SYSTEMATICS

ORDER AMPHIPODA

Definition: Body lateral compressed; compound eyes sessile and lateral; first and second antennae well developed, no antennal exopodites; without carapace; first thoracic segment and sometimes second (as in the Caprellidea) fused to head; first thoracic appendages forming coalesced maxillipeds; thoracic appendages without exopodites, with not more than one respiratory epipodites, and with oostegites in female; first three pairs of pleopod fringed and natatory, fourth and fifth pairs directed backward and resembling the uropods (Barnes, 1968:483-484).

The Amphipoda are divided into four suborders, Gammaridea, Hyperiidea, Caprellidea, and Ingolfiellidea.

Suborder Gammaridea

Definition: Head not fused with second thoracic segment; maxilliped with a palp; peraeopods with well-developed coxal plates.

Suborder Hyperiidea

Definition: Head not fused with second thoracic segment;

maxilliped without palp; coxae small; eyes usually very large, covering greater part of head.

Suborder Caprellidea

Definition: Head fused with second thoracic segment; abdominal segments fused, and reduced, with vestigial appendages.

Suborder Ingolfiellidea

Definition: Head not fused with second thoracic segment; coxae small; abdominal segments distinct, all but fourth and fifth pairs of abdominal appendages vestigial.

The classification of the Hyperiidea as given by Pirlot (1929) with few additions and changes by Stephensen and Pirlot (1931), Pirlot (1933) and Bowman (1953) is given below:

Order Amphipoda

Suborder Hyperiidea

Superfamily Physosomata Pirlot, 1929

Division Lanceoliformata Stephensen and Pirlot, 1931

Family Lanceolidae

Chuneolidae

Family Microphasmidae

Division Sciniformata Stephensen and Pirlot, 1931

Family Archaeoscinidae

Scinidae

Proscinidae

Mimonectidae

Superfamily Genuina Woltereck, 1909

Division Recticornia Bovallius, 1890

Family Cystisomatidae

Vibiliidae

Paraphronimidae

Division Filicornia Bovallius, 1890

Family Hyperiidae

Dairellidae

Phrosinidae

Phronimidae

Division Curvicornia Bovallius, 1890

Family Pronoidae

Lycaeopsidae

Lycaeidae

Oxycephalidae

Platyscelidae

Parascelidae

In order to conserve space and increase the ease of reading, certain abbreviations and terminology are used in

the keys, illustrations, and descriptions.

ant. 1.....first antenna

ant. 2.....second antenna

per. 1-per. 7.....first to seventh peraeopods

peraeons.....first to seventh peraeonal segments

pleons.....first to third pleonal segments

urosomes.....first to third urosomal segments

FAMILY PHROSINIDAE Stebbing, 1888

PHROSINIDES, subfamily

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 318.

ANCHYLOMERIDAE

Bovallius, C. 1887a. Bih. t. K. Sv. Vet. Akad. Handl., 11(16):27.

Stephensen, K. 1924. Danish Oceano. Exped., 2(D. 4):134.

_____. 1925. Danish Oceano. Exped., 2(D. 5):249.

Pirlot, J. 1930. Siboga Exped., 33a:21.

Shoemaker, C. 1945. Zoologica, 30(4):234.

Reid, D. 1955. Atlantide Rpts., 3:22.

PHROSINIDAE

Stebbing, T. 1888. Challenger Rpts., 29:1423.

Bovallius, C. 1889. K. Sv. Vet. Akad. Handl., 22(7):396. (key to genera).

Stebbing, T. 1910. Gen. Cat. S.A. Crust., p. 476.

Fowler, H. 1912. Rpt. New Jersey State Mus., Ann., p. 513.

Barnard, K. 1916. S. African Mus., Ann. 15(3):291.

_____. 1925. S. African Mus., Ann. 20(8):375.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:412.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):167. (key to genera).

Barnard, K. 1932. Discovery Rpts., 5:287.

Dakin, W. and A. Colefax. 1940. Publ. Monograph, 1:123.

Thorsteinson, H. 1941. Univ. of Wash. Publ. Oceano., 4(2):

93.

Hurley, D. 1955. Roy. Soc. N.Z., Trans. 83:170.

Head globular and large; eyes large, occupying greater part of head; ant. 1 and 2 fixed on front of head, rudimentary or absent in female, very long in male with slender and multiarticulated flagellum; mandibles with palp in male, without in female; maxillipeds having external lobes independent. Coxal plates distinct; per. 1 and 2 simple; per. 3-6 or only per. 5 prehensile; per. 7 more or less transformed or rudimentary; uropods without distinct rami.

Key to the South China Sea genera of Phrosinidae

1. Per. 7 having only the first two proximal articles--
---2

Per. 7 having all articles, the dactylus digitiform-
---3

2. Per. 3-6 subcheliform---Phrosina

Per. 3-5 subcheliform; per. 6 prehensile---
---Anchylomera

3. All the peraeopods simple, the fifth prehensile---
---Primno

FIGURE 1

Seasonal variations in mean density (No. per 1000 cu.m. of water) of members of the family Phrosinidae.

Phrosina Risso, 1822

Phrosina

Risso, A. 1822. de Physique, de Chimie et d'Hist. Nat., Journ. 94:244.

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 318.

Stebbing, T. 1888. Challenger Rpts., 29:1424.

Bovallius, C. 1889. K. Sv. Vet. Akad. Handl., 22(7):421.

Barnard, K. 1916. S. African Mus., Ann. 15(3):292.

Stephensen, K. 1924. Danish Oceano. Exped., 2(D. 4):138.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:413.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):249.

Pirlot, J. 1929. Mém. Soc. Liège, III, 15(2):129.

_____. 1930. Siboga Exped., 33a:23.

Hurley, D. 1955. Roy. Soc. N.Z., Trans. 83:174.

Dactylocera

Milne-Edwards, H. 1830. Ann. des Sc. Nat., 20:293.

_____. 1840. Hist. des Crust., III:89.

Type species: Phrosina semilunata Risso

Definition: Head having double short ant. 1; body smooth; per. 1 and 2 simple; per. 3-6 subcheliform; per. 7 having only the first two proximal articles; telson large.

Phrosina semilunata Risso, 1822

Figs. 1, 2, 3(A-D).

Phrosina semilunata

Risso, A. 1822. de Physique, de Chimie et d'Hist. Nat., Journ. 94:245.

Stebbing, T. 1888. Challenger Rpts., 29:1425, pl. 176.

Bovallius, C. 1889. K. Sv. Vet. Akad. Handl., 22(7):426, pl. 18, figs. 3-30.

Chevreux, E. 1900. Res. des Camp. Sc., 16:147.

Vosseler, J. 1901. Plankton Exped., 2(G.e.):89, pl. 8, figs. 18-20.

Lo Bianco. 1904. Mittheil. Zool. Station zu Neapel, 15:44.

Walker, A. 1904. Suppl. Rep., 17:230.

Tattersall, W. 1906. Fish. Ireland Sc. Invest., 4:24.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):52.

Stebbing, T. 1910. Australian Mus. Sydney, Mem. 4(12):477.

Steuer, A. 1911. Klasse, Wien, 120(4):681.

Pearse, A. 1912. U.S. Nat. Mus., Proc. 43(1936):378.

Stewart, D. 1913. Ann. Mag. Nat. Hist. (VIII), 12:257.

Barnard, K. 1916. S. African Mus., Ann. 15(3):292.

Pesta. 1920. Zoolog. Anzeiger, 51:29.

Spandl, H. 1924b. Zool. Klasse, 99:26.

Stephensen, K. 1924. Danish Oceano. Exped., 2(D. 4):138, chart 21.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:413, fig. 409.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):249.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):168, figs. 56, 60, 61.

Pirlot, J. 1929. Mém. Soc. Liège, III, 15(2):132.

Schellenberg, A. 1929. Apstein. Lief., p. 644, fig. 47.

Barnard, K. 1930. "Terra Nova" Exped., 8(4):424.

Pirlot, J. .1930. Siboga Exped., 33a:23.

Barnard, K. 1932. Discovery Rpts., 5:287.

Shoemaker, C. 1945. Zoologica, 30:236.

Reid, D. 1955. Atlantide Rpts., 3:22.

Hurley, D. 1956. Allan Hancock Found., Occas. Papers, 18 :18.

_____. 1960. N.Z. Journ. Sc., 3(2):280-281.

Evans, F. 1961. Linn. Soc. London, Proc., pt. 2:202.

Dactylocera Nicaeensis

Milne-Edwards, H. 1830. Ann. des Sc. Nat., 20:393.

Phrosina longispina

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 320, pl. 51, fig. 7.

Phrosina pacifica

Stebbing, T. 1888. Challenger Rpts., 29:1430.

Bovallius, C. 1889. K. Sv. Vet. Akad. Handl., 22(7):425, pl. 28, figs. 3-30.

Phrosina australis

Stebbing, T. 1888. Challenger Rpts., 29:1431.

Ant. 1: Male: Peduncle of 3 articles; 1st. article longer than broad, broader distally; 2nd. article slightly shorter than 1st., longer than broad; 3rd. article as long as 2nd., narrower distally. The articles of flagellum long, slender, cylindrical; last article tapering.

Female: Peduncle of single article, quite short and tapering.

Ant. 2: Male: Shorter than ant. 1. Peduncle of 3 articles; 1st. article broader than long; 2nd. article shorter than 1st., slightly longer than broad; 3rd. article almost twice as long as 1st., cylindrical. The articles of flagellum long, slender, cylindrical; last article tapering.

Female: Absent.

Peraeons: Peraeon 3 shorter than coalesced 1 and 2; peraeon 4 shortest; peraeon 5 longest and as long as 6; peraeon 7 as long as 1 and 2.

Per. 1: Simple. Basis long, cylindrical, almost 4 times as long as broad, superior and inferior margins convex. Ischium short, 1/6 basis, cylindrical, superior shorter than inferior, few setae at distal half of inferior

margin. Merus slightly shorter than ischium, producing nearly 1/2 along carpus distally in triangular process, few setae at proximal half of inferior margin. Carpus cylindrical, 1/4 basis. Propodus 2/5 basis, slender. Dactylus nearly 1/3 propodus.

Per. 2: Similar to per. 1, but longer. Basis longer than of per. 1, 4 times as long as broad. Ischium same as of per. 1, but longer and narrower. Merus shorter than ischium, producing 1/4 along carpus distally in triangular process, few setae at middle of inferior margin. Carpus almost twice as long as of per. 1, 1/4 basis. Propodus also 1.5 times as long as of per. 1, 1.5 times as long as carpus, slender. Dactylus as long as of per. 1, almost 1/4 propodus.

Per. 3: Subchelate, longer than per. 2. Basis about 4 times as long as broad, superior and inferior margins convex, narrowing at proximal half. Ischium somewhat m-shaped, nearly 1/3 basis, 3/4 as broad as long; small round process at superiodistal corner. Merus same as ischium, but 1/5 basis and as long as broad, small pointed process each at superio- and inferiodistal corners. Carpus ovate, nearly 1/2 basis, expanded, less than twice as long as broad, superior margin convex, inferior concave, serrated with about 5 seta-tipped teeth, posterior serrated with about 8 short teeth. Propodus slender, 2/5 basis, about 6 times as long as

broad. Dactylus slender, about 1/4 propodus.

Per. 4: Similar to per. 3, but longer. Basis longer than of per. 3, about 3 times as long as broad, superior and inferior margins convex, narrowing at proximal half. Ischium same as of per. 3, but slightly longer, almost 1/4 basis, inferior serrated with about 5 seta-tipped teeth. Merus about 1/5 basis, nearly as long as broad, superio- and inferiodistal corners produced into long pointed processes, inferior serrated with about 4 seta-tipped teeth. Carpus same as of per. 3, but longer, posterior serrated with about 8 short teeth. Propodus longer than of per. 3, with fine setae along inferior margin. Dactylus same as of per. 3, about 1/6 propodus.

Per. 5: Longest and prehensile. Basis ovate, narrowing proximally, nearly 3 times as long as broad, both superior and inferior margins convex, fine serration along superior margin, pointed tooth at superiodistal corner. Ischium short, about 1/4 basis, as long as broad, superior margin convex, inferior concave, distal half of both margins serrated with about 4 seta-tipped teeth, a pointed tooth each at superio- and inferiodistal corners, and also along posterior margin. Merus nearly 1/3 basis, less than twice as long as broad, both superio- and inferiodistal corners strongly producing downwards in sharp teeth, both margins serrated

with about 6 seta-tipped teeth. Carpus 5/7 basis, superior margin concave, inferior expanded, both margins serrated, posterior strongly serrated with about 8 short and long teeth including the teeth at superio- and inferiodistal corners. Propodus slender, nearly as long as basis, about 11 times as long as broad. Dactylus slender, about 5/6 propodus.

Per. 6: Similar to per. 5, but shorter. Basis longer, broader than of per. 5, about 3 times as long as broad, both superior and inferior margins convex, pointed tooth at superiodistal corner, distal half of inferior margin serrated. Ischium same as of per. 5, but longer, nearly 1/3 basis, twice as long as broad, without serrations along both margins. Merus same as of per. 5. Carpus shorter than of per. 5, nearly 1/3 basis, less than twice as long as broad, posterior strongly serrated with about 5 short and long teeth including the teeth at superio- and inferiodistal corners. Propodus shorter than of per. 5, fine setae along superior margin. Dactylus shorter than of per. 5, about 1/6 propodus.

Per. 7: Rudimentary. Basis expanded, nearly twice as long as broad, broadest at middle portion, both superior and inferior margins convex, round process at inferiodistal corner. Remaining articles absent.

Pleons: Pleon 1 shortest, but longer than peraeon 7; pleon 2 longest; pleon 3 slightly longer than pleon 1.

Epimeral plates: All three plates having round anterodistal angles, posterodistal angle sharp, posterior margin sigmoid.

Urosomes: Urosome 1 shorter than pleon 3, subrectangular, but slightly longer than coalesced urosomes 2 and 3.

Uropods: One-segmented. Uropod 1 peduncle about 3 times as long as broad, tip rounded. Uropod 2 reaching almost to tip of uropod 3, peduncle longer than that of uropod 1, more than 3 times as long as broad, tip rounded. Uropod 3 with peduncle as long as that of uropod 1, more than 3 times as long as broad, tip rounded.

Telson: Round, longer than wide, slightly shorter than coalesced urosomes 2 and 3.

Remarks: This species can be easily recognized by the basis of per. 5 which is narrow, long almost straight. It can be distinguished from Primno macropa, by per. 3 and 4 which are subchelate in this species, while they are simple in P. macropa.

General distribution: World distribution according to Bate (1862:320), Stephensen (1925:142-143), Barnard (1932: 287), and Shoemaker (1945:236) include: Atlantic;

north, tropical, south, from 47°N. to 35°S., Gulf of Mexico, Bermuda, south of Europe, Portuguese West Africa, Cape of Good Hope; Mediterranean; Pacific; north, south, Indo-Pacific, south of Japan, 24°49'N., 138°34'E., 26°29'N., 137°57'S., 26°27'S., 90°W.; Indian Ocean; tropical, 26°S. to 40°S.; Antarctic; 65°16'S., 80°28'E..

Distribution in the areas studied: This is a common species of the South China Sea, which appeared throughout the year ranging from north to the southern limit of the deep basin. During the northeast monsoon period (S-2, S-10), when the current flow was to the south along the coast and to the north along the farthest offshore areas, this species was found toward the offshore area where the current flow was away from the coast and joined the northerly flow. At the end of the northeast monsoon period (S-4), when currents were starting to flow northward in some areas, in the northern part this species was found distributed in two strips followed the northerly flow currents, one along the middle area and other along the farthest offshore area. In the central area, where the flow of the offshore current was away from the coast, this species became widely spread with a greater concentration. During the southwest monsoon period (S-6), when the current

flow was to the north and away from the coast in the offshore area of the central coast, the population increased and it was found along the central coast and widely spread offshore. During the change-over period from the southwest to the northeast monsoon winds (S-8), when the southerly flow was starting along the coast in the northern part and met with the northerly flow, the water mass was reflected away from the coast north of Nhatrang. The distribution of this species was found further offshore, and showed that it was effected by that offshore flow. The population declined, with the greater concentration in the most northern area. The common ranges of salinities and temperatures from the surface to the depth of the surface layer at the localities where it was found were from 29.93 to 30.88 ‰, and from 30.68° to 6.95°C.. The average densities of this species were from 8-19 individuals per 1000 cu.m. of water, and reached the peak of 23 at the end of the northeast monsoon period (S-4).

FIGURE 2

Phrosina semilunata Risso

Female: A, Lateral view; B-H, peraeopods 1-7; I, pleopod; J, uropods and telson.

Male: K, Head; L, antenna 1; M, antenna 2.

(A, scale a; B-K, scale b; L, M, scale c)

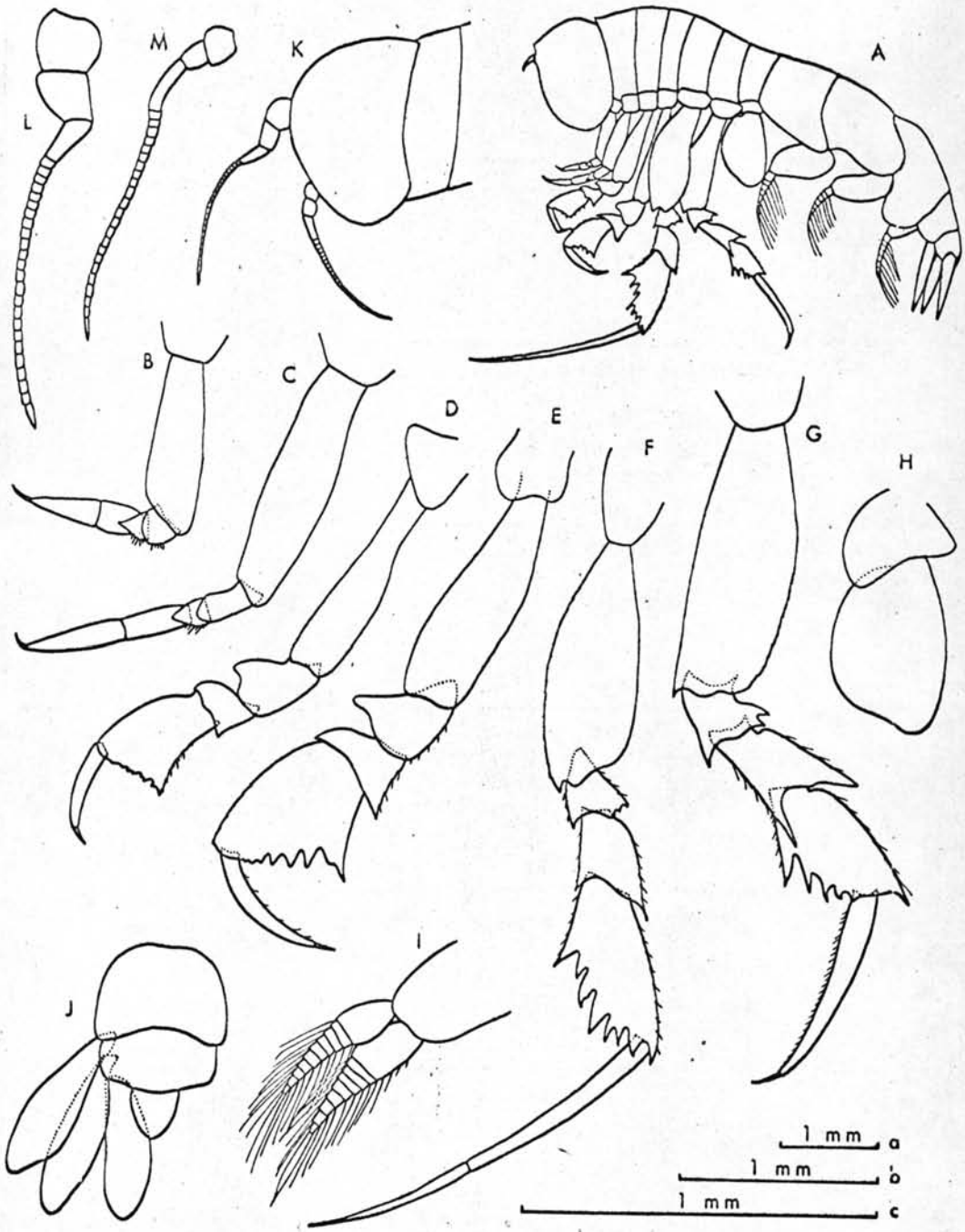
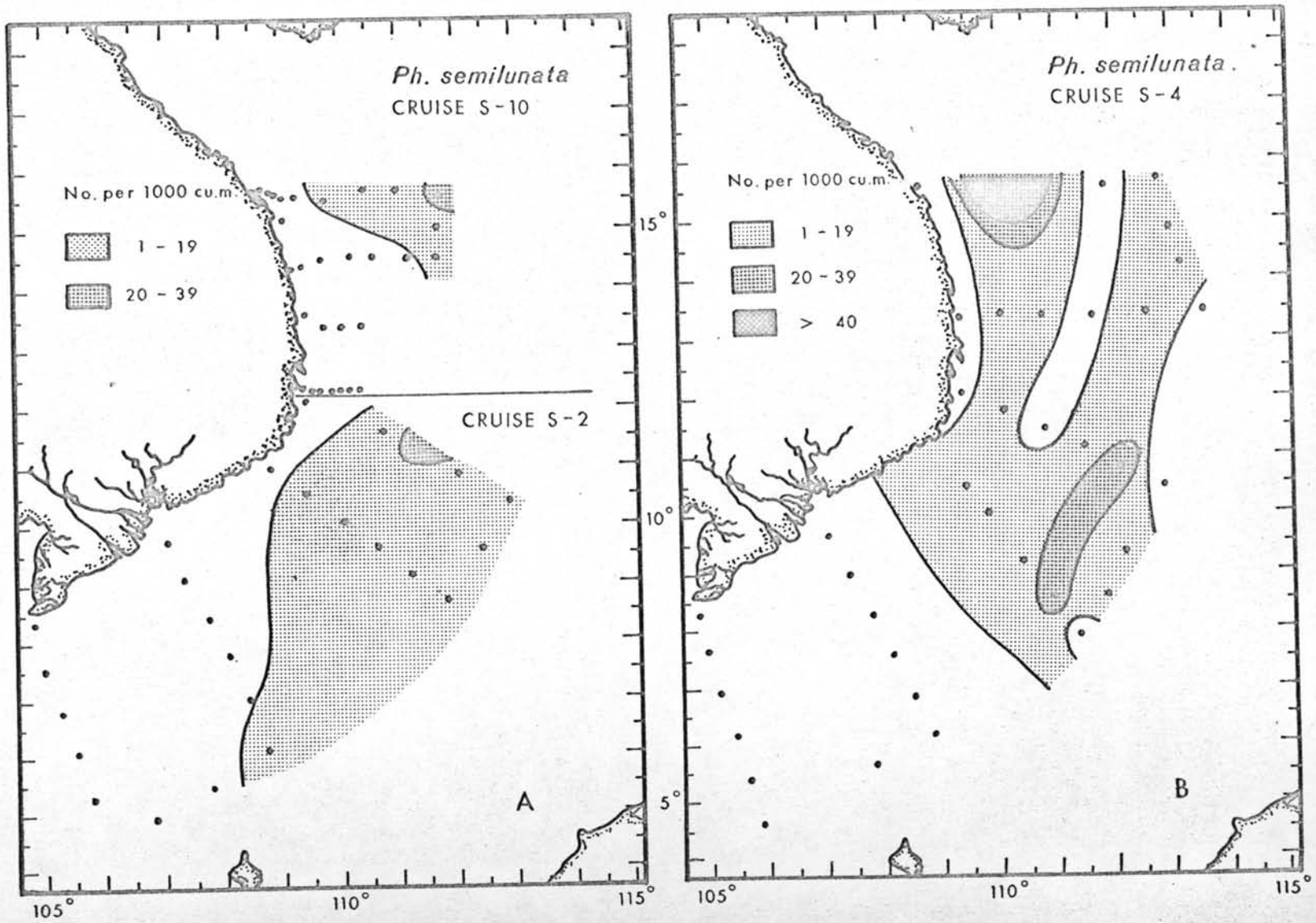
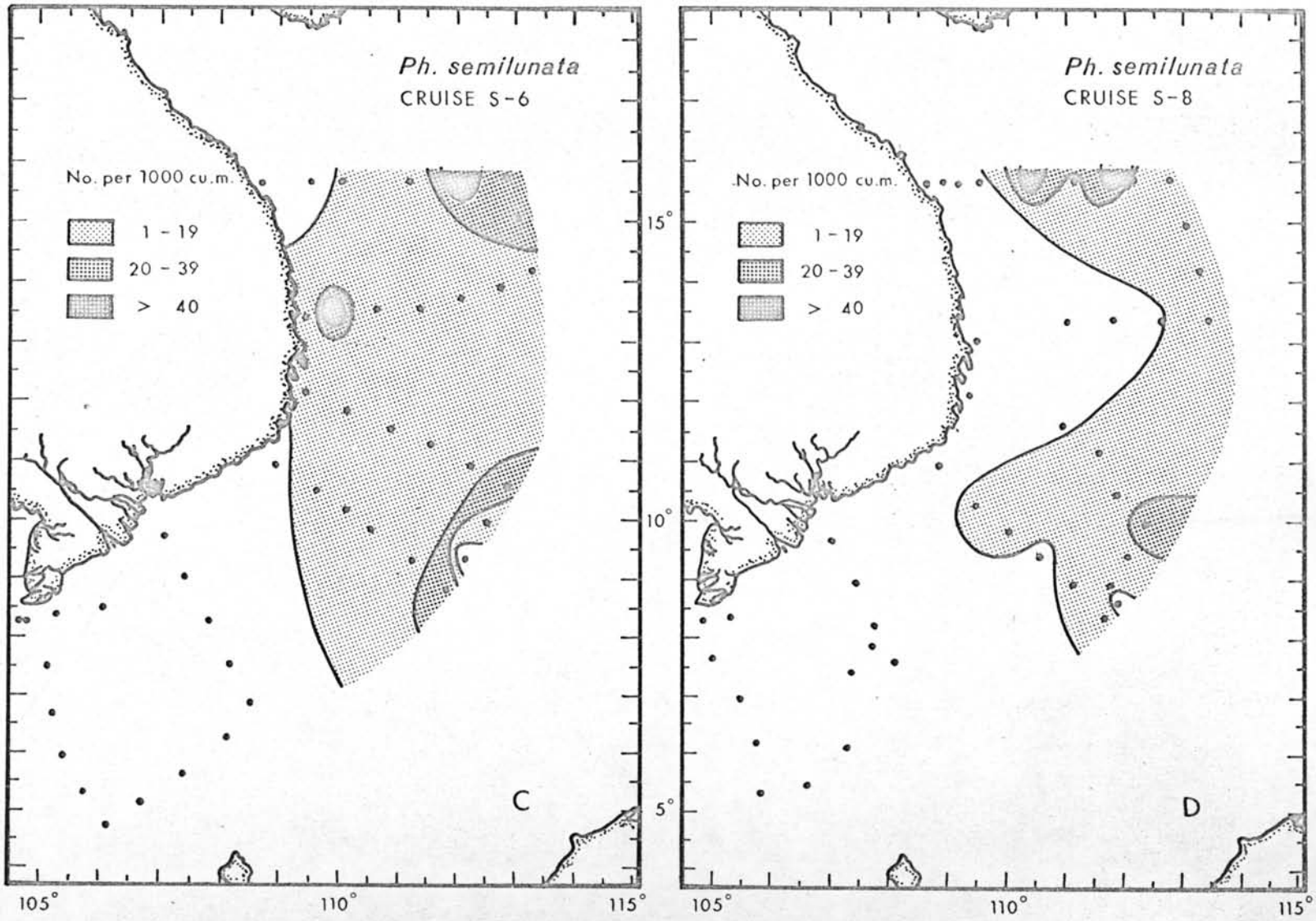


FIGURE 3

Maps showing the seasonal distributional patterns of *Ph. semilunata*.


Ph. semilunata
CRUISE S-10
No. per 1000 cu.m.
1 - 19
20 - 39
CRUISE S-2
A
15°
10°
5°
105°
110°
115°
Ph. semilunata.
CRUISE S-4
No. per 1000 cu.m.
1 - 19
20 - 39
> 40
B
105°
110°
115°


Ph. semilunata
CRUISE S-6
No. per 1000 cu.m.
1 - 19
20 - 39
> 40
C
Ph. semilunata
CRUISE S-8
No. per 1000 cu.m.
1 - 19
20 - 39
> 40
D
15°
10°
5°
105°
110°
115°

Anchylomera Milne-Edwards, 1830

Anchylomera

Milne-Edwards, H. 1830. Ann. des Sc. Nat., 20:394.

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 322.

Stebbing, T. 1888. Challenger Rpts., 29:1432.

Bovallius, C. 1889. K. Sv. Vet. Akad. Handl., 22(7):408.

Fowler, H. 1912. Ann. Rpt. New Jersey State Mus., p. 513.

Stephensen, K. 1924. Danish Oceano. Exped., 2(D. 4):134.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:414.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):249.

Pirlot, J. 1929. Mém. Soc. Liège, III, 15(2):132.

_____. 1930. Siboga Exped., 33a:21.

Barnard, K. 1932. Discovery Rpts., 5:288.

Dakin, W. and A. Colefax. 1940. Publ. Monograph, 1:123.

Hurley, D. 1955. Roy. Soc. N.Z., Trans. 83:174.

Hieraconyx

Guérin-Méneville, F. 1836. Mag. de Zool., 17:4.

Cheiropristis

Natale, G. 1850. Crost. Port. Messina.

Type species: Anchylomera blossevillei Milne-Edwards

Definition: Head having antennae; body smooth; per. 1 and 2 simple; per. 3-5 subchelate; per. 6 prehensile; per. 7 having only two proximal articles; telson large and round.

Anchylomera blossevillei Milne-Edwards, 1830

Figs. 1, 4.

Anchylomera Hunteri

Milne-Edwards, H. 1830. Ann. des Sc. Nat., 20:394.

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 324, pl. 52, fig. 2.

Anchylomera blossevillei

Milne-Edwards, H. 1830. Ann. des Sc. Nat., 20:394.

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 322, pl. 52, fig. 1.

Stebbing, T. 1888. Challenger Rpts., 29:1433, pl. 177.

Bovallius, C. 1889. K. Sv. Vet. Akad. Handl., 22(7):412, pl. 17, figs. 1-22.

Chevreux, E. 1900. Res. des Camp. Sc., 16:147.

Vosseler, J. 1901. Plankton Exped., 2(G.e.):88-89, fig. 4.

Holmes, S. 1903. Amer. Nat., 37:270.

_____. 1905. Bur. of Fish., Bull. 24:465.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):52.

Chilton, C. 1912. Roy. Soc. Edinburgh, Trans. 48:516.

Fowler, H. 1912. Ann. Rpt. New Jersey Mus., p. 514.

Stewart, D. 1913. Ann. Mag. Nat. Hist. (VIII), 12:258.

Spandl, H. 1924b. Zool. Klasse, 99:26, fig. 2.

Stephensen, K. 1924. Danish Oceano. Exped., 2(D. 4):134.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:414.

fig. 410.

Shoemaker, C. 1925. Bull. Amer. Mus. Nat. Hist., 52(2):42.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):249.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):167, fig. 7.

Pirlot, J. 1929. Mém. Soc. Liège, III, 15(2):141.

Barnard, K. 1930. "Terra Nova" Exped., 8(4):425.

Pirlot, J. 1930. Siboga Exped., 33a:21.

Barnard, K. 1932. Discovery Rpts., 5:288.

Dakin, W. and A. Colefax. 1940. Publ. Monograph, 1:123, fig. 211.

Shoemaker, C. 1945. Zoologica, 30:234.

Reid, D. 1955. Atlantide Rpts., 3:22.

_____. 1956. Allan Hancock Found., Occas. Papers, 18:18.

_____. 1960. N.Z. Journ. Sc., 3(2):281.

Evans, F. 1961. Linn. Soc. London, Proc., pt. 2:200.

Hieraconix abbreviatus

Guérin-Méneville, F. 1836. Mag. de Zool., 17:5, pl. 17, fig. 2.

Cheiropristis Messanensis

Natale, G. 1850. Crost. Port. Messina, p. 6, pl. 1, fig. 2,

Anchylomera purpurea

Dana, J. 1852b. U.S. Expl. Exped., 14(2):1001, pl. 68, fig. 9.

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 325, pl. 52,

fig. 5.

Anchylomera thyropoda

Dana, J. 1852b. U.S. Expl. Exped., 14(2):1004, pl. 68, fig. 10.

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 325, pl. 52, fig. 6.

Anchylomera antipodes

Bate, C. .1862. Brit. Mus. Catal. Amph., p. 322, pl. 51, figs. 9-10.

Ant. 1: Female: Absent.

Ant. 2: Female: Absent.

Peraeons: Peraeon 3 shorter than coalesced 1 and 2; peraeon 4 longer than 3; peraeon 5 longest and as long as 1 and 2; peraeon 6 as long as 3; peraeon 7 shortest.

Per. 1: Simple. Basis long, almost cylindrical, nearly 3 times as long as broad, superior margin strongly convex, inferior concave. Ischium short, cylindrical, 1/8 basis, superior margin as long as inferior. Merus slightly longer than ischium, producing 2/3 along carpus distally in triangular process. Carpus cylinfrical, 1/3 basis, both superior and inferior margins convex, fine setae along distal half of superior margin. Propodus 2/3 basis, narrowing distally, superior margin

same as of per. 3, but slightly longer, nearly as long as broad. Carpus same as of per. 3, but 6/11 as long as basis. Propodus and dactylus same as of per. 3, but slightly longer.

Per. 5: Longest and prehensile. Basis ovate, narrowing proximally, almost twice as long as broad, superior margin convex, inferior almost straight, a round process each at superio- and inferiodistal corners, posterior margin strongly concave. Ischium nearly 2/5 basis, about twice as long as broad, superior margin almost straight, inferior convex, a round process each at superio- and inferiodistal corners. Merus 1/5 basis, twice as broad as long, a pointed process each at superio- and inferiodistal corners. Carpus about 1/2 basis, expanded, nearly as long as broad, both superior and inferior margins convex, posterior margin strongly serrated with about 5 short and long teeth. Propodus nearly 1/2 basis, about 4 times as long as broad, superior margin concave, inferior strongly convex. Dactylus about 1/2 propodus, long, curved, and spiniform.

Per. 6: Similar to per. 5, but shorter. Basis same as of per. 5, but nearly twice as long as broad, superiodistal corner producing downwards into long process. Ischium same as of per. 5, but shorter. Merus same as of per. 5, nearly 1/5 basis, nearly as long as broad.

Carpus nearly 1/3 basis, expanded, nearly as long as broad, both superior and inferior margins convex, fine setae along superior margin. Propodus same as of per. 5, but shorter, 2/5 basis, about 4 times as long as broad, fine setae along superior margin. Dactylus same as of per. 5, 3/4 propodus, long, curved, and spiniform.

Per. 7: Rudimentary. Basis expanded, about 2.5 times as long as broad, broadest at proximal portion, both superior and inferior margins convex, a round process each at superio- and inferiodistal corners. Remaining articles absent.

Pleons: Pleon 1 longer than peraeon 7; pleon 2 shortest; pleon 3 longest.

Epimeral plates: 1st. plate having rounded anterodistal and posterodistal angles, posterior margin sigmoid; 2nd. and 3rd. plates with posterodistal angle and posterior margin rounded.

Urosomes: Urosome 1 shorter than pleon 3, subrectangular, but slightly longer than coalesced urosomes 2 and 3, a round process each at lateral margins of urosome 1.

Uropods: One-segmented. Uropod 1 peduncle about 3 times as long as broad, tip rounded. Uropod 2 reaching almost to tip of uropod 3, peduncle shorter than of

uropod 1, more than twice as long as broad, tip rounded. Uropod 3 with peduncle as long as that of uropod 2, almost twice as long as broad, tip rounded.

Telson: Round, wider than long, almost as long as coalesced urosomes 2 and 3.

Remarks: This species can be distinguished from a similar species, Phrosina (Ph.) demilunata, by the basis of per. 5, which is broad, with serrations, in this species, while it is narrower and longer, almost straight in Ph. semilunata.

General distribution: World distribution according to Barnard (1932:288), Shoemaker (1945:234), and Stephensen (1924:137) include: Atlantic; north, south, from 43°N. to 38°S., off the Coast of Newfoundland, northeast of Bermuda; Mediterranean; Pacific; north, south; Indo-Pacific, China Sea, 14°16'N., 119°21'E., south of Japan, $24\frac{3}{4}^{\circ}$ - $26\frac{1}{2}^{\circ}$N., 138° - $138\frac{1}{2}^{\circ}$E.; Indian Ocean; 11°15'S., 103°50'E., to 38°20'S., 30°E..

