

CAMPYLASPIS SPECIES (CRUSTACEA : CUMACEA) FROM THE DEEP ATLANTIC

By N. S. JONES

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SYNOPSIS

Thirty-nine species of *Campylaspis* were collected during a number of cruises, mostly by ships of the Woods Hole Oceanographic Institution, in depths exceeding 200 m in the Atlantic between 1960 and 1969. Twenty-five of these are described as new. A key is included to the 98 species known at the time of writing.

INTRODUCTION

THIS paper deals with the genus *Campylaspis* (family Nannastacidae) from a number of collections made in the deep water of the Atlantic Ocean. Almost all the stations sampled were in depths exceeding 200 m and the great majority of samples were obtained by epibenthic sled dredges (Sanders & Hessler, 1969). Altogether 39 species of *Campylaspis* were collected, of which 25 are described here as new.

A preliminary account of the distribution of the Cumacea from several of these collections has been published (Jones & Sanders, 1972) and also descriptions of a number of new genera and species (Jones, 1973; Reyss, 1974). Reyss (1973) has also discussed the distribution of Cumacea in the deep waters of the Mediterranean.

The material studied was obtained during the following cruises:

Gay Head - Bermuda transect (Woods Hole Oceanographic Institution ships), 1960-69.

'Chain' cruise (WHOI) off Brazil, April 1973.

Dakar - Recife transect ('Atlantis II', WHOI), February 1967.

'Sarsia' cruise (Marine Biological Association) in Bay of Biscay, July 1967.

'Discovery' cruise (National Institute of Oceanography) near the Canary Islands, March 1968.

'Atlantis II' cruise (WHOI) Walvis Bay - Luanda, May 1968.

'Jean Charcot' cruise (Centre Océanologique de Bretagne) in North Atlantic, August-October 1969.

THE GENUS *CAMPYLASPIS*

Including those described in this paper there are now 98 species in the genus *Campylaspis* known to the author. In spite of this rather unwieldy number there

seem to be no grounds at present for splitting the genus, but it may be divided into four main groups according to the sculpture or lack of it on the carapace, with two smaller groups of which one is rather miscellaneous. These are :

1. The *rubicunda*-group with the following 22 species :

alba, nitens, nuda, orientalis, inornata, guttata, pacifica, pulchella, paeneglabra, mauritanica, rubicunda, laevigata, angularis, glabra, bonetti, amblyoda, rufa, kiiensis, thompsoni, similis, roscida, laticarpa.

In this group the carapace is smooth, without lateral depressions, and with at most a pair of low rounded protuberances or with small granulations.

2. The *sulcata*-group with 20 species :

striata, aulacoeis, fusiformis, porcata, canaliculata, granulata, tubulata, pumila, jonesi, latidactyla, sulcata, minor, legendrei, aperta, sticta, echinata, pilosa, redacta, cognata, unisulcata.

In these there is a depression on either side of the carapace. If distinct ridges are present they do not extend to the dorsal hind end of the carapace. Some spines or a few low protuberances may be present but not conical, subcylindrical or rounded tubercles.

3. The *costata*-group with 24 species :

platyuropus, uniplicata, vitrea, pileus, macrophthalma, hartae, sinuosa, undata, johnstoni, ovalis, arcuata, crispa, speciosa, costata, triplicata, umbensis, reticulata, paucispina, caeperata, plicata, valleculeta, exarata, mansa, bicarinata.

These have one or more, usually two or three distinct ridges running horizontally or obliquely backwards on either side of the carapace, of which at least one extends onto the dorsum. Depressions may be present between the ridges but they are not defined posteriorly. Tubercles are not present.

4. The *verrucosa*-group with 24 species :

affinis, serratipes, clavata, thetidis, maculata, sagamiensis, intermedia, horrida, submersa, rubromaculata, papillata, paucinodosa, horridoides, glebulosa, frigida, pustulosa, squamifera, torulosa, verrucosa, aspera, nodulosa, globosa, antarctica, multinodosa.

These have moderate or large numbers of tubercles on the sides and dorsum of the carapace.

5. The *rostrata*-group with four species :

rostrata, rostellata, aculeata, brevicornis.

This is a small group in which the pseudorostrum is prominent and enlarged.

6. The *spinosa*-group with four species :

spinosa, rupta, quadriplicata, bulbosa.

These four species have little in common but do not fit into any other group.

The key which follows is based on that of Hale (1945) with some alterations, but is greatly enlarged to include more than twice the original number of species. The shape and markings of the carapace, including the eyelobe and the pseudorostrum, are the most important characters for identification, followed by the relative proportions and armature of the second and third maxillipeds, second pereopods and

uropods. Most characters can be seen under a stereo-microscope without dissection but when it is necessary to examine the second maxillipeds it is usually necessary to remove one and to examine it under a magnification of at least $\times 50$. Unfortunately not all the important characters have been described or figured for a number of species and identification is not always easy, especially in the *rubicunda*-group, where carapace markings are of little help, and sometimes where the key depends on relative lengths of appendages or their segments. In case of doubt a more complete dissection of appendages may be needed and the original descriptions consulted. Undoubtedly many species in the genus remain as yet undescribed.

KEY TO THE SPECIES OF *CAMPYLASPIS*

1	Carapace smooth, without tubercles, spines, ridges or lateral grooves	2
	Carapace with tubercles, spines or ridges, or at least a shallow groove on either side	21
2	Eyelobe small and rudimentary	3
	Eyelobe of normal size	5
3	Inner edge of merus of maxilliped 3 not serrated	<i>alba</i> Hansen, 1920
	Inner edge of merus of maxilliped 3 serrated	4
4	Dactyl of pereopod 2 broad and little tapered	<i>nitens</i> Bonnier, 1896
	Dactyl of pereopod 2 narrow and tapering	<i>nuda</i> sp. nov.
5	Dorsal outline of carapace a little uneven	<i>pacifica</i> Sars, 1887
	Dorsal outline of carapace smoothly rounded	6
6	Eye without lenses	7
	Eye with lenses visible	9
7	Maxilliped 3 with ischium, merus, carpus and propodus strongly serrated	<i>paeneglabra</i> Stebbing, 1912
	Maxilliped 3 without conspicuous serrations	8
8	Basis of maxilliped 3 much longer than remaining segments together	<i>orientalis</i> Calman, 1911
	Basis of maxilliped 3 shorter than the remaining segments together	<i>inornata</i> Jones, 1969
9	Uropods at least nearly as long as the last three pleon somites together	10
	Uropods much shorter than the last three pleonites together	<i>guttata</i> sp. nov.
10	Exopod of uropod a little longer than endopod	<i>pulchella</i> Sars, 1871
	Exopod of uropod not longer than endopod	11
11	Dactyl of pereopod 2 at least as long as carpus and propodus together	12
	Dactyl of pereopod 2 shorter than carpus and propodus together	17
12	Dactyl of pereopod 2 longer than the carpus and propodus together	13
	Dactyl of pereopod only as long as the carpus and propodus together	15
13	Distal seta of ischiobasis of maxilliped 2 swollen distally	<i>mauritanica</i> Bacescu & Muradian, 1972
	Distal seta of ischiobasis of maxilliped 2 normally tapered	14
14	Peduncle of the uropod twice as long as the endopod	<i>rubicunda</i> (Lilljeborg, 1855)
	Peduncle of uropod less than twice as long as the endopod	<i>laevigata</i> sp. nov.
15	Merus of maxilliped 3 narrow, its carpus and propodus not serrated	<i>angularis</i> Gamô, 1960
	Merus of maxilliped 3 broad, its carpus and propodus serrated	16
16	Basis of pereopod 2 nearly half the total length of the appendage	<i>bonetti</i> Bacescu & Muradian, 1972
	Basis of pereopod 2 little more than a third of the total length	<i>amblyoda</i> Gamô, 1960
17	Dactyl of maxilliped 2 with two or three spines	18
	Dactyl of maxilliped 2 with four spines	19

- 18 Dactyl of pereopod 2 little tapered. Terminal seta of ischiobasis of maxilliped 2 slender *glabra* Sars, 1879
 Dactyl of pereopod 2 normally tapered. Terminal seta of ischiobasis of maxilliped 2 thickened *rufa* Hart, 1930
- 19 Antennal notch deep *kiiensis* Gamô, 1960
 Antennal notch shallow 20
- 20 Carpus of pereopod 1 barely longer than propodus *thompsoni* Hale, 1945
 Carpus of pereopod 1 much longer than propodus *similis* Hale, 1945
- 21 Carapace with lateral furrows or ridges but without spines, tubercles or other large prominences 22
 Carapace may or may not have furrows but also at least a pair of tubercles or many spines or large prominences, which may or may not form lateral ridges 54
- 22 Either side of the carapace with a faint groove which is not margined above or below by a distinct ridge or fold 23
 Either side of the carapace with at least one well-formed ridge or fold 31
- 23 Carapace with three dorso-lateral striations on either side of the mid-line *striata* Gamô, 1960
 Carapace without dorso-lateral striations 24
- 24 Dactyl of pereopod 2 blunt ended and not tapering in distal half 25
 Dactyl of pereopod 2 tapering to a narrower distal end 29
- 25 Carapace with small granules above and below the faint lateral grooves *granulata* Gamô, 1960
 Carapace without granules 26
- 26 Dactyl of pereopod 2 with robust flattened terminal setae *porcata* sp. nov.
 Dactyl of pereopod 2 with short terminal setae 27
- 27 Groove at side of carapace scarcely reaches into posterior half *canaliculata* Zimmer, 1936
 Groove at side of carapace extends well into posterior half 28
- 28 Basis of maxilliped 3 much less than half as long as rest of appendage *aulacoeis* Le Loeuff & Intes, 1972
 Basis of maxilliped 3 much more than half as long as rest of appendage *fusiformis* Gamô, 1960
- 29 Dactyl of pereopod 2 sharply tapered, with short terminal setae *unisulcata* Hale, 1945
 Dactyl of pereopod 2 moderately tapered, with a long end spine 30
- 30 Groove at side of carapace scarcely reaching into posterior half *tubulata* Fage, 1945
 Groove at side of carapace broadened posteriorly in female, reaching well into posterior half in male *pumila* Gamô, 1960
- 31 Carapace with four irregular, subrectangular, depressed areas on either side, bordered by prominent folds *rupta* Hale, 1945
 Carapace not so sculptured, with carinae on either side subparallel 32
- 32 Carapace with one oblique ridge on either side 33
 Carapace with more than one ridge on either side 34
- 33 Peduncle of uropod very broad and only a little longer than the endopod *platyuropus* Calman, 1911
 Peduncle of uropod slender, three times as long as endopod *uniplicata* Hale, 1945
- 34 Two oblique carinae arising anteriorly and extending for greater part of length of carapace on either side 35
 Three or more oblique carinae extending similarly on carapace 49
- 35 Pseudorostrum long, at least a sixth of the total carapace length 36
 Pseudorostrum shorter, less than a sixth of the total carapace length 37
- 36 Pseudorostrum turned up at an angle to the line between its hind end and the hind end of the carapace *vitrea* Calman, 1906
 Pseudorostrum not turned up *pileus* Foxon, 1932
- 37 Eyelobe of normal size, with lenses 38
 Eyelobe small or absent, without lenses 46

- 38 Eyelobe linguiform, narrow and dilated distally *macrophthalmia* Sars, 1879
 Eyelobe not linguiform, broad at base 39
- 39 Pseudorostrum turned up at a distinct angle to dorsum of carapace *hartae* Lie, 1969
 Pseudorostrum little or not turned up 40
- 40 Peduncle of the uropods not more than one-and-a-half as long as the endopod 41
 Peduncle of the uropods more than one-and-a-half as long as the endopod 42
- 41 Uropods shorter than the last three pleonites together *sinuosa* Gamô, 1960
 Uropods as long as the last three pleonites together *jonesi* Bacescu & Muradian, 1972
- 42 Dactyl of pereopod 2 shorter than the carpus *undata* Sars, 1865
 Dactyl of pereopod 2 longer than the carpus 43
- 43 Dactyl of pereopod 2 not tapered and ending in a short articulated process
latidactyla Hale, 1945
 Dactyl of pereopod 2 tapered, without an articulated process 44
- 44 Dactyl of pereopod 2 with no terminal setae *sulcata* Sars, 1870
 Dactyl of pereopod 2 ending in setae 45
- 45 Sulcus on side of carapace undivided *minor* Hale, 1945
 Sulcus divided by a short vertical ridge *legendrei* Fage, 1951
- 46 Dactyl of pereopod 2 as long as the carpus and propodus together 47
 Dactyl of pereopod 2 only as long as the carpus *aperta* Lomakina, 1958
- 47 Merus and propodus of maxilliped 3 unserrated *johnstoni* Hale, 1937
 Merus and propodus of maxilliped 3 serrated 48
- 48 Ridges at side of carapace well separated and extending to hind end *ovalis* Stebbing, 1912
 Ridges at side of carapace closer together and not reaching hind end *sticta* sp. nov.
- 49 Carapace much elevated dorsally. Dactyl of pereopod 2 not tapered, without
 terminal spines or setae *arcuata* sp. nov.
 Carapace not much elevated. Dactyl of pereopod 2 tapered, with terminal spines or
 setae 50
- 50 Uropod distinctly longer than the last two pleonites together, its endopod not very
 broad 51
 Uropod not longer than the last two pleonites together, its endopod broad
crispa Lomakina, 1955
- 51 Lower lateral ridge on carapace branched 52
 Lower lateral ridge on carapace unbranched 53
- 52 Upper horizontal ridge on carapace joined to ridge below by a short vertical ridge
 near the front *speciosa* Lomakina, 1955
 These two ridges not joined in front by a vertical ridge *costata* Sars, 1865
- 53 Dactyl of pereopod 2 as long as the carpus and propodus together *triplicata* Hale, 1945
 Dactyl of pereopod 2 much longer than the carpus and propodus together
umbensis Gurwitsch, 1939
- 54 Carapace with many spines 55
 Carapace with few or no spines 59
- 55 Carapace with a depression on either side 56
 Carapace without a depression 57
- 56 Lateral depression deep. Carapace with long hairs dorsally and large reticulations
 behind the groove *reticulata* Gamô, 1960
 Lateral depression shallow. Carapace without hairs or reticulations *echinata* Hale, 1945
- 57 Pseudorostrum long and prominent. Only small spines present on carapace 58
 Pseudorostrum short and strongly upturned. Some stout spines present
spinosa Calman, 1906
- 58 Spines confined to dorsum of carapace. Dactyl of pereopod 2 shorter than carpus
rostellata sp. nov.
 Spines covering whole of carapace. Dactyl of pereopod 2 longer than carpus
aculeata sp. nov.

- 78 Pseudorostrum relatively long and prominent. Tubercles on carapace few and large
rostrata Calman, 1905
Pseudorostrum shorter and not prominent. Tubercles on carapace small and
numerous *thetidis* Hale, 1945
- 79 Merus of maxilliped 3 at least one-and-a-half as long as the carpus 80
Merus of maxilliped 3 very little longer than the carpus *maculata* Zimmer, 1907
- 80 Dactyl of pereopod 2 not longer than the carpus 81
Dactyl of pereopod 2 distinctly longer than the carpus 86
- 81 Tuberculate ridges at sides and lower edges of carapace joined near front by a small
vertical ridge, enclosing a smooth quadrilateral area *clavata* Lomakina, 1952
No smooth quadrilateral area at sides of carapace 82
- 82 Merus of maxilliped 3 very long, three times as long as the carpus *sagamiensis* Gamô, 1967
Merus of maxilliped 3 shorter, less than twice as long as the carpus 83
- 83 Sides of carapace with three folds, the two uppermost bearing large rounded tubercles
intermedia Hansen, 1920
Side of carapace with two ridges, formed of conical tubercles 84
- 84 Uropod as long as last three pleonites together *horrida* Sars, 1870
Uropod only as long as last two pleonites together 85
- 85 Carapace with many tubercles. Merus and carpus of maxilliped 3 dentate
papillata Lomakina, 1952
Carapace with comparatively few tubercles. Merus and carpus of maxilliped 3 not
dentate *paucinodosa* sp. nov.
- 86 Peduncle of uropod less than one-and-a-half as long as the endopod 87
Peduncle of uropod more than one-and-a-half as long as the endopod 89
- 87 Merus and carpus of maxilliped 3 without teeth *submersa* sp. nov.
Merus and carpus of maxilliped 3 dentate 88
- 88 Posterior pereonites and anterior pleonites each with a pair of dorso-lateral tubercles
squamifera Fage, 1929
Pereon and pleon without dorso-lateral tubercles *torulosa* sp. nov.
- 89 Pereopod 2 comparatively stout. Outer edge of merus and carpus of maxilliped 3
without teeth *rubromaculata* Lie, 1969
Pereopod 2 slender. Outer edge of merus and carpus of maxilliped 3 strongly
dentate 90
- 90 Uropods longer than the last three pleonites together, the peduncle much more than
twice as long as the endopod *horridoides* Stephensen, 1915
Uropods only as long as the last two pleonites together, the peduncle much less
than twice as long as the endopod *glebulosa* sp. nov.
- 91 Merus of maxilliped 3 triangular, expanded distally and as wide as long
frigida Hansen, 1908
Merus of maxilliped 3 oblong, never as wide as long 92
- 92 Merus of maxilliped 3 unusually slender, about three times as long as wide
pustulosa Hale, 1945
Merus of maxilliped 3 not more than twice as long as wide 93
- 93 Merus of maxilliped 3 as long as carpus and propodus together 94
Merus of maxilliped 3 much shorter than carpus and propodus together 95
- 94 Tubercles on carapace low and rounded *verrucosa* Sars, 1865
Tubercles on carapace conical and protruding *aspera* Hale, 1945
- 95 Pleon somites without dorsal teeth, at most with feeble tubercles on the first three. 96
Pleon somites with dorsal teeth 97
- 96 A depressed area on either side of the carapace. Merus of maxilliped 3 triangularly
expanded on inner side. Dactyl of pereopod 2 longer than carpus *globosa* Hansen, 1920
No depressed area on sides of carapace. Merus of maxilliped 3 not expanded on
inner side. Dactyl of pereopod 2 barely as long as carpus *nodulosa* Sars, 1887

- 97 Carpus of maxilliped 3 dentate on outer side. Dactyl of pereopod 2 longer than carpus and propodus together *antarctica* Calman, 1907
 Carpus of maxilliped 3 not dentate on outer side. Dactyl of pereopod 2 shorter than carpus and propodus together *multinodosa* sp. nov.

DESCRIPTIONS AND RECORDS

Genus *CAMPYLASPIS* G. O. Sars, 1865

Five pereon somites visible from above. Carapace strongly vaulted in the female, where it often bulges over the anterior pereon somites. Antero-lateral angles of carapace little or not at all produced. Eye unpaired and often rudimentary. Mandible with the molar process styliform. The second maxilla reduced to a simple plate without movable endites. The first maxilliped reduced with only three segments, the terminal very small. Second maxilliped with the propodus articulated at nearly a right-angle to the carpus and ending in a broad seta, the dactyl short and ending in two or more distal diverging spines. The first pereopod with the ischium not specially elongated.

Campylaspis alba Hansen, 1920

MATERIAL. 43°40·8'N, 3°35·2'W, 1739 m, 16.7.1967, 2 ♀♀; 28°06'N, 13°28'W, 1780 m, 15.3.1968, 2 ♀♀, 2 juv.

DISTRIBUTION. Previously recorded only from southwest of the Faroes, 840-918 m, and possibly from west of Ireland (Hansen, 1920), its range is now extended to the Bay of Biscay and the Canary Islands and its lower limit to 1780 m.

