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A new species of *Paeonodes* (Therodamasidae, Cyclopoida), a parasitic copepod of the fish *Tilapia melanotheron* from the Sakumo-lagoon, Ghana, Africa

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ABSTRACT

A new species of the genus *Paeonodes* Wilson, 1944 (Therodamasidae, Cyclopoida, Copepoda), *P. lagunaris*, is described from *Tilapia melanotheron* Rüppel, 1852, of the Sakumo-lagoon, Ghana, Africa. The new species is compared with the hitherto known two species of the genus *Paeonodes* and the relationship of the genus with euryhaline waters is discussed.

INTRODUCTION

A collection of parasitic copepods, recently received from Mr. D. Pauly, Fishery Research Institute, Kiel, Germany, contained specimens of special interest.

The collector found the parasites during his study of the ecology, food and feeding habits of *Tilapia melanotheron*, Rüppel, 1852, *Sarotherodon melanotheron*, according to the latest systematical review (Trewavas, 1973), in the Sakumo-lagoon (Ghana, near Accra, Africa) in 1971 and passed on the material to me for identification. The parasites were buried deeply with a long slender neck in the soft tissues inside the mouth of the fishes and were more or less encapsulated by the host connective tissue. Only a small ellipsoidal part and the ovisacs were seen protruding outside in the host's buccal cavity (fig. 1). Further study revealed that the specimens were distinct from the known African parasitic copepods occurring on cichlid and other fishes. Even an investigation of parasitic Crustacea in an adjoining lagoon (Paperna, 1969) did not mention the occurrence of this parasite. Their morphology indicated that the specimens belong to the Therodamasidae Tripathi, 1960, with similarity to the genus *Paeonodes*. However, no comparable specimens

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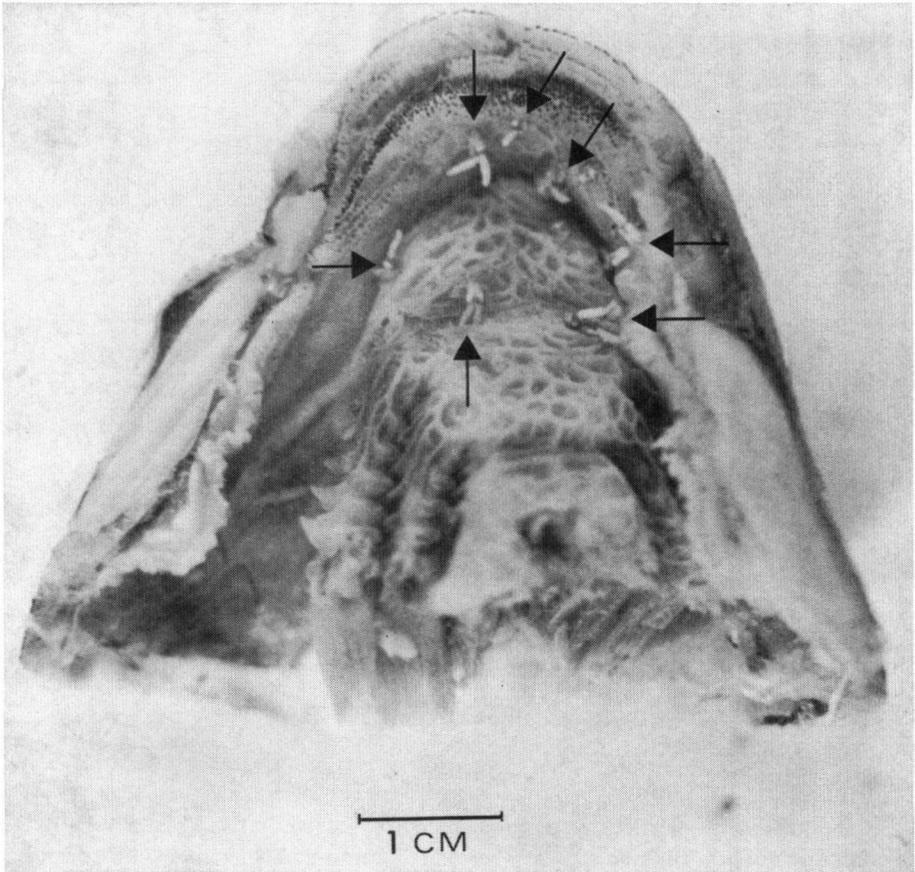


