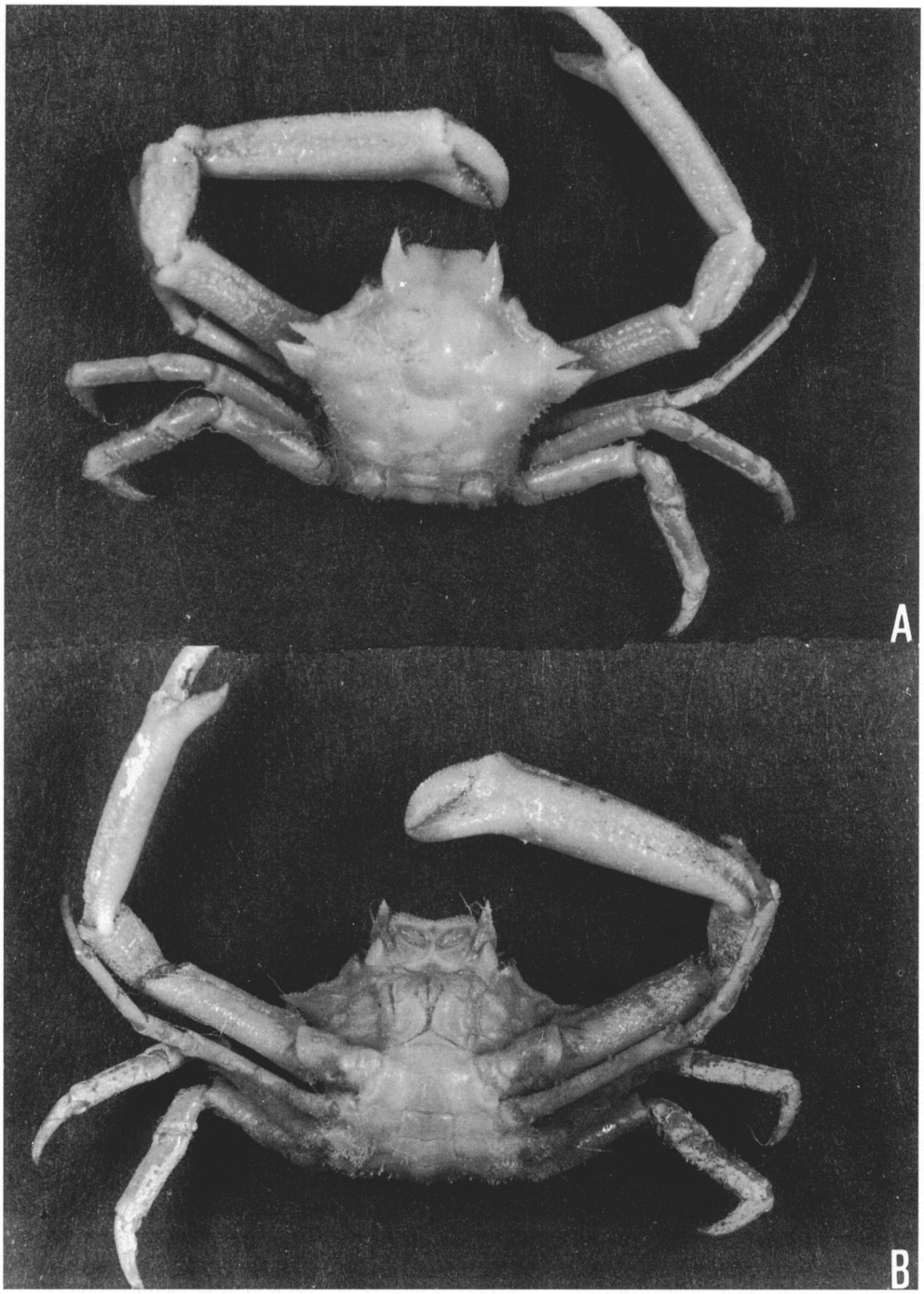


Fig. 12. *Harrovia cognata*, new species. Holotype male, 6.5 by 9.1 mm (QM W18689). A, dorsal view; B, ventral view.

