Nauplius
THE JOURNAL OF THE BRAZILIAN CRUSTACEAN SOCIETY

e-ISSN 2358-2936
www.scielo.br/nau
www.crustacea.org.br

ORIGINAL ARTICLE

Notes on amphipods associated with loggerhead marine turtle *Caretta caretta* (Linnaeus, 1758) in south-eastern Brazil

Tammy Iwasa-Arai[1] orcid.org/0000-0002-3654-8671
Hugo Gallo Neto[2] orcid.org/0000-0001-7769-5638
Raquel Beneton Ferioli[2] orcid.org/0000-0001-9212-7778
Max Rondon Werneck[3] orcid.org/0000-0002-5650-3649

[1] Programa de Pós-Graduação em Biologia Animal, Universidade Estadual de Campinas (UNICAMP). Campinas, São Paulo, Brazil

[2] Instituto Argonauta. Ubatuba, São Paulo, Brazil

[3] Instituto BW para Conservação e Medicina da Fauna Marinha. Araruama, Rio de Janeiro, Brazil

ZOOBANK: http://zoobank.org/urn:lsid:zoobank.org:pub:AAC7CA48-24A9-42B4-B520-32B4422B1410

ABSTRACT

The loggerhead marine turtle is an ideal substrate for epibionts and presents the highest diversity of associated fauna among marine turtles. Here we report the occurrence of two amphipod species, *Caprella andreae* Mayer, 1890 and *Podocerus chelonophilus* (Chevreux and Guerne, 1888) from the carapace of one stranded *Caretta caretta* (Linnaeus , 1758) in Ubatuba, São Paulo state, Brazil. This is the first record of *P. cheloniphilus* for Brazil and for the South Atlantic Ocean.

KEYWORDS

Caprella andreae, epibiosis, loggerhead marine turtle, *Podocerus cheloniphilus*

INTRODUCTION

Marine epibionts are important tools to understand the individual and population dynamics of long-lived animals, such as turtles and whales (Caine, 1986; Cabezas *et al.*, 2013; Iwasa-Arai *et al.*, 2017; Iwasa-Arai *et al.*, 2018). Marine turtles serve as perfect substrates for settlement by epibionts due to the complexity of the environment provided by their carapace, including suitable surface for macroalgae and sessile fauna, such as barnacles, that enrich the microenvironment for other invertebrates to occupy (Caine, 1986). The epibiont fauna can be divided into three categories: 1) true parasites, such as amphipods like *Podocerus chelonophilus* (Davenport, 1994); 2) commensals, such as barnacles in the families Lepadidae, Balanidae and

CORRESPONDING AUTHOR
Tammy Iwasa-Arai
araitammy@gmail.com

SUBMITTED 14 March 2020
ACCEPTED 16 June 2020
PUBLISHED 07 September 2020

DOI 10.1590/2358-2936e2020034

Coronulidae; and 3) symbiotic species, such as crabs of the genus *Planes* Bowdich, 1825 (Grapsidae), that apparently develop a cleaning association with marine turtles (Davenport, 1994; Badillo *et al.*, 2003).

The loggerhead marine turtle *Caretta caretta* (Linnaeus, 1758) (Testudines: Cheloniidae) is a cosmopolitan species and hosts the largest number of epibiont species among marine turtles (Kitsos *et al.*, 2005). The associated epibiotic community is widely studied worldwide, and especially in the North Atlantic and Mediterranean (Caine, 1986; Frick *et al.*, 1998; Fuller *et al.*, 2010; Domènech *et al.*, 2014).

In Brazil, the nesting range of *C. caretta* extends from the north of Rio de Janeiro State, up to Sergipe State, with the largest nesting density in Bahia State (Marcovaldi *et al.*, 2005), but the species is widely seen beyond its nesting latitudes. However, only a few studies on the epibiotic fauna of marine turtles in Brazil have been conducted, including notes on the barnacles from marine turtles (Bugoni *et al.*, 2001), epizoic fauna from green turtles *Chelonia mydas* (Linnaeus , 1758) (De Loreto and Bondioli, 2008) and hawksbill turtles *Eretmochelys imbricata* (Linnaeus, 1766) (Corrêa *et al.*, 2014).

Here we report two species of amphipods associated with one stranded loggerhead turtle in Ubatuba, São Paulo State, Brazil. This is the first record of *Podocerus cheloniphilus* (Chevreux and Guerne, 1888) from the South Atlantic Ocean.

Material and Methods

In August 2019, a juvenile loggerhead turtle (*C. caretta*) was found dead on Fazenda beach (-23,360474; -44,850561) in the municipality of Ubatuba, in the state of São Paulo, Brazil. External analysis of the turtle carcass (84.5 cm in curvilinear carapace length - CCL and weighing 54.5 kg) revealed the presence of amphipods, which were collected manually with tweezers, fixed in a 70% alcohol solution, stored at room temperature and then later analysed under a stereomicroscope. This is the first record of associated amphipods on the 180 loggerhead turtles analysed by the Instituto Argonauta since August 2015. Specimens were identified according to the redescription of Thomas and Barnard (1992) for *P. cheloniphilus* and the remarks of Sezgin *et al.* (2009) and Cabezas *et al.* (2013) for *Caprella andreae* Mayer, 1890. The material is deposited in the Museu de Zoologia da Universidade Estadual de Campinas (ZUEC) and the Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ).