Distribution in the areas studied: This is an offshore species of the South China Sea basin. All the specimens found in the surface layer were only adult females. During the southwest monsoon period (S-6), when the flow was to the north, this species was found widely

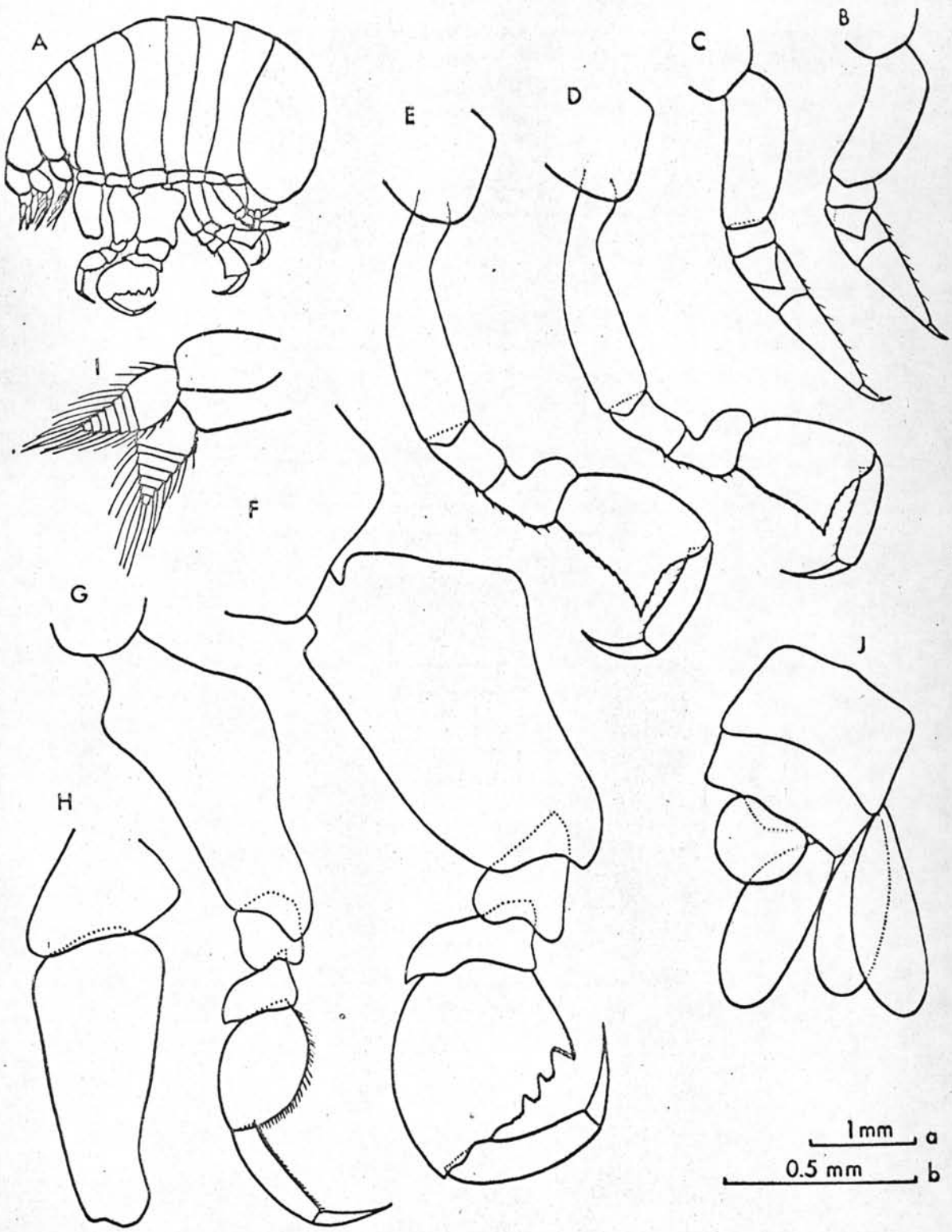
spread in the northern portion of the studied areas along the central coast and at scattered offshore localities in the southern portion. During the change-over period from the southwest to the northeast monsoon winds (S-8), it was found at a few scattered offshore localities in the northern portion. In the middle of the northeast monsoon period (S-2), when the current flow was to the south, this species was found at the southern portion of the deep basin and also overlying the offshore part of the shelf. Towards the end of the northeast monsoon (S-4), it was not found from the samples taken. Perhaps it was transported further south. The common ranges of salinities and temperatures from the surface to the depth of the surface layer at the localities where it was found were from 32.79 to 35.88 ‰., and from 30.52° to 14.92°C.. The average densities of this species were 5 individuals per 1000 cu.m. of water, and reached the peak of 8 during the southwest monsoon period (S-6) and during the change-over period from the southwest to the northeast monsoon winds (S-8).

FIGURE 4

Anchylomera blossevillei Milne-Edwards

Female: A, Lateral view; B-H, peraeopods 1-7; I, pleopod; J, uropods and telson.

(A, scale a; B-J, scale b)


A
B
C
D
E
F
G
H
I
J
1mm
a
0.5 mm
b

Primno Guérin, 1836

Primno

Guérin-Méneville, F. 1836. Mag. de Zool., 6(7):2.

Milne-Edwards, H. 1840. Hist. des Crust., III:81.

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 321.

Stebbing, T. 1888. Challenger Rpts., 29:1440.

_____. 1904. Linn. Soc. London, Trans. II, 10(2): 38.

Barnard, K. 1925. S. African Mus., Ann. 20(8):375.

_____. 1930. "Terra Nova" Exped., 8(4):424.

_____. 1932. Discovery Rpts., 5:287.

Dakin, W. and A. Colefax. 1940. Publ. Monograph, 1:123.

Shoemaker, C. 1945. Zoologica, 30:234.

Hurley, D. 1955. Roy. Soc. N.Z., Trans. 83:172.

Euprimno

Bovallius, C. 1889. K. Sv. Vet. Akad. Handl., 22(7):397.

Stephensen, K. 1924. Danish Oceano. Exped., 2(D. 4):143.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:415.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):249.

Pirlot, J. 1929. Mém. Soc. Liège, III, 15(2):129.

Type species: Primno macropa Guérin

Definition: Head slightly projecting forward; many segments of peraeon and pleon extending at posterior median point; per. 5 prehensile; the others simple; per. 7 with all arti-

cles, but the dactylus digitiform; telson with round posterior border.

Primno macropa Guérin, 1836

Figs. 1, 5, 6(A-D).

Primno macropa

Guérin-Méneville, F. 1836. Mag. de Zool., 6(7):4, pl. 17, figs. 1a-f.

Milne-Edwards, H. 1840. Hist. des Crust., III:81.

Lucas. 1851. p. 239, pl. 18, fig. 7.

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 322, pl. 51, fig. 8.

Bovallius, C. 1887a. Bih. t. K. Sv. Vet. Akad. Handl., 11(16):28.

Stebbing, T. 1888. Challenger Rpts., 29:1441, pl. 178.

_____. 1904. Linn. Soc. London, Trans. II, 10(2): 38, figs. 1-2.

Tattersall, W. 1906. Fish. Ireland Sc. Invest., 4:25.

Stewart, D. 1913. Ann. Mag. Nat. Hist. (VIII), 12:258.

Spandl, H. 1924b. Zool. Klasse, 99:25, fig. 1, chart 1.

Barnard, K. 1925. S. African Mus., Ann. 20(8):375.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):168, fig. 62.

Barnard, K. 1930. "Terra Nova" Exped., 8(4):424-425.

_____. 1932. Discovery Rpts., 5:287-288.

Dakin, W. and A. Colefax. 1940. Publ. Monograph, 1:123, fig. 210.

Thorsteinson, H. 1941. Univ. of Wash. Publ. Oceano., 4 (2):93-94, pl. 9, figs. 98-102.

Shoemaker, C. 1945. Zoologica, 30:234.

Hurley, D. 1955. Roy. Soc. N.Z., Trans. 83:172-174, figs. 219-235.

_____. 1956. Allan Hancock Found., Occas. Papers, 18:17.

Vinogradov, M. 1956. Zool. Journ. Acad. Nauk SSSR, 35(2): 209.

Hurley, D. 1960. N.Z. Journ. Sc., 3(2):280.

Primno Latreillei

Stebbing, T. 1888. Challenger Rpts., 29:1445, pl. 179A.

Primno Menevillei

Stebbing, T. 1888. Challenger Rpts., 29:1447, pl. 177B.

Primno Antarctica

Stebbing, T. 1888. Challenger Rpts., 29:1448, pl. 209B.

Euprimno macropus

Bovallius, C. 1889. K. Sv. Vet. Akad. Handl., 22(7):400 -407, pl. 17, figs. 23-40, pl. 18, figs. 1-2.

Chevreux, E. 1900. Res. des Camp. Sc., 16:148.

Vosseler, J. 1901. Plankton Exped., 2(G.e.):87, pl. 8, fig. 21.

Lo Bianco. 1904. Mittheil. Zool. Station zu Neapel, 15: 43, fig. 70.

Chilton, C. 1912. Roy. Soc. Edinburgh, Trans. 48:234.

Stephensen, K. 1924. Danish Oceano. Exped., 2(D. 4):143, chart 22.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:416, fig. 411.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):249.

Pirlot, J. 1929. Mém. Soc. Liège, III, 15(2):130.

Schellenberg, A. 1929. Apstein Lief., p. 643, fig. 46.

Reid, D. 1955. Atlantide Rpts., 3:23.

Evans, F. 1961. Linn. Soc. London, Proc., pt. 2:200.

Euprimno macropa

Walker, A. 1909. Linn. Soc. London, Trans. II, 13(1):52.

Primno macropa var. Menevillei

Monod, Th. 1927. Rapports Scientifiques, p. 50, fig. 49.

Ant. 1: Male: Peduncle of 3 articles; 1st. article as broad as long; 2nd. article 1/4 as long as 1st., broader than long; 3rd. article slightly shorter than 1st., broader than long, but narrower distally. The articles of flagellum long, cylindrical; last article tapering. Female: Peduncle of 2 articles; 1st. article slightly longer than broad; 2nd. article 4 times as long as 1st., but narrower distally. The only article of flagellum about 1/7 as long as peduncle, tapering.

Ant. 2: Male: Peduncle of 3 articles; 1st. article broader than long; 2nd. article twice as long as 1st.; 3rd.

article 1.5 times as long as 2nd.. The articles of flagellum long, cylindrical; last article tapering. Female: Absent.

Peraeons: Peraeon 1 shortest; peraeon 2 longer than 1; peraeon 3 as long as 6, but slightly longer than 2; peraeon 4 longest; peraeon 5 as long as 7, but slightly longer than 3 and 6. Peraeons 6 and 7 extending by a short posterior dorsal spine.

Per. 1: Simple and shortest. Basis about 4 times as long as broad, narrowing medially. Ischium short, about 1/5 basis, superior margin slightly longer than inferior. Merus longer than ischium, producing 1/3 along carpus distally in triangular process. Carpus about 1/3 basis, superior margin convex, inferior almost straight. Propodus 1/2 basis, slender, superior margin convex, inferior slightly concave. Dactylus at least 1/4 propodus.

Per. 2: Longer than per. 1. Basis ovate, about twice as long as broad, both superior and inferior margins convex. Ischium short, 1/4 basis, superior margin longer than inferior, superiodistal corner producing downwards along 1/2 merus superior margin into round process. Merus longer than ischium, producing about 1/6 along carpus distally in triangular process. Carpus nearly

1/2 basis, 2.5 times as long as broad, both superior and inferior margins convex. Propodus about 2/3 basis, slender, superior margin convex, inferior slightly concave. Dactylus at least 1/6 propodus.

Per. 3: Longer than per. 2. Basis same as of per. 1, narrowing proximally, about 6 times as long as broad. Ischium about 1/5 basis, cylindrical, superior margin almost straight, inferior slightly convex. Merus slightly longer than ischium, 2 serrations along inferior margin. Carpus about 1/3 basis, about 3 times as long as broad, 1 serration along inferior margin. Propodus nearly 1/2 basis, slender, superior margin convex, inferior slightly concave. Dactylus 2/5 propodus, long, curved, and spiniform.

Per. 4: Similar to per. 3, but slightly longer. Basis same as of per. 3, about 5 times as long broad. Ischium about 1/5 basis, cylindrical, superior margin concave, inferior slightly convex. Merus longer than ischium, 2 serrations along inferior margin. Carpus same as of per. 3, less than 1/2 basis, about 4 times as long as broad, 2 serrations along inferior margin. Propodus 1/2 basis, slender, superior margin convex, inferior concave. Dactylus 2/5 propodus, long, curved, and spiniform.

Per. 5: Longest and prehensile. Basis nearly 4 times as long as broad, narrowing proximally, superior margin

convex, inferior almost straight, a round process each at superio- and inferiodistal corners. Ischium 1/4 basis, slightly broader than long. Merus somewhat m-shaped, about 1/4 basis, nearly twice as broad as long, a pointed tooth each at superio- and inferiodistal corners, 1 fine serration at half of superior margin, posterior margin having 1 pointed tooth. Carpus ovate, nearly as long as basis, greatly expanded, more than twice as long as broad, fine serrations along 1/4 of distal of inferior margin, pointed tooth at inferiodistal corner, superior strongly serrated with about 14 short and long teeth. Propodus slender, reaching 1/3 along carpal superior margin, about 6 times as long as broad, superior margin concave, inferior convex. Dactylus about 5/7 propodus, long, curved, and spiniform.

Per. 6: Shorter than per. 5. Basis about 2.5 times as long as broad, superior margin convex, inferior almost straight, 1/3 of distal of superior margin finely serrated, pointed tooth at superiodistal corner. Ischium 1/5 basis, superior margin convex, inferior concave. Merus about 1/3 basis, twice as long as broad, superior margin having 1 strong tooth, inferior having 2 serrations, both superio- and inferiodistal corners strongly producing downwards in long pointed teeth. Carpus 1/2 basis, superior margin having about 4 strong teeth,

inferior margin having 1 serration, superio- and inferiodistal corners strongly producing downwards in sharp tooth. Propodus slightly more than 1/2 basis, about 7 times as long as broad, superior margin slightly concave, inferior convex, fine setae along superior margin. Dactylus nearly 1/2 propodus, long, curved, and spiniform.

Per. 7: Shorter than per. 6. Basis about 3 times as long as broad, superior margin slightly concave, inferior strongly convex, pointed process at superiodistal corner. Ischium short, about 1/6 basis, superior margin convex, inferior concave. Merus as long as ischium, twice as long as broad. Carpus about 5 times as long as broad, shorter than propodus, which is nearly 1/3 basis. Dactylus 3/5 propodus, fine setae along posterior margin.

Pleons: Pleon 1 longest, longer than peraeon 7; pleon 2 shorter than pleon 1; pleon 3 shortest.

Epimeral plates: Subrectangular, 1st. and 2nd. plates having rounded anterodistal angles, posterodistal angles sharp, posterior margin sigmoid; 3rd. plate with anterodistal angle rounded, posterodistal sharp, both lateral margins straight, parellel, slightly oblique.

Urosomes: Urosome 1 shorter than pleon 3, subrectangular,

but slightly longer than coalesced urosomes 2 and 3, pointed teeth at lateral margins of urosomes 2 and 3.

Uropods: One-segmented. Uropod 1 reaching almost to tip of uropod 3, peduncle about 4 times as long as broad, tip pointed, fine setae along 4/5 of superior margin. Uropod 2 reaching before tip of uropod 1, peduncle shorter than that of uropod 1, about 4 times as long as broad, tip pointed, 2/3 of superior margin finely serrated. Uropod 3 almost rectangular, with peduncle as long as that of uropod 2, 2/3 of superior margin finely serrated, pointed process at superiodistal corner, posterior margin having fine setae and medially produced to sharp point.

Telson: Subtriangular, 1/2 as long as urosome 1, broader than long, tip rounded.

Remarks: This species can be easily recognized by per. 3 and 4 which are simple. It can be distinguished from Anchylomera blossevillei by the basis of per. 5, which is narrow, long, almost straight in this species, while it is broad, with constrictions in A. blossevillei.

General distribution: World distribution according to Bate (1862:322), Stephensen (1924:145-146), Barnard (1932: 288), and Shoemaker (1945:234) include: Atlantic; north, western-north, east-mid Atlantic, south, south-

east, south-west, from 47°N. to 36°S., South west Ireland, Bay of Biscay, west of Bay of Cadiz, South Georgia; Mediterranean; Pacific; north, south, 36°32' S., 132°52'W., Indo-Pacific; Indian; 38°30'S., 30°E., 32°15' to 33°S., 58° to 58½°E., 4°16'S., 71°53'E.; Antarctic; 58° to 66°S., 85° to 89°E..

Distribution in the areas studied: This is a common species of the South China Sea, which appeared throughout the year ranging from north to the southern limit of the deep basin. During the northeast monsoon period (S-2, S-10), when the current flow was to the south along the coast and to the north along the farthest offshore areas, this species was found distributed mostly offshore following the northerly flow currents, and along the coast in the most northern portion of the studied areas. At the end of the northeast monsoon period (S-4), when currents were starting to flow northward, both along the central coast and in some offshore areas, some of the colder water brought in from the north was deflected offshore and caused a partial upwelling in the upper layers, it was widely distributed in the studied areas from north to the southern limit of the deep basin, and slightly overlying the offshore portion of the Sunda Shelf. Up to the southwest monsoon period (S-6), it was still found widely spread as

in the previous cruise except along the coast in the most northern portion. The maximum density was in the northeastern portion of the studied areas followed the northeastern flow of the currents. During the change-over period from the southwest to the northeast monsoon winds (S-8), when the southerly flow occurred in the northern part and the northerly flow still persisted in the southern part with the flow away from the coast in the area north of Nhatrang, this species was found widely distributed in the northern portion and in the offshore part at the southern portion with greater concentration in the northern part. The commnn ranges of salinities and temperatures from the surface to the depth of the surface layer at the localities where it was found were from 29.93 to 35.88‰., and from 30.68° to 14.18°C.. The average densities of this species were from 11-24 individuals per 1000 cu.m. of water and reached the peak of 35 at the end of the northeast monsoon period (S-4).

FIGURE 5

Primno macropa Guérin

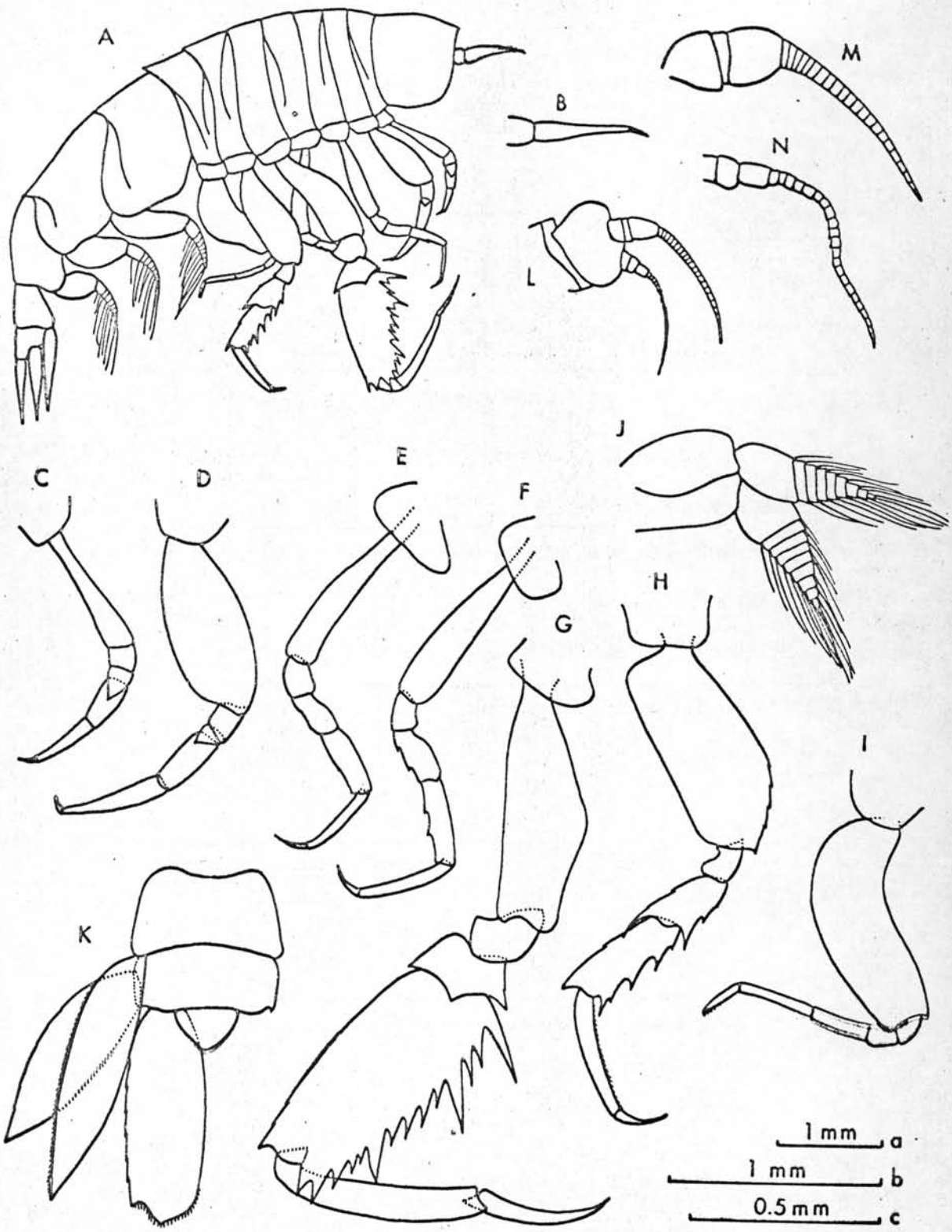
Female: A. Lateral view; B, antenna 1; C-I, peraeopods 1-7; J, plaopod; K, uropods and telson.

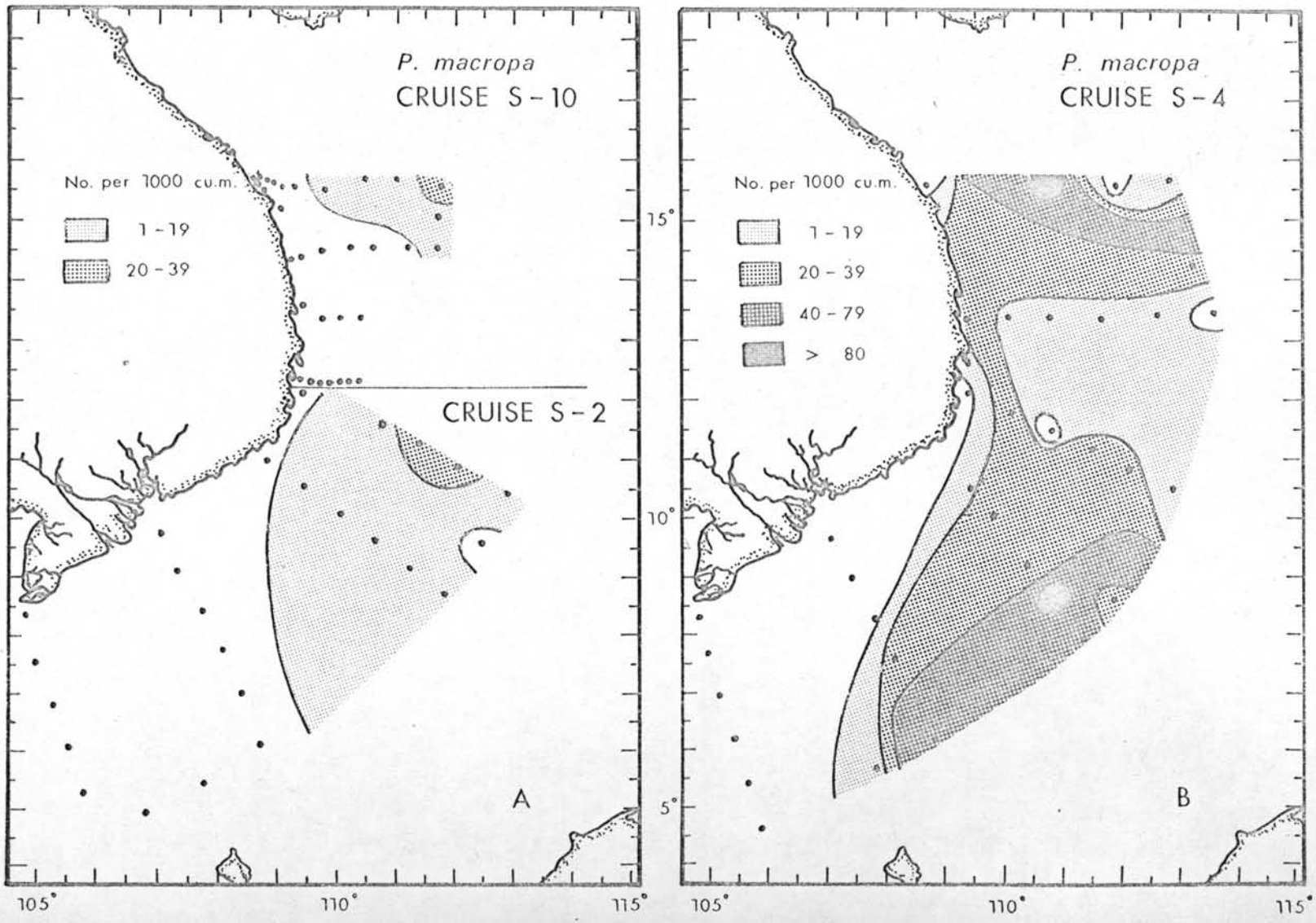
Male: L, Head; M, antenna 1; N, antenna 2.

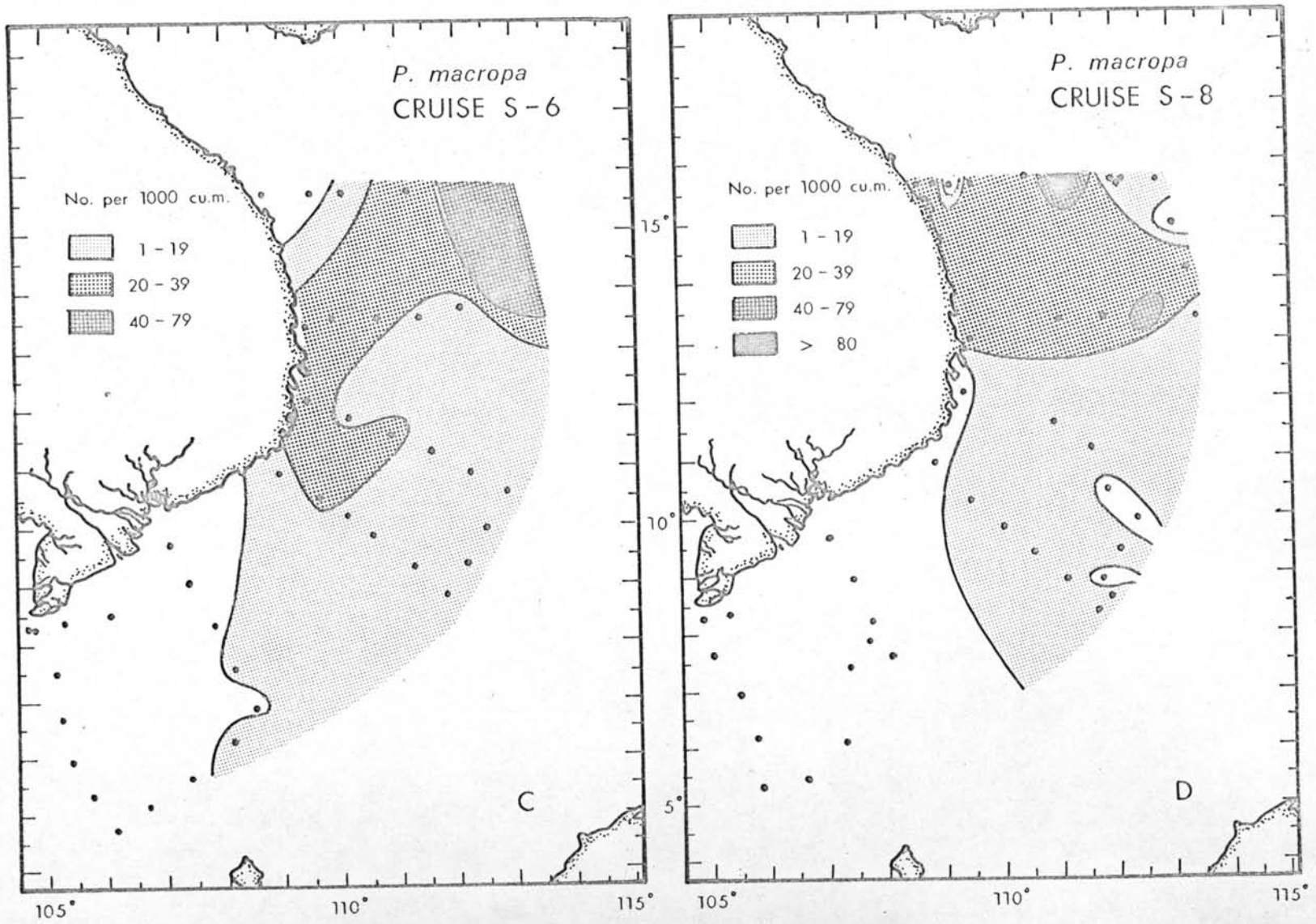
(A, L, scale a; C-K, scale b; B, M, N, scale c)

FIGURE 6

Maps showing the seasonal distributional patterns of *P. macropa*.


A
B
M
N
L
C
D
E
F
J
H
G
I
K
1 mm
a
1 mm
b
0.5 mm
c


P. macropa
CRUISE S-10
No. per 1000 cu.m.
1 - 19
20 - 39
CRUISE S-2
A
105°
110°
115°
P. macropa
CRUISE S-4
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
> 80
15°
10°
5°
B
105°
110°
115°


P. macropa
CRUISE S-6
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
C
105°
110°
115°
15°
10°
5°
P. macropa
CRUISE S-8
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
> 80
D
105°
110°
115°

FAMILY PRONOIDAE Claus, 1879

PRONOIDAE

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):149(3), 168 (22). (key to genera).

Bovallius, C. 1887a. Bih. t. K. Sv. Vet. Akad. Handl., 11(16):40.

Claus, C. 1887. Alfred Hölder, Wien, p. 47.

Stebbing, T. 1888. Challenger Rpts., 29:1506.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):50.

Stebbing, T. 1910. S. African Mus., Ann. 6(4):479.

Barnard, K. 1916. S. African Mus., Ann. 15(3):293.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:425.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):155, 250.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):216, (key to genera).

Barnard, K. 1930. "Terra Nova" Exped., 8(4):426.

Pirlot, J. 1930. Siboga Exped., 33a:30.

Barnard, K. 1932. Discovery Rpts., 5:289.

Dakin, W. and A. Colefax. 1940. Publ. Monograph, 1:123.

Shoemaker, C. 1945. Zoologica, 30:245.

Hurley, D. 1955. Roy. Soc. N.Z., Trans. 83:174.

Reid, D. 1955. Atlantide Rpts., 3:33.

Hurley, D. 1960. N.Z. Journ. Sc., 3(2):281.

Body more or less compressed, head globular or produced slightly forward, eyes occupying the greater part of head; 1st. flagellar article of ant. 1 dilated, the others subterminal; ant. 2 slender, folded in a zig-zag manner in male, a little inwardly curved in female; mandibles with 3-segmented palp; coxal plates distinct; basis of per. 5 and 6 enlarged but not transformed into an operculum; per. 7 basis the only article normally developed; gills on segments 2-6, simple or lobed; uropods biramous.

Key to the Gulf of Thailand and the South China Sea genera of Pronoidae

1. Per. 2 chelate, complex; double urosome segment (5th. and 6th. abdominal) relatively short; uropod rami very long and large----------Eupronoe
   Per. 1 simple; per. 2 chelate, complex; double urosome segment (5th. and 6th. abdominal) elongated; peduncle of uropods very short, rami lanceolate------Parapronoe

FIGURE 7

Seasonal variations in mean density (No. per 1000 cu.m. of water) of members of the family Pronoidae.

Eupronoe Claus, 1879

Pronoe

Guérin-Méneville, F. 1836. Mag. de Zool., 6(7):7.

Milne-Edwards, H. 1840. Hist. Nat. Crust., 3:98.

Dana, J. 1852a. American Journ. Sc. and Arts, ser. 2, 14 :1009, 1013, 1443.

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 336.

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):169(23).

_____. 1887. Alfred Hölder, Wien, p. 48.

Stebbing, T. 1888. Challenger Rpts., 29:1507.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):54.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):250.

Eupronoe

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):169(23), 172 (26).

_____. 1887. Alfred Hölder, Wien, p. 50.

Stebbing, T. 1888. Challenger Rpts., 29:1509.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):54.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:425.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):156, 250.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):222.

Pirlot, J. 1929. Mém. Soc. Liège, 3(15):147.

Eupronoe maculata Claus, 1879

Figs. 7, 8, 9(A-E).

Eupronoe maculata

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):172(26), 174(28).

Bovallius, C. 1887a. Bih. t.k. Sv. Vet. Akad. Handl., 11(16):40.

Claus, C. 1887. Alfred Hölder, Wien, p. 52, pl. 13, figs. 1-6.

Vosseler, J. in Lo Bianco. 1903-1904. Mittheil Zool. Sta. zu Neapel, 16:278.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):156, 250, figs. 53-54, chart 24.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):222.

Pirlot, J. 1929. Mém. Soc. Liège, 3(15):149.

Barnard, K. 1930. "Terra Nova" Exped., 8(4):426.

Pirlot, J. 1930. Siboga Exped., 33a:33.

Barnard, K. 1932. Discovery Rpts., 5:289.

Dakin, W. and A. Colefax. 1940. Publ. Monograph, 1:123, fig. 213.

Shoemaker, C. 1945. Zoologica, 30:245.

Reid, D. 1955. Atlantide Rpts., 3:24.

Evans, F. 1961. Linn. Soc. London, Proc., II:201.

Eupronoe inscripta

Stebbing, T. 1888. Challenger Rpts., 29:1510, pl. 187.

Eupronoe intermedia

Stebbing, T. 1888. Challenger Rpts., 29:1517, pl. 188.

Evans, F. 1961. Linn. Soc. London, Proc., II:200.

Eupronoe sp.

Vosseler, J. in Lo Bianco. 1903-1904. Mittheil Zool. Sta. zu Neapel, 16:278.

Ant. 1: Male: Peduncle of 2 articles, 1st. article broader than long; 2nd. article short, 1/3 as long as 1st. Flagellum of 4 articles; 1st. article long, longer than peduncle, inferior margin convex, superior concave, shorter than inferior, medial surface thickly covered with 2 tracts of long setae; 2nd. article cylindrical, 1/6 as long as 1st., few sensory setae on superior margin; 3rd. article slightly shorter than 2nd., 2 sensory setae on median of superior margin; 4th. article nearly as long as 3rd., tapering.

Female: Single peduncular article, long, almost cylindrical, 5/8 as broad as long. Flagellum of 4 articles; 1st. article 1/2 as long as peduncle, as broad as long; 2nd. article almost twice as long as 1st., smaller distally; 3rd. article shorter than 2nd.; 4th. article slightly longer than 3rd., tapering.

Ant. 2: Male: Single peduncular article, slightly expanded at proximal portion. Flagellum of 4 articles; 1st. article almost as long as 2nd., longer than peduncle;

3rd. article shorter than 1st. and 2nd., expanded at proximal portion; 4th. article almost 1/2 as long as 3rd., tapering; each article folded backward against preceding article.

Female: Absent.

Peraeons: Posterior ones longer than anterior ones. Peraeon 3-7 extending by a short posterior dorsal spine.

Per. 1: Short, complex-subchelate. Basis about twice as long as broad, broadest at distal portion, superior and inferior margins convex. Ischium short, 1/4 basis, slightly longer than broad, superior margin shorter than inferior. Merus longer than ischium, broader distally, superior margin shorter than inferior, with small process at posterodistal corner, pointed process at inferiodistal corner. Carpus 1/3 basis, superior margin convex, pointed process at superiodistal corner, inferior margin strongly expanded, small process at inferiodistal corner. Propodus longer than carpus, superior margin strongly convex, inferior slightly concave. Dactylus 1/3 propodus, curved, and spiniform.

Per. 2: Longer than per. 1, chelate. Basis same as of per. 1, but longer, twice as long as broad. Ischium same as of per. 1, but broader and longer, 1/3 basis.

Merus longer than ischium, broader distally, superior margin shorter than inferior, a small process each at superio- and inferiodistal corners. Carpus 2/3 basis, superior margin convex, inferior expanded, inferiodistal corner produced into long round process, as long as preceeding article. Propodus longer than carpus, both superior and inferior margins convex. Dactylus about 1/4 propodus, curved, and spiniform.