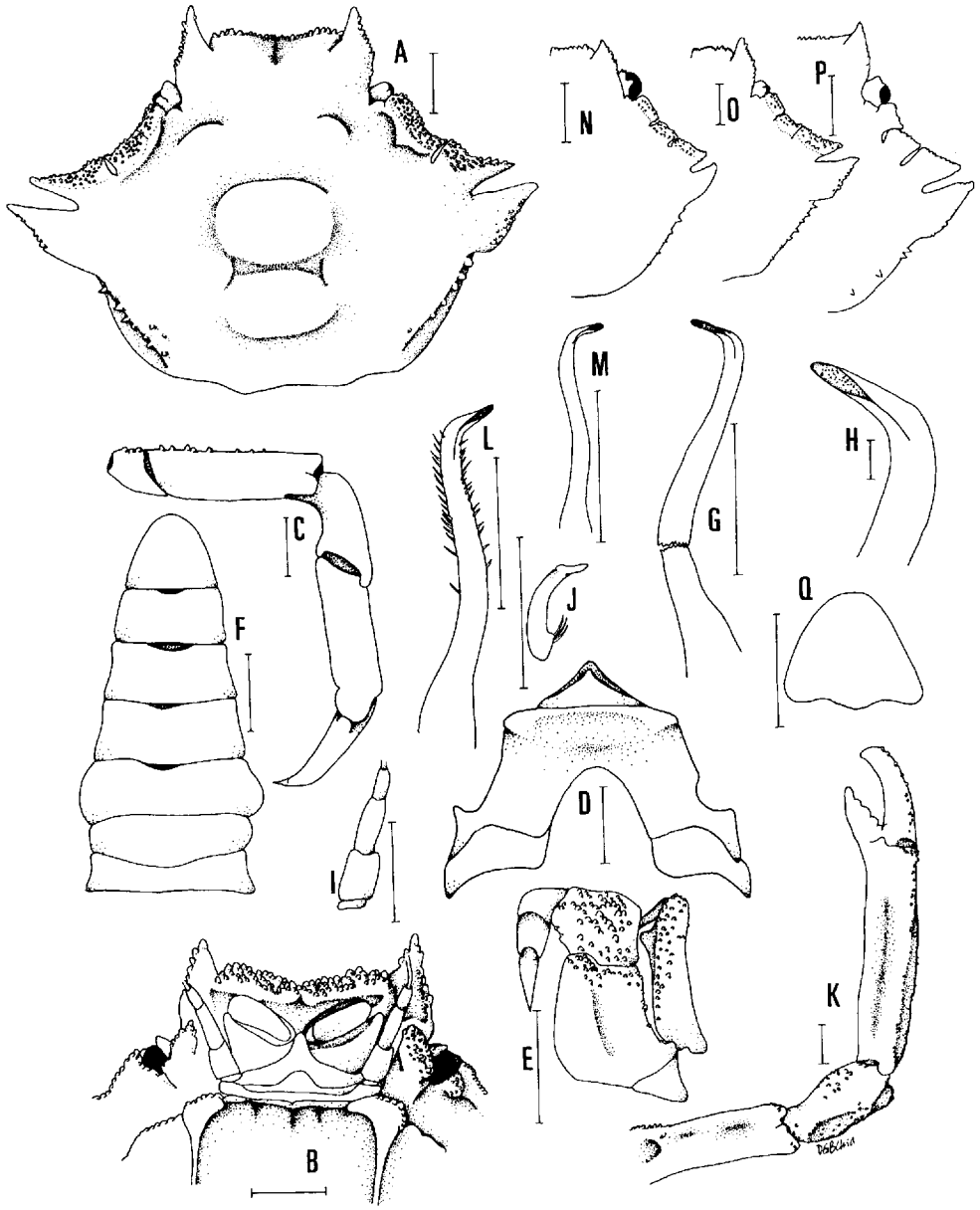


Fig. 13. *Harrovia cognata*, new species. A-K, O, Q, holotype male, 6.5 by 9.1 mm (QM W18689); L, male, 5.6 by 7.9 mm (QM W18690); M, male, 3.7 by 5.0 mm (QM W18692); N, male, 3.2 by 4.7 mm (QM W18694); P, male, 5.4 by 7.3 mm (QM W18693). A, dorsal view of carapace; B, face of carapace; C, fourth right ambulatory leg; D, thoracic sternum; E, left third maxilliped; F, abdomen; G, right G1; H, distal tip of right G1; I, antenna; J, left G2; K, postero-dorsal view of right cheliped; L, M, left G1; N-P, dorsal view of carapace (schematic); Q, 7th abdominal segment. Scales: A-G, I-Q = 1.0 mm; H = 0.1 mm.

H. cognata examined here. But the understanding of *H. ngi* is poor due to the limited number of specimens, thus making comparison between the two species difficult. As mentioned, the diagnostic characters of *H. cognata* are constant with little variation.

One slight variation observed in *H. cognata* is that the anterolateral lobes can be tightly joined, being fused with deep, narrow fissures (Fig. 13N) or separated by gaps but are fused only at the anterolateral margin (Fig. 13P).

Harrovia elegans De Man, 1887
(Figs. 14, 15)

Harrovia elegans De Man, 1887-1888: 5, 21, pl. 1: Figs. 5, 6 [type locality Elphinestone Island (= Thayawthadangyi Kyun), Mergui Archipelago, Burma (= Myanmar)]; De Man, 1902: 473, 682 [Ternate, Moluccas = Maluku Islands, Indonesia]; Balss, 1922: 136 [list only]; Flipse, 1930: 76, 77, 80, 90 [list only]; Serène et al., 1958: 196-198, 199 [in key], 239, Fig. 12A [type drawing refigured] [list only] (part); Garth, 1964: 140 [Enewetak Atoll, Marshall Islands, central Pacific Ocean; Serène, 1968: 63 [list only] (part); Kim, 1970: 26, pl. 5: Fig. 4 [Chuja Island, South Korea]; Kim & Rho, 1972: 86, 100, Fig. 5 [Chuja Island, South Korea]; Kim, 1973: 558, 586, 670, Fig. 265, pl. 112: Fig. 213 [list only]; Serène & Vadon, 1981: 124 [north of Lubang Island, Philippines]; Tirmizi & Kazmi, 1982: 308, Fig. 1 [Mekran coast, Pakistan]; Tirmizi & Kazmi, 1983: 369, 379 [list only]; Wu, 1983: 165 [name in Chinese]; Garth et al., 1987: 236, 242, 256 [list only]; Stevcic et al., 1988: 1311 [list only] (part); Tirmizi & Kazmi, 1988: 194, Fig. 60 [Mekran coast, Pakistan]; Castro, 1989: 97 [Sar Vanle, Somalia; Thailand, Andaman Sea; Kwajalein Atoll, Marshall Islands, central Pacific Ocean]; Chia et al., 1993: 266 [note only].

Harrovia albolineata - Laurie, 1906: 393 [Gulf of Manaar, southeast India]; Jones & Sankarankutty, 1961: 194, pl.1, fig1-4 [Gulf of Manaar, southeast India]; Serène et al., 1958: pl. 7, Figs. C, D, text Figs. 13A, B [Vietnam] (part); Sankarankutty, 1966: 350, 354 [Gulf of Manaar, southeast India] [not *Harrovia albolineata* Adams & White, 1849].

