II) “Projeto AMBES – Caracterização Ambiental Marinha da Bacia do Espírito Santo e Porção Norte da Bacia de Campos”. Two oceanographic campaigns were completed aboard the R/V “Seward Johnson” one from December 2011 to February 2012 (summer) and another in July 2013 (winter) (Bernardino et al. 2016). Sampling design was performed in seven transects named A to G from south to north, each of them comprising ten sampling stations, of which four were placed along the shelf at 25, 40, 50, and 150 m deep; and six along the slope at 400; 1,000; 1,300; 1,900; 2,300; and 3,000 m deep, totaling 70 sampling sites. The other two oceanographic campaigns were completed in the Watu Norte Canyon (CANWN). Sampling design was performed along the depth gradient at 150; 400; 1,000; and 1,300 m deep (stations 4 to 7). III) “Projeto Santos – Caracterização Ambiental da Bacia de Santos” used the R/V “Ocean Stalwart” (2019) and the R/V “Seward Johnson” for sample collection (2021). The stations were positioned along eight transects (A–H), over 11 isobaths, five on the platform (25, 50, 75, 100, and 150 m) and six on the slope (400; 700; 1,000; 1,300; 1,900; and 2,400 m). In addition to these, 12 collection points were established to cover the northern area of the São Paulo Plateau (1,300 to 2,200 m) (Moreira et al. 2023).

The sediment was collected in triplicate using a Young-modified Van Veen grab sampler (platform) or a box corer (slope), depending on the type of bottom. For the analysis of the macrofauna, the first 10cm of the sediment were considered, and for the slope, the samples were stratified into 0–2, 2–5 and 5–10 cm depth. On board, the samples were fixed in 10% formaldehyde, buffered with borax, and conserved in ethanol 70%.

Polychaetes and other benthic organisms were sieved from the sediment, washed, and fixed in 4% formalin solution, then conserved in 70% alcohol, and finally identified. The collected *Aberranta* specimens are extremely delicate and most preserved specimens were lacking the posterior segments and parapodial cirri, hampering image obtention. The specimens were examined with a stereoscope and optical microscope. For scanning electron microscope (SEM) imaging, the chosen specimens underwent a dehydration protocol, being sequentially immersed in increasingly concentrated alcohol solutions (starting from 80%, then 90%, and finally pure ethanol). Subsequently, they were dried using a critical point drying technique and then coated with a layer of gold. The analyzed material was deposited in the Polychaeta Collection, in the Laboratório de Zoologia de Invertebrados at the State University of Rio de Janeiro (UERJ) and in the Annelida collection, Laboratório de Sistemática e Ecologia de Polychaeta at Federal Fluminense University (UFF-ANN).

RESULTS

Systematic account

Family Aberrantidae Wolf, 1987

Genus *Aberranta* Hartman, 1965

Wolf 1987: 50.

Fauchald and Rouse 1997: 89.

Mackie et al. 2005:197–208.

Type species. *Aberranta enigmatica* Hartman, 1965, by original designation.

Diagnosis (by Mackie, 2019): prostomium with dorsal median antenna. A pair of lateral antennae arises close to the median, or absent. Annulated or smooth antennae. Prostomial eyes

present laterally, or absent. Nuchal organs with a pair of dorsolateral ciliated grooves. Ventrolateral palps, ventrally grooved, and heavily ciliated. Buccal region with dorsolateral ciliated folds confluent externally with palp grooves, and ventral muscularized organ. Three achaetous “peristomial annuli.” Biramous and small parapodia with fusiform parapodial cirri internally furnished with large light-reflective striated glands. Simple strap-like branchiae arising dorsally on notopodia from chaetiger 3 or 4 (varying in species with different number of segments). Midventral ciliated band present. Parapodia with several deeply originating and distally emergent capillary chaetae; absent embedded aciculae. Notochaetae capillary and lyriform. Neurochaetae lyriform and distally hooked chaetae. Pygidium with mid-ventral papilla, and pair of dorsolateral cirri of similar shape and structure to parapodial lobes.

Aberranta magnumlanai sp. nov.

