

SHORT COMMUNICATION

The first record of the deep-sea jellyfish *Stygiomedusa gigantea* (Scyphozoa: Semaestomeae) from the tropical Southwestern Atlantic found on social media

 Lorena S. Nascimento¹, Maria Angélica Haddad², Miodeli Nogueira Júnior³

¹*Centro de Estudos do Mar, Setor de Ciências da Terra, Universidade Federal do Paraná. Avenida Beira Mar, Pontal do Sul, 83255-976 Pontal do Paraná, PR, Brazil.*

²*Departamento de Zoologia, Setor de Ciências Biológicas, Universidade Federal do Paraná. Avenida Coronel Francisco H. dos Santos 100, 81531-980 Curitiba, PR, Brazil. (mahaddad@ufpr.br)*

³*Departamento de Sistemática e Ecologia, Centro de Ciências Exatas e da Natureza, Universidade Federal do Paraná. Cidade Universitária, 58051-090 João Pessoa, PB, Brazil. (miodeli@gmail.com)*

Corresponding author: Lorena S. Nascimento (lorena.sn@ufpr.br)

<https://zoobank.org/3524C52E-1F14-43F8-BCD1-F30796B7C3A9>

ABSTRACT. We provide the first record of the giant deep-sea jellyfish *Stygiomedusa gigantea* (Browne, 1910) from the tropical Southwestern Atlantic, based on a posting made on social media. The image was found during data filtering through the hashtag #aguavivagigante (in English, #giantjellyfish) on Instagram. The jellyfish was seen floating motionless at the surface, presumed dead, off Bahia, Northeast Brazil (12°34'39"S; 38°00'19"W), on August 23rd, 2016. Pygmy killer whales, *Feresa attenuata* Gray, 1874, were observed in the intermediate area and apparently interacting with the jellyfish. Observations of *S. gigantea* usually come from submersibles and ROVs. This is the first record extracted from social media, highlighting its potential use to complement information based on traditional scientific methods, and expanding the known geographic distribution of jellyfish. With the growth and development of social media in the coming years, we highlight its potential as a data source from citizen science. We also expect that social media will increasingly contribute to the knowledge of remarkable but poorly known species such as *S. gigantea*.

KEY WORDS. Citizen science, iEcology, Instagram, Medusae.

Stygiomedusa gigantea (Browne, 1910) is a jellyfish of Ulmaridae Haeckel, 1880 (Cnidaria: Scyphozoa: Semaestomeae), and the unique species currently recognized in the genus (Matsumoto et al. 2003, Benfield and Graham 2010, Collins et al. 2022). This species is popularly known as the 'giant phantom jellyfish'. It has a dark red-brown coloration and a large disc-shaped bell that can reach more than 1 m in diameter. Such coloration possibly helps *Stygiomedusa* to stay visually undetectable against the dark background of the deep sea, where the species is recurrently found (Russell and Rees 1960, Herring 2002, Johnsen 2005). Differently from most Semaestomeae, this species does not have tentacles, but its four highly flattened oral arms can extend more than 10 m in length (Russell and Rees 1960, Benfield and Graham 2010, MBARI 2022). Two individuals observed in

the Gulf of Mexico clinging to underwater structures led to the hypothesis that the jelly uses its long oral arms for the retention and digestion of plankton and small fishes (Benfield and Graham 2010).

Stygiomedusa gigantea has a cosmopolitan distribution, probably occurring in the mesopelagic and upper bathypelagic zones of all oceans, with a global average recorded depth of 657.6 m, but reaching more than 6600 m (Larson 1986, Benfield and Graham 2010, MBARI 2022). Little is known about its distribution, ecology, and behavior (Benfield and Graham 2010). This jellyfish has been recorded over a hundred times since its first sighting in 1899, most of them as a single individual (Russell 1959, Benfield and Graham 2010, Schnabel et al. 2021). In South America, this medusae was only previously recorded in Argentina at ~45°S (Oliveira et al. 2016, Schiariti

et al. 2018). Within the framework of an ongoing investigation of jellyfish occurrences through internet data mining, here we provide the first record of *S. gigantea* from Brazil, based on a posting made on the Instagram platform, highlighting the great potential of social media to complement traditional methods on conspicuous marine species.