Material examined. - Neotype: male (7.2 by 9.3 mm) (BMNH 1907.5.22.194), South of Manaar, Sri Lanka, coll. Herdman, no other data. Others: **Somalia**: 1 female (7.0 by 9.4 mm), (RMNH D42944), east Africa, Sar Unale, 20 km south of Kisimayo, open coast with tidepools, coll. M. Vannini, Nov. 1971. **Sri Lanka (= Ceylon)**: 1 female (7.1 by 9.2 mm) (BMNH 1907.5.22.195), South of Manaar, coll. Herdman, no other data. - 1 female (BMNH 1934.1.16.68), Gulf of Manaar, coral reef, coll. Herdman, no other data. **Thailand**: 1 male (7.5 by 9.3 mm), 3 females (8.0 by 10.3 mm) (ZRC 1997.320-323), Andaman Sea, coast of Thailand, Tevega Expedition, coll. J.L. & J.P. Christofferson, 29 Oct. 1953. **Peninsular Malaysia**: 3 males (5.5 by 7.0 mm, 4.3 by 5.2 mm, 4.9 by 6.0 mm), 1 female (ZRC 1985.1427-30), Sembilan Isles, 46-82 m, shell gravel, coral substratum, coll. D. S. Johnson, 29 Oct. 1953. **South China Sea**: 1 female (6.6 by 8.2 mm) (BMNH 92.8.28.342), Macclesfield Bank, R.V. 'Penguin', no other data. **Philippines**: 1 female (7.8 by 10.1 mm) (MNHN B25635), Station CP8, 85-90 m, 13°55'N, 120°20'E, MUSORSTOM 2 expedition, coll. MUSORSTOM. **Indonesia**: 1 female (6.1 by 7.6 mm) (SMF ZMG7077), Ternate, Moluccas, Kükenthal expedition, no other data. - 1 female (7.9 by 10.1 mm) (ZMUC), Kei Islands, Station 20, circa 50 m, sand and gravel substratum, trawl, Danish expedition, 14 Apr. 1922.

Diagnosis. - Carapace hexagonal, regions not well defined, usually with two tubercles on protogastric regions, but sometimes absent; surface usually thinly pubescent. Anterolateral margins separated into four lobes; the first and second generally lobiform, very low, subtruncate, the margins usually straight, separated by wide cleft, not fused, lobe two might be elongate and appears dentiform; third and four lobes distinctly dentiform, directed obliquely outwards. Posterolateral margin mildly tuberculated. Frontal margin with small median fissure, slightly deflexed, appearing straight from dorsal view, shallow median cleft. Infraorbital and subhepatic teeth not as strong. Merus of third maxilliped tuberculated. Surfaces of sternum highly tuberculated. Chelipeds cylindrical, surfaces highly tuberculated, carpus without large tubercle or spine on distal inner margin of carpus. Ambulatory legs short and stout, ratio of length to width of fourth ambulatory merus 2.7-3.6, anterior margin

of the ambulatory merus lined with strong spinules; distal part of G1 bends approximately 45°, sometimes 90°.

Remarks. - The holotype of *H. elegans* cannot be located. It is not in the BMNH or any of the museums where de Man could have retained his material. Considering the problems with *H. elegans*, we feel that it is best to designate a neotype to stabilise the taxonomy of this and allied species. Although it would be ideal to designate specimens from near the type locality (i.e. Andaman Islands), in this case, the only specimen available is from Sri Lanka (BMNH 1907.5.22.194). Decision was made against selecting the specimen (SMF ZMG7077) examined by De Man (1902) since it was collected from the Moluccas, which is even more distant from the type locality.

Specimens reported by Garth (1964), Kim (1970), Kim & Rho (1972), Kim (1973), Serène & Vadon (1981), Tirmizi & Kazmi (1982, 1988) and Castro (1989) seem to fit into the current concept of the species. The record by Huang (1989: 346, Fig. 316) from Zhejiang Province in China cannot be ascertained as his figure is too schematic.

Specimens reported by Laurie (1906) as *Harrovia albolineata* are examined and are re-determined as *H. elegans*. From the figures and descriptions provided by Jones & Sankarankutty (1961) and Sankarankutty (1966), their specimens are also referable to *H. elegans*. As reported in Chia et al. (1993: 267), Serène et al.'s (1958) specimens from Vietnam consisted a mixture of three species, which can be identified as *H. albolineata, H. elegans* and *H. longipes*. The specimens which appear on plate 7, figures. C, D and on text figures 13A, B are probably referable to *H. elegans*.

The series of specimens examined here shows a certain degree of variation. All of them seems have the form of anterolateral lobes as defined here for *H. elegans*, with minor variations. In the Somalia specimen (RMNH D42944), the second anterolateral lobe seems to be somewhat elongate and almost tooth-like (Fig. 15R). This is rather unusual and is not observed in any other specimens. In the Philippine specimen (7.8 by 10.1 mm, MNHN AC63) (Fig. 15V), the second anterolateral lobe appears to smaller than usual, and more interestingly, the ambulatory legs of this specimens are somewhat longer and thinner (length to width ratio = 3.6). The posterolateral margin of a specimen (6.6 by 8.2 mm, BMNH 92.8.28.342) is slightly more tuberculated than others (Fig. 15U).

There is also a variation in the distal part of G1. Two forms were observed amongst the lot of specimens from Sembilan (Malaysia): 1), the majority of specimens have the distal part bending at 45° (Figs. 15L, M), and 20, in some specimens, the distal part bending at 90° (Fig. 15N). Despite this variation, the anterolateral lobes, seem to agree well with the other specimens which were collected near the type locality.