Per. 3: Simple, longer than per. 2. Basis long, cylindrical, 3 times as long as broad, superior and inferior margins convex. Ischium short, about 1/7 basis, as long as broad, superior margin slightly shorter than inferior. Merus about 1/2 basis, broader distally, superior and inferior margins convex, small process each at superio- and inferiodistal corners. Carpus about 1/2 basis, superior and inferior margins convex. Propodus as long, and about 1/2 as broad as carpus, superior margin slightly convex, inferior almost straight. Dactylus 1/5 propodus, long, curved and spiniform.

Per. 4: Similar to per. 3, but slightly longer. Basis slightly narrower than of per. 3. Ischium and merus same as those of per. 3. Carpus 5/7 as broad as of per. 3, a sharp tooth each at superio- and inferiodistal corners. Propodus slightly longer than of per. 3. Dactylus same as of per. 3.

Per. 5: Longest. Basis expanded, slightly more than twice as long as broad, broadest at distal portion, both superior and inferior margins convex, a round process each at superio- and inferiodistal corners. Ischium short, 1/7 basis, longer than broad, inferior margin shorter than superior, pointed process at superiodistal corner, sharp process at inferiodistal corner. Merus about 3/7 basis, broader distally, both superior and inferior margins convex, with fine setae along 2/3 superior margin, strong pointed process at inferiodistal corner. Carpus 1/3 basis, shorter than merus, both superior and inferior margins convex, with fine setae along superior margin, a sharp process each at superio- and inferiodistal corners. Propodus about 6/7 basis, narrower than carpus, fine setae along concave superior margin, round process at superiodistal corner, inferior margin convex, pointed process at inferiodistal corner. Dactylus about 1/3 propodus, long, curved, and spiniform.

Per. 6: Similar to per. 5, but slightly shorter. Basis longer, broader than of per. 5, about 3/5 as broad as long, broadest at proximal half, both superio- and inferioproximal corners strongly expanded, a round process each at superio- and inferiodistal corners. Ischium same as of per. 5, but shorter, about 1/13 basis, broader than long. Merus slightly longer than

of per. 5, about 1/3 basis, broader distally, both superior and inferior margins convex, with fine setae along 4/5 superior margin, superiodistal corner producing downward along 1/2 merus into long process, strong pointed process at inferiodistal corner. Carpus shorter than of per. 5, about 1/6 basis, shorter than merus, both superior and inferior margins convex, with fine setae along superior margin, round process at superiodistal corner, pointed process at inferiodistal corner. Propodus and dactylus same as of per. 5, but shorter.

Per. 7: Rudimentary. Basis expanded, 7/11 as long as of per. 6, about 1/2 as broad as long, broadest at proximal half, superior margin concave, inferioproximal corner produced proximally into big round process, inferior margin strongly convex, a round process each at superio- and inferiodistal corners. Ischium small, twice as long as broad. Remaining articles absent.

Pleons: All 3 pleons longer than peraeon 7, posterior ones shorter than anterior ones, each extending by a short posterior dorsal spine.

Epimeral plates: All plates with ventral margins convex, posterior margins sigmoid, posterior angles round; in 3rd. plate posterior angle produced posteriorly.

Urosomes: Urosome 1 about 2/3 as long as pleon 3, twice as broad as long; coalesced urosomes 2 and 3 slightly longer than broad, pointed teeth at lateral margins.

Uropods: Uropod 1 longest; peduncle cylindrical, about 3/5 as broad as long, superior margin almost straight, inferior slightly convex, pointed teeth at superio- and inferiodistal corners; inner ramus slightly longer than peduncle, tip pointed, 2/3 of both margins finely serrated; outer ramus about 1.2 times as long as inner ramus, pointed teeth along superior margin, tip pointed, 2/3 of inferior margin finely serrated. Uropod 2 reaching passed tip of telson; peduncle almost 5/7 as long as that of uropod 1, broader distally, almost twice as long as broad, superior margin convex, inferior concave, pointed teeth at superio- and inferiodistal corners; both rami 1.5 times as long as peduncle, tip rounded. Uropod 3 shortest, reaching farthest passed tip of telson; peduncle almost 1/3 as long as that of uropod 2, broader distally, superior margin convex, inferior almost straight, pointed teeth at superio- and inferiodistal corners; both rami about 3 times as long as peduncle, tip rounded.

Telson: Subtriangular, about 2/3 as long as urosome 1, with tip strongly pointed.

Remarks: This species can be distinguished from very simi-

lar species, E. armata, by the process at inferiodistal corner of propodus of per. 2 which is round and long in this species, while it is pointed and shorter in E. armata; and also by the tip of telson which is strongly pointed, while it is round in E. armata.

General distribution: World distribution according to Stephensen (1925:158), Barnard (1932:289), Dakin and Colefax (1940:123), Shoemaker (1945:245), and Evans (1961:201) include: Atlantic; north, south, tropical, subtropical, from 40°N. to 29°S., Bermuda; Mediterranean; Pacific; north, south, Indo-Pacific, South of Japan, 26°29'N., 137°E., Japan, 31°N., 131°E., China Sea, 15°14'N., 118°41'E.; Indian; 8°3'N., 83°52'E.

Distribution in the areas studied: This is a neritic species which was found in the Gulf of Thailand and the South China Sea.

In the Gulf of Thailand, during the transition period between the southwest and the northeast monsoons (S-1), this species was found distributed in the central area of the Gulf, and extended to the middle portion of the east coast. Toward the end of the northeast monsoon period (S-3), the population increased, it was found widely distributed in the Gulf except at the northwestern corner where the isolated

pocket of low temperature water was observed, and the eastern half of the Gulf's opening. During the inter-monsoon period (S-5), it was found distributed from the northwest corner of the Gulf to the middle of the east coast and through the central portion and spread toward the opening of the Gulf. It was also found along the middle part of the west coast of the outer Gulf. During the southwest monsoon period (S-7), this species was found distributed through the central portion of the Gulf from the northern part of the inner Gulf to the opening of the Gulf. It was found up to the coast near the western opening of the Gulf. At the beginning of the northeast monsoon period (S-9), the distribution was still similar to the previous cruise, it was found distributed from the northern corner of the Gulf through the central portion to the opening of the Gulf. It was also found extended to the middle of the east coast of the inner Gulf.

In the South China Sea, it was found widely distributed offshore in the northern and central portions of the studied areas, along the coast in the most northern area, and extended widely over the Sunda Shelf during the northeast monsoon period (S-2, S-10). At the end of the northeast monsoon period (S-4), it was found widely distributed all over the studied areas in the South China Sea, with maximum density along the

central coast. During the southwest monsoon period (S-6), when the current flow was to the north, it was widely distributed only in the central and northern along the coast and offshore to the southern limit of the deep basin. During the change-over period from the southwest to the northeast monsoon winds (S-8), it was also found widely distributed except at the offshore portion of the central coast and the near shore portion over the Sunda Shelf. The maximum density was along the northern and central coast, and the southern offshore part over the shelf. The common ranges of salinities and temperatures from the surface to the depth of surface layer in the South China Sea at the localities where it was found were from 28.00 to 35.88‰., and from 31.70°to 4.34°C..

The average densities of this species in the Gulf of Thailand were at the minimum of 6 individuals per 1000 cu.m. of water and reached the peak of 48 individuals at the end of the northeast monsoon period (S-3).

The average densities in the South China Sea were at the minimum of 11 individuals per 1000 cu.m. of water and reached the peak of 38 individuals during the change-over period from the southwest to the northeast monsoon winds (S-8). The maximum densities in the Gulf and the South China Sea were not in the same season.

FIGURE 8

Eupronoe maculata Claus

Female: A, Lateral view; B, antenna 1; C-I, peraeopods 1-7; J, pleopod; K, uropods and telson.

Male: L, Head; M, antenna 1; N, antenna 2.

(A, L, scale a; C-K, scale b; B, M, N, scale c)

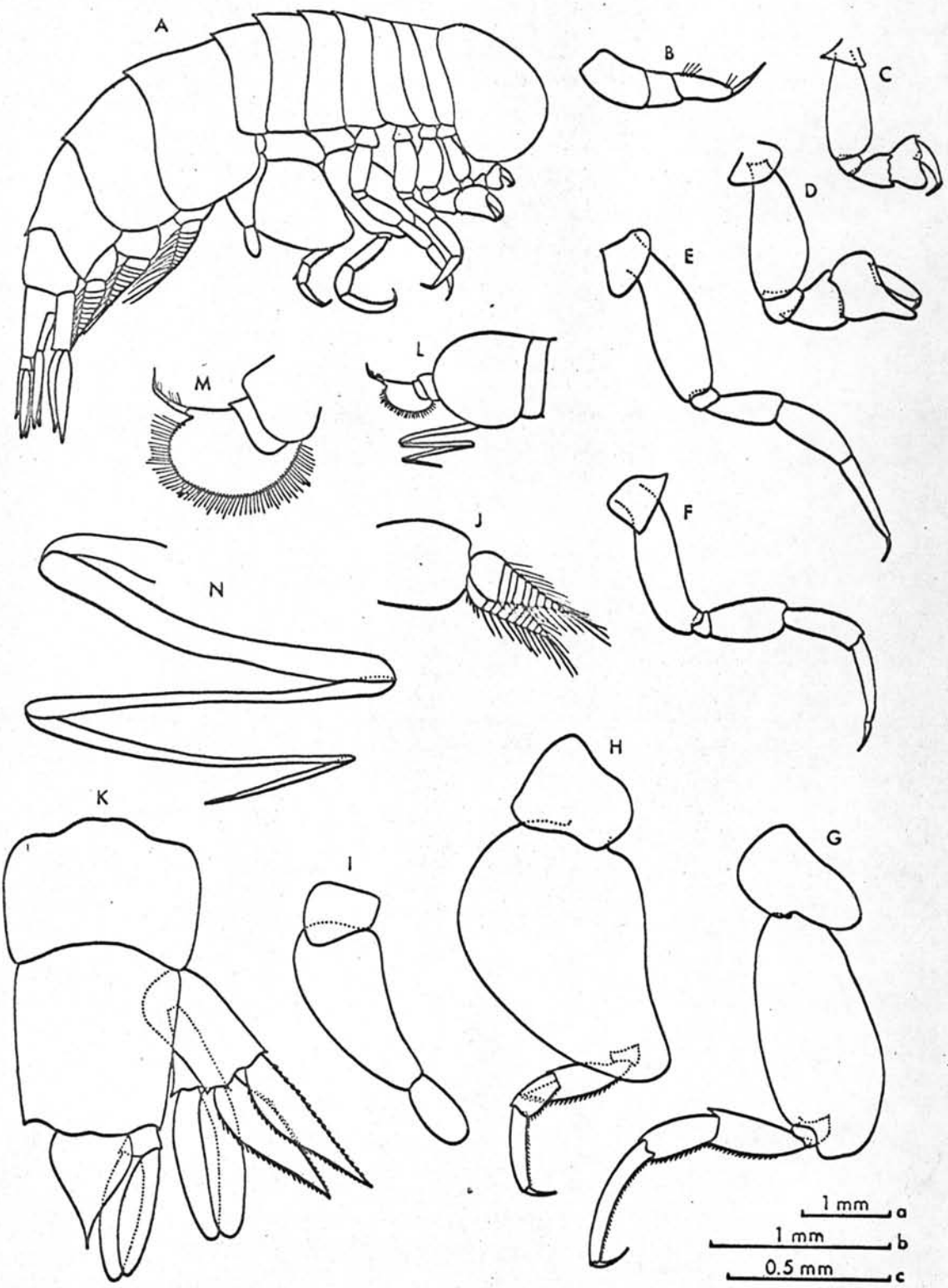
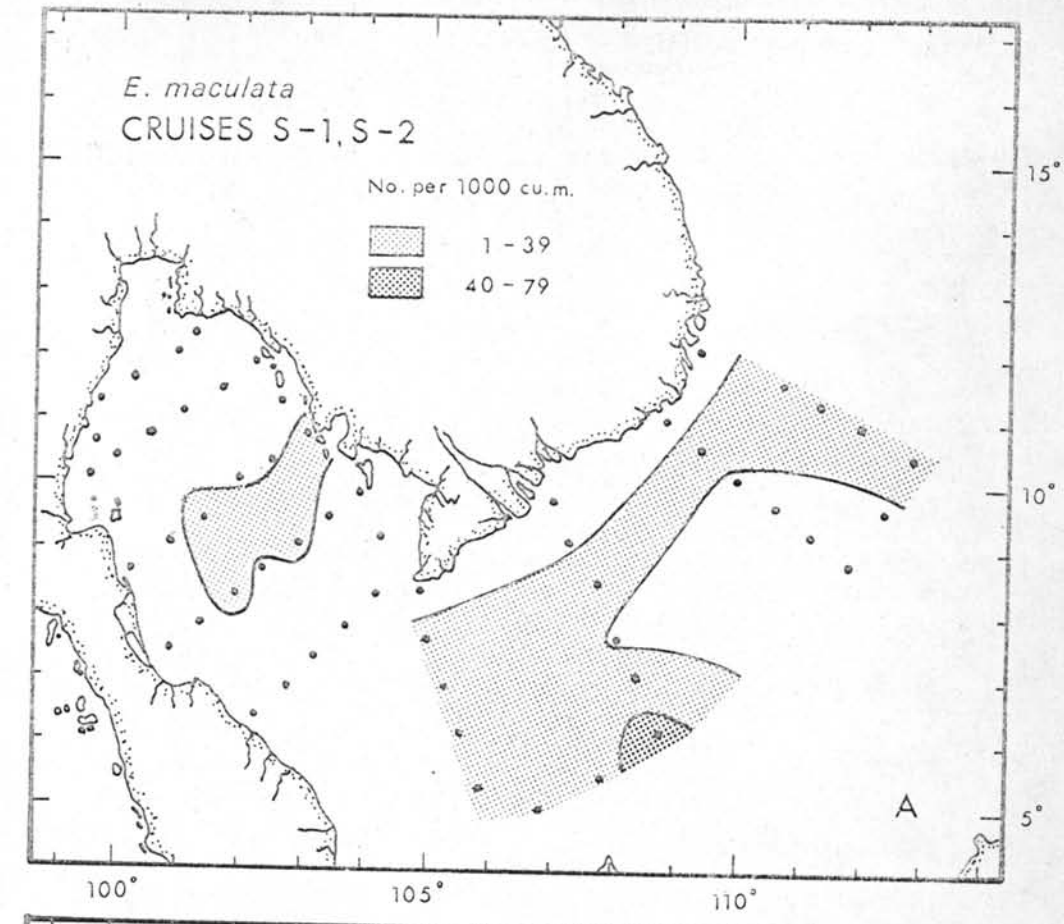
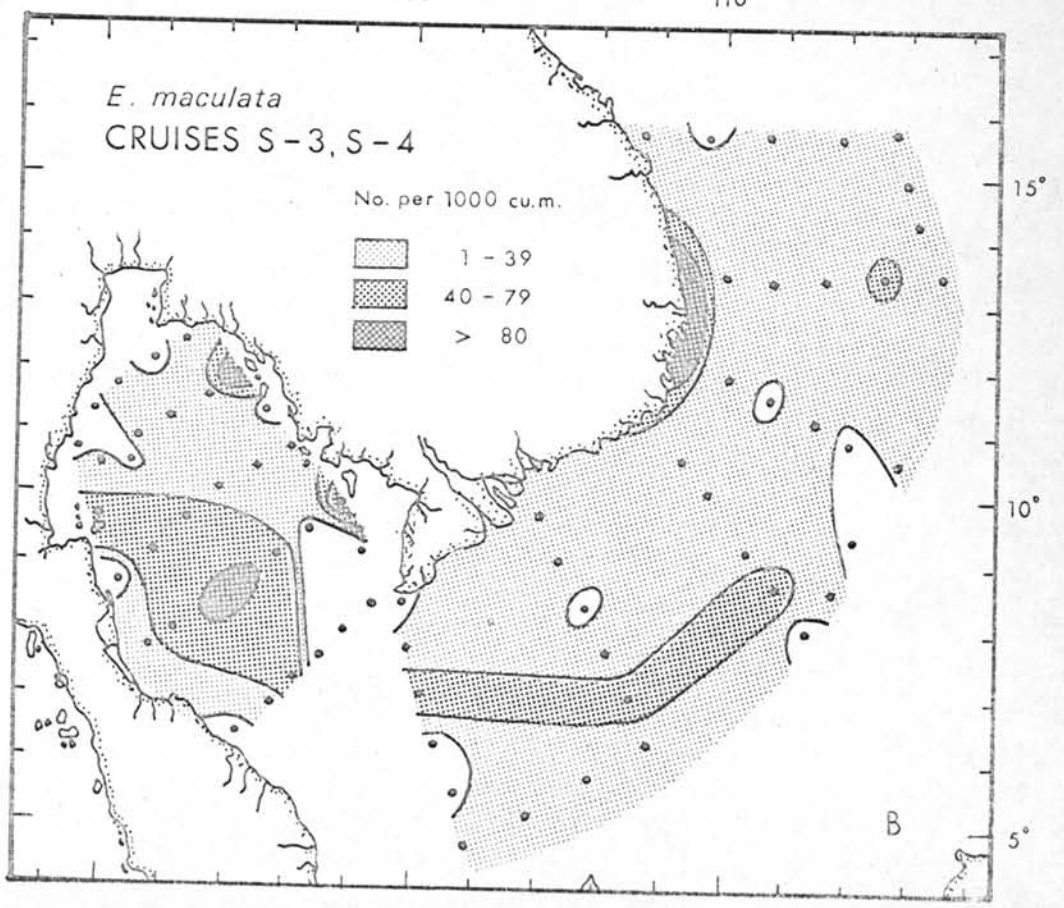
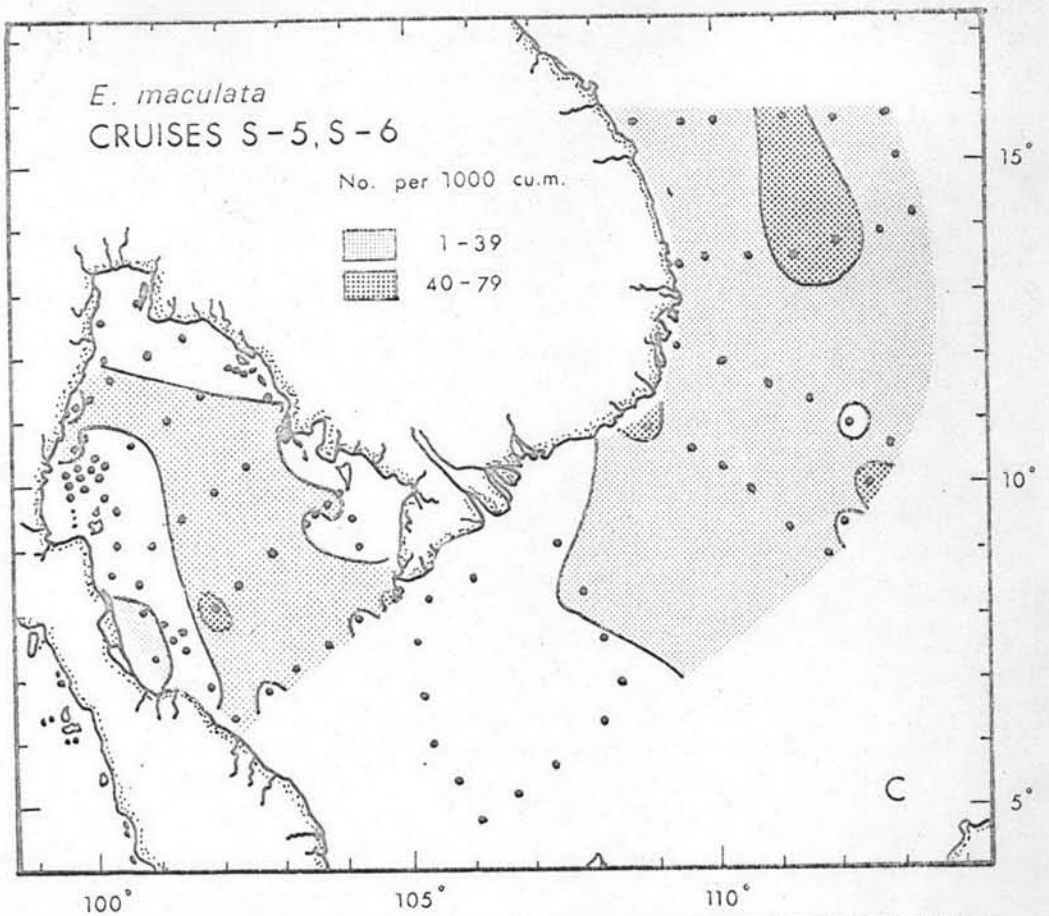

A
B
C
D
E
F
G
H
I
J
K
L
M
N
1 mm a
1 mm b
0.5 mm c

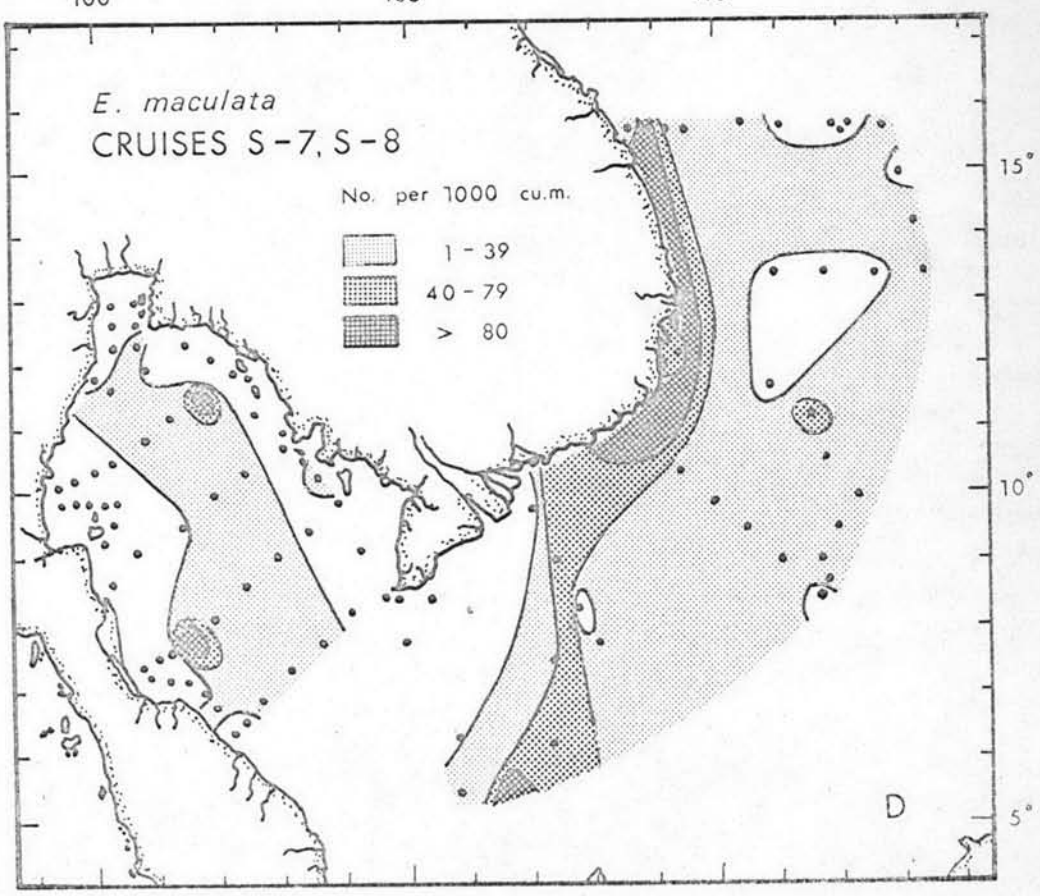
FIGURE 9

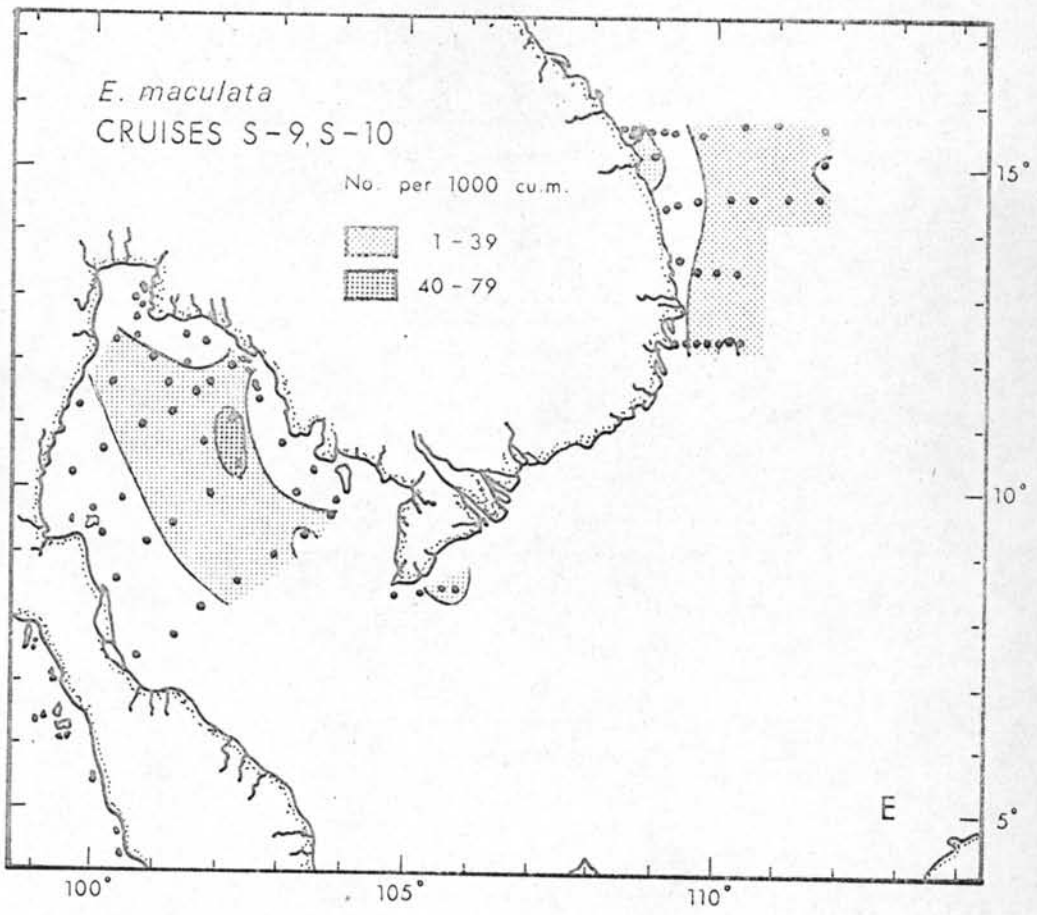
Maps showing the seasonal distributional patterns of *E. maculata*.


E. maculata
CRUISES S-1, S-2
No. per 1000 cu.m.
1 - 39
40 - 79
A
15°
10°
5°
100°
105°
110°


E. maculata
CRUISES S-3, S-4
No. per 1000 cu.m.
1 - 39
40 - 79
> 80
B
15°
10°
5°


E. maculata
CRUISES S-5, S-6
No. per 1000 cu.m.
1-39
40-79
15°
10°
5°
C
100°
105°
110°


E. maculata
CRUISES S-7, S-8
No. per 1000 cu.m.
1-39
40-79
> 80
15°
10°
5°
D


E. maculata
CRUISES S-9, S-10
No. per 1000 cu.m.
1 - 39
40 - 79
15°
10°
5°
100°
105°
110°
E

Eupronoe armata Claus, 1879

Figs. 7, 10, 11(A-E).

Pronoe brunnea

Dana, J. 1852a. American Journ. Sc. and Arts, series 2, 14:1015, pl. 69, fig. 5.

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 337, pl. 53, fig. 7.

Eupronoe armata

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):174(28).

_____. 1887. Alfred Hölder, Wien, p. 52, pl. 13, figs. 7-17.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):50, 54.

Eupronoe serrata

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):174(28).

_____. 1887. Alfred Hölder, Wien, p. 52, pl. 14, figs. 1-6.

Ant. 1: Male: Peduncle of 2 articles; 1st. article broader than long; 2nd. article short, 1/3 as long as 1st.. Flagellum of 4 articles; 1st. article long, almost as long as peduncle, 4/5 as broad as long, inferior margin convex, superior concave, shorter than inferior; medial surface thickly covered with 2 tracts of long setae; 2nd. article cylindrical, 1/6 as long as 1st., few

sensory setae on superior margin; 3rd. article shorter than 2nd., 2 sensory setae on median of superior margin; 4th. article twice as long as 2nd., tapering.

Female: Single peduncular article, long, almost cylindrical, 7/10 as broad as long. Flagellum of 4 articles; 1st. article about 1/2 as long as peduncle, almost as broad as long; 2nd. article almost twice as long as 1st., 2 sensory setae on distal of superior margin; 3rd. article about 1/4 as long as 2nd.; 4th. article slightly longer than 3rd., tapering.

Ant. 2: Male: Single peduncular article, long, cylindrical. Flagellum of 3 articles; 1st. article almost as long as 2nd., longer than peduncle; 3rd. article shorter than peduncle; each article folded backward against preceeding article.

Female: Absent.

Peraeons: Posterior ones longer than anterior ones except peraeons 6 and 7, slightly longer than peraeon 4.

Per. 1: Short, complex-subchelate. Basis almost 1/3 as broad as long, folding constrictly, superior margin convex, inferior concave. Ischium short, 1/8 basis, broader than long, superior margin as long as inferior. Merus longer than ischium, broader distally, superior margin shorter than inferior, a small process each at

superio- and inferiodistal corners. Carpus almost 1/3 basis, superior margin convex, inferior expanded, small process at inferiodistal corner, with fine setae along distal half of inferior margin. Propodus as long as carpus, superior and inferior margins convex. Dactylus 3/5 propodus, long, curved, and spiniform.

Per. 2: Longer than per. 1, chelate. Basis slightly longer than of per. 1, about 1/3 as broad as long. Ischium slightly longer than of per. 1, superior margin shorter than inferior. Merus same as of per. 1, but longer. Carpus longer than of per. 1, about 1/2 basis, superior margin convex, inferior expanded, with fine setae along inferior margin, a sharp tooth at superiodistal corner, inferiodistal corner produced into long pointed process. Propodus same as of per. 1, but slightly longer, with fine setae along inferior margin. Dactylus same as of per. 1.

Per. 3: Simple, longer than per. 2. Basis long, about 3 times as long as broad, superior margin concave medially, inferior convex. Ischium short, about 1/6 basis, slightly broader than long, superior margin shorter than inferior, a round process each at superio- and inferiodistal corners. Merus 1/2 basis, broader distally, superior and inferior margins convex, a round process each at superio- and inferiodistal corners. Carpus slightly shorter, narrower than merus, about

1/2 basis, superior and inferior margins convex, pointed tooth at superiodistal corner, with fine setae along 2/3 inferior margin. Propodus longer than merus, longer than 1/2 basis, tapering, superior margin convex, inferior slightly concave, with fine setae along inferior margin. Dactylus almost 1/2 propodus, long, curved, and spiniform.

Per. 4: Similar to per. 3, but longer. Basis longer, more curved than of per. 3, about 3 times as long as broad. Ischium, merus, carpus, propodus and dactylus each slightly longer than those of per. 3.

Per. 5: Longest. Basis expanded, about twice as long as broad, both superior and inferior margins strongly convex at proximal and distal portions, fine serrations along distal half of superior margin, a round process each at superio- and inferiodistal corners. Ischium short, about 1/7 basis, longer than broad, superior margin longer than inferior, pointed process at superiodistal corner. Merus long, cylindrical, almost 3/7 basis, broader distally, superior and inferior margins convex, with fine setae along superior margin, pointed tooth at inferiodistal corner. Carpus shorter, narrower than merus, slightly shorter than 1/3 basis, superior and inferior margins slightly convex, with fine setae along superior margin, pointed tooth at inferiodistal corner. Propodus longer than carpus, almost 1/2 basis,

tapering, superior margin concave, inferior convex, with fine serration along superior margin. Dactylus about 1/2 propodus, long, curved, and spiniform.

Per. 6: Similar to per. 5, but shorter. Basis longer, broader than of per. 5, about 6/11 as broad as long, broadest at proximal half, inferioproximal corner strongly expanded, round process at superiodistal corner. Ischium same as of per. 5, but shorter. Merus as long as of per. 5, but narrower, almost 5 times as long as broad, both superior and inferior margins slightly convex, pointed tooth at inferiodistal corner, superiodistal corner producing downwards along 2/3 carpus into sharp process, fine setae along superior margin. Carpus shorter, narrower than of per. 5, about 5 times as long as broad, both superior and inferior margins slightly convex, pointed tooth at inferiodistal corner, superiodistal corner producing downwards along 1/3 propodus into sharp process, with fine setae along superior margin. Propodus shorter than of per. 5, superior margin slightly concave, inferior convex, with fine setae along superior margin. Dactylus shorter than of per. 5, about 1/2 propodus, long, curved, and spiniform.

Per. 7: Rudimentary. Basis twice as long as broad, broadest at proximal half, superior margin medially concave, inferior convex. Ischium small, longer than broad.

Remaining articles absent.

Pleons: All pleons subequal, each one longer than peraeon 7.

Epimeral plates: All plates with convex ventral margins, posterior margins concave, posterior angles pointed.

Urosomes: Urosome 1 about 2/3 as long as pleon 3, lateral margins expanded into rounded processes; coalesced urosomes 2 and 3 longer than urosome 1, slightly broader than long, pointed teeth at lateral margins.

Uropods: Uropod 1 longest; peduncle almost 3/4 as broad as long, broader distally, superior margin almost straight, inferior convex, a pointed tooth each at superio- and inferiodistal corners; inner ramus twice as long as peduncle, tip pointed, fine setae along superior and distal half of inferior margins; outer ramus shorter than inner ramus, tip pointed, fine setae along inferior and distal half of superior margins. Uropod 2 reaching almost to tip of telson; peduncle almost 3/4 as long as that of uropod 1, broader distally, almost twice as long as broad, both superior and inferior margins convex; both rami twice as long as peduncle, tip rounded. Uropod 3 shortest, reaching passed tip of telson; peduncle almost 1/2 as long as that of uropod 2, broader distally, both margins same

as of uropod 2; both rami 5 times as long as peduncle, tip rounded.

Telson: Triangular, as long as urosome 1, with tip rounded.

Remarks: This species can be easily recognized by per. 1 which is complex-subchelate; per. 2 which is chelate; per. 7 which is rudimentary, having only 3 articles; the tip of both rami of uropods 2 and 3 which is round and the tip of telson which is also round.

General distribution: World distribution according to Stephensen (1925:161), Pirlot (1930:35), Barnard (1932:289), Shoemaker (1945:246), and Reid (1955:25) include: Atlantic; north, subtropical, temperate, from 36° to 31°N., Canaries, Azores, Bermuda; Mediterranean; Pacific; south, East Indies, South of Australia, 40°3'S., 132°58'W., New Zealand; Indian Ocean.

Distribution in the areas studied: This is a common species which was found in the Gulf of Thailand and the South China Sea.

In the Gulf of Thailand, it was not found during the transition period between the southwest and the northeast monsoons (S-1). Toward the end of the northeast monsoon period (S-3), this species was found widely distributed in the Gulf except along the west coast and

the eastern half of the Gulf's opening. The high concentration localities were along the outer half of the east coast and at the middle portion of the western half of the Gulf's opening. During the intermonsoon period (S-5), the population declined, it was found extended from the middle portion of the east coast toward the center of the inner Gulf and also at a few scattered localities in the outer Gulf. During the southwest monsoon period (S-7), it was again widely spread in the central area of the outer Gulf, extending tpward the middle of the east coast and extending further slightly off the east coast of the inner Gulf. It was also extending toward the west coast near the opening of the Gulf. At the beginning of the northeast monsoon period (S-9), it was found in the middle of the inner Gulf, extending toward the east coast, and further down toward the central portion of the outer Gulf. The maximum concentration was found at the region of the downwelling in the middle of the outer Gulf.

In the South China Sea, this species was found widely distributed slightly offshore mostly, extended from the northern portion of the studied areas to the southern portion over the Sunda Shelf during the northeast monsoon period (S-2, S-10). At the end of the northeast monsoon period (S-4), it was widely distri-

buted in the deep basin, along the coast and offshore, and overlying parts of the shelf. During southwest monsoon period (S-6), when the flow was to the north, it was found widely spread in the deep basin from the north to the southern limit, and along the central coast, and at a location over the offshore part of the shelf. During the change-over period from the southwest to the northeast monsoon winds (S-8), it was widely distributed in the deep basin, along the coast and offshore, and overlying the Sunda Shelf. The common ranges of salinities and temperatures from the surface to the depth of the surface layer in the South China Sea at the localities where it was found were from 29.93 to 35.88 ‰., and from 31.70° to 4.34°C..