Campylaspis nitens Bonnier, 1896

MATERIAL. 43°35·6'N, 3°24·8'W, 860 m, 15.7.1967, 2 ♀♀; 43°46·7'N, 3°38'W, 2379 m, 18.7.1967, 5 ♀♀, 3 ♂♂; 43°43'N, 3°47·8'W, 641 m, 19.7.1967, 54 ♀♀, 3 ♂♂, 14 juv.; 27°29·8'N, 15°20·1'W, 2351 m, 18.3.1968, 1 ♀; 27°14·9'N, 15°36·3'W, 2988 m, 19.3.1968, 1 ♂; 07°09'S, 34°25·5'W-07°08'S, 34°25'W, 770-805 m, 6.4.1963, 1 ♀; 7°58'S, 34°22'W, 834-939 m, 18.2.1967, 1 ♂.

DISTRIBUTION. Previously recorded from the Bay of Biscay and west of Ireland (Calman, 1905) but the latter was probably *C. alba* (see Hansen, 1920), 570-950 m. Its range is now extended to the Canary Islands and the tropical west Atlantic and its lower limit to 2988 m.

Campylaspis nuda sp. nov.

(fig. 1)

MATERIAL. 07°58'S, 34°17'W-07°50'S, 34°17'W, 943-1007 m, 20.2.1967, 4 ♀♀, 3 ♂♂; 08°03'S, 34°23'W-08°02'S, 34°25'W, 587 m, 21.2.1967, 15 ♀♀, 13 ♂♂.

DESCRIPTION. Adult female, length 3·8 mm: carapace (fig. 1a, b) smooth and vaulted, evenly rounded dorsally, projecting backwards over the first three pereonites, about one-and-a-half as long as high, more than half the total body length without

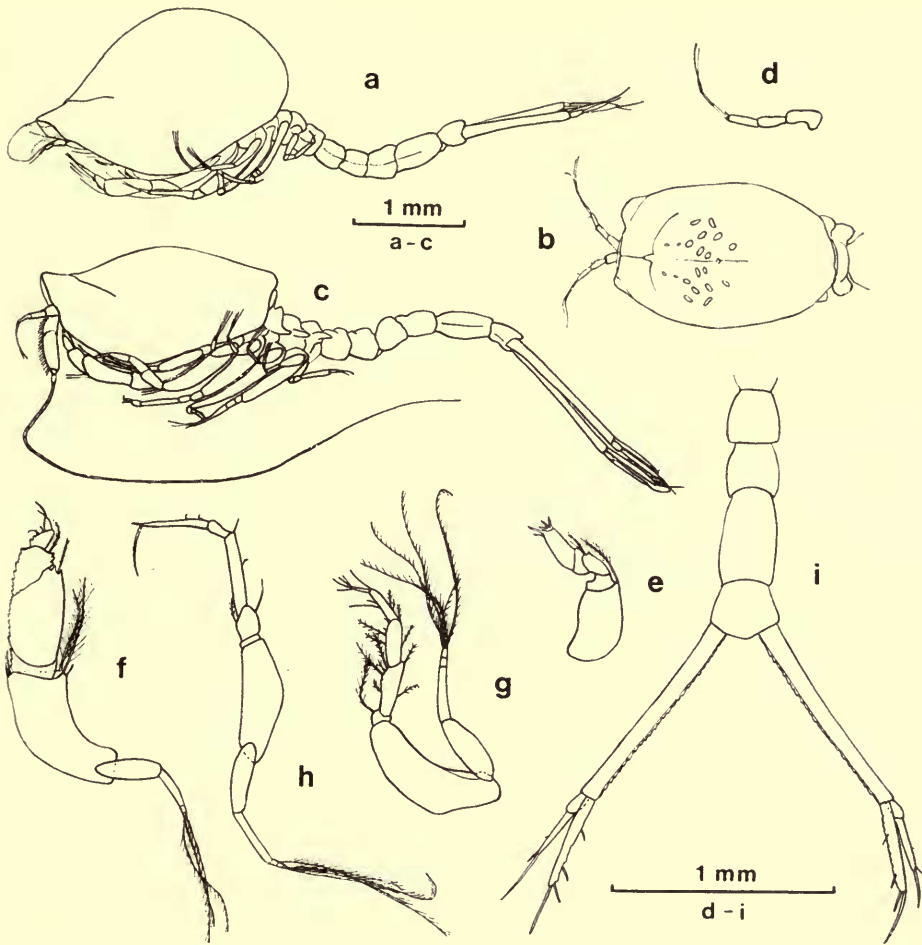


FIG. 1. *Campylaspis nuda*. a, ♀ from side; b, ♀ carapace from above; c, ♂ from side; d, ♀ antenna 1; e, ♀ maxilliped 2; f, ♀ maxilliped 3; g, ♀ pereopod 1; h, ♀ pereopod 2; i, ♀ uropod and end of pleon.

appendages. The pseudorostrum is fairly acute, slightly downturned and less than a sixth of the total carapace length. The eyelobe is short and rudimentary.

The first antenna (fig. 1d) has the three segments of the peduncle about equal in length.

The second maxilliped (fig. 1e) has the dactyl prolonged into three nearly equal spines; the merus with a tooth. The third maxilliped (fig. 1f) broad, the ischium, merus, carpus and propodus serrated on the inner edge, the merus and carpus also on the outer edge distally; the basis much curved, a little shorter than the remaining segments together.

The first pereopod (fig. 1g) with the basis about as long as the remaining segments together. The second pereopod (fig. 1h) with the dactyl distinctly shorter than the carpus; its basis is more than half as long as the remainder of the appendage.

Uropods (fig. 1i) long, about as long as the last five pleon somites together, the endopod less than half as long as the peduncle, which is serrated on its inner edge; the endopod is also somewhat serrated and has two spines on the inner edge and two unequal end spines.

Adult male, length 4.0 mm (fig. 1c): differing from the female in the usual manner, with the carapace less vaulted and less produced backwards over the pereonites. The second antenna with a long flagellum reaching beyond the end of the body. The uropods relatively longer and with more setae and spines.

TYPE LOCALITY. 08°03'S, 34°23'W, 587 m. Types deposited at the British Museum (Natural History). Registration numbers: Holotype 1974:283; Paratypes 1974:284.

REMARKS. *C. nuda* resembles *C. nitens* and *C. alba* in having a smooth carapace with rudimentary eyelobe but differs from either of these species in the shape of the merus of maxilliped 3, which is serrated internally but broader than in *C. nitens*. The dactyl of pereopod 2 is narrower than that of *C. nitens*. All other described species of *Campylaspis* with a smooth carapace have the eyelobe well developed, although lenses have not always been distinguished, as is the case with *C. paeneglabra* Stebbing. The latter species has a much longer dactyl of pereopod 2 compared with the carpus. *C. laevigata* sp. nov. following has a reasonably well-developed eyelobe with lenses visible and the dactyl of maxilliped 2 ends in four spines instead of three. *C. guttata* sp. nov. following also has a well-developed eyelobe with lenses, while the shape and proportions of its appendages differ considerably; in particular the uropods are very much shorter.

Recorded at present off Recife, Brazil, in depths between 587 and 1007 m.

Campylaspis guttata sp. nov.

(fig. 2)

MATERIAL. 23°05'S, 12°31.5'E, 1546-1559 m, 17.5.1968, 2 ♀♀; 9°43.5'S, 10°57'E-9°29'S, 11°34'E, 2644-2754 m, 22.5.1968, 1 ♀.

DESCRIPTION. Adult female, length 3.7 mm: carapace (fig. 2a, b) smooth, rounded dorsally, less than one-and-a-half as long as high, antero-lateral angles rounded and not produced. Pseudorostrum blunt and less than a seventh of the total carapace length. Eyelobe well developed with lenses faintly visible. A number of small irregular reddish pigment spots are present, mainly postero-laterally but some on the frontal area.

Antenna 1 (fig. 2c) with the first segment of the peduncle stout and elbowed, a little longer than the second, which is slightly longer than the third.

Maxilliped 2 (fig. 2d) with three spines on the dactyl, the middle one short; the carpus and propodus each with a small tooth on the inner edge; the terminal seta of the ischiobasis is thickened apically. Maxilliped 3 (fig. 2e) with the basis longer than the rest of the appendage, of which none of the segments is serrated; the merus and carpus are not widened.

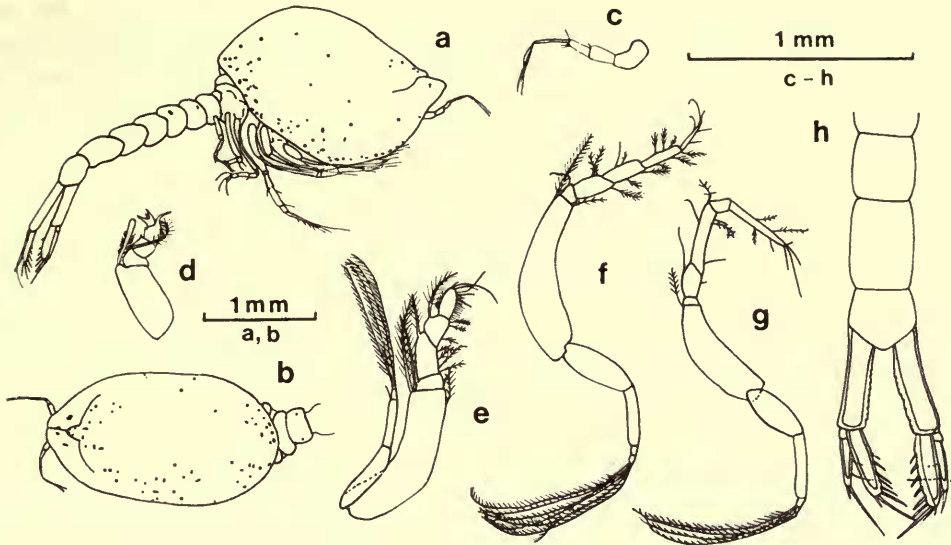


FIG. 2. *Campylaspis guttata* ♀. a, from side; b, carapace from above; c, antenna 1; d, maxilliped 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, uropod and end of pleon.

Pereopod 1 (fig. 2f) with the basis about as long as the rest of the appendage. Pereopod 2 (fig. 2g) with the basis more than half as long as the remaining segments together; the dactyl is about as long as the carpus.

Uropods (fig. 2h) short and broad, much shorter than the last three pleonites together, the peduncle less than one-and-a-half as long as the endopod and serrated along its inner edge; the endopod with six spines on the inner edge and two end spines, one much the longer.

TYPE LOCALITY. 23°05'S, 12°31.5'E, 1546–1559 m. Types deposited at the British Museum (Natural History). Registration numbers: Holotype 1974: 285; Paratype 1974: 286.

REMARKS. *C. guttata* is readily distinguished from other described species of the genus with a smooth carapace by its comparatively short uropods, which in all the others have the peduncle at least nearly as long as the last two pleonites together and in *C. guttata* is much shorter than these, and proportionately about as short as in *C. platyuropus* Calman. The latter has a ridge on either side of the carapace.

Three specimens have been collected off S.W. Africa.

Campylaspis rubicunda (Lilljeborg, 1855)

MATERIAL. 39°58.4'N, 70°40.3'W, 300 m, 28.8.1962, 1 juv.; 39°46.5'N, 70°43.3'W, 1470–1330 m, 25.8.1964, 1 ♀, 3 ♂♂; 40°1.6'N, 70°40.7'W, 196 m, 6.7.1965, 3 ♀♀, 5 ♂♂; 39°38.5'N, 70°36.5'W–39°39'N, 70°37.1'W, 2178 m, 18.12.1966, 1 ♀.

DISTRIBUTION. There have been many records from the N.E. Atlantic between Norway and the British Isles, from the Arctic, from the N.W. Atlantic between Greenland and New England and from the Okhotsk Sea in the North Pacific, at depths between 9 and 1977 m. The lower limit is now extended to 2178 m but it is essentially an inhabitant of the shelf and slope.

Campylaspis laevigata sp. nov.

(fig. 3)

MATERIAL. 47°40'N, 5°0'W, 119 m, 12.7.1967, 1 ♀, 1 ♂; 43°43'N, 3°47.8'W, 641 m, 19.7.1967, 1 ♀, 1 ♂; 46°17.5'N, 4°45.2'W, 1336 m, 24.7.1967, 3 ♀♀, 3 ♂♂; 46°16.3'N, 4°44'W, 1427 m, 25.7.1967, 1 ♀, 1 ♂; 22°54'S, 13°32'E, 205 m, 15.5.1968, 1 ♀, 3 juv.; 22°53'S, 13°31'E, 220 m, 16.5.1968, 4 ♀♀.

DESCRIPTION. Adult female, length 2.8 mm: carapace (fig. 3a, b) smooth, almost evenly rounded dorsally, a little less than twice as long as high, antero-lateral angles slightly produced. Pseudorostrum rather short, fairly acute, about a seventh of the total carapace length. Eyelobe well developed with lenses visible.

Antenna 1 (fig. 3c) with the first segment of the peduncle rather bent, distinctly longer than the second or third, which are nearly equal.

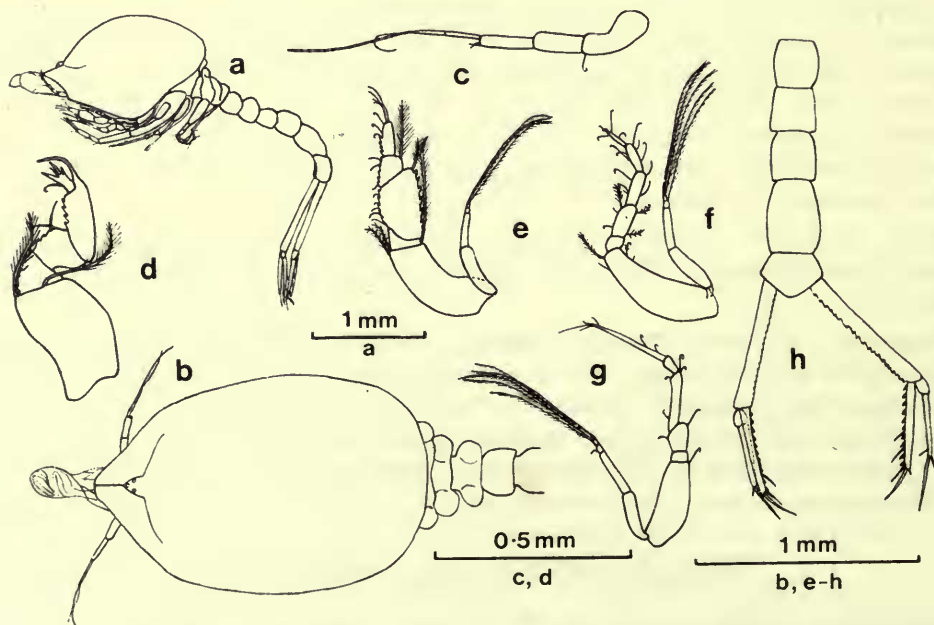


FIG. 3. *Campylaspis laevigata* ♀. a, from side; b, carapace and pereon from above; c, antenna 1; d, maxilliped 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, uropod and end of pleon.

Maxilliped 2 (fig. 3d) with the propodus rather long, ending in a long flattened seta; the dactyl with four spines; merus, carpus and propodus serrated along their inner edges. Maxilliped 3 (fig. 3e) with the basis distinctly shorter than the remaining segments together; the merus serrated on its outer edge and merus, carpus and propodus on the inner edge; propodus and dactyl narrow.

Pereopod 1 (fig. 3f) with the basis slightly shorter than the remaining segments together. Pereopod 2 (fig. 3g) with the basis less than half as long as rest of appendage; dactyl narrow, longer than the carpus and propodus together.

Uropods (fig. 3h) longer than the last four pleonites together, the endopod much more than half as long as the peduncle, serrated internally, with three spines on its inner edge and a long end spine.

TYPE LOCALITY. 47°40'N, 5°0'W, 119 m. Types deposited at the British Museum (Natural History). Registration numbers: Holotype 1974:287; Paratypes 1974:288.

REMARKS. *C. laevigata* resembles *C. bonetti* Bacescu & Muradian in having a smooth carapace and well-developed eyelobe with lenses and four spines on the dactyl of maxilliped 2 but the shape of the latter is rather different and the dactyl of pereopod 2 is proportionately longer. It also resembles in most respects *C. paeneglabra* Stebbing but the dactyl of maxilliped 2 in that species has only two spines according to Stebbing (1912) and its carapace has a few slight prominences. From *C. mauritanica* Bacescu & Muradian it differs in the shape of maxilliped 2 and especially that of the distal seta of the ischiobasis, which is not swollen nor tufted towards its tip. The endopod of the uropod is proportionately longer than in *C. rubicunda* Sars. The species with a smooth carapace described in Hale (1945) and Gamô (1960) all have the dactyl of pereopod 2 shorter than the carpus and propodus together.

Twenty specimens were collected in the Bay of Biscay and also off S.W. Africa between 119 and 1427 m.

Campylaspis glabra G. O. Sars, 1879

MATERIAL. 38°46'N, 70°06'W, 2886 m, 21.8.1964, 1 ♀.

DISTRIBUTION. Many specimens have been recorded from the N.E. Atlantic from Norway to Senegal in West Africa and in the Mediterranean. It has also been recorded by Fage (1945) from Vietnam but this identification, based on a single adult male, may be regarded as doubtful, as may also my own record from Senegal based on two males. The depth range was from 5 to 2827 m. The present record extends its range to the N.W. Atlantic and the lower depth range slightly to 2886 m. Like *C. rubicunda* it is an inhabitant of the shelf and slope, with a broadly overlapping but more southerly distribution.

Campylaspis porcata sp. nov.

(fig. 4)

MATERIAL. 40°37'N, 70°50'W-40°34'N, 70°51'W, 68 m, 27.11.1967, 82 ♀♀, 20 ♂♂, 3 juv.; 40°10.8'N, 70°43.6'W-40°10.6'N, 70°44'W, 123 m, 28.11.1967, 1 ♀.

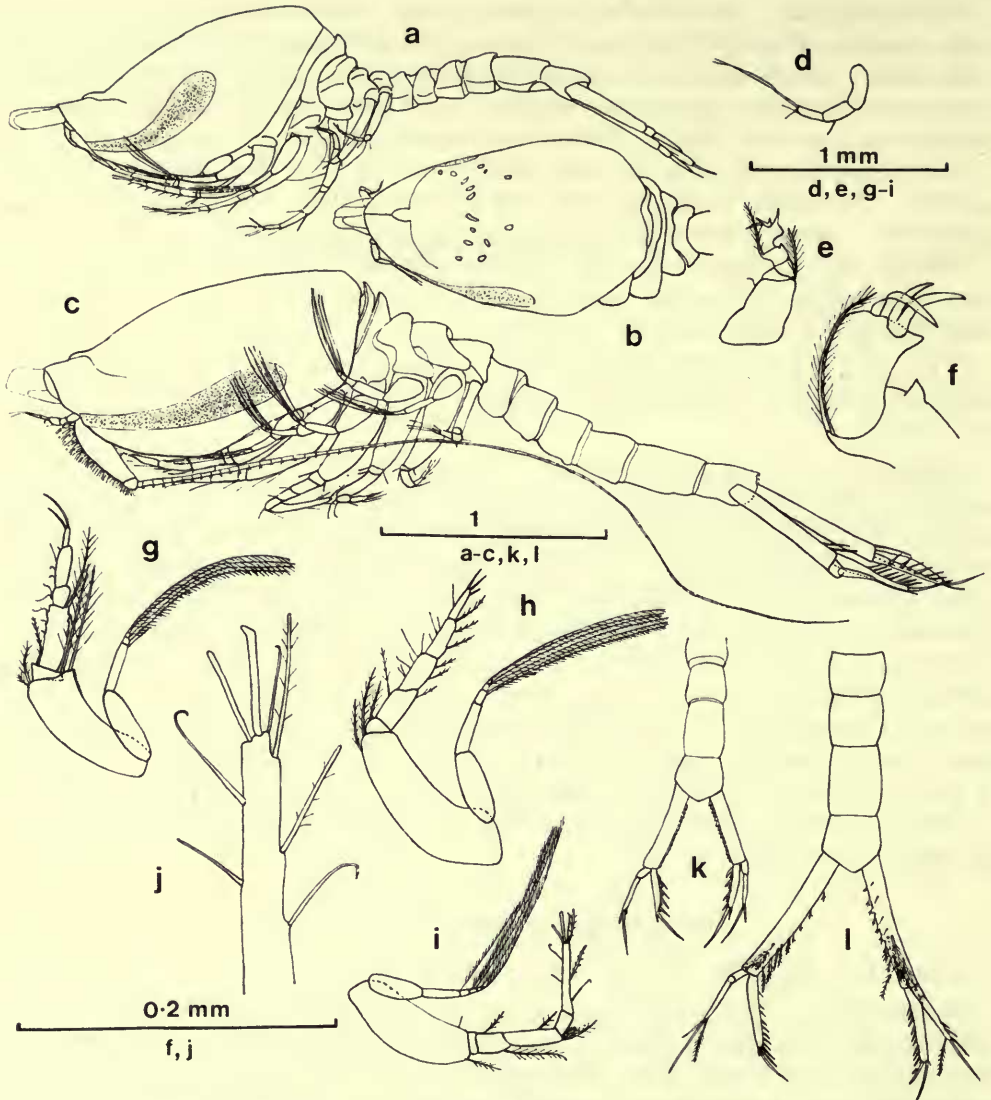


FIG. 4. *Campylaspis porcata*. a, ovigerous ♀ from side; b, ♀ from above; c, ♂ from side; d, ♀ antenna I; e, f, ♀ maxilliped 2; g, ♀ maxilliped 3; h, ♀ pereopod I; i, j, ♀ pereopod 2; k, ♀ uropod and end of pleon; l, ♂ uropod and end of pleon.