(Figure 1A-E)

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Type material. UERJ 5936 (holotype), 08.I.2012, Station AMB5 B7 R1 E0-10cm, 20° 36' 42,03" S 39° 49' 25,36" W, 1333m, box corer; UERJ 3214 (paratype 1), 31.I.2009, Station HAB 8 D6 R3 2-5cm, 22° 25' 54,966" S 40° 17' 39,534" W, 383m, box corer; UERJ 6346 (paratype 2), 15.I.2012, Station AMB6 D4 R2, 19° 45' 55,39" S 39° 30' 25,74" W, 149m, box corer; UERJ 5942 (1, used for SEM) (paratype 3), 31.XII.2011, Station AMB5 A8 R3 E0-10cm, 21° 6' 30,57" S 39° 38' 36,43" W, 1889m, box corer; UFF-ANN 1439 (paratype 4) 18.VI.2013, Station AMB11 B7 R3 E0-10cm, 20° 36' 48,64" S 39° 49' 32,61" W, 1324m, box corer.

Additional material. 14 specimens: UERJ 5937 (1), 11.I.2012, Station AMB5 D7 R3 E0-10cm, 19° 54' 5,01" S 39° 22' 20,04" W, 1335m, box corer; UERJ 5939 (1), 18.VI.2013, Station AMB11 B6 R2 E0-10cm, 20° 36' 2,03" S 39° 51' 35,37" W, 1003m, box corer; UERJ 5940 (1), 09.VI.2013, Station AMB11 A7 R1 E0-10cm, 21° 4' 43,08" S 40° 4' 12,96" W, 1295m, box corer; UERJ 5941 (1), 08.VI.2013, Station AMB11 A6 R3 E0-10cm, 21° 4' 37,64" S

40° 8' 32,68" W, 1015m, box corer; UERJ 5943 (1), 31.XII.2011, Station AMB5 A7 R1 E0-10cm, 21° 4' 51,67" S 40° 4' 14,88" W, 1300m, box corer; UERJ 6340 (1), 31.XII.2011, Station AMB5 A7 R2, 21° 4' 51,67" S 40° 4' 14,88" W, 1300m, box corer; UERJ 6341 (1), 13.I.2012, Station AMB6 CANW7 R3, 19° 58' 11,44" S 39° 31' 38,29" W, 1300m, box corer; UERJ 6343 (1), 29.VI.2013, Station AMB12 E4 R1, 19° 36' 3,57" S 39° 10' 33,64" W, 143m, van Veen, sand; UERJ 6344 (1), 13.I.2012, Station AMB6 CANWN6 R2, 19° 53' 31,53" S 39° 32' 56,35" W, 1023m, box corer; UERJ 7209 (1), 07.VII.2019, Station SANSED02 E6 R3, 24° 44' 32,64" S 44° 30' 18,00" W, 396m, box corer, mud; UERJ 8837 (1), 14.VI.2019, Station SANSED1 A8 R2, 27° 17' 48,48" S 46° 37' 30,72" W, 1045m, box corer, mud; UERJ 8839 (1), 27.II.2021, Station SANSED7 C8 R2, 26° 14' 34,44" S 45° 33' 27,00" W, 1000m, box corer.

Description. Holotype, complete, measuring 3.5 mm long and 0.25 mm wide for 39 chaetigers; paratype 1, incomplete, measuring 1.0 mm long and 0.25 mm wide for 11 chaetigers; paratype 2, incomplete, measuring 2.5 mm long and 0.3 mm wide for 19 chaetigers; paratype 3, complete (Figure 1); paratype 4, incomplete, measuring 0.5 mm long and 0.1 mm for 8 chaetigers. Prostomium of holotype appears to have two small laterofrontal indentations (more visible in the right than in the left side). Eyes absent. Single median antenna lost, scar inserted dorsomedially on prostomium. Palps stout, variable length, maximally reaching chaetigers 2–3, easily lost or broken (Figure 1A). Posterior part of mouth in U-shape. Pharynx straight, muscular, reaching chaetiger 4, gut as a slender straight tube. Paired nuchal organs conspicuous, ciliated regions in either side in groove between prostomium and first annulus. Reduced first peristomial annulus, small rounded triangular portion visible dorsally, followed by two peristomial annuli, equal to or longer than following chaetigers. Parapodia slightly projecting from body wall, with dorsal (=notopodial) and ventral (=neuropodial) postchaetal lobes. Fusiform postchaetal lobes containing highly reflective bacillary glands, that become reddish with Shirlastain dye. Glands can

be internally doubled in some parapodia; most easily lost. Dorsal lobes slightly larger, longer, and less pointed than ventral ones in midbody. Branchiae from chaetiger 3 but absent in posterior region. Branchiae strap-like, subcylindrical, superior to notochaetae, with lateral and distal margins having visible long cilia. Chaetae of both rami arise from small projecting conical lobes, supported by several robust capillaries with emergent tips. Short, smooth, and finely tapered capillaries. All chaetae with longitudinally striated shafts. Notopodial capillaries long, finely tapering (Figure 1B), arranged in 2–3 bundles. Neuropodial capillaries numbering 6–7 of intermediary length and with long marginal serration (Figure 1B) from median portion to distal end. Neuropodial lyriform chaetae with spinose shaft and with distal projections of same length (Figure 1C); internal board of distal projections of lyriform chaetae with delicate spinulations. Pygidium not seen in holotype, but observed in the paratype under SEM (UERJ5942), lacking lateral bacillar cirri that might have been lost (Figure 1D, E).

