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A NEW SPECIES OF THE GENUS *ACANTHEPHYRA* [CRUSTACEA: NATANTIA]: FIRST DISCOVERED AND DESCRIBED IN MS NOTES BY DR STANLEY W. KEMP

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(Text-figs. 1–4)

A new species of the genus *Acanthephyra* (Family Oplophoridae) is reported on and described. Surviving notes of the distinguished carcinologist Dr Stanley W. Kemp show that, during his extensive studies of deep-sea decapods, he had discovered the species in the Indian Ocean and Atlantic Ocean, named it, and prepared a description which hitherto has not been published. The name he proposed—*Acanthephyra prionota* sp.nov.—is retained and his notes are respectfully presented as description with some additional data and figures of the author. *A. prionota* sp.nov. is the smallest known representative of the genus. It has been recorded so far only between latitudes 18° N and 18° S in the Atlantic Ocean and 0° and 12° S in the Indian Ocean. Bathymetric data show it to be a deep-water species restricted to depths below 700 m with a probable population maximum between 1000 and 1300 m.

INTRODUCTION

During recent cruises of R.R.S. 'Discovery' in the eastern North Atlantic an investigation has been made of the depth distribution and diurnal migration of the pelagic fauna in selected oceanic areas. This continuing programme has entailed intensive mid-water sampling with opening–closing nets, fishing discrete depth horizons mainly within the upper 1000 m but also on occasion at greater depths. Hauls made during the cruise of January–April 1968 in a position 11° N, 20° W, south-east of the Cape Verde Islands, yielded 43 specimens of an apparently new species of the genus *Acanthephyra*. A further 113 specimens were taken during a subsequent cruise to the same area and the species has also been recorded in a sample collected in the Indian Ocean during the International Indian Ocean Expedition.

Having examined the literature and concluded that the species was undescribed the author referred to the large collection of decapod Crustacea that had been amassed as a result of cruises of ships of the Discovery Committee made prior to 1939. This material, together with that taken on the Dana Expeditions, had formed the subject of Dr Stanley W. Kemp's extensive studies on the Oplophoridae (Kemp, 1939), consequently the carefully preserved, labelled, and identified specimens represent a unique reference collection. It proved to contain five specimens identical to those taken at 11° N in 1968. Not unexpectedly Kemp had realized their uniqueness and had not only designated the type but named it. A description, however, was never published although it was prepared and has in part survived.

Kemp's study of the 'Discovery' and 'Dana' deep-water decapod Crustacea, on which he had been engaged for many years, was nearing completion in 1941. On the evening of

20 March 1941 Plymouth was bombed and The Laboratory of the Marine Biological Association on Citadel Hill caught fire; events which have been graphically described by others (see the account of Dr D. P. Wilson quoted by Hardy, 1946). As a result Kemp lost not only his personal possessions but also the notes and manuscript of his paper which was ready to go to the press. Little was salvaged apart from a few charred notes which passed, on Kemp's death in 1945, via Dr N. A. Mackintosh, Director of Discovery Investigations 1936–49, into the care of Dr Isabella Gordon. Later, consequent upon the reorganization and rehousing of part of the 'Discovery' Collection at the National Institute of Oceanography, Kemp's specimens were moved to Wormley. Dr Gordon felt that the papers relating to the decapods should remain with the collection and kindly passed them to the present author in 1969.

These few fragmentary papers include some taxonomic notes, an incomplete key to the genus *Acanthephyra* that refers to two new species, and a description minus the figures, of one of these species—named by Kemp *Acanthephyra prionota.* This latter find is important because the description is based on the five specimens found in the 'Discovery' Collections and is therefore referable to the specimens caught on recent cruises. Unfortunately under Article 9 of the International Code of Zoological Nomenclature this surviving document does not constitute a publication and it therefore falls to the present author to place on record Kemp's discovery and provide a description. It will be clear from the account which follows that the surviving notes have required little editing. Measurements have been included where they were missing and in some cases the description has been amplified by personal observation of the much larger collection of specimens now available for study. The illustrations (Figs. 1, 2) had already been prepared before the discovery of either Kemp's specimens or his notes and are based on the recent collections which have also provided the data on vertical distribution.

