Notes on the genus *Bythocaris* G.O. Sars, with the description of a new species

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Key words: Crustacea; Decapoda; Caridea; Hippolytidae: *Bythocaris*; key.

During the CANCAP-5 expedition to the Azores (1981) a new species of *Bythocaris* was found. The new species is described and figured. It is compared with other members of the genus. A key to the species of *Bythocaris* is provided. The intra-specific morphological variation of *B. payeri*, *B. leucopis* and *B. simplicirostris* has been studied. The relevance of this intra-specific variation for distinguishing between species is discussed.

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Introduction

During the CANCAP-5 expedition with HMS 'Tydeman' to the Azores in 1981, a shrimp belonging to the genus *Bythocaris* was caught in an Agassiz trawl, fishing at depths between 2070 and 2120 m. The CANCAP-project was a marine biological research project carried out in the CANarian-CAPe Verdian region of the North Atlantic Ocean from 1976 to 1987 (den Hartog, 1984; Van der Land, 1987). The specimen is similar to *B. payeri* (Heller, 1875) and *B. gorei* Abele & Martin, 1989, but differs from these in several characters. The combination of these distinguishing characters seems sufficient to describe the species as new.

In caridean shrimp families certain characters are more valuable to distinguish species than other characters. In the Pontoniine shrimps for instance the number and position of the dorsal and terminal spines on the telson are important. Within species of this subfamily variation in this character is almost absent. In the Hippolytidae this seems not the case. In many species the number and position of telson spines vary considerably. Variation of some characters is correlated with size, which also contributes to the intra-specific morphological variation.

At present 16 nominal species in the genus *Bythocaris* are known: *B. biruli* Kobjakova, 1964; *B. cosmetops* Holthuis, 1951; *B. cryonesus* Bowman & Manning, 1972; *B. curvirostris* Kobjakova, 1957; *B. elegans* Bryazgin, 1982; *B. floridensis* Abele & Martin, 1989; *B. gorei* Abele & Martin, 1989; *B. gracilis* Smith, 1885; *B. grumanti* Burukovsky, 1966; *B. irene* Retowsky, 1946; *B. leucopis* G.O. Sars, 1885; *B. miserabilis* Abele & Martin, 1989; *B. nana* Smith, 1885; *B. payeri* (Heller, 1875); *B. simplicirostris* G.O. Sars, 1869; *B. spinipleura* Squires, 1990. All species are distributed in the North Atlantic and Arctic seas, usually occurring in water down to ca. 3000 m. Of eight species nothing is known about the intra-specific morphological variation as they are only known from one or two specimens. To get more information about the variation of certain characters and their diagnostic value of these characters for distinguishing species, large series of material of *B. leucopis*, *B. payeri*, and *B. simplicirostris* were studied.

The material studied comprises collections of the Zoological Museum of Oslo, Norway (ZMO), including G.O. Sars' specimens from the Norwegian North Atlantic Expeditions 1876-1878; Bergens Museum, Norway (BeM); Trondheim Museum, Norway (ThM); Tromsø Museum, Norway (TsM); Nationaal Natuurhistorisch Museum, The Netherlands (NNM) [formely Rijksmuseum van Natuurlijke Historie (RMNH)]. The Norwegian collections were send to the NNM in 1961 to be studied for the "Marine Invertebrates of Scandinavia" series first by L.B. Holthuis, later by G.R. Heerebout. These collections comprise most *Bythocaris* specimens from Norwegian musea. Part of the material has been described or enumerated in previous publications. References to the publications are given with the material. Papers by Grieg (1909) and Wollebæk (1908) have been used to supplement some locality data. The program "Cricket Graph 1.3" for the MacIntosh has been used to draw the diagrams.

Intra-specific variation in *B. leucopis*, *B. payeri*, and *B. simplicirostris*

To study intra-specific variation the boundaries between species have to be dealt with too. Initial sorting out of the material investigated was done on the basis of the following key:

1. Antennal scales truncate anteriorly, anterior margins nearly straight, barely overreaching distolateral spine of scale. Eyes without dark pigment ..... ***B. leucopis***
- Antennal scales not truncate anteriorly, anterior margin rounded, projecting well beyond distolateral spine of scale. Eyes darkly pigmented 2
2. Pleura of abdominal segment 4 and 5 with spiniform process..... ***B. simplicirostris***
- Pleura of abdominal segment 4 and 5 rounded..... ***B. payeri***

Eleven morphological characters were studied: 1) the form and length/width ratio of the scaphocerite; 2) the pigmentation of the cornea; 3) the form and size of the rostrum and supraorbital teeth; 4) the number and form of middorsal teeth on the carapace; 5) the development of the antennal spine; 6) the length of the stylocerite in relation to the antennular peduncle; 7) the number of articles of the outer antennular flagellum; 8) the number of articles of the carpus of the second pereiopod; 9) the number of articles of the merus of the second pereiopod; 10) the form of the pleura of the abdominal segments; 11) the number of dorsal marginal spines on the telson.

Bythocaris payeri (Heller, 1875)
(figs. 1-13)

Hippolyte Payeri Heller, 1875a: 26-27, Pl. I figs. 1-4: Heller, 1875b: 609.

Bythocaris Payeri; Norman, 1882: 683; G.O. Sars, 1885: 33-35, pl. 3 fig. 27 (in part); G.O. Sars, 1886: 8; Norman, 1886: 8; Norman, 1894: 160; Ohlin, 1901: 41-43; Schmidt, 1904: 20; Hansen, 1908: 67-68; Kemp, 1910: 117-118, figs. 4-6; Stephensen, 1912: 567.

Bythocaris payerii; G.O. Sars, 1877: 240.

Bythocaris payeri; Hoek, 1882: 19-20, pl. I figs. 8-9; Norman, 1882: 684; Stuxberg, 1886: 53; Birula, 1897:

428-429; Thompson, 1901: 20; Breitfuss, 1904: 9; Appellöf, 1904: 14; Appellöf, 1906: 167, 168, 191, 192, 195, 196, 205; Birula, 1907: 43-44, 60, 67; Grieg, 1907: 544; Murray & Hjort, 1912: 529; Stephensen, 1913: 38-39; Williamson, 1915: 381; 544; Derjugin, 1916: 478, map; Grieg, 1927: 21; Gorbunov, 1934: 63-64, 68, 71, 75; Stephensen, 1935: 23-26, figs. 9-10, tab. 3; Gorbunov, 1946: 44, 100, 104, 126; Heegaard, 1951: 50-52, fig. 19, tab. 1; Sivertsen, 1935: 44; Sivertsen & Holthuis, 1956: 34, figs. 23-24; Kramp, 1963: 57, tab. 4; Kobjakova, 1964: 7; Squires, 1965: 27, figs. 12, 37, tab. 3; Burukovsky, 1966: 538, fig. 1; Pachomova, 1966: 63; Squires, 1966: 1, pl. 1 map 7; Abele & Martin, 1989: 47; Squires, 1990: 153-157, figs. 79-81.

? *Bythocaris payeri*; Bowen et al., 1979: 525.

Type material.— 1 specimen (48 mm total length) collected during the Österreichisch-Ungarische Nordpol-Expedition, vessel "Tegetthoff", S of Franz Josef Land, 79°0.4'N 62°29.7'E (cf. Payer, 1876) at a depth of 182 m, 3.vi.1873.

Material examined.— 2 males, cl. 5.8 and 6.0 mm; 1 ovigerous female, cl. 10.4 mm (BeM No. 2271): R.V. "Michael Sars" sta. 10, 64°53'N 10'W, 28.vii.1900, depth 630 m (Grieg, 1927: 26).— 1 male, cl. 6.8 mm; 1 non-ovigerous female, cl. 7.3 mm (BeM No. 15810): R.V. "Michael Sars" sta. 29, near Jan Mayen, 1900, depth 536 m, bottom temperature -0.1° to -0.2°C, (Grieg, 1927: 26).— 2 males, cl. 5.3 and 5.7 mm; 2 non-ovigerous females, cl. 4.6 and 6.9 mm; 6 ovigerous females, cl. 7.8-8.3 mm (BeM No. 15811): s/s "Michael Sars" sta. 13, 66°42'N 26°40'E, 13.viii.1900, depth 590 m, leg. A. Wollebæk (Grieg, 1927: 26).— 4 males, cl. 6.1-7.0 mm; 7 non-ovigerous females, cl. 4.6-8.3 mm; 1 ovigerous female, cl. 9.5 mm (BeM No. 15812): s/s "Michael Sars" sta. 10, 64°53'N 10°00'E, 28.vii.1900, depth 630 m, leg. A. Wollebæk (Grieg, 1927: 21).— 1 ovigerous female, cl. 13.0 mm (BeM No. 15814): R.V. "Michael Sars" sta. 55, 62°40'N 1°56'E, depth 670 m, bottom temperature -0.21°C, 19.vii.1902 (Grieg, 1927: 26).— 1 male, cl. 6.8 mm; 1 non-ovigerous female, cl. 9.6 mm (BeM No. 15818): R.V. "Michael Sars" sta. 55, 62°40'N 1°56'E, depth 670 m, 19.vii.1902, leg. A. Wollebæk (Grieg, 1927: 26).— 1 male, cl. 7.3 mm; 3 non-ovigerous females, cl. 7.3-7.9 mm (BeM No. 15892): R.V. "Armauer Hansen" sta. 4, 62°15'N 0°15'E, depth 800 m, bottom temperature -0.23°C, 12.v.1914 (Grieg, 1927: 26).— 3 non-ovigerous females, cl. 4.0-6.0 mm; 1 ovigerous female, 8.7 mm (BeM No. 34137): "Belgica" sta. 32, 75°58'N 14°08'W, depth 300 m, bottom brown and grey clay, bottom temperature 0.40°C, salinity 34.82‰, pelagic trawl, 24.vii.1905, det. M.J. Grieg (Grieg, 1907: 544).— 1 non-ovigerous female, cl. 12.3 mm (ZMO): s/s "Michael Sars" sta. 37, 62°43'N 1°26'E, 29.vi.1902, depth 775 m, det. L.B. Holthuis.— 1 male, cl. 6.6 mm (ZMO No. F 934): E of Bontekoe-øya, depth 168 m, bottom grayish blue clay with stone, temperature near the bottom -1.40°C, salinity 34.14‰, O_2 7.56 cc., 90.1%, 8.viii.1932, Grönland Ekspedition, sample no. 562, Hoels, det. E. Sivertsen, 1933 (Sivertsen, 1935: 44).— 1 non-ovigerous female, cl. 9.1 mm (ZMO No. F 929): Vegasund, depth 250-190 m, bottom clay, 17.viii.1930, Grönland Ekspedition, sample no. 1119, Hoels, det. E. Sivertsen (Sivertsen, 1935: 44).— 1 non-ovigerous female, cl. 9.1 mm (ZMO No. F 930): S of Kap Bennet, depth 290 m, bottom clay, 20.viii.1930, Grönland Ekspedition, sample no.1131, Hoels, det. E. Sivertsen, 1934 (Sivertsen, 1935: 44).— 2 non-ovigerous females, cl. 9.6 and 11.4 mm (ZMO No. F 931): Claveringfjord, near Kap Stosch, depth 400-338 m, bottom clay, bottom temperature at 350 m -1.19°C, salinity 34.20‰, 11.viii.1931, Grönland Ekspedition, sample no. 31, det. Sivertsen (Sivertsen, 1935: 44).— 1 non-ovigerous female, cl. 10.7 mm (ZMO No. F 935): Dusenfjorden, depth 300 m, bottom reddish brown clay with mud, temperature near bottom -1.59°C, salinity 33.79‰, O_2 6.51 cc., 76.9%, 19.viii.1932, Grönland Ekspedition, sample no. 644, Hoels, det. E. Sivertsen (Sivertsen, 1935: 44).— 2 males, cl. 5.7 and 7.9 mm; 2 non-ovigerous females, cl. 10.7 and 11.8 mm (ZMO No. F 2136. On the label three stations were indicated. This probably means that samples of the three stations were put together): Norske Nordhavs-Expedition sta. 137, Romsdalsfjord, 67°24'N 8°58'E, depth 827 m, bottom temperature -1.0 °C, clay, dredge and trawl, 21.vi.1877; Norske Nordhavs-Expedition sta. 312, Beeren Island, 74°54'N 14°53'E, depth 1203 m, bottom temperature -1.2 °C, clay, trawl, 22.vii.1878; Norske Nordhavs-Expedition sta. 359, Beeren Island, 78°2'N 9°25'E, depth 761 m, bottom temperature 0.8 °C, clay, dredge, 12.viii.1878, det. G.O. Sars (G.O. Sars, 1886: 8).— 1 ovigerous female, cl. 11.4 mm (ZMO No. F 2137): Norske Nordhavs-Expedition sta. 124, Romsdalsfjord, 66°41'N 6°59'E, depth 640 m, bottom temperature -0.9 °C, coarse clay, dredge and trawl, 19.vi.1877, det. G.O. Sars, seen by E. Sivertsen, 1934 (G.O. Sars, 1886: 8).— 2 males, cl. 7.5 and 4.7 mm; 3 non-ovigerous females, cl. 3.6-7.1 mm; 1 ovigerous female, cl. 9.6 mm, one damaged specimen, cl. 4.0 mm (ZMO No. F 2138. On the label two stations were indicated. This probably means that samples of the two stations were put together): Norske Nordhavs-

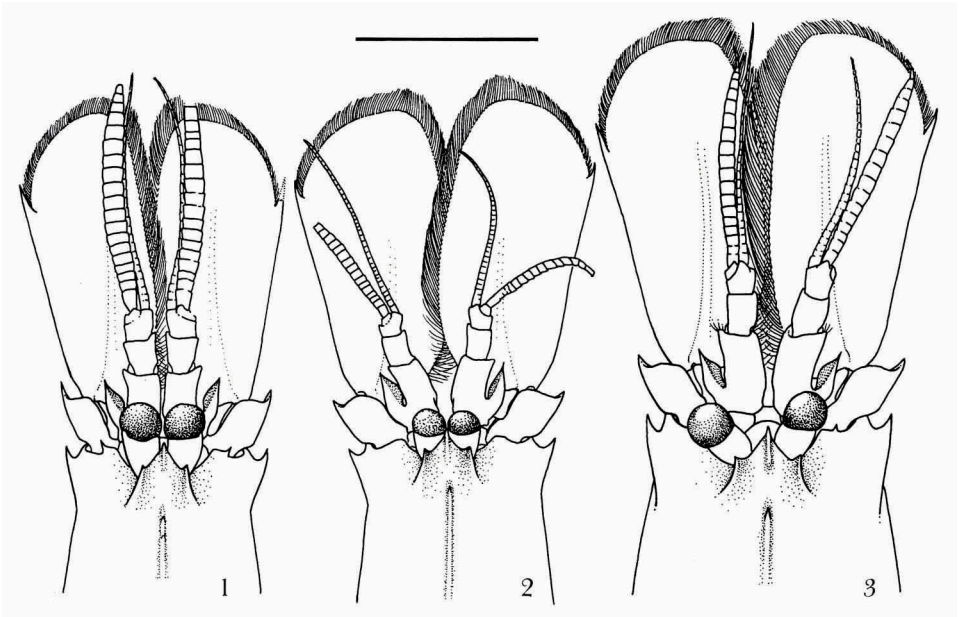
Expedition sta. 164, Vestfjord, 68°21'N 10°40'E, depth 836 m, bottom temperature -0.7 °C, sabulous clay, dredge and trawl, 29.vi.1877; Norske Nordhavs-Expedition sta. 251, Jan Mayen, 68°6'N 9°44'E, depth 1159 m, bottom temperature -1.3 °C, *Biloculina* clay, dredge, 9.viii.1877. Det. G.O. Sars, seen by Sivertsen, 1933 (G.O. Sars, 1886: 8).— 3 males, 4.7-6.0 mm (ZMO No. 2139. On the label four stations were indicated. This probably means that samples of the four stations were put together): Norske Nordhavs-Expedition sta. 35, 63°17'N 1°27'W, depth 1977 m, bottom temperature -1.0 °C, *Biloculina* clay, dredge and trawl, 5.vii.1876; Norske Nordhavs-Expedition sta. 192, Vestfjord, 69°46'N 16°15'E, depth 1187 m, bottom temperature -0.7 °C, sabulous clay, dredge, 7.vii.1877; Norske Nordhavs-Expedition sta. 286, Beeren Island, 72°57'N 14°32'E, depth 817 m, bottom temperature -0.8 °C, clay, trawl, 6.vii.1878; Norske Nordhavs-Expedition sta. 362, Beeren Island, 79°59'N 5°40'E, depth 839 m, bottom temperature -1.0 °C, clay, trawl, 14.viii.1878, det. G.O. Sars (G.O. Sars, 1886: 8).