Results

Order Amphipoda Latreille, 1816

Infraorder Corophiida Leach, 1814 (sensu Lowry and Myers, 2013)

Family Caprellidae Leach, 1814

Genus *Caprella* Lamarck, 1801

***Caprella andreae* Mayer, 1890**
(Figs. 1–2)

Caprella acutifrons Latreille, 1816: 433. — Van Beneden, 1859: 78–81, pl. 1, figs. 9–11.

Caprella acutifrons f. *andreae* Mayer, 1890: 51–55, 124, pl. 2, fig. 38, pl. 4, figs. 56, 70, 71. — Chevreux and Fage, 1925: 452, fig. 430A. — Stephensen, 1929: 182.

Caprella andreae. — McCain, 1968: 19, figs. 8, 9, 55. — Krapp-Schickel, 1993: 777, fig. 530. — Aoki and Kikuchi, 1995: 54–58, figs. 1, 2.

Material examined. 10 males, Brazil, São Paulo, Ubatuba, Fazenda Beach, MNRJ 029874; 1 ovigerous female, 2 non-ovigerous females, Brazil, São Paulo, Ubatuba, Fazenda Beach, MNRJ 029875; 4 males, Fazenda Beach, Ubatuba, Brazil, ZUEC CRU 4345.

Distribution. North Atlantic Ocean (Caine, 1986; Frick *et al.*, 1998; Pfaller *et al.*, 2008), China Sea (Aoki and Kikuchi, 1995), Mediterranean Sea (Krapp-Schickel, 1993; Sezgin *et al.*, 2009; Domènech *et al.*, 2014), south Atlantic Ocean (present study).

Remarks. Caprella andreae is an obligate rafting species that can benefit from different floating substrates to disperse (Thiel *et al.*, 2003), including

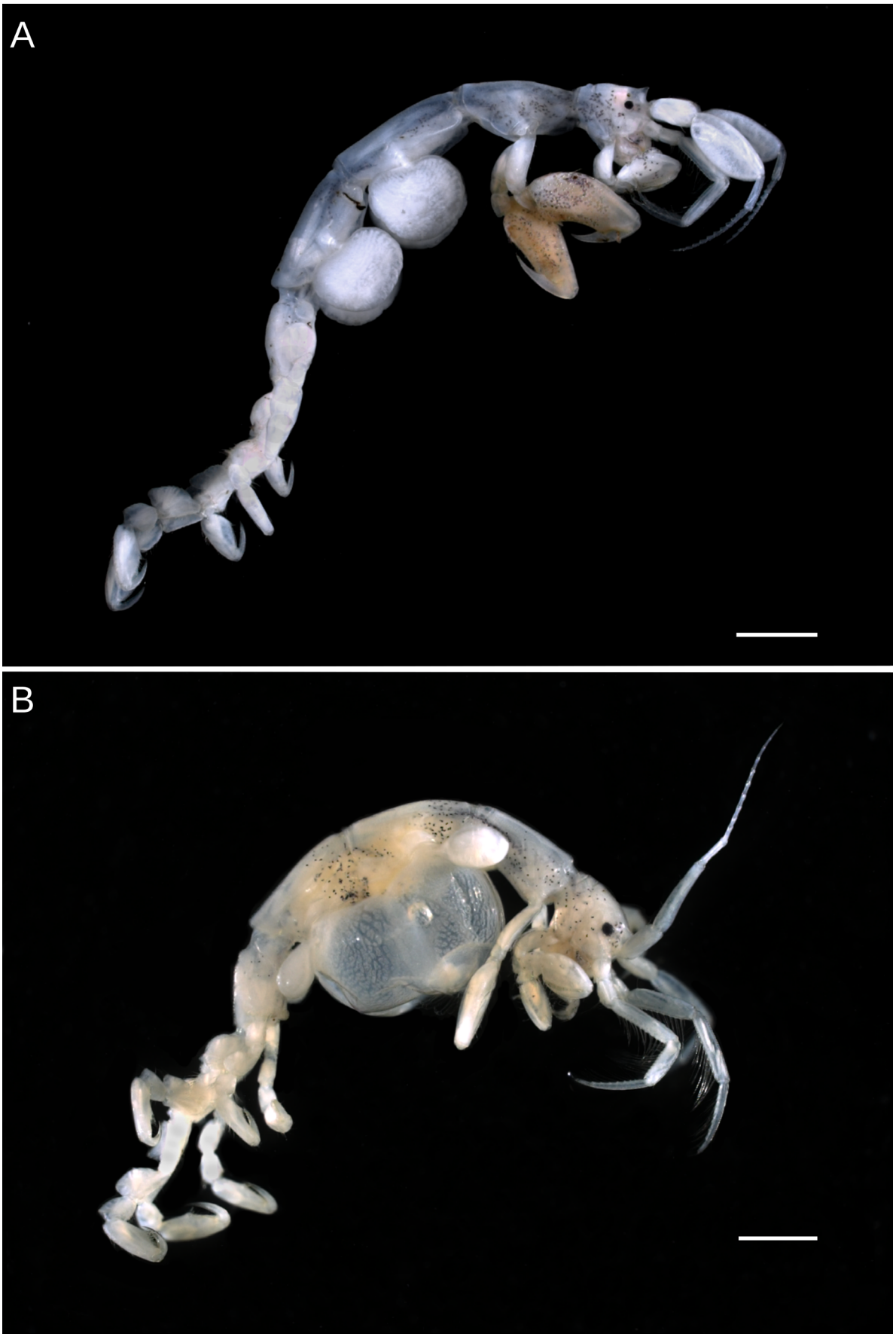

Figure 1. *Caprella andreae* Mayer, 1890. **A**, Male MNRJ 029874. **B**, Female MNRJ 029875. Scale = 1 mm.