Further study it is hoped will allow the second new species listed by Kemp to be described so that a key to the Acanthephyridae and a synopsis of the genus can be published. With the present paper, this will, it is hoped, provide some testimony, albeit inadequate, to what would undoubtedly have represented Kemp's most significant contribution to our knowledge of deep-sea decapods.

Notes on the sampling methods and abbreviations used

TYF, a 2 m diameter ring net (Kemp, Hardy & Mackintosh, 1929); N 450, a 4.5 m diameter ring net (Marr, 1938); RMT 8, a rectangular net of 8 m^2 effective mouth area (Clarke, 1969); RMT 90, an experimental rectangular trawl of 90 m^2 mouth area; IKMT, a 3 m (10 ft.) Isaacs-Kidd midwater trawl. The fishing procedure adopted for the day and night series at station 6662 and 7089 is described by Clarke (1969). Abbreviations: B, oblique tow; H, horizontal tow; N, night; D, day; followed by a serial number identifies each of the hauls from the day-and-night series fished at stations 6662 and 7089. Depth of fishing was measured unless given as estimated (est.). The sign ⊙ is used to indicate specimens whose sex could not be determined and which are considered to be immature. All lengths refer to carapace length unless stated otherwise.

Acanthephyra prionota sp.nov.

(Figs. 1, 2A–H)

Material examined by Dr S. W. Kemp

East African Coast

Stn 1582 29.4.35. 05° 39′ S, 46° 22′ E: N450H 1900–1850–(0)m: 1♂ 7·0 mm. Holotype Registration Number: British Museum (Nat. Hist.) 1970:253.

Stn 1585 1.5.35. 00° 06′ S, 49° 45′ E: TYFB 1400–700 m: 1♂ 5·3 mm.

Atlantic Ocean

Stn 287 19.8.27. 2° 49.5′ S, 09° 25.5′ W: TYFH 1000–800–(0)m: 1♀ 8·2 mm.

Stn 2061 1.5.37. 06° 36′ S, 06° 25′ W: N450B 1900–1500 m: 1♂ 6·4 mm.

Stn 2066 5.5.37. 04° 56.4′ N, 14° 46.7′ W: N450B 1950–1500 m: 1♂ 6·7 mm.

Material examined by author

Indian Ocean

Stn 5332 18.4.64. 12° 37.2′ S, 67° 21.8′ E: IKMT 800–0 m. est. 2♂ 5·8 6·1 mm, 1♀ 6·8 mm.

Atlantic Ocean

Stn 6662 11° 00′ N, 19° 56.8′ W (for # 8) RMT8H.

15.2.68. # 8 (N) 985–910 m: 5 ⊙ 4·1–4·6 mm, 2♀ 7·4 7·4 mm.

16.2.68 # 16 (N) 890–810 m: 1 ⊙ 4·4 mm.

19.2.68 # 28 (N) 1250–1000 m: 5 ⊙ 4·5–5·1 mm, 8♂ 6·1–8·1 mm, 4♀ 5·2–7·8 mm. # 30 (D) 795–730 mm: 1 ⊙ 5·1 mm.

20.2.68 # 34 (D) 1040–900 m: 6 ⊙ 4·2–5·6 mm, 1♀ 7·7 mm. # 35 (N) 1680–1300 m: 1 ⊙ 5·8 mm, 2♂ 6·7 7·5 mm, 1♀ 7·7 mm.

21.2.68 # 37 (D) 1300–1060 m: 1 ⊙ 4·9 mm, 5♀ 5·8–7·2 mm. including 2 ovigerous.

Stn 7069 29.10.69. 18° 4.8′ N, 25° 7.9′ W: RMT8B 1000–0 m: 1 ⊙ 3·8 mm, 2♂ 6·1 6·1 mm, 1♀ 7·0 mm.

Stn 7078 2.11.69. 17° 28.8′ N, 25° 39.6′ W. RMT90H 1000–(0) m. 3♂ 6·1–7·2 mm, 17♀ 6·1–8·7 mm including 2 ovigerous.

