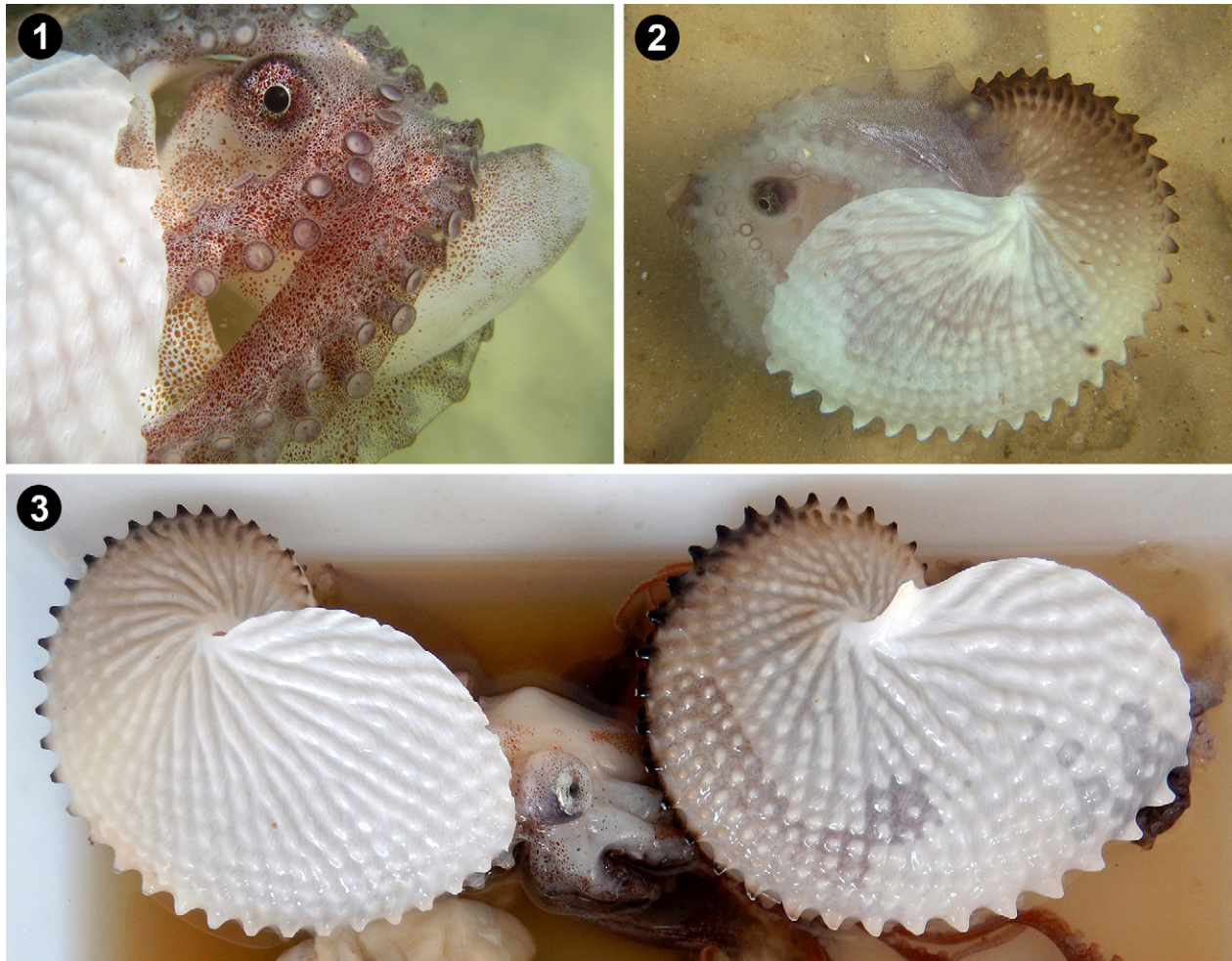


Research Note

Mass stranding of *Argonauta nodosus* [Lightfoot], 1786 (Cephalopoda: Argonautidae) in southeastern Brazil

Argonauta Linnaeus, 1758 is a genus of pelagic octopods distributed in tropical, subtropical, and temperate regions. Females have a thin white shell and specialized tentacles for storing eggs, features typical of the group. Argonautids show extreme sexual dimorphism, females being much larger than males (Finn, 2013). Currently the genus includes four species: *Argonauta argo* Linnaeus