The whale watcher Adriano Paiva posted an underwater image of *S. gigantea* on July 06th, 2019 on Instagram (Fig. 1A). The image was found during social media data mining, using the hashtag #aguavivagigante (in English, #giantjelly-

fish) on Instagram. The hashtag is a word or phrase preceded by a hash sign (#) used on social media platforms to identify digital content on a specific topic. The whale watcher was then contacted via Instagram direct messenger for additional images, more detailed information, and permission to use images and information for a specific publication illustrating the findings.

Adriano Paiva sent via Instagram direct messenger more detailed information and a video of the encounter with the giant *S. gigantea* (Supplementary material 1).

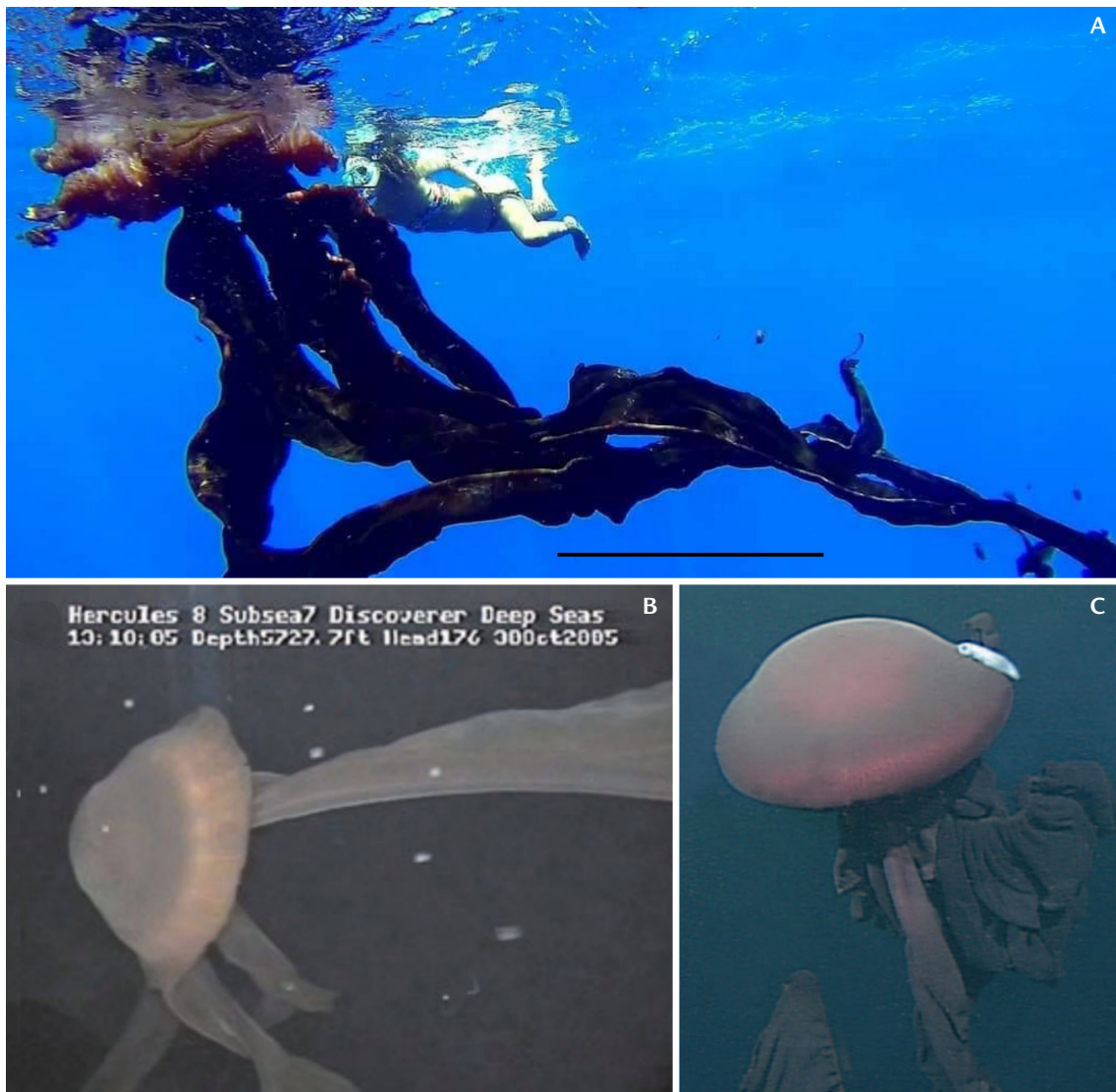


Figure 1. Image of *Sygiomedusa gigantea* individuals observed in (A) Brazil, 12°34'39"S, 38°00'19"W, at the water surface, present study; (B) Gulf of Mexico, 26°12.483'N, 91°26.583'W, at 1747 m, from Benfield and Graham (2010); (C) Gulf of California, 25°27.220'N, 109°50.170', at 1300 m, from Drazen and Robinson (2004). The scale (= 1 m) is only applicable for Fig. 1A.

The observation was made on August 23rd, 2016, during a research cruise coordinated by the Instituto Baleia Jubarte (Humpback Whale Project – Brazil). The vessel was off Praia do Forte, Bahia, at the continental slope, about 1000–2000 m in bottom depth (12°34'39"S; 38°00'19"W; Fig. 2). According to the whale watcher, the jellyfish appeared already dead at the moment of observation and pygmy killer whales, *Feresa attenuata* Gray, 1874 (Delphinidae), were swimming around the jellyfish at the water's surface, apparently "nibbling" on it. From the images shared by Adriano Paiva, it is possible to observe that the individual was damaged.

