

First record of *Caligus mutabilis* (Copepoda: Caligidae), in sea-farmed *Mycteroperca microlepis* (Perciformes: Serranidae) in Brazil

Primeiro registro de *Caligus mutabilis* (Copepoda) em cultivos de *Mycteroperca microlepis* (Perciformes: Serranidae) no Brasil

Eduardo Gomes Sanches¹; Claudia Ehlers Kerber²; Fabiano Paschoal³; José Luis Luque^{3*}

¹Núcleo de Pesquisa e Desenvolvimento do Litoral Norte, Instituto de Pesca, Ubatuba, SP, Brasil

²Laboratório Kerber, Ilhabela, SP, Brasil

³Departamento de Parasitologia Animal, Curso de Pós-graduação em Ciências Veterinárias, Universidade Federal Rural do Rio de Janeiro – UFRRJ, Seropédica, RJ, Brasil

Received November 28, 2011

Accepted March 23, 2012

Abstract

Sea lice (copepods) are widespread pathogens in marine teleost cultivation around the world. The sea louse *Caligus mutabilis* Wilson, 1905, is recorded here for the first time in sea-farmed gag grouper, *Mycteroperca microlepis*, in Brazil.

Keywords: Mariculture, pathogens, ectoparasites, *Caligus mutabilis*.

Resumo

Os piolhos marinhos (copépodes) são patógenos amplamente difundidos nos cultivos de teleósteos marinhos ao redor do mundo. O copépode *Caligus mutabilis* Wilson, 1905 é aqui registrado pela primeira vez em cultivos de badejo-de-areia, *Mycteroperca microlepis*, no Brasil.

Palavras-chave: Maricultura, patógenos, ectoparasitos, *Caligus mutabilis*.

Cultivation of fish in Brazil begun in the mid 17th century, but the first attempts to farm marine fish started in the 1970s and 1980s only, with snooks (*Centropomus undecimalis* and *C. parallelus*), flounders (*Paralichthys orbignyanus*), groupers (*Epinephelus marginatus* and *Mycteroperca microlepis*), snappers (*Lutjanus synagris* and *L. analis*), pompanos (*Trachinotus carolinus* and *T. goodei*) and cobias (*Rachycentron canadum*) as the main species (SANCHES et al., 2008a, b).

Mycteroperca microlepis (Goode & Bean, 1879) is a fish species in the Serranidae family that is distributed from Massachusetts (northeastern United States) to Santa Catarina (southeastern Brazil), and is frequently cultivated in fish farms because of its high growth potential (FIGUEIREDO; MENEZES, 1980; SANCHES et al., 2008a, b). This species is listed as presenting least concern by International Union for Conservation of Nature and Natural Resources (IUCN Red List), although its current population trend in the wild is decreasing (BERTONCINI et al., 2011), and in Brazil it is overexploited in the state of São Paulo (SÃO PAULO, 2010; SANCHES et al., 2010).

Sea lice are copepods belonging to the Caligidae family within the order Siphonostomatoida. There are 36 genera within this family, which include approximately 107 *Lepeophtheirus* and 239 *Caligus* species (HO et al., 2000). Sea lice are ectoparasites that feed on the mucus, epidermal tissue and blood of marine fish, and they are among the most notorious pests affecting cultivated marine fish. These copepods erode fishes epithelium and consequently damage their eyes, thus leading to corneal ulceration and secondary bacterial infection. Cataracts and blindness interfere with feeding and result in further loss of condition. Cage cultivation of non-salmonids is also developing rapidly around the world, and sea lice are becoming increasingly associated with mortality and disease in these fish species too (BOXSHALL; DEFAYE, 1993; LESTER; HAYWARD, 2006).

The genus *Caligus* includes crustacean ectoparasites that are highly pathogenic to fish, with numerous reports worldwide (HO et al., 2000). According to Luque and Tavares (2007), 24 species of *Caligus* are found along the Brazilian coast parasitizing 57 fish species. In this paper, we present the first record of a sea-louse species (*Caligus mutabilis*) in farmed fish in Brazil.