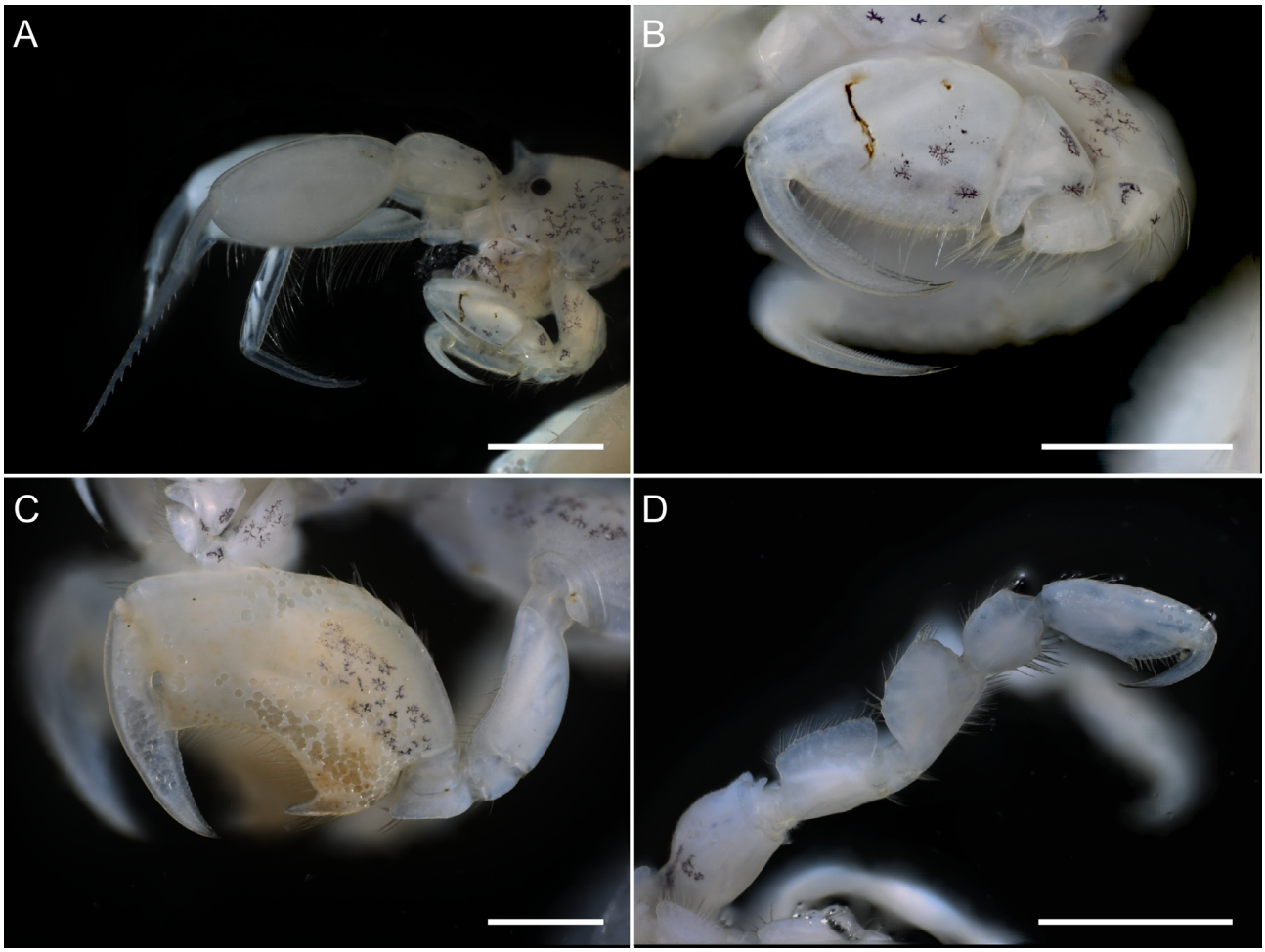

Figure 2. *Caprella andreae* Mayer, 1890. Male, MNRJ 029874. **A**, Antenna 1, scale = 500 μm. **B**, Gnathopod 1, scale = 200 μm. **C**, Gnathopod 2, scale = 200 μm. **D**, Pereopod 7, scale 200 μm.

turtle carapaces (Caine, 1978; Cabezas *et al.*, 2013). Cabezas *et al.* (2013) showed that *C. andreae* is closely associated with settling substrates, and that populations associated with turtles present higher genetic diversity. They also suggest that *C. andreae* may represent a species complex, based on two distinct clades found: one from the eastern North Atlantic and western Mediterranean, and other comprising the western North Atlantic and eastern Mediterranean. The specimens found in Brazil are almost identical to the descriptions provided by Krapp-Schickel (1993) and Aoki and Kikuchi (1995), with the exception of the grasping spines of P7, which are located closer to the upper margin of propodus (Fig. 1D). However, this slight difference was not considered enough to make another species designation and further genetic studies may confirm the species identity. De Loreto and Bondioli (2008) previously found one unidentified species of *Caprella* sp. on turtles in Cananéia, state of São Paulo, which could possibly be *C. andreae*.