Harrovia elegans is very close to *H. japonica*, the main difference being in the form of the anterolateral teeth (see *Remarks* for *H. japonica*). *Harrovia elegans* is also smaller in size when compared to *H. japonica*. As with other species of *Harrovia*, the carapace of large females appears to be bulbous, inflated and highly convex (Fig. 15S). This is particularly obvious in the female specimens (ZRC 1997.320-323) from Thailand.

Distribution. - Stretches from the Indian Ocean to the Pacific Ocean and as far south to Indonesia.

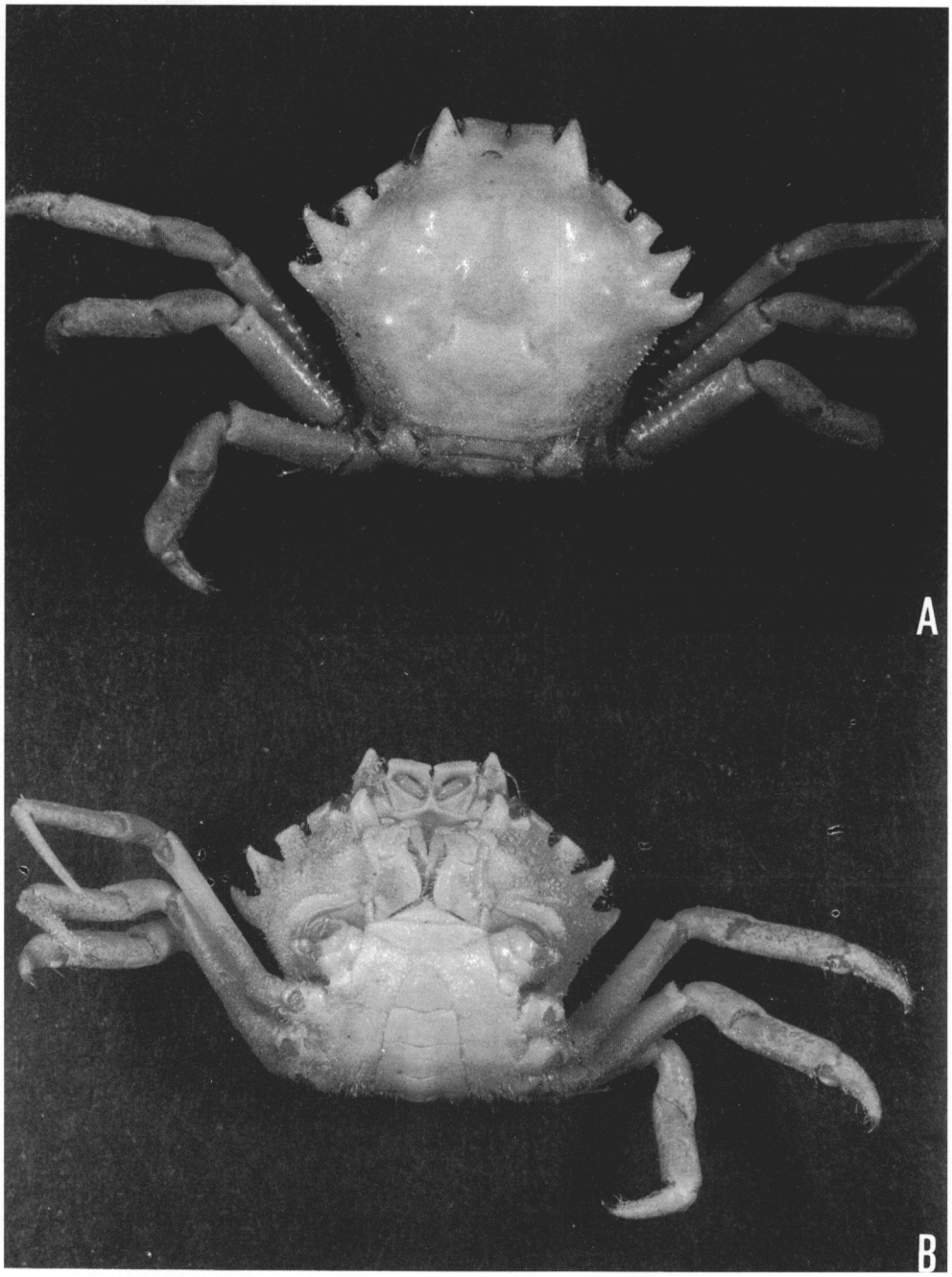
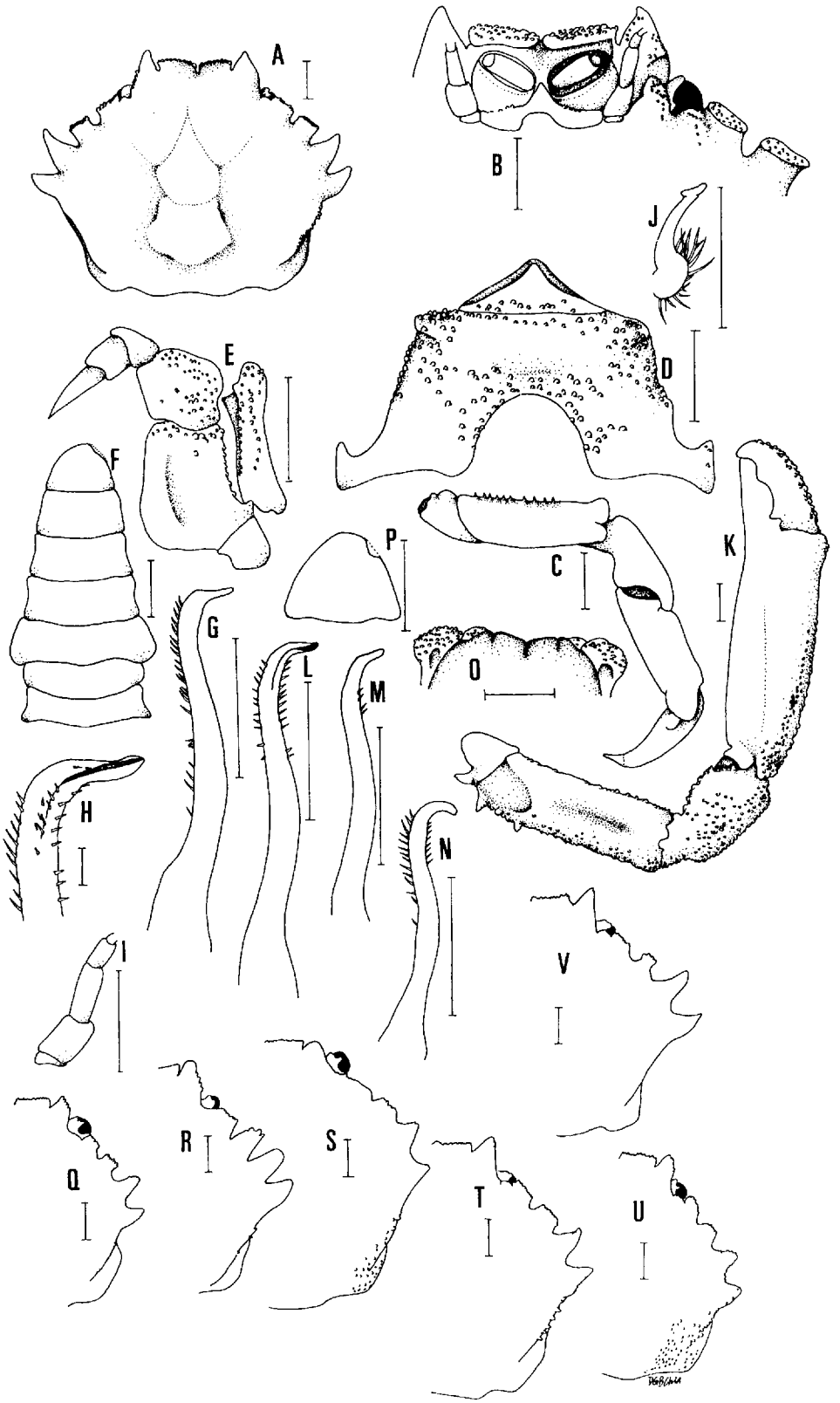