1. In all 59 specimens the distal lamina of the scaphocerite is rounded, not truncate, extending far beyond the latero-distal tooth (figs. 1-3). The ratio of width and length varies from 0.32 to 0.49. There is a weak correlation between carapace-length and this ratio, indicating that in small specimens the ratio is usually lower than in larger specimens (fig. 4).

2. Eyes always with dark pigment.

3. The rostrum is short, reaching the level of the antennal spine, never reaching the cornea of the eye. In dorsal aspect the rostrum is triangular. In lateral aspect the central border is markedly convex, especially in large specimens. A dorsal carina is always present. The supraorbital teeth are pointing forward, reaching halfway the orbit and the antennal spine (figs. 5-10).

4. In 28 specimens no trace of a middorsal tooth is present (figs. 5, 7). In 19 specimens a knob is present (fig. 6), in 7 specimens one tooth is present and in 5 specimens two teeth are present (figs. 7-10). In fact all transitions between the absence of



Figs. 1-3. *Bythocaris payeri* (Heller, 1875), dorsal view of anterior region. 1, male, cl. 5.32 mm (BeM 15811); 2, ovigerous female, cl. 11.17 mm (BeM 15814); 3, ovigerous female, cl. 8.31 mm (BeM 15811). Scale 1, 3 = 4 mm; 2= 8 mm.

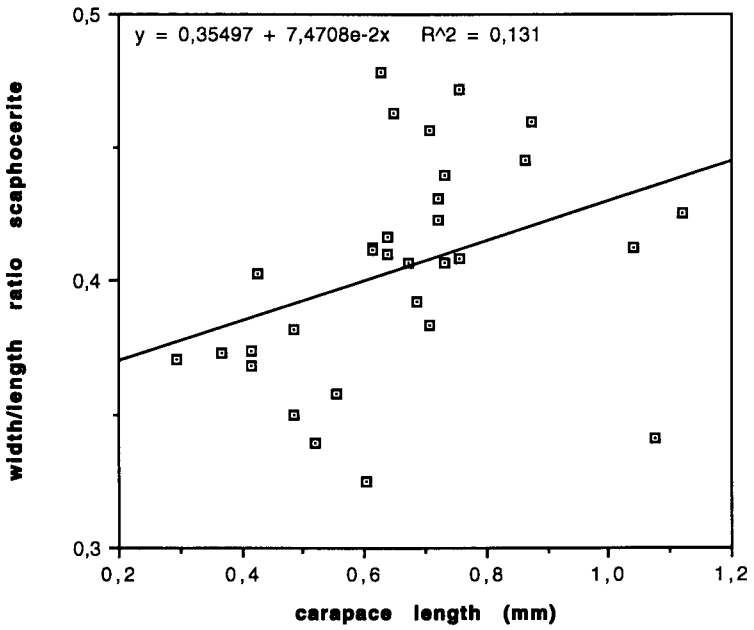


Fig. 4. *Bythocaris payeri* (Heller, 1875). Graph showing width/length ratio of scaphocerite in relation to carapace length.

teeth and the presence of 2 teeth are present.

5. The antennal spine is absent in 30 specimens (fig. 8). In 4 specimens the antennal spine is minute, in 23 it is well developed (figs. 5-7, 9-10), and in 2 specimens it is developed on one side and absent on the other. Here also intermediate forms between absence and presence can be found.

6. The stylocerite never reaches the distal end of the basal segment of the antennular peduncle.

7. The number of articles in the outer antennular flagellum varies between 13 and 26. Here also there is a weak correlation between carapace length and number of articles (fig. 11).

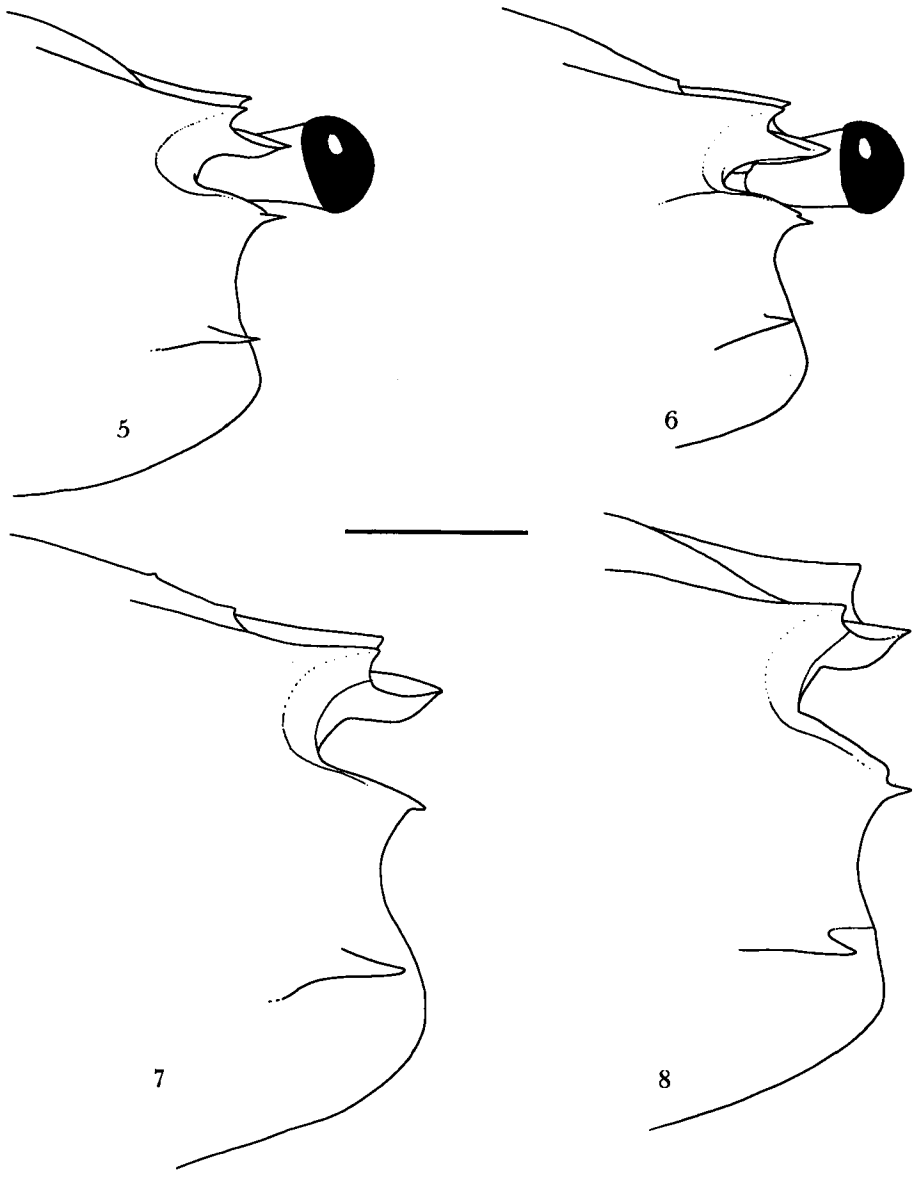
8. In 51 specimens both left and right carpus of the second pereiopod have 9 articles, in 5 specimens 10 articles, in 2 specimens only 8 articles, and in one specimen 9 articles on the right and 10 on the left pereiopod.

9. Number of articles on the merus of the second pereiopod is 2 in all 59 specimens.

10. Pleura of the abdominal segments are always rounded (figs. 12, 13).

11. The dorsal marginal spines on the telson are minute, not clearly in pairs, and their location varies too. The number of spines varies between 1 to 4 on each side.

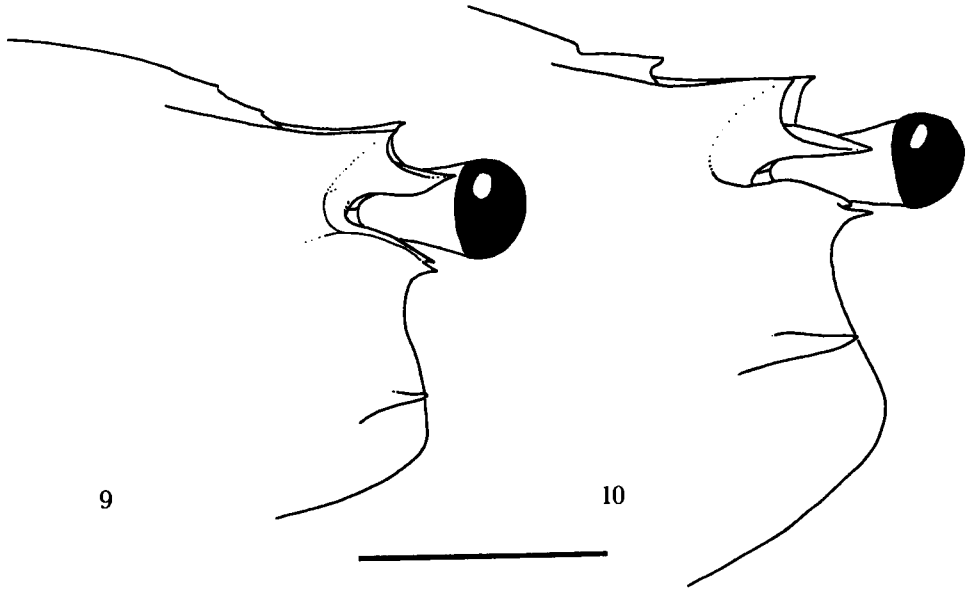
Discussion.— The most diagnostic characters to distinguish *B. payeri* from other species of *Bythocaris* are: 1) the anteriorly rounded scaphocerite, 2) the dark pigmentation of the eye, 3) the ventrally distinctly sinuous rostrum, 4) the rounded pleura of the fourth and fifth abdominal segment. These four characters always occur together.



Figs. 5-8. *Bythocaris payeri* (Heller, 1875), lateral view of anterior part of carapace. 5, ovigerous female, cl. 8.05 mm (BeM 15811); 6, ovigerous female, cl. 8.31 mm (BeM 15811); 7, non-ovigerous female, cl. 10.65 mm (ZMO F 935); 8, ovigerous female, cl. 11.43 mm (ZMO F 2137). Scale= 2 mm.

Form and number of middorsal teeth and number of articles of the carpus of the second pereiopod, and the absence or presence of the antennal spines are less reliable.

Sivertsen & Holthuis (1956) indicated the morphological variability in the species of *B. gracilis* Smith, 1885 and *B. payeri* (Heller, 1875). They argued that many characters used before (Smith, 1885; Hansen, 1908; Kemp, 1910) to distinguish between the



Figs. 9-10. *Bythocaris payeri* (Heller, 1875), lateral view of anterior part of carapace (BeM 15811). 9, male, cl. 5.32 mm; 10, female, cl. 6.88 mm. Scale = 2 mm.

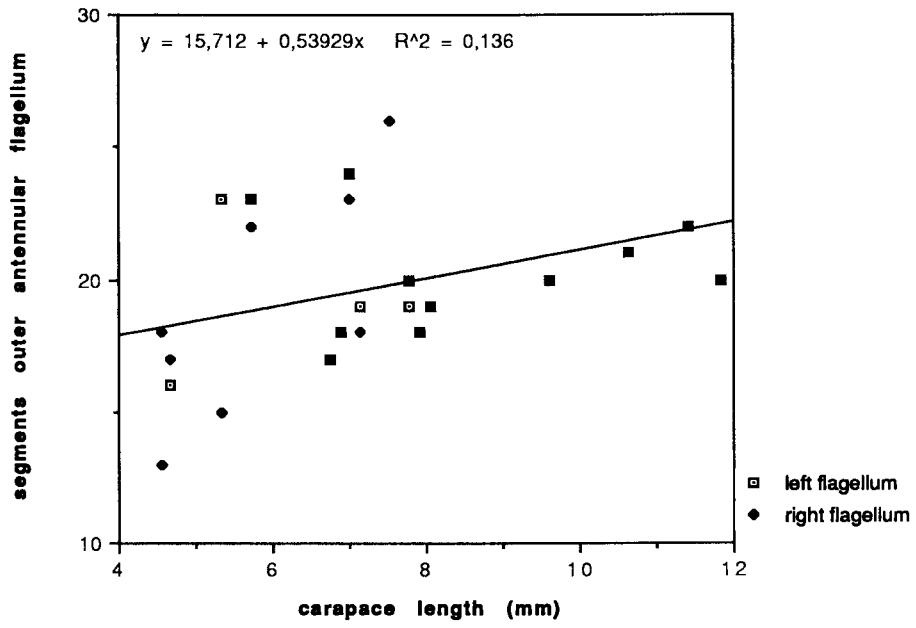
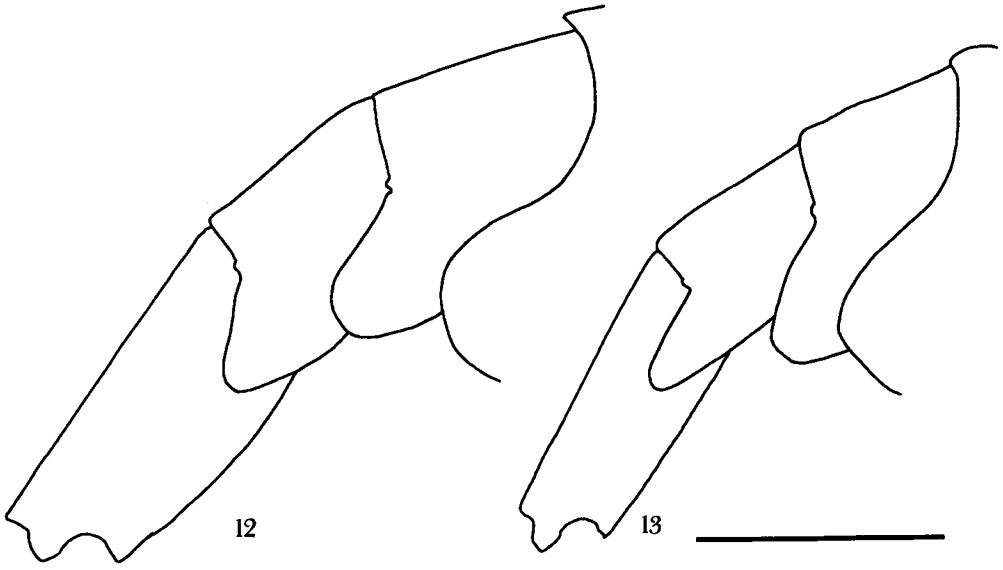


Fig. 11. *Bythocaris payeri* (Heller, 1975). Graph showing number of segments on left and right outer antennular flagellum.