Specimens of copepods were collected from cultivated *Mycteroperca microlepis* (wet weight 4.0 ± 0.3 kg) that were kept in concrete tanks of volume 80 m³, in a marine farm at Ilhabela, state of São Paulo, Brazil. Fishes were collected on the rocky

*Corresponding author: José Luis Luque
 Departamento de Parasitologia Animal,
 Universidade Federal Rural do Rio de Janeiro – UFRRJ,
 CEP 23851-970, Seropédica, RJ, Brasil
 e-mail: jlluque@ufrj.br

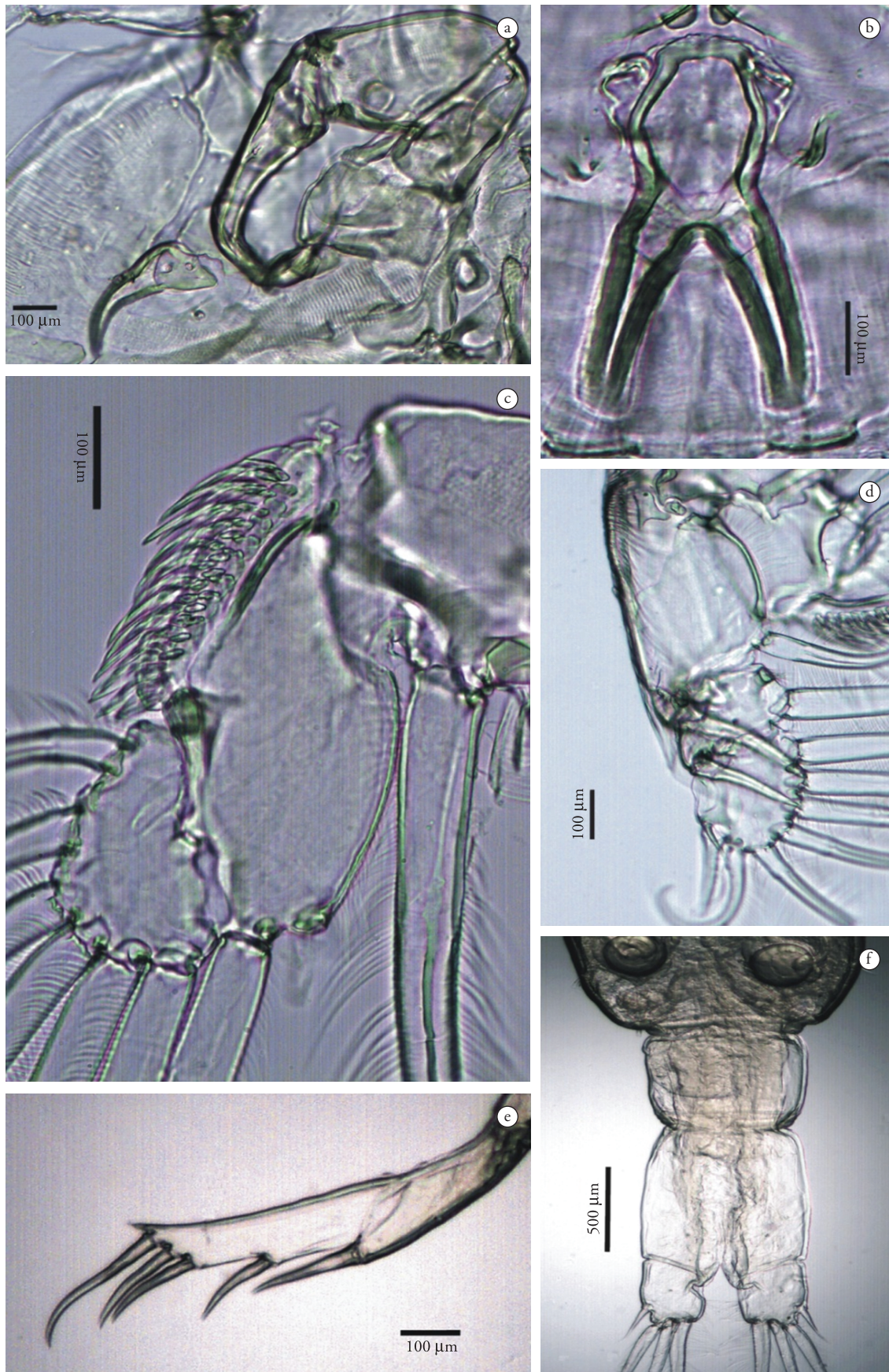


Figure 1. Some appendages of *Caligus mutabilis* Wilson, 1905. Female: a) Antenna; b) Furca; c) Second endopod; d) Second exopod; e) Fourth leg; f) Male: genital complex, abdomen and caudal rami.

shoreline near the site of cultivation and were fed with sardines. After collection, the copepods were fixed and preserved in ethanol (70% GL) and were clarified with lactic acid for identification. Measurements were made in millimeters (mm). The taxonomic determination of the parasites was in accordance with the diagnosis proposed by Cressey and Cressey (1980). Voucher specimens of *C. mutabilis* (two male and two females) were deposited in the Crustacea Collection of the National Museum, Rio de Janeiro (MNRJ No 23299, 23300).

