

# *Alebion echinatus* Capart from Japanese Waters, with Observations on the Newly Found Male Form<sup>1</sup>

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THE HAMMERHEAD SHARK, *Sphyrna zygaena* (Linné), was reported by Wilson (1932) as infected by a copepod belonging to the Family Euryphoridae, *Alebion crassus* Wilson, at Woods Hole. On the same shark caught off Hamazima, Mie Prefecture, Japan, I found another species of the same genus, *A. echinatus* Capart, which was recently discovered on *S. diplana* in the gulf of Sénégal (Capart, 1953). This species was based on a single female and the male was unknown. As the original diagnosis was rather brief and my collection included a male form, a new description has been prepared for both the sexes.

*Alebion echinatus* Capart, 1953

Capart, A., 1953. Inst. Franç. d'Afrique noire, Bul. 15: 655-656, Fig. 4.

Two females and a male, found on the outside surface of *Sphyrna zygaena* (Linné) (new host), off Hamazima, Mie Prefecture, Japan.

*Female* (Figs. 1a-j, 2a-g): Thickly covered with minute dendritic patterns of dark red, the color appearing uniform over whole dorsal surface to the naked eye; ventral surface much paler. Eye pigment blackish. 11.4 mm. × 10.4 mm.

Carapace almost half as long as body, wider than long, orbicular, with depressed front and well-rounded sides. Central part considerably raised and rugose on the surface. Frontal plates about half the entire width, slightly arched and with blunt lateral ends. Transverse suture a little undulated and placed just behind the center of carapace. Longitudinal sutures slightly curved laterally both

before and behind transverse one. Two grooves arising from anterior end of each, one narrow, short, extending antero-mesially, the other broader, horizontal, connected with lateral margin of carapace by a curved, diagonal suture. Another pair of grooves extends from the bases of the frontal plates postero-mesially and intersects a short transverse one at anterior one fourth of cephalic area. Eyes at the center of this area. Thoracic area armed with short spinules close to its truncate posterior border on each side. Sinuses deep, obovate, with broad membranes along their lateral edges. Narrow areas just outside them are traversed by longitudinal folds raised above the surface and expanded at the caudal end into oval lobes which cover the posterior openings of the sinuses. Lateral areas relatively broad terminating in blunt lobes which project for some little distance beyond thoracic area.

Fourth thoracic segment with a pair of oval dorsal plates covering anterior half of succeeding segment; the plates separated from each other by a deep, narrow, median crevice. Width of the segment across the plates  $\frac{3}{7}$  that of carapace, and the length inclusive of these  $\frac{2}{3}$  the width. Genital segment large, about half as long as carapace on the midline, and same time as wide on an anterior level. It is convex dorsally, more or less quadrate, with antero-lateral angles slightly produced, and with posterior border emarginate. It is reinforced laterally near the caudal end by triangular lamellae and at the caudo-lateral angles by long lanceolate diagonal processes. Outer and caudal margins of the lamellae, inner margins of the processes, anterior portions of lateral margins and lateral portions of caudal margin fringed with a row of sharp spines. Caudal margin also with a pair of

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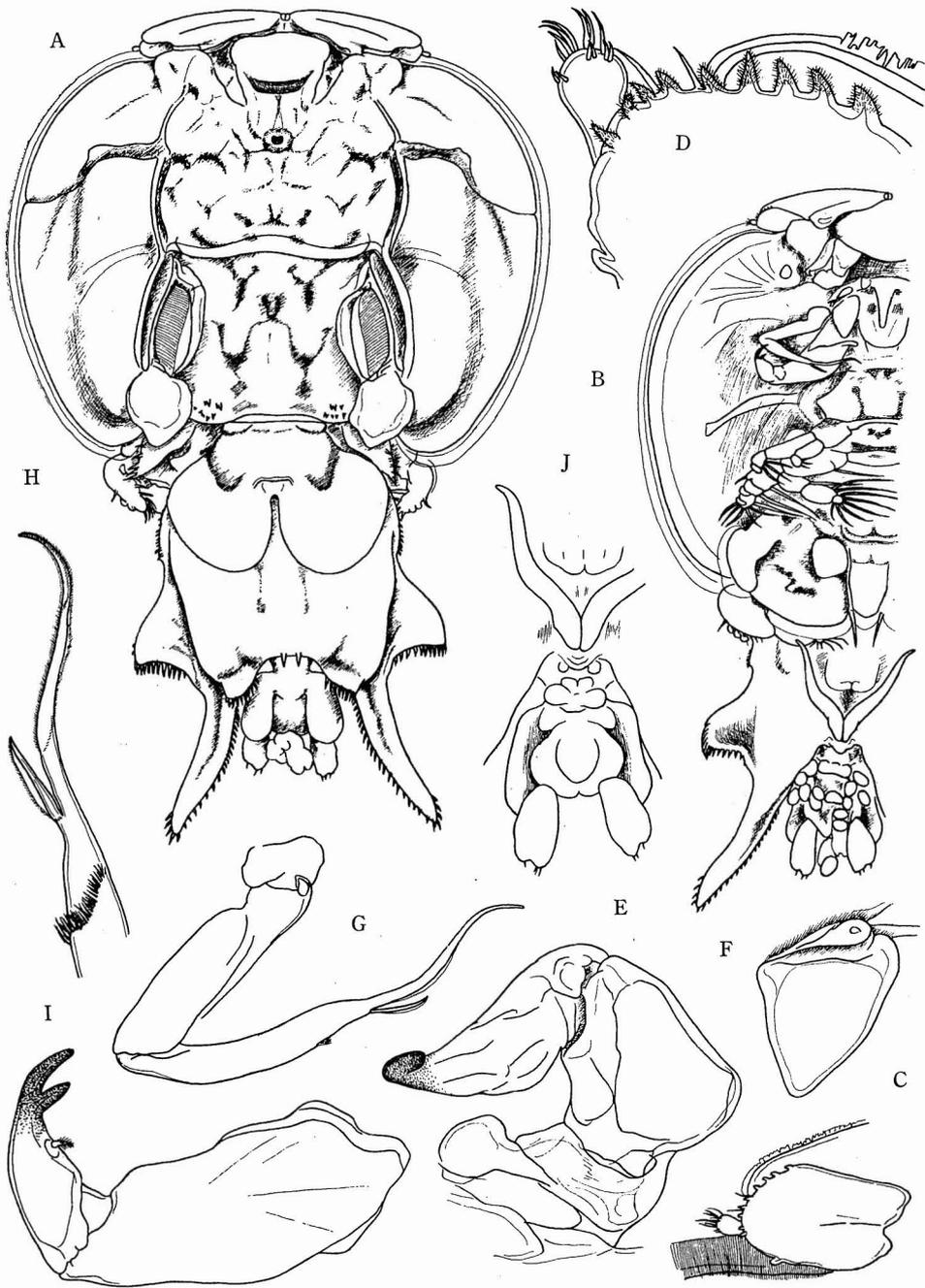