Figs. 12-13. *Bythocaris payeri* (Heller, 1875), lateral view abdominal pleura 2-5 (BeM, 15811). 12, non-ovigerous female, cl. 6.88 mm; 13, ovigerous female, cl. 8.05 mm. Scale 12 = 4 mm; 13= 8 mm.

two species do not hold when larger series are being studied. The present data support the findings of Sivertsen & Holthuis, which makes the specific status of *B. gracilis* doubtful. A character used by Squires to separate *B. payeri* from *B. gracilis* are the proportionately longer legs in the latter species. In the present material the dimensions of the legs are more like what Squires figures for *B. gracilis* than the relative short legs of *B. payeri*. Kobjakova (1964) suggested that apart from *B. gracilis* Smith, *B. nana* Smith is likely to be conspecific with *B. payeri*. The main difference here is the form of the rostrum, which is broad and short in *B. nana* compared to that of *B. payeri*. In fact the form of the rostrum in "*B. nana*" comes close that of the new species described below. Abele & Martin (1989) redescribed *B. nana*. also giving attention to intra-specific variation. The taxonomic status of the species was confirmed.

Sivertsen (1935) studied material from East Greenland and suggested that *B. payeri* and *B. leucopis* are depth-related forms of one species, the typical *B. payeri* form occurring in depths between 135-300 m changing to the typical *B. leucopis* form in depths between 250 and 502 m. Heegaard (1941: 50) found both 'species' in Franz Joseph Fjord at a depth of 320 m. He found specimens which differ slightly from the typical *B. payeri* and *B. leucopis*, but could not confirm that real transitional forms exist on the basis of the material available to him. I have tried to find characters in the material of *B. payeri* that change with depth but failed to trace any.

Colour noted by Sars (1885: 35) to be "..whitish, the anterior part of the carapax and the point of the abdomen being however faintly tinged with reddish pigment. The oral appendages and the base of the legs are somewhat more intensely red-coloured."

Distribution.— North Atlantic and Arctic Seas: Davis Strait, Baffin Bay, Norwegian Sea, Greenland Sea, Barentz Sea, Kara Sea, along the coasts of Newfoundland, Baffin

Island, Greenland, Iceland, the Faroes, the Shetlands, Norway, Jan Mayen, Spitzbergen, Franz Josef Land, Novaya Zemlya, N coast of Russia till Severnaya Zemlya; in depths between 180-2000 m, usually not deeper than 1000 m. A specimen resembling *B. payeri* has been found in the NW Atlantic between Cape Cod and Cape Hatteras (Bowen et al., 1979).

Bythocaris leucopis G.O. Sars, 1879
(figs. 14-31)

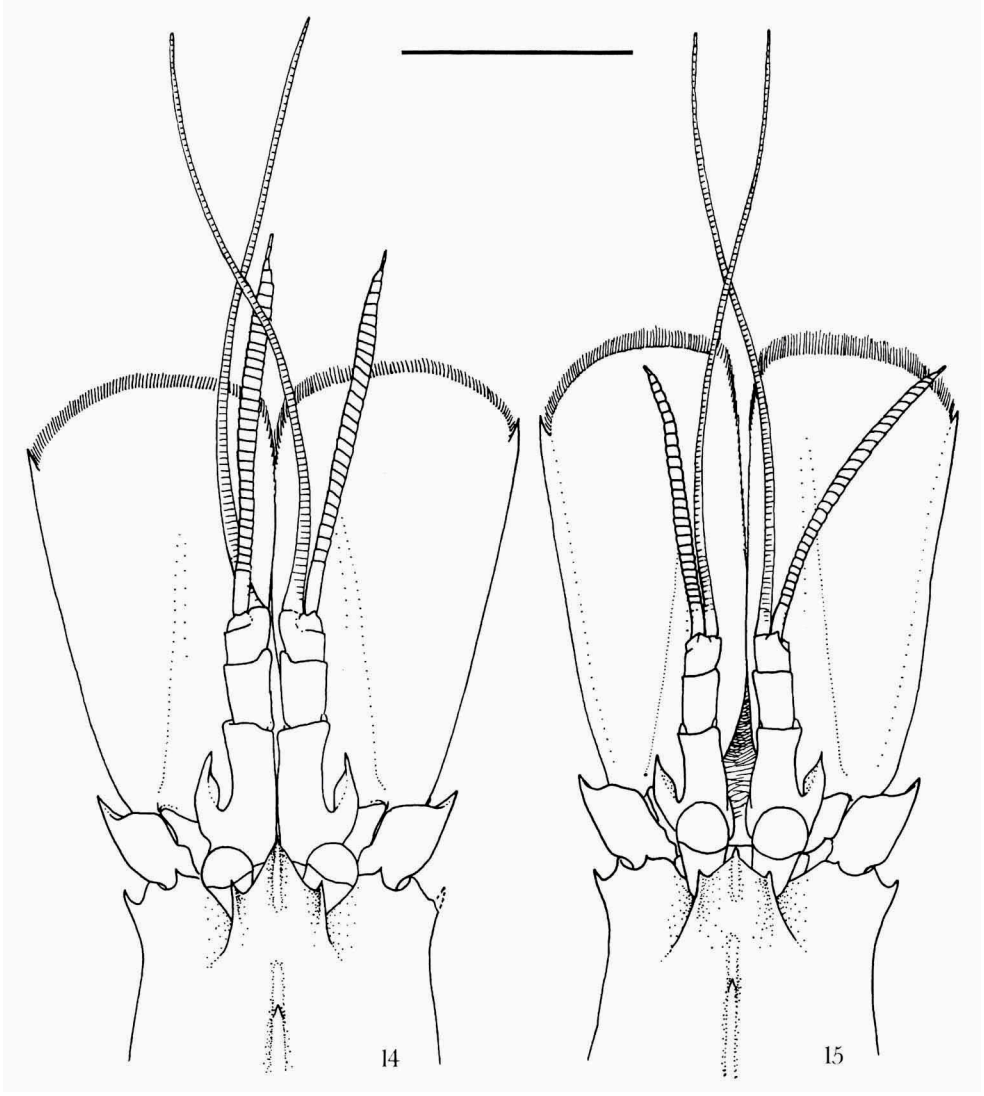
Bythocaris leucopis G.O. Sars, 1879: 427; G.O. Sars, 1885: 27-33, pl. 3 figs. 1-26; G.O. Sars, 1886: 8; Appellöf, 1906: 167, 190, 191, 195, 196, 205; Ohlin, 1901: 40-41; Hansen, 1908: 66-67; Birula, 1907: 2, 44-46, 53, 60, 67 fig. 4; Stephensen, 1912: 567; Stephensen, 1913: 39; Williamson, 1915: 388, fig. 106; Grieg, 1927: 20; Stephensen, 1935: 26-27, figs. 9, 11, tab. 3; Heegaard, 1941: 52, 53, fig. 20, tab. 1; Gorbunov, 1946: 94, 100, 126; Kramp, 1963: 57, 64, tab. 4; Burukovsky, 1966: 538, fig. 1; Bowman & Manning, 1973: 189 (key).

Bylhocaris leucopis ; Gorbunov, 1946: 44.

? *Bythocaris Payeri*; G.O. Sars, 1885: 33-35 (in part, 2 specimens sta. 35, 192, 286, 362) non *Bythocaris payeri* (Heller, 1875).

Type material.— "..Stat. 295 specimina 4 bene conservata collecta.", Norske Nordhavs-Expedition sta. 295, between Jan Mayen and Finmarken, near Beeren Island, 71°59'N 11°40'E, depth 2030 m, bottom temperature -1.3 °C, *Biloculina* clay, trawl, 14.vii.1878. (G.O. Sars, 1879: 428).

Material examined.— 1 ovigerous female, cl. 15.2 mm; 1 non-ovigerous female [aff. *biruli*], cl. 14.6 mm; 1 male, cl. 8.1 mm (BeM No. 15813): R.V. "Michael Sars" sta. 9, 63°53'N 6°22'E, depth 1960 m, bottom temperature -1°C, 26.vii.1900, A. Wollebæk (Grieg, 1927: 20).— 2 ovigerous females, cl. 16.9 and 17.9 mm; 1 non-ovigerous female, cl. 16.4 mm; 1 male, cl. 10.1 mm (BeM No. 15815): R.V. "Michael Sars" sta. 36b, 63°12'N 1°30'E, depth 1320 m, 28.vi.1902, A. Wollebæk (Grieg, 1927: 20).— 2 ovigerous females, cl. 17.1 and 17.3 mm (BeM No. 15821): R.V. "Michael Sars" sta. 102, 63°13'N 6°32'W, depth 1783 m, bottom temperature -0,41°C, 29.viii.1902 (Grieg, 1927: 20).— 1 ovigerous female, cl. 16.9 mm; 1 non-ovigerous female, cl. 7.3 mm; 2 damaged specimens (BeM No. 15896): R.V. "Armauer Hansen" sta. 3, off "Tampen", 62°10'N 0°8'E, depth 1400 m, bottom temperature -0.74°C, 10-11.v.1914 (Grieg, 1927: 20).— 1 ovigerous female, cl. 14.9 mm (ZMO): Franz-Josef Fjord, near the mouth of Isfjorden, depth 780-700 m, bottom clay with stone, 16.viii.1931, Grönland Ekspedition, sample no. 44.— 1 non-ovigerous female, cl. 12.1 mm (ZMO No. F 932): Franz-Josef Fjord, NE of K. Pettersen, depth 462-400 m, bottom clay with stone, temperature near bottom -0.03°C, 17.viii.1931, Grönland Ekspedition, sample no. 47, Hoels, det. Sivertsen (as. *B. payeri* ?), redet. L.B. Holthuis (as *B. leucopis*).— 1 male, cl. 10.1 mm (ZMO No. F 933): Franz-Josef Fjord, depth 502 m, bottom viscous clay, temperature at 480 m 1.3°C, salinity 34.85‰, 19.viii.1931, Grönland Ekspedition, sample no. 50, Hoels, det. E. Sivertsen, 1934 (as *B. payeri* ?).— 1 non-ovigerous female, cl. 17.8 mm; 1 ovigerous female, cl. 18.6 mm (ZMO No. F 2134 syntypes); 1 non-ovigerous female, cl. 14.7 mm (ZMO No. F 2135 syntype): Norske Nordhavs-Expedition sta. 295, Beeren Island, 71°59'N 11°40'E, depth 2030 m, bottom temperature -1.3 °C, *Biloculina* clay, trawl, 14.vii.1878, det. G.O. Sars (G.O. Sars, 1879: 427-428; G.O. Sars, 1885: 27, 33; G.O. Sars, 1886: 8).— 2 non-ovigerous females, cl. 6.0 and 6.8 mm (ZMO No. 2139. On the label four stations were indicated. This probably means that samples of the four stations were put together): Norske Nordhavs-Expedition sta. 35, 63°17'N 1°27'W, depth 1977 m, bottom temperature -1.0 °C, *Biloculina* clay, dredge and trawl, 5.vii.1876; Norske Nordhavs-Expedition sta. 192, Vestfjord, 69°46'N 16°15'E, depth 1187 m, bottom temperature -0.7 °C, sabulous clay, dredge, 7.vii.1877; Norske Nordhavs-Expedition sta. 286, Beeren Island, 72°57'N 14°32'E, depth 817 m, bottom temperature -0.8 °C, clay, trawl, 6.vii.1878; Norske Nordhavs-Expedition sta. 362, Beeren Island, 79°59'N 5°40'E, depth 839 m, bottom temperature -1.0 °C, clay, trawl, 14.viii.1878, det. G.O. Sars (as *B. payeri*) (G.O. Sars, 1885: 34 in part).— 1 male, cl. 8.7 mm, 1 non-ovigerous female, cl. 9.9 mm (TsM No. 494): Zool. Polarexp. 1900, sta. 29, Mellan Grönland och Jan Mayen, 72°42'N 14°49'W, 27.viii.1900, depth 2000 m, mud with foraminifera, det. ? (as *B. simplicirostris*), redet. L.B. Holthuis



Figs. 14-15. *Bythocaris leucopis* G.O. Sars, 1879, dorsal view of anterior region. 14, ovigerous female, cl. 18.57 mm (ZMO F 2134); 15, ovigerous female, cl. 17.14 mm (BeM 15821). Scale = 8mm.

(as. *B. leucopis*).

1. The scaphocerite is truncate anteriorly in all specimens and has its maximal width at the level of the disto-lateral tooth (figs. 14-15). The width/length ratio is between 0.35 and 0.57. There is an indistinct positive correlation between the width/length ratio and the carapace length (fig. 16). In larger specimens the anterior margin of the lamina is flattened making an angle of nearly 90° with the outer lateral margin, slightly extending beyond the disto-lateral tooth. In smaller specimens the distal lamina is more rounded its anterior margin making a smaller angle with the outer lateral margin, clearly extending beyond the disto-lateral tooth. This has been

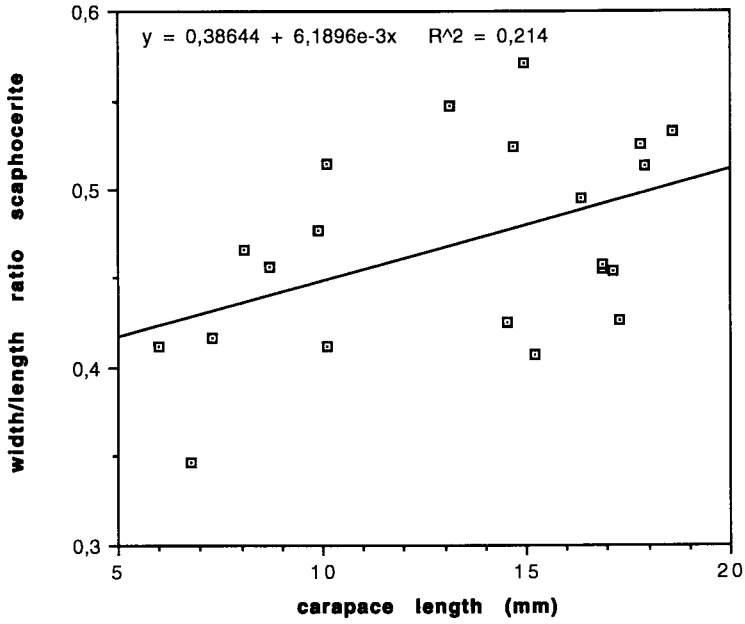


Fig. 16. *Bythocaris leucopis* G.O. Sars, 1879. Graph showing width/length ratio of scaphocerite in relation to carapace length.

noted before by Hansen (1908: 67).