DESCRIPTION. Ovigerous female, length 2.3 mm: carapace (fig. 4a, b) twice as long as high, with on either side a narrow sulcus becoming a little broader towards its upper end; the dorsal surface is smooth in outline and little produced backwards. The pseudorostrum is a little less than a sixth of the total carapace length, with barely a trace of antennal notch below. The eyelobe is well developed but lenses

are not visible in the preserved specimens although they seem likely to be present.

Antenna 1 (fig. 4d) with the basal segment of the peduncle about one-and-a-half as long as the distal segment.

Maxilliped 2 (fig. 4e, f) with the ischiobasis broad proximally, its apical seta slender and not very long; the carpus and propodus each with a tooth and the dactyl with three rather long fragile spines, of which the middle is a little shorter than those on either side. Maxilliped 3 (fig. 4g) with the basis a little shorter than the rest of the appendage; ischium with an apical tooth; merus long and narrow and serrated on either edge.

Pereopod 1 (fig. 4h) with the basis about as long as the following segments combined. Pereopod 2 (fig. 4i) with the basis little more than two-thirds as long as the rest of the appendage; dactyl as long as the carpus and propodus together, ending in three spines of which two are rather stout (fig. 4j).

Uropod (fig. 4k) fairly short, shorter than the last three pleonites together; endopod more than half as long as the peduncle, which is strongly serrated along its inner edge and a little longer than the exopod; it has four spines with some serrations interspersed along the inner edge and two unequal end spines.

Adult male, length 3.2 mm (fig. 4c, l): differs from the female in the usual manner. The flagellum of antenna 2 reaches to the end of the uropods.

TYPE LOCALITY. 40°37'N, 70°50'W-40°34'N, 70°51'W, 68 m. Types are deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 289; Paratypes 1974: 290.

REMARKS. *C. porcata* resembles several other species in having a rather narrow sulcus on either side. These include *C. canaliculata* Zimmer, *C. unisulcata* Hale, *C. pumila* Gamô and *C. jonesi* Bacescu & Muradian but it differs from all these in the shape of the sulcus, which in none of the other species is narrow anteriorly and wider posteriorly. *C. porcata* differs from other sulcate species in the proportions of some of the appendages and especially in the armature of the dactyl of pereopod 2.

It seems possible that Calman's record of *C. affinis* (Calman, 1912), which he describes as differing from Sars' account in having on either side a shallow oblique depression and which he refers to *C. affinis* with considerable doubt, should be referred to *C. porcata*. They were found off Marthas Vineyard in 66-71 m in the same area as this species.

Many specimens were obtained off Gay Head in 68-123 m.

Campylaspis vitrea Calman, 1906

MATERIAL. 43°43'N, 3°47-8'W, 641 m, 19.7.1967, 7 ♀♀, 2 ♂♂, 16 juv.

DISTRIBUTION. Previously recorded from the Mediterranean south of Sardinia and near Capri, 950-1100 m and 1227 m, and doubtfully by Calman (1912) from the coast of Labrador in 985 m. The present record from the Bay of Biscay extends its upper depth range to 641 m and shows that it certainly occurs outside as well as within the Mediterranean.

Campylaspis macrophthalma G. O. Sars, 1879

MATERIAL. 47°40'N, 5°0'W, 119 m, 12.7.1967, 5 ♀♀.

DISTRIBUTION. Recorded from the Mediterranean between Monaco and the Straits of Messina and from Île d'Yeu in the Bay of Biscay, 38–200 m. The present record extends its range a little further to the north. This species is probably confined to the shelf.

Campylaspis sticta sp. nov.

(fig. 5)

MATERIAL. 23°0'S, 12°45'E, 1007–1014 m, 16.5.1968, 7 ♀♀.

DESCRIPTION. Adult female, length 3.3 mm : carapace (fig. 5a, b) more than twice as long as high, not at all produced over the pereon somites, with a well-defined groove on either side bounded by distinct ridges ; the dorsal outline is well elevated and smooth and apart from two small protuberances on the frontal area there are no spines or other prominences. The pseudorostrum is rather upturned, less than a fifth of the total carapace length, with no trace of an antennal notch below. The eyelobe is fairly large but without lenses. The carapace, pereon and pleon, and most of the appendages have many small scattered red blotches of pigment.

Antenna 1 (fig. 5c) with the basal segment of the peduncle strongly curved, little longer than either of the more distal segments.

Maxilliped 2 (fig. 5d) with the ischiobasis long ; carpus with two teeth on its inner edge ; propodus ending in a slender spine and dactyl with four slender spines, of

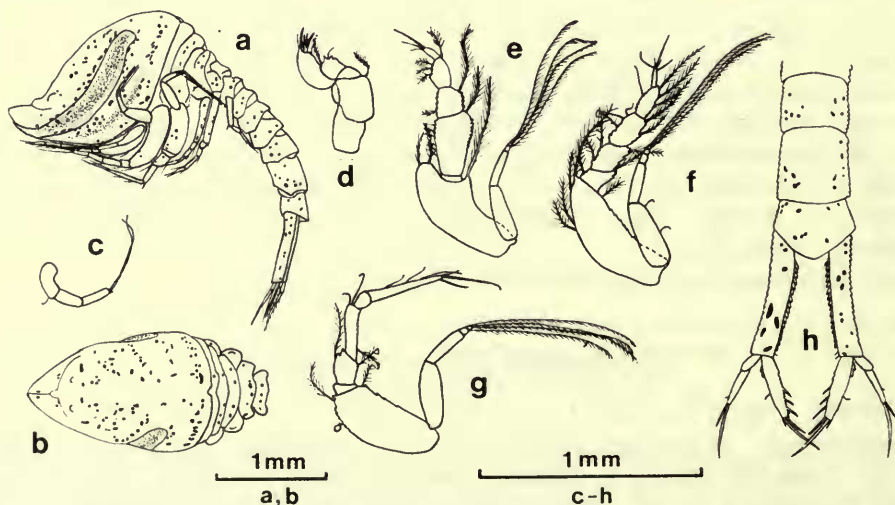


FIG. 5. *Campylaspis sticta* ♀. a, from side ; b, carapace and pereon from above ; c, antenna 1 ; d, maxilliped 2 ; e, maxilliped 3 ; f, pereopod 1 ; g, pereopod 2 ; h, uropod and end of pleon.

which the most basal is longest. Maxilliped 3 (fig. 5e) with the basis curved, as long as the ischium to propodus combined, widened at the distal end which is produced well beyond the end of the ischium; the merus and carpus are fairly broad and serrated on both edges and the propodus on the lower edge.

Pereopod 1 (fig. 5f) with the basis almost as long as rest of appendage; the ischium, merus, carpus and propodus are serrated on either edge. Pereopod 2 (fig. 5g) with the basis broad, a little more than half as long as the remaining segments together; the dactyl is tapered and longer than the carpus and propodus together.

Uropod (fig. 5h) as long as the last three pleonites together, peduncle fairly broad and about twice as long as the endopod, which is distinctly longer than the exopod; the peduncle is serrated on both edges but more distinctly on the inner edge, and the endopod has four spines and some serrations on the inner edge and two unequal end spines.

TYPE LOCALITY. 23°0'S, 12°45'E, 1007-1014 m. The types are deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 291; Paratypes 1974: 292.

REMARKS. *C. sticta* is distinguished from most species with a sulcus on either side of the carapace by the absence of lenses in the eyelobe. The sulcus differs from that of *C. porcata* in being of much the same width throughout and among other differences the dactyl of pereopod 2 is tapered and without thickened terminal spines.

Seven specimens were found off S.W. Africa in 1007-1014 m.

***Campylaspis arcuata* sp. nov.**
(fig. 6)

MATERIAL. 8°48'S, 12°52'E, 527-542 m, 23.5.1968, 2 ♀♀.

DESCRIPTION. Adult female, length 3.3 mm: carapace (fig. 6a, b) twice as long as high, well elevated dorsally, with two long ridges on either side running back parallel with the lower edge of the carapace, joined by a vertical ridge at the hind end but not meeting the ridge from the opposite side dorsally; a third shorter ridge is present dorsal to these, running backwards on either side from behind the side of the frontal area. The pseudorostrum is about a fifth of the total carapace length and not inclined upwards but set at a very obtuse angle to the carapace behind the eyelobe; there is a little trace of an antennal notch below it. The eyelobe is short and without lenses.

Antenna 1 (fig. 6c) with the segments of the peduncle slender, the first strongly curved and shorter than the third.

Maxilliped 2 (fig. 6d) with the ischiobasis of moderate length, its distal seta normally pinnate; the propodus has a distal process reaching as far as the end of the spines of the dactyl, of which there are three of about equal length. Maxilliped 3 (fig. 6e) with the basis curved, a little shorter than the rest of the appendage, the merus and carpus broadened but not serrated.

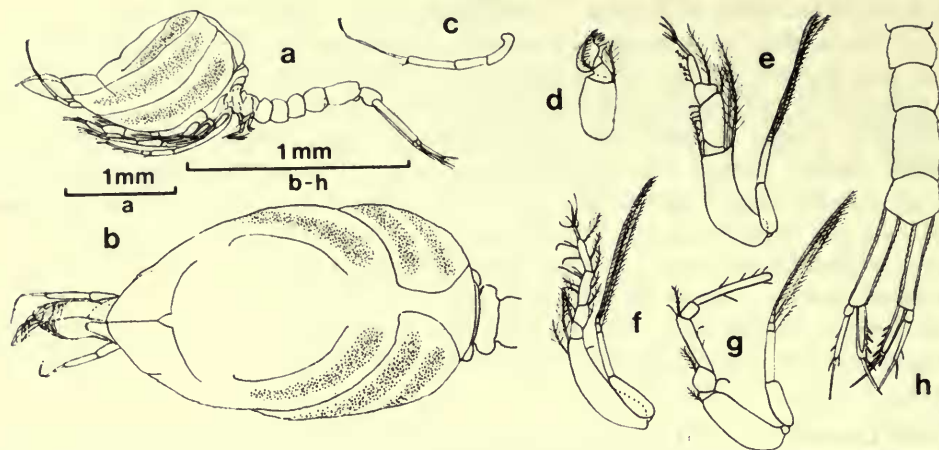


FIG. 6. *Campylaspis arcuata* ♀. a, from side; b, carapace from above; c, antenna 1; d, maxilliped 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, uropod and end of pleon.

Pereopod 1 (fig. 6f) with the basis very little shorter than the remaining segments together; these are without spines or serrations. Pereopod 2 (fig. 6g) with the basis less than half as long as rest of appendage; the dactyl is not tapered and without distal spines; it is about as long as the carpus and propodus together.

Uropod (fig. 6h) a little shorter than the last three pleonites combined; the peduncle is serrated on either side and twice as long as the endopod, which is only slightly longer than the exopod and has four or five spines and some serrations on its inner edge and a long end spine.

TYPE LOCALITY. 8°48'S, 12°52'E, 527-542 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974:293; Paratype 1974:294.

REMARKS. *C. arcuata* resembles *C. exarata* sp. nov. a little in the shape of the carapace but it is more elevated dorsally and its pseudorostrum is not upturned, while it lacks prominences at the sides of the frontal area. The shape of the dactyl of pereopod 2 is quite different in the two species.

Two specimens were collected off S.W. Africa in 527-542 m.

Campylaspis costata G. O. Sars, 1865

MATERIAL. 39°46.5'N, 70°43.3'W, 1470-1330 m, 25.8.1964, 1 ♀.

DISTRIBUTION. Many records in the N.E. Atlantic from northern Norway to the British Isles, 23-478 m. Although apparently almost confined to the shelf in N.W. Europe this species can apparently occur on the slope off N.E. America down to about 1470 m. A subspecies, *C. c. speciosa*, has been described by Lomakina (1955) from the northern Pacific but I am inclined to regard it as a separate species.

Campylaspis spinosa Calman, 1906

MATERIAL. 28°06'N, 13°28'W, 1780 m, 15.3.1968, 2 ♀♀, 1 ♂; 07°09'S, 34°25'5"W-07°08'S, 34°25'W, 770-805 m, 6.4.1963, 1 juv.; 7°58'S, 34°22'W, 834-939 m, 18.2.1967, 3 ♀♀, 1 ♂, 1 juv.; 7°58'S, 34°17'W-7°50'S, 34°17'W, 943-1007 m, 20.2.1967, 9 ♀♀, 2 ♂♂, 1 juv.; 8°03'S, 34°23'W-8°02'S, 34°25'W, 587 m, 21.2.1967, 56 ♀♀, 9 ♂♂, 8 juv.; 23°0'S, 12°45'E, 1007-1014 m, 16.5.1968, 2 ♀♀.

DISTRIBUTION. Recorded previously from the western Mediterranean (Calman, 1906; Reyss, 1972), 950-2924 m. The present records extend its geographical range to the Canaries, the tropical West Atlantic and the coast of S.W. Africa and its upper depth limit to 587 m.

Campylaspis rostellata sp. nov.

(fig. 7)

MATERIAL. 27°13'N, 15°41'W, 3301 m, 20.3.1968, 1 ♀.

DESCRIPTION. Adult female, length 4.2 mm: carapace (fig. 7a, b) more than twice as long as high, smooth at the sides but with fairly numerous small spines dorso-laterally and on the frontal area. The pseudorostrum is two-ninths of the total carapace length, prominent and sharply pointed when viewed from the side; behind it the side of the carapace is produced into an antero-lateral angle, with serrations extending backwards. The eyelobe is rudimentary.

The pereon somites are serrated laterally (fig. 7b), the pleon somites laterally and the hinder ones also dorsally.

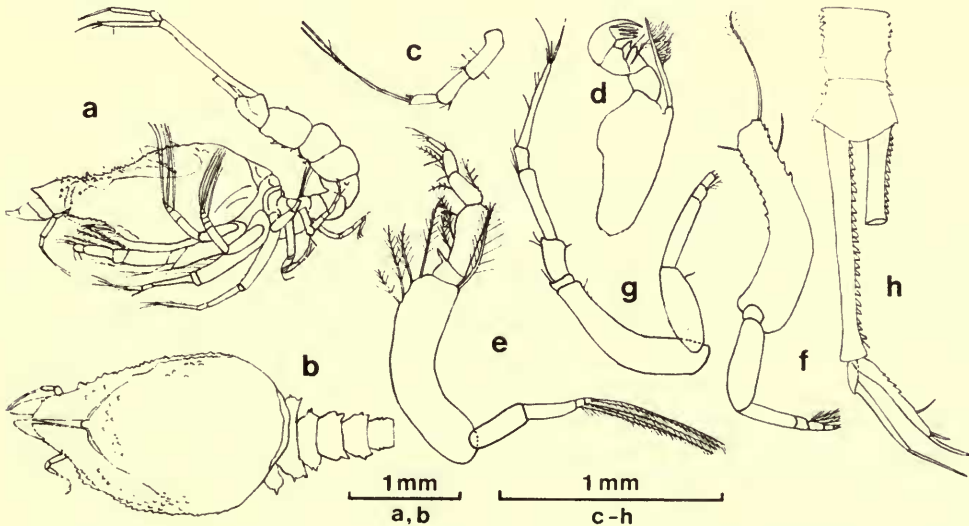


FIG. 7. *Campylaspis rostellata* ♀. a, from side; b, carapace and pereon from above; c, antenna 1; d, maxilliped 2; e, maxilliped 3; f, basis of pereopod 1; g, pereopod 2; h, uropod and end of pleon.

Antenna 1 (fig. 7c) with the basal segment of the peduncle elbowed near the base, nearly twice as long as the third segment.

Maxilliped 2 (fig. 7d) with the ischiobasis long and with a robust but not distally thickened terminal seta; carpus with two teeth on its inner edge; propodus with a long tooth and dactyl with three equal teeth. Maxilliped 3 (fig. 7e) with the basis curved, longer than rest of appendage; ischium with a tooth on the lower edge; merus nearly twice as long as the carpus, both segments with some small serrations on the upper edge.

Pereopod 1 (fig. 7f) incomplete in the specimen but the basis curved and serrated on both edges distally. Pereopod 2 (fig. 7g) with the basis about two-thirds as long as remaining segments together; merus with a terminal tooth on its lower edge; dactyl narrow and nearly as long as the carpus and propodus together.

Uropod (fig. 7h) longer than last four pleonites combined; peduncle with strong serrations along either edge, more than twice as long as the endopod, which has some serrations along the inner edge basally, two spines distally and a stout end spine; exopod about as long as the endopod, with a long slender terminal spine.

TYPE LOCALITY. 27°13'N, 15°41'W, 3301 m. Type deposited in the British Museum (Natural History). Registration number: Holotype 1974: 295.

REMARKS. *C. rostellata* somewhat resembles *C. rostrata* Calman and *C. aculeata* sp. nov. in the shape of the pseudorostrum but is easily distinguished from either by the markings of the carapace, from *C. rostrata* by the relative length of the uropods and from *C. aculeata* by its much smaller size and lack of spinulation on most of the appendages.

A single specimen was obtained off the Canary Islands in 3301 m.

Campylaspis aculeata sp. nov.

(fig. 8)

MATERIAL. 0°46'S, 29°28'W–0°46.5'S, 29°24'W, 3459 m, 14.2.1967, 3 ♀♀, 1 ♂, 4 juv.

DESCRIPTION. Oviparous female, length 9.6 mm: carapace (fig. 8a) a little more than twice as long as high, with a mid-dorsal groove reaching from the eyelobe to near the hind end and then bifurcating obliquely; the whole surface is covered with numerous small spines. Pseudorostrum two-ninths of total carapace length, prominent and sharply pointed when viewed laterally; no antero-lateral angle is visible but the lower part of the carapace is serrated. The eyelobe is obsolete.

The first and second pereonites each have a pair of blunt mid-dorsal spines and the fourth has a ring of spines. The pleon somites have numerous spines at the sides and dorso-laterally.

Antenna 1 (fig. 8b) with the first two segments of the peduncle studded with blunt spines or serrations; the first segment nearly twice as long as the second and more than twice as long as the third.