The parasites collected on *M. microlepis* were spread across the body surface, and were most frequently observed in the fish cephalic region and mouth. The specimens of copepods collected showed great mobility, which caused intense itching that drove the fish to scrape themselves against the floor and walls, thereby causing mucus removal and skin lesions.

The following measurements were made on the specimens of *C. mutabilis* Wilson, 1905, collected from *M. microlepis*: Female (based on ten specimens) (Figure 1) Total length (including caudal rami), 4.87-4.21 (4.5) mm. Cephalothorax, 2.79-2.5 (2.67) mm long, 2.42-2.25 (2.37) mm wide. Genital semioval complex, 1.16-0.91 (1.12) mm long, 0.82-0.68 (0.73) mm wide. Abdomen, 0.91-0.65 (0.81) mm long, 0.54-0.42 (0.48) mm wide. Caudal rami with longest seta measuring 0.98 mm. Frontal lunulae spaced 0.67-0.52 (0.6) mm apart, with diameter of 0.71-0.57 (0.63) mm. Male (based on 10 specimens), ten measured. Total length (up to caudal rami), 4.99-4.11 (4.59) mm. Cephalothorax, 3.19-2.33 (2.7) mm long, 2.96-2.22 (2.61) mm wide (Figure 1b). Genital oval complex, 1.36-0.99 (1.11) mm long, 0.79-0.62 (0.69) mm wide. Bisegmented abdomen; first segment 0.39-0.31 (0.36) mm long, 0.45-0.31 (0.38) mm wide, second segment 0.68-0.42 (0.54) mm long, 0.48-0.31 (0.39) mm wide. Caudal rami, longest seta 0.59 mm. Frontal lunula, 0.76-0.58 (0.66) mm in diameter, spacing 0.63-0.51 (0.57) mm.

Caligus mutabilis was originally described by Wilson (1905). Subsequently, Cressey and Cressey (1980) made a detailed redescription with specimens collected from scombrid fish. The specimens collected in the present study corroborate the data collected by Cressey and Cressey (1980). On the coast of the Rio de Janeiro state it is a well-known species and has previously been recorded in fish of the families Carangidae, Scombridae, Sparidae and Ehippidae (LUQUE; TAVARES, 2007).

In wild fish stocks high levels of infection are occasionally pathogenic. Regarding the infection site and the life cycle characteristics of this pathogen, the high population density of farmed groupers might favor its dissemination, thereby increasing the parasite burden, since they can migrate from host to host, facilitating rapid spread (LUQUE, 2004). The first record of parasitic copepods in groupers in Brazil was made by Luque et al. (1998), who observed the copepod *Lepeophtheirus curtus* in black grouper (*Mycteroperca bonaci*). In other species of marine fish with a potential for cultivation, there are some records of caligid copepods. For example, *Caligus bonito* (Wilson, 1905) was observed in the gills of the mullet *Mugil platanus*, off the coast of Rio de Janeiro, with a prevalence of 13.3% (KNOFF et al., 1994). Tavares and Luque (2001) recorded *Caligus praetextus* Bere, 1936, in juvenile snook (*Centropomus undecimalis*) from Rio de Janeiro with a prevalence of 11.4%. More recently, Robaldo et al. (2002)

observed *Caligus* sp. parasitizing the Brazilian flounder *Paralichthys orbignyanus* in captivity. Another well-known example is the caligid copepods of the genus *Lepeophtheirus*, which have caused mortalities among non-salmonid fishes in Asia (BOXSHALL; DEFAYE, 1993; HO et al., 2000).

Since cultivation of non-salmonids is also developing in Brazil, sea lice may be associated with mortality and disease in these fishes. Since significant numbers of caligid species have been recorded along the Brazilian coast, cultivation of marine fish species may be highly affected, thus making it very important to study these parasites with a view to control and prophylaxis (LUQUE, 2004).

Acknowledgements

To Giorgio de Angeli for allowing access to the area used for mariculture development by Kerber Laboratory. José L. Luque was supported by a research fellowship from Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq).