Stn 7089 17° 47.9′ N, 25° 18.2′ W (for # 8) RMT8H

12.11.69 # 4 (D) 890–800 m: 10 ⊙ 4·1–5·3 mm. # 5 (D) 790–700 m: 3 ⊙ 3·7–4·1 mm.

13.11.69 # 8 (N) 1010–900 m: 6 ⊙ 4·1–4·7 mm, 4♂ 4·9–5 mm, 4♀ 5·2–8.2 mm. including ovigerous.

14.11.69 # 12 (N) 900–800 m: 1 ⊙ 4·0 mm. # 14 (D) 1020–910 m: 7 ⊙ 4·4–5·0 mm, 5♀ 6·1–8·6 mm. including 2 ovigerous.

17.11.69 # 32 (N) 1250–1000 m. est: 19♂ 5·8–8·3 mm, 6♀ 6·2–8·9 mm. including 1 ovigerous.

18.11.69 # 34 (D) 1240–1000–(0) m. (Net failed to close completely): 2 ⊙ 2·8 mm, 14♂ 4·6–6·5 mm, 8♀ 4·0–6·1 mm including 1 ovigerous.

Description

(Consisting of Kemp's notes referring to the East African specimens, rearranged to include his additional observations made on the specimen from Stn 2061.)

The rostrum is short and reaches only to the end of the eyes (Fig. 1), in lateral view it is deep, the height measured from the back of the orbit being rather greater than the length. It forms the termination of a convex dorsal crest which occupies the anterior third of the carapace. The crest (Fig. 2A) is armed with five or six procumbent teeth, four of which are placed on the carapace behind the latitude of the orbit; in the type the apex is slender and styliform and points obliquely downwards; in the second specimen it is broken. The lower border is unarmed; it has two carinae, one on each side, which slope downwards and backwards to the orbit, the rostrum thus forming a kind of hood over the base of the eyes as in *A. cucullata* Faxon and its allies.

The carapace is dorsally carinate for nearly three-quarters of its length in the type—for about half in the smaller specimen. On the anterior margin the orbital angle has the form of a rounded protuberance and beneath it a minute projection marks the position of the antennal spine. The branchiostegal tooth is strong and is situated on the margin. The grooves and ridges of the carapace (in the type) can only be traced with difficulty owing to the membranous consistency and rather crumpled condition of the integument. The branchiostegal tooth is not supported by a carina; the carapace behind it is rounded and a little swollen and, much as in *A. tenuipes*, Sp. Bate, this swelling is defined dorsally by a furrow which is continuous with the anterior end of the deeply cut hepatic groove. A rather strong horizontal ridge marks the upper limit of the branchial cavity. The cervical groove is clear cut but does not cross the dorsum; the hepatic groove is deep.

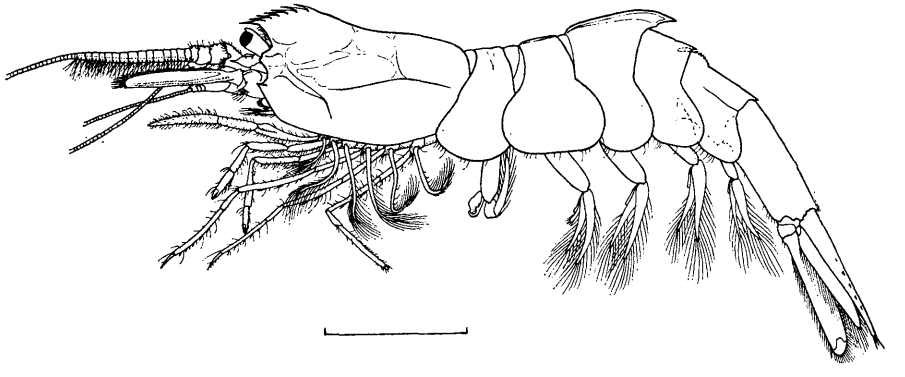

Fig. 1. *Acanthephyra prionota* sp.nov., lateral view of a mature male (spermatophores not shown) 6·5 mm cl. from Stn 6662 # 35. The scale indicates 5 mm.