Maxilliped 2 (fig. 8c) with the ischiobasis fairly long, the terminal pinnate seta long and slender; there are five spines on the inner edge of the carpus; the propodus

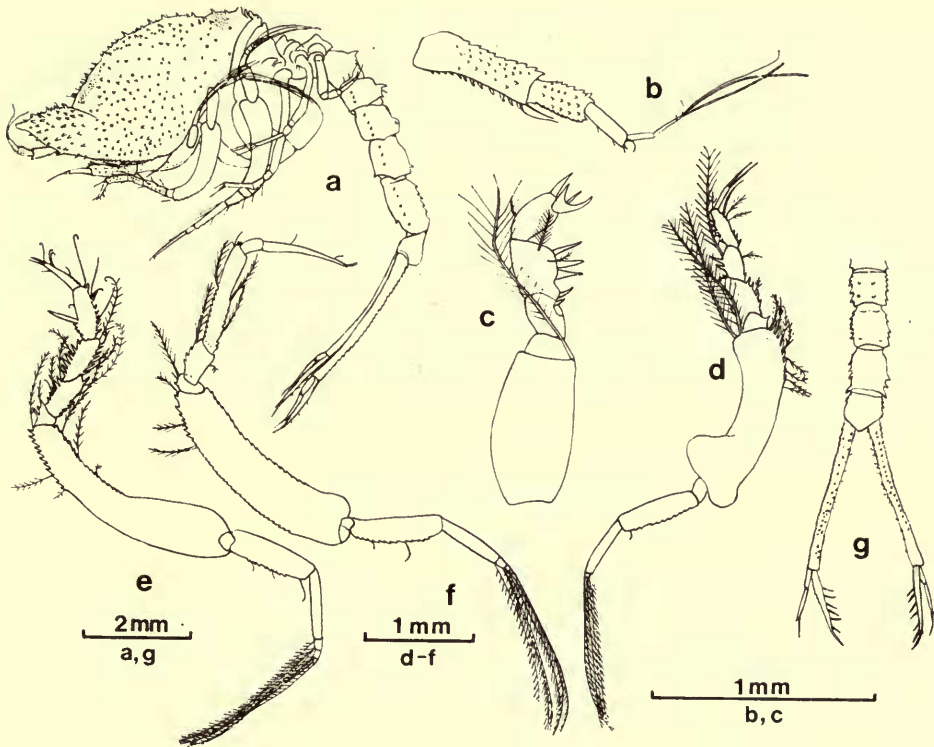


FIG. 8. *Campylaspis aculeata* ovigerous ♀. a, from side; b, antenna 1; c, maxilliped 2; d, maxilliped 3; e, pereopod 1; f, pereopod 2; g, uropod and end of pleon.

has one terminal spine and the dactyl three of nearly equal length. Maxilliped 3 (fig. 8d) with the basis curved, broadened basally, a little longer than the remaining segments together, with a number of spines on the lower edge; ischium, merus, carpus and propodus all have one or a number of spines on one or both edges.

Pereopod 1 (fig. 8e) with the basis curved, distinctly longer than the other segments combined; all the segments have a number of spines or serrations, the merus, carpus and propodus on both edges, and the propodus also has a long spine on the lower edge. Pereopod 2 (fig. 8f) with the basis a little shorter than the rest of the appendage, serrated on both edges, as is the carpus along its basal part; the propodus is much shorter than the carpus.

Uropod (fig. 8g) longer than the last five pleonites together; the peduncle is nearly two-and-a-half as long as the endopod, which is distinctly longer than the exopod; the peduncle has many short spines and serrations and the endopod has six slender spines on its inner edge and a longer end spine.

TYPE LOCALITY. $0^{\circ}46'S$, $29^{\circ}28'W$ – $0^{\circ}46.5'S$, $29^{\circ}24'W$, 3459 m. The types are deposited in the British Museum (Natural History). Registration numbers: Holotype 1974 : 296; Paratypes 1974 : 297.

REMARKS. *C. aculeata* is unusually large for the genus. The shape of the carapace is rather similar to that of *C. rostellata* sp. nov. but it is much more spiny. The spines are much smaller than in *C. spinosa* Calman and the pseudorostrum is not upturned as in that species. From *C. echinata* Hale it is distinguished by the shape of the carapace and of the second maxillipeds and second pereopods, among other details.

In general shape and size this species approaches the genus *Campylaspides* Fage, and especially to *Campylaspides spinifera* Jones (1973). However, although the shape of its second maxillipeds might be thought to represent a transitional stage towards *Campylaspides*, having several well-developed carpal spines, the propodus and dactyl retain the form typical of *Campylaspis*.

Eight specimens were found near the mid-Atlantic Ridge between Dakar and Recife in 3459 m.

Campylaspis brevicornis sp. nov.
(fig. 9)

MATERIAL. 23°02'S, 12°19'E, 2117-2154 m, 17.5.1968, 1 ♂.

DESCRIPTION. Adult male, length 3.8 mm: carapace (fig. 9a, b) more than twice as long as high, with some small rounded prominences dorsally and with numerous short hairs, the dorsal outline not much elevated and rather irregular.

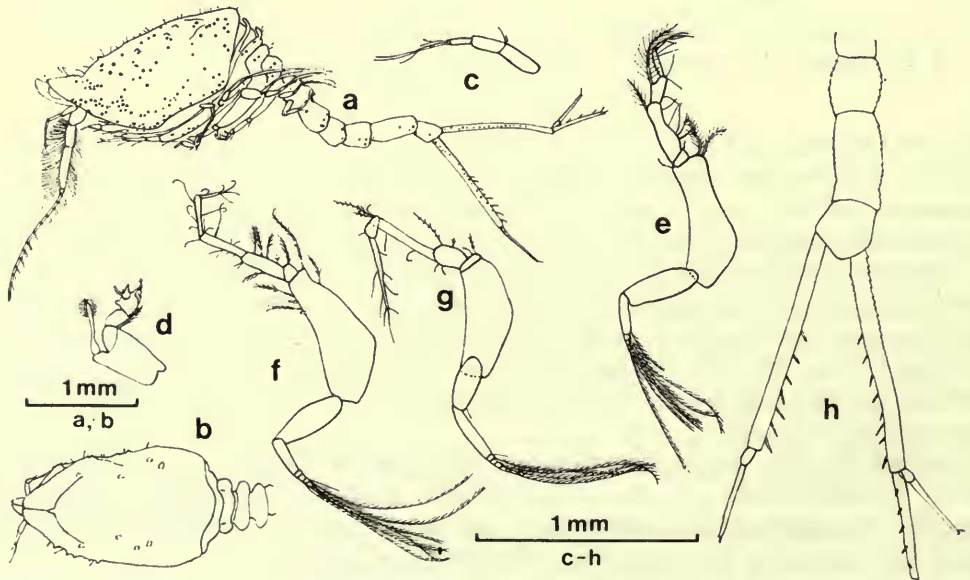


FIG. 9. *Campylaspis brevicornis* ♂. a, from side; b, carapace and pereon from above; c, antenna 1; d, maxilliped 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, uropod and end of pleon.

Pseudorostrum fairly large and prominent; antero-lateral angle not at all produced and some infero-lateral serrations present. Eyelobe rudimentary.

The first two pereonites with dorsal projections. The whole body and most of the appendages have numerous small reddish pigment spots.

Antenna 1 (fig. 9c) with the segments of the peduncle decreasing successively in length, the basal segment straight and nearly twice as long as the third. Antenna 2 (fig. 9a) with the flagellum rather short, not reaching beyond the pereon.

Maxilliped 2 (fig. 9d) with the ischiobasis broad, its distal seta thickened and with a distal tuft of hairs; the propodus with a fairly short distal seta and a small tooth on its inner edge; the dactyl with three spines, the middle one small. Maxilliped 3 (fig. 9e) with its segments fairly narrow, unarmed, the basis as long as the remaining segments together, with two rather short and thick pinnate setae distally; the merus long and narrowed distally, more than twice as long as the carpus.

Pereopod 1 (fig. 9f) with the basis broadened proximally, a little shorter than the rest of the appendage. Pereopod 2 (fig. 9g) with the basis a little more than half as long as the rest of the appendage; the dactyl narrowed distally, about as long as the carpus.

Uropod (fig. 9h) incomplete in the specimen but longer than the pleon, the peduncle about twice as long as the endopod; the peduncle has about eight spines on its inner edge and the endopod at least five.

TYPE LOCALITY. 23°02'S, 12°19'E, 2117-2154 m. Type deposited in the British Museum (Natural History). Registration number: Holotype 1974: 298.

REMARKS. It is difficult to see if the flagellum of the second antenna is complete but it is certainly shorter than usual for the genus and distinguishes the adult male from other species with a similarly prominent pseudorostrum.

A single male was found off S.W. Africa in 2117-2154 m.

Campylaspis pilosa sp. nov.

(fig. 10)

MATERIAL. 7°08'S, 34°17'W-7°50'S, 34°17'W, 943-1007 m, 20.2.1967, 5 ♀♀, 1 ♂; 8°03'S, 34°23'W-8°02'S, 34°25'W, 587 m, 21.2.1967, 5 ♀♀.

DESCRIPTION. Adult female, length 4.0 mm: carapace (fig. 10a, b) about twice as long as high, with a blunt prominence on either side of the frontal area and an ill-defined groove on either side above and below it; a number of moderately long hairs are scattered over the dorsal surface. The pseudorostrum is more than a sixth of the total carapace length and the antero-lateral angle is slightly produced on either side below it. The eyelobe is rudimentary.

Some blunt spines and numerous short hairs are present on the sides of the pleon somites.

Antenna 1 (fig. 10c) with the peduncle segments slender, the first a little curved.

Maxilliped 2 (fig. 10d) with the ischiobasis broad, its distal seta much thickened at the distal end; propodus with a fairly stout spine distally and a prominent tooth on

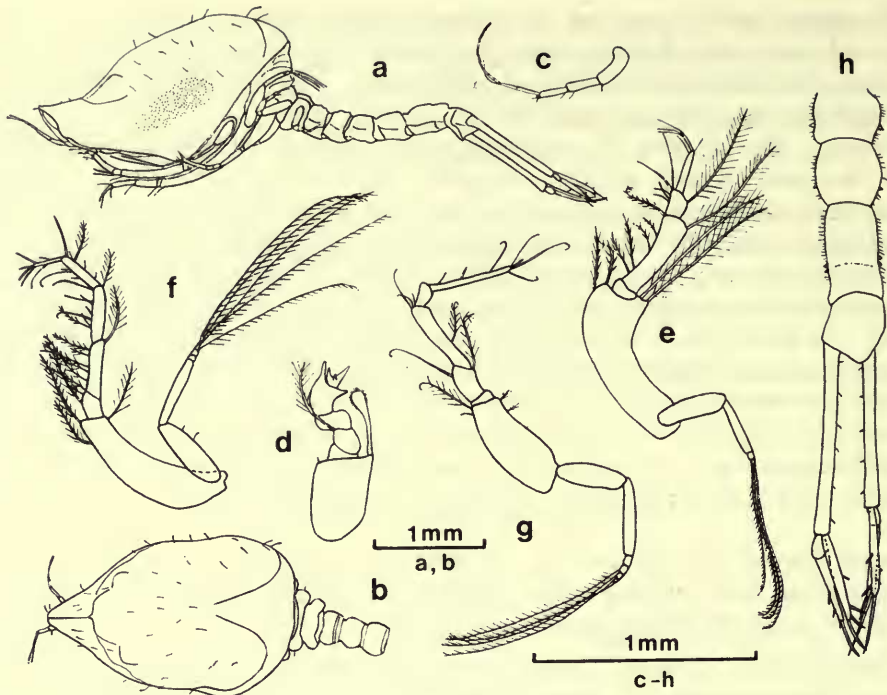


FIG. 10. *Campylaspis pilosa* ♀. a, from side; b, carapace and pereon from above; c, antenna 1; d, maxilliped 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, uropod and end of pleon.

the inner side; dactyl with three spines, the middle one small. Maxilliped 3 (fig. 10e) with the basis a little shorter than the remaining segments together and strongly curved, the other segments slender and unarmed, the merus nearly twice as long as the propodus.

Pereopod 1 (fig. 10f) fairly slender, with the basis much shorter than the rest of the appendage. Pereopod 2 (fig. 10g) with the basis about half as long as remaining segments together; the dactyl narrow, about as long as the carpus.

Uropod (fig. 10h) about as long as the last four pleonites together, the endopod a little less than half as long as the peduncle, which has a few setae along its inner edge; the endopod has three spines and one terminal spine and is about as long as the exopod, which has several short spines along its outer edge and a long end spine.

TYPE LOCALITY. 8°03'S, 34°23'W-8°02'S, 34°25'W, 587 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 299; Paratypes 1974: 300.

REMARKS. The rather hairy carapace without any other projections except the two antero-lateral prominences distinguish this species from others with a lateral groove.

Twelve specimens have been collected off Recife, Brazil, in 587-1007 m.

Campylaspis bulbosa sp. nov.

(fig. 11)

MATERIAL. 23°02'S, 12°19'E, 2117-2154 m, 17.5.1968, 5 ♀♀.

DESCRIPTION. Immature female, length 3.3 mm: carapace (fig. 11a, b) less than twice as long as high, broad and bulbous, with a well-defined ridge on either side running from below the pseudorostrum backwards to the dorsal side about three-quarters of the carapace length from the front, where it is joined by a short transverse ridge with some blunt teeth to its fellow on the opposite side; near the lower edge of the carapace is a less prominent ridge; two further short transverse ridges are present on either side of the frontal area, not quite meeting on the mid-line, the more anterior with a low prominence in the middle on either side; below the long ridge is a large oval shallow depression and a further small depression is present on either side dorsally behind the posterior transverse ridge; there are a few scattered hairs on the dorsal surface. The pseudorostrum is short, only about an eighth of the total carapace length and there is little trace of an antennal notch. The eyelobe is small but broad, without lenses.

Antenna 1 (fig. 11c) with the basal segment of the peduncle curved, more than one-and-a-half as long as the distal segment.

Maxilliped 2 (fig. 11d) with the ischiobasis broad, its distal seta rather short but not thickened; the propodus has a tooth on its inner edge and a long distal spine

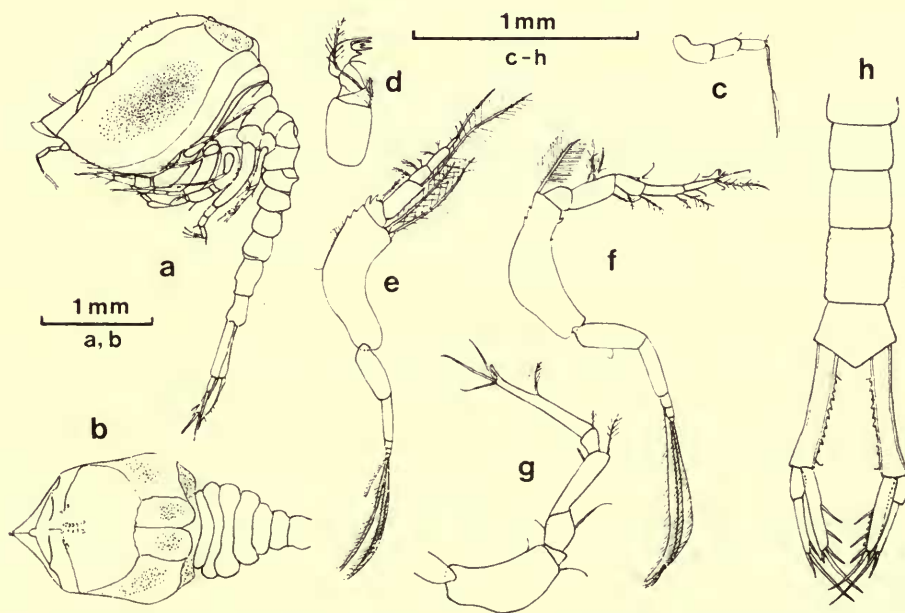


FIG. 11. *Campylaspis bulbosa* immature ♀. a, from side; b, carapace and pereon from above; c, antenna 1; d, maxilliped 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, uropod and end of pleon.

and the dactyl has three spines of which the middle is fairly short. Maxilliped 3 (fig. 11e) with the basis strongly curved, longer than the remaining segments together; the ischium has two sharp teeth on the lower edge and the merus is fairly narrow, with a distal tooth on the upper edge.

Pereopod 1 (fig. 11f) with the basis curved, as long as the following four segments together. Pereopod 2 (fig. 11g) with the basis a little less than a third of the total length; the dactyl is broad basally, a little longer than the carpus and propodus together, and has three long slender terminal spines and a single thicker short blunt spine.

Uropod (fig. 11h) with the peduncle about as long as the last three pleonites combined and serrated along its inner edge; the endopod is two-thirds as long as the peduncle and very slightly shorter than the exopod; it has three slender spines and a few serrations along the inner edge and two unequal end spines.

TYPE LOCALITY. 23°02'S, 12°19'E, 2117-2154 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 301; Paratypes 1974: 302.

REMARKS. *C. bulbosa* is distinguished by the shape and markings of the carapace from any other known species in the genus.

Five females, none of them fully grown, occurred off S.W. Africa in 2117-2154 m.

Campylaspis redacta sp. nov.

(fig. 12)

MATERIAL. 8°03'S, 34°23'W-8°02'S, 34°25'W, 587 m, 21.2.1967, 15 ♀♀, 8 ♂♂.

DESCRIPTION. Immature male, length 2.2 mm: carapace (fig. 12a, b) less than twice as long as high, with a large irregular sulcus on either side not bounded by raised carinae and with some hollows and irregularities dorsally. The pseudorostrum is slightly downturned, a little less than a fifth of the total carapace length, and there is no antennal notch. The eyelobe is rudimentary and minute.

The fourth and fifth pereonites have a number of dorsal teeth.

Antenna 1 (fig. 12c) has the third segment of the peduncle almost as long as the basal segment.

Maxilliped 2 (fig. 12d) with the ischiobasis long, its distal seta slender; the propodus is long, with a very long spine, and the dactyl has three equal spines. Maxilliped 3 (fig. 12e) with the basis short and broad, much shorter than the remaining segments together; the merus is long, more than twice as long as the propodus, while the carpus is very short.

Pereopod 1 (fig. 12f) with the basis distinctly shorter than the rest of the appendage. Pereopod 2 (fig. 12g) with the basis not much more than half as long as the rest of the appendage; the dactyl is fairly slender and longer than the carpus and propodus together.

Uropod (fig. 12b) slightly longer than the last three pleonites together; the exopod is nearly as long as the endopod, which is more than half as long as the peduncle; the peduncle is serrated along its inner edge and has a number of short setae while the endopod has five spines on the inner edge and a long end spine.

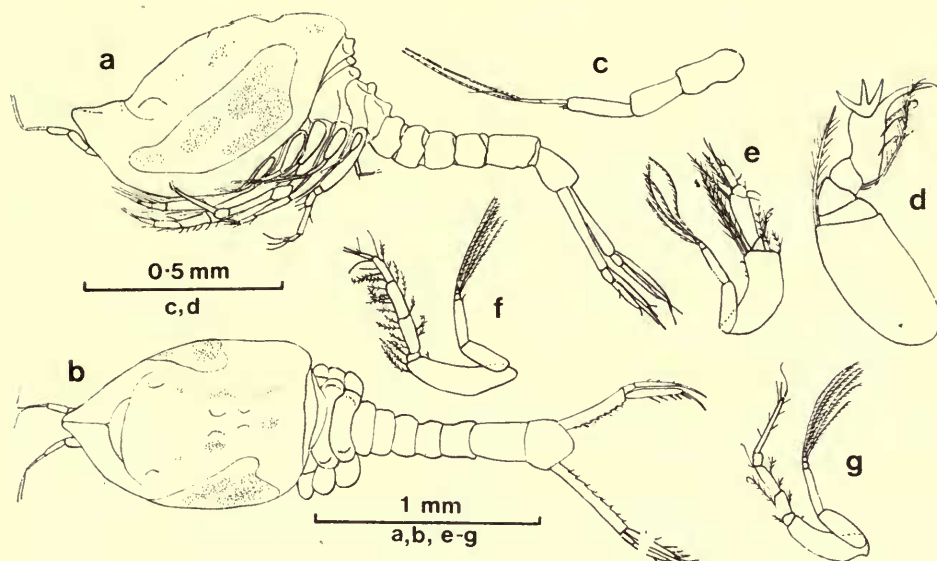


FIG. 12. *Campylaspis redacta* subadult ♂. a, from side; b, from above; c, antenna 1; d, maxilliped 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2.