Family Podoceridae Leach, 1814

Genus *Podocerus* Leach, 1814

Podocerus cheloniphilus (Chevreux and Guerne, 1888)

(Figs. 3–4)

Cyrtophium chelonophilum Chevreux and Guerne, 1888: 625.

Platophium chelonophilum. — Chevreux and de Guerne, 1893: 445. — Chevreux, 1900: 115, pl. 13, fig. 2; pl. 14, fig. 7.

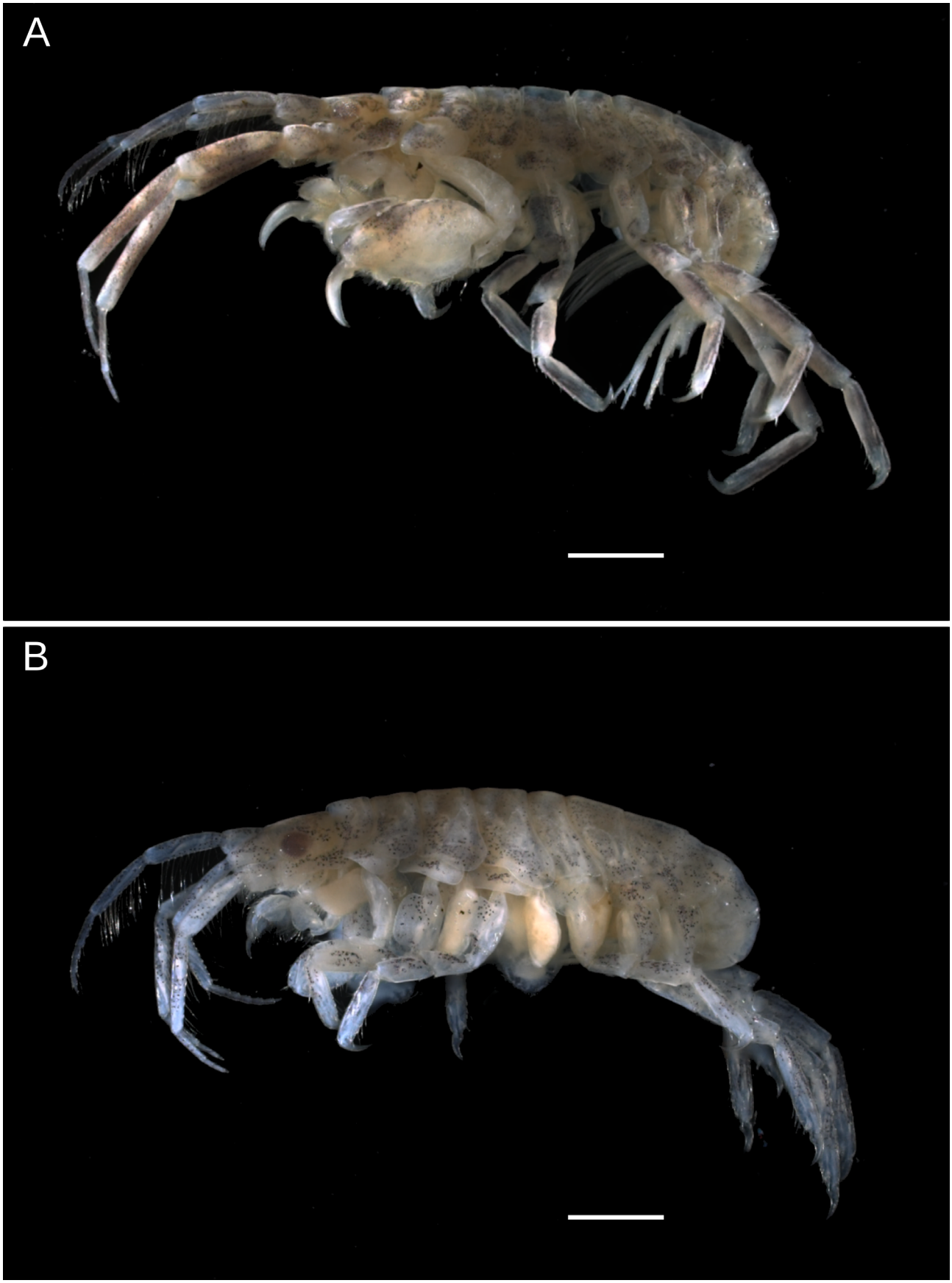

Figure 3. *Podocerus cheloniphilus* (Chevreux and Guerne, 1888). **A**, Male, MNRJ 029872. **B**, Female MNRJ 029873. Scale = 500 μm.