The abdomen is rather more than twice as long as the carapace. The first somite is rounded above; the last five somites are dorsally carinate and in each of the last four the carina ends in a tooth. The tooth of the 3rd somite is large and deep, with an obtuse projection on its posterior side; it reaches to the middle of the 4th somite. The teeth on the 5th and 6th somites are very small. A remarkable feature of this species—one by which it may be distinguished at a glance from all other members of the genus—is the series of dorsal serrations on the 3rd, 4th and 5th somites. These are most conspicuous at the proximal end of the 5th somite, where there is a rounded crest, underlying the tooth of the 4th somite, which bears seven comparatively large teeth with their points directed backwards (Fig. 2B). Behind this crest the series of teeth is continued throughout the length of the somite, but they diminish in size and tend to become mere nicks in the dorsal carina. Similar nicks or crenulations occur on the carina of the 4th somite on either side of the wide and shallow dorsal notch; they are also to be seen on the 3rd somite and faint indications of them can be found on the 2nd. The 6th somite is rather less than twice the length of the 5th and is slender, nearly three times as long as deep.

The telson is broken in the type. In the second specimen it is complete and reaches nearly to the end of the outer uropod; it is broadly channelled at its proximal end and in the distal half bears 4 pairs of conspicuous dorsal spinules (Fig. 2C). The apical spines

have the same number and arrangement as in other species of the genus, but are exceptionally long.

The eye is very broad. In dorsal view (Fig. 2 D) the stalk is nearly as wide as it is long and