1758, *Argonauta hians* [Lightfoot], 1786, *Argonauta nodosus* [Lightfoot], 1786 and *Argonauta nouryi* Lorois, 1852, which can be distinguished by shell shape and morphology of soft parts (Finn, 2013, 2014). *Argonauta nodosus* is characterized by a shell with intersecting radial and transverse series of raised tubercles (Grove, 2014). The species has a wide geographic distribution, with records in the Indo-Pacific and the Atlantic oceans. In Brazil, *A. nodosus* is recorded from the archipelagos of Fernando de Noronha and Saint Peter and Saint Paul, as also in the southeastern and southern Brazilian coasts based on point records, mostly of empty shells (Rios, 2009; Vidal *et al.* 2024). Mass stranding events of



Figures 1–3. *Argonauta nodosus*. Stranded individuals from Arraial do Cabo, Brazil. **1.** Living female with siphon evident. **2.** Senescent female on the sea floor. **3.** Preserved specimens (MNRJ 23650, 36787 and 36788). Photos by C. E. L. Ferreira.

Table 1. Shell measurements of three specimens of *Argonauta nodosus* from Praia Grande, Arraial do Cabo, Brazil (MNRJ 36387).

	Shell length	Shell width	Aperture width
Specimen 1	15.2	10.0	6.2
Specimen 2	13.6	9.8	5.5
Specimen 3	12.8	9.1	5.3

A. nodosus were previously recorded in southern Australia, Tasmania, New Zealand, and along the Uruguayan coast (Demicheli *et al.* 2006; Finn, 2013; Grove, 2014; Vidal *et al.* 2024).

Here, we report a second mass stranding event of *A. nodosus* in South America, the first one reported in the Brazilian coast. In two days at the end of January and the beginning of February, summer of 2021, more than 100 female specimens were observed alive on two different beaches of Cabo Frio region, southeastern Brazil. Most specimens were observed in the senescent life stage at Praia Grande, Arraial do Cabo (22°58'22" S, 42°1'58" W) and, in smaller numbers, at Praia Azeda, Armação dos Búzios (22°44'30" S, 41°52'55" W). The argonauts were photographed alive and five specimens (two complete individuals and three empty shells) from Praia Grande were collected and deposited at the Mollusca Collection of the Museu Nacional, Universidade Federal do Rio de Janeiro, Brazil (MNRJ 23650, 36787, and 36788, January 31, 2021). Two empty shells were collected at Praia Azeda (MNRJ 23649) (Figure 1). Measurements of the three shells from Arraial do Cabo are presented in Table 1.

Although the main cause of mass strandings of argonautids worldwide remains unclear, it has been linked to a combination of factors, including reproductive events, changes in sea surface temperature and in local oceanographic conditions, such as winds and marine currents (Nishimura, 1968; Demicheli *et al.* 2006; Grove, 2014). During the mass stranding event observed in the Cabo Frio region the conditions were typical of an upwelling system with relatively low water temperature (16–18°C) and strong east-northeast winds. In southern Brazil and Uruguay, the species is also found mostly during the summer (Haimovici and Andriquetto, 1986; Haimovici *et al.* 2009). Vidal *et al.* (2010) reported a high density of small juveniles of *A. nodosus* associated with elevated phytoplankton production and a subsurface upwelling in the region off Cape Santa Marta Grande, southern Brazil. The Cabo Frio and Arraial do Cabo region is characterized by steady marine biodiversity research and fisheries monitoring during the last 40 years. Although empty argonaut shells are sporadically found in that area, this is the first record of a mass stranding event.

ACKNOWLEDGMENTS

We thank Manuel Haimovici (Fundação Universidade do Rio Grande, Rio Grande, Brazil) and Fabrizio Scarabino (Universidad de la República and Museo Nacional de Historia Natural, Uruguay) for sending important references, Maurício Romulo Fernandes (Universidade Federal do Estado do Rio de Janeiro, Rio de Janeiro, Brazil) for the information about specimens from Praia Azeda. We thank two anonymous referees for their constructive comments. We thank Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro, Rio de Janeiro, Brazil (FAPERJ) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Brazil, for their financial and restructuring support after the fire at Museu Nacional, 2018. ACLS had a scholarship from Universidade Federal do Rio de Janeiro (Edital CEPG N° 155, ALV 2020) and JT had a scholarship from FAPERJ (Edital FAPERJ N° 06/2022, Bolsa de Iniciação Científica (IC) – 2022) and is currently granted by Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq). VP and CELF are supported by grants from CNPq and FAPERJ.