2. Pigmentation of the cornea always absent.

3. Only in the type-material the rostrum reaches slightly beyond the eyes (fig. 17), in most specimens the rostrum just reaches the cornea (figs. 18-19) which is the situation described for *B. biruli* Kobjakova, 1964 and *B. elegans* Bryazgin, 1982. In lateral aspect the ventral margin of the rostrum is concave (figs. 17, 19-21), seldom slightly sinuate (figs. 18, 22), but never as pronounced as in *B. payeri*. The supraorbital teeth are projecting forward with sharp points, reaching from halfway the orbit to the level of the antennal spine.

4. In 19 specimens out of 21 a well developed sharply pointed middorsal tooth is present on the carapace (figs. 17-20), in one specimen a well developed tooth with a proximal small tooth is present (fig. 21), and in the other specimen a large middorsal tooth is present with two small proximal teeth (fig. 22).

5. A usually well developed antennal spine is present in all examined specimens.

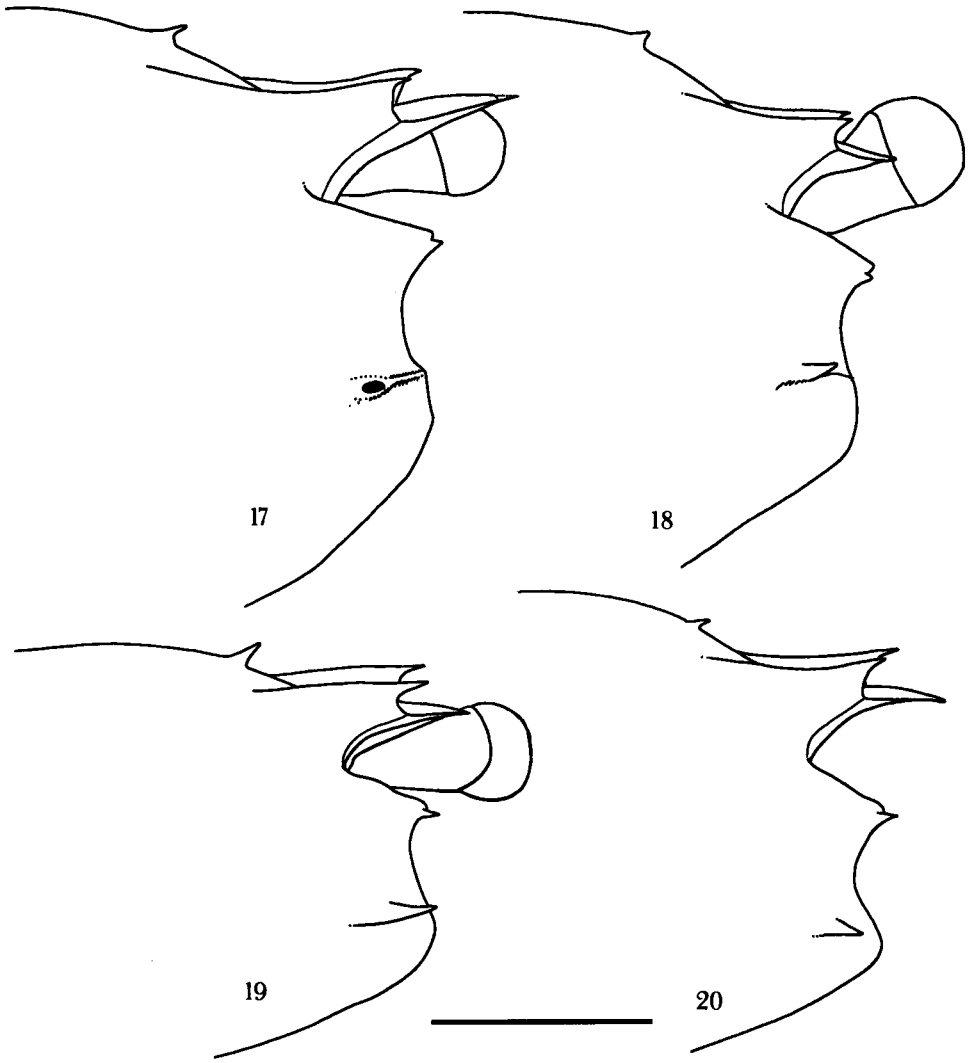
6. Length of stylocerite 0.8-0.9 of length of antennular peduncle.

7. Number of articles of the outer antennular flagellum could be counted in a few specimens. In the smallest specimen the number is 23, in the largest 38 segments.

8. The number of articles of the carpus of the second pereiopod varies between 8 and 12, 9 or 10 being commonest. In several specimens the number on the left and right pereiopod is different. A positive correlation with carapace length is very weak (fig. 23).

9. The number of articles on the merus of the second pereiopod is always 2.

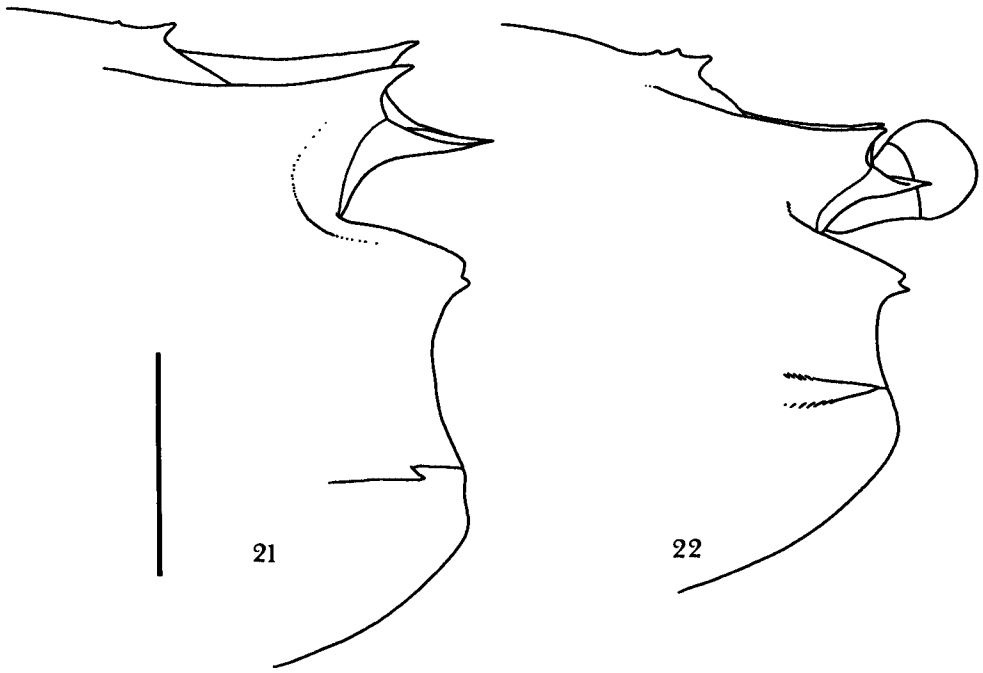
10. The form of the pleura of the abdominal segments varies. In all specimens the



Figs. 17-20. *Bythocaris leucopis* G.O. Sars, 1879, lateral view of anterior part of carapace. 17, ovigerous female, cl. 18.57 mm (ZMO F 2134); 18, ovigerous female, cl. 17.14 mm (BeM 15821); 19, non-ovigerous female, cl. 5.97 mm (ZMO F 2139); 20, non-ovigerous female, cl. 6.75 mm (ZMO F 2139). Scale 17,18= 4 mm; 19, 20 = 2 mm.

pleuron of the fifth abdominal segment has a proximal sharp tooth (figs. 24-28). In one specimen the tooth is blunt. The pleuron of the fourth abdominal segment has a proximal tooth in all specimens except two. In these - of which one is a type (ZMO F 2134) - the pleuron is rounded (figs. 27, 28) as has been described for *B. biruli*. In several specimens the pleuron of the third abdominal segment has a blunt tooth ventrally (figs. 24-26).

11. The number of dorsal marginal spines on the telson can only be counted in 5



Figs. 21-22. *Bythocaris leucopis* G.O. Sars, 1879, lateral view of anterior part of carapace. 21, male, cl. 10.13 mm (ZMO F 933); 22, female, cl. 16.36 mm (BeM 15815). Scale 21=2 mm; 22=4 mm.

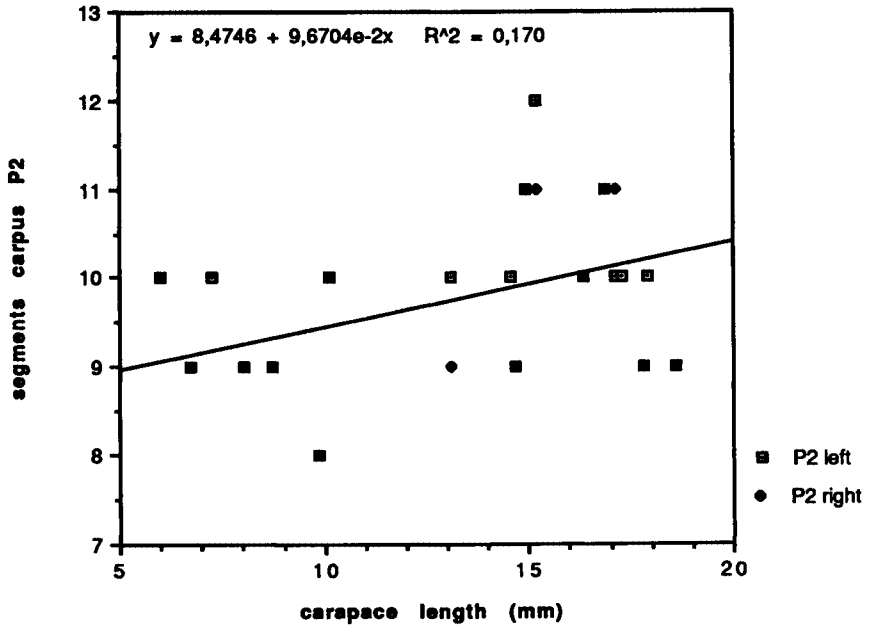
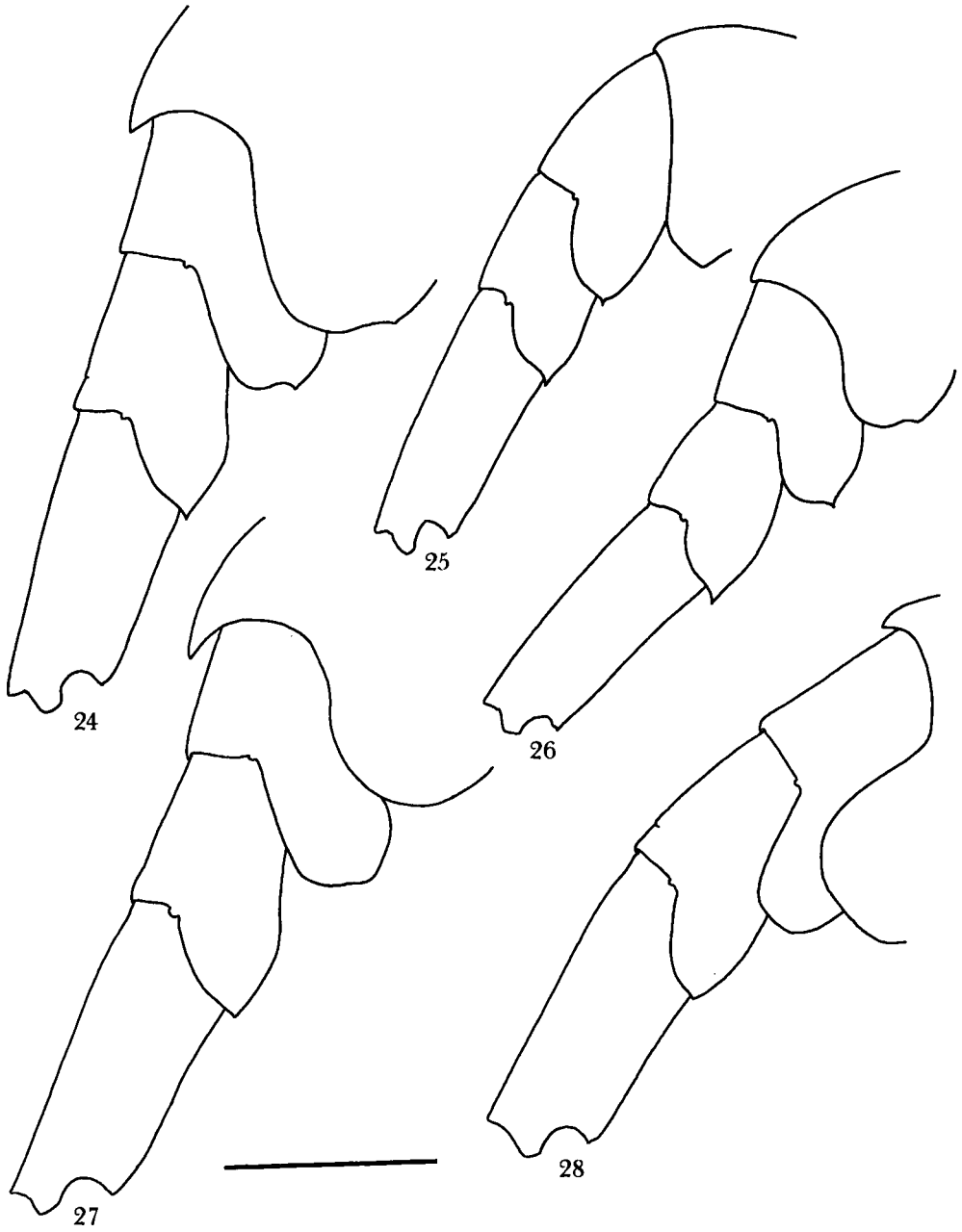


Fig. 23. *Bythocaris leucopis* G.O. Sars, 1879. Graph showing number of segments on carpus of left and right second pereiopod.



