

## THE USE OF SCAPHOPODS (MOLLUSCA) EMPTY SHELLS BY SIPUNCULIDS AND CRUSTACEANS AT BRAZILIAN COAST

All the living forms, in at least one moment in space or time, interact in some way (positively or negatively, directly or indirectly). Molluscs of the class Scaphopoda are involved in a variety of associations with other organisms that includes: commensal associations with ciliates protozoans, anemones, corals and barnacles that lives attached to the external shell surface of some species; parasitism by platyhelminth larval stages; predation by ratfish and naticid gastropods; and use of scaphopods empty shells as substrata and shelters for other invertebrates (see Reynolds (2002) for detailed revision and bibliography).

The use of scaphopod empty shells by pagurids crabs and other invertebrates, mainly sipunculids, is frequently mentioned in the literature (JAECKEL, 1953; PALMER; STEINER, 1998; REYNOLDS, 2002). During the revision of material from Brazilian collections, we observed a number of scaphopods shells occupied by crustaceans and sipunculans that motivates the preparation of this paper.

### Crustacea: Paguridae (Figs. 1-3)

A ovigerous female of the pagurid crab *Pylopagurus discoidalis* (A. Milne-Edwards, 1880) with 3 mm of shield length was found in a shell fragment, ca. 20 mm length, of the scaphopod *Dentalium laqueatum* Verrill, 1885 collected at Espírito Santo coast, Brazil (REVIZEE station C27, 19°45'36" S, 39°31'36" W, 60 m depth). According to Melo (1999) and McLaughlin; Lemaitre (2001) this pagurid is most commonly found in empty shells of scaphopod molluscs but others "houses", such as polychaets worms tubes, could be used. *Pylopagurus discoidalis* is a morphologically variably species, particularly in the shape and color of the right cheliped (McLAUGHLIN; LEMAITRE, 2001). A. Milne-Edwards and Bouvier (1893 apud McLAUGHLIN; LEMAITRE, 2001) suggested that the right chela of *P. discoidalis* was initially elongate, but became more discoid with increase age. However, McLaughlin; Lemaitre (2001) observed that shell selection and/or association appears to greatly influence

morphology. According to these authors, two variations were observed: one that had long and relatively narrow shields and almost circular right chela which occupies well calcified, free of epizoans, *Dentalium* sp. shells; and other that had broader shields and more elongate chela, found occupying shells that were encrusted with, or had been decalcified or dissolved by anemones. In this study, the specimens of *P. discoidalis* collected agree with the former variation and presents a right cheliped circular probably acting as an operculum for the anterior shell aperture of *Dentalium laqueatum*. Melo (1999) reported *Pylopagurus discoidalis* for Northern Brazil, Amapá and Pará states (ca. 04° N to 04° S). Thus, the present record also extends southward the geographical distribution of this species until the Espírito Santo state (19° S).

### Sipuncula: Aspidosiphonidae (Figs. 4-5)

Only one specimens of *Aspidosiphon gosnold* Cutler, 1981 was found inside the shell of the scaphopod *Graptacme calamus* (Dall, 1881) collected off Sergipe state between 20-70 m of depth. This species is a common inhabitant of gastropod shells (CUTLER, 1981; 1994; CUTLER; CUTLER, 1989; MIGOTO; DITADI, 1988). Cutler (1981) observed that the most of the animals of *A. gosnold* presented a spiral trunk, as a consequence of the use of gastropod shells. The specimens of *A. gosnold* here examined showed some differences in body shape (e.g., almost straight body) that probably reflects the use of non-spiral scaphopods shells.

### Sipuncula: Golfingiidae (Figs. 6-9)

The examination of samples obtained from northern coast of Rio de Janeiro state (off Bacia de Campos, Rio de Janeiro, 1000-1600 m) revealed the presence of the sipunculid *Nephasoma* sp. in scaphopods shells of *Fissidentalium candidum* (Jeffreys, 1877). This association is very frequent in the abundant material studied (n = 76 shells) with nearly 70% of all empty scaphopods shells had being

occupied by this sipunculid. The specimens collected showed higher lengths (mean total length, trunk plus introvert, about 5 cm), introvert short and continuous to the trunk, tentacles few developed and lobate, beyond the occurrence of an only one pair of retractors muscles at the introvert. No specimens presented hooks in introvert. The tegument of the trunk presented two types of papillae, globular and digitiforme (these last ones in the posterior portion of the trunk). Besides that, we also observed the occurrence of colonies of unidentified hydroids circularly disposed close to the anal region (Fig. 8).