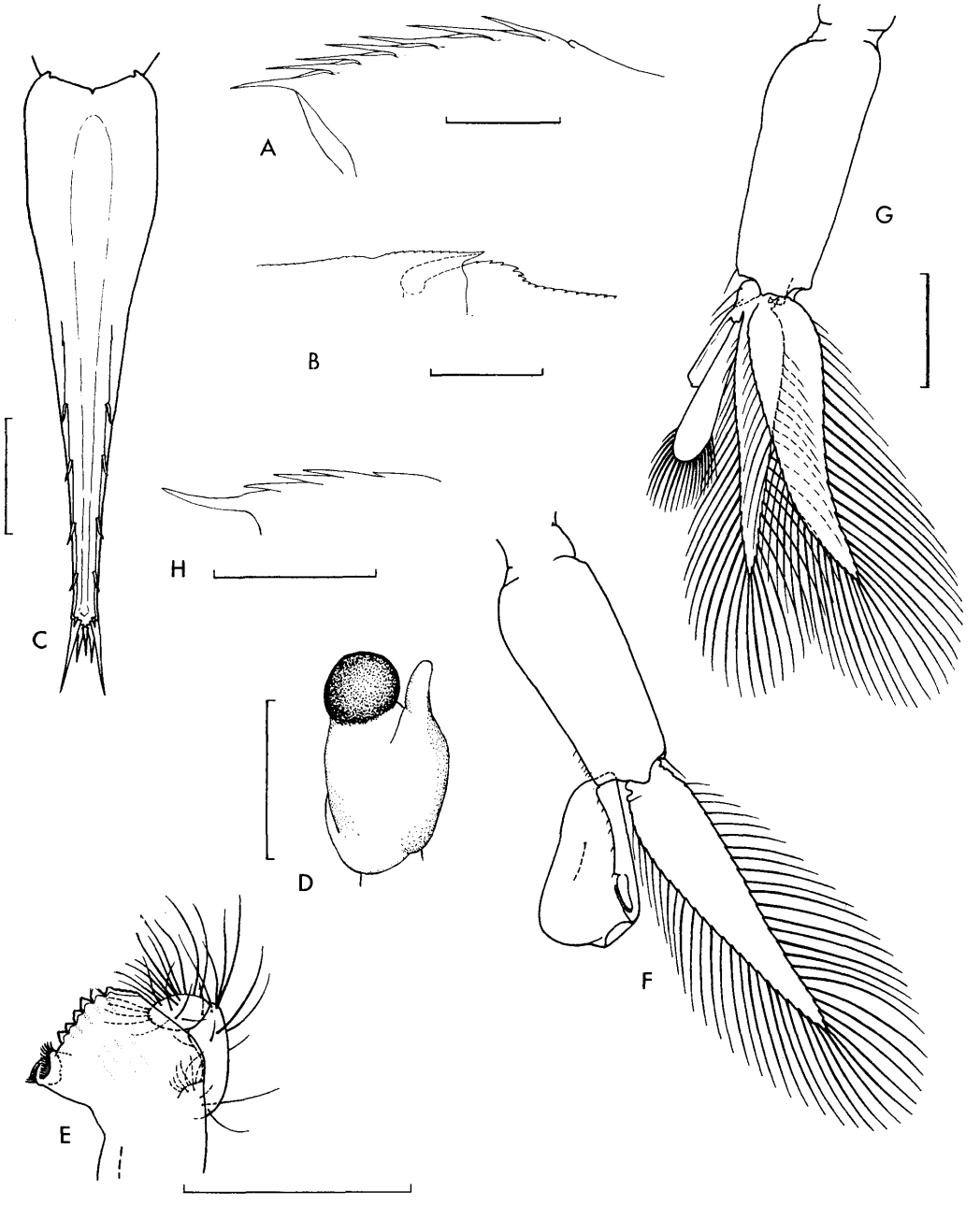

Fig. 2. *Acanthephyra prionota* sp.nov. A, rostrum and anterior part of carapace; B, tooth of 4th abdominal somite and proximal part of 5th; C, telson; D, dorsal view of left eye; E, mandible; F, first pleopod of male; G, second pleopod of male; H, rostrum and anterior part of carapace of a juvenile of 3·7 mm cl. Scales indicate 1 mm.

is not far short of twice the breadth of the cornea. On the inner and upper side the stalk carries a long papilla which reaches to or beyond the cornea itself.

The antennal scale is about three times as long as wide and is narrowed at its distal end. The outer border is slightly convex ending in a slender tooth which extends a little beyond the extremity of the lamella. In the male the swollen basal part of the outer antennal flagellum reaches to the end of the scale. The mouth parts are typical of the genus. The margin above the large teeth of the incisor part of the mandible is simple (Fig. 2E)—not finely serrate as in *Notostomus*. In the maxilla the proximal endite is much shorter than those in advance of it. The endopod of the first maxillipede is formed of three segments and the exopod is rounded distally and does not possess the rudimentary lash found in *Oplophorus* and *Notostomus*.

The carpus of the 2nd pair of legs is longer than is usual in the genus: it is nearly twice the length of that of the 1st pair. The 3rd leg when stretched forwards reaches nearly to the end of the scale. The 4th has a few large spines on the posterior borders of the ischium and merus; in the 5th there are similar spines on the merus in the type, and on the ischium in the second specimen. The dactylus of the 4th pair bears a series of fine spinules; in the 5th the dactylus is greatly reduced and there is a brush of fine setae along the distal half of the propodus. When stretched forward the 5th leg reaches the end of the antennular peduncle. The 4th extends beyond it by the dactylus and nearly half the length of the propodus.

The pleopods show conclusively that the type specimen, although very small, is a fully adult male. The endopod of the 1st pair (Fig. 2F) is broadly oval, somewhat folded distally and with a finger-shaped lobe or process on the inner side. In the 2nd pair the appendix masculina is twice as long as the appendix interna (Fig. 2G); it is expanded distally where it is furnished with about 20 long and finely plumose setae. The outer uropod is rather longer than the 6th somite.

A. prionota, which appears to be adult at a total length of only 26 mm, is the smallest known species of *Acanthephyra*. In the type the carapace is 7·1 mm long; in the second specimen 5·3 mm. The species is readily distinguished from all other members of the genus by the curious serration of the carinae of the 3rd, 4th and 5th abdominal somites. Among the deep-water species with short rostrum and membranous integument it appears to have no close allies. It resembles *A. cucullata*, *A. curtirostris* Wood-Mason and their allies in possessing a dorsal carina on the 2nd abdominal somite, but is distinguished from all of them by the absence of a branchiostegal carina.