The average densities of this species in the Gulf of Thailand were at the minimum of 15-20 individuals per 1000 cu.m. of water and reached the peak of 36 individuals at the end of the northeast monsoon period (S-3).

The average densities in the South China Sea were at the minimum of 12-18 individuals per 1000 cu.m. of water and reached the peak of 24 individuals during the change-over period from the southwest to the northeast monsoon winds (S-8). The maximum densities in the Gulf and the South China Sea were not at the same period.

FIGURE 10

Eupronoe armata Claus

Male: A, Lateral view; B, antenna 1; C, antenna 2; D-J, peraeopods 1-7; K, pleopod; L, uropods and telson.

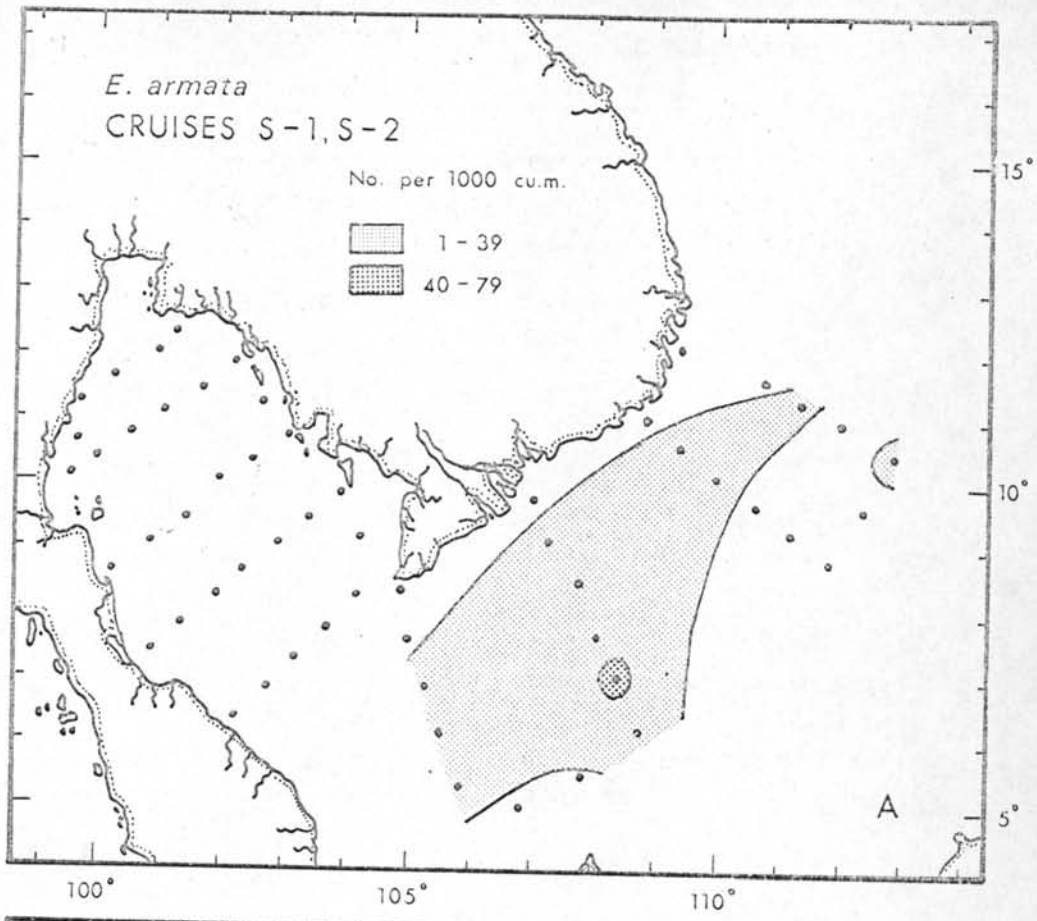
Female: M, antenna 1.

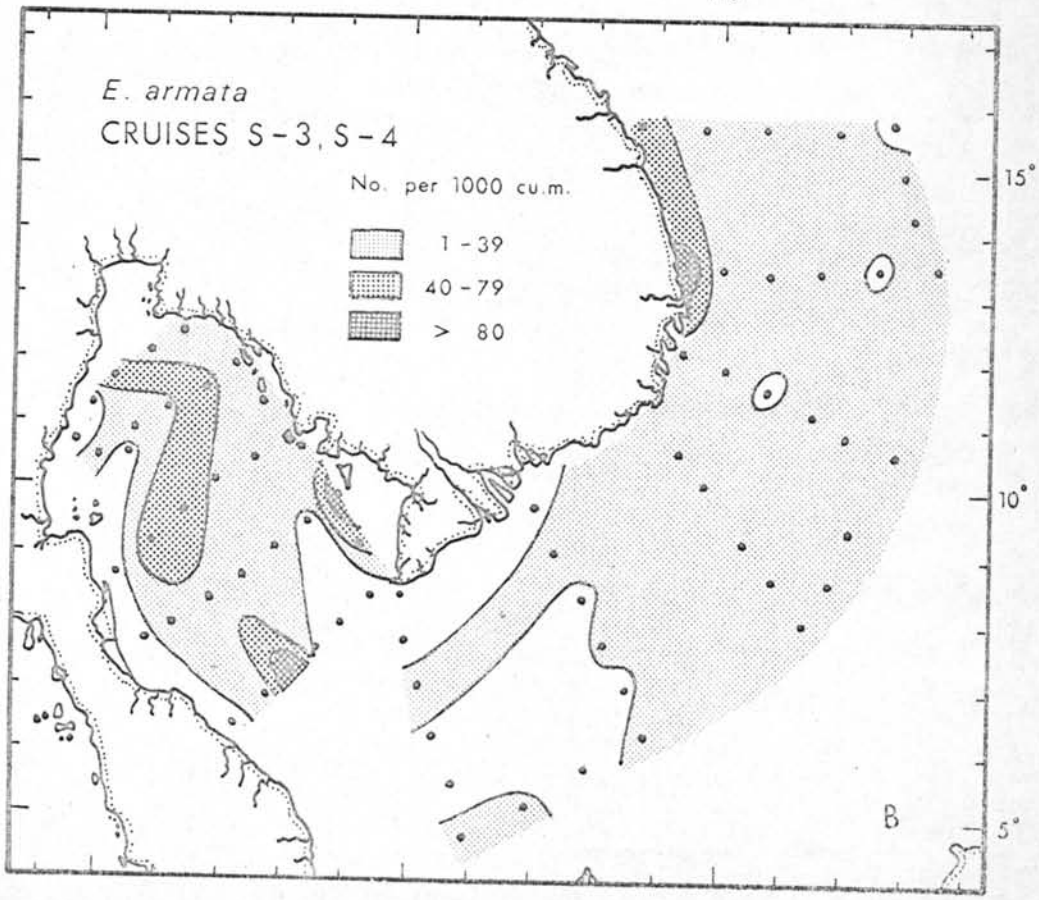
(A, scale a; K, L, scale b; B-J, M, scale c)

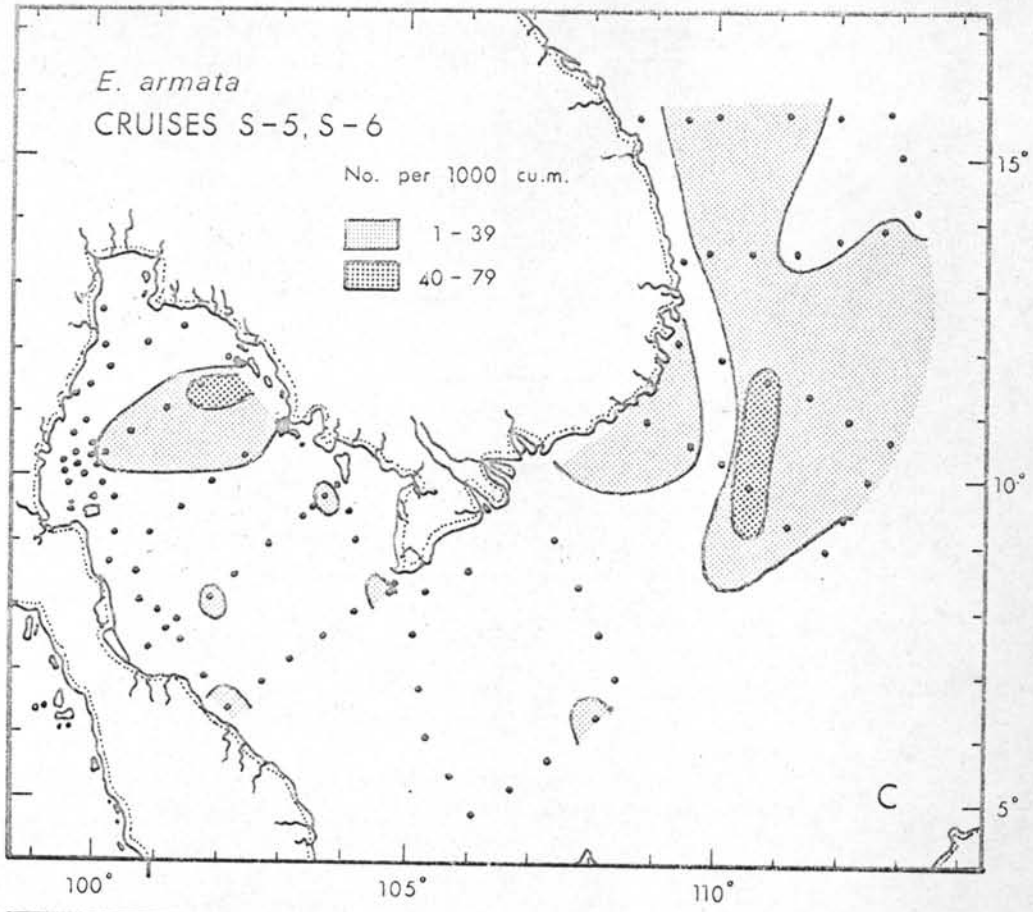

A
M
B
C
D
E
F
G
J
I
K
L
H
1 mm a
1 mm b
0.5 mm. c

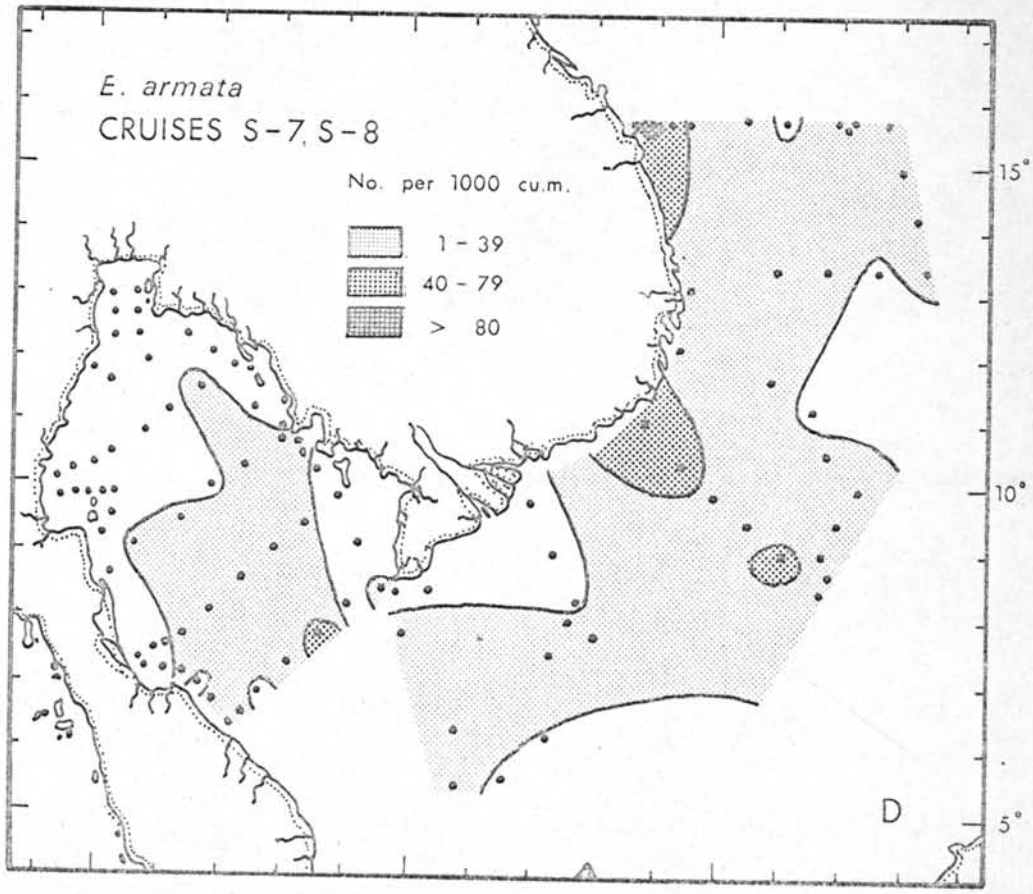
FIGURE 11

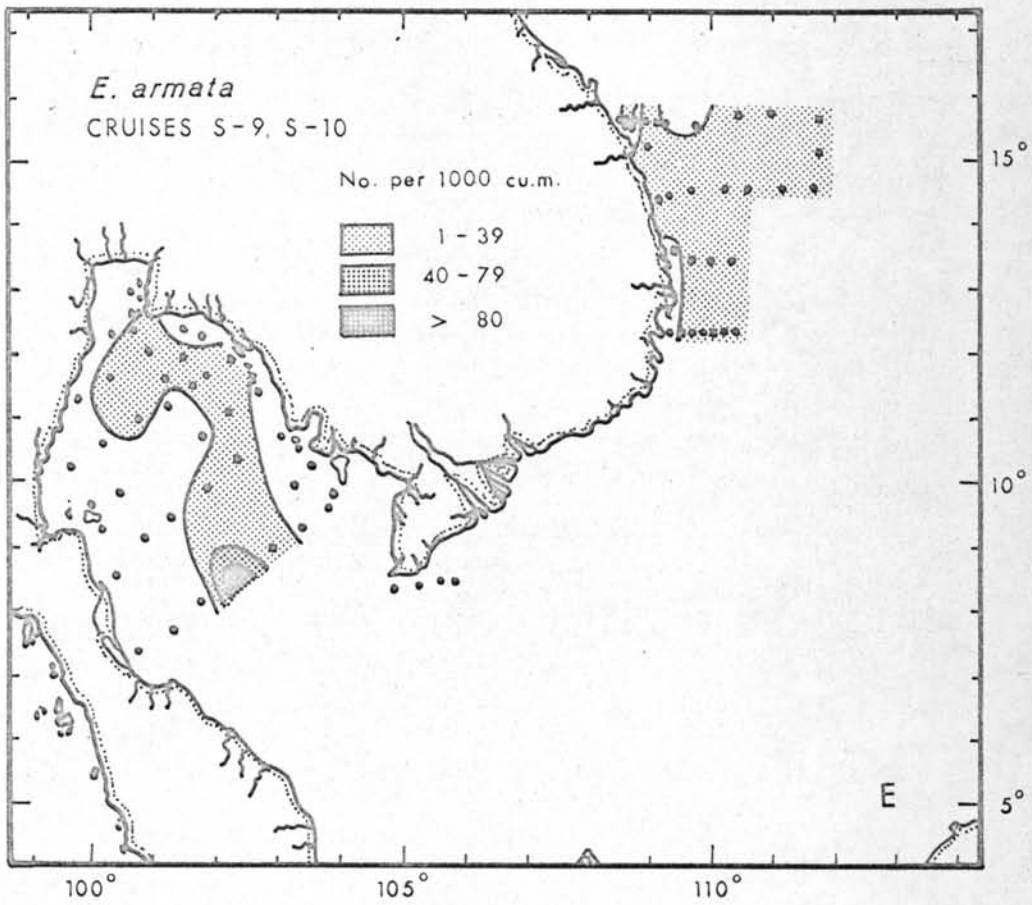
Maps showing the seasonal distributional patterns of *E. armata*.


E. armata
CRUISES S-1, S-2
No. per 1000 cu.m.
1 - 39
40 - 79
15°
10°
5°
A
100°
105°
110°


E. armata
CRUISES S-3, S-4
No. per 1000 cu.m.
1 - 39
40 - 79
> 80
15°
10°
5°
B


E. armata
CRUISES S-5, S-6
No. per 1000 cu.m.
1 - 39
40 - 79
15°
10°
5°
C
100°
105°
110°


E. armata
CRUISES S-7, S-8
No. per 1000 cu.m.
1 - 39
40 - 79
> 80
15°
10°
5°
D


E. armata
CRUISES S-9, S-10
No. per 1000 cu.m.
1 - 39
40 - 79
> 80
15°
10°
5°
100°
105°
110°
E

Parapronoe Claus, 1879

Amphipronoe

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 335.

Parapronoe

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):169(23), 175(29).

Bovallius, C. 1887a. Bih. t. k. Sv. Vet. Akad. Handl., 11(16):42.

Claus, C. 1887. Alfred Hölder, Wien, p. 48, 53.

Stebbing, T. 1888. Challenger Rpts., 29:1521.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):54.

Barnard, K. 1916. S. African Mus., Ann., 15(3):293.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):165, 250.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):219.

Pirlot, J. 1929. Mém. Soc. Liège, 3(15):149.

Barnard, K. 1930. "Terra Nova" Exped., 8(4):427.

Pirlot, J. 1930. Siboga Exped., 33a:31.

Hurley, D. 1955. Roy. Soc. N.Z., Trans., 83:175.

Sympronoe

Stebbing, T. 1888. Challenger Rpts., 29:1533.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):54.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):162,

250.

Pirlot, J. 1930. Siboga Exped., 33a:32.

Type species: Parapronoe crustulum Claus

Definition: Per. 1 simple; per. 2 chelate, complex; double urosome segments (5th. and 6th. abdominal) elongated; peduncle of uropods very short, rami lanceolate.

Key to the Gulf of Thailand and the South China Sea species of Parapronoe

1. Per. 1 simple; per. 2 chelate, with lightly toothed carpal process----------2
   Per. 1 simple; per. 2 strongly chelate, with lightly toothed carpal process----------3
2. Telson very short, round; inner ramus of uropod 3 round, outer ramus with sharp point----------P. parva
3. Telson long, alomst sharp; inner and outer ramus of uropod 3 with sharp points----------P. crustulum

Parapronoe parva Claus, 1879

Figs. 7, 12.

Parapronoe parva

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):177(31).

_____. 1887. Alfred Hölder, Wien, p. 55, pl. 14, figs. 13-18.

Sympronoe parva

Stebbing, T. 1888. Challenger Rpts., 29:1533, pl. 192.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):51, 54.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):162, 250, figs. 58-59.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):225, fig. 43a-h.

Pirlot, J. 1929. Mém. Soc. Liège, 3(15):152.

_____. 1930. Siboga Exped., 33a:32-33.

Barnard, K. 1932. Discovery Rpts., 5:291.

Shoemaker, C. 1945. Zoologica, 30:246.

Reid, D. 1955. Atlantide Rpts., 3:23.

Hurley, D. 1956. Allan Hancock Found., Occas. Papers, 18:19.

_____. 1960. N.Z. Journ. Sc., 3(2):281.

Evans, F. 1961. Linn. Soc. London, Proc., II:203.

Sympronoe propinqua

Stebbing, T. 1888. Challenger Rpts., 29:1537, pl. 193,

fig. B.

Sympronoe anomala

Shoemaker, C. 1925. Amer. Mus. Nat. Hist., Bull., 52:42, figs. 14, 15.

Sympronoe parva var. 7-articulata

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):162-163, figs. 59, 60.

Sympronoe parva septemarticulata

Pirlot, J. 1930. Siboga Exped., 33a:33.

Ant. 1: Female: Absent.

Ant. 2: Female: Absent.

Peraeons: Peraeon 1 as long as peraeon 7; peraeon 2 shortest; peraeon 3 slightly longer than 2; peraeon 4 slightly longer than 3; peraeon 5 longest and as long as 6; peraeons 5-7 extending by a short posterior dorsal spine.

Per. 1: Short, simple. Basis about twice as long as broad, broadest at distal half portion, superior and inferior margins convex, a small round process each at superio- and inferiodistal corners. Ischium short, 1/4 basis, as long as broad, superior margin shorter than inferior. Merus longer than ischium, broader distally, superior margin slightly shorter than inferior, a small round

process each at superio- and inferiodistal corners. Carpus nearly 1/2 basis, superior and inferior margins convex, a pointed process each at superio- and inferiodistal corners. Propodus as long as ischium, superior margin convex, inferior slightly concave. Dactylus about 1/3 propodus, long, curved, and spiniform.

Per. 2: Longer than per. 1, chelate. Basis same as of per. 1, but longer, nearly 3 times as long as broad. Ischium same as of per. 1, but slightly longer, longer than broad. Merus same as of per. 1, but longer. Carpus nearly 1/3 basis, superior margin convex, inferior expanded, pointed process at superiodistal corner, inferiodistal corner producing downwards along 1/3 propodus into long round process, fine setae along distal half of inferior margin and along posterior margin. Propodus same as of per. 1, almost 1/3 propodus.

Per. 3: Simple, longer than per. 2. Basis long, cylindrical, about 3.5 times as long as broad, superior and inferior margins convex, small round process at inferiodistal corner. Ischium short, about 1/7 basis, broader than long, superior margin slightly shorter than inferior. Merus about 1/2 basis, superior and inferior margins strongly convex. Carpus slightly shorter than merus, about 1/2 basis, superior and inferior margins convex. Propodus slightly longer than carpus, superior

margin convex, inferior concave. Dactylus 2/5 propodus, long, curved, and spiniform.

Per. 4: Similar to per. 3, but longer. Basis same as of per. 1, but slightly longer, small round process at superiodistal corner. Ischium same as of per. 3, superior margin longer than inferior. Merus about 5/7 basis, superior margin concave, inferior convex. Carpus same as of per. 3, but narrower and longer, about 5/7 basis. Propodus same as of per. 3, but longer, superior margin strongly convex, inferior strongly concave. Dactylus same as of per. 3.

Per. 5: Longer than per. 4. Basis expanded, about 4/5 as broad as long, broadest at middle portion, superior and inferior margins strongly convex. Ischium short, about 1/5 basis, fixing at 1/3 at distal of basis, superior margin convex, inferior concave. Merus about 1/2 basis, superior and inferior margins convex. Carpus as long as merus, about 3/7 basis, superior and inferior margins slightly convex. Propodus about 1/2 basis, narrower than carpus, superior margin slightly concave, inferior slightly convex. Dactylus 1/5 propodus, long, curved, and spiniform.

Per. 6: Similar to per. 5, but shorter. Basis longer, narrower than of per. 5, about 1.5 times as long as broad, inferioproximal corner expanded, a small round process each at superio- and inferiodistal corners.

Ischium same as of per. 5, but shorter, 1/8 basis, fixing at about 1/4 at distal of basis. Merus about 1/3 basis, superior margin slmost straight, inferior strongly convex, pointed process at inferiodistal corner, fine setae along superior margin, superiodistal corner producing downwards along 2/3 of carpal superior margin into long process. Carpus about 1/4 basis, superior and inferior margins convex, fine setae along superior margin. Propodus shorter and narrower than carpus, about 1/4 basis, superior margin slightly concave, inferior slightly convex. Dactylus about 1/2 propodus, long, curved, and spiniform.

Per. 7: Rudimentary. Basis expanded, nearly 1/3 as broad as long, broadest at proximal half, superior and inferior margins convex. Ischium and merus small, longer than broad. Remaining articles absent.

Pleons: All 3 pleons longer than peraeon 7, anterior ones longer than posterior ones, pleon 2 extending by a short posterior dorsal spine.

Epimeral plates: 1st. and 2nd. plates with ventral margins convex, posterior margins sigmoid, posterior angles produced posteriorly; 3rd. plate with ventral margin convex, posterior margin concave, posterior angle producing posteriorly in sharp process.

Urosomes: Urosome 1 about 2/3 as long as pleon 3, 7/12 as long as broad; coalesced urosomes 2 and 3 about 4/5 as broad as long, a pointed process each at lateral margins.

Uropods: Uropod 1 longest, peduncle cylindrical, about 1/4 as broad as long, superior and inferior margins slightly convex, pointed teeth at superio- and inferiodistal corners; inner ramus slightly longer than peduncle, tip pointed, fine setae along distal half of inferior margin; outer ramus as long as peduncle, tip pointed, fine setae along 7/8 of superior and inferior margins. Uropod 2 reaching almost to tip of uropod 3; peduncle 3/4 as long as that of uropod 1, about 1/4 as broad as long, superior margin convex, inferior almost straight, pointed teeth at superio- and inferiodistal corners; inner ramus about 1.3 times as long as peduncle, tip pointed; outer ramus slightly shorter than inner ramus, tip pointed. Uropod 3 shortest, reaching passed tip of telson; peduncle about 1/5 as long as that of uropod 2, superior margin almost straight, inferior strongly convex, pointed teeth at superio- and inferiodistal corners; inner ramus about 3 times as long as peduncle, tip rounded; outer ramus slightly shorter than inner ramus, tip pointed, fine setae along inferior margin.

Telson: Subtriangular, short, about 1/7 as long as coa-

lesced urosomes 2 and 3, with tip rounded.

Remarks: This species can be distinguished from a similar species, Parapronoe crustulum, by:

1. the carpus of per. 1 which is narrow in P. parva, while it is broader, with serrations along inferior and posterior margins in P. crustulum.

2. the inferiodistal corner of carpus of per. 2 which producing downwards along 1/3 propodus into long round process in P. parva, while producing downwards into long pointed process which is longer than preceeding articles in P. crustulum.

3. the tip of inner ramus of uropod 3 which is rounded in P. parva, while it is pointed in P. crustulum.

4. the shape of telson which is longer in P. crustulum than in P. parva.

General distribution: World distribution according to Walker (1909:51), Stephensen (1925:162), Pirlot (1930:33), Barnard (1932:291), Shoemaker (1945:246), Reid (1955:24), and Evans (1961:203) include: Atlantic; north, south, from 10°N. to 10°S., Bermuda; Mediterranean; Pacific; north, Indo-Pacific, East Indies, South of Mindanao, Zanzibar, Celebes Sea, 6°20'N., 123°13'E., China Sea, off Luzon, 17°54'N., 117°14'E.; Indian;

$10^{\circ}27'S.$, $51^{\circ}17'E.$.

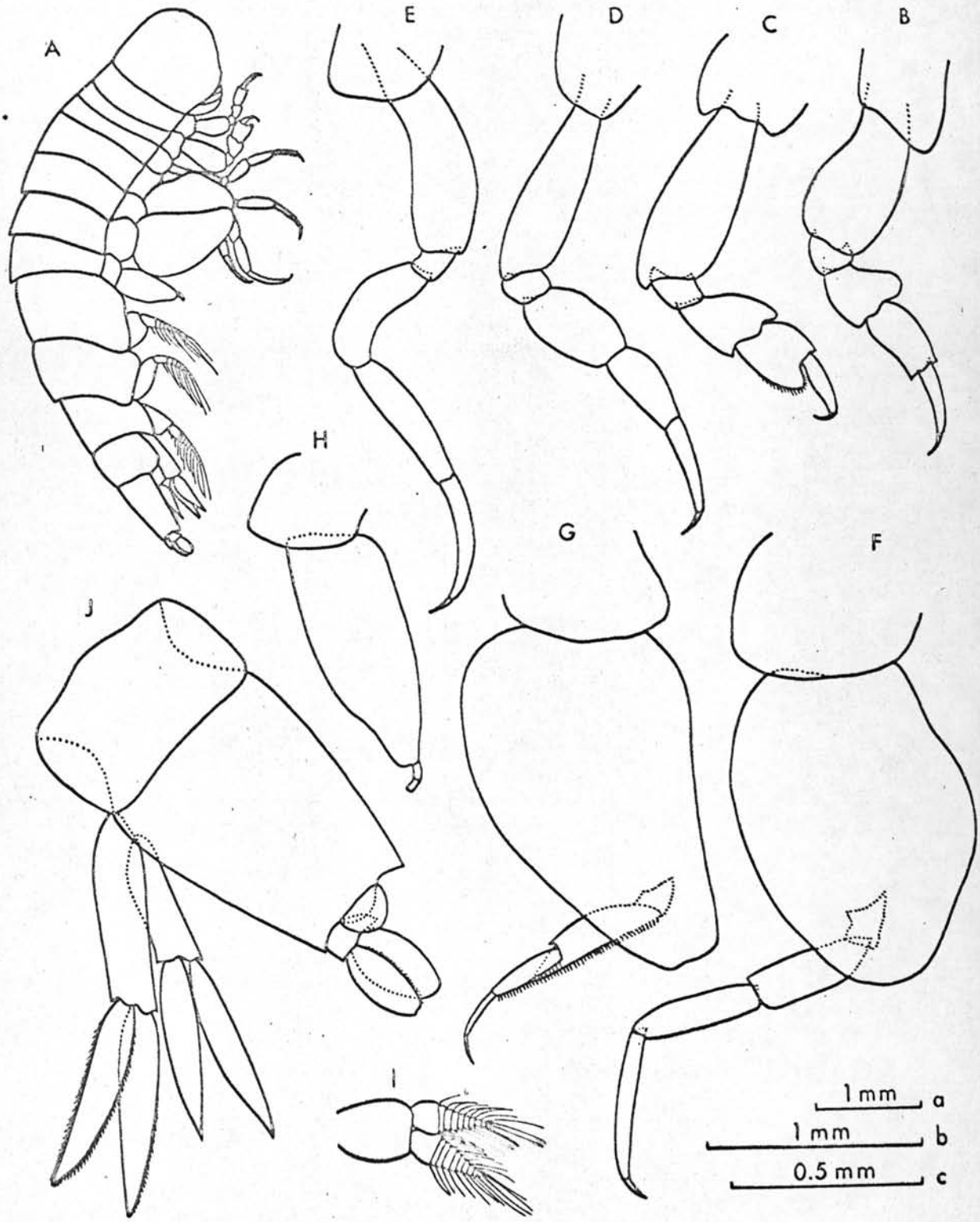
Distribution in the areas studied: This is an uncommon species of the South China Sea. During the northeast monsoon period (S-2, S-10), when the current flow was to the south along the coast and to the north along the farthest offshore areas, this species was found offshore in the central portion of the deep basin, and at a location slightly overlying the Sunda Shelf. At the end of the northeast monsoon period (S-4), when currents were starting to flow northward in some areas, it was found distributed along the coast in the north and slightly offshore in the central area off Nhatrang, and at a few scattered offshore localities in the southern portion of the basin. This species was not found in the areas studied during the southwest monsoon period (S-6), until during the change-over period from the southwest to the northeast monsoon winds (S-8). It was found at few scattered localities offshore in the central portion of the deep basin. The common ranges of salinities and temperatures from the surface to the depth of the surface layer at the localities where it was found were from 31.79 to 34.67 ‰., and from 29.96° to $15.95^{\circ}C$.. The average densities of this species were 4-5 individuals per 1000 cu.m. of water.

FIGURE 12

Parapronoe parva Claus

Female: A, Lateral view; B-H, peraeopods 1-7; I, pleopod; J, uropods and telson.

(A, scale a; I, scale b; B-H, J, scale c)


A
E
D
C
B
H
G
F
J
I
1 mm
a
1 mm
b
0.5 mm
c

Parapronoe crustulum Claus, 1879

Figs. 7, 13.

Parapronoe crustulum

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):177(31).

Bovallius, C. 1887a. Bih. t. k. Sv. Vet. Akad. Handl., 11(16):42.

Claus, C. 1887. Alfred Hölder, Wien, p. 55, pl. 15, figs. 1-15.

Stebbing, T. 1888. Challenger Rpts., 29:1530, pl. 193, fig. A.

Chevreux, E. 1900. Res. des Camp. Sc., 16:152.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):51, 54.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):165, 250.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):221, fig. 40.

Pirlot, J. 1929. Mém. Soc. Liège, 3(15):150.

_____. 1930. Siboga Exped., 33a:31-32.

Barnard, K. 1932. Discovery Rpts., 5:290.

Shoemaker, C. 1945. Zoologica, 30:246, figs. 40, 41.

Reid, D. 1955. Atlantide Rpts., 3:24.

Hurley, D. 1960. N.Z. Journ. Sc., 3(2):281.

Parapronoe atlantica

Bovallius, C. 1887a. Bih. t. k. Sv. Vet. Akad. Handl.,

11(16):42.

Parapronoe campbelli

Stebbing, T. 1888. Challenger Rpts., 29:1522, pl. 189.

Chevreux, E. 1900. Res. des Camp. Sc., 16:152.

Pirlot, J. 1929. Mém. Soc. Liège, 3(15):149.

Barnard, K. 1930. "Terra Nova" Exped., 8(4):427.

Pirlot, J. 1930. Siboga Exped., 33a:32.

Barnard, K. 1932. Discovery Rpts., 5:290.

Parapronoe clausi

Stebbing, T. 1888. Challenger Rpts., 29:1526, pl. 190.

Barnard, K. 1916. S. African Mus., Ann., 6(4):294.

Parapronoe clausoides

Stebbing, T. 1888. Challenger Rpts., 29:1529, pl. 191.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):50, 54.

Barnard, K. 1932. Discovery Rpts., 5:290, fig. 165.

Parapronoe similis

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):219, fig. 38.

Parapronoe stebbingi

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):220, fig. 39.

Ant. 1: Female: Peduncle of 2 articles; 1st. article longer than broad, cylindrical; 2nd. article 1/3 as long as 1st., cylindrical, almost as broad as long.

Flagellum of 4 articles; 1st. article about 4 times as long as broad, 4 sensory setae along superior margin; 2nd. article shorter than 1st., 2 sensory setae on distal of superior margin; 3rd. article nearly as long as 2nd.; 4th. article slightly shorter than 3rd., tapering.

Ant. 2: Female: Absent.

Peraeons: Peraeon 1 as long as peraeon 7; peraeon 2 shorter than 1; peraeon 3 shortest; peraeon 4 longer than 1; peraeon 5 longer than 4; peraeon 6 longest; peraeon 3 extending by a short posterior dorsal spine.

Per. 1: Short, simple. Basis about twice as long as broad, broadest at middle portion, superior and inferior margins strongly convex. Ischium short, about 1/4 basis, as long as broad, superior margin shorter than inferior, pointed process at inferiodistal corner. Merus longer than ischium, broader distally, superior margin slightly shorter than inferior, a small round process each at superio- and inferiodistal corners. Carpus about 1/2 basis, superior and inferior margins convex, pointed process at superiodistal corner, inferiodistal corner strongly serrated with short teeth, posterior margin serrated. Propodus longer than carpus, superior and inferior margins convex. Dactylus almost 1/3 propodus,

short, curved, and spiniform.

Per. 2: Longer than per. 1, chelate. Basis same as of per. 1, but longer, about 3 times as long as broad. Ischium same as of per. 1, but slightly shorter, slightly broader than long, superior margin as long as inferior, a round process each at superio- and inferiodistal corners. Merus same as of per. 1, but slightly longer. Carpus 3/5 basis, superior margin convex, inferior expanded, round process at superiodistal corner, fine setae along posterior margin, long pointed process at inferiodistal corner, longer than preceeding articles, inferior strongly serrated with short seta-tipped teeth. Propodus same as of per. 1, but shorter and broader. Dactylus same as of per. 1.

Per. 3: Simple, longer than per. 2. Basis long, cylindrical, 3 times as long as broad, superior and inferior margins slightly convex. Ischium short, about 1/4 basis, longer than broad, superior margin shorter than inferior. Merus about 1/2 basis, superior and inferior margins strongly convex, a round process each at superio- and inferiodistal corners. Carpus 1/2 basis, superior and inferior margins convex, a pointed process each at superio- and inferiodistal corners. Propodus slightly longer than carpus, superior and inferior margins convex. Dactylus about 1/3 pro-

podus, long, curved, and spiniform.

Per. 4: Similar to per. 3, but longer. Basis and ischium same as those of per. 3, but longer. Merus 4/5 basis, superior margin convex, pointed process at superiodistal corner, inferior concave, round process at inferiodistal corner. Carpus 7/10 basis, superior convex, round process at superiodistal corner, inferior concave, pointed process at inferiodistal corner. Propodus and dactylus same as those of per. 3, but longer.

Per. 5: Longer than per. 4. Basis expanded, about twice as broad as long, inferioproximal corner expanded. Ischium short, about 1/14 basis, fixing at 4/5 at distal of inferior margin, superior margin convex, pointed process at superiodistal corner, inferior concave. Merus about 1/5 basis, both superior and inferior margins convex, with fine setae along 4/5 superior margin, pointed process each at superio- and inferiodistal corners. Carpus about 1/5 basis, both superior and inferior margins convex, fine setae along superior margin. Propodus about 1/9 basis, narrower than carpus, with fine setae along superior margin. Dactylus 1/3 propodus, long, curved, and spiniform.

