



A new species of copepod (Siphonostomatoida: Caligidae) parasitic on the tiger shark *Galeocerdo cuvier* (Péron & Lesueur) from Western Australian waters

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Abstract

A new species of sea-louse (Caligidae, Siphonostomatoida), *Caligus oculicola* n. sp., is described from the eye surface of the tiger shark *Galeocerdo cuvier* from off the northwestern coast of Australia. This copepod is distinguished from its congeners by a combination of characters that include: (i) a bifid, dentiform process of the maxillule; (ii) a sternal furca with a box longer than wide and diverging, truncate tines; (iii) terminal spines 1 to 3 on the last segment of leg 1 exopod, each with serrate margins and an accessory process (accessory process on the spines extending beyond the tip of the spine itself); and (iv) a two-segmented exopod of leg 4 with an armature formula of I-0; III. This is the first description of a caligid copepod collected from a shark host in Western Australian waters. The host-parasite relationships between *Caligus oculicola* and its elasmobranch host are discussed.

Introduction

Although some members of *Caligus* Müller, 1785 have been reported from elasmobranch hosts, this genus is considered predominantly parasitic on marine teleost fishes (Kabata, 1979). The relationship between *Caligus* and elasmobranch species is ill-defined, since reports of *Caligus* collected from elasmobranchs are uncommon, the specific attachment site on the host is infrequently reported, infection parameters are rarely provided, the early infective stages (copepodid and chalimus) have not been found on any elasmobranch, and there is no *Caligus* species that has been repeatedly collected from one particular elasmobranch species. As a consequence, reports of *Caligus* from elasmobranchs are often regarded by parasitologists as 'accidental' or 'fortuitous' infections, indicating a very loose or ephemeral association between the copepod and its host.

Of the more than 250 recognised *Caligus* species, only 17 have been reported from elasmobranchs (Table 1). It must be emphasised that 13 of the 17 species listed, namely *C. alalongae*, *C. belones*, *C. chelifera*, *C. coryphaenae*, *C. curtus*, *C. elongatus*, *C. latigenitalis*, *C. praetextus*, *C. productus*,

C. punctatus, *C. quadratus*, *C. rufimaculatus* and *C. willungae*, have been reported in the literature from various teleost hosts as well. Furthermore, *C. chiloscyllii* has been collected from two teleost hosts, the six-lined trumpeter *Pelates sexlineatus* (Quoy & Gaimard) and the barfaced sandsmelt *Paraperca nebulosa* (Quoy & Gaimard), in Shark Bay, Western Australia (Tang, unpublished data). During a biological survey of pelagic sharks conducted in July, 1997 along the Western Australian coastline (Newbound & Knott, 1999), one of us (DRN) collected *Caligus* specimens from tiger sharks *Galeocerdo cuvier* (Péron & Lesueur). These specimens represent a new species, which is described below. In addition, we discuss the host-parasite relationship between this new copepod and its elasmobranch host.

Materials and methods

Tiger sharks were caught along the Western Australian coastline, from west of the Montebello Islands (20°28'25 S, 115°24'24 E) to west of the Peron Peninsula (22°51'75 S, 113°14'89 E), Shark Bay, using set-line fishing with hooks. Sharks were examined for

Table 1. Species of *Caligus* (in alphabetical order) reported from elasmobranch hosts.