FIG. 1. *Paeonodes lagunaris* n.sp. in situ (indicated by arrows) in the lower mouthparts of *Tilapia melanotheron*.

of this genus were previously recorded from Africa and beside this there were some morphological differences with the hitherto known species of *Paeonodes*, *P. exiguus* Wilson, 1944, and *P. nemaformis* Hewitt, 1969. The African specimens therefore represent a new species, which is here described as *Paeonodes lagunaris*.

Measurements have been made in most instances from specimens stained in methyl blue and cleared in a mixture of two parts chloral hydrate, one part carbolic and one part lactic acid; the drawings have been made with the aid of a camera lucida.

***Paeonodes lagunaris* n. sp.**

Description

Material examined: 10 females, all bearing eggs. The specimens were all from the buccal cavity of *Tilapia melanotheron*, Sakumo-lagoon, Ghana,

Africa. Overall length, excluding egg sacs, 4.69—6.84 mm. General form as in fig. 2. Thorax consisting of a very elongated and slender neck (3.4—5.5 mm \times 0.19—0.21 mm), sharply widening into a swollen trunk; neck and trunk without any sign of segmentation; neck merged into head with no obvious line of demarcation.

Head (fig. 3) only slightly wider than the neck without lateral processes, anterior median part more or less protruding, carrying an eye spot with, posterior of this, three bluish pigmented spots. Width of head 0.31—0.40 mm; first and second antennae situated median frontal; mouthparts minute, 0.09—0.17 mm from anterior margin of the head.

Trunk (fig. 7) swollen, barrel shaped with a slight narrowing at the mid-point, slightly flattened dorsoventrally, length 0.92—1.34 mm, width 0.67—0.87 mm.

First antenna (fig. 4), length 0.06—0.09 mm, 5-segmented, armed with setae.

Second antenna (fig. 5), length 0.18—0.27 mm, 3-segmented, a firm triangular tooth medially on the inner margin of the second segment; terminal segment forming a stout and slightly curved claw, reaching over the tooth of the second segment; direction of the second antennae hooks toward the midline.

Mouthparts (fig. 6) minute, scale-like labrum present, 0.03—0.05 mm; mouth tube approximately 0.03—0.07 mm in length, subcylindrical; mandibles (?), maxilla (?) and maxillipeds (?) present as minute broadbased 1 to 2-segmented appendages with shaggy tips; length of mandibles (?), maxilla (?) and maxillipeds (?) between a range of 0.03—0.07 mm.

Pereiopods four pairs, biramous; pereiopods 1—3 similar in form with 3-segmented rami, on the distal segment 5 or 6 plumose setae; fourth pereiopod with 1-segmented rami, minute, 2 setae per ramus.

First pereiopod situated just behind the mid-point of the trunk, other pereiopods close together near the posterior end of the trunk. First pereiopod: protopodite, oval shaped with a swollen part of outer margin, 0.06—0.07 mm \times 0.03—0.05 mm; connecting bar 0.10—0.11 mm; exopod 0.05—0.07 mm; endopod 0.05—0.07 mm.

Second pereiopod: protopodite 0.07—0.08 mm \times 0.04—0.06 mm; connecting bar 0.09—0.10 mm; exopod 0.06—0.07 mm; endopod 0.05—0.07 mm.

Third pereiopod: protopodite 0.06—0.08 mm \times 0.04—0.05 mm; connecting bar 0.07—0.08 mm; exopod 0.05—0.07 mm; endopod 0.05—0.06 mm.

Fourth pereiopod: protopodite 0.03—0.05 mm \times 0.03—0.05 mm; connecting bar 0.04—0.05 mm; exopod 0.02—0.03 mm; endopod 0.02—0.03 mm.