Per. 6: Similar to per. 5, but shorter. Basis shorter, broader than of per. 5, less than twice as long as broad, broadest at proximal half, superior margin strongly convex, inferior concave, a small round process each

at superio- and inferiodistal corners. Ischium same as of per. 5, but longer, about 1/9 basis, fixing at 1/3 at distal of basis. Merus slightly shorter than of per. 5, about 1/5 basis, superior and inferior margins convex, with fine setae along superior margin, superiodistal corner producing downward along 4/5 of carpal superior margin into long process. Carpus same as of per. 5, but shorter, about 1/6 basis. fine setae along distal half of superior margin. Propodus same as of per. 5, but shorter, about 1/9 basis. Dactylus same as of per. 5, 5/8 propodus, long, curved, and spiniform.

Per. 7: Rudimentary. Basis expanded, about 7/12 as long as of per. 6, about 1/2 as broad as long, broadest at almost proximal half, superior margin concave, inferioproximal corner produced proximally half into big round process, inferior margin strongly convex, a round process each at superio- and inferiodistal corners. Ischium and merus small, longer than broad. Remaining articles absent.

Pleons: All 3 pleons longer than peraeon 7, posterior ones longer than anterior ones, each extending by a short posterior dorsal spine.

Epimeral plates: All plates with ventral margins convex, posterior margins sigmoid, posterior angles produced

poateriorly.

Urosomes: Urosome 1 about 1/2 as long as pleon 3, 5/9 as long as broad; coalesced urosomes 2 and 3 about 3/5 as long as broad, a round process each at lateral margins.

Uropods: Urcpod 1 longest, peduncle cylindrical, about 2/5 as broad as long, superior and inferior margins almost straight, pointed teeth at superio- and inferiodistal corners; inner ramus slightly shorter than peduncle, tip pointed, distal half of both margins finely serrated; outer ranus slightly shorter than inner ramus, tip pointed, superior and 1/5 of inferior margins finely serrated. Uropod 2 reaching to 1/2 telson; peduncle 7/10 as long as that of uropod 1, broader distally, twice as long as broad, superior margin straight, inferior convex, pointed teeth at superio- and inferiodistal corners; inner ramus about 1.3 times as long as peduncle, tip pointed, 1/2 of both margins finely serrated; outer ramus slightly longer than inner ramus, tip pointed, 1/2 of inferior margin finely serrated. Uropod 3 shortest, reaching farthest passed tip of telson; peduncle almost 1/3 as long as that of uropod 2, broader distally, superior margin straight, inferior convex, pointed teeth at superio- and inferiodistal corners; inner ramus about 2.3 times as long as

peduncle, tip pointed, 1/3 of inferior margin finely serrated; outer ramus slightly longer than inner ramus, tip pointed, 1/2 of inferior margin finely serrated.

Telson: Subtriangular, as long as urosome 1, with tip rounded.

Remarks: This species can be easily recognized by per. 1 which is simple; per. 2 which is chelate; per. 7 which is rudimentary, having only 4 articles; and tip of both rami of the three uropods which is round.

General distribution: World distribution accoeding to Walker (1909:51), Stephensen (1925:165), Barnard (1932 :290), Shoemaker (1945:246), and Reid (1955:24) include: Atlantic; north, south, from 47° to 17°N., Bermuda; Pacific; north, south, Indo-Pacific, East Indies, Australia, New Zealand; Indian; 10°27'S., 51°17'E.

Distribution in the areas studied: This is a South China Sea species which can be found during a certain period in the Gulf of Thailand. All the specimens found in the surface layer were only adult females.

During the northeast monsoon period (S-2, S-10), this species was found offshore in the north and in the middle portion of the deep South China Sea basin. Toward the end of the northeast monsoon period (S-3),

it was found at the middle of the outer portion of the Gulf of Thailand. Perhaps it was transported temporarily from the South China Sea into the Gulf. At the end of the northeast monsoon period (S-4), it was found distributed along the central coast of the Viet-Nam, and at a few scattered localities offshore in the northern part of the deep basin and slightly overlying the offshore part of the Sunda Shelf. During the southwest monsoon period (S-6), when the current flow was to the north, it was found only in the northern portion of the deep basin. During the change-over period from the southwest to the northeast monsoon winds (S-8), the distribution remained similar to the previous cruise. The common ranges of salinities and and temperatures from the surface to the depth of the surface layer in the South China Sea at the localities where it was found were from 31.50 to 35.21 %., and from 30.52° to 14.18°C..

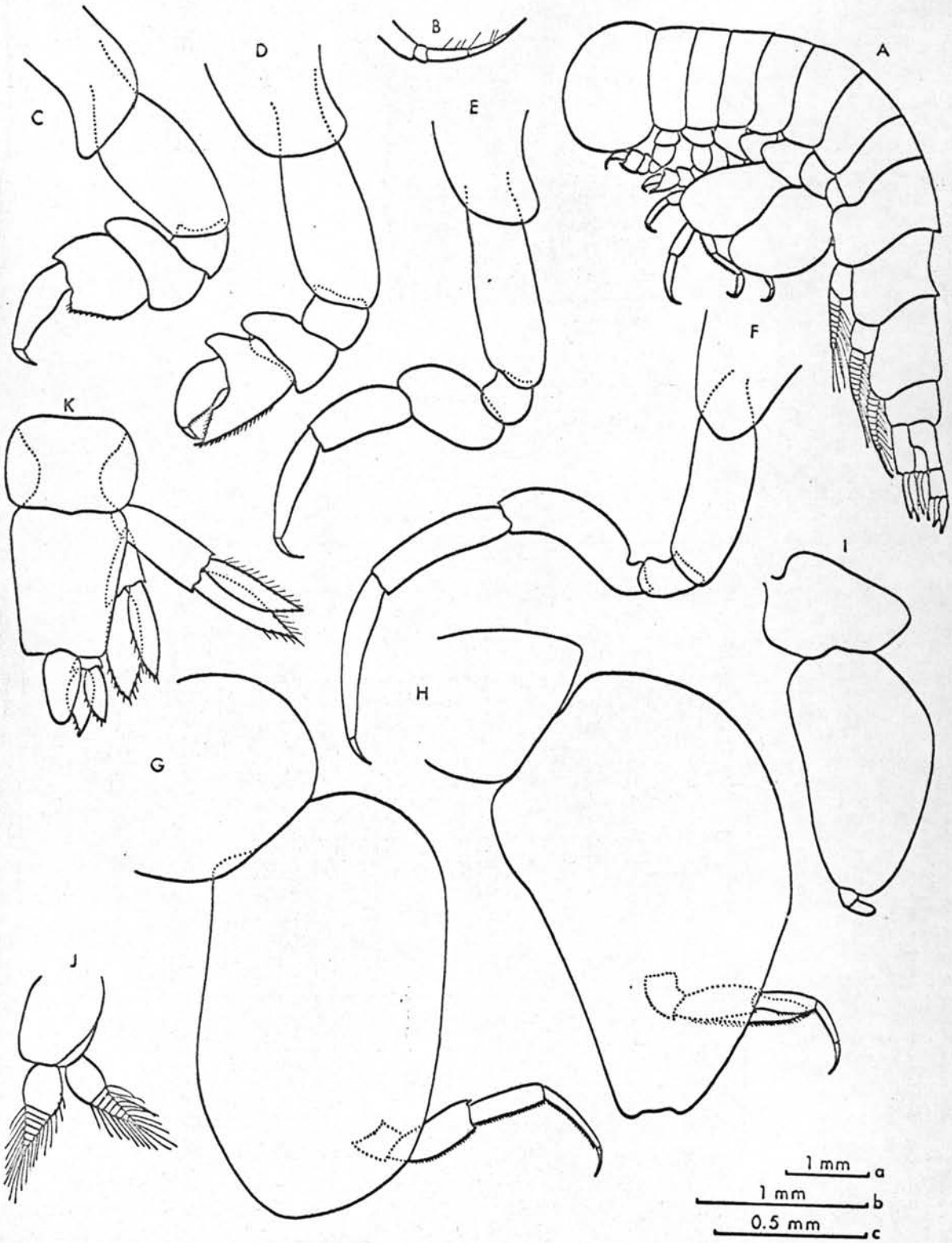
The average densities of this species were 4 individuals per 1000 cu.m. of water at the end of the northeast monsoon period (S-3) in the Gulf of Thailand, and at the minimum of 3-7 individuals per 1000 cu.m. of water which reached the peak of 8 individuals during the change-over period from the southwest to the northeast monsoon winds (S-8) in the South China Sea.

FIGURE 13

Parapronoe crustulum Claus

Female: A, Lateral view; B, antenna 1; C-I, peraeopods 1-7; I, pleopod; K, uropods and telson.

(A, scale a; J, K, scale b; B-I, scale c)


A
B
C
D
E
F
G
H
I
J
K
1 mm
a
1 mm
b
0.5 mm
c

FAMILY PLATYSCELIDAE Stebbing, 1910

HYPERINES ANORMALES

Milne-Edwards, H. 1830. Hist. des Crust., III:49.

TYPHIDAE

Dana, J. 1852a. American Journ. Sc. and Arts, ser. 2, 14 :1008.

Bate, C. 1855. Brit. Assoc. Rpt.

Dana, J. 1855. U.S. Explor. Exped., 13:1442.

Bate, C. 1857. Synopsis, a.c., Ann. Nat. Hist.

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):149(3), 150(4).

_____. 1887. Alfred Hölder, Wien, p. 30, 31. (key to genera).

Stebbing, T. 1888. Challenger Rpts., 29:1461.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):50.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:419.

PLATYSCELIDAE

Bate, C. 1862. Brit. Mus. Catal. Amphi., p. 326.

Claus, C. 1887. Alfred Hölder, Wien, p. 30.

Stebbing, T. 1910. Gen. Cat. S.A. Crust., p. 656.

_____. 1910. S. African Mus., Ann., 6(4):477.

Spandl, H. 1924a. Zool. Klasse, 99:34.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):212, 252.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):227.

(key to genera).

Pirlot, J. 1930. Siboga Exped., 33a:37. (key to species).

Barnard, K. 1932. Discovery Rpts., 5:297.

Dakin, W. and A. Colefax. 1940. Publ. Monograph, 1:128.

Shoemaker, C. 1945. Zoologica, 30:255.

Hurley, D. 1955. Roy. Soc. N.Z., Trans., 83:187.

Reid, D. 1955. Atlantide Rpts., 3:33.

Hurley, D. 1960. N.Z. Journ. Sc., 3(2):283.

EUTYPHIDAE

Bovallius, C. 1887a. Bih. t. k. Sv. Vet. Akad. Handl., 11(16):45.

Body very wide; head large, wider than body; eyes occupying the greater part of head; antenna 1 short and curved, 1st. flagellar article dilated, the others subterminal; antenna 2 slender, folded in a zig-zag in male, a little inwardly curved in female; mandibles with palp in male, without palp in female; maxilliped outer plates lobes externally convex, inner margin concave, ending in a frayed crown distally which reaches considerably past the fused inner plates; coxal plates distinct, basis of per. 5-7 transformed into opercular plates, gills on segments 2-6; last two segments of urosome and telson fused; uropods with both rami fused or articulated with peduncle.

Key to the Gulf of Thailand and the South China Sea genera of Platyscelidae.

1. Per. 1 and 2 both chelate----------2
   Per. 1 and 2 simple or minutely subchelate----------3
2. Ant. 2, male, last 2 articles many times smaller than the preceding one----------Platyscelus
3. Per. 3 and 4, propodus with small process----------
   ----------Tetrathyrus
   Per. 3 and 4, propodus smooth----------Paratyphis

FIGURE 14

Seasonal variations in mean density (No. per 1000 cu.m. of water) of members of the family Platyscelidae.

Platyscelus Bate, 1861

Typhis

Milne-Edwards, H. 1830. Ann. Sci. Nat., 20:395.

_____. 1840. Hist. des Crust., III:94.

Thyropus

Dana, J. 1852b. U.S. Explor. Exped., 14(2):1012.

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 326.

Platyscelus

Bate, C. 1861. Ann. Mag. Nat. Hist., ser. 3, 8:4.

_____. 1862. Brit. Mus. Catal. Amph., p. 329.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:419.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):213, 252.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):227-228. (key to species).

Pirlot, J. 1930. Siboga Exped., 33a:37.

Barnard, K. 1932. Discovery Rpts., 5:297.

Hurley, D. 1955. Roy. Soc. N.Z., Trans., 83:189.

Eutyphis

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):150(4), 151(5).

Bovallius, C. 1887a. Bih. t. k. Sv. Vet. Akad. Handl., 11(16):45.

Claus, C. 1887. Alfred Hölder, Wien, p. 31.

Stebbing, T. 1888. Challenger Rpts., 29:1462.

Type species: Platyscelus ovoides (Claus)

Definition: Carpus of per. 1 and 2 greatly prolonged under the propodus; basis of per. 5 and 6 forming a very long and wide opercular plate; per. 7 reduced, much shorter and narrower than the two preceding peraeopods.

Key to the Gulf of Thailand and the South China Sea species of Platyscelus.

1. Per. 1 and 2, dorsal margin of propodus serrulated all along its length, inferior carpal process has numerous lateral spines; carpus of per. 6 little smaller than merus----------P. ovoides

   Per. 1 and 2, dorsal margin of propodus smooth, inferior carpal process without lateral spines (rarely 1 or 2); carpus of per. 6 about 1/2 merus---------P. serratulus

Platyscelus ovoides (Claus, 1879)

Figs. 14, 15, 16(A-E).

Typhis ferus

Milne-Edwards, H. 1830. Ann. Sci. Nat., 20:395, pl. 11, fig. 8.

Thyropus ferus

Bate, C. 1862. Brit. Mus. Catal. Amph., p. 328, pl. 52, fig. 8.

Eutyphis globosus

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):155(9), 159 (13).

_____. 1887. Alfred Hölder, Wien, p. 38, pl. 3, figs. 4, 15, 19.

Eutyphis ovoides

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):155(9).

_____. 1887. Alfred Hölder, Wien, p. 35, pl. 1, pl. 2, figs. 1-2; pl. 3, figs. 1-3.

Walker, A. 1909. Linn. Soc. London, Trans. II, Zoology, 13(1):50, 54.

Platyscelus intermedius

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Platyscelus ovoides

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Platyscelus globosus

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):218-219, 252.

Ant. 1: Male: Peduncle of 2 articles; 1st. article broader than long; 2nd. article short, 1/6 as long as 1st. Flagellum of 4 articles; 1st. article long, longer than peduncle, inferior margin convex, superior concave, shorter than inferior, medial surface thickly covered with tract of long setae, 2nd. article cylindrical, 1/7 as long as 1st., few sensory setae along superior margin; 3rd. article slightly longer than 2nd., 2 sensory setae on median of superior margin; 4th. article slightly

longer than 3rd., tapering.

Female: Peduncle of 2 articles; 1st. article almost cylindrical, twice as long as broad; 2nd. article long, almost cylindrical, 1/3 as long as 1st. Flagellum of 3 articles; 1st. article slightly longer than 2nd. article of peduncle, but narrower, 1/2 as broad as long, 3 sensory setae along distal half of superior margin; 2nd. article almost 1/6 as long as 1st.; 3rd. article longer than 2nd., tapering.

Ant. 2: Male: Single peduncular article, slightly expanded at proximal portion. Flagellum of 4 articles; 1st. article almost twice as long as peduncle; 2nd. article slightly shorter than 1st., expanded at proximal portion; 3rd. article about 1/5 as long as 2nd.; 4th. article longer than 3rd., tapering; each article folded backward against preceding article.

Female: Absent.

Peraeons: Peraeon 1 shortest and as long as 2; peraeon 3 longer than 1 or 2 and as long as 4; peraeon 5 longest and as long as 6 and 7.

Per. 1: Short, complex-subchelate. Basis about 3 times as long as broad, broadest at distal portion, superior and inferior margins slightly convex. Ischium short, almost 1/4 basis, longer than broad, superior margin shorter

than inferior, with fine seta at the middle of inferior margin. Merus slightly longer than ischium, broader distally, superior margin slightly shorter than inferior, a small round process each at superio- and inferiodistal corners, with fine setae along distal half of superior margin and along 2/3 of inferior margin. Carpus almost 1/4 basis, superior margin convex, round process at superiodistal corner, with fine setae on the process, inferior margin expanded, pointed process at inferiodistal corner, pointed tipped-teeth along posterior and 2/3 of inferior margins, with fine setae at the middle of inferior margin. Propodus shorter than carpus, superior and inferior margins convex, with pointed tipped-teeth along inferior margin. Dactylus about 1/3 propodus, short, curved, and spiniform.

Per. 2: Longer than per. 1, chelate. Basis longer than of per. 1, about 4 times as long as broad, broadest at middle portion, superior margin slightly concave, inferior strongly convex. Ischium same as of per. 1, but broader and longer, about 1/5 basis. Merus same as of per. 1, but broader and longer. Carpus 1/4 basis, superior margin same as that of per. 1, inferior expanded, inferiodistal corner produced into long pointed process, pointed tipped-teeth along posterior and 3/4 of inferior margins, with fine setae at the middle of inferior margin. Propodus and dactylus same as those

of per. 1, but slightly longer.

Per. 3: Simple, longer than per. 2. Basis long, almost cylindrical, 4 times as long as broad, superior margin slightly concave, inferior strongly convex. Ischium short, almost 1/5 basis, superior margin shorter than inferior. Merus about 3/4 basis, superior margin strongly convex, inferior slightly concave. Carpus about 5/8 basis, superior and inferior margins straight. Propodus more than 1/2 as long as carpus, superior margin straight, inferior slightly concave. Dactylus almost 1/6 propodus, short, curved, and spiniform.

Per. 4: Similar to per. 3, but slightly longer. Basis slightly narrower than of per. 3, about 4 times as long as broad, superior margin straight, inferior strongly convex. Ischium same as of per. 3, but slightly longer. Merus same as of per. 3, but longer. Carpus as long as of per. 3, superior margin convex, inferior concave. Propodus as long as of per. 3, superior margin slightly convex, inferior slightly concave. Dactylus same as of per. 3.

Per. 5: Longest. Basis expanded, forming a very long and wide opercular plate, slightly more than twice as long as broad, broadest at middle portion, superior and inferior margins convex, round process at superiodistal corner. Ischium short, fixing at distal of basis, slightly longer than broad, superior and inferior margins

convex. Merus about 1/4 basis, superior and inferior margins convex, small pointed process at inferiodistal corner. Carpus almost 1/5 basis, shorter than merus, superior and inferior margins slightly convex. Propodus nearly as long as merus, about 1/4 basis, narrower than carpus, superior and inferior margins slightly convex. Dactylus 1/6 propodus, short, curved, and spiniform.

Per. 6: Similar to per. 5, but slightly shorter. Basis longer, broader than of per. 5, about 3/5 as broad as long, broadest at distal portion, inferioproximal corner strongly expanded, round process at superiodistal corner. Ischium same as of per. 5, but shorter, broader than long. Merus shorter than of per. 5, about 1/6 basis, superior and inferior margins convex, with fine setae along superior margin. Carpus much shorter than of per. 5, much shorter than merus, superior margin concave, inferior convex, with fine setae along superior margin. Propodus much shorter than of per. 5, slightly shorter than carpus, superior margin slightly concave, inferior slightly convex. Dactylus same as of per. 5, but shorter.

Per. 7: Rudimentary. Basis about 1/2 as long as of per. 6, about 1/3 as broad as long, superior margin strongly concave, inferior strongly convex, round process at superiodistal corner. Ischium and merus small, almost

twice as long as broad. Carpus small, about twice as long as broad, tapering. Remaining articles absent.

Pleons: Pleon 1 longest, longer than peraeon 7; pleon 2 shortest; pleon 3 slightly longer than pleon 2.

Epimeral plates: All plates with ventral margins convex, posterior margins concave, posterior angles rounded.

Urosomes: Urosome 1 about 1/2 as long as pleon 3, lateral margins expanded into rounded processes; coalesced urosomes 2 and 3 almost twice as broad as long, pointed teeth at lateral margins, together with telson almost 3 times as long as urosome 1.

Uropods: Uropod 1 longest; peduncle about 1/2 as broad as long, superior and inferior margins slightly convex, pointed teeth at superio- and inferiodistal corners; inner ramus longer than peduncle, tip pointed; outer ramus almost as long as peduncle, superior margin finely serrated, tip pointed. Uropod 2 reaching passed coalesced urosomes 2 and 3; peduncle 1/2 as long as that of uropod 1, broader distally, about 3/4 as broad as long, superior and inferior margins convex, pointed teeth at superio- and inferiodistal corners; inner ramus 3 times as long as peduncle, tip pointed; outer ramus about 3/4 as long as inner ramus, tip pointed. Uropod 3 shortest, reaching farthest passed tip of telson;

peduncle slightly shorter than that of uropod 2, superior margin slightly concave, inferior slightly convex, pointed teeth at superio- and inferiodistal corners; inner ramus almost twice as long as peduncle, 2/3 of superior and distal half of inferior margins finely serrated, tip pointed; outer ramus about 5/7 as long as inner ramus, distal half of inferior margin finely serrated, tip pointed.

Telson: Subtriangular; slightly shorter than coalesced urosomes 2 and 3, with tip rounded.

Remarks: This species can be easily recognized by per. 1 which is complex-subchelate; per. 2 which is chelate; dorsal margin of propodus of both per. 1 and 2 serrulated all along its length; inferior carpal process of both per. 1 and 2 which has numerous lateral spines; and also carpus of per. 6 which is little smaller than merus.

General distribution: World distribution according to Stephensen (1925:215), Barnard (1932:298), Shoemaker (1945:256), Hurley (1955:192), and Reid (1955:37) include: Atlantic; north, south, from $51\frac{1}{2}^{\circ}$N., to 31°N. and 35°S., Bermuda; Mediterranean; Pacific; north, south, $35^{\circ}24'$ N., $166^{\circ}35'$E., Indo-Pacific, East coast of Otago, New Zealand; Indian; $10^{\circ}27'$S., $51^{\circ}17'$E., $27^{\circ}40'$S., $58^{\circ}30'$E..

Distribution in the areas studied: This is a neritic species which was found in the Gulf of Thailand and in the South China Sea.

In the Gulf of Thailand, during the transition period between the southwest and the northeast monsoons (S-1), this species was found at few scattered localities in the upwelling region at the middle of the east coast, slightly offshore at the central portion of the west coast and at the middle of the Gulf's opening. Toward the end of the northeast monsoon period (S-3), it was widely distributed in the Gulf except along the west coast and the eastern half of the Gulf's opening. The pattern of distribution followed the clockwise gyre in the central Gulf, with highest concentration at the outer half of the west coast where upwelling occurred, and at the northwest corner of the inner Gulf. During the intermonsoon period (S-5), it was still found with maximum concentration at the northwest corner of the inner Gulf and spread toward the eastern side. It was also found extended from the middle of the east coast to the center of the Gulf followed the clockwise gyre, at a location in the outer Gulf toward the west coast, and at the western part of the Gulf's opening. During the southwest monsoon period (S-7), the upwelling at the northwest corner of the inner of the Gulf was still exist, hence the high concentration of this species was

still in this area, and spread toward the eastern side of the inner Gulf following the outflow of the gyre to the widely spread area in the central portion of the Gulf, then followed the outflow of the anti-clockwise gyre of the outer Gulf. At the beginning of the northeast monsoon period (S-9), the high concentration were at the northern portion and at the middle of the east coast of the inner Gulf where upwelling occurred, and spread through the central portion of the Gulf.

In the South China Sea, during the northeast monsoon period (S-2, S-10), it was widely distributed offshore, except in the central portion where it was found up to the coast, and over the offshore portion of the Sunda Shelf. At the end of the northeast monsoon period (S-4), when the currents were starting to flow northward, it was found along the central coast and widely spread in the deep basin both in the northern and southern portions, and slightly overlying the offshore part of the Sunda Shelf. During the southwest monsoon period (S-6), when the flow was to the north, it was found widely distributed offshore in the central and northern portions of the studied areas and at a location in the southern part over the shelf. During the change-over period from the southwest to the northeast monsoon winds (S-8), it was found along the coast in the northern and central portions, widely spread

offshore in the northern area followed the eastern direction of the current in that region, and spread over the Sunda Shelf. It was also found at few scattered localities in the central and the most southern portions of the studied areas over the Sunda Shelf. The common ranges of salinities and temperatures from the surface to the depth of the surface layer in the South China Sea at the localities where it was found were from 29.47 to 35.75 ‰., and from 31.70° to 6.82° C..

In the Gulf of Thailand this species was found with two peaks within the year studied. Toward the end of the northeast monsoon period (S-3), the average densities reached the peak of 35 individuals per 1000 cu.m. of water, then declined during the two following periods (S-5, S-7), and increased again to the second peak of 66 individuals per 1000 cu.m. of water at the beginning of the northeast monsoon period (S-9).

In the South China Sea the average densities were relatively low as compared to those in the Gulf. During the periods prior and up to the middle of the northeast monsoon and during the southwest monsoon period (S-8, S-2, S-10, S-6), the average densities were at the minimum of 6-9 individuals per 1000 cu.m. of water, and reached the peak of 11 individuals at the end of the northeast monsoon period (S-4).

FIGURE 15

Platyscelus ovoides (Claus)

Male: A, Lateral view; B, antenna 1; C, antenna 2; D-J, peraeopods 1-7; K, pleopod; L, uropods and telson.

Female: M, antenna 1.

(A, scale a; K, scale b; B-J, L, scale c)

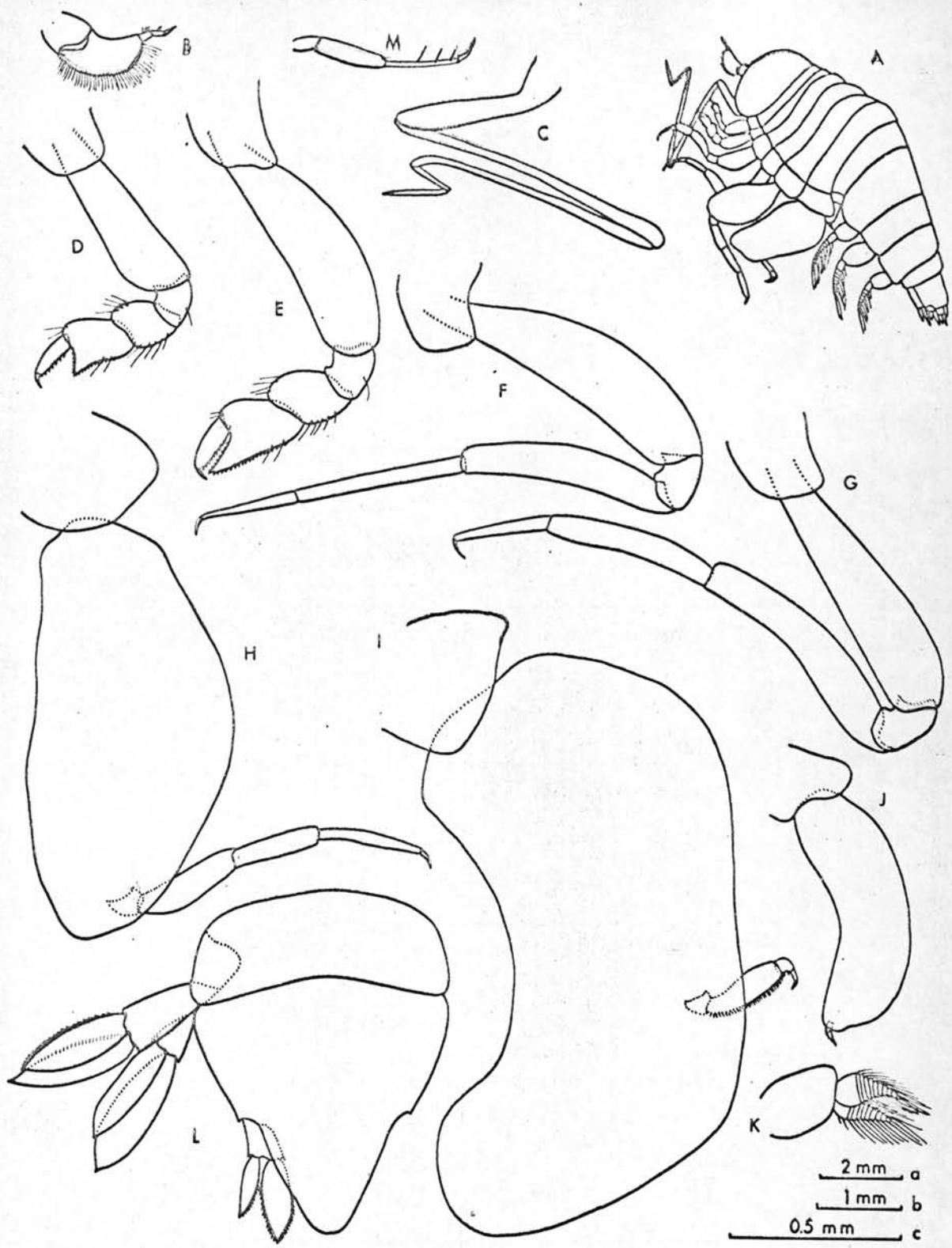
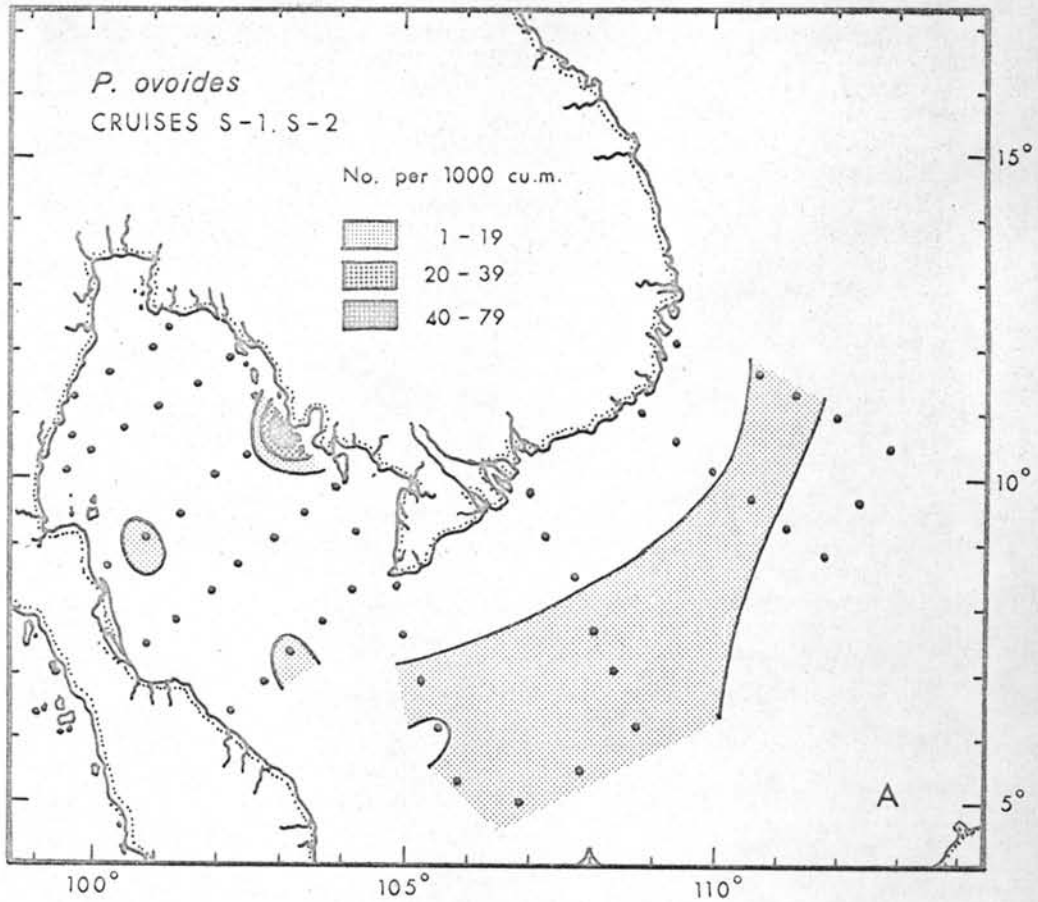
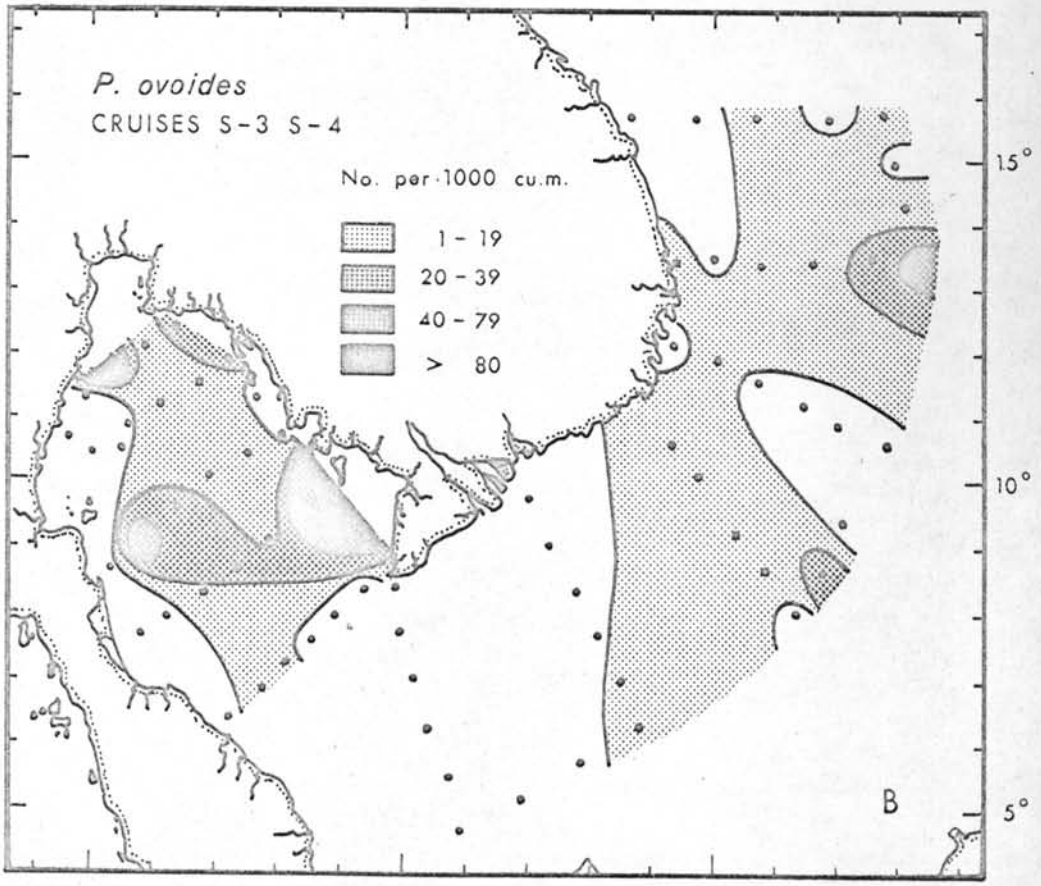
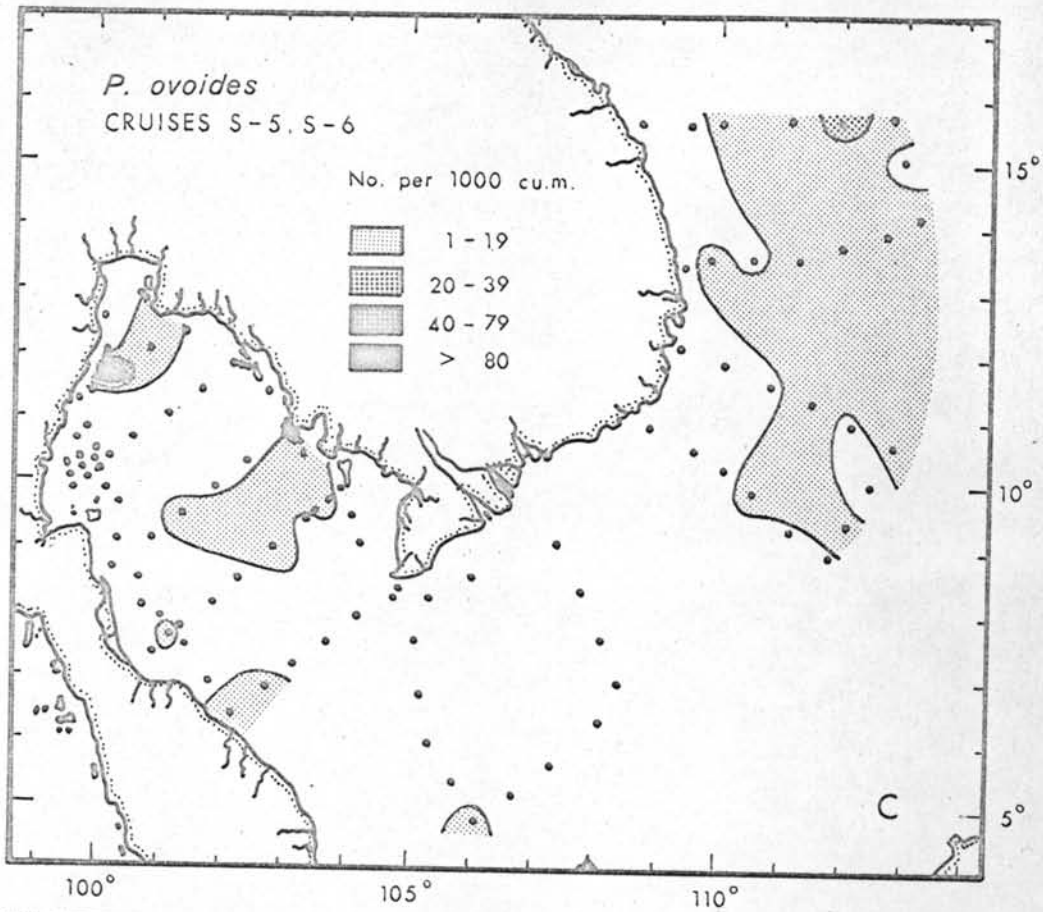