TYPE LOCALITY. 8°03'S, 34°23'W–8°02'S, 34°25'W, 587 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 303; Paratypes 1974: 304.

REMARKS. The length of the largest specimen was 3.0 mm but none was mature. In having a fairly large sulcus on either side of the carapace *C. redacta* somewhat resembles *C. cognata* sp. nov. but there are many differences in the appendages. In *C. sulcata* Sars the sulcus is of a different shape and the latter species has a well-developed eyelobe with lenses.

Twenty-three specimens were collected off Recife, Brazil, in 587 m.

Campylaspis paucispina sp. nov.

(fig. 13)

MATERIAL. 39°26'N, 70°33'W, 2496 m, 21.8.1964, 2 ♀♀; 39°46.5'N, 70°43.3'W, 1470–1330 m, 25.8.1964, 17 ♀♀, 2 ♂♂; 39°48.7'N, 70°40.8'W, 1102 m, 6.7.1965, 7 ♀♀; 39°43.6'N, 70°37.4'W, 2022 m, 4.5.1966, 8 ♀♀.

DESCRIPTION. Adult female, length 4.2 mm: carapace (fig. 13a) twice as long as high, integument rather scabrous, not much elevated, with two ill-defined oblique ridges on either side with a slight hollow between them, somewhat undulating with a few smallish spines on them at intervals; there are some more spines or slight prominences on the dorsal surface. The pseudorostrum is less than a fifth of the total carapace length and is slightly upturned; the antero-lateral angle is slightly

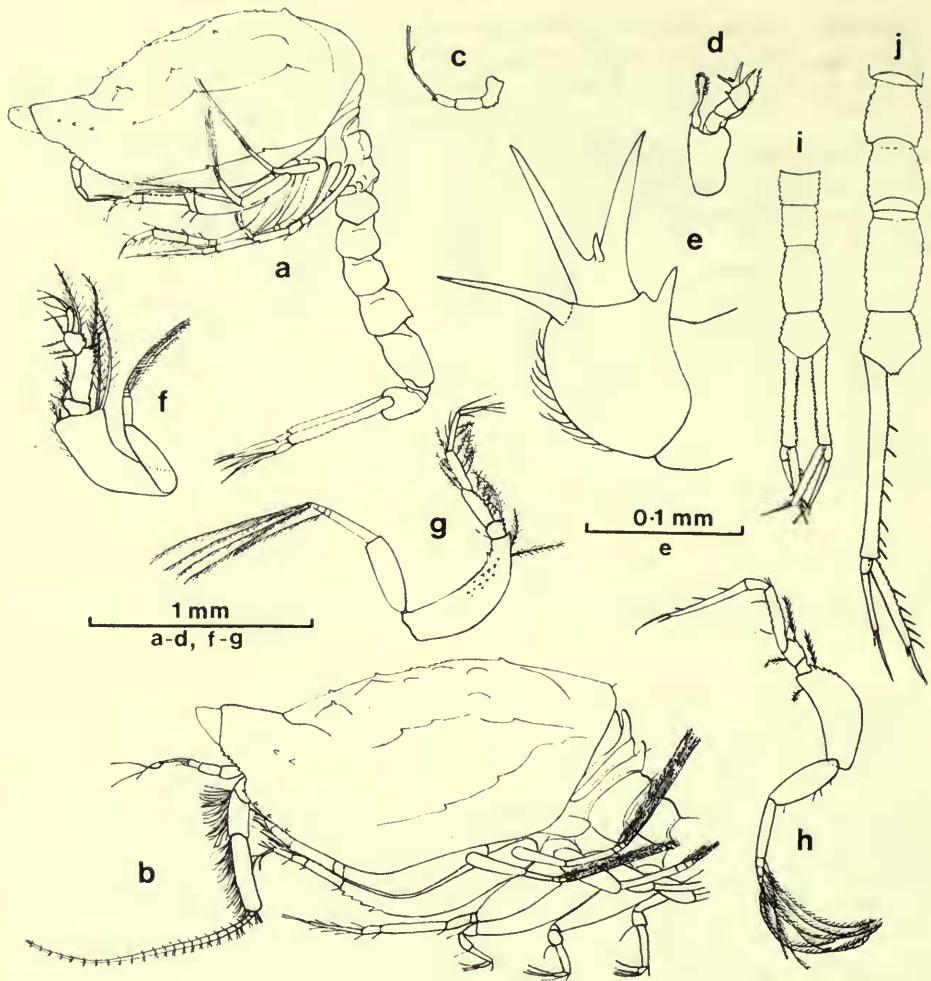


FIG. 13. *Campylaspis paucispina*. a, ♀ from side; b, ♂ carapace and pereon from side; c, ♀ antenna 1; d, e, ♀ maxilliped 2; f, ♀ maxilliped 3; g, ♀ pereopod 1; h, ♀ pereopod 2; i, ♀ uropod and end of pleon; j, ♂ uropod and end of pleon.

produced and the infero-lateral edge is serrated behind it. The eyelobe is rudimentary.

Antenna 1 (fig. 13c) with the segments of the peduncle differing little in length, the basal segment curved and serrated below.

Maxilliped 2 (fig. 13d, e) has the apical seta on the ischiobasis thickened, with a distal brush of hairs; the propodus has a longish distal spine and a shorter spine on its inner edge; the dactyl has three spines of which the middle is very small. Maxilliped 3 (fig. 13f) with the basis curved, a little shorter than the remaining segments together; the merus is long and the carpus broad, both segments serrated along the upper edge.

Pereopod 1 (fig. 13g) with the basis curved, shorter than the rest of the appendage, with some spines on its outer side; the ischium is serrated below and the carpus above. Pereopod 2 (fig. 13h) with the basis about half as long as the remainder of the appendage; the dactyl is as long as the carpus and propodus combined; the carpus is serrated on its upper edge.

Uropod (fig. 13i) nearly as long as the last four pleonites together, the peduncle about one-and-a-half as long as the endopod, which is a little longer than the exopod; the peduncle is strongly serrated on either edge and the endopod has a few spines on the inner edge and a longer end spine.

Adult male, length 3.8 mm: differs from the female in the usual manner. The first two pereonites are produced dorsally. The second antennal flagellum is long (fig. 13b, j).

TYPE LOCALITY. 39°26'N, 70°33'W, 2496 m, 21.8.1964. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 305; Paratypes 1974: 306.

REMARKS. In having a carapace with comparatively few protuberances and rather ill-defined lateral ridges this species resembles *C. intermedia* Hansen but in the latter the prominences are mostly larger and blunter and the antero-lateral angle is more developed. The shape of the distal seta of the ischiobasis of maxilliped 2 resembles that of *C. affinis* Sars and also of some of the other species described here but none of these has a similarly marked carapace.

A fair number of specimens were collected south of Gay Head between 1102 and 2496 m.

Campylaspis cognata sp. nov.

(fig. 14)

MATERIAL. 8°02'S, 34°03'W-7°56'S, 34°09'W, 1493 m, 19.2.1967, 1 ♀; 7°58'S, 34°17'W-7°50'S, 34°17'W, 943-1007 m, 20.2.1967, 20 ♀♀, 6 ♂♂; 8°03'S, 34°23'W-8°02'S, 34°25'W, 587 m, 21.2.1967, 10 ♀♀, 12 ♂♂.

DESCRIPTION. Ovigerous female, length 2.7 mm: carapace (fig. 14a, b) more than twice as long as high with a sulcus of moderate breadth on either side defined by low keels, the uppermost of which has two blunt spines; dorsal outline fairly smooth but a fairly large prominence bearing a spine is present on either side below the frontal area. The pseudorostrum is less than a fifth of the total carapace length and there is a slightly excavated antennal notch below it. The eyelobe is fairly well developed, though without lenses. Twelve embryos were contained in the brood pouch.

The first three pereonites are broad (fig. 14b) and the first three pleonites have some dorso-lateral spines.

Antenna 1 (fig. 14d) with the basal segment of the peduncle curved, distinctly longer than the third segment.

Maxilliped 2 (fig. 14e) with the ischiobasis broad, its terminal feathered seta slender; propodus with an end spine of moderate length and a prominent tooth on the inner edge; dactyl with three spines, the middle one small. Maxilliped 3

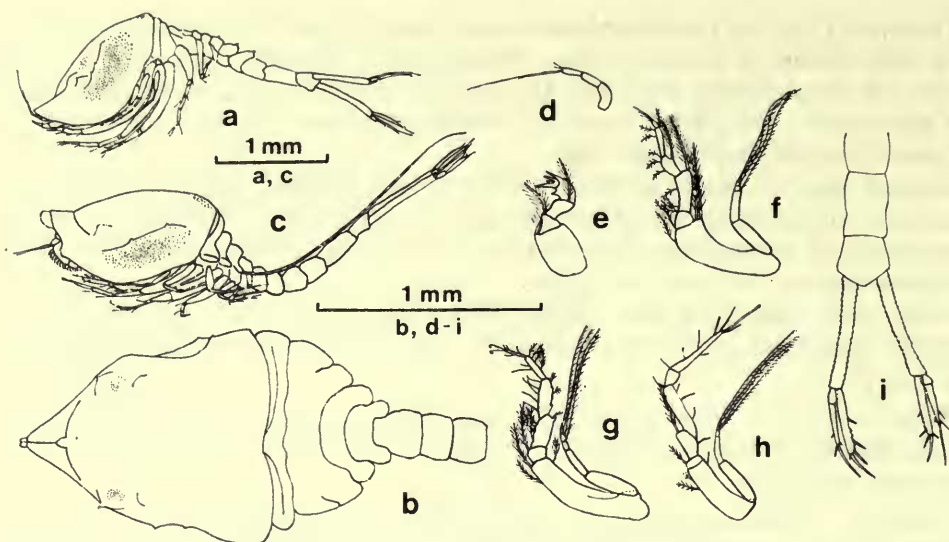


FIG. 14. *Campylaspis cognata*. a, ♀ from side; b, ♀ carapace and pereon from above; c, ♂ from side; d, ♀ antenna 1; e, ♀ maxilliped 2; f, ♀ maxilliped 3; g, ♀ pereopod 1; h, ♀ pereopod 2; i, ♀ uropod and end of pleon.

(fig. 14f) with the basis broadened distally, only a little shorter than the remaining segments combined; the merus is about twice as long as the carpus and not very much longer than the propodus.

Pereopod 1 (fig. 14g) with the basis very slightly shorter than the rest of the appendage; the merus has a tooth distally and the carpus several serrations along the upper edge. Pereopod 2 (fig. 14h) with the basis less than half as long as the remaining segments together; the dactyl is fairly broad proximally and has a long robust distal spine; it is slightly shorter than the carpus and propodus together.

Uropod (fig. 14i) longer than the last three pleonites together, the peduncle serrated along both edges; the endopod is rather more than half as long as the peduncle and distinctly longer than the exopod, with some serrations and three spines along the inner edge and two unequal end spines.

Adult male, length 3.0 mm (fig. 14c): differs from the female in the usual characters. The antennal notch is deeper and the pseudorostrum more truncated. The second antennal flagellum reaches to the end of the uropods.

TYPE LOCALITY. 8°03'S, 34°23'W-8°02'S, 34°25'W, 587 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 307; Paratypes 1974: 308.

REMARKS. The size of the eyelobe and the shape and proportions of maxillipeds 2 and 3 and pereopod 2 among other characters differentiate this species from *C. redacta*. The presence of a few blunt spines distinguish it from other sulcate species.

A fairly large number of specimens were obtained off Recife, Brazil, between 587 and 1493 m.

Campylaspis caperata sp. nov.
(fig. 15)

MATERIAL. 10°30'N, 17°51·5'W, 1624-1796 m, 5.2.1967, 5 ♀♀, 6 ♂♂.

DESCRIPTION. Adult female, length 3·8 mm: carapace (fig. 15a, b) much less than twice as long as high, covered with minute spiny scales and with a few hairs, with two oblique ridges on either side, the lower one less well defined, and two more short transverse ridges behind the frontal area; there are a number of undulations and prominences, especially dorsally. The pseudorostrum is less than a sixth of the total carapace length, truncated, with a shallow antennal notch below. The eyelobe is rudimentary.

Antenna 1 (fig. 15c) with the segments of the peduncle fairly slender, the first distinctly less than twice as long as the third.

Maxilliped 2 (fig. 15d) with the ischiobasis broad, its terminal seta thickened and tufted apically; propodus with a long terminal spine and dactyl with three spines of which the middle is very small. Maxilliped 3 (fig. 15e) with the basis curved, broadened distally, much shorter than the remaining segments combined; the merus is about twice as long as the carpus and both are unarmed.

Pereopod 1 (fig. 15f) with the basis nearly as long as the remainder of the appendage, all the segments of which are unserrated. Pereopod 2 (fig. 15g) with the basis about two-thirds as long as the remaining segments together; the propodus is very

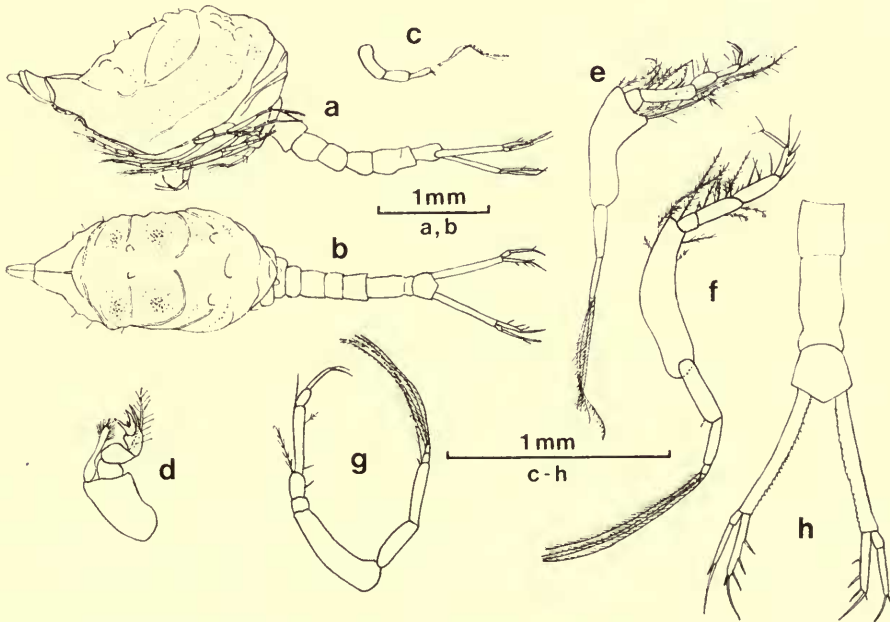


FIG. 15. *Campylaspis caperata* ♀. a, from side; b, from above; c, antenna 1; d, maxilliped 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, uropod and end of pleon.

short, only a third as long as the carpus, while the dactyl is a little less than half as long as the carpus.

Uropod (fig. 15h) a little longer than the last three pleonites together; the endopod is less than half as long as the peduncle, which is serrated along its inner edge; the endopod has three slender spines on its inner edge and one longer and a shorter end spine; the exopod is almost as long as the endopod.

TYPE LOCALITY. $10^{\circ}30'N$, $17^{\circ}51.5'W$, 1624-1796 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 309; Paratypes 1974: 310.

REMARKS. The combination of ridges and irregular prominences on the carapace is unlike that of any other species. *C. caperata* is also distinguished by the shortness of the dactyl of pereopod 2 compared with other species.

Eleven specimens were collected off Dakar in 1624-1796 m.

Campylaspis plicata sp. nov.

(fig. 16)

MATERIAL. $7^{\circ}58'S$, $34^{\circ}17'W$ - $7^{\circ}50'S$, $34^{\circ}17'W$, 943-1007 m, 20.2.1967, 4 ♀♀, 6 ♂♂.

DESCRIPTION. Adult female, length 4.8 mm: carapace (fig. 16a, b) about twice as long as high, with two oblique ridges on either side, the anterior ridge bifurcating behind the side of the frontal area to cross the dorsal surface and join with its fellow from the other side; on the dorsal surface there are a number of low spines, with a larger prominence on either side of the frontal area. The pseudorostrum is less than a fifth of the total carapace length and fairly sharply pointed when viewed laterally, with a shallow antennal notch below, followed by some serrations. The eyelobe is rudimentary.

The first two pereonites are raised dorsally.

Antenna 1 (fig. 16d) with the basal segment of the peduncle about twice as long as the third.

Maxilliped 2 (fig. 16e) with the ischiobasis fairly long; the merus has one tooth and the carpus two; the propodus ends in a long slender spine and the dactyl has three fairly long spines of almost equal length. Maxilliped 3 (fig. 16f) with the basis curved, broadened distally and serrated along the distal lower edge; the merus is a little broadened distally and serrated, and the carpus is fairly broad; carpus and propodus have serrations along the lower edge.

Pereopod 1 (fig. 16g) with the basis about two-fifths as long as the rest of the appendage, serrated on either edge distally; the ischium has a single tooth on the lower edge and the merus, carpus and propodus are serrated on either edge. Pereopod 2 (fig. 16h) with the basis three-quarters as long as the rest of the appendage; the dactyl is narrow, about two-thirds as long as the carpus, and ends in a thick spine.

Uropod (fig. 16i) about as long as the last four pleonites together, the peduncle serrated on either edge; the endopod is much longer than the exopod and more than half as long as the peduncle, with three spines on its serrated inner edge and a longer end spine.