Genital segment (fig. 9) small, nearly spherical, 0.07—0.10 mm; egg sacs attached ventrolaterally about half way along the segment.

Egg sacs cigar-shaped 1.34—1.74 mm \times 0.34—0.54 mm, with numerous eggs in multiseriate rows, diameter of eggs 0.05—0.08 mm.

Abdomen (fig. 9) minute, almost hemispherical, 0.07—0.12 mm; one

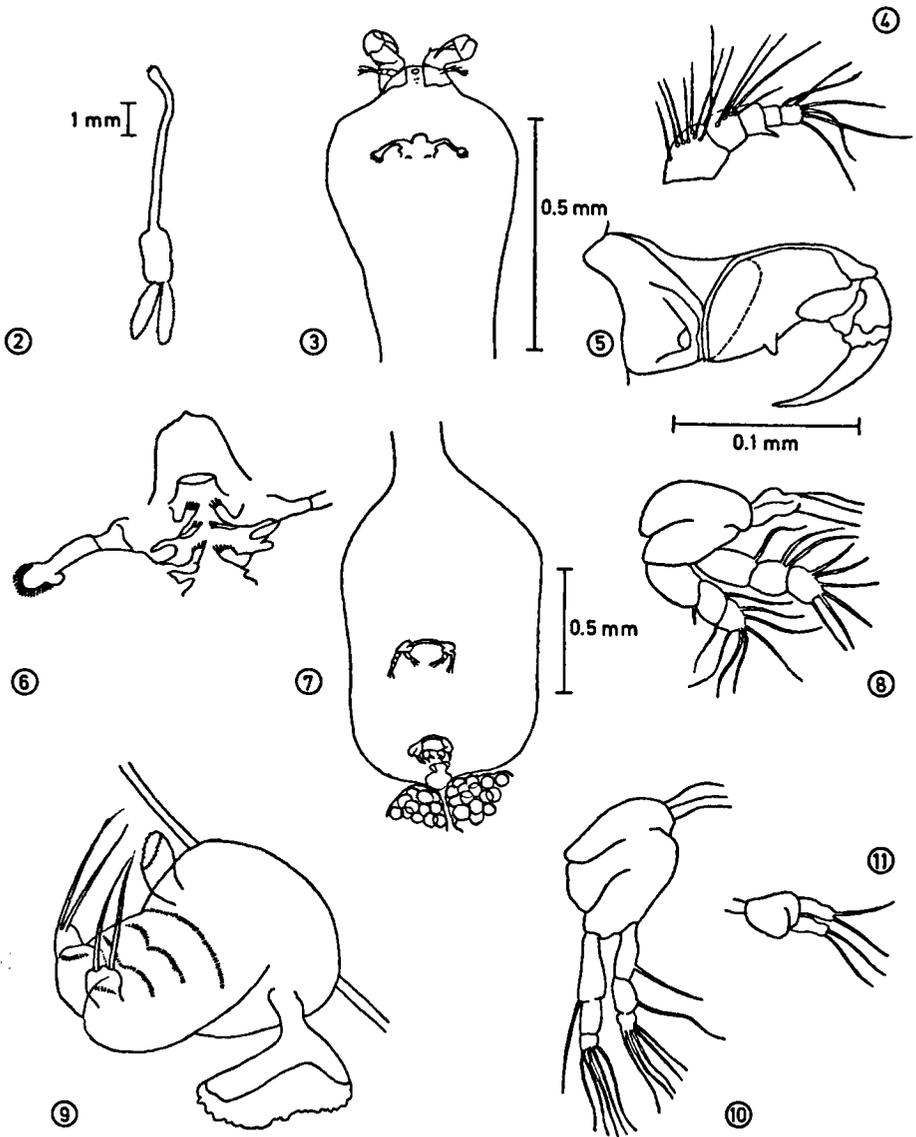


FIG. 2. *Paeonodes lagunaris* nov. spec., female — total aspect; fig. 3: head, ventral aspect; fig. 4: first antenna; fig. 5: second antenna; fig. 6: mouth parts; fig. 7: trunk, ventral aspect; fig. 8: first pereiopod; fig. 9: genital segment and abdomen; fig. 10: second pereiopod; fig. 11: fourth pereiopod.

segmented, on ventral surface beset with 4 rows of extremely minute spines, which give a false indication of segmentation; each ramus of caudal rami with 2 setae.