A
B
C
D
E
F
G
H
I
J
K
L
M
2 mm a
1 mm b
0.5 mm c

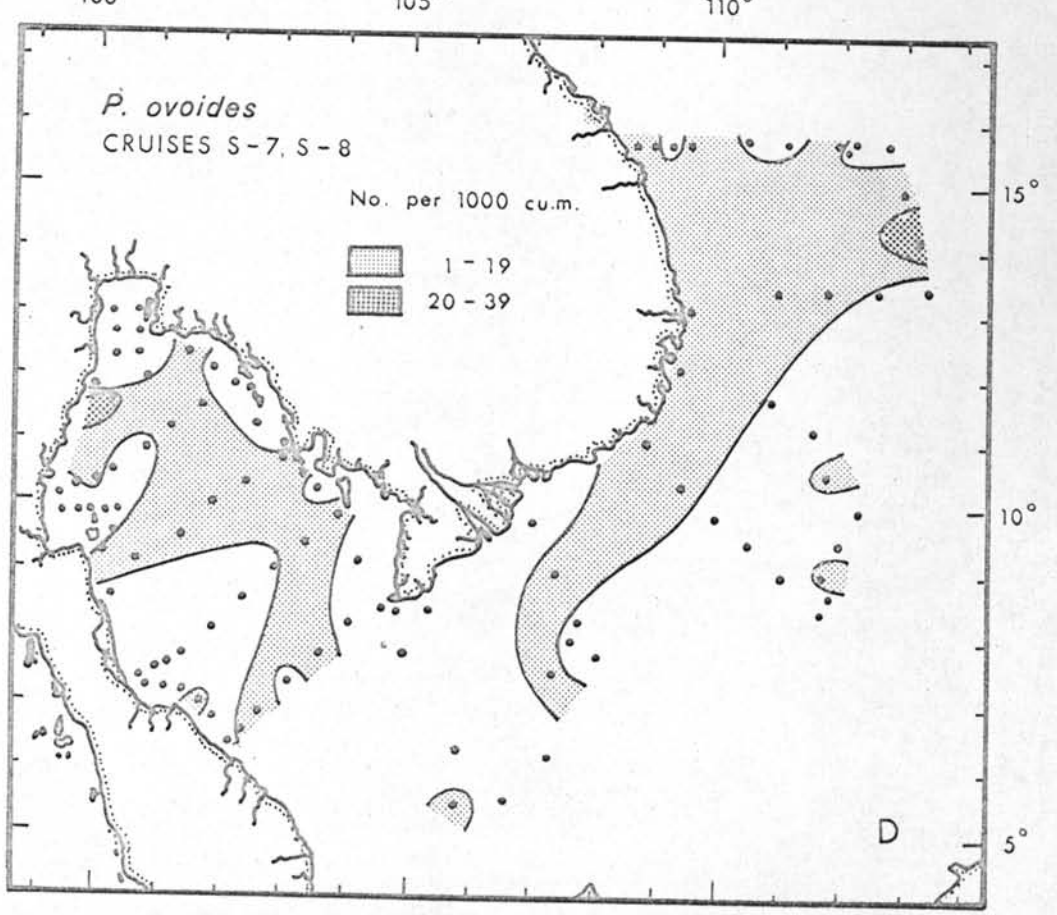
FIGURE 16

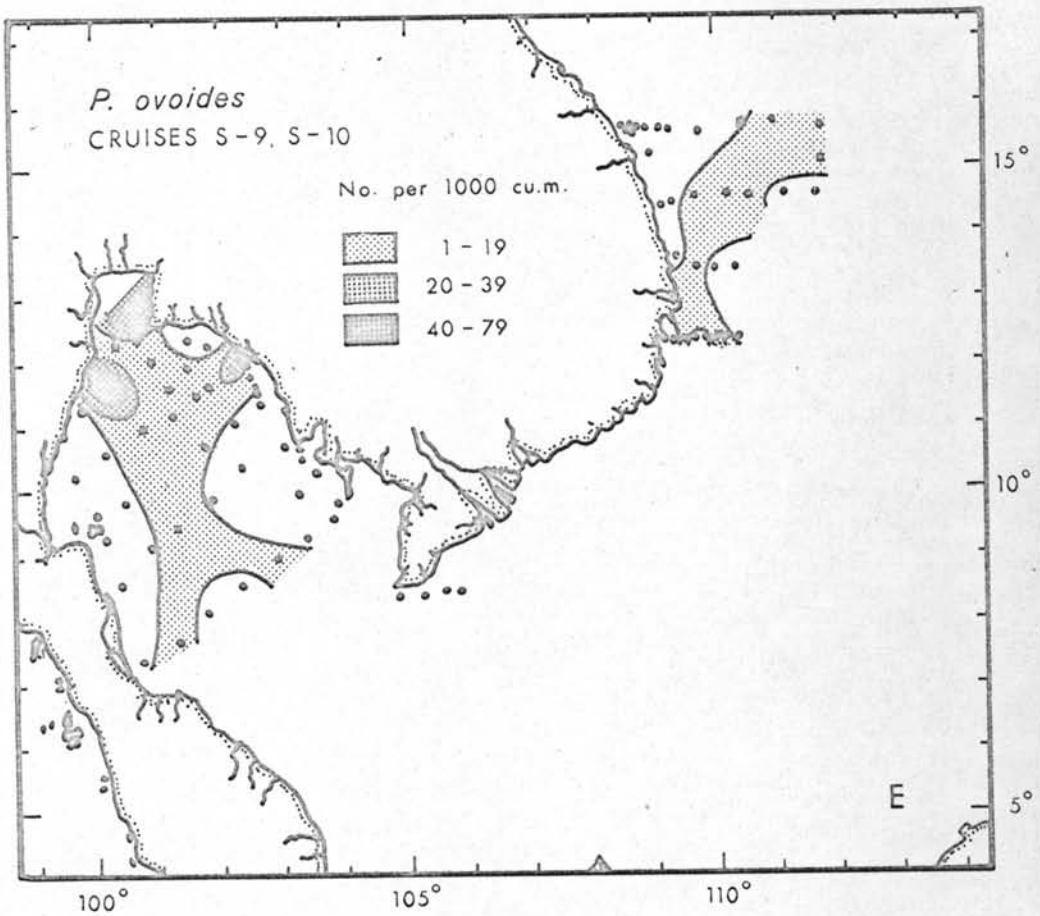
Maps showing the seasonal distributional patterns of *P. ovoides*


P. ovoides
CRUISES S-1, S-2
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
15°
10°
5°
A
100°
105°
110°


P. ovoides
CRUISES S-3 S-4
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
> 80
15°
10°
5°
B


P. ovoides
CRUISES S-5, S-6
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
> 80
15°
10°
5°
C
100°
105°
110°


P. ovoides
CRUISES S-7, S-8
No. per 1000 cu.m.
1 - 19
20 - 39
15°
10°
5°
D


P. ovoides
CRUISES S-9, S-10
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
15°
10°
5°
E
100°
105°
110°

Platyscelus serratulus Stebbing, 1888

Figs. 14, 17, 18(A-E).

Eutyphis serratus

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Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):157(11).

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Chevreux, E. and L. Fage. 1925. Fauna de France, 9:422, fig. 414.

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Reid, D. 1955. Atlantide Rpts., 3:37.

Hurley, D. 1956. Allan Hancock Found., Occas. Papers, 18 :21.

_____. 1960. N.Z. Journ. Sc., 3(2):283.

Evans, F. 1961. Linn. Soc. London, Proc., II:203.

Platyscelus dubius

Shoemaker, C. 1925. Amer. Mus. Nat. Hist., Bull., 52:51, figs. 20, 21.

Ant. 1: Male: Single peduncular article, almost as broad as long. Flagellum of 4 articles; 1st. article long, longer than peduncle, inferior margin convex, superior concave, shorter than inferior, medial surface thickly covered with tract of long setae; 2nd. article cylindrical, about 1/7 as long as 1st., 1 sensory seta at distal of superior margin; 3rd. article almost as long as 2nd., few sensory setae along distal of superior margin; 4th. article twice as long as 3rd., tapering. Female: Single peduncular article, 5/8 as broad as long. Flagellum of 5 articles; 1st. article short, much shorter than peduncle, almost twice as broad as long; 2nd. article slightly shorter than 1st., broader than long; 3rd. article almost twice as long as 2nd., many sensory setae along superior margin; 4th. article as long as 3rd., 1 sensory seta at distal of superior margin; 5th. article slightly longer than 4th., tapering.

Ant. 2: Male: Single peduncular article, slightly expanded at distal portion. Flagellum of 4 articles; 1st. article about 3.5 times as long as peduncle; 2nd. article slightly longer than 1st.; 3rd. article about 3/4 as long as 2nd.; 4th. article much shorter than 3rd., tapering. Each article folded backward against pre-

ceding article.

Female: Single peduncular article, slightly longer than broad. Flagellum of 5 articles; 1st. article long, longer than peduncle; 2nd. article shorter than 1st.; 3rd. article slightly shorter than 2nd., 1 sensory seta at distal of superior margin; 4th. article slightly shorter than 3rd.; 5th. article 1/4 as long as 4th., tapering.

Peraeons: Peraeon 1 shortest; peraeon 2 longer than 1 and as long as 4; peraeon 3 longer than 1, but shorter than 2 and 4; peraeon 5 slightly shorter than 2 and 4, but as long as 6; peraeon 7 longest.

Per. 1: Short, complex-subchelate. Basis almost twice as long as broad, broadest at middle portion, superior and inferior margins strongly convex. Ischium short, almost 1/4 basis, longer than broad, superior margin shorter than inferior. Merus longer than ischium, broader distally, superior margin slightly shorter than inferior, a small round process each at superio- and inferiodistal corners. Carpus about 1/2 basis, superior margin convex, round process at superiodistal corner, inferior margin slightly concave, pointed process at inferiodistal corner, pointed teeth along 1/3 of posterior and 1/5 of inferior margins. Propodus

slightly longer than carpus, superior margin convex, inferior concave. Dactylus about 1/4 propodus, short, curved, and spiniform.

Per. 2: Longer than per. 1, complex-subchelate. Basis longer than of per. 1, about 4 times as long as broad, broadest at distal portion, superior margin strongly concave, inferior strongly convex. Ischium same as of per. 1, but broader and longer, about 1/5 basis. Merus same as of per. 1, but broader and longer. Carpus about 1/4 basis, superior margin slightly convex, pointed process at superiodistal corner, inferior margin expanded, inferiodistal corner produced into long pointed process. Propodus and dactylus same as those of per. 1, but longer.

Per. 3: Simple, longer than per. 2. Basis long, about 3 times as long as broad, broadest at distal portion, superior margin slightly concave, inferior strongly convex. Ischium short, about 1/5 basis, superior margin shorter than inferior. Merus about 1/2 basis, superior margin strongly convex, inferior slightly concave, a round process each at superio- and inferiodistal corners. Carpus slightly shorter than merus, about 1/2 basis, superior margin slightly convex, inferior slightly concave. Propodus longer than carpus, superior margin slightly convex, inferior slightly concave. Dactylus about 1/3 propodus, short, curved,

and spiniform.

Per. 4: Similar to per. 3, but longer. Basis same as of per. 3, but broader, almost twice as long as broad, broadest at distal portion. Ischium same as of per. 3, but broader and longer. Merus much longer than of per. 3, superior margin strongly convex, inferior almost straight, pointed process each at superio- and inferiodistal corners. Carpus same as of per. 3, but longer. Propodus same as of per. 3, but slightly longer. Dactylus same as of per. 3.

Per. 5: Longest. Basis expanded, forming a very long and wide opercular plate, more than twice as long as broad, broadest at middle portion, superior and inferior margins convex, round process at superiodistal corner. Ischium short, fixing at distal of basis, longer than broad, superior and inferior margins slightly convex. Merus about 1/4 basis, superior margin slightly concave, inferior convex, small pointed process at inferiodistal corner. Carpus almost 1/5 basis, shorter than merus, superior and inferior margins convex. Propodus slightly longer than merus, almost 1/3 basis, narrower than carpus, superior margin slightly concave, inferior slightly convex. Dactylus 1/4 propodus, short, curved, and spiniform.

Per. 6: Similar to per. 5, but slightly shorter. Basis longer, broader than of per. 5, about 1/3 as broad as

long, broadest at middle portion, inferioproximal corner strongly expanded, round process at superiodistal corner. Ischium short, broader than long, superior and inferior margins convex, pointed process at superiodistal corner, round process at inferiodistal corner. Merus shorter than of per. 5, about 1/5 basis, superior and inferior margins convex, with fine setae along superior margin, pointed process each at superio- and inferiodistal corners. Carpus much shorter than of per. 5, much shorter than merus, superior and inferior margins convex, with fine setae along superior margin. Propodus much shorter than of per. 5, much shorter than carpus, superior margin slightly concave, inferior slightly convex. Dactylus same as of per. 5, but shorter.

Per. 7: Rudimentary. Basis about 2/5 as long as of per. 6, about 1/3 as broad as long, superior margin strongly concave, inferior strongly convex, round process at superiodistal corner. Remaining articles absent.

Pleons: Pleon 1 longer than peraeon 7 and as long as 2; pleon 3 longer than 1 and 2.

Epimeral plates: All plates with ventral margins convex, posterior margins concave, posterior angles pointed.

Urosomes: Urosome 1 about 1/2 as long as pleon 3, lateral margins expanded into rounded processes; coalesced

urosomes 2 and 3 about 7/10 as long as broad, pointed teeth at lateral margins, together with telson slightly more than twice as long as urosome 1.

Uropods: Uropod 1 longest; peduncle 1/3 as broad as long, superior margin convex, inferior slightly concave, pointed teeth at superio- and inferiodistal corners, with fine setae along superior margin and superiodistal corner; inner ramus shorter than peduncle, tip pointed, outer ramus slightly longer than inner ramus, superior margin finely serrated, tip pointed. Uropod 2 reaching passed coalesced urosomes 2 and 3; peduncle almost 1/2 as long as that of uropod 1, broader distally, about 2/3 as broad as long, superior and inferior margins convex, pointed teeth at superio- and inferiodistal corners; inner ramus slightly more than twice as long as peduncle, tip pointed; outer ramus slightly shorter than inner ramus, tip pointed. Uropod 3 shortest, reaching farthest passed tip of telson; peduncle 1/3 as long as that of uropod 2, superior and inferior margins slightly convex, pointed teeth at superio- and inferiodistal corners; inner ramus about 4 times as long as peduncle, tip pointed; outer ramus about 5/8 as long as inner ramus, tip pointed.

Telson: Subtriangular; shorter than coalesced urosomes 2 and 3, with tip rounded.

Remarks: This species can be distinguished from a similar species, Platyscelus ovoides, by the inferior carpal process of both per. 1 and 2, which has no spines in this species, while having numerous lateral spines in P. ovoides.

General distribution: World distribution according to Stephensen (1925:218), Pirlot (1930:37), Barnard (1932 :298), Shoemaker (1945:259), and Evans (1961:203) include: Atlantic; north, south, from 42°N. - 37°S., Bermuda; Mediterranean; Red Sea; Pacific; north, south, Indo-Pacific; Indian; 30°9'N., 84°44'E., Bay of Bengal.

Distribution in the areas studied: This is a neritic species which was commonly found in the South China Sea and also during some seasons in the Gulf of Thailand.

In the Gulf of Thailand, this species was not found until toward the end of the northeast monsoon period (S-3). It was found in the northern portion of the Gulf with maximum density at the northeastern corner where upwelling was detected, and also at the center of the outer Gulf. During the intermonsoon period (S-5), it was found extended from the middle of the east coast toward the center of the Gulf following the clockwise gyre of the 30 m. layer at the middle portion of outer Gulf's west coast, and from the center

toward the opening of the outer Gulf. During the southwest monsoon period (S-7), it was found at scattered localities at the center of the inner Gulf, at the middle of the west coast, and also at both corners of the Gulf's opening.

In the South China Sea, during the northeast monsoon period (S-2, S-10), it was found at scattered localities along the coast in the northern portion of the studied area, also found as a narrow strip followed the southerly flow in the middle portion and widely spread over the offshore portion of the Sunda Shelf. At the end of the northeast monsoon period (S-4), it was found at Nhatrang's coast, at the offshore portion of the southern limit of the deep basin and spread over the offshore portion of the Shelf where the current flow was still southerly. During the southwest monsoon period (S-6), it was found distributed along the central coast and spread in the northeastern direction followed the direction of the flow. It was also found widely spread over the central part of the Sunda Shelf and extended as a narrow strip slightly offshore to the central coast. During the change-over period from the southwest to the northeast monsoon winds (S-8), it was found widely spread in the studied areas except at the middle part of the northern portion where the currents began to flow southerly, and the coastal

area over the Shelf. The common ranges of salinities and temperatures from the surface to the depth of the surface layer in the South China Sea at the localities where it was found were from 29.93 to 35.32 ‰., and from 31.70° to 6.82°C..

The average densities of this species both in the Gulf of Thailand and in the South China Sea were relatively low, up to 3 and 7 individuals per 1000 cu.m. of water, respectively. The higher densities in the Gulf of Thailand were toward the end of the northeast monsoon period (S-3) and during the intermonsoon period (S-5), and in the South China Sea were during the change-over period from the southwest to the northeast monsoon winds (S-8). The maximum densities in the Gulf and the South China Sea Sea were not at the same period.

FIGURE 17

Platyscelus serratulus Stebbing

Male: A, Lateral view; B, antenna 1; C, antenna 2; D-J, peraeopods 1-7; K, pleopod; L, uropods and telson.

Female: M, antenna 1; N, antenna 2.

(A, scale a; K, L, scale b; B-J, M, N, scale c)

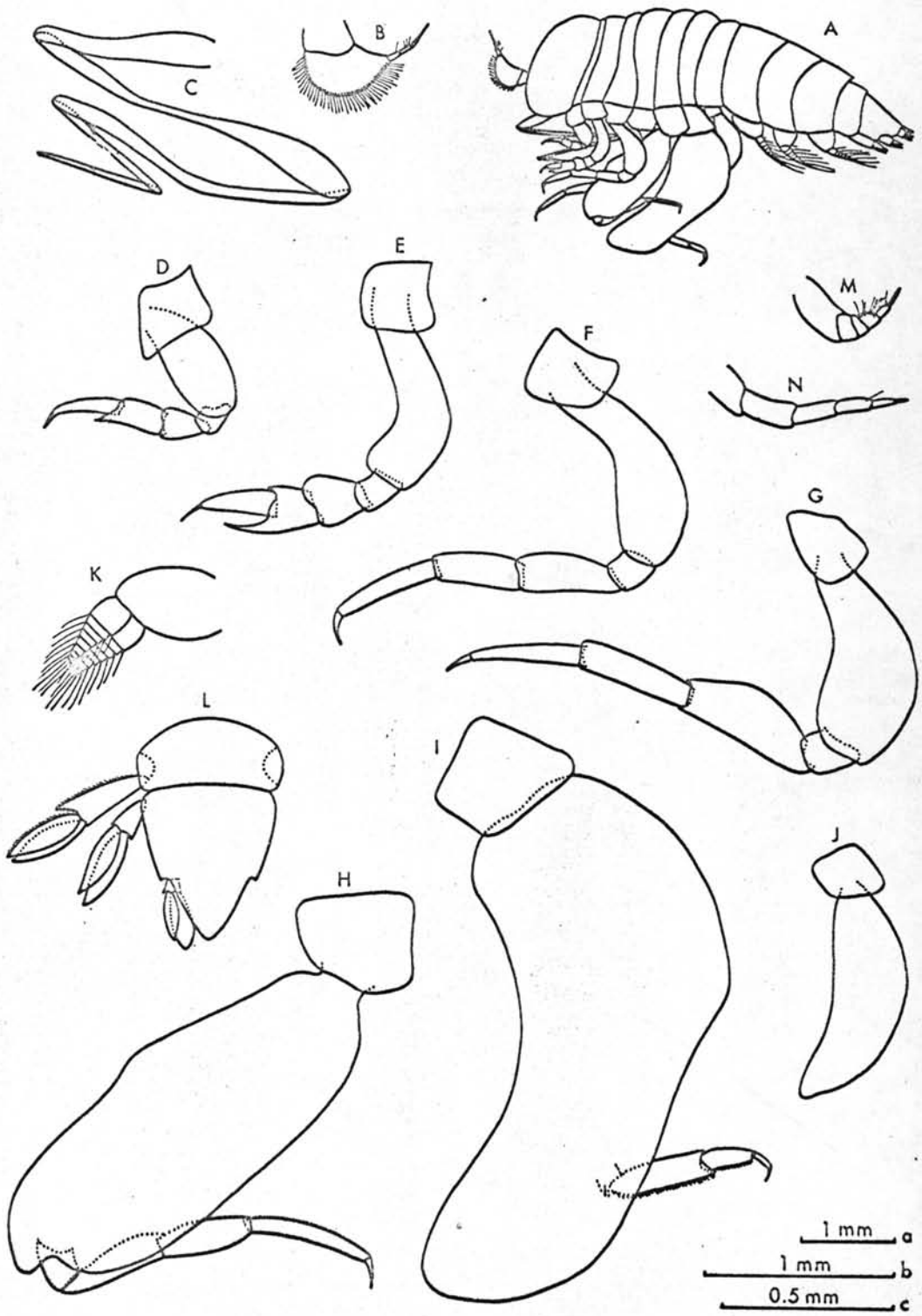
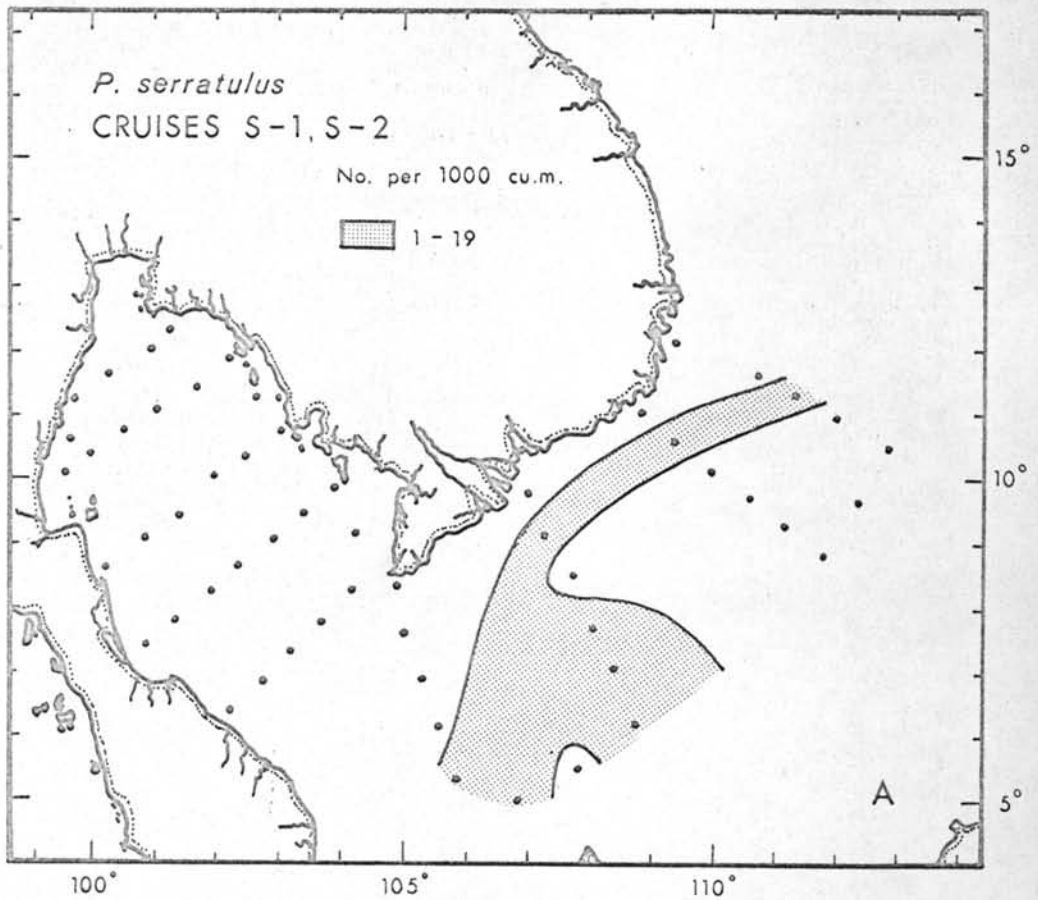
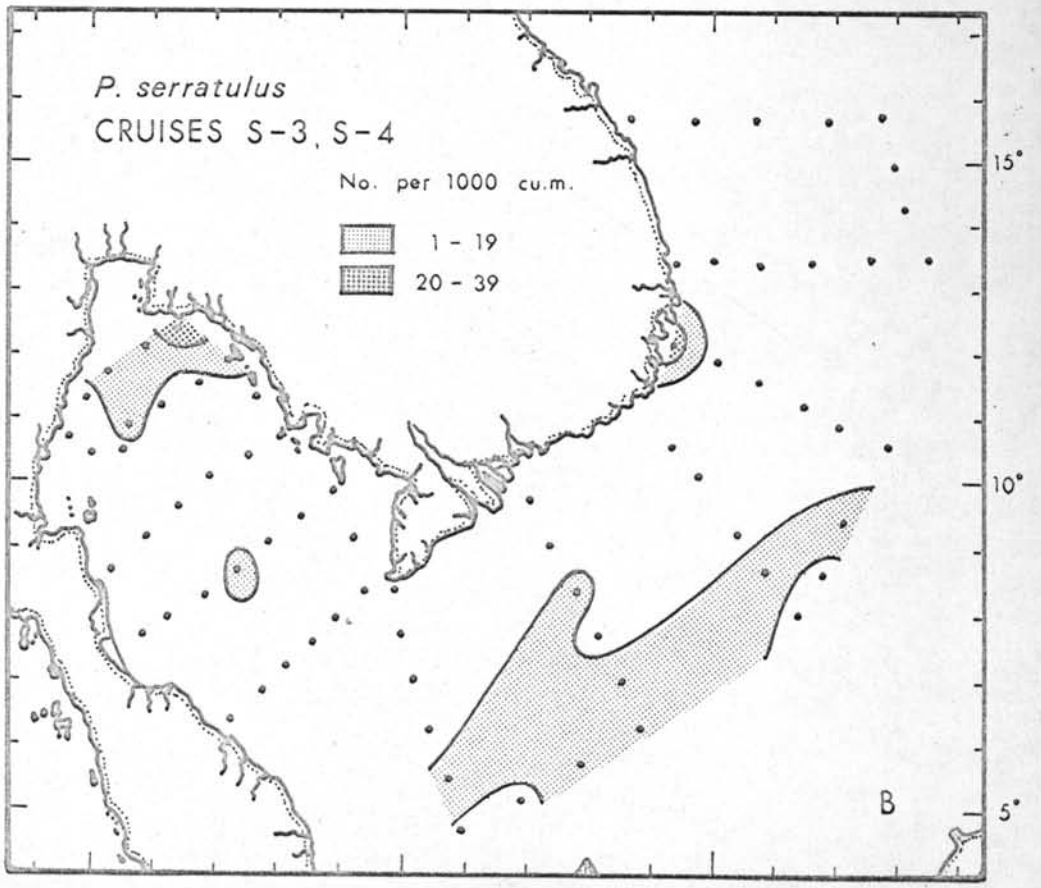
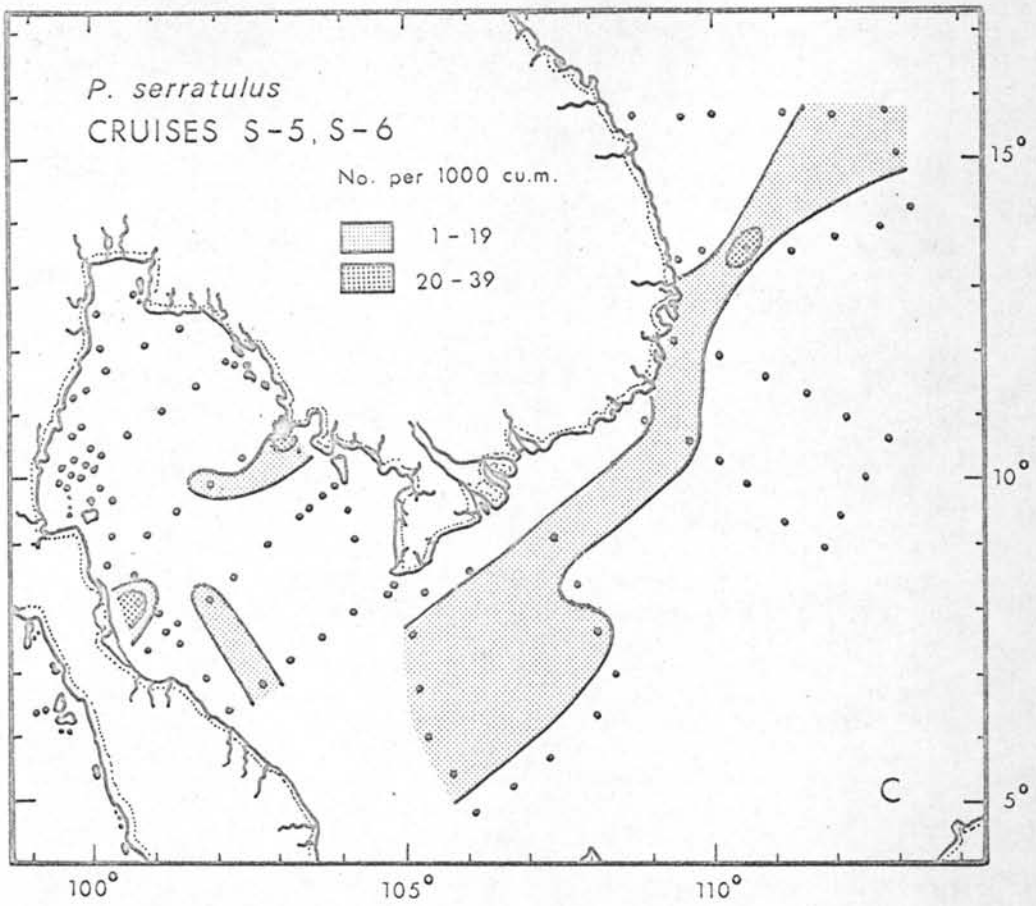

A
B
C
D
E
F
G
H
I
J
K
L
M
N
1 mm a
1 mm b
0.5 mm c

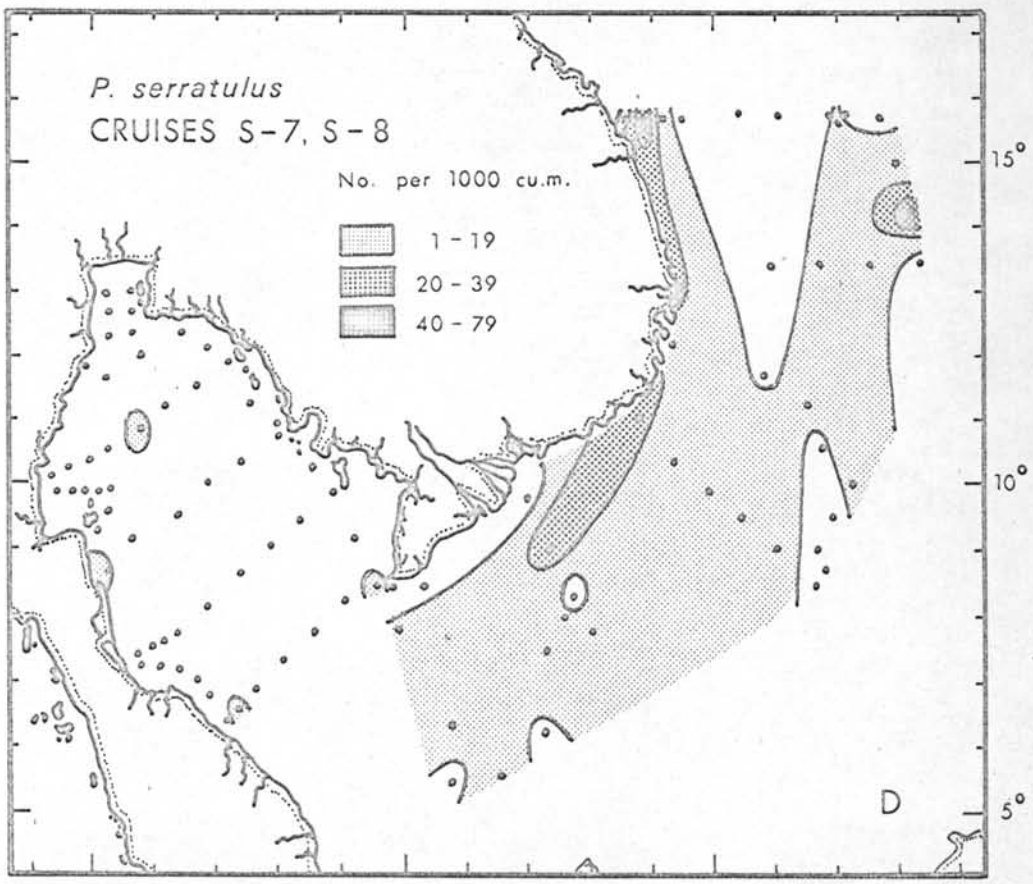
FIGURE 18

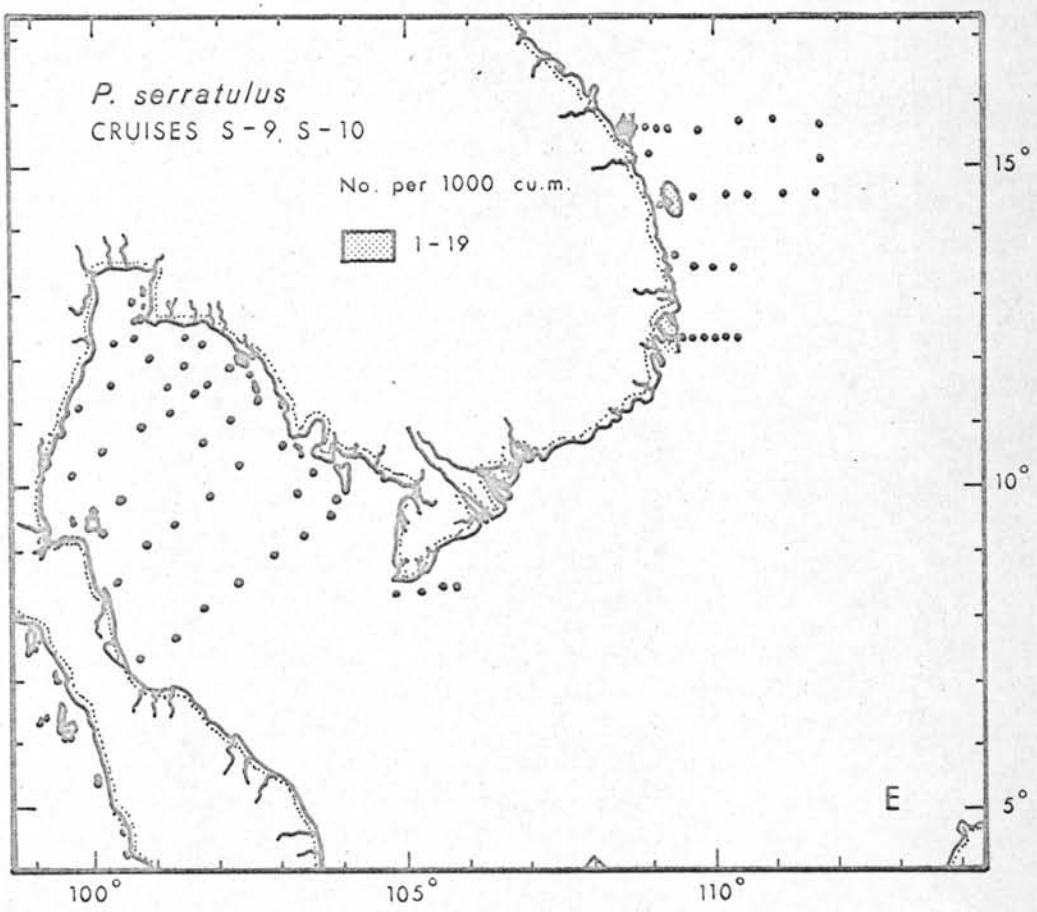
Maps showing the seasonal distributional patterns of *P. serratulus*


P. serratulus
CRUISES S-1, S-2
No. per 1000 cu.m.
1 - 19
15°
10°
5°
A
100°
105°
110°


P. serratulus
CRUISES S-3, S-4
No. per 1000 cu.m.
1 - 19
20 - 39
15°
10°
5°
B


P. serratulus
CRUISES S-5, S-6
No. per 1000 cu.m.
1 - 19
20 - 39
15°
10°
5°
C
100°
105°
110°


P. serratulus
CRUISES S-7, S-8
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
15°
10°
5°
D


P. serratulus
CRUISES S-9, S-10
No. per 1000 cu.m.
1-19
15°
10°
5°
E
100°
105°
110°

Tetrathyrus Claus, 1879

Tetrathyrus

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):150(4), 160 (14).