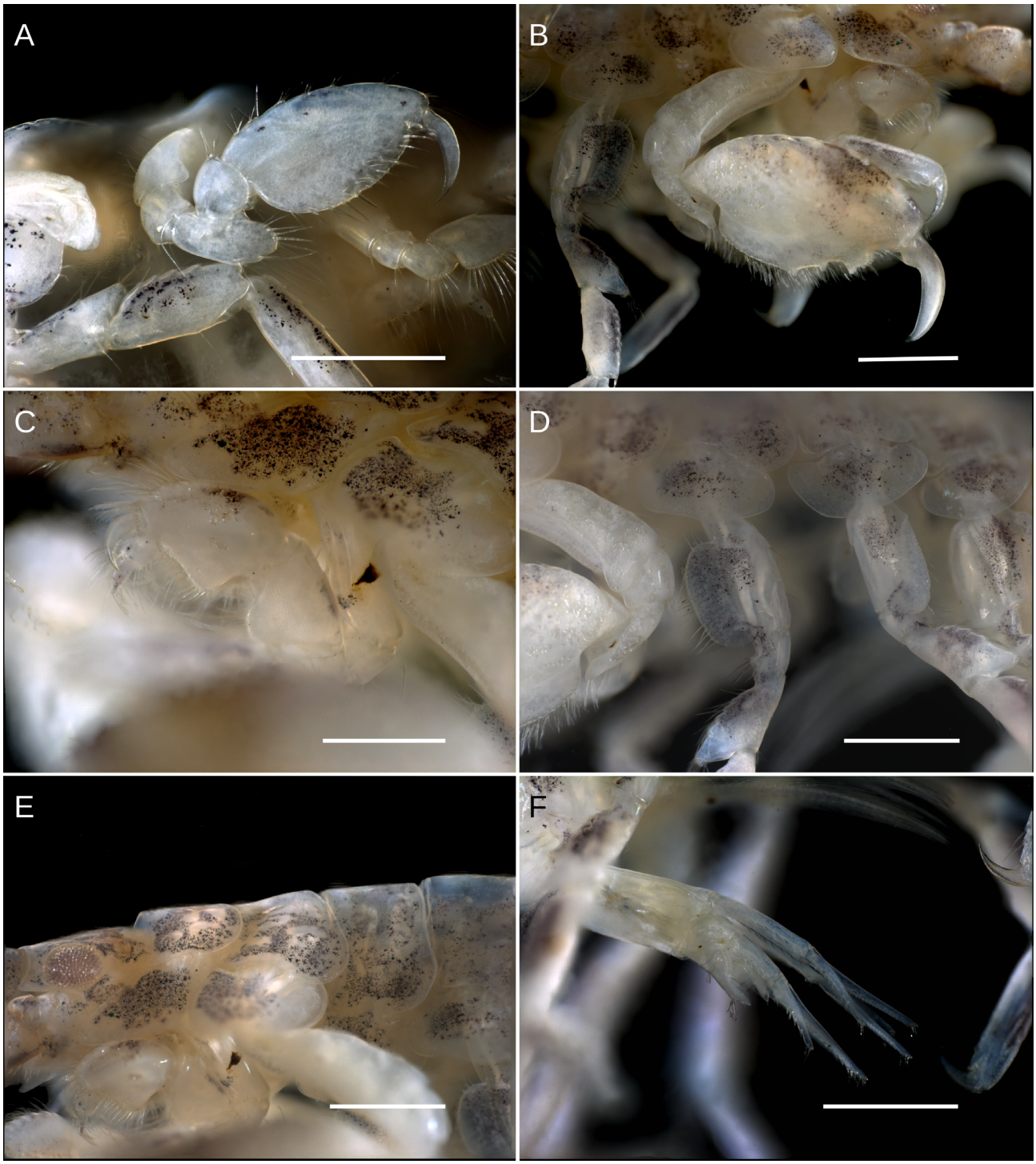

Figure 4. *Podocerus cheloniphilus* (Chevreux and Guerne, 1888). **A**, Gnathopod 2 of female, MNRJ 029873, scale = 200 µm. **B**, Gnathopod 2 of male, MNRJ 029872, scale = 100 µm. **C**, Gnathopod 1 of male, MNRJ 029872, scale = 200 µm. **D**, Pereopod 3, scale = 200 µm. **E**, Pereonites 1–3, scale = 200 µm. F, Uropods, scale = 200 µm.

Podocerus cheloniae. — Stebbing, 1906: 701.

Podocerus chelonophilus. — Stebbing, 1906: 703. — Chevreux, 1911: 272. — Chevreux and Fage, 1925: 375, fig. 383. — Chevreux, 1935: 130. — Mateus and Alfonso, 1974: 36, figs. 27, 28. — Thomas and Barnard, 1992: 110, figs. 1, 2. — Ruffo, 1993: 675, fig. 462. — Moore, 1995: 253. — Baldinger, 2001: 441, figs. 1–6. — Kilgallen, 2009: 848–850. —

Sezgin *et al.*, 2009: 435–436. — Zakhama-Sraieb *et al.*, 2010: 2. — Lazo-Wazem, *et al.*, 2011: 230–232, fig. 6c. — Hughes, 2016: 321.