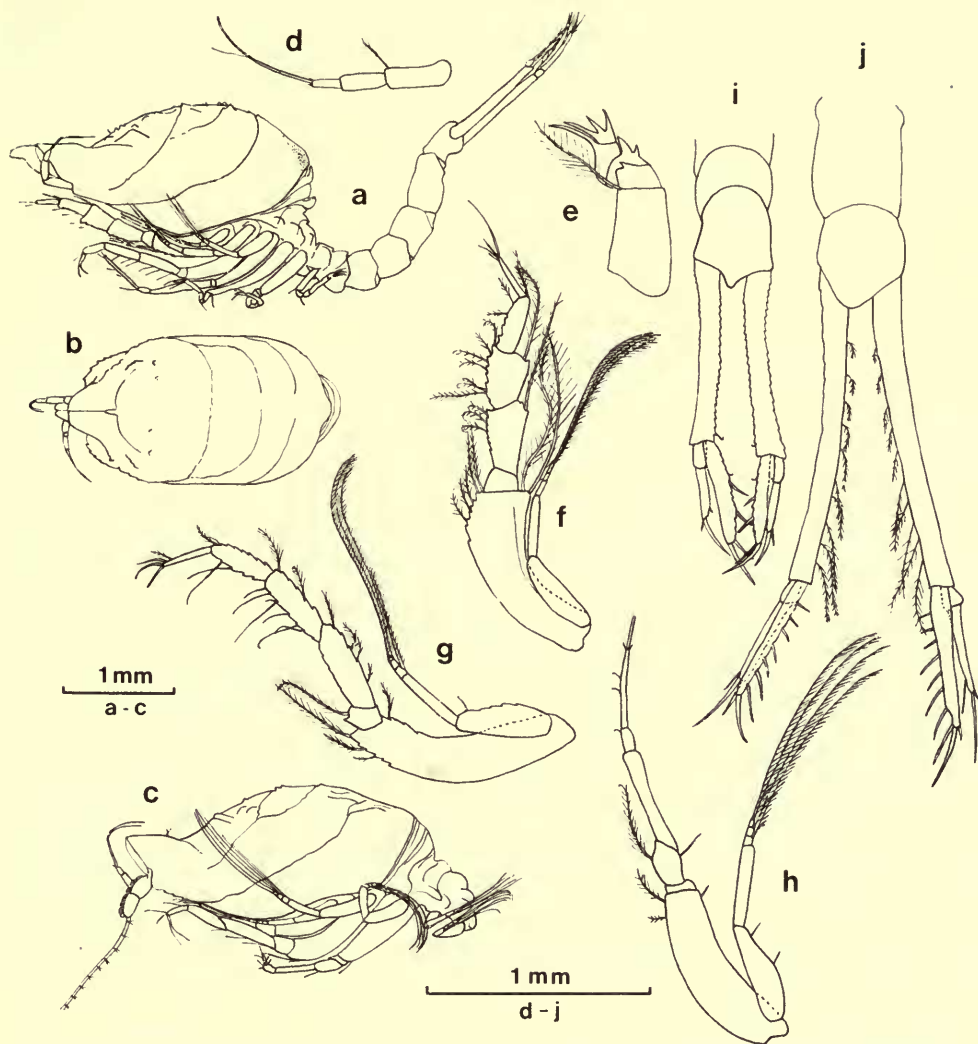


FIG. 16. *Campylaspis plicata*. a, ♀ from side; b, ♀ from above; c, ♂ carapace and pereon from side; d, ♀ antenna I; e, ♀ maxilliped 2; f, ♀ maxilliped 3; g, ♀ pereopod I; h, ♀ pereopod 2; i, ♀ uropod and end of pleon; j, ♂ uropod and end of pleon.

Adult male, length 5.3 mm (fig. 16c, j) : differs from the female in the usual manner. The second antennal flagellum reaches to the end of the uropods which are proportionately longer than in the female and have a number of feathered setae along the inner edge and about eight spines on the inner edge of the endopod.

TYPE LOCALITY. 7°58'S, 34°17'W-7°50'S, 34°17'W, 943-1007 m. Types deposited in the British Museum (Natural History). Registration numbers : Holotype 1974 : 311 ; Paratypes 1974 : 312.

REMARKS. In general appearance *C. plicata* somewhat resembles *C. caperata* but differs in the relative shapes and proportions of the appendages, among which may be mentioned the terminal seta of the ischiobasis of maxilliped 2, which is not thickened as it is in *C. caperata*, while the latter species lacks serrations on maxilliped 3 and pereopod 1.

Ten specimens were found off Recife, Brazil, in 943-1007 m.

Campylaspis valleculata sp. nov.

(fig. 17)

MATERIAL. 38°46'N, 70°06'W, 2886 m, 21.8.1964, 29 ♀♀, 18 ♂♂, 38 juv.; 38°46.7'N, 70°08.8'W, 2802 m, 21.8.1964, 5 ♀♀, 2 ♂♂; 38°16'N, 71°47'W, 2864 m, 24.8.1964, 4 ♀♀, 1 juv.; 39°38.3'N, 67°57.8'W, 2862 m, 29.6.1965, 1 ♀, 1 juv.; 39°48.7'N, 70°40.8'W, 1102 m, 6.7.1965, 1 ♀, 2 juv.; 39°37'W, 66°47'W-39°37.5'N, 66°44'W, 3806 m, 24.8.1966, 2 ♀♀.

DESCRIPTION. Adult female, length 6.7 mm: carapace (fig. 17a, b) more than twice as long as high, with three well-defined ridges on either side, the upper minutely crenulated and running backwards from below the front of the pseudorostrum to meet its fellow from the other side on the mid-line, where it curves forward at rather less than a sixth of the total carapace length from the hind end; the middle ridge runs backwards nearly parallel to the uppermost from well below and behind the antero-lateral angle, with a slight upward curve near the hind end of the carapace after which it dips to join its fellow from the other side to define the hind end; an undulating ridge joins the middle ridge from the top of the upward curve obliquely forward to the upper ridge; the lower ridge starts a little below the middle one and runs backwards parallel with the lower edge of the carapace to end below the upward curve of the middle ridge; there are several blunt prominences on either side of the frontal area and a number of scattered short hairs dorsally. The pseudorostrum is a little less than a sixth of the total carapace length and fairly acute from the side; there is only a faint indication of an antennal notch and antero-lateral angle. The eyelobe is fairly long and narrow, without lenses.

Antenna 1 (fig. 17d) with the segments of the peduncle long and narrow, the basal strongly curved and nearly twice as long as the third.

Maxilliped 2 (fig. 17e) with the ischiobasis moderately long, its distal seta fairly short; the propodus has a small tooth on the inner edge and a long end process; the dactyl has three spines, the middle one very small. Maxilliped 3 (fig. 17f) with the basis only a little shorter than the rest of the appendage; all the segments are comparatively slender.

Pereopod 1 (fig. 17g) with the basis curved, about as long as the remaining segments together. Pereopod 2 (fig. 17h) with the basis more than half as long as rest of appendage; the dactyl is tapered, its terminal spines not thickened, and is distinctly longer than the carpus and propodus together.

Uropod (fig. 17i) about as long as the last four pleonites together, the peduncle faintly serrated and with a few short setae along the inner edge; it is nearly three

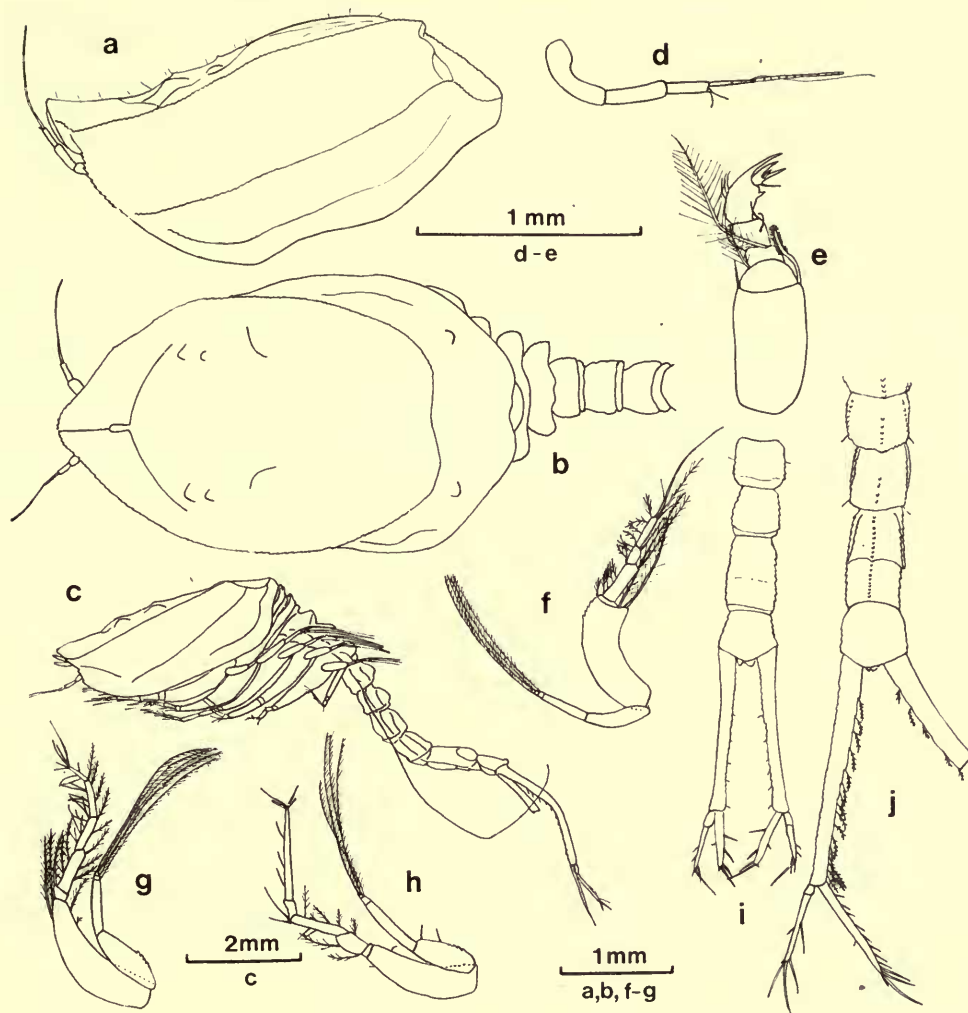


FIG. 17. *Campylaspis valleculata*. a, ♀ carapace from side; b, ♀ carapace and pereon from above; c, ♂ from side; d, ♀ antenna 1; e, ♀ maxilliped 2; f, ♀ maxilliped 3; g, ♀ pereopod 1; h, ♀ pereopod 2; i, ♀ uropod and end of pleon; j, ♂ uropod and end of pleon.

times as long as the endopod, which has three slender spines on the inner edge and two unequal end spines; the exopod is only a little shorter than the endopod.

Adult male, length 8.1 mm (fig. 17c, j): differs from female in the usual characters; the second antennal flagellum reaches to the end of the uropods.

TYPE LOCALITY. 38°46'N, 70°06'W, 2886 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 313; Paratypes 1974: 314.

REMARKS. *C. valleculata* is large for the genus. The shape of the carapace is somewhat similar to that of *C. undata* Sars and *C. mansa* sp. nov. but it is distinguished

from either by the presence of a third lower ridge on either side and by a number of other characters.

Many specimens were obtained on the Gay Head - Bermuda transect between 1102 and 3806 m.

Campylaspis exarata sp. nov.

(fig. 18)

MATERIAL. 8°03'S, 34°23'W-8°02'S, 34°25'W, 587 m, 21.2.1967, 6 ♀♀.

DESCRIPTION. Adult female, length 4.7 mm: carapace (fig. 18a, b) about two-and-a-half as long as high, produced backwards to overhang the anterior pereonites, with two well-defined, somewhat undulating ridges running obliquely backwards, more or less parallel with the lower edge of the carapace; the upper edge does not reach as far as the mid-dorsal line; a fairly large blunt prominence is present on either side of the frontal area. The pseudorostrum is more than a fifth of the total

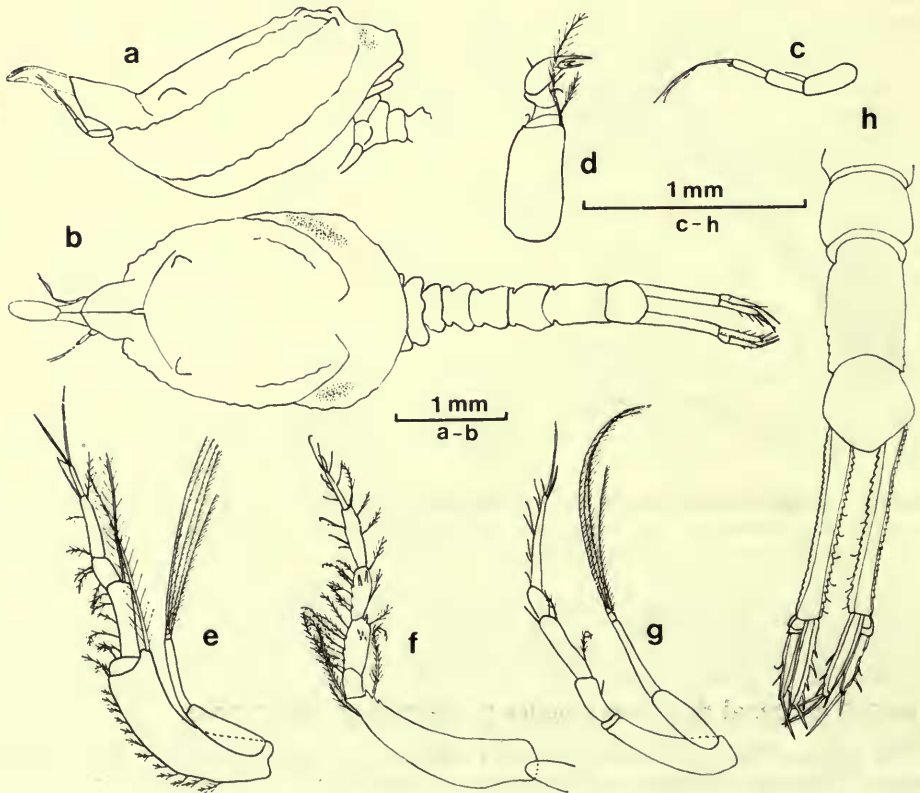


FIG. 18. *Campylaspis exarata* ♀. a, carapace from side; b, from above; c, antenna 1; d, maxilliped 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, uropod and end of pleon.

carapace length and is obliquely upturned, with a distinctly excavated antennal notch below. The eyelobe is small and narrow, without lenses.

Antenna 1 (fig. 18c) with the basal segment of the peduncle straight, about one-and-a-half as long as the third segment.

Maxilliped 2 (fig. 18d) with the ischiobasis fairly long, its distal seta slender and normally pinnate; propodus with a fairly slender terminal process reaching well beyond the dactyl, which has three spines, the middle small. Maxilliped 3 (fig. 18e) with the basis curved, distinctly shorter than the rest of the appendage, and with the upper distal part somewhat produced; the remaining segments are rather slender and unserrated.

Pereopod 1 (fig. 18f) with the basis a little shorter than remaining segments combined, somewhat curved, with several teeth on the distal upper edge; the merus and carpus are serrated on the lower edge and have a number of spines on the outer side. Pereopod 2 (fig. 18g) with the basis narrow, little more than half as long as the rest of the appendage; the dactyl is tapered, with several slender spines distally, and is shorter than the carpus and propodus combined.

Uropod (fig. 18h) about as long as the last three pleonites together; the peduncles are strongly serrated on either side and about twice as long as the endopod, which is a little longer than the exopod and has four spines on its inner edge and two unequal end spines.

TYPE LOCALITY. 8°03'S, 34°23'W-8°02'S, 34°25'W, 587 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 315; Paratypes 1974: 316.

REMARKS. *C. exarata*, with its lateral ridges on the carapace and upturned pseudorostrum, considerably resembles *C. vitrea* Calman. However, the rear dorsal side of the carapace has a different appearance, the uppermost ridge being in *C. vitrea* joined by its fellow from the opposite side by a short ridge passing straight across the top of the carapace. Among other differences the dactyl of pereopod 2 in *C. vitrea* is distinctly longer than the carpus and propodus combined.

Six specimens were collected off Recife, Brazil, in 587 m.

Campylaspis mansa sp. nov.

(fig. 19)

MATERIAL. 38°46'N, 70°06'W, 2886 m, 21.8.1964, 2 ♀♀, 3 ♂♂; 32°10.5'N, 64°40.7'W, 2291 m, 6.8.1966, 4 ♀♀; 32°19.4'N, 64°34.9'W-32°19'N, 64°34.8'W, 1135-1153 m, 18.8.1966, 97 ♀♀, 19 ♂♂, 10 juv.; 32°15.8'N, 64°31.6'W-31°16.1'N, 64°32.6'W, 2095-2223 m, 19.8.1966, 13 ♀♀, 5 ♂♂, 8 juv.

DESCRIPTION. Immature male, length 3.5 mm: carapace (fig. 19a, b) a little more than twice as long as high, not much elevated, with two rather irregular but well-defined ridges on either side running backwards more or less parallel with the lower posterior edge; the lower ridge extends back as far as the hind dorsal edge of the carapace; there are a few blunt prominences dorsally and a larger rotundity on either side of the frontal area. The pseudorostrum is about a seventh of the total

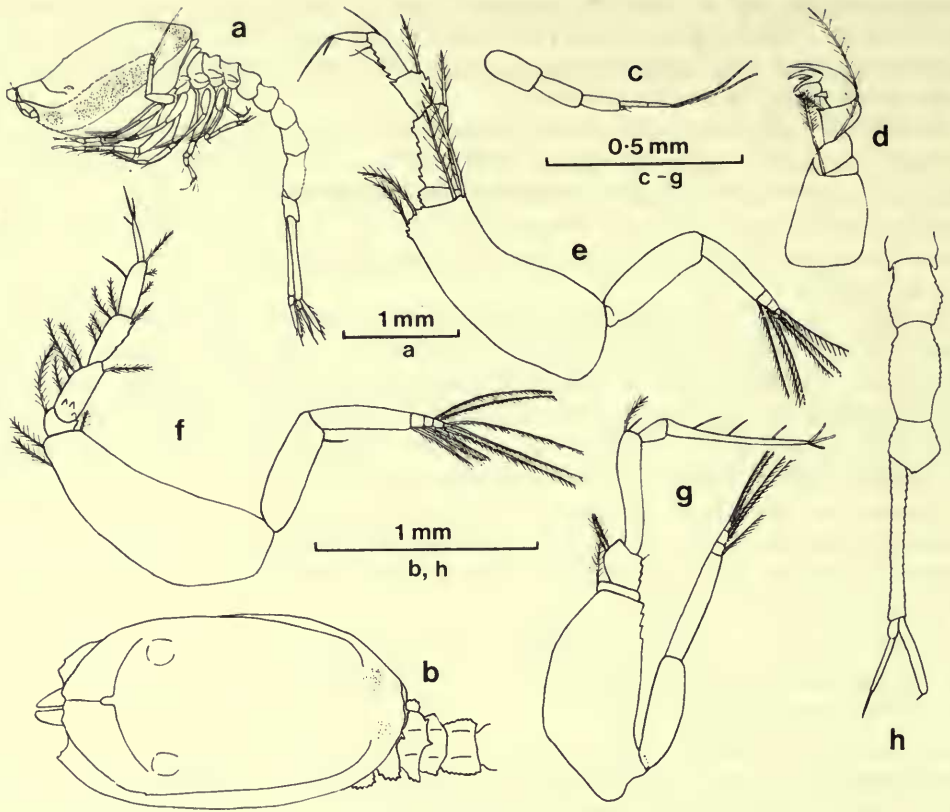


FIG. 19. *Campylaspis mansa* subadult ♂. a, from side; b, carapace and pereon from above; d, maxilliped 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, uropod and end of pleon.

carapace length, with a well-excavated antennal notch below, bounded by an anterolateral tooth, with some obtuse serrations behind. The eyelobe is rudimentary, fairly narrow.

The pereon and pleon somites have some dorsal teeth and lateral serrations. The anterior pereonites have dorsal elevations.

Antenna 1 (fig. 19c) with the basal segment of the peduncle straight, about one-and-a-half as long as the third segment.

Maxilliped 2 (fig. 19d) with the ischiobasis broad, its terminal seta slender and normally pinnate; there is a tooth on the inner edge of the carpus and of the propodus, which has a long end spine; the dactyl has three spines, the middle rather small. Maxilliped 3 (fig. 19e) with the basis broad basally, about as long as the rest of the appendage; the merus is narrow and serrated on the lower edge; the carpus has serrations on the upper edge and one terminal tooth on the lower edge while the propodus is serrated along the lower edge.

Pereopod 1 (fig. 19f) with the basis a little longer than remaining segments together; the carpus is serrated along the upper edge. Pereopod 2 (fig. 19g) with the basis more than half as long as the rest of the appendage, rather broad; the merus is serrated on the upper edge; the dactyl is slender and tapering, as long as the carpus and propodus together, with three stout spines distally.

Uropod (fig. 19h) distinctly longer than the last three pleonites together, the peduncle slender, serrated on both edges and more than twice as long as the endopod; the exopod is about as long as the endopod.

Adult male, length 5.0 mm: differs from the immature male in the usual characters. The flagellum of antenna 2 is as long as the body with the uropods.