Fig. 14. *Harrovia elegans* De Man, 1887. Neotype male, 7.2 by 9.3 mm (BMNH 1907.5.22.194). A, dorsal view; B, ventral view.


A
B
J
D
E
F
P
C
K
G
L
M
O
H
N
I
V
Q
R
S
T
U

Harrovia japonica Balss, 1921
(Figs. 16-18)

Harrovia japonica Balss, 1921: 177 [type locality Sagami Bay, Honshu island, Japan]; Balss, 1922: 136, Figs. 8,9 [Sagami Bay, Honshu island, Japan]. Chia et al. 1993: 266 [note only].

Harrovia elegans - Urita, 1918: 164 [Kagoshima, Japan]; Urita, 1926: ii, 30 [off Ibusuki, Kyushu island, Japan]; Sakai, 1932: 42, 54, pl. 2, Fig. 2 [Tateyama and Sagami bays, Izu Peninsula, Honshu island, Japan]; Sakai, 1934: 300, Fig. 13 [Nagasaki, Kyushu island, Japan]; Yokoya, 1936: 142, Fig. 8 [Sagami Bay, Honshu island, Japan]; Sakai, 1936: 18, 114, Fig. 54, pl. 30: Fig. 3 [colour plate] [list only]; Sakai, 1938a: 53 [Izu Islands, Japan]; Sakai, 1938b: 350, pl. 33: Fig. 1 [colour plate] [Tateyama and Sagami bays, Izu and Kii peninsulas, Honshu island; Nagasaki, Kyushu island, Japan]; Sakai, 1940: 37 [list only]; Sakai, 1956: 26 [appendix list] [list only]; Sakai, 1957: 699, Fig. 2019 [list only]; Serène et al., 1958: 240, Figs. 12B, 12D [list only]; Sakai, 1960: 53, pl. 26: Fig. 5 [colour plate] [list only]; Miyake, 1961: 17 [Amakusa Island, Japan]; Sakai, 1961: colour plate on unnumbered page [list only]; Miyake et al., 1962: 128 [list only]; Ozaki, 1964: 43 [Kii Peninsula, Honshu island, Japan]; Sakai, 1965: 101, pl. 46: Figs. 2, 5 [colour plate] [English text], 42 [Japanese text] [Sagami Bay, Honshu island, Japan]; Suzuki & Kurata, 1967: 97 [Izu Islands, Japan]; Serène, 1968: 63 [list only] (part); Utinomi, 1969: 80, pl. 40: Fig. 8 [colour plate] [list only]; Nishimura & Suzuki, 1971: 112, pl. 39: Fig. 3 [colour plate] [list only]; Watabe, 1974: 139 [Sagami Bay, Honshu Island, Japan]; Takeda, 1975: 23, 130 [colour photograph] [list only]; Sakai, 1976: 298 [in key], 299, Fig. 166d [volume in English], 180 [volume in Japanese], pl. 100: Fig. 3 [colour plate] [Tateyama and Sagami bays, Izu and Kii peninsulas, Honshu island; Nagasaki, Kyushu island, Japan] - Yamaguchi et al., 1976: 36 [Amakusa Islands, Japan]; Kim, 1977: 208 [Cheju Island, South Korea]; Miyake & Takeda, 1978: 37 [Amakusa Islands, Japan]; Takeda, 1979b: 155 [Cape Shimonoseki, Honshu island, Japan]; Takeda, 1982: 137, Fig. 404 [colour plate] [list only]; Kim & Kim, 1982: 154 [list only]; Imanaka et al., 1983: 63 [Kominato, Honshu island, Japan]; Miyake, 1983: 56, 212 pl. 19, Fig. 5 [colour photograph] [list only]; Kikuchi, 1985: 84 [Amakusa Islands, Japan]; Masuda et al., 1986: 141 [colour photograph] [list only]; Yamaguchi et al., 1987: 17, pl. 7: Fig. 2 [Amakusa Islands, Japan]; Stevcic et al., 1988: 1311 [list only] (part); Anon, 1992: 8 (colour photograph) [Japan]; Takeda, 1994: 246 [Japan] [not *Harrovia elegans* De Man, 1887].