? *Podocerus umigame* Yamato, 1992: 281, figs. 1–3. — Ren, 1994: 265, fig. 13. — Ren, 2012: 404, fig. 175.

Material examined. 2 males, Brazil, São Paulo, Ubatuba, Fazenda Beach, MNRJ 029872; 2 females, Brazil, São Paulo, Ubatuba, Fazenda Beach, MNRJ 029873; 1 male, Fazenda Beach, Ubatuba, Brazil, ZUEC CRU 4347; 1 female, Fazenda Beach, Ubatuba, Brazil, ZUEC CRU 4346.

Distribution. North Atlantic Ocean (Chevreux, 1900; Thomas and Barnard, 1992; Moore, 1995; Lazo-Wazem *et al.*, 2011; Baldinger, 2000; 2001); Mediterranean Sea (Chevreux and de Guerne, 1888; Sezgin *et al.*, 2009); ? South China Sea (Yamato, 1992) Pacific Ocean (Kilgallen, 2009; Hughes, 2016); south Atlantic Ocean (present study).

Remarks. *Podocerus cheloniphilus* is an obligate epibiont of marine turtles, and the general morphology of specimens found on *C. caretta* from Brazil agrees well with the description provided by Thomas and Barnard (1992). Most of the records of *P. cheloniphilus* are from the northern Hemisphere, but Hughes (2016) reported the most southerly record of *P. cheloniphilus* from the Gold Coast, Queensland, Australia. The present study extends the range of *P. cheloniphilus* to the South Atlantic Ocean.

Acknowledgements

We are extremely grateful to the Instituto Argonauta team that collected the samples. We thank Prof. A. Cecilia Amaral (Unicamp) for the stereomicroscopy use. TI-A is funded by the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) (No. 2018/00488-7; 2018/10313-0). Biological samples were obtained during the "Santos Basin Beach Monitoring Project" (PMP-BS) , which is part of the federal environment licensing process conducted by IBAMA, for the exploration of oil and gas by Petrobras in the Santos Basin presalt province. BW is involved in veterinary medicine activities and develops specific consulting work of which one of the main aims is to disseminate scientific study results to contribute to the conservation of marine organisms.

References

Aoki, M. and Kikuchi, T. 1995. Notes on *Caprella andreae* Mayer, 1890 (Crustacea: Amphipoda) from the carapace of Loggerhead Sea Turtles in the East China Sea and in Kyushu, Japan. *Proceedings of the Japan Society of Systematic Zoology*, 53: 54–61.

Badillo, F.J.; Aznar, F.J.; Tomas, J. and Raga, J.A. 2003. Epibiont Fauna of *Caretta caretta* in the Spanish Mediterranean. p. 62–66. In: D. Margaritoulis and A. Demetropoulos (ed), Proceedings of the First Mediterranean Conference on Marine Turtles. Barcelona Convention, Bern Convention, Bonn Convention (CMS). Nicosia, Cyprus.

Baldinger, A.J. 2000. Notes on *Podocerus chelonophilus* (Chevreux and de Guerne, 1888) (Crustacea: Amphipoda: Podoceridae) from a sea turtle off the coast of Ecuador. *Polish Archives of Hydrobiology*, 47: 441–455.

Baldinger, A.J. 2001. An additional record of *Podocerus chelonophilus* (Chevreux and de Guerne, 1888) (Crustacea: Amphipoda: Podoceridae) from a sea turtle off the coast of Ecuador. p. 441–455. In: K. Jazdzewski; A. Baldinger; C.O. Coleman; C. De Broyer; M.F. Gable and W. Plaiti (eds), Proceedings of the Xth International Colloquium on Amphipoda, Heraklion, Crete, Greece, 16–21 April 2000. Polskie Archiwum Hydrobiologii.

Bugoni, L.; Krause, L.; Almeida, A.O. and Bueno, A.A.P. 2001. Commensal barnacles of sea turtles in Brazil. *Marine Turtle Newsletter*, 94: 7–9.

Cabezas, M.P.; Navarro-Barranco, C.; Ros, M. and Guerra-García, J.M. 2013. Long-distance dispersal, low connectivity and molecular evidence of a new cryptic species in the obligate rafter *Caprella andreae* Mayer, 1890 (Crustacea: Amphipoda: Caprellidae). *Helgoland Marine Research*, 67: 483–497.

Caine, E.A. 1978. Habitat adaptations of North American caprellid Amphipoda (Crustacea). *Biological Bulletin*, 155: 288–296.

Caine, E.A. 1986. Carapace epibionts of nesting loggerhead sea turtles: Atlantic coast of USA. *Journal of Experimental Marine Biology and Ecology*, 95: 15–26.

Chevreux, E. 1900. Amphipodes provenant des campagnes de l'Hirondelle (1885–1888). In: Résultats des Campagnes Scientifiques Accomplies sur son Yacht par Albert Ier, Prince Souverain de Monaco, 16. Impremerie de Monaco, 195p., 18 pls.

Chevreux, E. 1911. Campagnes de la Melita. Les amphipodes d'Algérie et de Tunisie. *Mémoires de la Société Zoologique de France*, 23: 145–285.