We could not obtain a sample of the whole animal for adequate morphological examination, or a sample of tissue for molecular analysis, but the picture of the organism observed in Brazil showed macro-morphological characteristics consistent with *S. gigantea* (Fig. 1). Those characteristics are: about 1 m in bell diameter, four long and flattened oral arms extended about 5 m in length, absence of marginal tentacles, and red-brownish coloration pattern, all of them confirmed by the observer, a person linked to science who can be considered trustworthy. These morphological characteristics are very distinctive and typical of *S. gigantea* (Russell and Rees 1960, Benfield and Graham 2010), remaining very little possibility that it belongs to other species. Image-based species identification poses some challenges and is often

made at higher taxonomic ranks due to lower resolution and fewer details if compared with the identification of physical specimens (Horton et al. 2021), and it is especially true for images extracted from social media (Abreo et al. 2019, Read and Jean 2021). However, following the recommendations of image-based identification (Horton et al. 2021), we identified the specimen as *S. gigantea*, given the macro-morphology of the specimen can be identified as belonging to a known species and it is the single species currently recognized in the genus (Benfield and Graham 2010). Moreover, the species identification was validated by another expert with experience in the study of *S. gigantea*, Dr. Mark Benfield.

This record in Brazil is the first of *S. gigantea* from the tropical Southwestern Atlantic. Previous records in the South Atlantic include the Gulf of Guinea at 5°S (Repelin 1967) and seven records from near the Subantarctic Oceanic Domain (~50°S) (Larson 1986, Mianzan and Cornelius 1999, Schiariti et al. 2018). *Stygiomedusa gigantea* was seen about a hundred times worldwide. The greatest number of records of this jellyfish come from the Southern Ocean while observations at low latitudes are particularly rare (Fig. 2), highlighting the relevance of the present finding. Currently, relatively little is known about this giant medusae aside from its morphological description and sporadic sighting notes (Russell and Rees 1960, Harbison et al. 1973, Benfield and Graham 2010).