LITERATURE CITED

- Demicheli, M., A. Martínez, L. Ortega, F. Scarabino, S. Maytía, and A. Demicheli. 2006. Mass stranding of *Argonauta nodosa* Lightfoot, 1786 (Cephalopoda, Argonautidae) along the Uruguayan coast (southwestern Atlantic). *Revista de Biología Marina y Oceanografía* 41:(2) 147–153. <http://dx.doi.org/10.4067/S0718-19572006000200002>.
- Finn, J. K. 2013. Taxonomy and biology of the argonauts (Cephalopoda: Argonautidae) with particular reference to Australian material. *Molluscan Research* 33:143–222 <https://doi.org/10.1080/13235818.2013.824854>.
- Finn J. K. 2014. Family Argonautidae. In: Jereb, P, C. F. E. Roper, M. D. Norman, and J. K. Finn, J. K. (eds.) *Cephalopods of the world. An annotated and illustrated catalogue of cephalopod species known to date. Vol. 3. Octopods and Vampire Squids*. FAO Species Catalogue for Fishery Purposes [Rome, FAO] 4(3): 353 1–351.
- Grove, S. 2014. Invasion of the argonauts! *The Tasmanian Naturalist* 136: 67–73.
- Haimovici M. and J. M. Andriquetto. 1986. Composição de espécies e distribuição de cefalópodes costeiros do Rio Grande do Sul (Cefalópodes costeiros capturados na pesca de arrasto do litoral sul do Brasil). *Arquivos de Biologia e Tecnologia do Paraná* 29: 473–495.
- Haimovici, M., R. A. Santos, and L. G. Fischer. 2009. Class Cephalopoda. In: Rios, E. de C. 2009. *Compendium of Brazilian Seashells*. Evangraf, Rio Grande, RS. 610–649.
- Leite T. S. 2024. Argonautidae in Catálogo Taxonômico da Fauna do Brasil. PNUD. Available from: <<http://fauna.jbrj.gov.br/fauna/faunadobrasil/103480>> (Accessed 19 January 2024.)
- Nishimura, S. 1968. Glimpse of the biology of *Argonauta argo* Linnaeus (Cephalopoda: Octopodida) in Japanese waters.

- Publications of the Seto Marine Biological Laboratory 16: (1) 61–70.
- Rios, E. C. 2009. Compendium of Brazilian seashells. Editora Evangraf, Fundação Universidade do Rio Grande. Museu Oceanográfico, Rio Grande, Rio Grande do Sul, 668 pp.
- Vidal, E. A. G., M. Haimovici, and V. C. Hackbart. 2010. Distribution of paralarvae and small juvenile cephalopods in relation to primary production in an upwelling area off southern Brazil. *ICES Journal of Marine Science*, 67: (7), 1346–1352.
- Vidal, E. A. G., T. Leite, C. C. Melo, J. B. L. Sales, L. M. Specht, M. O. Côrtes, R. Schroeder, R. Schwarz, R. S. Martins, R. A. Santos, A. C. S. Scalco, F. Schneider, P. M. Dolphine, M. Haimovici. 2024. *Argonauta nodosus*. Sistema de Avaliação do Risco de Extinção da Biodiversidade - SALVE. Available: (<https://salve.icmbio.gov.br>) <https://doi.org/10.37002/salve.ficha.38957.1> (Accessed 01 July 2024.)

Juliana Tolla**Ana Carolina Leite Salles**

Setor de Malacologia, Departamento de Invertebrados
Museu Nacional, Universidade Federal do Rio de Janeiro
Rio de Janeiro, BRAZIL

Carlos Eduardo Leite Ferreira

Laboratório de Ecologia e Conservação em Ambientes Recifais,
LECAR
Universidade Federal Fluminense
Niterói, BRAZIL

Vinicius Padula¹

Setor de Malacologia, Departamento de Invertebrados
Museu Nacional, Universidade Federal do Rio de Janeiro
Rio de Janeiro, BRAZIL

¹ Corresponding author: padula@mn.ufjf.br