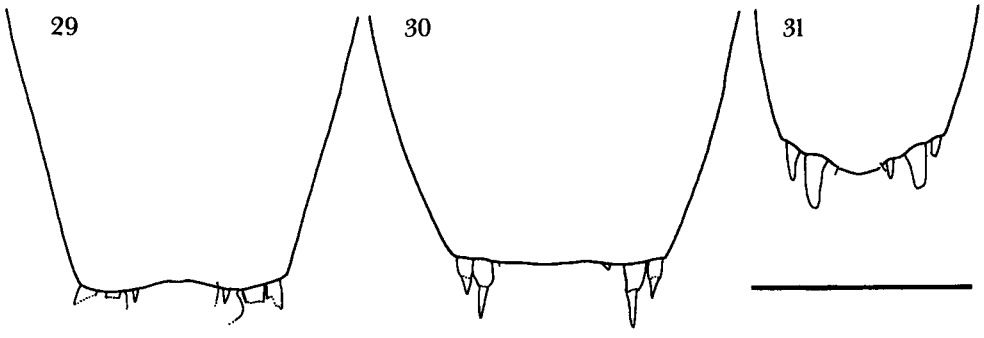
Figs. 24-28. *Bythocaris leucopis* G.O. Sars, 1879, lateral view of abdominal pleura 2-5. 24, ovigerous female, cl. 18.57 mm (ZMO F 2134); 25, non-ovigerous female, cl. 5.97 mm (ZMO F 2139); 26, non-ovigerous female, cl. 6.75 mm (ZMO F 2139); 27, ovigerous female, cl. 17.79 mm (ZMO F 2134); ovigerous female, cl. 17.14 mm (BeM 15821). Scale 24, 27, 28 = 8 mm; 25, 26= 4 mm.

specimens, two specimens have 3 pairs, three specimens have 4 pairs of spines.

Discussion.— The most diagnostic characters to distinguish *B. leucopis* from other species of *Bythocaris* are: 1) the anteriorly truncate scaphocerite, 2) lack of pigmentation of the eye, 3) the rostrum having the ventral margin concave, not distinctly sinuous. These three characters always occur together. Usually a tooth is present on the pleura of the fourth and fifth abdominal segment. Other characters like the middorsal dentation of the anterior part of the carapace, the number of articles of the carpus of the second pereiopods, absence or presence of an antennal spine, and relative lengths of rostrum and eyes are less reliable.

Kobjakova (1964) described a new subspecies of *B. leucopis* based on many specimens caught at high latitudes, north of Spitzbergen and Franz-Josef Land; she named it *B. leucopis biruli.* The specimens were compared by Kobjakova with the type-description of *B. leucopis* G.O. Sars from which they differ in the following respects. The rostrum never extends beyond the eyes. In the types of *B. leucopis* the width/length ratio of the scaphocerite is more than 0.5, while it is 0.5 or less in *B. l. biruli* sensu Kobjakova. *B. leucopis* G.O. Sars has a depression at the tip of the telson, which is somewhat rounded in *B. l. biruli.* Further, Kobjakova noted a variation in the number of carpal segments in the second pereiopod ranging between 9 and 11 and observed one specimen with 10 on one and 11 on the other side. She also observed the pleura of the fifth abdominal segment to have a less pronounced proximal tooth and that of the fourth being barely visible, this in contrast to the figure of G.O. Sars (1885: pl. 3 fig. 2).

The present material of *B. leucopis* is from latitudes of 62°-79°N between Norway and Greenland. The morphological characters defined for *B. l. biruli* by Kobjakova (1964) can be observed in many specimens. As the morphological variation does not follow a geographical pattern *B. l. biruli* cannot be regarded as a subspecies of *B. leucopis*. In many specimens both 'leucopis' and 'biruli' diagnostic characters as mentioned by Kobjakova are combined in different ways, illustrating the morphological variation. In the three type specimens the width/length ratio of the scaphocerite is 0.52-0.53, which is within the range found in the other specimens of this species studied. The depression in the tip of the telson is only present in the type-specimen



Figs. 29-31. *Bythocaris leucopis* G.O. Sars, 1879, tip of telson in dorsal view. 29, ovigerous female, cl. 18.57 mm (ZMO F 2134); 30, female, cl. 14.68 mm (ZMO F 2135); 28, ovigerous female, cl. 17.14 mm (BeM 15821). Scale = 1 mm.

of *B. leucopis* figured by G.O. Sars (1885: pl. 3 fig. 21, 22) (fig. 29). In an other specimen of the type series (ZMO F 2135) the tip is straight (fig. 30), but in most specimens investigated the tip was more or less rounded (fig. 31). Something similar is observed in the form of the pleura of the fourth and fifth abdominal segment: in one type specimen (ZMO F 2135) the tooth on the fourth and fifth abdominal pleura is less distinct than in the type-specimen figured by G.O. Sars (1885: pl. 3 fig. 2). The meri of pereiopods 3-5 are devoid of spines in the type-specimens. In the other material the number of spines ranges between 1 and 8.

Another species similar to *B. leucopis* is *B. elegans* Bryazgin, 1982. This species is known only from the female holotype caught on the western slope of the Franz-Victoria Trough, west of Franz-Josef Land (81°51'N 36°20'E) at a depth of 420 m. Bryazgin compared the type-specimen with specimens of *B. biruli* sensu Bryazgin. The following differences were noted. In *B. elegans* the tooth on the fourth and fifth abdominal segments is pronounced, and the two middorsal teeth of the carapace are equally strongly developed. In *B. biruli* sensu Bryazgin the teeth on the fourth and fifth abdominal segments are less pronounced and one of the middorsal teeth of the carapace is large, while there are 0 to 2 minor additional teeth. The tip of the telson in *B. elegans* is straight while it is slightly rounded in *B. biruli* sensu Bryazgin. The form of the fourth and fifth abdominal segments of *B. elegans* as well as the form of the telson are within the range of variation observed in the material of *B. leucopis* studied. Although the middorsal teeth seem to be different from what is known of *B. leucopis*, this could also be a slightly aberrant feature in this single type-specimen of *B. elegans*. The specific status of *B. elegans* can only be confirmed when more material comes available for study.

Two specimens identified as *B. Payeri* by G.O. Sars (1885: 33-35) are here recognized (with some hesitation) as *B. leucopis* as they share the three diagnostic characters mentioned above. Due to the preservation in alcohol the pigment in the eyes of specimens of *B. payeri*, caught during the same expedition, has more or less disappeared which makes this character less reliable for this old material.

Colour was noted by Sars (1885: 32) to be "... exceedingly brilliant, everywhere a magnificent rosy red, a trifle more intense at the end of each segment of the posterior division of the body. Extending across the middle of the carapax, is observed moreover a large, irregular, saddle-shaped area, of a darkbluish colour. The ocular pigment is, as stated above, wholly colourless, viz. an opaque white, and forms a striking contrast to the intensely red-coloured eye-stalks."

Distribution.— North Atlantic and Arctic seas: Baffin Bay, Norwegian Sea, Greenland Sea and Barentz Sea, along coasts of Greenland, Iceland, Jan Mayen, Norway, Spitzbergen, in depths between 650 and 2850 m.

Bythocaris simplicirostris G.O. Sars, 1869
(figs. 32-40)

Bythocaris simplicirostris G.O. Sars, 1869: 5-6; G.O. Sars, 1873: 86-87; Storm, 1878: 112; G.O. Sars, 1882: 46-47; G.O. Sars, 1886: 7-8; Norman, 1893: 346; Norman, 1894: 160; Birula, 1897: 427-428, pl. 20(-22) fig. 3; Breitfuss, 1904: 9; Appellöf, 1906: 126, 161, 167, 168, 188, 189, 210; Ohlin, 1901: 39-40, fig. 1; Nordgáard, 1905: 188; Birula, 1907: 43; Birula, 1907: 43, 60, 67; Hansen, 1908: 69-70; G.O. Sars, 1912: 13-17, pl. 2 figs. 1-21; Stephensen, 1912: 567; Stephensen, 1913: 39-40, 418; Dons, 1914:

Williamson, 1915: 381; 50-51; Grieg, 1917: 21-22; Sivertsen, 1927: 4; Sivertsen, 1935: 44; Heegaard, 1941: 53-54, figs. 21-22, tab. 1; Christiansen, 1972: 23, fig. 13.

Hippolyte Panschii Buchholz, 1874: 277, pl. 1 fig. 1.

Hippolyte panchii; Kingsley, 1878: 62; Kingsley, 1899: 717.

Bythocaris panschi; Appellöf, 1906: 191, 193, 196, 197.

Bythocaris spinipleura Squires, 1990: 158-162, figs. 82-83.

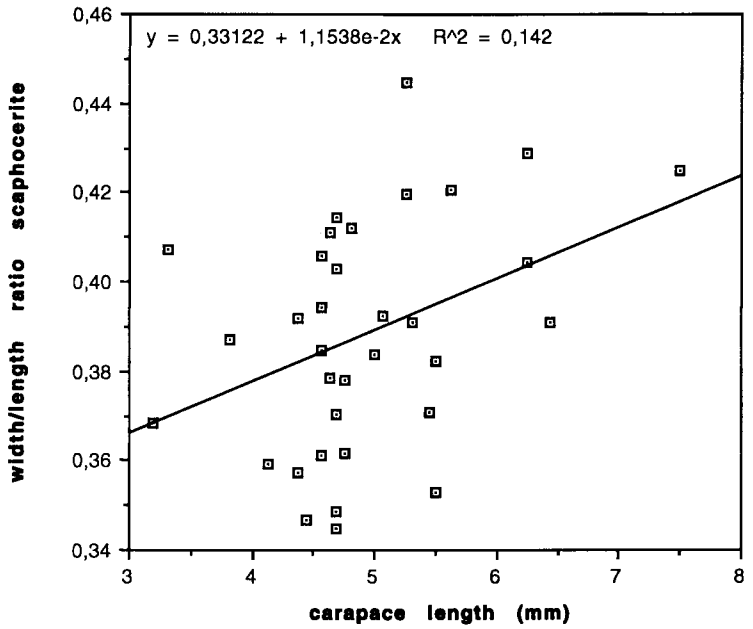
Type material.—1 ovigerous female (32 mm total length) collected off Lofoten Island near Skraaven, Norway, at a depth of 250 fathoms, before 1869, leg. G.O. Sars.

Material examined.— 1 male, cl. 4.4 mm (BeM): Iceland, 66°42'N 26°40'W, S/S Michael Sars sta. 13, 3.viii.1900, depth 590 m, bottom temperature 0.11°C (Grieg, 1927: 21).— 1 female, cl. 5.5 mm (BeM 8972): Tranødybet, between Tranø and Lødingen, depth 607-640 m, 16.iii.1899, R/V "Gunnar Berg", sta. 56, leg. & det. Nordgaard (Nordgaard, 1905: 188).— 1 female, cl. 4.4 mm (BeM 9311): Malangen II, between Senjen and Kvalø, depth 100-200 m, 14.iv.1899, leg & det. Nordgaard (Nordgaard, 1905: 188).— 1 male, cl. 3.3 mm (BeM 10082): Norway, 52°22'N 4°30'E, s/s "Michael Sars" sta. 284, 1904, depth 292 m.— 1 male, cl. 4.7 mm (BeM 12271): E of Iceland, 64°53'N 10°0'W, 28.vii.1900, depth 630 m, bottom temperature -0.69°C, s/s "Michael Sars" sta. 10 (Grieg, 1927: 21).— 1 female, cl. 3.2 mm (BeM 16237): s/s Michael Sars" (no further data).— 3 males, cl. 4.1, 4.7, 4.8 mm; 2 non-ovigerous females, cl. 5.5, 6.3 mm; 3 ovigerous females, cl. 6.1, 6.3, 7.5 mm (BeM 33462): Iceland, 66°42'N 26°40'W, S/S Michael Sars sta. 13, 3.viii.1900, depth 590 m, bottom temperature 0.11°C (Grieg, 1927: 21).— 1 female, cl. 4.8 mm (ZMO F 926): S of Kap Bennet, depth 290 m, bottom clay, 20.viii.1930, Hoels, Grönland Ekspedition, sample no. 1131, det. E. Sivertsen (Sivertsen, 1935: 44).— 1 female, cl. 6.3 mm (ZMO F 927): Dusénfjorden, depth 185-75 m, bottom clay, temperature at 60 m -1.2°C, salinity 33.32‰, 20.viii.1931, Hoels, Grönland Ekspedition, sample no. 55, det. E. Sivertsen (Sivertsen, 1935: 44).— 1 female, cl. 6.4 mm (ZMO F 928): Nathorstfjorden, depth 137 m, bottom reddish brown clay, temperature near the bottom -1.76°C, salinity 33.71‰, 4.viii.1932, Hoels, Grönland Ekspedition, sample no. 548, det. E. Sivertsen (Siversten, 1935: 44).— 1 female, cl. 4.7 mm; 1 damaged sp. (ZMO F 2140): Norske Nordhavs-Expedition sta. 290, Beeren Island, 72°27'N 20°51'E, depth 349 m, bottom temperature 3.5°C, bottom sabulous clay, trawl, 7.vii.1878; sta. 359, Beeren Island, 78°2'N 9°25'E, depth 761 m, bottom temperature -.0°C, *Biloculina* clay, dredge and trawl, 5.vii.1876, det. G.O. Sars (G.O. Sars, 1886: 7).— 1 ovigerous female, cl. 5.3 mm; 1 non-ovigerous female, cl. 4.6 mm (ThM 492): Röberg, Stadsbygd, Sör-Tröndelag, leg. G.G. Storms.— 3 females, cl. 4.6-5.3 mm (ThM 493): Röberg, Stadsbygd, Sör-Tröndelag, leg. G.G. Storms.—1 male, cl. 2.8 mm (ThM 495). Düklet, Skarnsundet Verran, Nord-Tröndelag, 15.viii.1906, depth ca. 150 m.—1 ovigerous female, cl. 5.0 mm; 1 non-ovigerous female, cl. 4.8 mm (ThM 496): Ingdalen, Stadsbygd, Sör-Tröndelag, Nr. 60.— 1 female, cl. 4.7 mm (ThM 497): Hambåta, Agdenes, Sör-Tröndelag, 31.vii.1913, depth ca. 250 m.— 1 female, cl. 4.4 mm (ThM 498): Kineb, Lensvik, Sör-Tröndelag, 26.vii.1922, depth 350-200, mud and coral bottom.— 1 female, cl. 4.6 mm (ThM 499): Tömmerdalen, M/S "Gunnerus".— 1 ovigerous female, cl. 4.6 mm (ThM 500): Röberg, Stadsbygd, Sör-Tröndelag, 18.vii.1922, depth 350-150 m.— 2 females, cl. 4.6 & 5.1 mm (ThM): Galgenes, 4.viii.1925, depth 250-300 m, mud, M/S "Gunnerus".— 1 female, cl. 3.8 mm (ThM): Hysnes, Rissa, Sör-Tröndelag, 30.vii.1923, depth 180-300 m, bottom with sand, shells and coral, M/S "Gunnerus".— 2 females, cl. 4.7-5.6 mm (ThM): Trondheims fjord, leg. G.G. Storms, collected before 1882, det. G.O. Sars (G.O. Sars, 1882: 46-47).— 1 female, cl. 2.44 mm (ThM): Off Storeggen 4007, summer 1871, det. G.O. Sars (G.O. Sars, 1873: 87).— 1 ovigerous female, cl. 5.4 mm (ThM): Gl. nr. 61, *Dupea hastala*, (no further data).— 1 female, cl. 4.6 mm (TsM): Norway, Folden Fiord, sta. XIIa, 3.viii.1923, depth 250-350 m, det. E. Sivertsen.