TYPE LOCALITY. 38°46'N, 70°06'W, 2886 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 317; Paratypes 1974: 318.

REMARKS. *C. mansa* somewhat resembles *C. undata* Sars in the presence of two well-defined ridges on either side of the carapace. *C. undata*, however, has a large eyelobe with lenses and the dactyl of pereopod 2 is of quite a different shape.

Numerous specimens occurred on the Gay Head - Bermuda transect between 1135 and 2886 m.

Campylaspis bicarinata sp. nov.

(fig. 20)

MATERIAL. 36°23'N, 67°58'W, 4680 m, 23.8.1964, 2 ♂♂; 37°59.2'N, 79°26.2'W; 3834 m, 5.7.1965, 6 ♀♀, 2 ♂♂; 0°03'S, 27°48'W, 3730-3783 m, 13.2.1967, 1 ♀, 0°46'S, 29°28'W-0°46.5'S, 29°24'W, 3459 m, 14.2.1967, 18 ♀♀, 11 ♂♂; 7°58'S, 34°22'W, 834-939 m, 18.2.1967, 3 ♂♂; 7°58'S, 34°17'W-7°50'S, 34°17'W, 943-1007 m, 20.2.1967, 2 ♀♀, 1 ♂, 1 juv.

DESCRIPTION. Adult female, length 4.2 mm: carapace (fig. 20a, b) about twice as long as high, not greatly elevated dorsally, with two well-defined ridges on either side running backwards more or less parallel with the lower edge, the lower ridge defining the hind dorsal edge of the carapace and the upper ridge ending short of the mid-line; there is a small spine on the mid-dorsal line behind the eyelobe but no other prominences. The pseudorostrum is not upturned, less than a fifth of the total carapace length, with an obtuse antero-lateral angle below it and some serrations behind. The eyelobe is not very large, without lenses.

The anterior pereonites are elevated dorsally.

Antenna 1 (fig. 20d) with the segments of the peduncle fairly slender, the first moderately curved, about one-and-a-half as long as the third.

Maxilliped 2 (fig. 20e) with the ischiobasis long, its terminal seta fairly short but not much thickened; there is a tooth on the inner edge of the carpus and of the propodus, of which the terminal process reaches beyond the spines of the dactyl; there are three of these, the middle one very small. Maxilliped 3 (fig. 20f) with the basis curved, longer than the rest of the appendage; the remaining segments are fairly slender, the merus and carpus serrated on the upper edge.

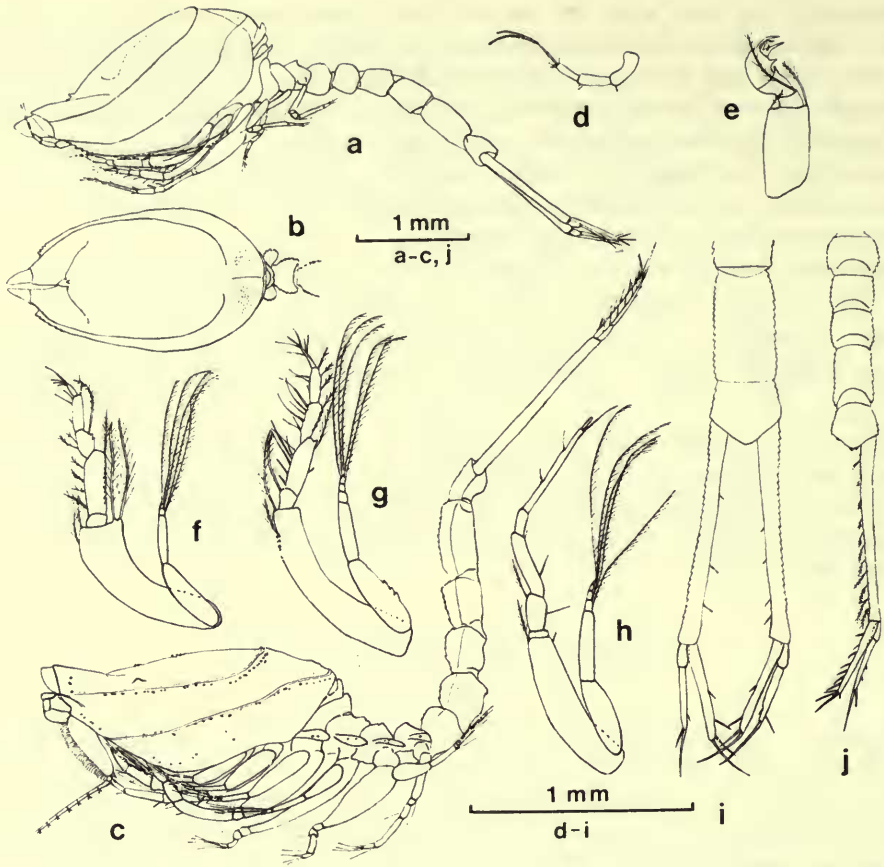


FIG. 20. *Campylaspis bicarinata*. a, ♀ from side; b, ♀ carapace from above; c, ♂ from side; d, ♀ antenna 1; e, ♀ maxilliped 2; f, ♀ maxilliped 3; g, ♀ pereopod 1; h, ♀ pereopod 2; i, ♀ uropod and end of pleon; j, ♂ uropod and end of pleon.

Pereopod 1 (fig. 20g) with the basis curved, serrated on the distal lower edge, about as long as the rest of the appendage; there is a spine on the upper distal end of the merus. Pereopod 2 (fig. 20h) with the basis about two-thirds as long as the remaining segments together; the dactyl is slender, little tapered, with some setae and one short thick spine distally; it is very little longer than the carpus and propodus together.

Uropod (fig. 20i) about as long as the last four pleonites combined, the peduncle serrated on its outer edge, more than twice as long as the endopod, which is distinctly longer than the exopod; the endopod has three thin spines on its inner edge and a longer end spine.

Adult male, length 4.7 mm (fig. 20c, j): differs in the usual respects from the female. The flagellum of antenna 2 is probably as long as the body including uropods. A male, length 6.0 mm, from the Gay Head - Bermuda transect differs in

some minor respects from males from the Dakar – Recife transect, especially in the presence of some small spines dorsally on the carapace and a low tubercle on either side of the frontal area ; it also has a number of blotches of red pigment on the carapace and pereon somites, especially concentrated along the lateral ridges. These, and some small differences in the appendages, however, do not seem to warrant separation of the specimens from the two areas.

TYPE LOCALITY. $0^{\circ}46'S$, $29^{\circ}28'W$ – $0^{\circ}46.5'S$, $29^{\circ}24'W$, 3459 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974:319; Paratypes 1974:320.

REMARKS. *C. bicarinata* is fairly near to *C. undata* Sars but the latter species has a well-developed eyelobe with lenses and there are various differences in the appendages ; in particular the dactyl of pereopod 2 is much more slender and proportionately longer in *C. bicarinata* and the peculiar spine at its distal end is not present in *C. undata* but somewhat resembles the distal armature of the dactyl of pereopod 2 in *C. plicata* and *C. bulbosa*.

A moderate number of specimens was obtained at several stations on the Gay Head – Bermuda transect and in the western part of the Dakar – Recife transect, between 834 and 4680 m.

Campylaspis rostrata Calman, 1905

MATERIAL. $43^{\circ}35.6'N$, $3^{\circ}24.8'W$, 860 m, 15.7.1967, 1 ♀; $43^{\circ}43'N$, $3^{\circ}47.8'W$, 641 m, 19.7.1967, 4 ♀♀; $46^{\circ}17.5'N$, $4^{\circ}45.2'W$, 1336 m, 24.7.1967, 1 ♂.

DISTRIBUTION. Previously recorded from southwest of the Faroes, southwest of Ireland and the Mediterranean off Monaco, between 220 and 1205 m. The present records from the Bay of Biscay extend its lower depth limit slightly to 1336 m. Calman (1910) records it from the coast of Sudan but this must be a mistake. The latitude and longitude given place the position somewhere south of the Canary Islands.

Campylaspis intermedia Hansen, 1920

MATERIAL. $39^{\circ}50.5'N$, $70^{\circ}35'W$, 823.5 m, 25.5.1961, 1 ♀; $39^{\circ}54.5'N$, $70^{\circ}35'W$, 466.7–508.7 m, 23.5.1962, 1 ♀; $39^{\circ}46.5'N$, $70^{\circ}43.3'W$, 1470–1330 m, 25.8.1964, 36 ♀♀, 12 ♂♂, 4 juv.; $39^{\circ}48.7'N$, $70^{\circ}40.8'W$, 1102 m, 6.7.1965, 3 ♀♀, 2 ♂♂, 4 juv.; $39^{\circ}54.1'N$, $70^{\circ}37'W$, 478 m, 6.7.1965, 8 ♀♀; $39^{\circ}56.6'N$, $71^{\circ}03.6'W$, 530 m, 5.5.1966, 1 ♀; $39^{\circ}38.5'N$, $70^{\circ}36.5'W$ – $39^{\circ}39'N$, $70^{\circ}37.1'W$, 2178 m, 18.12.1966, 2 ♀♀, 4 juv.

DISTRIBUTION. The only previous records are those of Hansen (1920) from the Davis Strait and south of Jan Mayen in 582 and 679 m. The present records extend its geographical range southwards in the N.W. Atlantic and its depth range to between 467 and 2178 m. It seems to be confined more or less to the continental slope.

Campylaspis submersa sp. nov.
(fig. 21)

MATERIAL. 8°02'S, 34°03'W-7°56'S, 34°09'W, 1493 m, 19.2.1967, 2 ♀♀.

DESCRIPTION. Adult female, length 3.4 mm : carapace (fig. 21a, b, c) distinctly less than twice as long as high, nearly oval in outline, with many rather large rounded prominences on the dorsal part ; on either side is a shallow indistinct sulcus. The pseudorostrum is blunt, less than a sixth of the total carapace length, with a distinct antennal notch below and an acute antero-lateral angle. The eyelobe is large and broad but without lenses.

Antenna 1 (fig. 21d) with the first segment of the peduncle broad, slightly curved, nearly twice as long as the third segment.

Maxilliped 2 (fig. 21e) with the ischiobasis fairly long, its distal seta normally pinnate ; the distal spine of the propodus reaches a little beyond the spines of the dactyl, of which there are three, the middle small. Maxilliped 3 (fig. 21f) with the basis curved, fairly slender and distinctly longer than the remaining segments together ; the merus is broadened distally.

Pereopod 1 (fig. 21g) with the basis moderately curved, slender, a little longer than the rest of the appendage ; no spines or serrations are present. Pereopod 2 (fig. 21h) with the basis fairly broad, about half as long as the rest of the appendage ; the dactyl is tapered to a point, with several slender spines at its end, and is shorter than the carpus and propodus together.

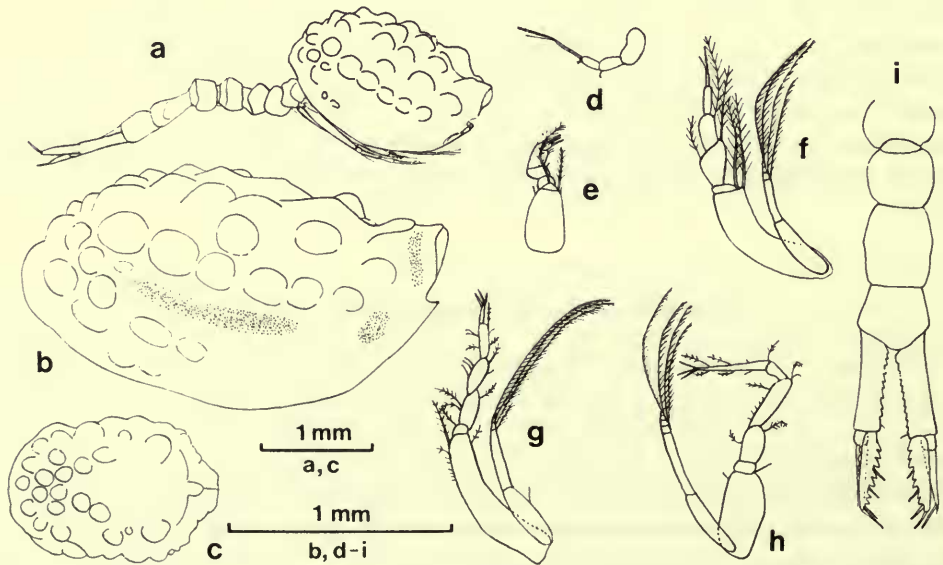


FIG. 21. *Campylaspis submersa* ♀. a, from side ; b, carapace from side ; c, carapace from above ; d, antenna 1 ; e, maxilliped 2 ; f, maxilliped 3 ; g, pereopod 1 ; h, pereopod 2 ; i, uropod and end of pleon.

Uropod (fig. 21i) fairly broad, shorter than the last three pleon somites together ; the peduncle is serrated on the inner edge and only about a quarter longer than the endopod, which is a little longer than the exopod ; the endopod has some strong serrations and three slender spines on the inner edge, with one end spine.

TYPE LOCALITY. 8°02'S, 34°03'W-7°56'S, 34°09'W, 1493 m. Types deposited in the British Museum (Natural History). Registration numbers : Holotype 1974 : 321 ; Paratype 1974 : 322.

REMARKS. None of the described species of *Campylaspis* has precisely the arrangement of large rounded prominences on the carapace shown by this species, although there are a number with fairly large tubercles, such as *C. globosa* Hansen. This arrangement and the short, rather broad uropods, as well as the relative proportions of some of the appendages, should make recognition easy.

Two specimens only were collected off Recife, Brazil, in 1493 m.

Campylaspis paucinodosa sp. nov.

(fig. 22)

MATERIAL. 39°54.5'N, 70°35'W, 466.7-508.7 m, 23.5.1962, 1 ♀.

DESCRIPTION. Subadult female, length 3.9 mm : carapace (fig. 22a, b) distinctly less than twice as long as high, with a relatively small number of fairly large tubercles confined to the dorsal half and with a shallow excavation on either side. The

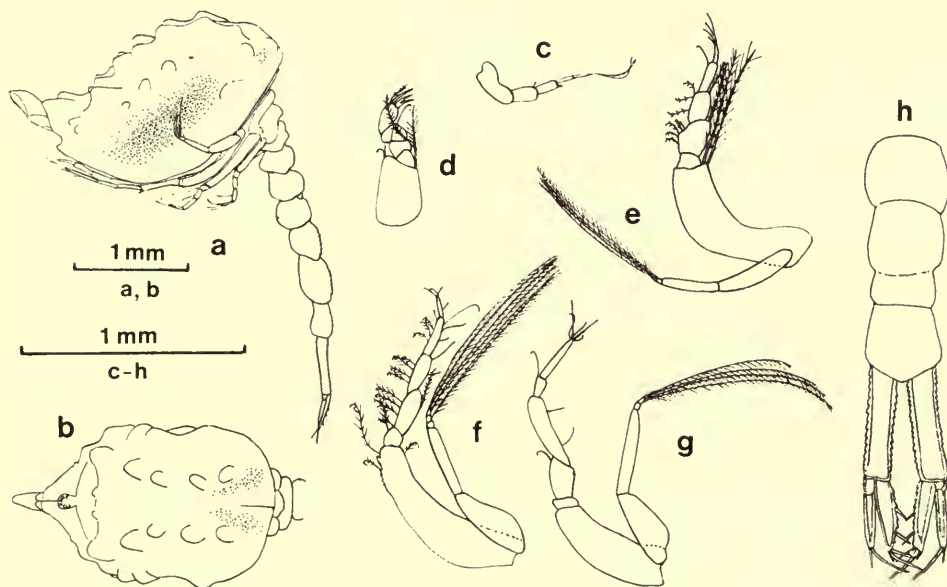


FIG. 22. *Campylaspis paucinodosa* immature ♀. a, from side ; b, carapace from above ; c, antenna 1 ; d, maxilliped 2 ; e, maxilliped 3 ; f, pereopod 1 ; g, pereopod 2 ; h, uropod and end of pleon.

pseudorostrum is inclined slightly upwards and fairly acutely pointed from the side, truncated from above, with a well-defined antennal notch below and a distinct but rounded antero-lateral angle. The eyelobe is large and prominent and has visible lenses.

The fourth and fifth pleonites are serrated dorsally.

Antenna 1 (fig. 22c) with the first segment of the peduncle broad basally, slightly curved, about twice as long as the third.

Maxilliped 2 (fig. 22d) with the basis fairly broad, its distal seta normally pinnate; the terminal spine on the propodus is fairly long and slender; the dactyl has two end spines of equal length. Maxilliped 3 (fig. 22e) with the basis strongly curved, longer than the rest of the appendage; the merus is fairly broad but none of the segments have spines or serrations.

Pereopod 1 (fig. 22f) with the basis a little longer than the remaining segments together, with some serrations on the distal lower edge. Pereopod 2 (fig. 22g) with the basis about two-thirds as long as the rest of the appendage; the dactyl is short, scarcely tapering, much shorter than the carpus.

Uropod (fig. 22h) short, about as long as the last two pleonites together; the peduncle is serrated on either edge, about one-and-a-half as long as the endopod, which is scarcely longer than the exopod; the endopod has some serrations and three fairly stout spines on its inner edge and two unequal end spines.

TYPE LOCALITY. 39°54'5"N, 70°35'W, 467-509 m. Type deposited in the British Museum (Natural History). Registration number: Holotype 1974:323.

REMARKS. *C. paucinodosa* shows some resemblance to *C. horrida* Sars but it has a smaller number of tubercles and is without dorso-lateral projections on the pereonites and anterior pleonites; the uropods are also much shorter and the relative proportion of the peduncle to the endopod much smaller than in *C. horrida*.

Calman (1912) doubtfully referred a dried and broken specimen from 428 fathoms in nearly the same locality as that for *C. paucinodosa* to *C. horrida*. It is likely that it was *C. paucinodosa*, and not *C. clavata*, as suggested by Lomakina (1958).

A single specimen was obtained south of Gay Head in 467-509 m.

***Campylaspis horridoides* Stephensens, 1915**
(fig. 23)

MATERIAL. 43°35'6"N, 3°24'8"W, 860 m, 15.7.1967, 3 ♀♀, 1 ♂, 1 juv.; 38°27'N, 4°08'E, 2447 m, June 1970, 1 ♀.

DISTRIBUTION. Previously recorded only from the Mediterranean south of Sardinia in 1227 m this species is now recorded also from the Bay of Biscay and its depth range between 860 and 2447 m.

REMARKS. Although Stephensens's (1915) figures are adequate there is one character which he omits to mention and which may be useful for identifying the species. This is the rather broad suture visible from above along the mid-dorsal line (fig. 23) which differs in appearance from closely related species such as

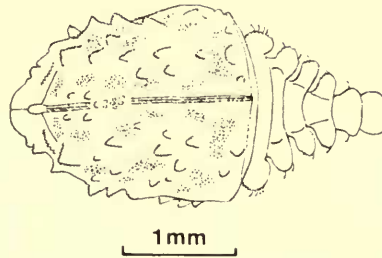


FIG. 23. *Campylaspis horridoides* ♀. Carapace and pereon from above.

C. squamifera Fage. Dr Torben Wolff of Universitetets Zoologiske Museum, København, has kindly allowed me to examine Stephensen's original specimens which I have checked for this character and from which I have selected lectotypes.

Campylaspis squamifera Fage, 1929

MATERIAL. 43°35·6'N, 3°24·8'W, 860 m, 15.7.1967, 5 ♀♀, 1 ♂, 3 juv.; 43°43'N, 3°47·8'W, 641 m, 19.7.1967, 3 ♀♀, 5 ♂♂, 19 juv.

DISTRIBUTION. Known previously from a single specimen dredged in the south of the Bay of Biscay from 4380 m, those recorded here are from considerably lesser depths in the more northerly part of the Bay.

Campylaspis glebulosa sp. nov.