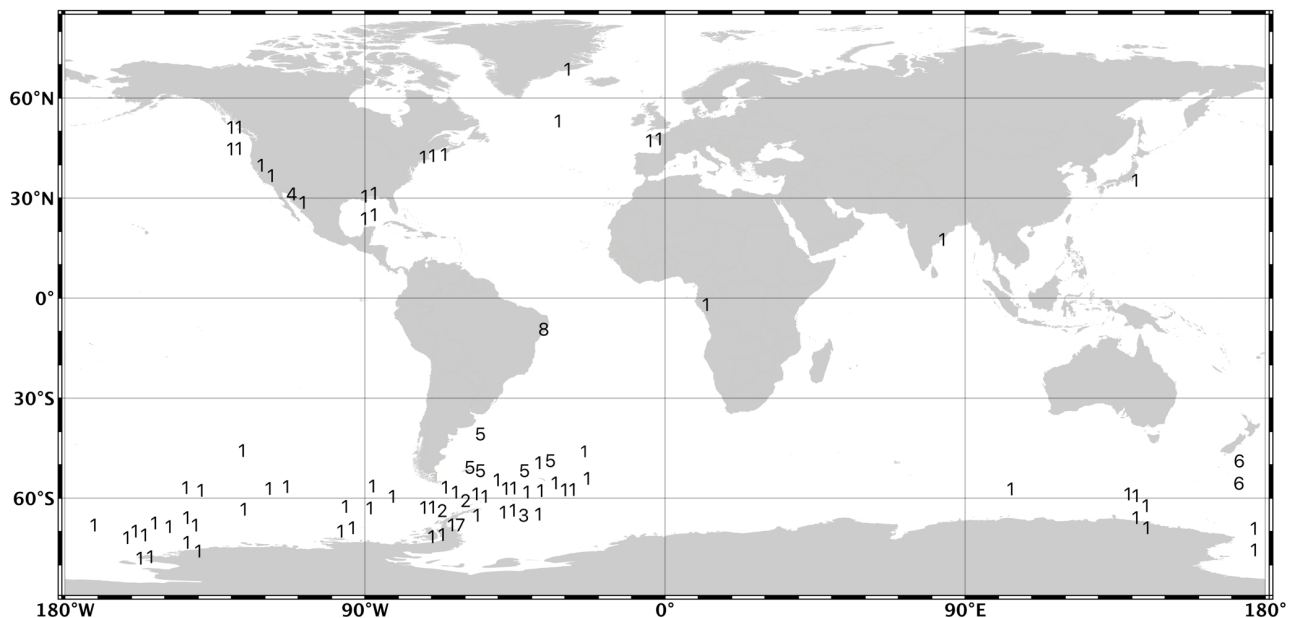


Figure 2. Global distribution of documented records of *Stygiomedusa gigantea* in the literature. Sources: 1) Benfield and Graham (2010); 2) Parker et al. (2011, 2015); 3) Tarling et al. (2012); 4) Gasca and Loman-Ramos (2014); 5) Schiariti et al. (2018); 6) Schnabel et al. (2021); 7) Moore et al. (2023); 8) present study.

It is not possible to determine if the higher number of records of this species in the Southern Ocean and the fewer in other regions represent the distribution of this species or if it is due to uneven distribution of the explorations (Benfield and Graham 2010). The disproportions in the explorations likely contribute to a lack of observations in tropical regions, since studies are limited in these regions (Menegotto and Rangel 2018). However, temperate regions are generally well-studied and the challenges of accessing the deep-water habitat of *S. gigantea* must also be considered. This species is known to inhabit mostly the mesopelagic and bathypelagic zones, although can also be found in shallower waters (Larson 1986, Benfield and Graham 2010, MBARI 2022). It has porphyrin pigments, commonly occurring in low light levels due to the phototoxic effects of light exposure on the pigment (Herring 1972, Benfield and Graham 2010). When exposed to daylight photo decomposition can convert these porphyrins into toxic compounds (Herring 1972). But, at high latitudes, the low angle of incidence of the sun may permit the jellyfish to ascent to shallower depths without damage to porphyrin pigments, which may facilitate the increased record of this species in these regions (Benfield and Graham 2010). Conversely, migration into surface waters could bring adverse consequences in lower latitudes (Benfield and Graham 2010), possibly contributing to the relative scarcity of sightings for such a large species in these regions. In the present study, *S. gigantea* was observed at the water surface at 12°S, potentially because the specimen was dead. The continental shelf off Bahia is narrow and the winds are the major drivers of circulation in this region, varying seasonally (Castro and Miranda 1998, Amorim et al. 2011). There is no evident circulation pattern in this area to indicate that the jellyfish was transported from depths to water surface after death. Although it is speculative and can be rationally dismissed, a possible reason for the jellyfish to be found on the water surface could be its transport by the pygmy killer whales, since these cetaceans are found in deeper waters ranging from about 500 m to 2500 m in depth (McSweeney et al. 2009) and they were observed interacting with the jellyfish.