Chevreux, E. 1935. Amphipodes provenant des campagnes du Prince Albert Ier de Monaco. Résultats des Campagnes Scientifiques Accomplies sur son Yacht par Albert Ier Prince Souverain de Monaco, 90. Imprimerie de Monaco, 214p.

Chevreux, E. and Fage, L. 1925. Amphipodes. *Faune de France*, 9: 1–488.

Chevreux, E. and de Guerne, J. 1888. Sur un amphipode nouveau (*Cyrtophium chelonophilum*), commensal de *Thalassochelys caretta* L. *Comptes rendus hebdomadaires des séances de l'Academie des Sciences*, 106: 625–628.

Chevreux, E. and Guerne, J. 1893. Crustacés et cirrhipèdes commensaux des tortues marines de la Méditerranée. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences*, 116: 443–445.

Corrêa, G.V.V.; Ingels, J.; Valdes, Y.V.; Fonsêca-Genevois, V.G.; Farrapeira, C.M.R. and Santos, G.A.P. 2014. Diversity and composition of macro- and meiofaunal carapace epibionts of the hawksbill sea turtle (*Eretmochelys imbricata* Linnaeus, 1822) in Atlantic waters. *Marine Biodiversity*, 44: 391–401.

Davenport, J. 1994. A cleaning association between the oceanic crab *Planes minutus* and the loggerhead sea turtle *Caretta caretta*. *Journal of the Marine Biological Association of the United Kingdom*, 74: 735–737.

De Loreto, B.O. and Bondioli, A.C.V. 2008. Epibionts associated with Green Sea Turtles (*Chelonia mydas*) from Cananéia, Southeast Brazil. *Marine Turtle Newsletter*, 122: 5–8.

Domènech, F.; Badillo, F.J.; Tomás, J.; Raga, J.A. and Aznar, F.J. 2014. Epibiont communities of loggerhead marine turtles (*Caretta caretta*) in the western Mediterranean: influence of geographic and ecological factors. *Journal of the Marine Biological Association of the United Kingdom*, 95: 851–861.

Frick, M.G.; Williams, K.L. and Robinson, M. 1998. Epibionts associated with nesting loggerhead sea turtles (*Caretta caretta*) in Georgia, USA. *Herpetological Review,* 29: 211–214.

Fuller, W.J.; Broderick, A.C.; Enever, R.; Thorne, P. and Godley, B.J. 2010. Motile homes: a comparison of the spatial distribution of epibiont communities on Mediterranean sea turtles. *Journal of Natural History*, 44: 1743–1753.

Hughes, L.E. 2016. Designation of neotypes for *Cyrtophium orientale* Dana, 1853, *Podocerus brasiliensis* (Dana, 1853) and *P. cristatus* (Thomson, 1879) and the description of a new species *Podocerus cyrenensis* (Crustacea: Amphipoda: Podoceridae). *Raffles Bulletin of Zoology*, 34: 312–330.

Iwasa-Arai, T.; Siciliano, S.; Serejo, C.S. and Rodríguez-Rey, G.T. 2017. Life history told by a whale-louse: a possible interaction of a southern right whale *Eubalaena australis* calf with humpback whales *Megaptera novaeangliae*. *Helgoland Marine Research*, 71: 6.

Iwasa-Arai, T.; Serejo, C.S.; Siciliano, S.; Ott, P.H.; Freire, A.S.; Elwen, S.; Crespo, E.A.; Colosio, A.C.; Carvalho, V.L. and Rodríguez-Rey, G.T. 2018. The host-specific whale louse (*Cyamus boopis*) as a potential tool for interpreting humpback whale (*Megaptera novaeangliae*) migratory routes. *Journal of Experimental Marine Biology and Ecology*, 505: 45–51.

Kilgallen, N.M. 2009. Podoceridae. In: J.K. Lowry and A.A. Myers (eds), Benthic Amphipoda (Crustacea: Peracarida) of the Great Barrier Reef, Australia. *Zootaxa*, 2260: 848–850.

Kitsos M.S.; Christodoulou M.; Arvanitidia C.; Mavidis M.; Kirmitzoglou, I. and Koukouras, A. 2005. Composition of the organismic assemblage associated with *Caretta caretta*. *Journal of the Marine Biological Association of the United Kingdom*, 85: 257–261.

Krapp-Schickel, T. 1993. Suborder Caprellidea. In: S. Ruffo (ed), The Amphipoda of the Mediterranean, Part 3. Gammaridea (Melphidippidae to Talitridae), Ingolfiellidea, Caprellidea. *Memoires de l'Institut Oceanographique, Monaco*, 13: 773–809.

Lamarck, J.B. 1801. Système des animaux sans vertèbres, ou tableau général des classes, des ordres et des genres de ces animaux; Présentant leurs caractères essentiels et leur distribution, d'apres la considération de leurs rapports naturels et de leur organisation, et suivant l'arrangement établi dans les galeries du Muséum d'Histoire Naturelle, parmi leurs dépouilles conservées; Précédé du discours d'ouverture du Cours de Zoologie, donné dans le Muséum National d'Histoire Naturelle l'an 8 de la République. Paris, published by the author and Deterville, viii + 432p.