_____. 1887. Alfred Hölder, Wien, p. 31, 40.

Stebbing, T. 1888. Challenger Rpts., 29:491, 1480.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:422.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):224, 252.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):240.

Pirlot, J. 1930. Siboga Exped., 33a:41.

Dakin, W. and A. Colefax. 1940. Publ. Monograph, 1:128.

Hurley, D. 1955. Roy. Soc. N.Z., Trans., 83:188. (key to species).

Type species: Tetrathyrus forcipatus Claus

Definition: Per. 1 and 2 simple or minutely subchelate; per. 3 and 4 simple; basis of per. 5 and 6 forming a very long and wide opercular plate; per. 7 reduced.

Tetrathyrus forcipatus Claus, 1879

Figs. 14, 19, 20(A-E).

Tetrathyrus forcipatus

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):160(14).

Bovallius, C. 1887b. K. Sv. Vet. Akad. Handl., 21(5):47.

Claus, C. 1887. Alfred Hölder, Wien, p. 40, pl. 5, figs. 10-18; pl. 6, figs. 1-3.

Stebbing, T. 1888. Challenger Rpts., 29:1484.

Chevreux, E. 1900. Res. des Camp. Sc., 16:150.

Spandl, H. 1924b. Zool. Klasse, 99:38, fig. 11.

Chevreux, E. and L. Fage. 1925. Fauna de France, 9:422, fig. 415.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):224, 252.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):240, fig. 48.

Shoemaker, C. 1945. Zoologica, 30:259.

Reid, D. 1955. Atlantide Rpts., 3:34.

Evans, F. 1961. Linn. Soc. London, Proc., II:203.

Tetrathyrus sancti-josephi

Shoemaker, C. 1925. Amer. Mus. Nat. Hist., Bull., 52:54, figs. 22-24.

Tetrathyrus forcipatus forcipatus

Pirlot, J. 1930. Siboga Exped., 33a:41, fig. 11.

Ant. 1: Male: Peduncle of 2 articles; 1st. article broader than long; 2nd. article short, about 1/3 as long as 1st. Flagellum of 4 articles; 1st. article long, longer than peduncle, superior margin concave, inferior convex, 4 sensory setae at distal of superior margin, medial surface thickly covered with tract of long setae; 2nd. article cylindrical, 1/4 as long as 1st., 2 sensory setae along superior margin; 3rd. article slightly longer than 2nd., 2 sensory setae on median of superior margin; 4th. article as long as 3rd., tapering.

Female: Absent.

Ant. 2: Male: Single peduncular article; slightly expanded at distal portion. Flagellum of 4 articles; 1st. article about 4 times as long as peduncle; 2nd. article as long as 1st., expanded at distal portion; 3rd. article longer than 2nd.; 4th. article about 3/4 as long as 1st. and 2nd., almost tapering; each article folded backward against preceding article.

Female: Peduncle of 2 articles; 1st. article almost cylindrical, slightly longer than broad; 2nd. article cylindrical, almost 1/3 as long as 1st. Flagellum of 4 articles; 1st. article slightly shorter than 1st. article of peduncle, nearly as broad as long, 4 sensory setae along superior margin; 2nd. article nearly as long as 1st., but narrower, 2 sensory setae on median of superior margin; 3rd. article as long as 2nd., but

narrower; 4th. article slightly longer than 3rd., tapering.

Peraeons: Posterior ones longer than anterior ones; peraeon 6 extending by a short posterior dorsal spine.

Per. 1: Short, subchelate. Basis about 3 times as long as broad, broadest at distal portion, superior and inferior margins strongly convex. Ischium short, about 1/5 basis, slightly longer than broad, superior margin shorter than inferior. Merus more than 1/2 as long as basis, superior margin slightly shorter than inferior, a small round process each at superio- and inferiodistal corners, with fine setae on the process at superiodistal corner and along distal half of inferior margin. Carpus almost 1/5 basis, superior margin convex, inferior expanded, with fine setae along 2/3 of inferior margin. Propodus shorter than carpus, superior and inferior margins slightly convex, pointed process at inferiodistal corner. Dactylus about 1/2 propodus, short, curved, and spiniform.

Per. 2: Similar to per. 1, but longer. Basis longer than of per. 1, almost 5 times as long as broad, superior margin strongly concave, inferior strongly convex. Ischium same as of per. 1, but slightly broader and longer, with fine setae at distal of inferior margin.

Merus same as of per. 1, but slightly narrower. Carpus same as of per. 1, but longer, with fine seta at distal of superior margin. Propodus same as of per. 1, but broader. Dactylus same as of per. 1.

Per. 3: Simple, longer than per. 2. Basis long, almost cylindrical, about 7 times as long as broad, superior margin strongly concave, inferior strongly convex. Ischium short, about 1/6 basis, superior margin straight, inferior slightly convex. Merus about 1/2 basis, superior margin convex, inferior concave. Carpus slightly shorter than merus, superior margin slightly convex, inferior slightly concave. Propodus 7/12 as long as carpus, superior margin slightly convex, inferior slightly concave. Dactylus 2/7 propodus, short, curved, and spiniform.

Per. 4: Similar to per. 3, but longer. Basis same as of per. 3, but shorter. Ischium, merus, carpus and propodus same as those of per. 3, but longer. Dactylus same as of per. 3, short, curved, and spiniform.

Per. 5: Longest. Basis expanded, forming a very long and wide opercular plate, about 2.5 times as long as broad, superior and inferior margins convex, round process at superiodistal corner. Ischium short, fixing at distal of basis, as long as broad, superior margin convex, pointed process at superiodistal corner, inferior concave, round process at inferiodistal corner. Merus

about 2/7 basis, superior and inferior margins convex. Carpus about 2/5 basis, longer than merus, superior margin slightly concave, inferior slightly convex, small pointed process at inferiodistal corner. Propodus slightly shorter than merus, narrower than carpus, superior and inferior margins convex. Dactylus almost 1/6 propodus, short, curved, and spiniform.

Per. 6: Similar to per. 5, but slightly shorter. Basis much longer, broader than of per. 5, about twice as long as broad, broadest at distal portion, inferioproximal corner strongly expanded, superiodistal corner producing downwards into long round process. Ischium same as of per. 5, but shorter, slightly longer than broad. Merus slightly shorter than of per. 5, about 1/6 basis, superior and inferior margins slightly convex; superiodistal corner producing downwards along 1/2 carpal superior margin into long round process, with fine setae along superior margin. Carpus much shorter than of per. 5, much shorter than merus, superior and inferior margins slightly convex, with fine setae along superior margin. Propodus much shorter than of per. 5, almost 1/2 as long as carpus, superior and inferior margins slightly convex, with fine setae along superior margin. Dactylus same as of per. 5, but shorter.

Per. 7: Rudimentary. Basis about 2/5 as long as of per. 6,

almost 1/2 as broad as long, superior margin strongly concave, inferior convex, round process at superiodistal corner. Ischium and merus small, twice as long as broad. Remaining articles absent.

Pleons: Pleon 1 longest, longer than peraeon 7; pleon 2 shorter than pleon 1; pleon 3 shortest.

Epimeral plates: All plates with ventral margins convex, posterior margins concave; posterior angles rounded.

Urosomes: Urosome 1 about 5/7 as long as pleon 3; coalesced urosomes 2 and 3 about 1.5 times as broad as long, pointed teeth at lateral margins, together with telson almost twice as long as urosome 1.

Uropods: Uropod 1 longest; peduncle about 1/2 as broad as long, superior margin slightly convex, inferior slightly concave, pointed teeth at superio- and inferiodistal corners, with short tipped-teeth along superior margin; inner ramus longer than peduncle, with short tipped-teeth along superior and inferior margins, tip pointed; outer ramus nearly as long as peduncle, with short tipped-teeth along superior margin, tip pointed. Uropod 2 reaching passed coalesced urosomes 2 and 3; peduncle 2/3 as long as that of uropod 1, superior margin slightly convex, inferior slightly concave; inner ramus 1.5 times as long as peduncle, with short tipped-teeth along

superior margin, tip pointed; outer ramus 7/10 as long as inner ramus, tip pointed. Uropod 3 shortest, reaching farthest passed tip of telson; peduncle slightly shorter than that of uropod 2, superior and inferior margins convex, pointed teeth at superio- and inferio-distal corners; inner ramus about 1.6 times as long as peduncle, with fine setae along superior and 2/3 of inferior margins, tip almost pointed; outer ramus slightly shorter than inner ramus, with fine setae along inferior margin, tip almost pointed.

Telson: Subtriangular; slightly longer than coalesced urosomes 2 and 3, with tip rounded.

Remarks: This species can be easily recognized by per. 1 and 2 which are minutely subchelate, with fine setae along both superior and inferior margins of merus and carpus.

General distribution: World distribution according to Chevreux and Fage (1925:423), Stephensen (1925:224), Pirlot (1930:42), Shoemaker (1945:259), Reid (1955: 35), and Evans (1961:203) include: Atlantic; north, temperate, tropical, south, from about 40°N. to Cape of Good Hope, Bermuda; Mediterranean; Red Sea; northern Arabian Sea; Pacific; north, East Indies, New Zealand; Indian Ocean.

Distribution in the areas studied: This is a neritic species which was found in the Gulf of Thailand and the South China Sea.

In the Gulf of Thailand, during the transition period between the southwest and the northeast monsoons (S-1), this species was found at the middle of the east coast of the outer Gulf where upwelling occurred, and along the eastern side of the Gulf's opening. Perhaps this species was transported into the Gulf during the southwest monsoon period. Toward the end of the northeast monsoon period (S-3), the population increased. It was found distributed along both sides of the Gulf, the distribution along the west coast was slightly off the coast in middle of the inner and outer Gulf and widely spread centrally in the outer Gulf and followed the outflow toward the Gulf's opening. During the intermonsoon period (S-5), the population declined. It was found at the northern part of the Gulf at the middle of the east coast of the inner Gulf and slightly off the coast in the outer Gulf. During the southwest monsoon period (S-7), it was found at scattered localities at the northern corner at the middle of the east coast and inner Gulf, and also at the southwest corner at the central area of the Gulf and on the west coast of the outer Gulf. At the beginning of the northeast monsoon period (S-9), its distribution was at the

northern portion and at the central area of the outer Gulf.

In the South China Sea, during the northeast monsoon period (S-2, S-10), in the northern half it was found distributed into two strips, one along the coast and other along the offshore areas, and in the southern half it was found as a narrow strip slightly offshore along the central coast followed the southerly flow, and widely spread over the Sunda Shelf. At the end of the northeast monsoon period (S-4), it was found along the northern and central coast where southerly flow still persisted. In the central area it was found to be deflected offshore, as the currents in that area were changing to the northern direction and it was found widely spread over the shelf where the currents still remained southerly. During the southwest monsoon period (S-6), the population were divided into the northern and southern halves. The northern half was found in the offshore area followed the northeastern direction of the currents, the southern half was found along the central coast and overlying the offshore part of the Sunda Shelf as influenced by the direction of the currents over the shelf. During the change-over period from the southwest to the northeast monsoon winds (S-8), it was found slightly offshore in the most northern portion, in the offshore area of the northern

part and at the mouth of the Mekhong River. The common ranges of salinities and temperatures from the surface to the depth of the surface layer in the South China Sea at the localities where it was found were from 27.77 to 35.75 ‰., and from 30.68° to 6.82°C..

The average densities of this species in the Gulf of Thailand were at the minimum of 11-12 individuals per 1000 cu.m. of water, and reached the peak of 62 individuals during the intermonsoon period (S-5).

The average densities in the South China Sea reached the peak of 20 individuals per 1000 cu.m. of water at the end of the northeast monsoon period (S-4), slightly prior to the peak in the Gulf.

FIGURE 19

Tetrathyrus forcipatus Claus

Male: A, Lateral view; B, antenna 1; C, antenna 2; D-J, peraeopods 1-7; K, pleopod; L, uropods and telson.

Female: M, Antenna 1.

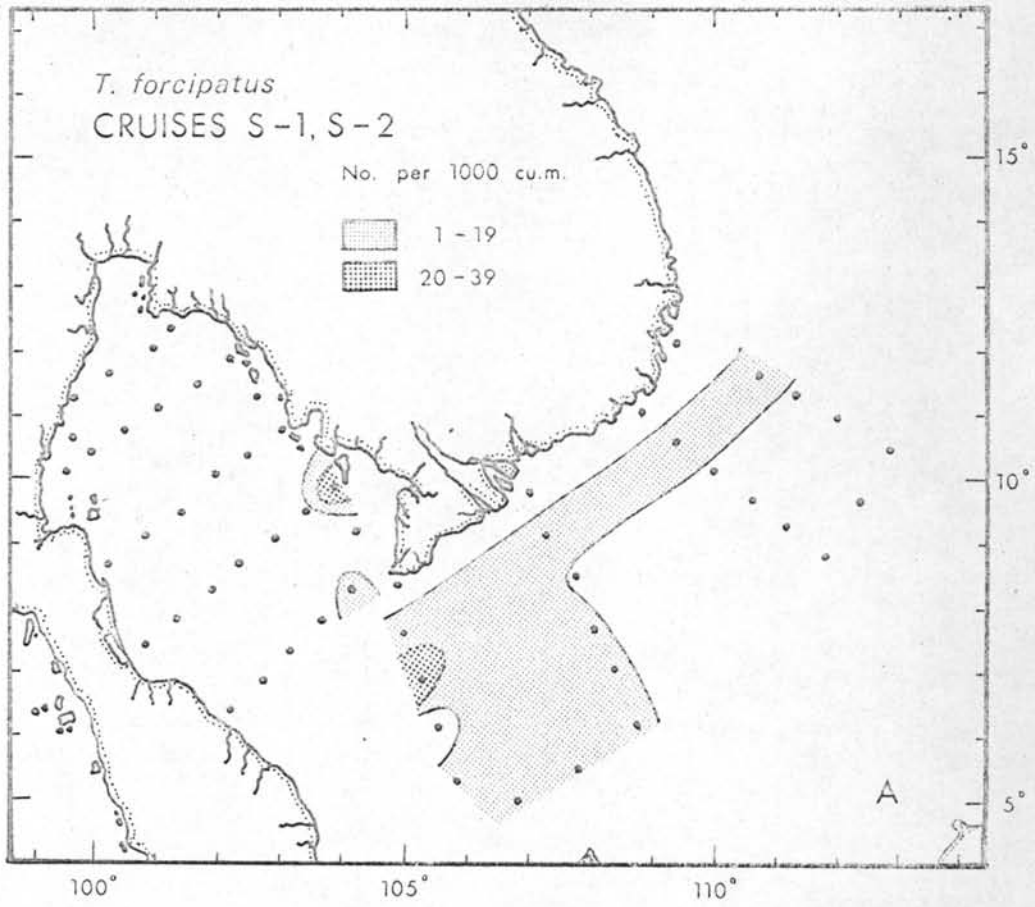
(A, scale a; K, scale b; B-J, L, M, scale c)

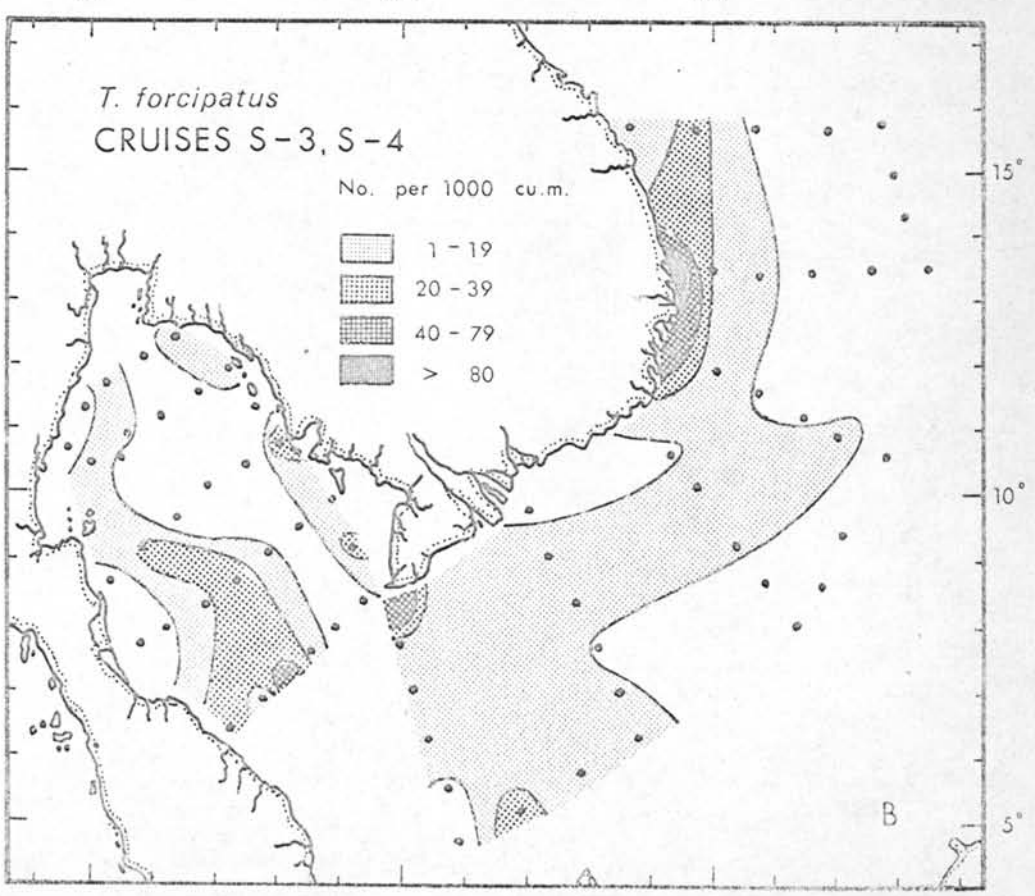

A
B
D
E
F
M
L
G
H
C
I
J
K
1 mm
a
1 mm
b
0.5 mm
c

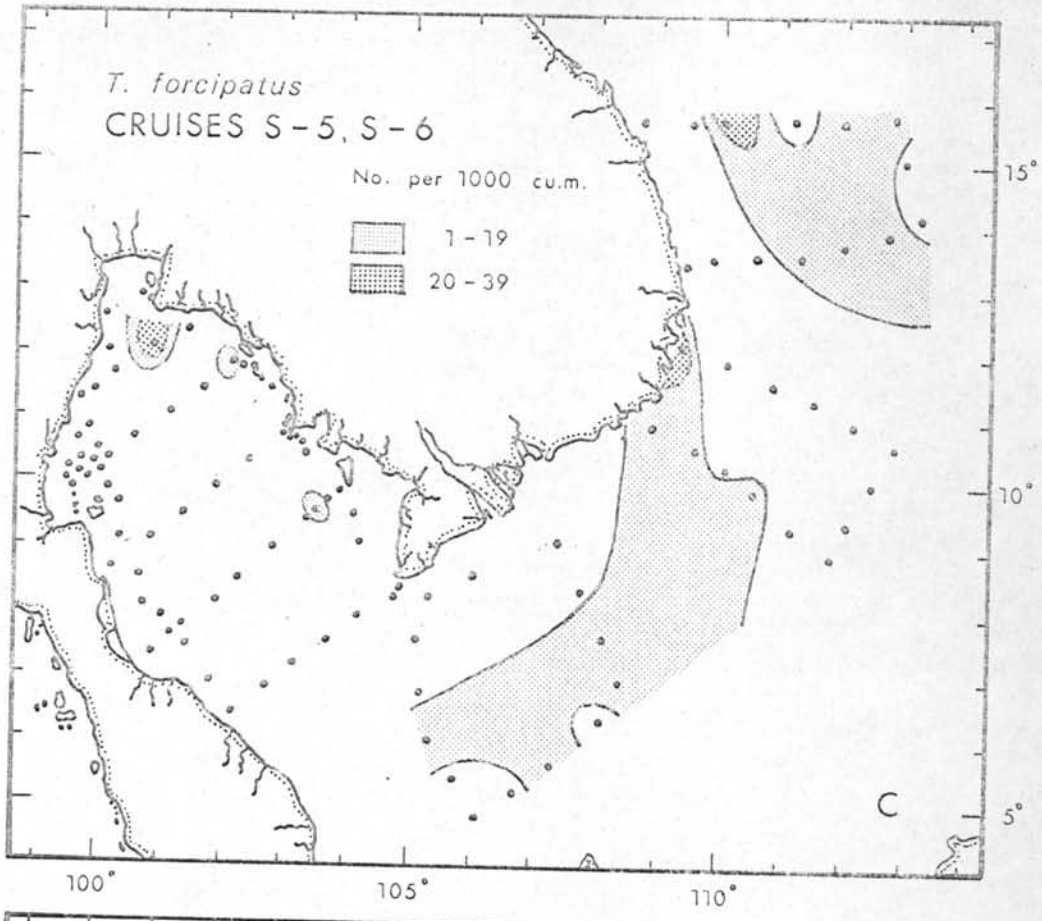
FIGURE 20

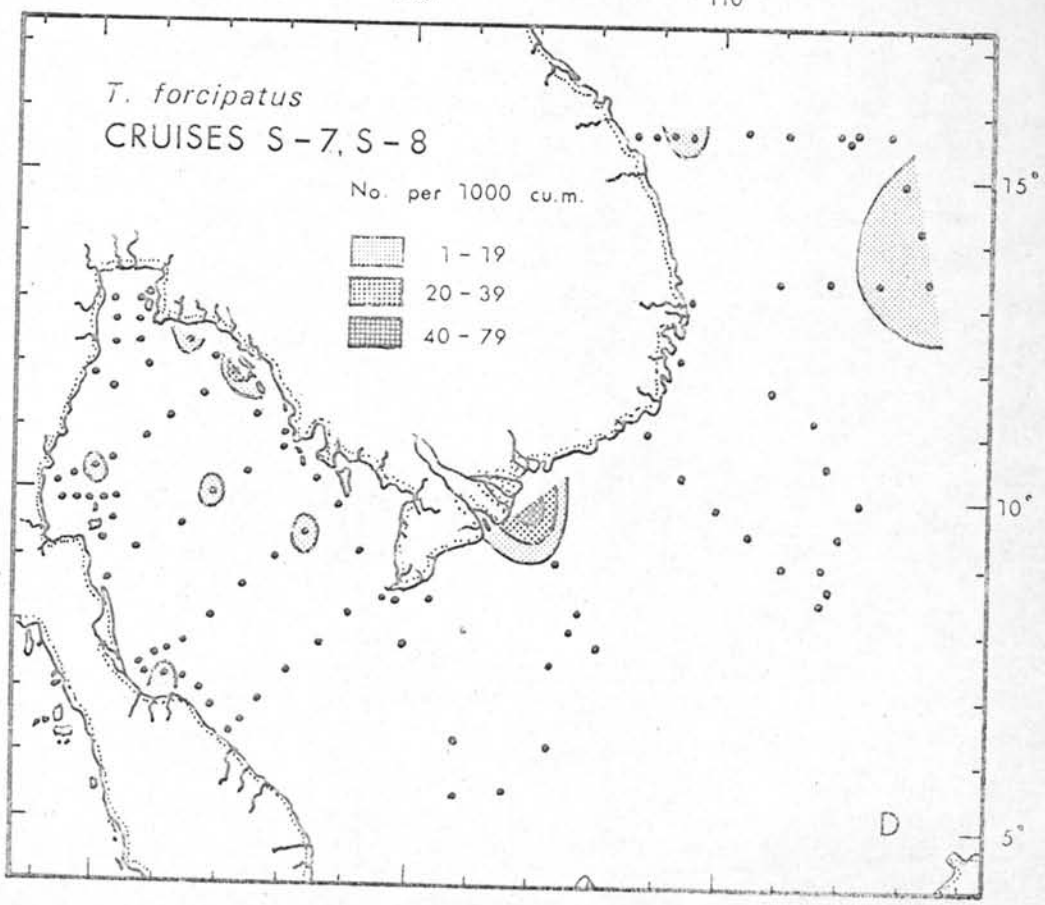
Maps showing the seasonal distirbutional patterns of

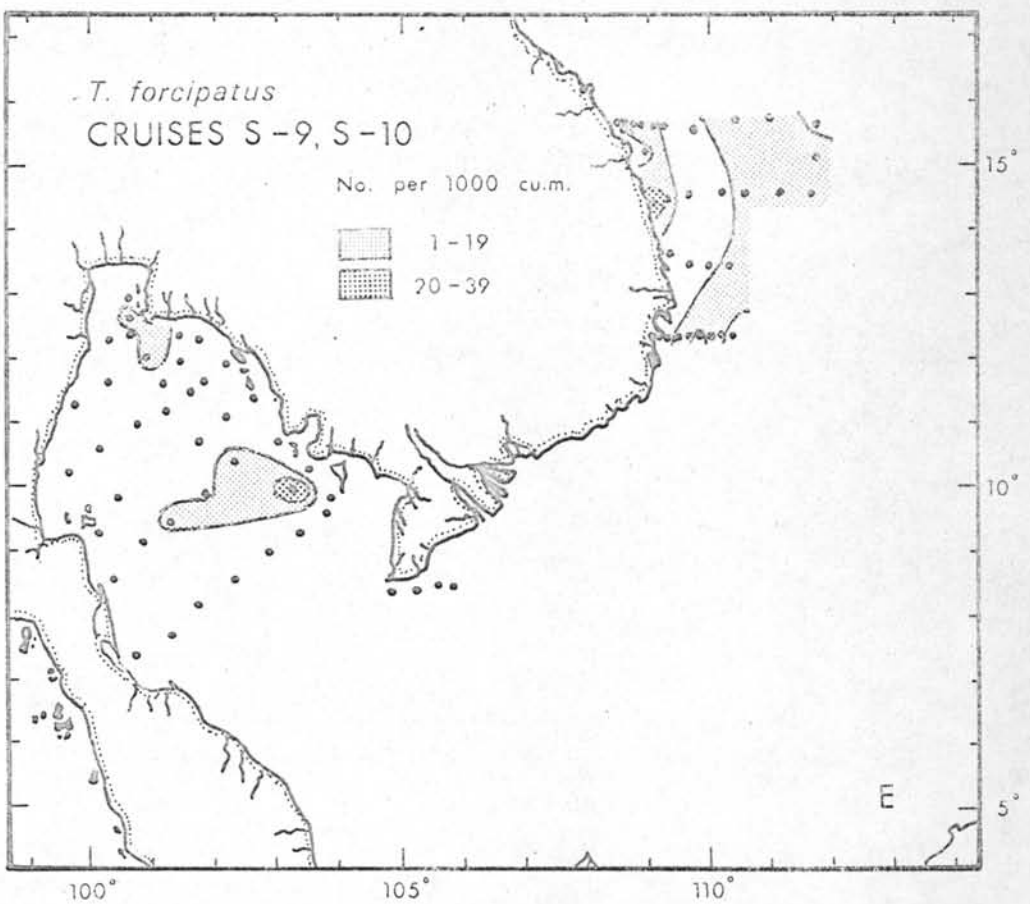
T. forcipatus


T. forcipatus
CRUISES S-1, S-2
No. per 1000 cu.m.
1 - 19
20 - 39
15°
10°
5°
A
100°
105°
110°


T. forcipatus
CRUISES S-3, S-4
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
> 80
15°
10°
5°
B


T. forcipatus
CRUISES S-5, S-6
No. per 1000 cu.m.
1 - 19
20 - 39
15°
10°
5°
C
100°
105°
110°


T. forcipatus
CRUISES S-7, S-8
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
15°
10°
5°
D


T. forcipatus
CRUISES S-9, S-10
No. per 1000 cu.m.
1-19
20-39
15°
10°
5°
E
100°
105°
110°

Paratyphis Claus, 1879

Paratyphis

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):150(4), 159 (13).

_____. 1887. Alfred Holder, Wien, p. 39.

Stebbing, T. 1888. Challenger Rpts., 29:491, 1476.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):221, 252.

Spandl, H. 1927. Deut. Sudpolar Exped., 19(Zool. 11):243.

Pirlot, J. 1929. Mem. Soc. Liege., 3(15):157.

_____. 1930. Siboga Exped., 33a:39.

Hurley, D. 1955. Roy. Soc. N.Z., Trans., 83:188.

Paratyphes

Bovallius, C. 1887a. Bih. t. k. Sv. Vet. Akad. Handl., 11(16):47.

Type species: Paratyphis maculatus Claus

Definition: Per. 1 simple; per. 2 simple or with a rudimentary chela. The last two articles or ant. 2 of the male moderately long.

Key to the Gulf of Thailand and the South China Sea species of Paratyphis

1. Ischium of per. 5 is fixed within a notch in the edge

of basis; outer ramus of uropod 3 about 3/4 as long as inner ramus----------P. promontorii

Ischium of per. 5 is fixed wihtin a notch in the edge of basis; outer ramus of uropod 3 at most half or only a trifle more than half as long as inner ramus------

----------P. maculatus

Paratyphis maculatus Claus, 1879

Figs. 14, 21.

Paratyphis maculatus

Claus, C. 1879. Zool. Inst. Wien, Arb., 2(2):160(14).

Bovallius, C. 1887b. K. Sv. Vet. Akad. Handl., 21(5):47.

Claus, C. 1887. Alfred Hölder, Wien, p. 39, pl. 5, figs. 1-9.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):221, 223, 252, fig. 86.

Spandl, H. 1927. Deut. Südpolar Exped., 19(Zool. 11):243, fig. 49.

Pirlot, J. 1930. Siboga Exped., 33a:39.

Shoemaker, C. 1945. Zoologica, 30:259.

Reid, D. 1955. Atlantide Rpts., 3:36.

Hurley, D. 1960. N.Z. Journ. Sc., 3(2):283.

Paratyphis parvus

Claus, C. 1887. Alfred Hölder, Wien, p. 40, pl. 7, figs. 13-21.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):221, 252.

Pirlot, J. 1930. Siboga Exped., 33a:39.

Hurley, D. 1955. Roy. Soc. N.Z., Trans., 83:188.

Paratyphis pacificus

Stebbing, T. 1888. Challenger Rpts., 29:1479.

Stephensen, K. 1925. Danish Oceano. Exped., 2(D. 5):221,

252.

Pirlot, J. 1930. Siboga Exped., 33a:39.

Ant. 1: Male: Single peduncular article, almost as broad as long. Flagellum of 4 articles; 1st. article long, longer than peduncle, inferior margin convex, superior concave, shorter than inferior, medial surface thickly covered with tract of long setae; 2nd. article cylindrical, about 1/7 as long as 1st., few sensory setae along distal of superior margin; 3rd. article almost as long as 2nd., few sensory setae along distal of superior margin; 4th. article slightly longer than 3rd., tapering.

Female: Single peduncular article, about 1/3 as broad as long. Flagellum of 4 articles; 1st. article short, much shorter than peduncle, almost as broad as long; 2nd. article slightly longer than 1st., longer than broad, many sensory setae along superior margin; 3rd. article almost as long as 1st., many sensory setae along superior margin; 4th. article longer than 2nd., tapering.

Ant. 2: Male: Single peduncular srticle, slightly expanded at distal portion. Flagellum of 4 articles; 1st. article about 3 times as long as peduncle; 2nd. article longer than 1st.; 3rd. article about 8/11 as long as 2nd.; 4th. article much shorter than 3rd., tapering.

Each article folded backward against preceding article. Female: Single peduncular article, slightly longer than broad. Flagellum of 5 articles; 1st. article long, longer than peduncle; 2nd. article almost 1/2 as long as 1st., 1 sensory seta at distal of inferior margin; 3rd. article slightly longer than 2nd., 1 sensory seta at distal of inferior margin; 4th. article shorter than 3rd., 1 sensory seta at distal of superior margin; 5th. article shorter than 4th., tapering.

Peraeons: Peraeon 1 shortest and as long as 2; peraeon 3 slightly longer than 1 and 2; peraeon 4 longer than 3; peraeon 5 longer than 4; peraeon 6 slightly shorter than 5; peraeon 7 longest.

Per. 1: Short, simple. Basis 3 times as long as broad, broadest at distal portion, superior and inferior margins strongly convex. Ischium short, almost 1/4 basis, longer than broad, superior margin shorter than inferior, a round process each at superio- and inferiodistal corners. Merus longer than ischium, broader distally, superior margin strongly convex, inferior slightly concave, a short round process each at superio- and inferiodistal corners. Carpus almost 1/2 basis, superior margin convex, pointed process at superiodistal corner,

inferior margin slightly concave, round process at inferiodistal corner. Propodus shorter than carpus, superior margin convex, inferior concave. Dactylus almost 1/2 propodus, long, curved, and spiniform.

Per. 2: Similar to per. 2, but longer. Basis longer than of per. 1, about 4 times as long as broad, superior and inferior margins convex. Ischium same as of per. 1, but broader and longer, almost 1/4 basis. Merus same as of per. 1, but slightly broader and shorter. Carpus same as of per. 1, but slightly broader and shorter. Propodus same as of per. 1, but longer, superior and inferior margins convex. Dactylus same as of per. 1.

Per. 3: Simple, longer than per. 2. Basis long, almost 4 times as long as broad, superior margin concave, inferior convex. Ischium short, almost 1/5 basis, superior margin shorter than inferior. Merus about 1/2 basis, superior margin convex, inferior almost straight. Carpus shorter than merus, superior margin strongly convex, inferior slightly concave. Propodus as long as carpus, superior margin slightly convex, inferior slightly concave. Dactylus about 2/5 propodus, long, curved, and spiniform.

Per. 4: Similar to per. 3, but longer. Basis same as of per. 3, superior margin slightly concave, inferior convex. Ischium same as of per. 3, but slightly narrower

and shorter. Merus same as of per. 3, but slightly longer, fine seta at inferiodistal corner. Carpus same as of per. 3, but narrower and longer, fine seta at inferiodistal corner. Propodus same as of per. 3, but slightly longer. Dactylus same as of per. 3.

Per. 5: Longer than per. 4. Basis expanded, forming a long and wide opercular plate, less than twice as long as broad, broadest at middle portion, superior and inferior margins strongly convex, a round process each at superio- and inferiodistal corners. Ischium short, fixing at distal of basis, longer than broad, superior margin strongly convex, inferior strongly concave, round process at superiodistal corner. Merus about 1/4 basis, superior and inferior margins convex. Carpus 5/13 basis, longer than merus, superior and inferior margins slightly convex, pointed process at inferiodistal corner. Propodus shorter than carpus, almost 1/3 basis, narrower than carpus, superior margin almost straight, inferior slightly convex. Dactylus about 1/5 propodus, short, curved, and spiniform.

Per. 6: Similar to per. 5, but longest. Basis forming a very long and wide opercular plate, much longer and broader than of per. 5, about 3/7 as broad as long, broadest at proximal portion, inferioproximal corner strongly expanded, a round process each at superio- and inferiodistal corners. Ischium short, as broad as

long, superior margin strognly convex, inferior strongly concave. Merus slightly shorter than of per. 5, almost 1/9 basis, superior margin strongly convex, inferior almost straight, fine setae along superior margin, pointed process each at superio- and inferiodistal corners. Carpus much shorter than of per. 5, much shorter than merus, superior and inferior margins slightly convex, with fine setae along superior margin. Propodus much shorter than of per. 5, as long as carpus, superior margin slightly concave, inferior slightly convex. Dactylus same as of per. 5.