1. Scaphocerite is rounded anteriorly in all specimens. The width/length ratio varies from 0.35 to 0.44. There is an indistinct positive correlation between the width/length ratio and the carapace length (fig. 32).

2. Eyes always with dark pigment.

3. In 33 specimens the rostrum reaches beyond the eyes, in 3 specimens it is level with the eyes and in one small specimen (cl. 2.44 mm) it is shorter than the eyes. The rostrum reaches between the middle and the end of the basal antennular segment



Figs. 32. *Bythocaris simplicirostris* G.O. Sars, 1869. Graph showing width/length ratio of scaphocerite in relation to carapace length.

(figs. 33-34).

4. In 37 specimens two middorsal teeth are present, in one specimen only one middorsal tooth is present. If two are present the anteriormost is best developed (fig. 35).

5. A well developed antennal spine is present in all examined specimens.

6. The stylocerite reaches the distal end of the basal segment of the antennular peduncle. In some specimens it falls just short of the distal end of it.

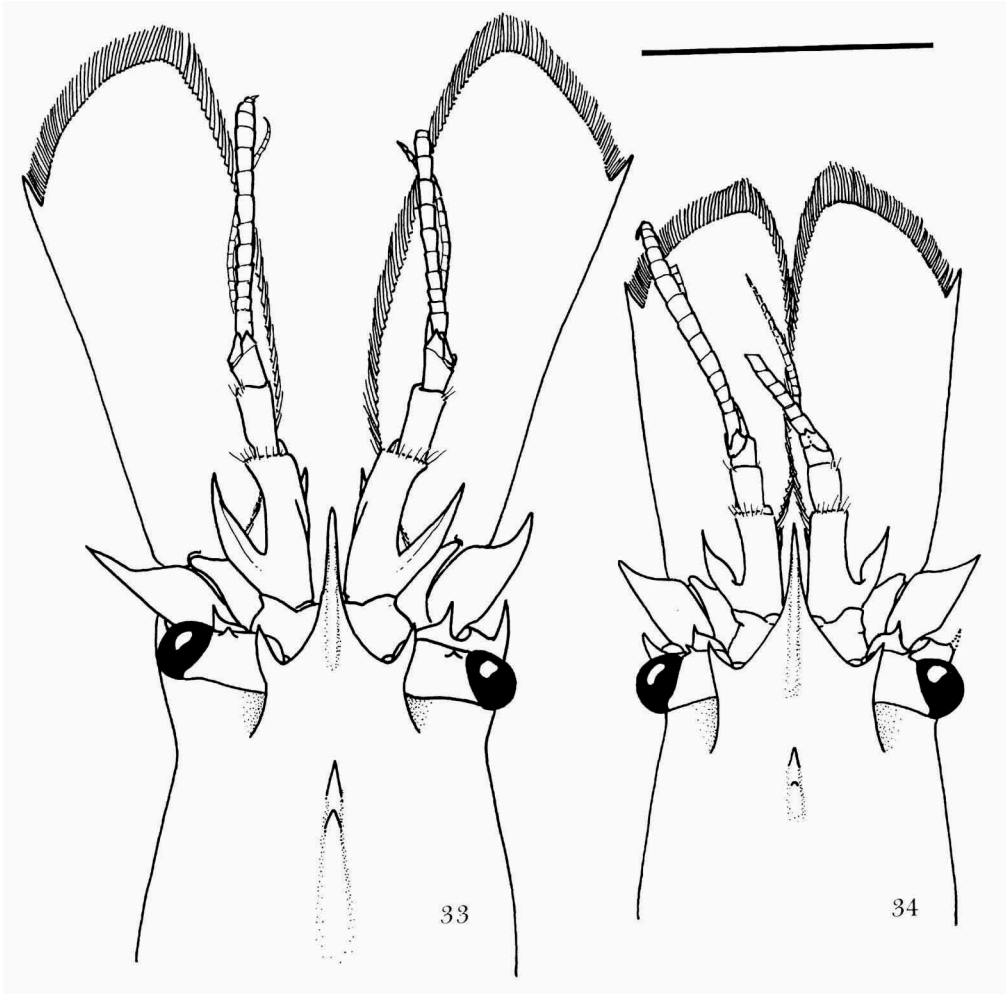
7. The number of segments of the outer antennular flagellum varies between 12 and 20. A correlation between number of segments and carapace length has not been found (fig. 36).

8. In the majority of the specimens (25) both carpi of the second pereiopods have 10 articles. In 5 specimens the number is 11, in one specimen 9 and in one other 8. In several specimens the left and right carpus have a different number of articles, like 9 left and 10 right and vice versa and in one specimen 10 left and 11 right.

9. The number of articles in the merus of the second pereiopod is one or two. If two, the articulation is often indistinct.

10. All pleura of the abdominal segments have a proximo-ventral tooth (figs. 37-38). Especially in ovigerous females this tooth can be indistinct in the first and second abdominal segments.

11. The dorsal marginal spines on the telson are not clearly paired. Four on both sides is commonest but three on one and four on the other also occurs. The tip of the telson has a median notch. On each side of the notch three distal spines are present of which the medial is longest (figs. 39-40). In two specimens four distal spines on



Figs. 33-34. *Bythocaris simplicirostris* G.O. Sars, 1869, dorsal view of anterior region. 33, non-ovigerous female, cl. 6.44 mm (ZMO F 928); 34, non-ovigerous female, cl. 4.69 mm (Trondheim fiord, leg. G.G. Storms). Scale = 4 mm.

each side of the notch are present.

Discussion.— In 1869 G.O. Sars published a short diagnosis of the species in latin. In 1912 he fully described and figured it. Both descriptions are based on one ovigerous female caught at a depth of 250 fathoms off Lofoten Island near Skraaven. Between these descriptions however one difference should be noted. In the description of 1869 it is stated that the carpus of the second pereiopod has 12 segments "Pedes.... 2di paris angusti et debiles, parte terminali articulis antecedentibus junctis longitudine circiter aeqvali et in articulos 12 divisa...". In 1912, G.O. Sars describes the carpus of the second pereiopod as having 10 joints. I assume the latter to be correct. In the 1912 description a posterior 'acute corner' is described and figured for the fourth and fifth abdominal pleura only. In the drawing also only the fourth and fifth

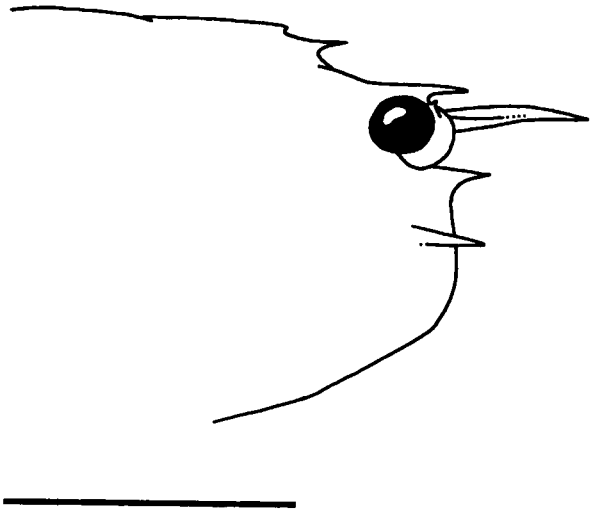


Fig. 35. *Bythocaris simplicirostris* G.O. Sars, 1869, lateral view of anterior part of carapace, female, cl. 6.44 mm (ZMO F 928). Scale = 4 mm.

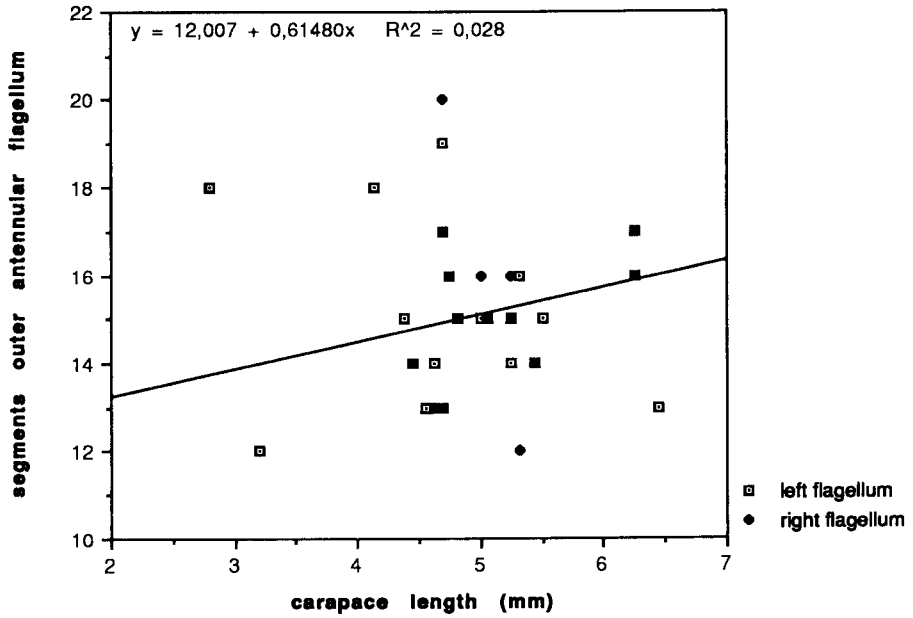
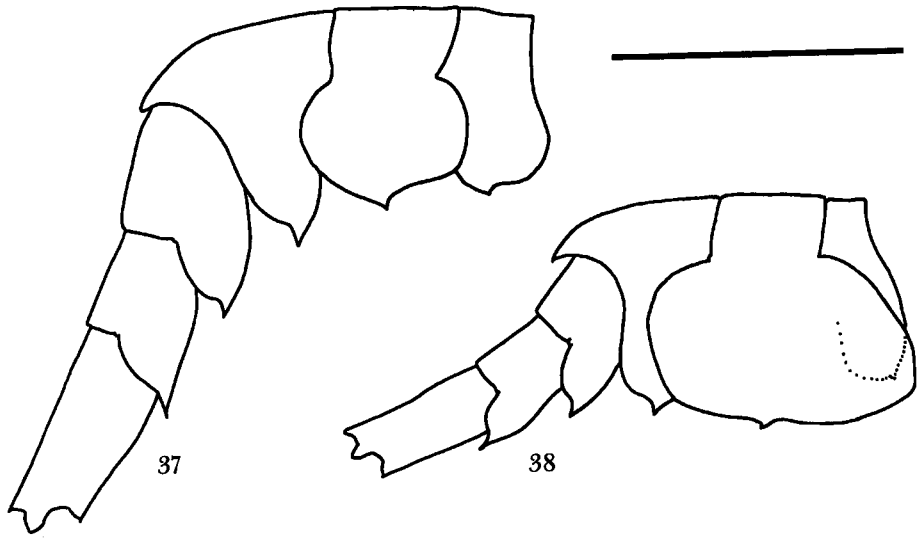
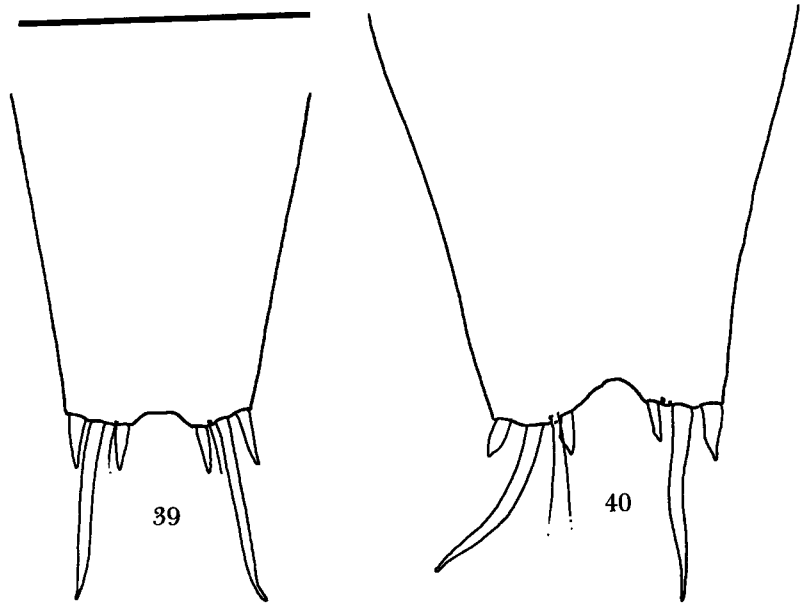


Fig. 36. *Bythocaris simplicirostris* G.O. Sars, 1869. Graph showing number of segments on left and right outer antennular flagellum.



Figs. 37-38. *Bythocaris simplicirostris* G.O. Sars, 1869, lateral view of abdominal pleura 1-5. 37, non-ovigerous female, cl. 3.51 mm (BeM 10082); male, cl. 5.63 mm (Trondheim fiord, leg. G.G. Storms). Scale 37 = 4 mm; 38 = 8 mm.



Figs. 39-40. *Bythocaris simplicirostris* G.O. Sars, 1869, tip of telson in dorsal view. 39, male, cl. 4.69 mm (BeM 12271); 40, ovigerous female, cl. 6.25 mm (BeM 33462). Scale = 1 mm.

abdominal segments have the pleura acutely pointed posteriorly. In the specimens studied by me a tooth could also be observed on the first, second and third abdominal pleura, although not always very prominent. Part of this material was previously studied by G.O. Sars who identified the specimens as belonging to *B. simplicirostris*, which indicates their conspecificity with the holotype specimen. Although most specimens from Norwegian musea were sent to Leiden, I failed to find the holotype among them.

In 1990, Squires described a new species of *Bythocaris*, *B. spinipleura* on the basis of 2 adult males from the stomach of a cod (*Gadus morrhua*) taken off Bonavista Bay, Newfoundland. As the distinguishing character between *B. simplicirostris* and *B. spinipleura*, Squires used the presence of spiniform processes on all abdominal pleura in the latter species. As is shown above, this character does not hold, which makes *B. spinipleura* a junior synonym of *B. simplicirostris*.

Distribution.— North Atlantic and Arctic Seas: Norwegian Sea, Greenland Sea and Barentz Sea, along the E coasts of Greenland, Iceland, Faroe Islands, Ireland, Norway and Spitzbergen, in depths between 55 and 760 m.

Bythocaris akidopleura spec. nov.
(figs. 41-62)

Material examined.— Holotype: 1 non-ovigerous female, cl. 6.75 mm (RMNH D 42361). Sta. CANCAP 5.024, Azores, W of Formigas, 37°17'N 25°14'W, depth 2070-2120 m, clay with pumice, 1.2 m Agassiz trawl, 28.v.1981.

Description of holotype.— Rostrum dorsoventrally flattened, without middorsal carina, unarmed, triangular in dorsal view; apex bluntly angular, slightly sinuate in lateral view, short, ending at level of lower orbital angle. Supraorbital spines prominent, reaching slightly beyond the tip of the rostrum, with lateral carina extending backwards. Carapace with dorsal carina in anterior 2/3, ending in a anterior blunt knob. No postorbital groove. Lower orbital angle produced. Submarginal antennal spine present just below lower orbital angle. Anterior margin sinuate, broadly rounded ventrally. Hepatic spine robust, submarginal.