Additional notes

Specimens examined by the author ranged in size from 2·8 to 8·9 mm cl. A juvenile of 3·7 mm cl. is of particular interest because the rostrum (Fig. 2H) is noticeably longer than in the adult and points slightly upwards, while the crest is armed with only four teeth. The minimum recorded size of males bearing spermatophores was 6·0 mm cl. and of ovigerous females 7·4 mm cl. A measure of fecundity can be gained from a count of 80 eggs on an individual from which some had already been detached. The eggs are relatively large, measuring $1{\cdot}14 \times 0{\cdot}70 \times 0{\cdot}70$ mm just prior to hatching (P. J. Herring, personal communication).

In freshly caught individuals the body pigmentation is scarlet red, the anterior part of of the carapace being darker. Pigmentation is less intense on the rostral crest, the carinae of the carapace and abdominal segments 2–5, imparting a golden colour to these areas when viewed laterally. The same colour is repeated in the flagellae of antennule and antenna. The cornea of the eye is black.

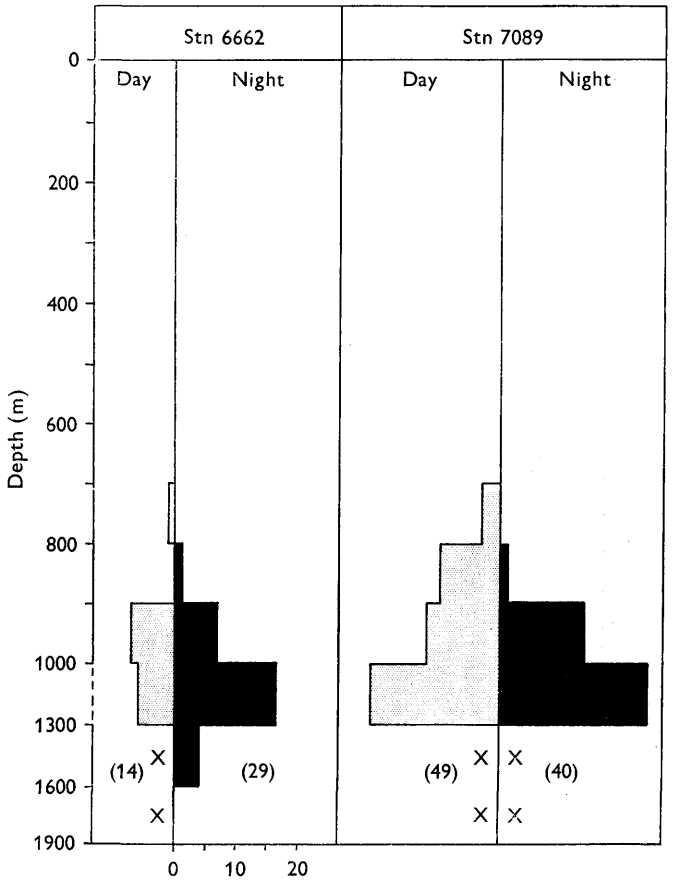

Fig. 3. The day and night depth distributions of *Acanthephyra prionota* sp.nov. at 11° N, 20° W (Stn 6662) and close to the Cape Verde Islands (Stn 7089). Numbers in brackets indicate the day and night total catches. X indicates a depth interval which was not sampled. Note change of depth scale below 1000 m.

Distribution

Kemp first recorded the species on the east coast of Africa to the north of the Mozambique Channel and later from comparable latitudes of the Central Atlantic. To these records can be added those from recent cruises which show its occurrence in the Atlantic as far north as the Cape Verde Islands and also in the central Indian Ocean. Since Kemp only recorded the species at five stations in his examination of an extensive collection covering most latitudes of the world's oceans there is some basis for supposing that this limited data approximates the species latitudinal distribution. The possible extension of the known