Variation: Branchiae have been found in one specimen (UERJ 5941) beginning from chaetiger 1.

Remarks: Up to now four species of *Aberranta* are considered valid (Table 1), even though there are additional reports of aberrantids that might belong to undescribed taxa (Mackie, 2019). The new species, *A. magnumlanai* shares with *A. enigmatica* and *A. sulcata* the presence of one antenna and the absence of eyes but differ from both by having lyriform chaetae with spinose shaft. On the other hand, *A. sulcata* presents a more rectangular anterior peristomial annulus that is triangular in the new species. In addition, *A. sulcata* was described from Hong Kong, China, living in muddy inshore sediments from less than 10 m depth, while the new species is from deep water in South Atlantic Ocean. When compared to *A. palpata* and *A. banyuelensis* the three species share the presence of lyriform chaetae with spinose shaft; however, *A. palpata* and *A. banyuelensis* present three antennae and eyes, whereas *A. magnumlanai* sp. nov. has no eyes and a single antenna. In *A. magnumlanai* sp. nov.,

the median antenna was lost, but a distinct scar on prostomium can be observed. It is unlikely there are also lateral antennae as those present in *A. palpata* and *A. banyulensis*, once there is no space in the prostomium to accommodate them next to the median antenna, neither additional scars were observed. All *Aberranta* species present bacillary glands in the postchaetal lobe but the notopodial and neuropodial may differ slightly in shape and length. Only *A. palpata* present dorsal lobes with bulbous base that are clearly longer

than the neuropodial, whereas the other species, including the new one described, present fusiform lobes. *Aberranta sulcata* is the only species that present dorsal and ventral lobes similar in length and the other three, *A. enigmatica*, *A. banyulensis*, and *Aberranta magnumlanai* sp. nov. present the dorsal lobe slightly longer than the ventral ones. *Aberranta magnumlanai* sp. nov. was recorded in similar soft substrate when compared to the known species (Table 1), but was found in the greatest recorded depth among all valid species.