Material examined. - Lectotype: 1 female (10.3 by 14.4 mm) (BMNH 1934.4.6.1, exchange with Munich Museum), Sagami Bay, Japan.

Others: **Japan**: 1 male (9.5 by 14.0 mm), 1 female (11.3 by 16.8 mm) (RMNH 32040), Wagu, Kii, Mie Prefecture, coll. N. Yamashita, 1978-79. - 1 young female (4.7 by 6.6 mm) (ZMUC), Misaki, on *Actinometra*, coll. Dr Th. Mortensen, 6 May 1914. - 1 male, 3 females (BMNH 1967.6.5.132-4), Tosa Bay, commensal on *Comanthus japonicus*, coll. T. Sakai, Apr. 1961. - 2 males, 2 females (ZMG TS00063), Tsuji-Shima, Amakusa, Kumamoto Prefecture, Japan. coll. T. Sakai, 25 Apr. 1963. - 1 female (ZMG), Habu-minato, Oshima, Izu, coll. T. Sakai, 10 May 1963. - 1 male, 1 female (ZMG), coll. T. Sakai, no other data. - 1 male, 1 female (13.3 by 19.2 mm) (ZRC 1997.175-176), Shirahama Bay, found live at Seto Aquarium, on *Comanthus japonicus*, coll. P. Castro, Aug. 1993. - 1 male, 1 female (ZRC 1997.177-178), Fuku-ura, Manazuru, Honshu, 35°09'N, 139°08'E, 4.5m, on *Comanthus japonicus*, coll. P. Castro, 5 Oct. 1993. - 1 juvenile female (ZRC 1997.179), Tomioka Bay, Amakusa-Shimo-Shima Island, Amakusa Islands, 5 m, coll. P. Castro, 25 Aug. 1993. - 1 female (ZRC 1997.183), Kushimoto, 10 m, on *Comanthus* sp., coll. S. Nagai, Sep. 1990. - 1 male (BPBM), Simoda Biological

---

(See opposite page) Fig. 15. *Harrovia elegans* De Man, 1887. A-K, O, P, neotype male, 7.2 by 9.3 mm (BMNH 1907.5.22.194); L, male, 7.5 by 9.3 mm (ZRC 1997.320-323); M, male, 5.5 by 7.0 mm (ZRC 1985.1427-30); N, male, 4.6 by 6.0 mm (ZRC 1985.1427-30); Q, female, 6.1 by 7.6 mm (SMF ZMG7077); R, female, 7.0 by 9.4 mm (RMNH D42944); S, female, 8.0 by 10.3 mm (ZRC 1997.320-323); T, female, 7.9 by 10.1 mm (ZMUC); U, female, 6.6 by 8.2 mm (BMNH 92.8.28.342); V, female, 7.8 by 10.1 mm (MNHN AC63). A, dorsal view of carapace; B, face of carapace; C, fourth right ambulatory leg; D, thoracic sternum; E, left third maxilliped; F, abdomen; G, left G1; H, distal tip of left G1; I, antenna; J, left G2; K, postero-dorsal view of right cheliped; L-N, left G1; O, endostome; P, 7th abdominal segment; Q-V, dorsal views of carapaces (schematic). Scales: A-G, I-V = 1.0 mm; H = 0.1 mm.

Station, Simoda, 27 Jan. 1936, no other data. - 1 male (9.2 by 12.9 mm) (ZRC 1997.180), off Akasaki, Matsu-Shima Island, on comatulid crinoid, coll. T. Yamaguchi, Aug. 1993. - 1 male, 1 juvenile female (ZRC 1997.181-182), Tomioka Bay, Amakusa-Shimo-Shima Island, coll. K. Yamahira, 24 Aug. 1993. - 1 female (USNM 50895), station 3729, Omai Zaki Lt., 34 fms, off Honshu, coll. ALBATROSS Philippine Expedition. - 1 female (USNM 72504), off Honshu Island, 34 fms, coll. ALBATROSS Philippine Expedition, 15 May 1900. 1 female (dried) (USNM 22862), Japan, don. Reverend H. Loomir. - 1 female (USNM 48457), Tara, Ibusuki, in net used for *Penaeus* fishing, coll. T. Urita, no date. **Southern China**: 1 male (8.8 by 12.8 mm) (ZMUC), Cape Christiansen, 23°15'N, 117°40'E, SL Nordiske, 26 Jan. 1912.

Diagnosis. - Carapace hexagonal, regions not well defined, usually with two strong tubercles on protogastric regions, but sometimes absent; surface covered with thick pubescent. Anterolateral margins separated into four lobes; the first and second generally truncate, separated by narrow fissures, usually appearing fused, margins usually straight or distinctly concave, lined with many tubercles, often callositised, edge of lobes highly spiniform; third and four lobes distinctly dentiform, almost equal, directed strongly forward, margin of third lobe might be covered with some tubercles thus appearing straight. Posterolateral margin mildly tuberculated, sometimes absent. Frontal margin with small median fissure, slightly deflexed, appearing straight from dorsal view, shallow median cleft, covered with many tubercles. Strong infraorbital and subhepatic teeth which are often covered with callosities. Merus of third maxilliped tuberculated. Chelipeds cylindrical, carpus without large tubercle or spine on distal inner margin of carpus. Ambulatory legs short and stout, ratio of length to width of fourth ambulatory merus 2.6-3.4, anterior margin of the ambulatory merus lined with very strong spinules. Distal part of G1 bends approximately 90° or very slightly downwards.