FIG. 1. *Alebion echinatus* Capart, female. A, dorsal aspect; B, ventral aspect; C, first antenna, ventral aspect; D, tip of same, further enlarged; E, second antenna; F, second maxilla; G, first maxilliped; H, tip of same, further enlarged; I, second maxilliped; J, posterior end of body, ventral aspect.  
 A  $\times 7.1$ , B  $\times 5.9$ , C, F, G, I  $\times 27$ , D  $\times 83$ , E, H  $\times 41$ , J  $\times 9.8$ .

TABLE 1.  
DETAILS OF ARMATURE ON LEGS OF *Alebion echinatus* CAPART

LEG	BORDER	STERNAL PLATE	PROTOPODITE	EXOPODITE			ENDOPODITE		
				I	II	III	I	II	III
I.....	outer inner		1p	c	1H, 1H 3P, 2p			c 3p	
II.....	outer inner	f	f, 1p 1P, f	f, 1H c, 1P	1H c, 1P	1H c, 6P	c 1P	c c, 2P	6P
III.....	outer inner	f	f, 1h, 5h 1P, f	1H c, 1P	c, 1H c, 1P	c, 2H, 1h 5P	c	c c, 2P	4P
IV.....	outer inner			2p, 1h					

Abbreviations: c, row of hairs; f, membranous flange; H, longer spine; h, shorter spine; *H*, modified spine peculiar to the genus; P, longer plumose spine; p, shorter plumose spine. Roman numerals indicate the numerical orders of the legs or of the joints and Arabic the number of spines or other armature present on each.

stouter spines, one on each side of midline. A pair of horn-like spermatophores are attached on the ventral surface close to posterior end, with their apices directing forwards and diverging. Abdomen two-segmented, small, not surpassing the middle of diagonal processes of the preceding segment. First segment is narrowly inserted into median sinus of preceding segment then widens posteriorly, bearing a pair of small oboval, dorsal plates, which are parallel and separated from each other by a deep, wide, median sinus. Ventral surface has inconspicuous, symmetrically arranged tubercles. Second segment is cordiform and covered from above by dorsal plates of the first, beyond which it does not extend.

First antennae with apical joint short, terminating in a swollen, spinulate knob; basal joint obovate and fringed on anterior border by short, conical, thickly ciliated spines as well as by a few setae. Claw of 2nd antennae tapering towards curved blunt apex and without accessory spinule, middle joint conical, and basal one short, broad, with an oval boss on the outside. Mouth tube elongate conical. First maxillae replaced by small, insignificant oval bosses. Second maxillae triangular, placed outside the base of mouth tube. Apical joint

of 1st maxillipeds traversed near the tip by a diagonal row of spinules and terminating in two unequal flagella, both edged with fine pectination. Second maxillipeds have nearly fusiform palm and powerful finger ending in bifurcate tip and carrying a short plumose spinule on inner border. Sternal furca absent.