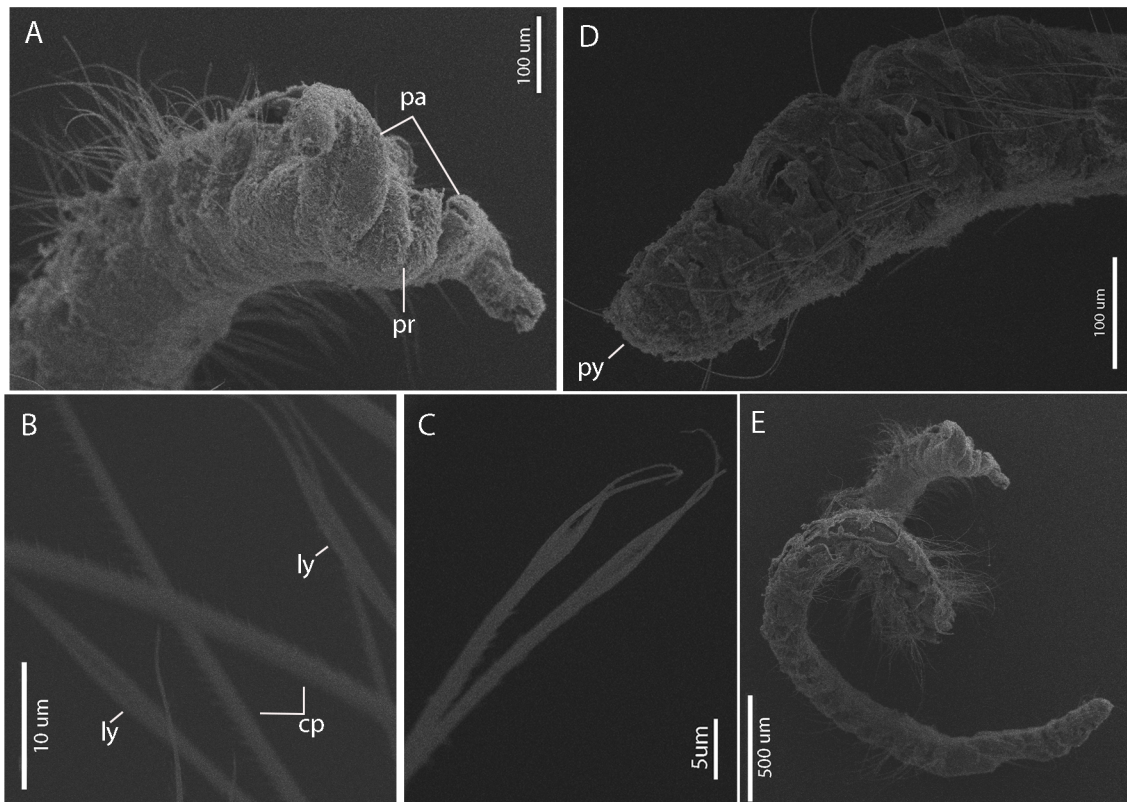


Figure 1. *Aberranta magnumlanai* sp. nov. (UERJ 5942): A. anterior end, front-lateral view; B. Capillary chaetae; C. Lyriform chaetae; D. posterior end, lateral view; E. Whole body, complete specimen. Legends: cp. capillary chaeta; ly. lyriform chaeta; pa. palp; pr. Prostomium; py. pygidium.

Mackie et al. (2005) performed a phylogenetic analysis based on morphology that yielded two trees and three species were diagnosed by one or more apomorphies and only *A. sulcata* by a combination of plesiomorphies. The authors pointed out that it is not easy to interpret

the significance of an Aberrantidae annelid morphological character, probably because of the homoplasies, a common issue in polychaete systematics. Therefore, it would be very important to perform an additional phylogenetic analysis based on molecular data.

Table 1. Main features to differentiate species based on the list of characters of Mackie et al. (2005) and on Martinez & Adarraga (2011) table 1.

Species	<i>Aberranta magnumlanai</i> sp. nov.	<i>Aberranta enigmatica</i> Hartman, 1965	<i>Aberranta palpata</i> Wolf, 1987	<i>Aberranta banyulensis</i> Mackie, Pleijel & Rouse, 2005	<i>Aberranta sulcata</i> Mackie, Pleijel & Rouse, 2005
Occurrence	Off Rio de Janeiro, Campos Basin, Santos Basin, Southeast Brazil, SW Atlantic	Off New England, east USA, NW Atlantic	Off Florida, USA, Gulf of Mexico	Off Banyuls-sur-mer, France Bay of Biscay	Hong Kong, China
Type-locality	Campos Basin, Brazil	New England, East of block Canyon	Gulf of Mexico	Banyuls sur Mer	Hong Kong
Substrate/Depth	Sand, silt and clay/383–1889 m	Muddy sediments/68–300 m	Medium to coarse sand/36–45 m	Muddy sediments with debris/32–200 m	Muddy inshore sediments with debris/ 4–9 m
Length and number of chaetigers of the longest specimen	3.5mm-39	6.6mm-32	4.6mm-35	6.7 mm-44	3.8mm-31
Ventral ciliated band	Present	?	?	Present	?
Prostomial ciliation	Heavy; frontal, and mid-dorsal	Heavy	Heavy	Heavy	Heavy
Eyes	Absent	Absent	Present	Present	Absent
Number of antennae	1 (one scar)	1	3	3	1
Paired antennae	Absent	Absent	Present	Present	Absent
Annellation of paired antennae	Not applied	Not applied	?	Present	Not applied
Annellation of median antenna	? (lost)	Present	Absent	Present	Present
Maximal length of median antennae	? (lost)	Reaching segment 3	Reaching segment 1	Reaching segment 2	Reaching chaetiger 1
Palp length	Reaching chaetiger 2	Reaching chaetiger 2	Reaching chaetiger 4	Reaching chaetiger 3	Reaching chaetiger 3
Postchaetal lobe shape	Fusiform with bacillar glands	Fusiform with bacillar glands	Bulbose in the base with bacillar glands	Fusiform with bacillar glands	Fusiform with bacillar glands
Postchaetal lobe length	Notopodial slightly longer than neuropodial	Notopodial slightly longer than neuropodial	Notopodial clearly longer than neuropodial	Notopodial slightly longer than neuropodial	Similar length
Shafts of neuropodial lyriform chaetae	Spinose	Smooth	Spinose	Spinose	Smooth
First notopodia with branchiae	Chaetiger 3/ chaetiger 1	Chaetiger 3	Chaetiger 4	Chaetiger 3	Chaetiger 4
Pygidium	Median papilla and pygidial cirri not seen	A pair of pygidial cirri with bacillary glands and a ventral, conical median papilla	Conical median papilla and pygidial cirri not seen	Conical median papilla and pygidial cirri not seen	Conical median papilla and pygidial cirri not seen