Male: unknown.

TYPE MATERIAL

The measured specimens and specimens still anchored in *T. melanotheron* are deposited in the Zoological Museum, Amsterdam, reg. no. CO 102.407 a (mountings on slides of the holotype), reg.no. 102.408 (paratypes), and reg.no. CO 102.407 b respectively.

DISCUSSION

In the review of the Therodamasidae by Hewitt (1969) there are only 3 genera mentioned belonging to this family: *Mugilicola* Tripathi, *Therodamas* Kroyer, and *Paeonodes* Wilson. All the representatives of this family have the characteristics of a long slender neck buried in the host tissue and a more or less swollen trunk. The number of species known of the three genera is very few. Hitherto, specimens of the genera *Mugilicola* and *Therodamas* are known from the West Indies, Santa Lucia, Uruquay and India.

The genus *Paeonodes* is represented only by two species: *P. exiguus* from the fish *Verillida grayula* May, 1911 (as was traced by Hewitt on a label of the U.S. National Museum enclosed with the type specimen of *P. exiguus*) and *P. nemaformis* from salmonids of New Zealand. The West-African specimens from *Tilapia melanotheron*, as described in this paper, are therefore not only interesting as a first record for Africa but also as revealing the occurrence of the genus *Paeonodes* in a locality far from New Zealand and the probable area in which *Verillida grayula* was caught*). However, the African specimens show sufficient different features to consider them as a separate species. The differences are indicated in table I.

With this new species, 3 species of *Paeonodes* are known now from three different, widely separated localities.

Reviewing the hitherto known hosts of the Therodamasidae, namely representatives of the Serranidae, Lutianidae and Salmonidae, *Trachysurus* spp., *Mugil* spp. and now also *Tilapia melanotheron*, one can note that these fishes inhabit coastal, estuarine or tidal waters or pass such a zone during their migration (salmonids). This suggests that the Therodamasidae are probably linked with this kind of euryhaline waters. The relatively few known genera and species, and their widespread but local occurrence, leads one to assume that the Therodamasidae are relicts of a former widespread marine parasitic

*) Note on *Verillida grayula*:

I have been unable to find any data about this species, neither in a study of old and new fish systematics, nor with the help of the excellent library of the ichthyological department of the Zoologisch Museum, Amsterdam. In Bashford Dean, 1917: A bibliography of fishes, Vol. II, The American Museum of Natural History, only one paper by May, 1911, was mentioned, but after checking this work no information or description of *Verillida grayula* was found. The best approach to the probable host of *P. exiguus* may be therefore to suppose a representative of the Verillida (as is also suggested by Hewitt), which in the new systematics are incorporated in the Lutianidae (snappers). These occur along tropical coasts and include many species that enter or live in tidal estuaries.

TABLE I. Main differences between the species of the genus *Paenodes*.

	localisation on the host	overall length, excluding egg strings	head	second antenna	trunk 	neck/trunk length ratio	structure on neck
<i>P. exiguus</i>	near eye	3.15 mm	with dorso-ventral processes	spine on first and second segment	cylindrical	2.4 : 1	transverse striations on base
<i>P. nemafomis</i>	gills, gill cover, pectoral fins	3.74 mm-4.46 mm	with posterolateral bilobate processes	spine on first and second segment	pear shaped	2.6 : 1	without striations
<i>P. lagunaris</i>	buccal cavity	4.69 mm-6.84 mm	without lateral processes, only a slightly protruding median part	spine on second segment only	barrel shaped	2.9 : 1 up to 4.8 : 1	without striations

family, which have persisted by adaptation to the difficult physiological conditions of varying salinities or to fresh water. In these scattered relict areas they evolved to separate species, of which perhaps others may be found in comparable areas of tropical or subtropical coastal waters.

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