Latreille, P.A. 1816. Amphipodes. p. 467–469. In: Nouveau Dictionnaire d'histoire naturelle, appliquée aux arts, à l'Agriculture, à l'Economic rurale et domestique, à la Médecine, etc. Par une Société de Naturalistes et d'Agriculteurs. Nouvelle Édition. Vol. 1. Paris, Deterville.

Lazo-Wasem, E.; Pinou, T.; Peña de Niz, A. and Feuerstein, A. 2011. Epibionts associated with the nesting marine turtles *Lepidochelys olivacea* and *Chelonia mydas* in Jalisco, Mexico: a review and field guide. *Bulletin of the Peabody Museum of Natural History*, 52: 221–240.

Leach, W.E. 1814. Crustaceology. p. 383–429. In: D. Brewster (ed), The Edinburgh Encyclopaedia, vol. 7. Edinburgh, Blackwood.

Linnaeus, C. 1758. Systema naturæ per regna tria naturæ, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Stockholm, Laurentius Salvius, 824p.

Linnaeus, C. 1766. *Systema naturae per regna tria naturae: secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis.* Ed. 12. 1., *Regnum Animale. 1 & 2*. Holmiae, Laurentii Salvii. *Holmiae [Stockholm], Laurentii Salvii.* p. 1–532 [1766], p. 533–1327 [1767].

Marcovaldi, M.A.; Patri, V. and Thome, J.C. 2005. Projeto TAMAR-IBAMA: twenty-five years protecting Brazilian sea turtles through a community-based conservation programme. *Maritimi Studies*, 3: 39–62.

Mateus, E.D.O. and Afonso, O. 1974. Étude d'une collection d'Amphipoda des Açores avec la description d'une nouvelle espèce. *Publicaçoes do Instituto de Zoologia "Dr Augusto Nobre", Faculdade de Ciências do Porto*, 126: 9–39.

Mayer, P. 1890. Die Caprelliden des Golfes von Neapel und der angrenzenden Meeres Abschinitte. *Fauna Flora Golf Neapel*, 17: 1–55.

McCain, J.C. 1968. The Caprellidea (Crustacea: Amphipoda) of the western North Atlantic. *Bulletin of the United States National Museum*, 278: 1–116

Moore, P.G. 1995. *Podocerus chelonophilus* (Amphipoda: Podoceridae) associated with epidermal lesions of the loggerhead turtle, *Caretta caretta* (Chelonia). *Journal of the Marine Biological Association of the United Kingdom*, 75: 253–255.

Pfaller, J.B.; Frick, M.G.; Reich, K.J.; Williams, K.L. and Bjorndal, K.A. 2008. Carapace epibionts of Loggerhead Sea turtles (*Caretta caretta*) nesting at Canaveral National Seashore, Florida. *Journal of Natural History*, 42: 1095–1102.

Ren, X. 1994. Studies on Gammaridea (Crustacea: Amphipoda) from Hong Kong, Daya Bay and adjacent waters. *Studia Marina Sinica*, 35: 249–271.

Ren, X. 2012. Crustacea Amphipoda Gammaridea (II). Fauna Sinica Invertebrata, vol. 43. Beijing, Science Press, 651p.

Ruffo, S. 1993. Family Podoceridae. *Mémoires de l'Institute Océanographique, Monaco*, 13: 669–680.

Sezgin, M.; Ates, A.S.; Katagan, T.; Bakir, K. and Yalcin Ozdilek, S. 2009. Notes on amphipods *Caprella andreae* Mayer, 1890 and *Podocerus chelonophilus* (Chevreux and Guerne, 1888) collected from the loggerhead sea turtle, *Caretta caretta*, off the Mediterranean and the Aegean coasts of Turkey. *Turkish Journal of Zoology*, 33: 433–437.

Stebbing, T.R.R. 1906. Amphipoda. I. Gammaridea. *Das Tierreich*, 21: 1–806.

Stephensen, K. 1929. Amphipoda. *Die Tierwelt der Nord- und Ostsee*, 14: 1–188.

Thiel, M.; Guerra-García, J.M.; Lancelotti, D.A. and Vásquez, N. 2003. The distribution of littoral caprellids (Crustacea: Amphipoda: Caprellidea) along the Pacific coast of continental Chile. *Revista Chilena de Historia Natural*, 76: 297–312.

Thomas, J.D. and Barnard, J.L. 1992. *Podocerus chelonophilus*, a testudinous amphipod newly recorded from the Western Atlantic Ocean. *Bulletin of Marine Science*, 50: 108–116.

Van Beneden, P.-J. 1859. La Tortue franche (*Chelonia midas*) dans la mer du Nord, ses commensaux et ses parasites. *Bulletin de l'Académie Royale des Sciences de Belgique*, 2: 71–87.

Yamato, S. 1992. A new species of *Podocerus* (Amphipoda, Podoceridae) from the carapace of a loggerhead sea turtle in Japan. *Publications of the Seto Marine Biological Laboratory*, 35: 281–288.

Zakhama-Sraieb, R.; Karaa, S.; Bradai, M.N.; Jribi, I. and Charfi-Cheikhrouha, F. 2010. Amphipod epibionts of the sea turtles *Caretta caretta* and *Chelonia mydas* from the Gulf of Gabès (central Mediterranean). *Marine Biodiversity Records*, 3: e38.