Abdomen smooth. Pleura of first and second abdominal segments broadly rounded. Pleura of third abdominal segment with concave posterolateral emargination. Pleura of fourth and fifth abdominal segment with prominent posterolateral tooth. Telson 1.4 times as long as sixth abdominal segment; dorsal surface with 3 pairs of minute spines situated close to the lateral margin at 0.77-0.62-0.23 of the telson length. Posterior margin of telson damaged. Uropods falling short of telson.

Eyes small; cornea rounded, with dark pigment, without accessory ocellus. Eyestalk without protuberances.

Basal segment of antennular peduncle 1.3 times as long as combined distal segments, with ventromesial spine at 2/3 of its length; penultimate segment 1.7 times as long as distal segment. Stylocerite produced laterally, almost reaching distal end of basal segment, slender tip projecting straight forward. Outer antennular flagellum uniramous, as long as scaphocerite, composed of about 20 articles; inner antennular flagellum short, not reaching beyond scaphocerite.

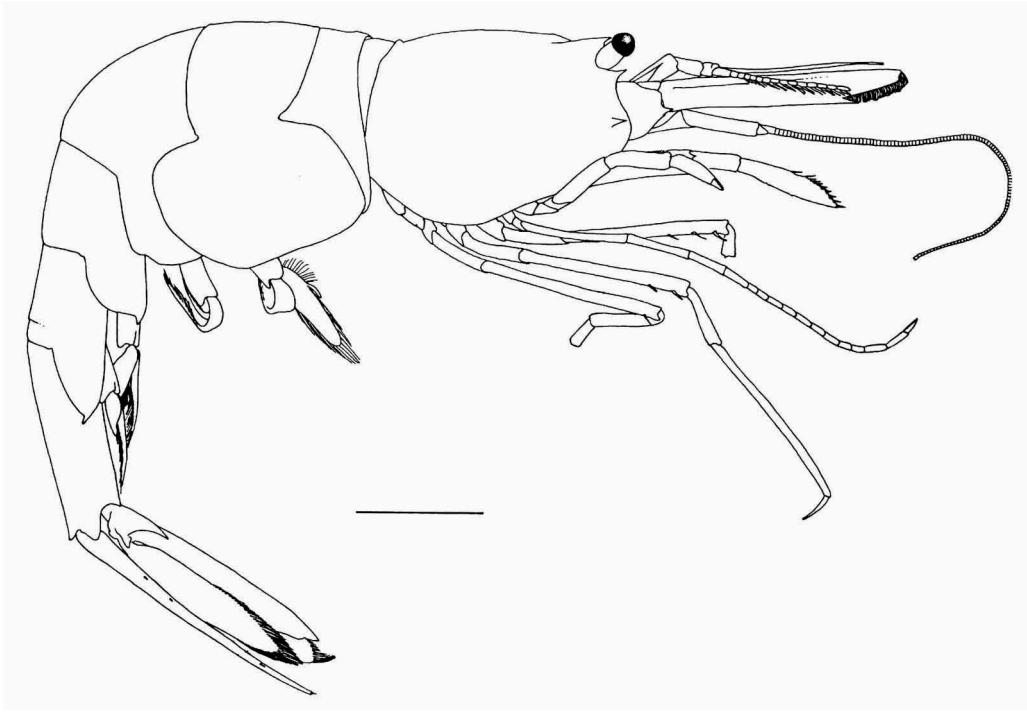


Fig. 41. *Bythocaris akidopleura* spec. nov., holotype ovigerous female, cl. 6.75 mm (RMNH D 42361). Scale = 4 mm.

Scaphocerite 1.2 times the carapace length, 2.5 times longer than antennular peduncle and 2.5 times as long as its greatest width; anterior margin rounded, not truncate, projecting well beyond disto-lateral tooth. Basal segment of antennal peduncle with strong distolateral spine.

Mandible without incisor process; molar process with short distal setae. Palp absent.

First maxilla with broad upper lacinia with stout median setae; lower lacinia turned towards upper lacinia, narrow with few distal, slender, serrate setae; palp slender with few long slender distal setae.

Second maxilla with bilobated distal endite, the distal lobe somewhat larger than proximal one; both lobes with many simple setae. Proximal endite reduced to a single lobe with long setae; unsegmented palp with few long setae; scaphognathite well developed, rounded.

First maxilliped with well developed distal endite; mesial margin straight with many slender short setae. Basal endite rounded with few slender setae; unsegmented palp long, with many long slender setae at mesial border; exopod normally developed, with caridean lobe; epipod more or less triangular.

Dactylar segment of second maxilliped with rows of short, stout, serrate setae on mesial border; propodal segment with 11 long slender setae on rounded mesial border; carpal segment short; two basal segments more or less fused; exopod with broad basal and slender distal part; epipod absent.

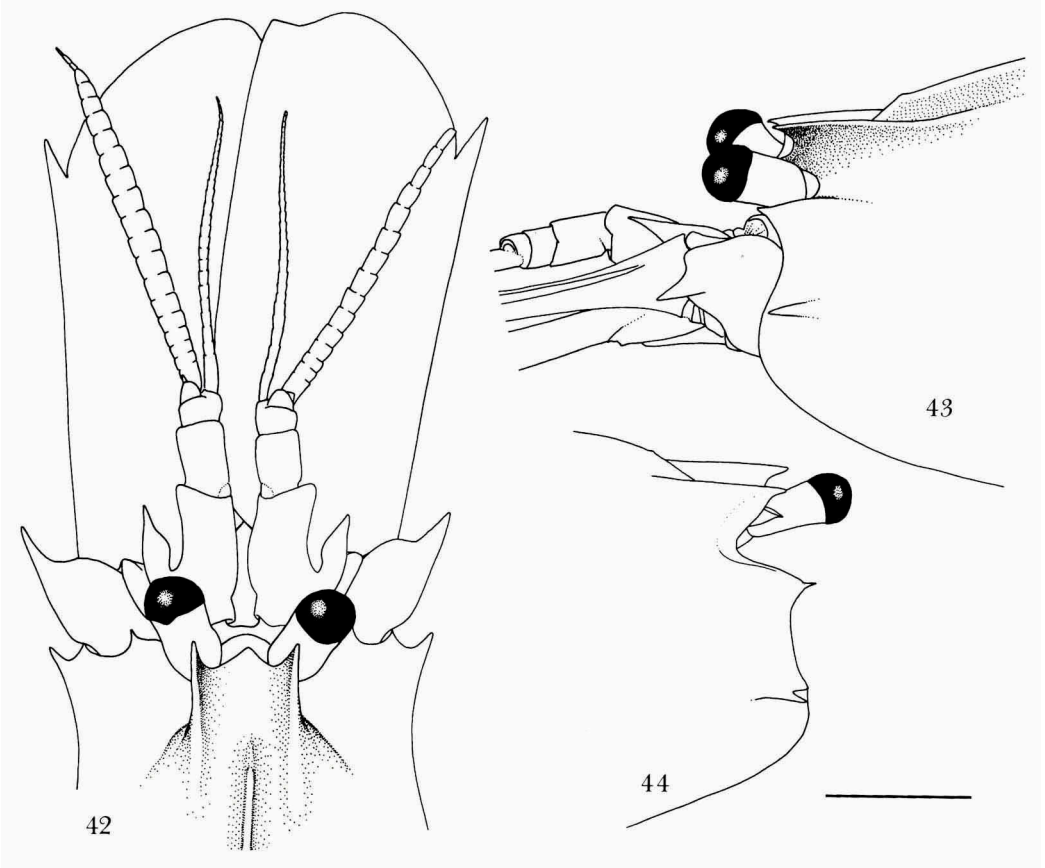


Fig. 42-44. *Bythocaris akidopleura* spec. nov., holotype ovigerous female, cl. 6.75 mm (RMNH D 42361). 42, anterior part of body in dorsal view; 43-44, anterior part of body in lateral view, fig. 44 showing ventral margin of rostrum. Scale = 2 mm.

Third maxilliped reaching distolateral tooth of scaphocerite; ultimate segment spatulate, nearly three times as long as penultimate segment, with nine robust spines along distoventral border, and about ten transverse rows of finely serrate setae on median surface; penultimate segment straight with six transverse rows of finely serrate setae on median surface; basal segment nearly three times as long as penultimate segment, slightly curved, with distolateral tooth and distomedial spine, proximally with small tubercle; exopod short with few distal setae.

First pereiopod short, reaching distal end of penultimate segment of third maxilliped. Chela simple with entire cutting edges; fingers about 0.5 times the palm length; carpus 1.2 times the palm length with a disto-medial row of ca. 10 serrate cleaning setae; merus slightly longer than carpus; ischium nearly half as long as merus, with three disto-ventral spines.

Second pereiopod long and slender, overreaching the scaphocerite with the distal two carpal segments. Fingers of chela with entire cutting edges, 0.8 times the palm length; carpus divided into 11 segments, as long as merus and ischium together; merus

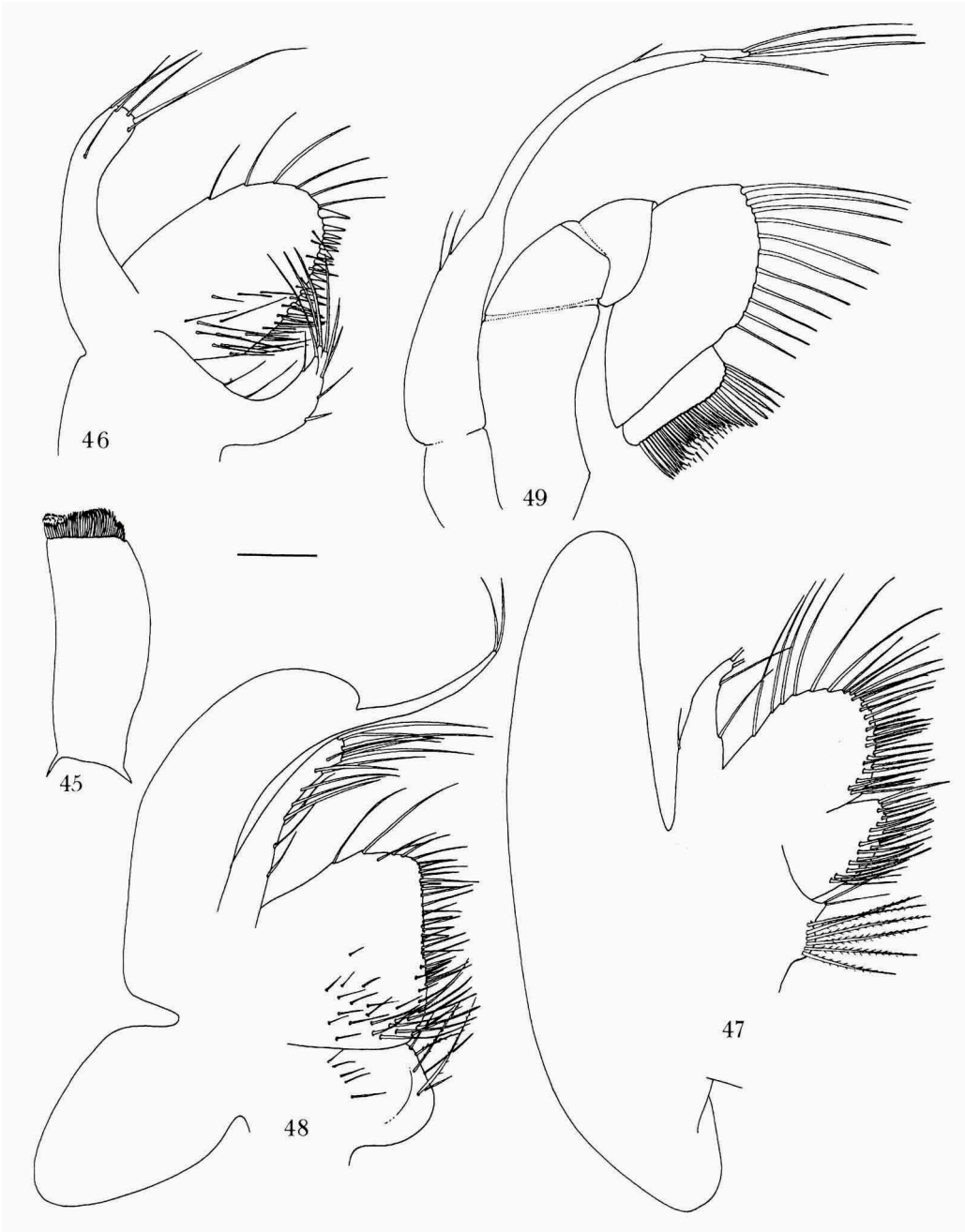


Fig. 45-49. ***Bythocaris akidopleura*** **spec. nov., holotype ovigerous female, cl. 6.75 mm (RMNH D 42361). 45, left mandible; 46, left first maxilla; 47, left second maxilla; 48, left first maxilliped; 49, left second maxilliped (setae on caridean lobe ommitted). Scale = 0.4 mm.**