Per. 7: Similar to per. 5, but much shorter. Basis about 1/2 as long as of per. 5, about 1/2 as broad as long, superior margin concave, inferior strongly convex, round process at superiodistal corner. Ischium short, about 1/6 basis, superior and inferior margins convex. Merus as long as ischium, superior and inferior margins convex. Carpus slightly longer than merus, about 1/5 basis, superior margin slightly convex, inferior slightly concave. Propodus as long as carpus, superior margin concave, inferior convex. Dactylus as long as propodus, almost tapering.

Pleons: Pleon 1 longer than peraeon 7 and as long as 2; pleon 3 shortest.

Epimeral plates: All plates with ventral margins convex,

posterior margins concave, posterior angles rounded.

Urosomes: Urosome 1 about 1/2 as long as pleon 3, lateral margins expanded into rounded processes; coalesced urosomes 2 and 3 about 3/4 as long as broad, pointed teeth at lateral margins, together with telson twice as long as urosome 1.

Uropods: Uropod 1 longest; peduncle 2/3 as broad as long, superior margin convex, inferior slightly concave, pointed teeth at superio- and inferiodistal corners; inner ramus longer than peduncle, tip pointed; outer ramus 2/3 as long as inner ramus, tip pointed. Uropod 2 reaching passed coalesced urosomes 2 and 3; peduncle about 1/2 as long as that of uropod 1, about twice as long as broad, superior and inferior margins convex, pointed teeth at superio- and inferiodistal corners; inner ramus twice as long as peduncle, tip pointed; outer ramus 3/5 as long as inner ramus, tip pointed. Uropod 3 shortest, reaching farthest passed tip of telson; peduncle 1/2 as long as that of uropod 2, superior and inferior margins convex, pointed teeth at superio- and inferiodistal corners; inner ramus almost 3 times as long as peduncle, tip pointed; outer ramus about 1/2 as long as inner ramus, tip pointed.

Telson: Subrectangular; shorter than coalesced urosomes 2 and 3, with tip rounded.

Remarks: This species can be distinguished from a similar species, Paratyphis promontorii, by the outer ramus of uropod 3, which is at most half or only a trifle more than half as long as inner ramus in this species, while it is about 3/4 as long as inner ramus in Pa. promontorii.

General distribution: World distribution according to Stephensen (1925:223), Pirlot (1930:40), Shoemaker (1945:260), and Reid (1955:36) include: Atlantic; north, south; from 22°N. to 7°N., Gulf of Eden, Bermuda; Pacific; East Indies; Indian; north.

Distribution in the areas studied: This is a neritic species which was found in the Gulf of Thailand and the South China Sea only in a certain period.

In the Gulf of Thailand, it was found only during the intermonsoon period (S-5) at the central portion of the west coast where upwelling occurred off Songkhla, and almost at the central portion of the inner half of the Gulf.with the average density of 3 individuals per 1000 cu.m. of water.

In the South China Sea, it was found only during the northeast monsoon period (S-2, S-10) at few stations slightly offshore in the north, at an offshore station in the central area and overlying the offshore portion

of the Sunda Shelf, with the maximum density of 25 individuals per 1000 cu.m. of water. The common ranges of salinities and temperatures from the surface to the depth of the surface layer in the South China Sea at the localities where it was found were from 32.50 to 34.64 ‰., and from 31.00° to 16.36°C..

FIGURE 21

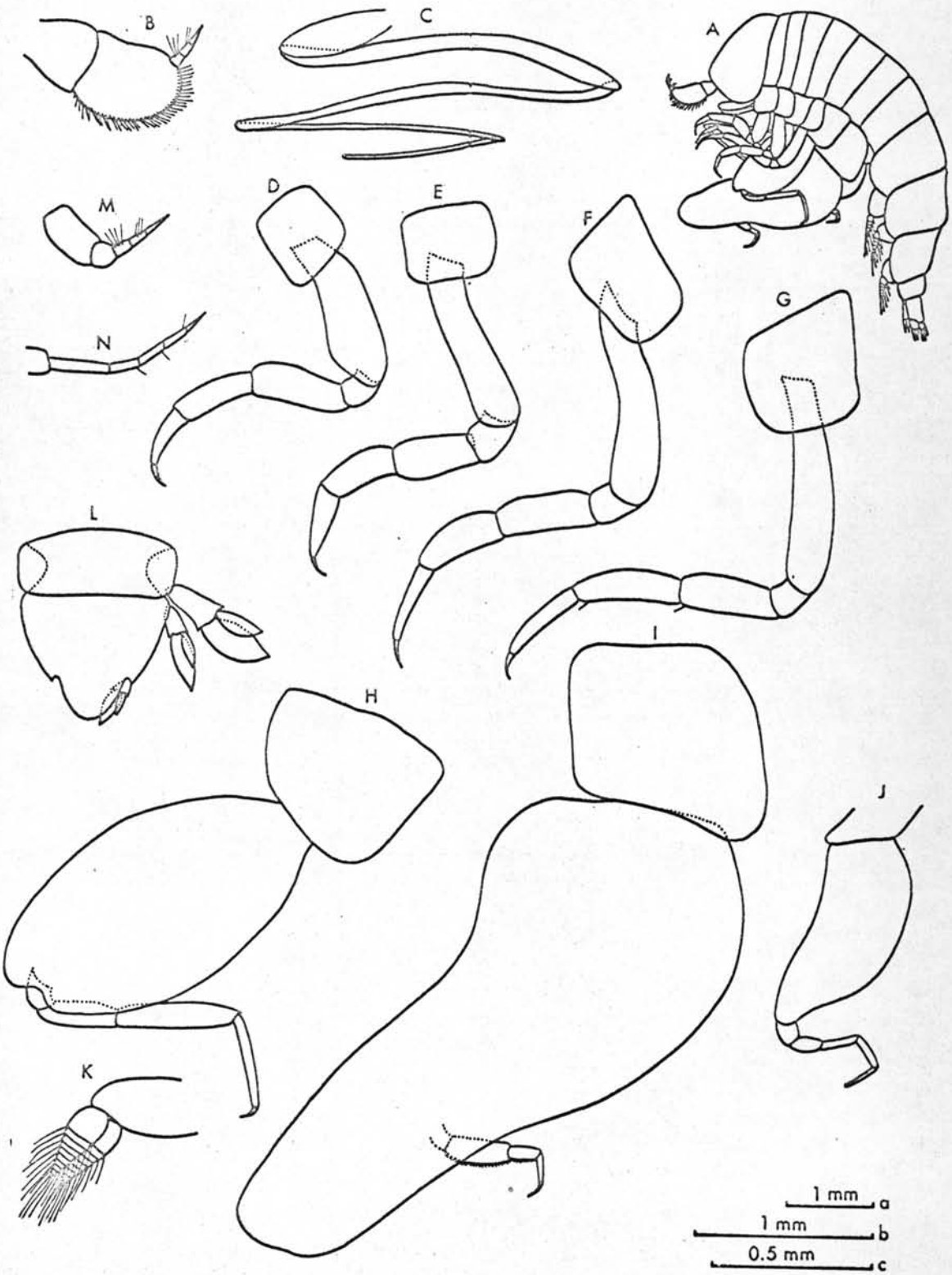
Paratyphis maculatus Claus

Male: A, Lateral view; B, antenna 1; C, antenna 2;

D-J, peraeopods 1-7; K, pleopod; L, uropods and telson.

Female: M, Antenna 1; N, antenna 2.

(A, scale a; K, L, scale b; B-J, M, N, scale c)


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1 mm
a
1 mm
b
0.5 mm
c

Paratyphis promontorii Stebbing, 1888

Figs. 14, 22, 23(A-E).

Paratyphis Theelii

Bovallius, C. 1887a. Bih. t. k. Sv. Vet. Akad. Handl., 11(16):47.

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Paratyphis promontorii

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Pirlot, J. 1930. Siboga Exped., 33a:39.

Evans, F. 1961. Linn. Soc. London, Proc., II:202.

Ant. 1: Male: Single peduncular article, almost as broad as long. Flagellum of 4 articles; 1st. article long, longer than peduncle, inferior margin convex, superior concave, shorter than inferior, medial surface thickly covered with tract of long setae; 2nd. article cylindrical, about 1/5 as long as 1st.; 3rd. article as long as 2nd., 2 sensory setae along distal of superior margin; 4th. article slightly longer than 3rd., tapering. Female: Single peduncular article, about 1/2 as broad as long. Flagellum of 4 articles; 1st. article short, much shorter than peduncle, almost as broad as long;

2nd. article as long as 1st., many sensory setae along distal of superior margin, 2 sensory setae at middle of inferior margin; 3rd. article slightly shorter than 2nd., 2 sensory setae along distal of superior margin; 4th. article longer than 2nd., tapering.

Ant. 2: Male: Single peduncular article, slightly expanded at distal portion. Flagellum of 4 articles; 1st. article about 2.5 times as long as peduncle; 2nd. article slightly longer than 1st.; 3rd. article less than 1/2 as long as 2nd.; 4th. article slightly longer than 3rd. Each article folded backward against preceding article.

Female: Single peduncular article, slightly broader than long. Flagellum of 4 articles; 1st. article long, longer than peduncle; 2nd. article 2/3 as long as 1st., 3rd. article slightly longer than 2nd., 1 sensory seta at distal of superior margin; 4th. article as long as 2nd., tapering.

Peraeons: Peraeon 1 slightly longer than 2 and 3; peraeon 4 longer than 1; peraeon 5 longer than 4; peraeon 6 longer than 5; peraeon 7 longest.

Per. 1: Short, simple. Basis about 3 times as long as broad, broadest at distal portion, superior and inferior margins strongly convex. Iachium short, about 1/4

basis, longer than broad, superior margin shorter than inferior, a small round process each at superio- and inferiodistal corners. Merus slightly longer than ischium, about 1/3 basis, broader distally, superior and inferior margins convex, a round process each at superio- and inferiodistal corners. Carpus about 2/5 basis, superior and inferior margins convex. Propodus shorter than carpus, superior and inferior margins convex. Dactylus 1/2 propodus, long, curved, and spiniform.

Per. 2: Similar to per. 1, but slightly longer. Basis slightly longer than of per. 1, about 2.5 times as long as broad, superior and inferior margins strongly convex. Ischium, merus, carpus and propodus same as those of per. 1, but slightly broader and longer. Dactylus same as of per. 1.

Per. 3: Simple, longer than per. 2. Basis long, 4 times as long as broad, superior margin slightly concave, inferior convex. Ischium short, about 1/6 basis, superior margin shorter than inferior. Merus about 1/2 basis, superior and inferior margins convex. Carpus shorter than merus, superior margin slightly convex, inferior straight. Propodus shorter than carpus, superior margin strongly convex, inferior slightly concave. Dactylus about 1/2 propodus, long, curved, and spiniform.

Per. 4: Similar to per. 3, but longer. Basis, ischium,

merus, carpus and propodus same as those of per. 3, but slightly longer. Dactylus same as of per. 3.

Per. 5: Longer than per. 4. Basis expanded, forming a long and wide opercular plate, less than twice as long as broad, broadest at middle portion, superior and inferior margins strongly convex, a round process each at superio- and inferiodistal corners. Ischium short, fixing at distal of basis, longer than broad, superior margin strongly convex, inferior strongly concave, round process at superiodistal corner. Merus about 1/4 basis, superior and inferior margins convex. Carpus about 1/4 basis, slightly longer than merus, superior and inferior margins almost straight, pointed process at inferiodistal corner. Propodus almost as long as carpus, but narrower, superior margin almost straight, inferior slightly convex. Dactylus about 1/3 propodus, short, curved, and spiniform.

Per. 6: Similar to per. 5, but longest. Basis forming a very long and wide opercular plate, much longer and broader than of per. 5, about 1/2 as broad as long, broadest at proximal portion, inferioproximal corner strongly expanded, a round process each at superio- and inferiodistal corners. Ischium short, as broad as long, superior margin strongly convex, inferior strongly concave. Merus shorter than of per. 5, about 1/8 basis, superior margin strongly convex, inferior

almost straight, fine setae along superior margin, pointed process at superiodistal corner, round process at inferiodistal corner. Carpus much shorter than of per. 5, much shorter than merus, superior and inferior margins slightly convex, with fine setae along superior margin. Propodus much shorter than of per. 5, slightly shorter than carpus, superior margin slightly concave, inferior slightly convex. Dactylus same as of per. 5.

Per. 7: Similar to per. 5, but much shorter. Basis more than 1/2 as long as of per. 5, about 1/2 as broad as long, superior margin concave, inferior strongly convex, round process at superiodistal corner. Ischium short, about 1/8 basis, superior and inferior margins convex. Merus slightly longer than ischium, superior and inferior margins convex. Carpus slightly longer than merus, about 1/6 basis, superior and inferior margins slightly convex. Propodus as long as carpus, superior margin concave, inferior convex. Dactylus as long as propodus, almost tapering.

Pleons: Pleon 1 longer than peraeon 7; pleon 2 shorter than 1; pleon 3 shortest.

Epimeral plates: All plates with ventral margins convex, posterior margins concave, posterior angles rounded.

Urosomes: Urosome 1 about 1/2 as long as pleon 3, lateral

margins expanded into rounded processes; coalesced urosomes 2 and 3 about 7/12 as long as broad, pointed teeth at lateral margins, together with telson almost twice as long as urosome 1.

Uropods: Uropod 1 longest; peduncle 2/3 as broad as long, superior margin convex, inferior slightly concave, pointed teeth at superio- and inferiodistal corners; inner ramus longer than peduncle, tip pointed; outer ramus slightly shorter than inner ramus, tip pointed. Uropod 2 reaching slightly passed coalesced urosomes 2 and 3; peduncle about 1/2 as long as that of uropod 1, about twice as long as broad, superior and inferior margins convex, pointed teeth at superio- and inferiodistal corners; inner ramus twice as long as peduncle, tip pointed; outer ramus 4/5 as long as inner ramus, tip pointed. Uropod 3 shortest, reaching farthest passed tip of telson; peduncle 1/2 as long as that of uropod 2, superior and inferior margins convex, pointed teeth at superio- and inferiodistal corners; inner ramus almost 3 times as long as peduncle, tip pointed; outer ramus about 3/4 as long as inner ramus, tip pointed.

Telson: Subrectangular; shorter than coalesced urosomes 2 and 3, with tip pointed.

Remarks: This species can be easily recognized by per. 1

and 2, which are simple, having short and broad merus, and the outer ramus of uropod 3 which is 3/4 as long as inner ramus.

General distribution: World distribution according to Stephensen (1925:223), and Evans (1961:202) include: Atlantic; tropical, subtropical, 35°4'S., 18°37'E., 29°1'S., 28°59'W.

Distribution in the areas studied: This is a common neritic species which was found in the Gulf of Thailand and the South China Sea.

In the Gulf of Thailand, during the transition period between the southwest and the northeast monsoons (S-1), it was found with maximum density along the outer part of the east coast where upwelling was evidenced at the middle of the inner Gulf, spread toward the middle portion of the west coast and slightly offshore along the west coast to the opening of the Gulf. The pattern of distribution resembled the anti-clockwise gyre of the surface water in the Gulf. Toward the end of the northeast monsoon poriod (S-3), the population increased and it was found widely distributed all over the Gulf, except along the most part of the west coast and the eastern portion of the Gulf's opening. During the intermonsoon period (S-5), the population slightly

declined, it was found at the northwest corner of the Gulf, spread across the northern portion of the inner Gulf where upwelling occurred, widely distributed along the central portion of the east coast, spread across the Gulf to the middle of the west coast following the clockwise gyre in the Gulf, and to the western half of the Gulf's opening following the outflow from the Gulf. During the southwest monsoon period (S-7), the population increased again to the maximum, it was found widely distributed all over the Gulf, except at a few areas along the east and the west coasts. At the beginning of the northeast monsoon period (S-9), the population declined, but it was still found widely distributed in the Gulf except in the northern part and at a few areas on the eastern side of the Gulf, and along the west coast of the outer Gulf.

In the South China Sea, this species was found widely distributed in the studied area all year round. During the northeast monsoon period (S-2, S-10), the population was still in a low concentration with maximum density in the northern area and over the shelf. At the end of the northeast monsoon period (S-4), the maximum concentration was in the northern portion of the studied area, especially off Nhatrang where upwelling was found. During the southwest monsoon period (S-6), the maximum concentration was found along the central

coast where upwelling occurred. During the change-over period from the southwest to the northeast monsoon winds (S-8), the population declined and the concentration areas were along the coast and over the offshore part of the shelf. The common ranges of salinities and temperatures from the surface to the depth of the surface layer in the South China Sea at the localities where it was found were from 27.77 to 35.88 ‰., and from 31.70° to 4.34°C.,

In the Gulf of Thailand this species had two peaks during the year. Toward the end of the northeast monsoon period (S-3), the average density reached the peak of 58 individuals per 1000 cu.m. of water, then declined during the following period (S-5), and increased again to the second peak of 50 individuals per 1000 cu.m. of water during the southwest monsoon period (S-7).

In the South China Sea, the average densities reached the peak of 32 individuals per 1000 cu.m. of water during the southwest monsoon period (S-6), slightly before the time of the second peak in the Gulf.

FIGURE 22

Paratyphis promontorii Stebbing

Male: A, Lateral view; B, antenna 1; C, antenna 2;

D-J, peraeopods 1-7; K, pleopod; L, uropods and telson.

Female: M, Antenna 1; N, antenna 2.

(A, scale a; K, L, scale b; B-J, M, N, scale c)

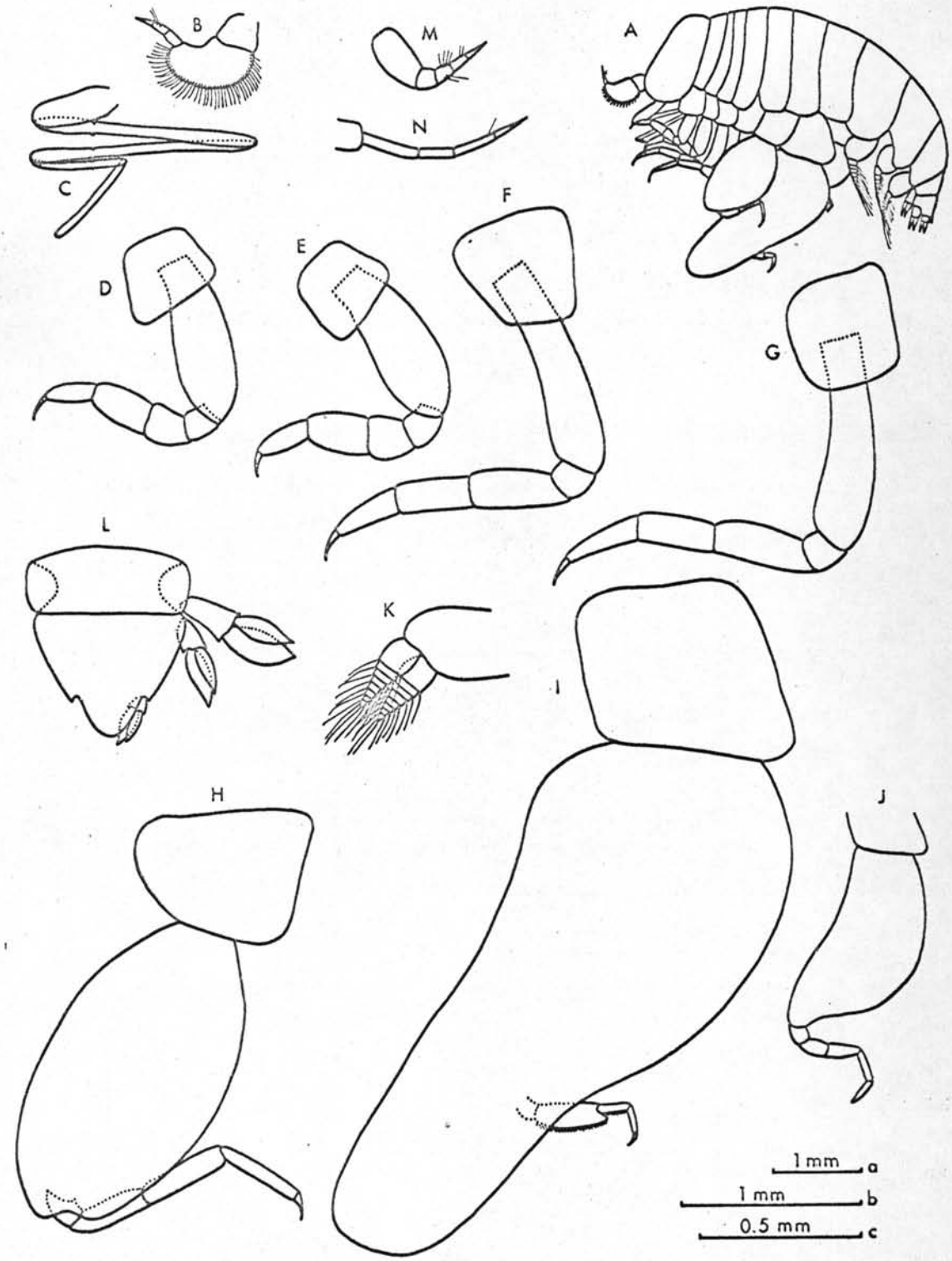
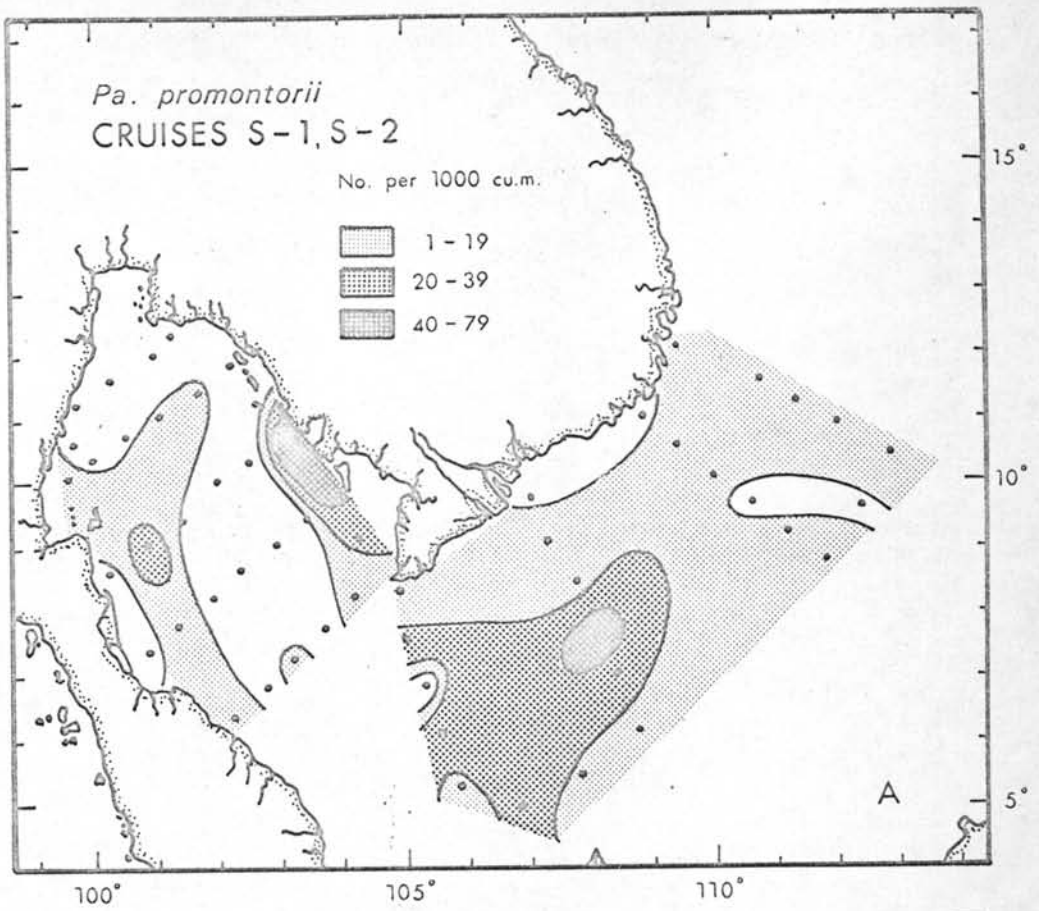
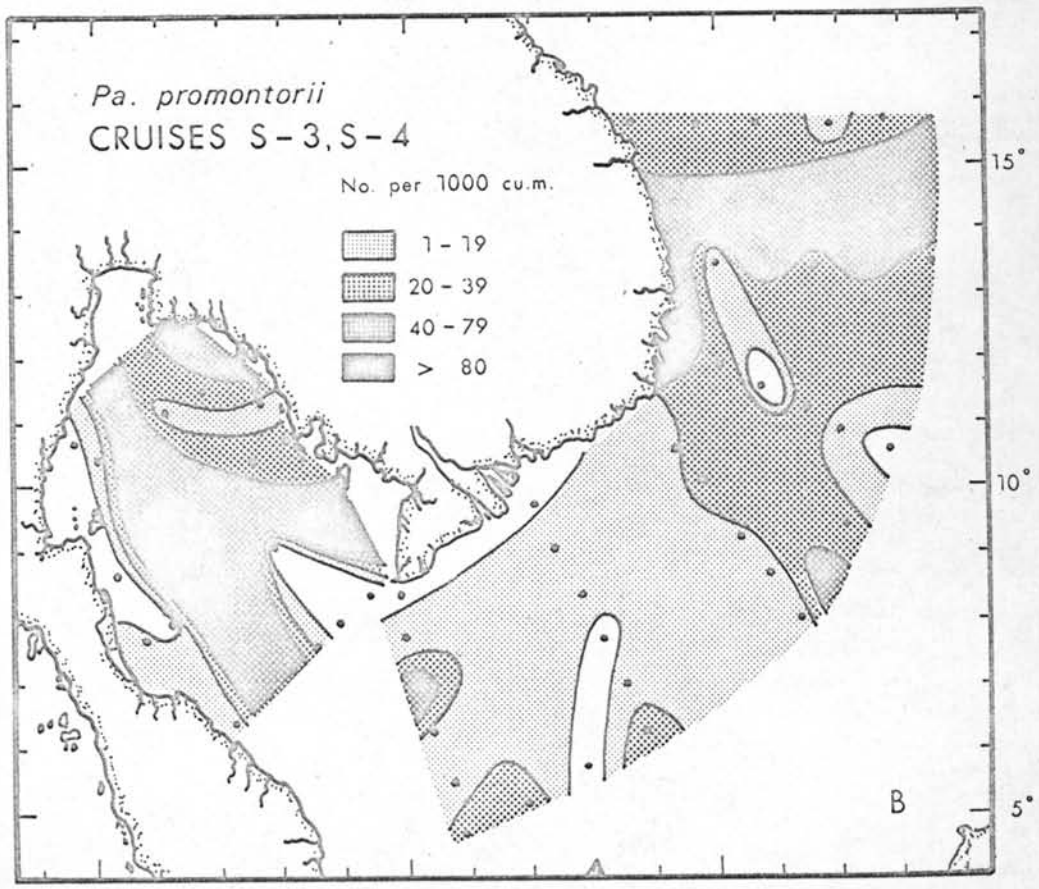

A
B
C
D
E
F
G
H
I
J
K
L
M
N
1 mm a
1 mm b
0.5 mm c

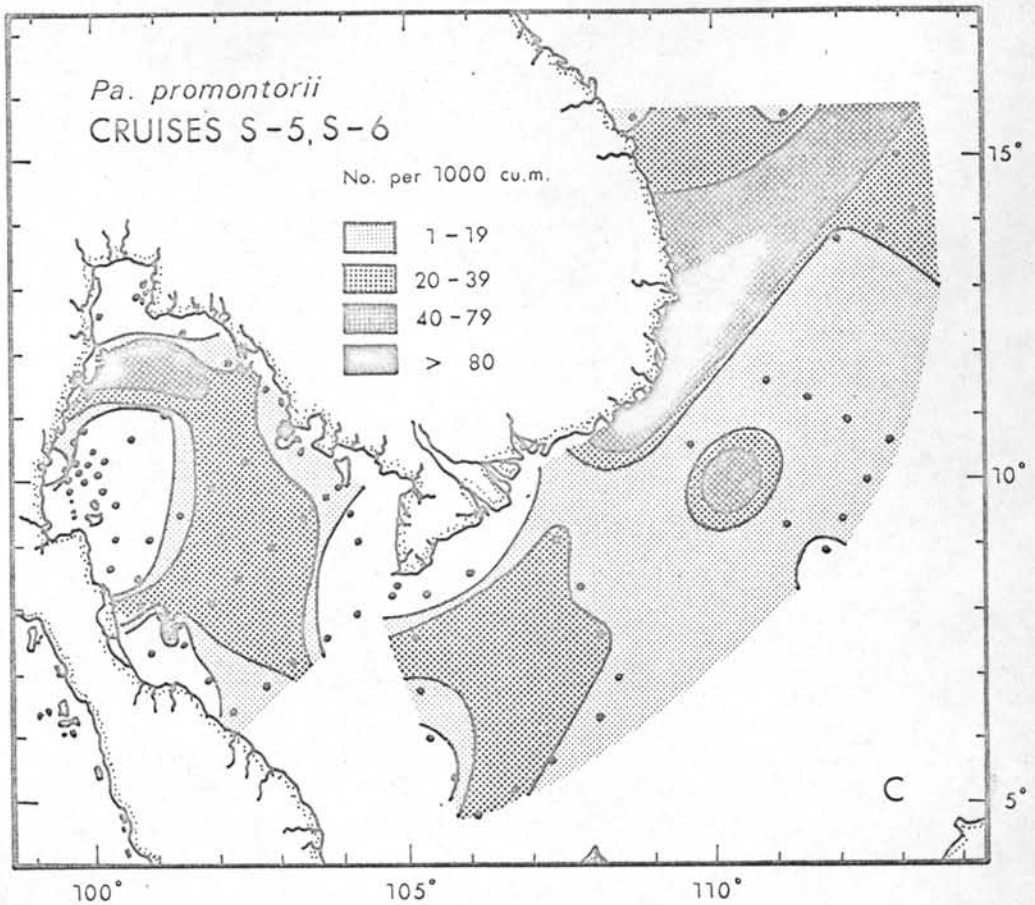
FIGURE 23

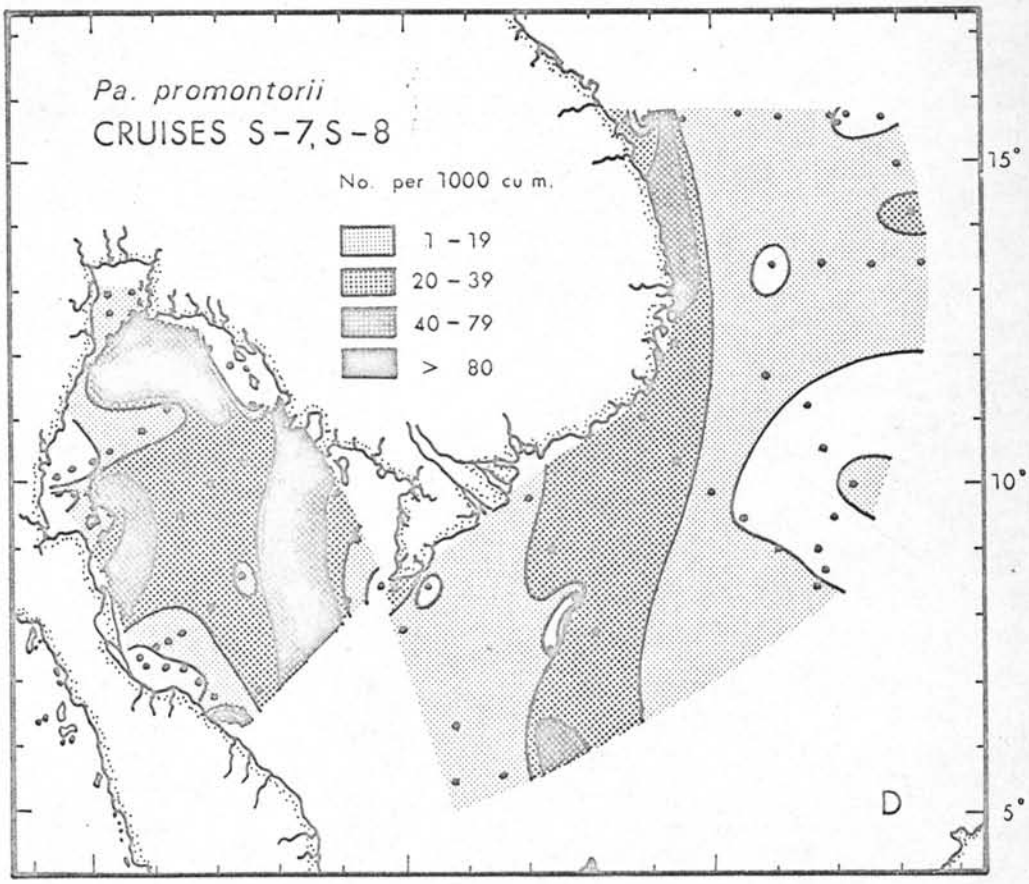
Maps showing the seasonal distributional patterns of

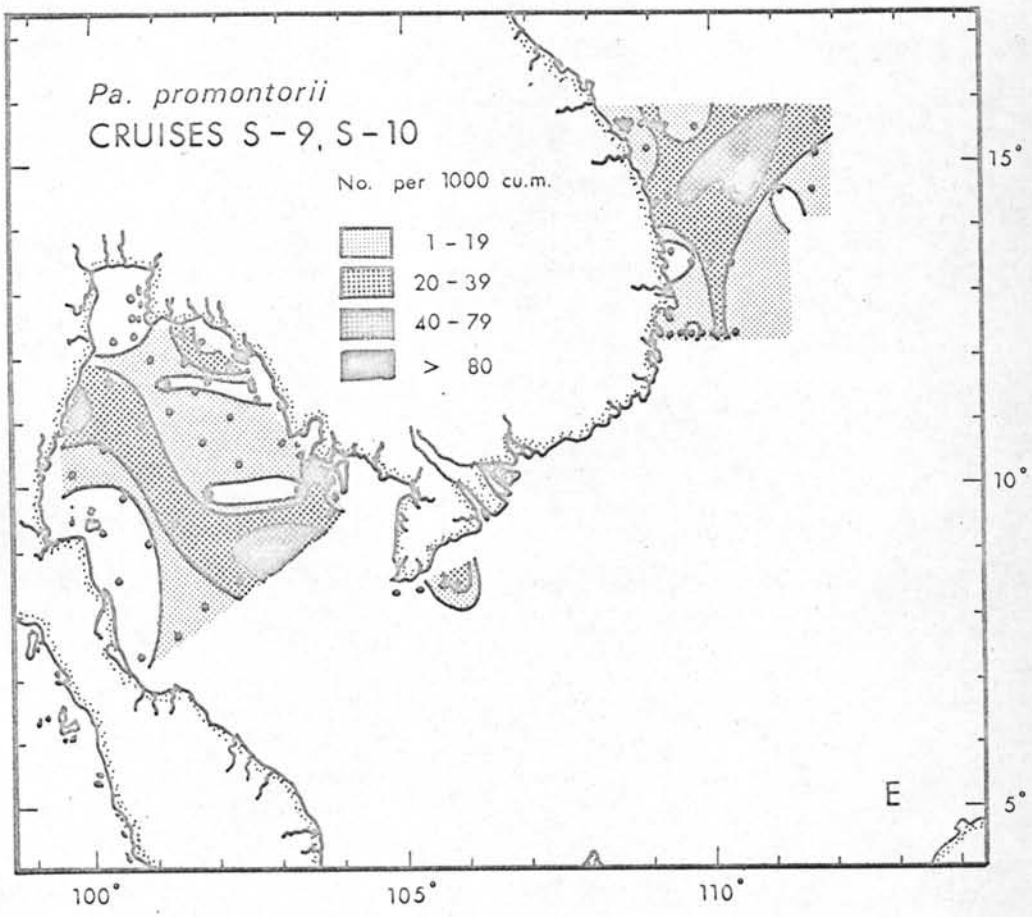
Pa. promontorii


Pa. promontorii
CRUISES S-1, S-2
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
A
15°
10°
5°
100°
105°
110°


Pa. promontorii
CRUISES S-3, S-4
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
> 80
B
15°
10°
5°


Pa. promontorii
CRUISES S-5, S-6
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
> 80
15°
10°
5°
C
100°
105°
110°


Pa. promontorii
CRUISES S-7, S-8
No. per 1000 cu m.
1 - 19
20 - 39
40 - 79
> 80
15°
10°
5°
D


Pa. promontorii
CRUISES S-9, S-10
No. per 1000 cu.m.
1 - 19
20 - 39
40 - 79
> 80
15°
10°
5°
E
100°
105°
110°