(fig. 24)

MATERIAL. 0°03'S, 27°48'W, 3730-3783 m, 13.2.1967, 1 ♂; 0°46'S, 29°28'W-0°46·5'S, 29°24'W, 3459 m, 14.2.1967, 1 ♀; 7°58'S, 34°17'W-7°50'S, 34°17'W, 943-1007 m, 20.2.1967, 1 ♀; 8°03'S, 34°23'W-8°02'S, 34°25'W, 587 m, 21.2.1967, 1 ♀.

DESCRIPTION. Adult female, length 4·5 mm: carapace (fig. 24a, b) a little more than one-and-a-half as long as high, well elevated, with fairly numerous tubercles, most of which are serrated, and an ill-defined sulcus on either side; there is a short transverse ridge across the middle of the frontal area. The pseudorostrum is less than a sixth of the total carapace length, bluntly pointed from the side, with a slightly excavated antennal notch below and a slightly projecting antero-lateral angle. The eyelobe is fairly large but without lenses.

The pereon and anterior pleon somites have serrated low dorsal projections.

Antenna 1 (fig. 24d) with the basal segment of the peduncle curved, nearly three times as long as the third.

Maxilliped 2 (fig. 24e) with the ischiobasis long, its terminal seta fairly short and pinnate distally but not thickened; terminal propodal spine about as long as the spines of the dactyl, of which there are three, the middle very small. Maxilliped 3 (fig. 24f) with the basis curved, distinctly longer than the rest of the appendage; the segments are not broad, the merus and carpus with some strong spines on the upper edge.

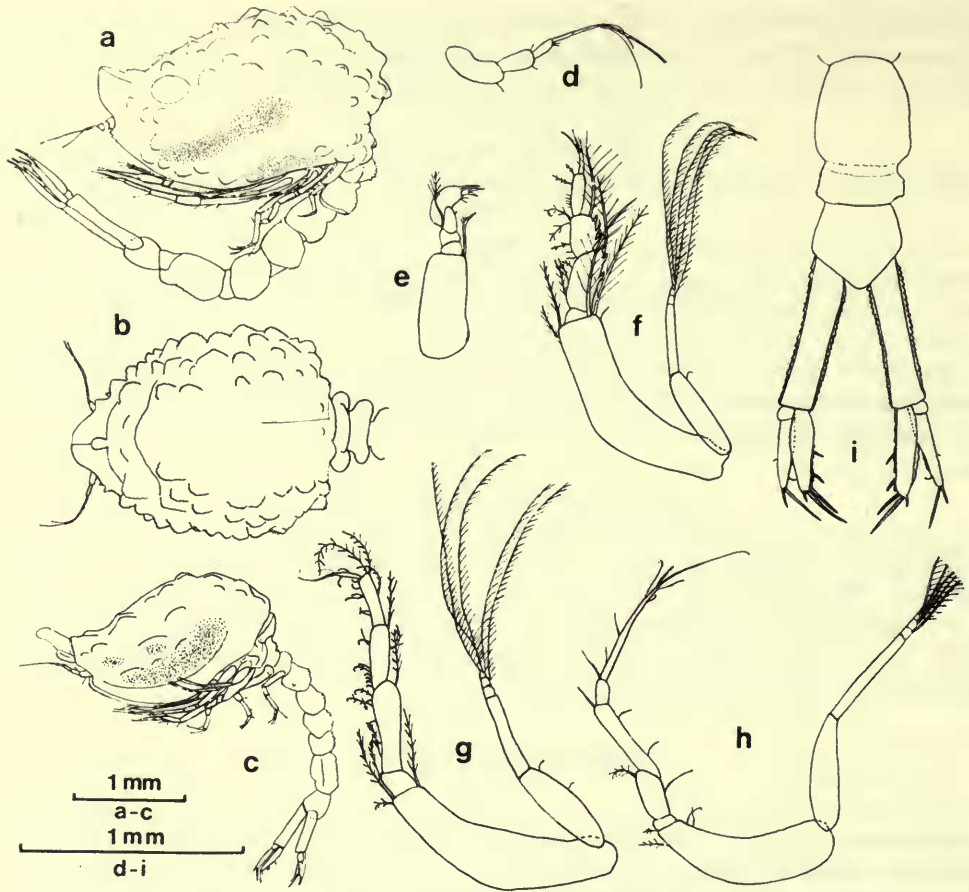


FIG. 24. *Campylaspis glebulosa*. a, ♀ from side; b, ♀ carapace from above; c, immature ♂ from side; d, ♀ antenna 1; e, ♀ maxilliped 2; f, ♀ maxilliped 3; g, ♀ pereopod 1; h, ♀ pereopod 2; i, ♀ uropod and end of pleon.

Pereopod 1 (fig. 24g) with the basis moderately curved, a little longer than the rest of the appendage. Pereopod 2 (fig. 24h) with the basis about two-thirds as long as the rest of the appendage; the dactyl is tapered but not pointed, with long slender terminal spines, and is almost as long as the carpus and propodus together.

Uropod (fig. 24i) about as long as the last two pleonites together; the peduncle is serrated on either edge and more than one-and-a-half as long as the endopod, which is equal in length to the exopod; the endopod has some serrations on either edge and three fairly slender spines on the inner edge, with two unequal end spines.

TYPE LOCALITY. $0^{\circ}46'S$, $29^{\circ}28'W$ – $0^{\circ}46.5'S$, $29^{\circ}24'W$, 3459 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 324; Paratype 1974: 325.

REMARKS. *C. glebulosa* quite closely resembles *C. squamifera*, but has fewer tubercles, especially on the sides of the carapace, and lacks the dorso-lateral processes and strong serrations present on the pereon and pleon of the latter species. There are also many differences in the appendages, especially the comparative lack of teeth or serrations in *C. glebulosa* and the much longer basis of pereopod 2 compared with the rest of the appendage. From *C. globosa* Hansen this species may be distinguished, among other characters, by the comparative shortness of the uropods, which in *C. globosa* are as long as the last three pleonites.

A few specimens were obtained at several stations in the western part of the Dakar - Recife transect, in 587-3783 m.

Campylaspis torulosa sp. nov.

(fig. 25)

MATERIAL. 36°23'N, 67°58'W, 4680 m, 23.8.1964, 18 ♀♀, 4 ♂♂; 36°24'4"N, 67°56'W, 4749 m, 4.7.1965, 3 ♀♀, 6 ♂♂, 2 juv.; 36°20'N, 67°56'W, 4694 m, 13.12.1965, 1 ♀; 37°24'N, 65°54'W-37°26'N, 65°50'W, 4825 m, 23.8.1966, 1 ♀, 4 ♂♂, 3 juv.

DESCRIPTION. Adult female, length 5.2 mm: carapace (fig. 25a, b) about twice as long as high, evenly rounded dorsally, somewhat produced backwards over the anterior pereonites, with many fairly large tubercles or blunt spines set in irregular rows, leaving a fairly small area free from tubercles on either side; the frontal area is crossed by two poorly defined transverse ridges. The pseudorostrum is short and obtuse, less than a seventh of the total carapace length, with a trace of an antennal notch below, defined posteriorly by two blunt teeth. The eyelobe is of moderate size, without lenses.

The pereon and the first five pleon somites have blunt lateral projections and there are some small tubercles on the dorsum of the fifth pleonite.

Antenna 1 (fig. 25c) with the segments of the peduncle fairly stout, the first curved and nearly three times as long as the third.

Maxilliped 2 (fig. 25d) with the ischiobasis broad and truncated at the base; the carpus has a small tooth on the distal inner edge; the propodal process reaches beyond the spines of the dactyl, of which there are two of approximately equal length. Maxilliped 3 (fig. 25e) with the basis much longer than rest of appendage; the ischium has some teeth on the lower edge and there are a number of teeth on the lower edge of the merus, which also has a sharp tooth on the upper edge distally; there are several sharp teeth on the upper edge of the carpus; the ischium and merus are fairly broad.

Pereopod 1 (fig. 25f) with the basis distinctly longer than rest of appendage, serrated distally on both edges. Pereopod 2 (fig. 25g) with the basis broad, less than three-quarters as long as the remaining segments together, serrated distally on either edge; the dactyl is little tapered, with a blunt end, about as long as the carpus and propodus together.

Uropod (fig. 25h) broad, a little shorter than the last three pleonites together, the peduncle serrated on either edge and with some short setae on the inner edge, only about one-and-a-quarter as long as the endopod, which is a little longer than the

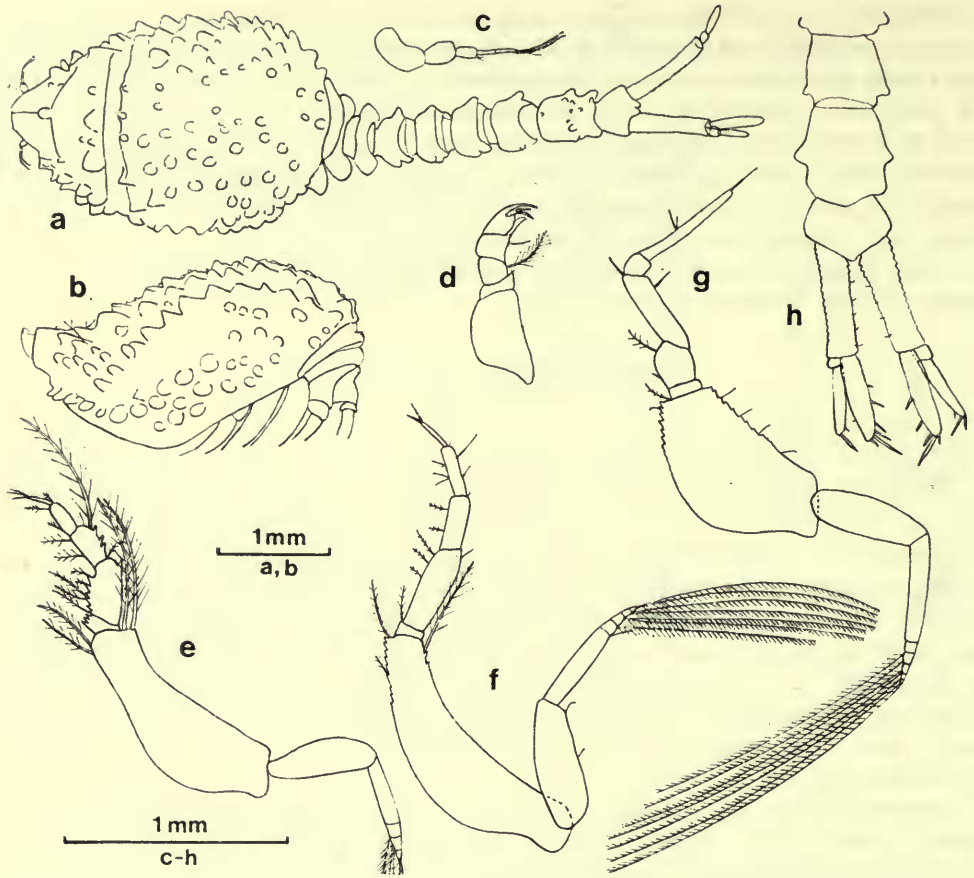


FIG. 25. *Campylaspis torulosa* ♀. a, from above; b, carapace from side; c, antenna 1; d, maxilliped 2; e, maxilliped 3; f, pereopod 1; g, pereopod 2; h, uropod and end of pleon.

exopod; the endopod has three or four spines on the inner edge and two unequal end spines.

TYPE LOCALITY. 37°24'N, 65°54'W-37°26'N 65°50'W, 4825 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974: 326; Paratypes 1974: 327.

REMARKS. *C. torulosa* seems to be closely related to *C. papillata* Lomakina but the arrangement of the tubercles on the carapace is somewhat different, while in *C. papillata* the dactyl of pereopod 2 is more tapered and the endopod of the uropod is narrower and has a greater number of spines on its inner edge. It also resembles *C. squamifera* but has many more tubercles on the dorsum of the carapace than that species.

The species was obtained on several occasions on the deeper parts of the Gay Head - Bermuda transect from the abyssal plain, between 4680 and 4825 m.

Campylaspis verrucosa G. O. Sars, 1866

MATERIAL. 43°40'8"N, 3°35'2"W, 1739 m, 16.7.1967, 3 ♂♂; 43°43'N, 3°47'8"W, 641 m, 19.7.1967, 4 ♀♀, 1 ♂♂.

DISTRIBUTION. Recorded from the N.E. Atlantic from the Lofotens to the coast of Portugal and from the Mediterranean, between 100 and 1100 m. The present records from the Bay of Biscay increase the lower limit of known occurrence to 1739 m.

Campylaspis globosa Hansen, 1920

MATERIAL. 39°26'N, 70°33'W, 2496 m, 21.8.1964, 20 ♀♀; 38°46'N, 70°06'W, 2886 m, 21.8.1964, 1 ♀; 39°55'2'N, 70°39'5'W, 498 m, 27.4.1966, 11 ♀♀, 6 ♂♂; 39°56'6'N, 71°03'6'W, 530 m, 5.5.1966, 1 ♀.

DISTRIBUTION. Previously recorded only from the Davis Strait in 2626 m. As with *C. intermedia*, which has much the same geographical range, its range is extended to the south and its upper depth limit to 498 m. It appears to extend to greater depths than *C. intermedia*.

Campylaspis multinodosa sp. nov.

(fig. 26)

MATERIAL. 23°00'S, 12°45'E, 1007-1014 m, 16.5.1968, 12 ♀♀, 1 ♂; 23°05'S, 12°31'5'E, 1546-1559 m, 17.5.1968, 1 ♀, 2 juv.; 23°02'S, 12°19'E, 2117-2154 m, 17.5.1968, 1 ♀, 2 ♂♂.

DESCRIPTION. Adult female, length 3.9 mm: carapace (fig. 26a, b) twice as long as high, with many small tubercles dorsally and on the sides, some of which are acute, especially on the pseudorostrum and just below it; on either side is a fairly small shallow excavation. The pseudorostrum is more than a sixth of the total carapace length, truncate in front, with a well-defined antennal notch and anterolateral angle below it. The eyelobe is fairly large but without lenses.

The last pereonite and the first five pleonites have paired dorso-lateral teeth.

Antenna 1 (fig. 26d) with the segments of the peduncle slender, the basal segment slightly curved and less than one-and-a-half as long as the third.

Maxilliped 2 (fig. 26e) with the ischiobasis fairly long, serrated on its distal outer edge, with its distal seta normally pinnate; the carpus has a few serrations on the outer edge and the propodus a tooth on the inner edge and a slender end spine; the dactyl has two spines. Maxilliped 3 (fig. 26f) with the basis slender, serrated on either edge distally, much longer than the remaining segments together; these are not widened and the merus, carpus and propodus are serrated on the lower edge; the dactyl is small.

Pereopod 1 (fig. 26g) with the basis about as long as the rest of the appendage, serrated on its distal lower edge; there are one or two serrations on the lower edge of the ischium. Pereopod 2 (fig. 26h) with the basis little more than half as long as the rest of the appendage, serrated along its distal upper edge; the merus is serrated distally on both edges and the carpus proximally on the upper edge; the dactyl is

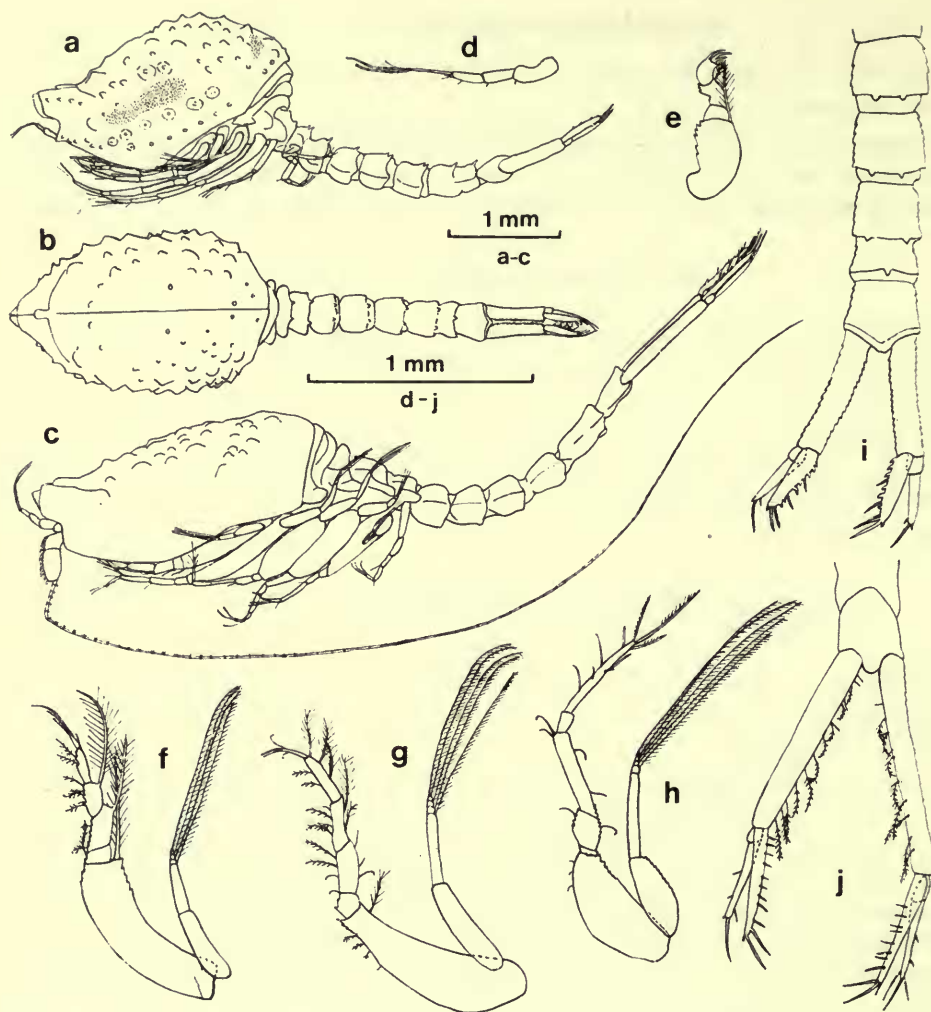


FIG. 26. *Campylaspis multinodosa*. a, ♀ from side; b, ♀ from above; c, ♂ from side; d, ♀ antenna 1; e, ♀ maxilliped 2; f, ♀ maxilliped 3; g, ♀ pereopod 1; h, ♀ pereopod 2; i, ♀ uropod and end of pleon; j, ♂ uropod and end of pleon.

not tapered and has several fairly long pinnate end spines; it is a little shorter than the carpus and propodus together.

Uropod (fig. 26i) rather longer than the last two pleon somites together, the peduncle serrated on either edge and about one-and-three-quarters as long as the endopod, which is a little longer than the exopod; the endopod has some stout serrations and three spines on the inner edge, with two unequal end spines.

Adult male, length 5.3 mm (fig. 26c, j): differs from the female in the usual characters. The sides of the carapace are smoother and there are no dorso-lateral teeth on the pleon somites. The second antennal flagellum reaches to the end of the

uropods and these are more slender and have more setae and spines but are little serrated.

TYPE LOCALITY. 23°00'S, 12°45'E, 1007-1014 m. Types deposited in the British Museum (Natural History). Registration numbers: Holotype 1974:328; Paratypes 1974:329.

REMARKS. *C. multinodosa* shows a considerable resemblance to *C. antarctica* Calman. The latter has several teeth on the outer side of the carpus of maxilliped 3 and the dactyl of pereopod 2 is longer than the carpus and propodus together, but otherwise it is difficult to separate them and the two are very closely related and perhaps identical.

A moderate number of specimens were captured at several stations off S.W. Africa in 1007-2154 m.

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DR N. S. JONES
 Department of Marine Biology
 THE UNIVERSITY OF LIVERPOOL
 PORT ERIN
 ISLE OF MAN