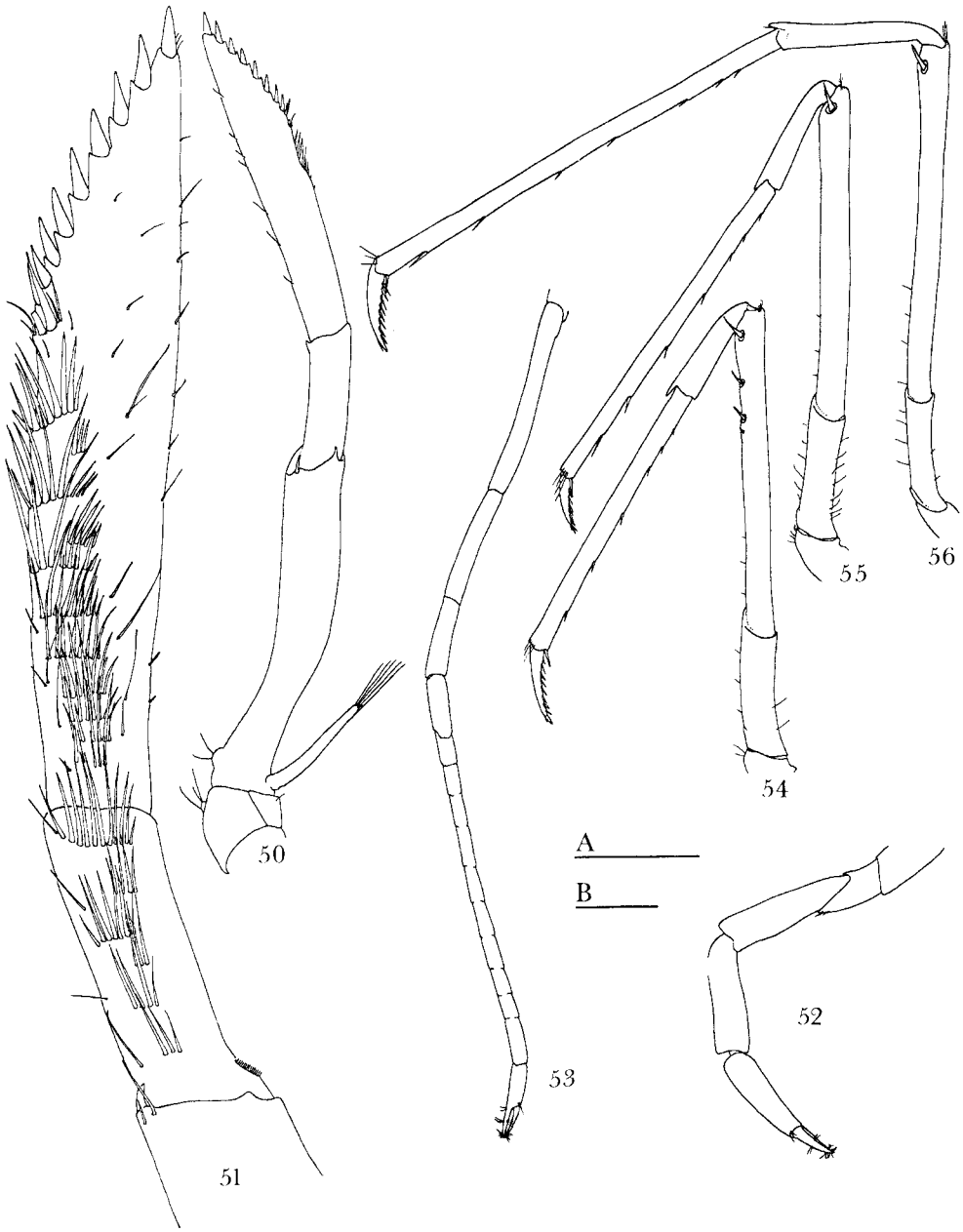
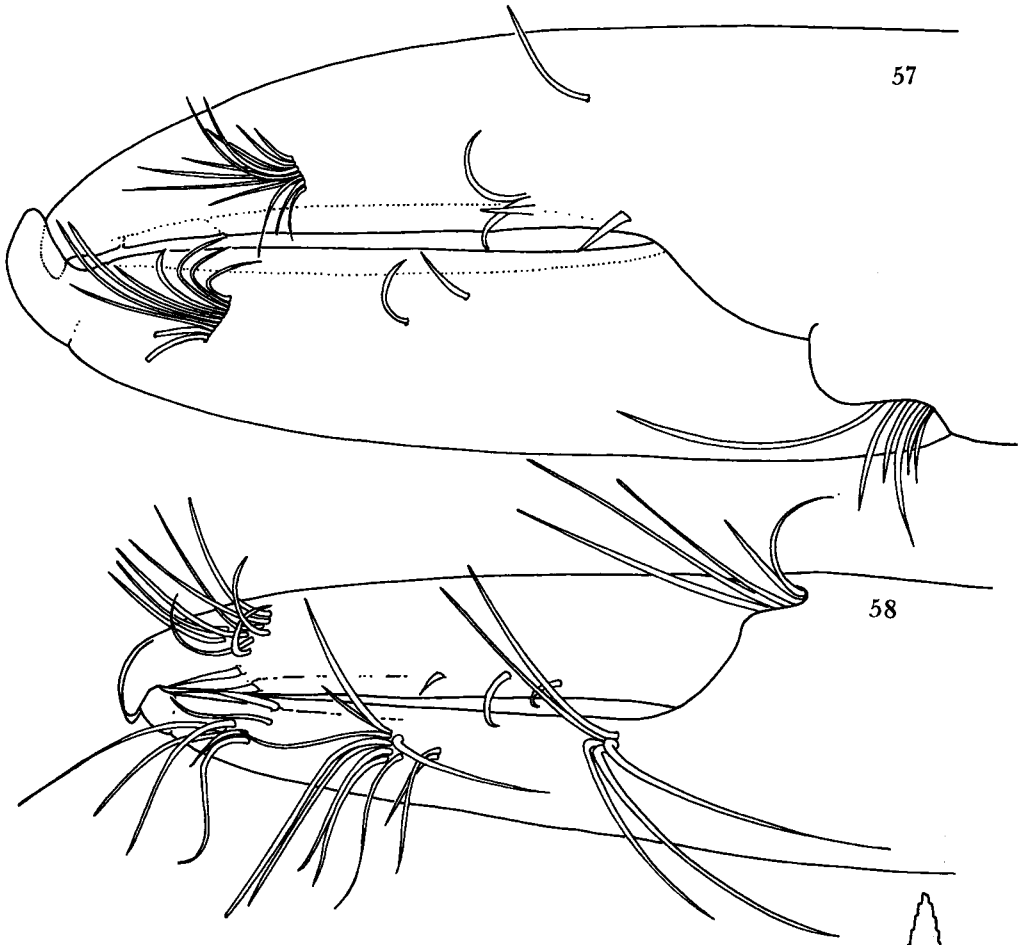


Fig. 50-56. *Bythocaris akidopleura* spec. nov., holotype ovigerous female, cl. 6.75 mm (RMNH D 42361). 50, left third maxilliped; 51, detail of ultimate and penultimate segment of left third maxilliped; 52, left first pereiopod; 53, left second pereiopod; 54, left third pereiopod; 55, left fourth pereiopod; 56, left fifth pereiopod. Scale A: 50, 52-56 = 2 mm. Scale B: 51 = 0.4 mm.

Fig. 57-61. *Bythocaris akidopleura* spec. nov., holotype ovigerous female, cl. 6.75 mm (RMNH D 42361). 57, chela of left first pereiopod; 58, chela of left second pereiopod; 59, antennular peduncle in ventral view; 60, tailfan in dorsal view; 61, first pleopod. Scale A: 60 = 4 mm. Scale B: 59, 61 = 1 mm; 57, 58 = 0.1 mm.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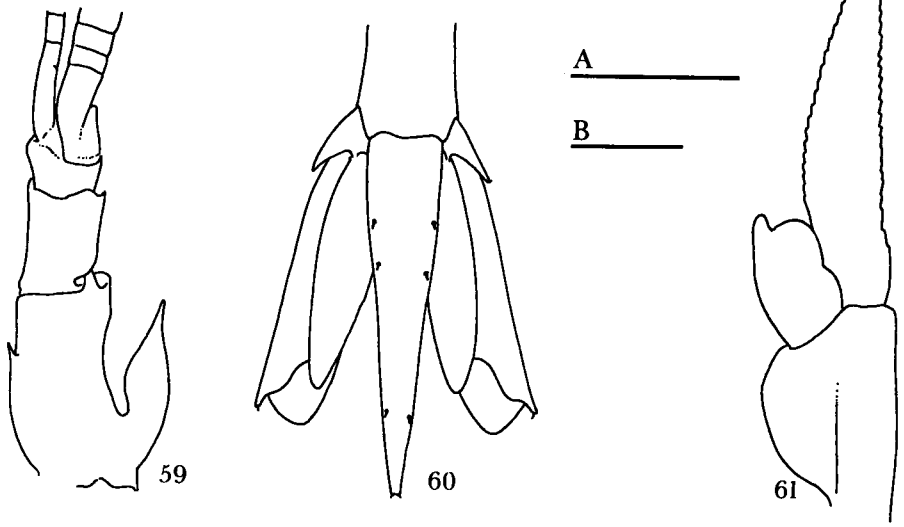
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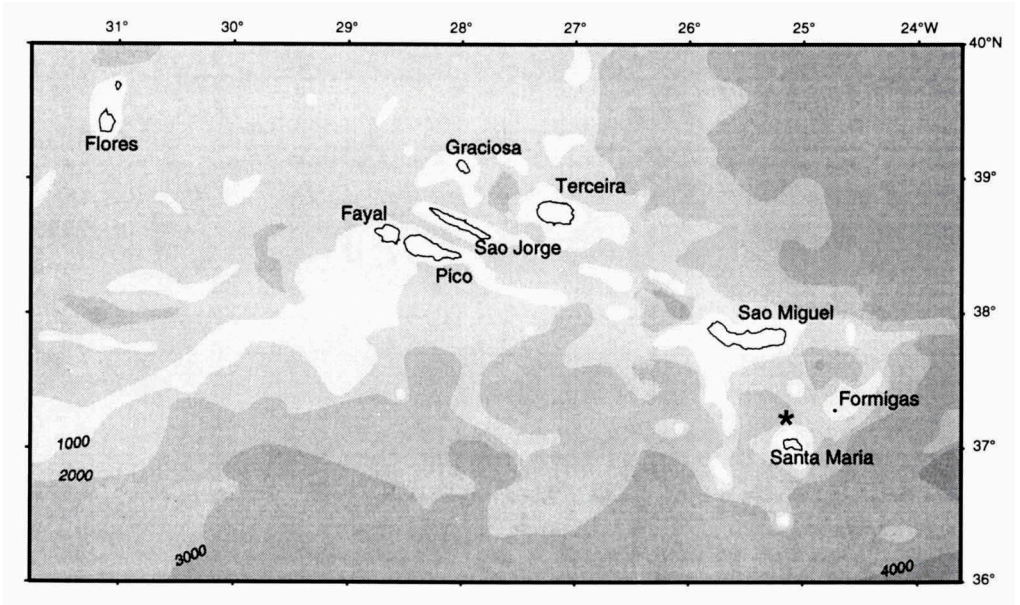

Fig. 62. Map of the Azores showing where *Bythocaris akidopleura* spec. nov. was found.

half the carpus length, indistinctly divided in two articles; ischium as long as merus.

Third, fourth and fifth pereiopods similar; length of ratio pereiopods 3, 4 and 5 is 1.00 : 1.05 : 1.24. Dactylus of third pereiopod 0.25 of propodus length, with 8 spinules on flexor margin; propodus with 6 ventral spines and 2 disto-ventrally. Carpus one third of propodus length; merus slightly longer than propodus, with three disto-lateral spines; ischium ca. 0.4 times the merus length. Fourth pereiopod with two disto-lateral spines on merus. Fifth pereiopod with one disto-lateral spine on merus. Other characters of fourth and fifth pereiopods as in third pereiopod.

Endopod of first pleopod of female ovate, with internal projection. Appendix interna on pleopod 2-5.

Etymology.— The specific name *akidopleura* is derived from the combination of the greek word 'akidotos', meaning pointed, and 'pleuron' meaning flap. It refers to the fourth and fifth abdominal pleura being acutely pointed, in which character the species differs from *B. payeri.*

Remarks.— The species is similar to *B. payeri* from which it differs in the following characters: 1) in *B. payeri* the pleura of the abdominal segments are always rounded while the fourth and fifth segment in *B. akidopleura* are acutely pointed posteriorly; 2) in *B. payeri* the carpus of the second pereiopod has usually 9 articles, seldom 8 or 10, while in *B. akidopleura* the carpus has 11 articles; 3) in *B. payeri* the rostrum exceeds the supraorbital teeth while the rostrum and supraorbital teeth are on one level in *B. akidopleura.*

Most closely related to the new species is *B. gorei* Abele & Martin, 1989. From this species *B. akidopleura* differs in the following characters: 1) in *B. gorei* the eyes are without of with very light pigmentation while with dark pigmentation in *B. akidopleura.*; 2) in *B. gorei* the third maxilliped is overreaching the distal lamina of the

scaphocerite with the distal half of the ultimate segment. In *B. akidopleura* the third maxilliped does not extend beyond the level of the distolateral tooth of the scaphocerite; 3) in *B. gorei* the merus of the second pereiopod is entire while divided in two joints in *B. akidopleura;*. *B. gorei* is distributed along the eastern and southern coast of Florida, in depths between 531 to 1460 m. Abele & Martin (1989: 40) mention a single ovigerous female which differs from *B. gorei* in having the eyes pigmented and the carpus of the second pereiopod with 10 segments. This specimen shares the pigmentation of the eye with *B. akidopleura* but differs from it in the number of carpal segments of the second pereiopod. When more material of *B. akidopleura* becomes available, allowing to study the infra-specific morphological variation, its taxonomical relation with *B. gorei* should be reconsidered

Key to the species of the genus *Bythocaris* (status of the species marked with an '*' is doubtful):

1. Antennal scales anteriorly rounded, projecting well beyond distolateral spine of scale. Eyes with or without pigmentation 2
- Antennal scales truncate anteriorly, anterior margins nearly straigth, barely overreaching distolateral spine of scale. Eyes without pigmentation 11
2. Pleura of third abdominal segment with spiniform process 3
- Pleura of third abdominal segment rounded 4
3. Pleura of all abdominal somites with spiniform process. Carpus of second pereiopod divided into 9-11 articles. Rostrum reaching cornea of eyes ..... ***B. simplicirostris***
- Only pleura of abdominal segments 3-5 with spiniform process. Carpus of second pereiopod divided into 8 articles. Rostrum very short, not reaching cornea of eyes ..... ***B. cosmetops***
4. Apex of rostrum not extending beyond eyes. Stylocerite not extending beyond 1st segment of antennular peduncle. Carpus of second pereiopod divided into 8 or more articles 5
- Apex of rostrum extending beyond eyes. Stylocerite extending beyond second segment of antennular peduncle. Carpus of second pereiopod divided into 7 articles ..... ***B. grumanti***
5. Pleura of abdominal segments 4 and 5 with spiniform process 6
- Pleura of abdominal segments 4 and 5 without spiniform process 8
6. Carpus of second pereiopod divided into 11 segments 7
- Carpus of second pereiopod divided into 8 segments..... ***B. floridensis.***
7. Eyes with pigmentation ..... ***Bythocaris akidopleura*** spec. nov.
- Eyes without or with very light pigmentation ..... ***B. gorei***
8. Hepatic spine present. Pterygostomial spine absent 9
- Hepatic spine absent. Pterygostomial spine present..... ***B. miserabilis***
9. Distance between supraorbital teeth about 0.5 times the carapace width. Rostrum broad triangular, reaching level of supraorbital teeth. Eye-stalks reaching tip of stylocerite ..... ***B. nana***
- Distance between supraorbital teeth about 0.25 times the carapace width. Rostrum triangular, reaching beyond supraorbital teeth. Eye-stalks not reaching tip of stylocerite 10

10. Antennal scale width 0.3 times its length. Peduncle of antenna half the scale length or longer. Pereiopods slender ..... * ***B. gracilis***
- Antennal scale width 0.4 times its length. Peduncle of antenna less than half the scale length. Pereiopods stout ..... ***B. payeri***
11. Median dorsal carina of carapace with one or two dorsal teeth 12
- Median dorsal carina of carapace unarmed 13
12. Median dorsal carina of carapace with one tooth, or with two unevenly developed teeth ..... ***B. leucopis***
- Median dorsal carina of carapace with two teeth of equal size ..... ****B. elegans***
13. Eye-stalks short, wider than long, hardly visible in dorsal view. Eyes not extending beyond rostrum. Carpus of second pereiopod divided into 10 articles 14
- Eye-stalks more than twice as long as wide, clearly visible in dorsal view. Eyes about twice as long as rostrum. Carpus of second pereiopod divided into 10 articles ..... ***B. irene***
14. Apex of rostrum strongly depressed ..... ***B. curvirostris***
- Apex of rostrum not depressed ..... ***B. cryonesus***

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