Etymology. The specific epithet *magnumlanai* (*magnum*, in Latin, great) is to honor the researcher and friend Paulo da Cunha Lana, a great professional and person, that left an extremely important legacy to the knowledge about annelids polychaetes, marine ecology, and conservation in Brazil.

Occurrence: Campos Basin and Santos Basin, Brazil. From 383 to 1,889 m depth, in sediments composed of sand, silt, and clay.

KEY TO SPECIES OF *Aberranta* (modified from Martinez & Adarraga, 2011)

1. Smooth shaft of the neurochaetae lyriform; prostomium with one antenna.....2
- Spinose shaft of the neurochaetae lyriform; prostomium with one or three antennae.....3
- 2(1). Branchiae from chaetiger 3; postchaetal dorsal lobes slightly longer than ventral ones
.....*Aberranta enigmatica* (off New England)
- Branchiae from chaetiger 4; postchaetal dorsal and ventral lobes similar in length.....
.....*Aberranta sulcata* (Hong Kong)
- 3(1). Branchiae from chaetiger 4; present eyes; three antennae; postchaetal lobes bulbous in the base, the dorsal clearly longer than ventral.....
.....*Aberranta palpata* (Gulf of Mexico, off Florida)
- Branchiae from chaetiger 3; fusiform postchaetal lobe; dorsal slightly longer than ventral.....4
- 4(3). Eyes present; three antennae.....
.....*Aberranta banyulensis* (France)
- Eyes absent; one antenna.....*Aberranta magnumlanai* sp. nov. (Southeast Brazil)

DISCUSSION

This is the first record of the genus in the Southern Hemisphere, in the Atlantic Ocean, collected at the greatest depth among the valid species (Mackie et al. 2019, GBIF, 2024). Considering the known records of all valid species, only *A. banyulensis* and *A. enigmatica* have been recorded beyond the type locality, both in the Northern Hemisphere (Martinez and Adarraga, 2011; Rouse et al., 2022). The Global Biodiversity Information Facility (GBIF) platform lists 198 occurrences of the genus, 192 of which refer to the species *Aberranta enigmatica* (GBIF, 2024).

The genus *Aberranta* was named due to its unusual anatomy (Rouse et al., 2022). In addition to being a rare taxon, it is morphologically homogeneous and free-living, with adults reaching up to 7 mm and about 40 chaetigers (Rouse et al., 2022).

Considering the biology and ecology of the group, reproduction details and life cycle remain unknown. Up to now, no specimens with gametes or other indications of sexual maturity have been found. Aberrantids are considered epibenthic and interstitial feeders using the ciliated grooved palps for feeding on microbial biofilms, microphytobenthos, and organic detritus, based on morphology, including the presence of palps, small size, and occurrence in unconsolidated substrates (Jumars et al., 2015). The new described species *Aberranta magnumlanai* sp. nov. was also recorded on substrates with similar granulometry and has a similar morphology when compared to the four species described thus far.

Aberranta stands out as one of the most unusual among polychaete annelids. However, establishing distribution patterns and other ecological and biological characteristics is challenging due to the low number of records, low abundance, occurrence only in the infralittoral zone, predominantly at high depths, as well as the specimen's fragility. For instance, most examined specimens of *A. magnumlanai* sp. nov. had lost their parapodial lobes due to their deciduousness.

Although knowledge about the new species is limited, the description of *A. magnumlanai* sp. nov. contributes to our understanding of polychaete annelids diversity, in general, and notably extends the known distribution of the genus, marking the first record in the Southern Hemisphere. However, much remains to be discovered about the genus *Aberranta*.

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This work is a tribute to the memory of Dr. Paulo Lana, who was essential to consolidate the knowledge about polychaetes annelids in Brazil and marine science in general. He was CSGS master and PhD formal leading professor. However, more than leading professor, Paulo was a great encourager, undoubtedly essential in academic training since the first contact in under

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AUTHOR CONTRIBUTIONS

CSGS; AER: Conceptualization; Writing – original draft; Writing – review & editing.

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