The majority of published *S. gigantea* records are from trawl or net samples, and direct observations of this large jellyfish come from submersibles and ROVs (Drazen and Robinson 2004, Benfield and Graham 2010, Tarling et al. 2012, Moore et al. 2023). This is the first record of this species extracted from social media. Although the investigations are still incipient, social media is already recognized as a useful tool in obtaining rare observations of marine species (O'Neil et al. 2019, McDavitt and Kyne 2020), including jellyfish (Kienberger

and Pietro 2017, Rizgalla and Crocetta 2020, Nascimento et al. 2023). Marine citizen science is underrepresented in the literature, but it has been a growing field over recent decades, with an increase in the interest of marine users (Roy et al. 2012, Sandahl and Tøttrup 2020). The expanding and developing social media and its usage as a data source from citizen science is expected to help increase the knowledge of poorly known remarkable species such as *S. gigantea*.

ACKNOWLEDGMENTS

We are especially grateful to Adriano Paiva for kindly providing information, images, and permission to use the posting to illustrate the findings. We want also to thank Mark Benfield for confirming the species identification recorded in the present study. We thank Jeffrey Drazen and Mark Benfield for the permission to use *Stygiomedusa gigantea* images in this manuscript. We also thank the two anonymous reviewers for the suggested improvements in this manuscript. This study is part of LSN PhD thesis and was supported by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (process 88882.382983/2019-01). This research was approved for financing in the Universal Call of CNPq/MCTI/FNDCT no. 18/2021 (process 407644/2021-0).

LITERATURE CITED

- Abreo NAS, Thompson KE, Arabejo GFP, Superio MDA (2019) Social media as a novel source of data on the impact of marine litter on megafauna: The Philippines as a case study. *Marine Pollution Bulletin* 140: 51–59. <https://doi.org/10.1016/j.marpolbul.2019.01.030>
- Amorim FN, Cirano M, Marta-Almeida M, Middleton JF, Campos EJD (2011) The seasonal circulation of the Eastern Brazilian shelf between 10°S and 16°S: A modeling approach. *Continental Shelf Research* 65: 121–140. <https://doi.org/10.1016/j.csr.2013.06.008>
- Benfield MC, Graham WM (2010) In situ observations of *Stygiomedusa gigantea* in the Gulf of Mexico with a review of its global distribution and habitat. *Journal of the Marine Biological Association of the United Kingdom* 90(6): 1079–1093. <https://doi.org/10.1017/S0025315410000536>
- Castro BM, Miranda LB (1998) Physical oceanography of the Western Atlantic continental shelf located between 4°N and 34°S. In: Robinson AL, Brink KH (Eds) *The Sea*. John Wiley & Sons, Oxford, vol. 11, 209–251.
- Collins AG, Jarm G, Morandini AC (2022) World List of Scyphozoa. *Stygiomedusa* Russell 1959. <https://www>