Caligus spp.	Host	Reference
<i>C. alalongae</i> Krøyer, 1863	<i>Mobula rochebrunei</i> (Vaillant)	Margolis et al. (1975)
<i>C. belones</i> Krøyer, 1863	<i>Raja batis</i> Linnaeus [= <i>Dipterus batis</i> (Linnaeus)]	Margolis et al. (1975)
<i>C. chelififer</i> Wilson, 1905	<i>Mustelus canis</i> (Mitchill)	Benz (1986)
<i>C. chiloscyllii</i> Pillai, 1967	<i>Chiloscyllium indicum</i> (Gmelin)	Pillai (1985)
<i>C. coryphaenae</i> Steenstrup & Lütken, 1861	<i>Isurus oxyrinchus</i> Rafinesque <i>Squalus acanthias</i> Linnaeus	Kabata (1979)
<i>C. curtus</i> Müller, 1785	<i>Raja batis</i> Linnaeus [= <i>Dipturus batis</i> (Linnaeus)] <i>R. clavata</i> Linnaeus <i>R. fullonica</i> Linnaeus [= <i>Leucoraja fullonica</i> (Linnaeus)] <i>R. laevis</i> Mitchill [= <i>Dipturus laevis</i> (Mitchill)] <i>R. maculata</i> Shaw [= <i>Narcine maculata</i> (Shaw)] <i>R. montagui</i> Fowler <i>R. naevus</i> Müller & Henle [= <i>Leucoraja naevus</i> (Müller & Henle)] <i>R. oxyrhynchus</i> Linnaeus [= <i>Dipturus oxyrhynchus</i> (Linnaeus)] <i>R. radiata</i> Donovan [= <i>Amblyraja radiata</i> (Donovan)] <i>Squalus acanthias</i> Linnaeus	Parker et al. (1968), Kabata (1979)
<i>C. dasyaticus</i> Rangnekar, 1957	<i>Amphotistius kuhlii</i> (Müller & Henle) [= <i>Dasyatis kuhlii</i> (Müller & Henle)] <i>Dasyatis akajei</i> (Müller & Henle) <i>Dasyatis uarnak</i> (Forsskål) [= <i>Himantura uarnak</i> (Forsskål)] <i>Pristis</i> sp.	Pillai (1985)
<i>C. elongatus</i> Nordmann, 1832	<i>Alopias vulpinus</i> (Bonnaterre) <i>Squalus littoralis</i> Lesueur [= <i>Carcharias taurus</i> Rafinesque] <i>Dasyatis centroura</i> (Mitchill) <i>Raja batis</i> Linnaeus [= <i>Dipturus batis</i> (Linnaeus)] <i>R. brachyura</i> Lafont <i>R. clavata</i> Linnaeus <i>R. erinacea</i> Mitchill [= <i>Leucoraja erinacea</i> (Mitchill)] <i>R. laevis</i> Mitchill [= <i>Dipturus laevis</i> (Mitchill)] <i>R. montagui</i> Fowler <i>R. naevus</i> Müller & Henle [= <i>Leucoraja naevus</i> (Müller & Henle)] <i>R. ocellata</i> Mitchill [= <i>Leucoraja ocellata</i> (Mitchill)] <i>R. radiata</i> Donovan [= <i>Amblyraja radiata</i> (Donovan)] <i>Squalus acanthias</i> Linnaeus	Parker (1969), Margolis et al. (1975), Kabata (1979)
<i>C. furcisetifer</i> Redkar, Rangnekar & Murti, 1949	<i>Sphyrna blochii</i> (Cuvier) [= <i>Eusphyra blochii</i> (Cuvier)] <i>Pristis</i> sp.	Margolis et al. (1975), Pillai (1985)
<i>C. latigenitalis</i> Shiino, 1954	<i>Mustelus manazo</i> Bleeker <i>Rhinobatus schlegelii</i> Müller & Henle	Margolis et al. (1975)
<i>C. praetextus</i> Bere, 1936	<i>Dasyatis sabina</i> Lesueur <i>Raja eglanteria</i> Bosc	Margolis et al. (1975)
<i>C. productus</i> Dana, 1852	<i>Prionace glauca</i> (Linnaeus)	Benz (1986)
<i>C. punctatus</i> Shiino, 1955	<i>Triakis scyllium</i> Müller & Henle	Margolis et al. (1975)
<i>C. quadratus</i> Shiino, 1954	<i>Rhinobatus schlegelii</i> Müller & Henle	Margolis et al. (1975)
<i>C. rufimaculatus</i> Wilson, 1905	<i>Mobula</i> sp. <i>Rhinobatus lentiginosus</i> Garman	Margolis et al. (1975)
<i>C. torpedinis</i> Heller, 1865	<i>Torpedo</i> sp.	Margolis et al. (1975)
<i>C. willungae</i> Kabata, 1965	Unidentified elasmobranchs	Margolis et al. (1975)