References

- Bertoncini AA, Choat JH, Craig MT, Ferreira BP, Rocha L. Mycteroperca microlepis. In: International Union for Conservation of Nature - IUCN. *IUCN Red List of Threatened Species*. version 2011.2. [cited 2011 Nov. 24]. Available from: www.iucnredlist.org.
- Boxshall GA, Defaye D. *Pathogens of wild and farmed fish: Sea lice*. Ellis Horwood, Chichester, 1993.
- Cressey R, Cressey HB. Parasitic copepods of mackerel and tuna-like fishes (Scombridae) of the world. *Smithsonian Contrib Zool* 1980; 311: 1-186.
- Figueiredo JL, Menezes NA. *Manual de Peixes Marinhos do Sudeste do Brasil. III – Teleostei* (2). São Paulo: Museu de Zoologia da USP; 1980.
- Ho JS, Lin CL, Chen SN. Species of *Caligus* Müller, 1785 (Copepoda: Caligidae) parasitic on marine fishes of Taiwan. *Syst Parasitol* 2000; 46(3): 159-179. <http://dx.doi.org/10.1023/A:1006342120411>
- Knoff M, Luque JL, Takemoto RM. Parasitic copepods on *Mugil platanus* Günther (Osteichthyes: Mugilidae) from the coast of the State of Rio de Janeiro, Brazil. *Rev Bras Parasitol Vet* 1994; 3(1): 45-56.
- Lester RJG, Hayward CJ. Phylum Arthropoda. In: Woo PTK. *Fish Diseases and Disorders, Volume 1: Protozoan and Metazoan Infections*. 2nd ed. Oxfordshire: CABI publishing; 2006. p. 466-565.
- Luque JL, Chaves ND, Cezar AD. Novos registros de copépodes caligóideos parasitos de peixes marinhos do Brasil. *Nauplius* 1998; 6: 9-16.
- Luque JL. Biologia, epidemiologia e controle de parasitos de peixes. *Rev Bras Parasitol Vet* 2004; 13(S1): 161-164.
- Luque JL, Tavares LER. Checklist of Copepoda associated with fishes from Brazil. *Zootaxa* 2007; 1579: 1-39.
- Robaldo R, Pereira Junior J, Sampaio LA, Kütter V, Bianchini A. Ovoposição e desenvolvimento inicial de *Caligus* sp. (Copepoda: Caligidae) parasita de juvenis do linguado *Paralichthys orbignyanus* (Teleostei: Paralichthyidae) em cativeiro. *Atlântica* 2002; 24(2): 85-88.

Sanches EG, Pannuti CV, Sebastiani EF. A piscicultura marinha como opção para a carcinicultura brasileira. *Aqüicultura & Pesca*, 2008a; 36: 12-19.

Sanches EG, Seckendorff RW, Henriques MB, Fagundes L, Sebastiani EF. Viabilidade econômica do cultivo do Bijupirá (*Rachycentron canadum*) em sistema offshore. *Info. Econômicas* 2008b; 38(12): 42-51.

Sanches EG, Pannuti CV, Sebastiani EF, Rodrigues-Filho JA, Garcia CEO, Moreira RG. Threatened fishes of the world: *Mycteroperca microlepis* (Goode & Bean, 1880) (Serranidae: Epinephelinae). *Environ Biol Fish* 2010; 87(4): 317-318. <http://dx.doi.org/10.1007/s10641-010-9602-4>

São Paulo. Decreto 56031/10. Declara as Espécies da Fauna Silvestre Ameaçadas, as Quase Ameaçadas, as Colapsadas, Sobreexploradas, Ameaçadas de Sobreexploração e com dados insuficientes para avaliação no Estado de São Paulo e dá providências correlatas. *Diário Oficial do Estado de São Paulo*, São Paulo, 21 jul. 2010. p. 3.

Tavares LER, Luque JL. Aspectos quantitativos das infrapopulações de *Caligus praetextus* Bere, 1936 (Copepoda, Caligidae) parasitos do robalo *Centropomus undecimalis* (Bloch, 1792) (Osteichthyes, Centropomidae) no litoral do estado do Rio de Janeiro, Brasil. *Rev Bras Zool* 2001; 3(2): 253-258.

Wilson CB. North American parasitic copepods belonging to the family Caligidae, 1: The Caliginae. *Proc US Natl Mus* 1905; 28:479-672.