- marinespecies.org/aphia.php?p=taxdetails&id=135268 [Accessed: 22/11/2022]
- Drazen JC, Robison BH (2004) Direct observations of the association between a deep-sea fish and a giant scyphomedusa. *Marine and Freshwater Behaviour and Physiology* 37(3): 209–214. <https://doi.org/10.1080/10236240400006190>
- Gasca R, Loman-Ramos L (2014) Biodiversidad de Medusozoa (Cubozoa, Scyphozoa e Hydrozoa) en México. *Revista Mexicana de Biodiversidad* 85: S154-S163. <https://doi.org/10.7550/rmb.32513>
- Harbison GR, Smith KL, Backus RH (1973) *Stygiomedusa fabulosa* from the North Atlantic: its taxonomy, with a note on its natural history. *Journal of the Marine Biological Association of the United Kingdom* 53: 615–617. <https://doi.org/10.1017/S0025315400058811>
- Herring PJ (1972) Porphyrin pigmentation in deep-sea medusae. *Nature* 238: 276–277.
- Herring PJ (2002) *The biology of deep oceans*. Oxford University Press, Oxford, 324 pp.
- Horton T, Marsh L, Bett BJ, Gates AR, Jones DO, Benoist N, et al. (2021) Recommendations for the standardisation of open taxonomic nomenclature for image-based identifications. *Frontiers in Marine Science* 8: 62. <https://doi.org/10.3389/fmars.2021.620702>
- Johnsen S (2005) The red and the black: bioluminescence and the color of animals in the deep sea. *Integrative and Comparative Biology* 45(2): 234–246. <https://doi.org/10.1093/icb/45.2.234>
- Kienberger K, Prieto L (2017) The jellyfish *Rhizostoma luteum* (Quoy & Gaimard, 1827): Not such a rare species after all. *Marine Biodiversity* 48: 1455–1462. <https://doi.org/10.1007/s12526-017-0637-z>
- Larson RJ (1986) *Biology of the Antarctic Seas 16. Pelagic scyphomedusae (Scyphozoa: Coronatae and Semaestomeae) of the Southern Ocean*. Antarctic Research Series 1: 59–135.
- Matsumoto GI, Raskoff KA, Lindsay DJ (2003) *Tiburonia granrojo* n. sp., a mesopelagic from the Pacific Ocean representing the type of a new subfamily (class Scyphozoa: order Semaestomeae: subfamily Tiburoniinae subfam. nov.). *Marine Biology* 143: 73–77. <https://doi.org/10.1007/s00227-003-1047-2>
- MBARI (2022) Giant phantom jelly. Monterey Bay Aquarium Research Institute, California. <https://www.mbari.org/products/creature-feature/giant-phantom-jelly/> [Accessed: 17/11/2022]
- Menegotto A, Rangel TF (2018) Mapping knowledge gaps in marine diversity reveals a latitudinal gradient of missing species richness. *Nature Communications* 9: 4713. <https://doi.org/10.1038/s41467-018-07217-7>
- McDavitt MT, Kyne PM (2020) Social media posts reveal the geographic range of the Critically Endangered clown wedgefish, *Rhynchobatus cooki*. *Journal of Fish Biology* 97(6): 1846–1851. <https://doi.org/10.1111/jfb.14530>
- McSweeney DJ, Baird RW, Mahaffy SD, Webster DL, Schorr GS (2009) Site fidelity and association patterns of a rare species: Pygmy killer whales (*Feresa attenuata*) in the main Hawaiian Islands. *Marine Mammal Science* 25(3): 557–572. <https://doi.org/10.1111/j.1748-7692.2008.00267.x>
- Mianzan HW, Cornelius PFS (1999) Cubomedusae and Scyphomedusae. In: Boltovskoy D (Ed.) *South Atlantic Zooplankton*. Backhuys, Leiden, 230–257.
- Moore DM, Flink AE, Prendergast E, Gilbert A (2023) Personal submersibles offer novel ecological research access to Antarctic waters: an example, with observations of the rarely encountered scyphozoan *Stygiomedusa gigantea*. *Polar Research* 42: 8873. <https://doi.org/10.33265/polar.v42.8873>
- Nascimento LS, Noernberg MA, Bleninger TB, Lindner A, Nogueira Júnior M (2023) Not such a rare species, after all? Insights into *Drymonema gorgo* Müller 1883 (Cnidaria, Scyphozoa), a large and little-known jellyfish from Brazil. *Aquatic Ecology* 58: 17–30. <https://doi.org/10.1007/s10452-023-10074-2>
- O’Neil KE, Cunningham EG, Moore DM (2019) Sudden seasonal occurrence of humpback whales *Megaptera novaeangliae* in the Firth of Forth, Scotland and first confirmed movement between high-latitude feeding grounds and United Kingdom waters. *Marine Biodiversity Records* 12(1): 1–5. <https://doi.org/10.1186/s41200-019-0172-7>
- Oliveira OM, Miranda TP, Araujo EM, Ayon P, Cedeno-Posso CM, Cepeda-Mercado AA, et al. (2016) Census of Cnidaria (Medusozoa) and Ctenophora from south American marine waters. *Zootaxa* 4194(1): 1–256. <https://doi.org/10.11646/zootaxa.4194.1.1>
- Parker ML, Donnelly J, Torres JJ (2011) Invertebrate micronekton and macrozooplankton in the Marguerite Bay region of the Western Antarctic Peninsula. *Deep Sea Research Part II. Topical Studies in Oceanography* 58(13–16): 1580–1598.
- Parker ML, Fraser WR, Ashford J, Patarnello T, Zane L, Torres JJ (2015) Assemblages of micronektonic fishes and invertebrates in a gradient of regional warming along the Western Antarctic Peninsula. *Journal of Marine Systems* 152: 18–41. <https://doi.org/10.1016/j.jmarsys.2015.07.005>