The occurrence of species of the genus *Nephasoma* in scaphopod empty shells was previously reported by Saiz Salinas (1993), Cutler; Cutler (1987) and Cutler (1994).

#### ACKNOWLEDGMENTS

We would like to thank Dra. Gisele Yukimi Kawauchi (Smithsonian Marine Station at Fort Pierce) and Dr. Edward B. Cutler (Utica College of Syracuse University) for the suggestions on the manuscript, to Dr. Rafael Lemaitre (National Museum of Natural History, Smithsonian Institution) for the help with the pagurid identification and to provide bibliography, to Dr. Ricardo Silva Absalão (Universidade do Estado do Rio de Janeiro) for the permission of using your laboratory and equipments.

#### REFERENCES

- CUTLER, E. B. A new species of *Aspidosiphon* (Sipuncula) from the western Atlantic Ocean. **Proceedings of the Biological Society of Washington**, Washington, v. 94, n. 2, p. 445-449, 1981.
- CUTLER, E. B. **The Sipuncula, their systematics, biology, and evolution**. New York: Cornell University, 1994. 480 p.
- CUTLER, E. B.; CUTLER, N. J. Deep-Water Sipuncula from the Eastern Atlantic Ocean. **Sarsia**, Oslo, v. 72, p. 71-89, 1987.
- CUTLER, E. B.; CUTLER, N. J. A Revision of the Genus *Aspidosiphon* (Sipuncula: Aspidosiphonidae). **Proceedings of the Biological Society of Washington**, Washington, v. 102, n. 4, p. 826-865, 1989.
- MIGOTO, A. E.; DITADI, A. S. F. Aspidosiphonidae (Sipuncula) from the Northern and Northeastern coasts of Brazil. **Revista Brasileira de Biologia**, Rio de Janeiro, v. 48, n. 2, p. 245-263, 1989.
- SAIZ SALINAS, J. I. Sipuncula from Réunion Island (Indian Ocean). **Journal of Natural History**, Perth, v. 27, p. 535-555, 1993.
- JAECKEL, S. H. Über Scaphopoden der Nordsee (hauptsächlich nach den Poseidon Fängen 1902-1912). **Kieler Meeresforschung**, Kiel, v. 9, p. 293-299, 1953.
- MCLAUGHLIN, P. A.; LEMAITRE, R. Revision of *Pylopagurus* and *Tomopagurus* (Crustacea: Decapoda: Paguridae), with descriptions of new genera and species. Part VI. *Pylopagurus* A. Milne-Edwards & Bouvier, 1891, *Haigia* McLaughlin, 1981, and *Pylopaguridium*, a new genus. **Proceedings of the Biological Society of Washington**, Washington, v. 114, n. 2, p. 444-483, 2001.
- MELO, G. A. S. **Manual de identificação dos Crustacea Decapoda do litoral brasileiro: Anomura, Thalassinidea, Palinuridea, Astacidea**. São Paulo: Editora Plêiade, 1999. 551 p.
- PALMER, C. P.; STEINER, G. Class Scaphopoda. Introduction. In: BEESLEY, P. L.; ROSS, G. J. B.; WELLS, A. (Eds.). **Mollusca: the southern synthesis**. Fauna of Australia. Part A. Melbourne: CSIRO Publishing, 1998. p. 431-438. v. 5.
- REYNOLDS, P. D. The Scaphopoda. **Advances in Marine Biology**, San Diego, California, v. 42, p. 137-236, 2002.

**Rubens José Massud-Ribeiro<sup>1</sup>**  
**Carlos Henrique Soares Caetano<sup>1</sup>**

Recebido em: 22.03.2006; aceito em: 17.04.2006.

<sup>1</sup> Universidade do Estado do Rio de Janeiro (UERJ), Av. São Francisco Xavier, 524, Maracanã, CEP 20550-900, Rio de Janeiro, RJ, Brazil. <chcaetano@zipmail.com.br>.



**Figs. 1-9.** 1-2. *Pylopagurus discoidalis*, dorsal and lateral views, respectively. Shield length = 3 mm; 3. *Dentalium laqueatum*, shell in lateral view, total length = 27 mm; 4. *Aspidosiphon gosnold*, lateral view, total length = 1.7 mm; 5. *Graptacme calamus*, shell in lateral view, total length = 18 mm; 6-8. *Nephasoma* sp., 6. juvenile, total length = 3.2 mm, 7. detail showing the colonies of unidentified hydroids in a adult specimen, Scale bars = 2 mm; 8. diagrammatic representation of hydroid morphology, Scale bars = 30  $\mu$ m; 9. *Fissidentalium candidum*, shell in lateral view, total length = 92 mm.