Remarks. - This species was described by Balss (1921) but was later synonymised under *H. elegans* by Sakai (1932). Most subsequent workers have followed this action (e.g. Serène et al., 1958). Not much justification was provided for the synonymy. Sakai (1932) regarded De Man's (1887) type specimen of *H. elegans* as a juvenile (6.6 by 9.25 mm) when compared to his specimen measuring 12.5 by 15 mm. Chia et al. (1993: 266) suggested that *H. japonica* should be regarded as a distinct taxon from *H. elegans*.

Undoubtedly, these two species are very close. However, there are consistent differences in the form of their anterolateral lobes. The margins of the first and second anterolateral lobes in *H. japonica* are concave and the edges of the lobes are strongly spiniform, apposing each other and appearing fused, whilst the third and fourth anterolateral lobes are highly spiniform, acute and distinctly curving forward. This condition is evident even in small specimens (Figs. 18A, M). In *H. elegans*, the margins of the first and second anterolateral teeth are straight or subtruncate, the edges are not spiniform, and are separated by a wide gap; the third and fourth anterolateral teeth are less acute, weaker and directed obliquely outwards (Fig. 15A). Other differences include the stronger infraorbital and subhepatic teeth in *H. japonica*, stronger spinules on the anterior margins of the ambulatory meri in *H. japonica*, and the more tuberculate surfaces of the third maxillipeds and thoracic sternum in *H. elegans*. Known *H. japonica* specimens in general are also larger in size (width of adult carapace is usually above 10 mm as compared to less than 10 mm in *H. elegans*).

Variations observed within the species include a more dentiform third anterolateral lobe the but margin of which may be tuberculated, appearing slightly truncate (Fig. 18N), highly or mildly tuberculated surfaces of the chelipeds, the number of spines on the anterior margins of the ambulatory meri vary from two to 10, the posterolateral margin of the carapace is

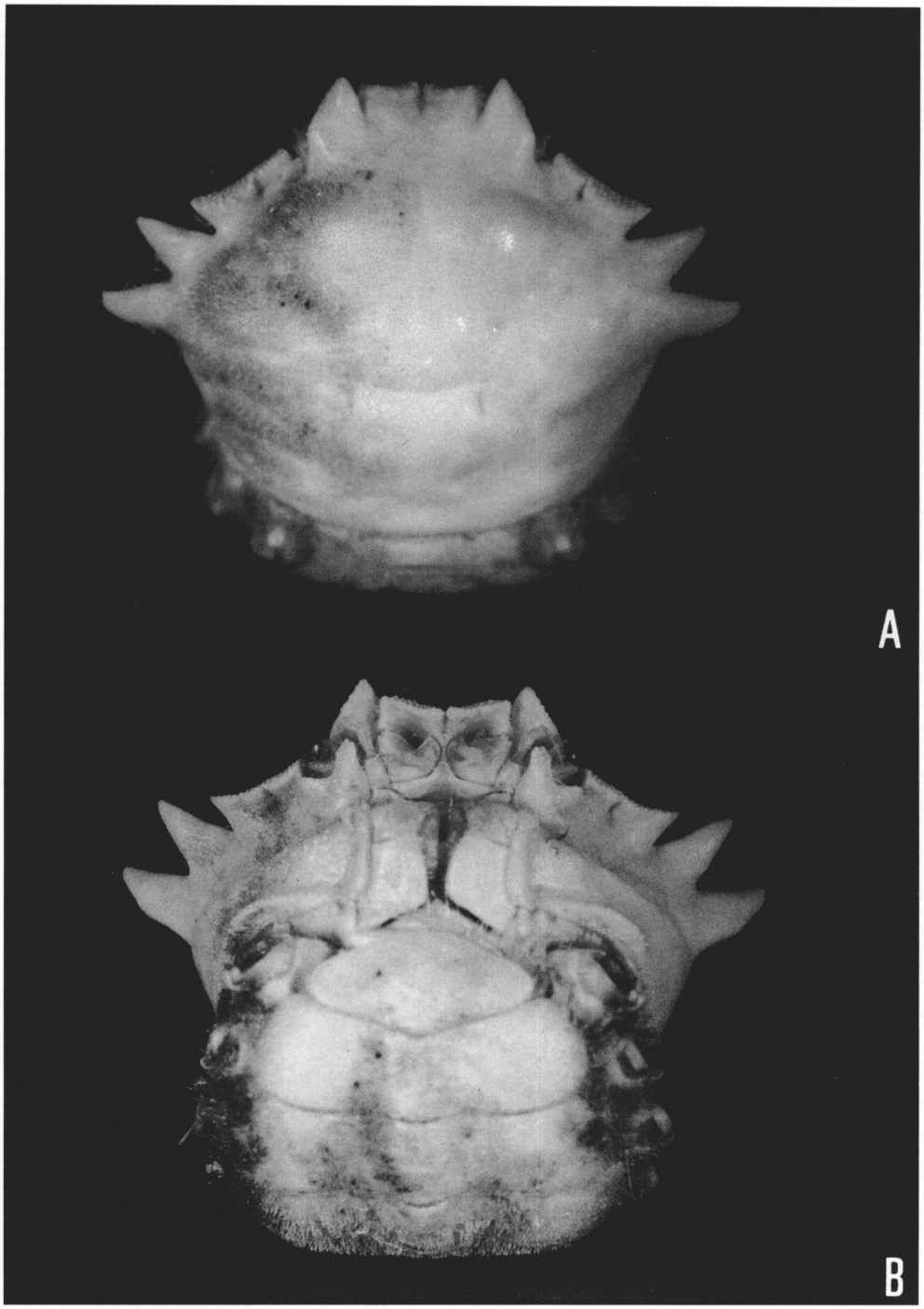


Fig. 16. *Harrovia japonica* Balss, 1921. Lectotype female, 10.3 by 14.4 mm (BMNH 1934.4.6.1). A, dorsal view; B, ventral view.