- Read T, Jean C (2021) Using social media and photo-identification for sea turtles of New Caledonia. *Marine Turtle Newsletter* 162: 25–29.
- Repelin R (1967) *Stygiomedusa stauchi* n. sp. scyphomédusae géante des profondeurs. *Cahiers O.R.S.T.O.M., Série Océanographique* 5: 23–28.
- Rizgalla J, Crocetta F (2020) First record of *Phyllorhiza punctata* von Lendenfeld, 1884 (Cnidaria: Scyphozoa: Rhizostomeae) in Libya through social media data mining. *BioInvasions Records* 9(3): 490–495. <https://doi.org/10.3391/bir.2020.9.3.05>
- Roy HE, Pocock MJ, Preston CD, Roy DB, Savage J, Tweddle JC, Robinson LD (2012) Understanding citizen science and environmental monitoring. In: Final report on behalf of UK Environmental Observation Framework. NERC Centre for Ecology & Hydrology and Natural History Museum, 173 pp.
- Russell FS (1959) A viviparous deep-sea jellyfish. *Nature* 4698: 1527–1528.
- Russell FS, Rees WJ (1960) The viviparous scyphomedusa *Stygiomedusa fabulosa* Russell. *Journal of the Marine Biological Association of the United Kingdom* 39(2): 303–318. <https://doi.org/10.1017/S0025315400013345>
- Sandahl A, Tøttrup AP (2020) Marine citizen science: recent developments and future recommendations. *Citizen Science: Theory and Practice* 5(1): 24. <https://doi.org/10.5334/cstp.270>
- Schiariti A, Dutto MS, Morandini AC, Nagata RM, Pereyra DY, Tapia FAP, Briz LD, Genzano G (2018) An overview of the Medusozoa from the Southwestern Atlantic. In: Hoffmeyer MS, Sabatini ME, Brandini FP, Calliari DL, Santinelli NH (Eds) *Plankton Ecology of the Southwestern Atlantic*. Springer-Verlag, Cham, 413–449.
- Schnabel KE, Mills VS, Tracey DM, Macpherson D, Kelly M, Peart RA, et al. (2021) Identification of benthic invertebrate samples from research trawls and observer trips, 2020-21. *New Zealand Aquatic Environment and Biodiversity Report* 269(51): 1–51.
- Tarling GA, Stowasser G, Ward P, Poulton AJ, Zhou M, Venables HJ, McGilld RAR, Murphy EJ (2012) Seasonal trophic structure of the Scotia Sea pelagic ecosystem considered through biomass spectra and stable isotope analysis. *Deep Sea Research Part II. Topical Studies in Oceanography* 59–60: 222–236. <https://doi.org/10.1016/j.dsr2.2011.07.002>
-
- Submitted: November 1, 2023
Accepted: March 16, 2024
Editorial responsibility: Rosana M. da Rocha
-
- Author Contributions**
LSN: design, literature review, and discussion, data collection, Writing – original draft, Writing – review & editing; MAH: design, literature review, and discussion, Writing – review & editing; MNJ: design, literature review, and discussion, Writing – review & editing
- Competing Interests**
The authors have declared that no competing interests exist.
- How to cite this article**
Nascimento LS, Haddad MA, Nogueira Júnior M (2024) The first record of the deep-sea jellyfish *Stygiomedusa gigantea* (Scyphozoa: Semaestomeae) from the tropical Southwestern Atlantic found on social media. *Zoologia* 41: e23082. <https://doi.org/10.1590/S1984-4689.v41.e23082>
- Published by**
Sociedade Brasileira de Zoologia at Scientific Electronic Library Online (<https://www.scielo.br/zool>)
- Copyright**
© 2024 The Authors.
- Supplementary material 1**
Video S1. Video showing the giant jellyfish *Stygiomedusa gigantea* observed on the water surface off Bahia, Northeast Brazil (12°34'39"S, 38°00'19"W), on August 23, 2016 (<https://www.instagram.com/p/BzlnDMxht0y/?hl=pt-br/>).
Author: Adriano Paiva (@adrianopaiva.biologo)
Data type: video.
Copyright notice: This dataset is made available under the Open Database License (<http://opendatacommons.org/licenses/odbl/1.0/>). The Open Database License (ODbL) is a license agreement intended to allow users to freely share, modify, and use this Dataset while maintaining this same freedom for others, provided that the original source and author(s) are credited.
Link: <https://doi.org/10.3897/zoologia.41.e23082>