Fig. 17. *Harrovia japonica* Balss, 1921. Male, 9.5 by 14.0 mm (RMNH 32040). A, dorsal view; B, ventral view.

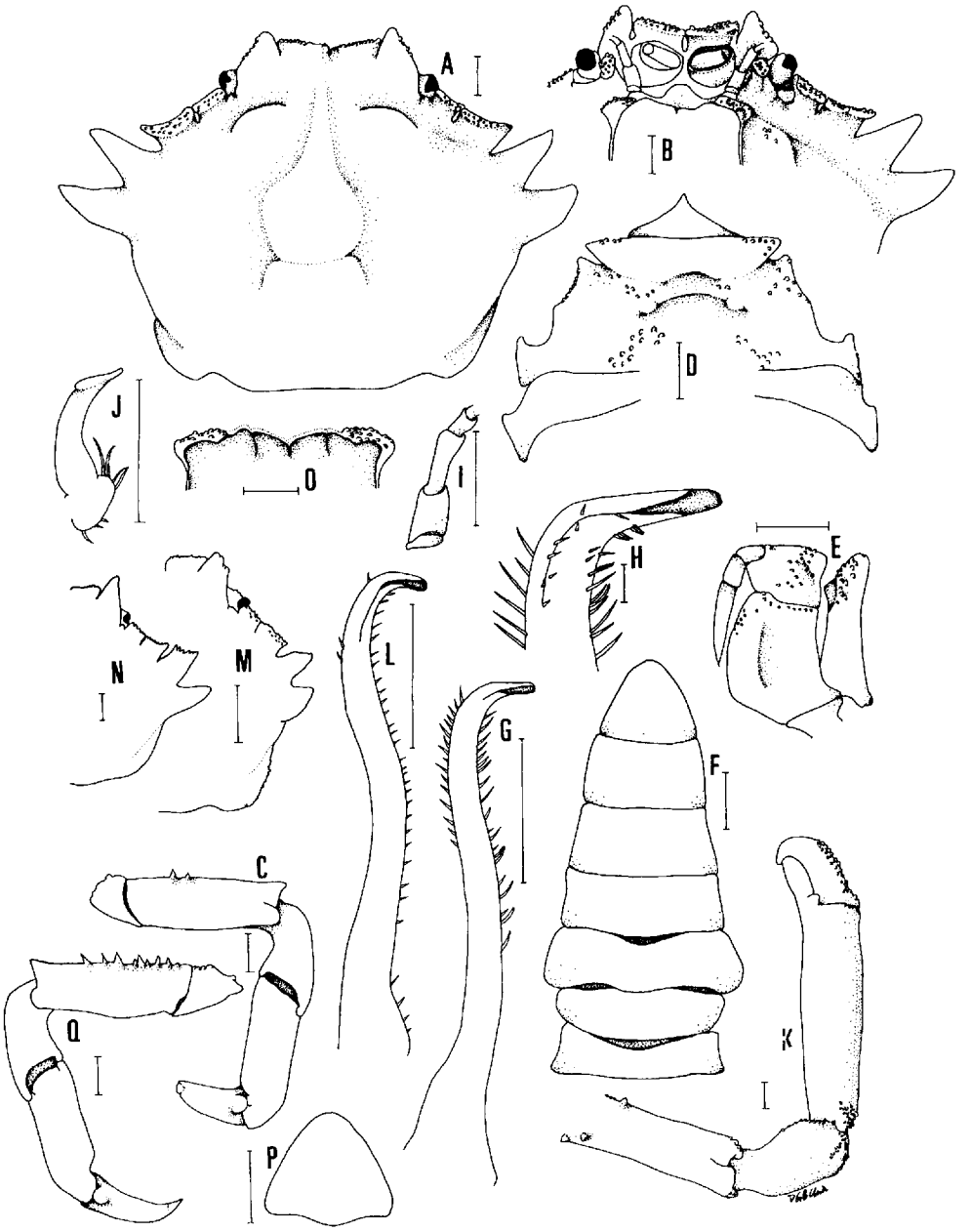


Fig. 18. *Harrovia japonica* Balss, 1921. A-E, I, O, Lectotype female, 10.3 by 14.4 mm (BMNH 1934.4.6.1); F-H, J-K, P, male, 9.5 by 14.0 mm (RMNH 32040); L, male, 8.8 by 12.8 mm (ZMUC); M, juvenile female, 4.7 by 6.6 mm (ZMUC); N, male, 9.2 by 12.9 mm (ZRC 1997.180); Q, female, 11.3 by 16.8 mm (RMNH 32040). A, dorsal view of carapace; B, face of carapace; C, fourth right ambulatory leg; D, thoracic sternum; E, left third maxilliped; F, abdomen; G, left G1; H, distal tip of left G1; I, antenna; J, left G2; K, postero-dorsal view of right cheliped; L, left G1; M, N, dorsal view of carapace (schematic). N, dorsal view of carapace (schematic); O, endostome; P, 7th abdominal segment; Q, fourth left ambulatory leg. Scales: A-G, I-Q = 1.0 mm; H = 0.1 mm.