First three pairs of legs biramous, with both rami two-jointed in first pair, three-jointed in other two. Endopodite of first legs half as long as exopodite, first joint of both rami proportionally much longer than second. Two apical joints of exopodite of second legs short. Distal joint of endopodite of second legs narrow. Exopodite of third legs shorter and narrower than endopodite, apical joint of latter much reduced. Fourth legs are minute papilliform stumps without any distinct articulation. Arrangement of spines and other armature of legs is given in Table 1.

Exopodites of first three legs armed with falciform spines, peculiar to the genus, their distribution on the legs is shown in Table 1. Two spinules on inner margin of apical exopodite joint of first legs edged with a few cirri only. Basal apron combining third legs has two triangular, raised areas on posterior face on each side, outer one of these with a

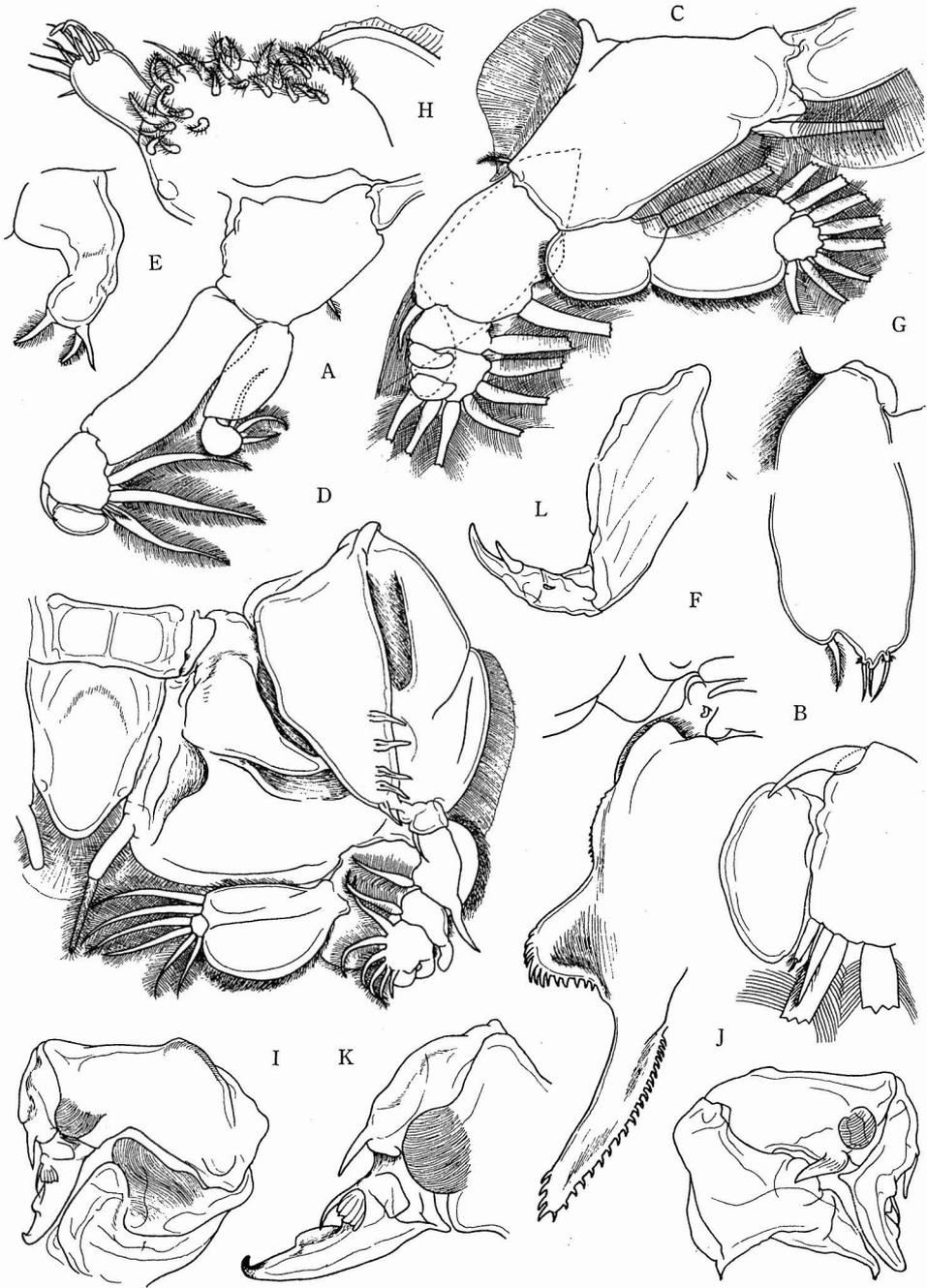


FIG. 2. *Alebion echinatus* Capart, female and male. A-G, female; A, first leg; B, tip of same, further enlarged; C, second leg; D, third leg, posterior face; E, fourth leg; F, posterior part of body; G, caudal ramus; H-L, male; H, first antenna, ventral aspect; I, second antenna, posterior face; J, same, anterior aspect; K, tip of same, further enlarged; L, second maxilliped.

A, L  $\times 27$ , B, H, K  $\times 83$ , D  $\times 18.6$ , E  $\times 120$ , F  $\times 10$ , G  $\times 34$ , I, J  $\times 47$ .

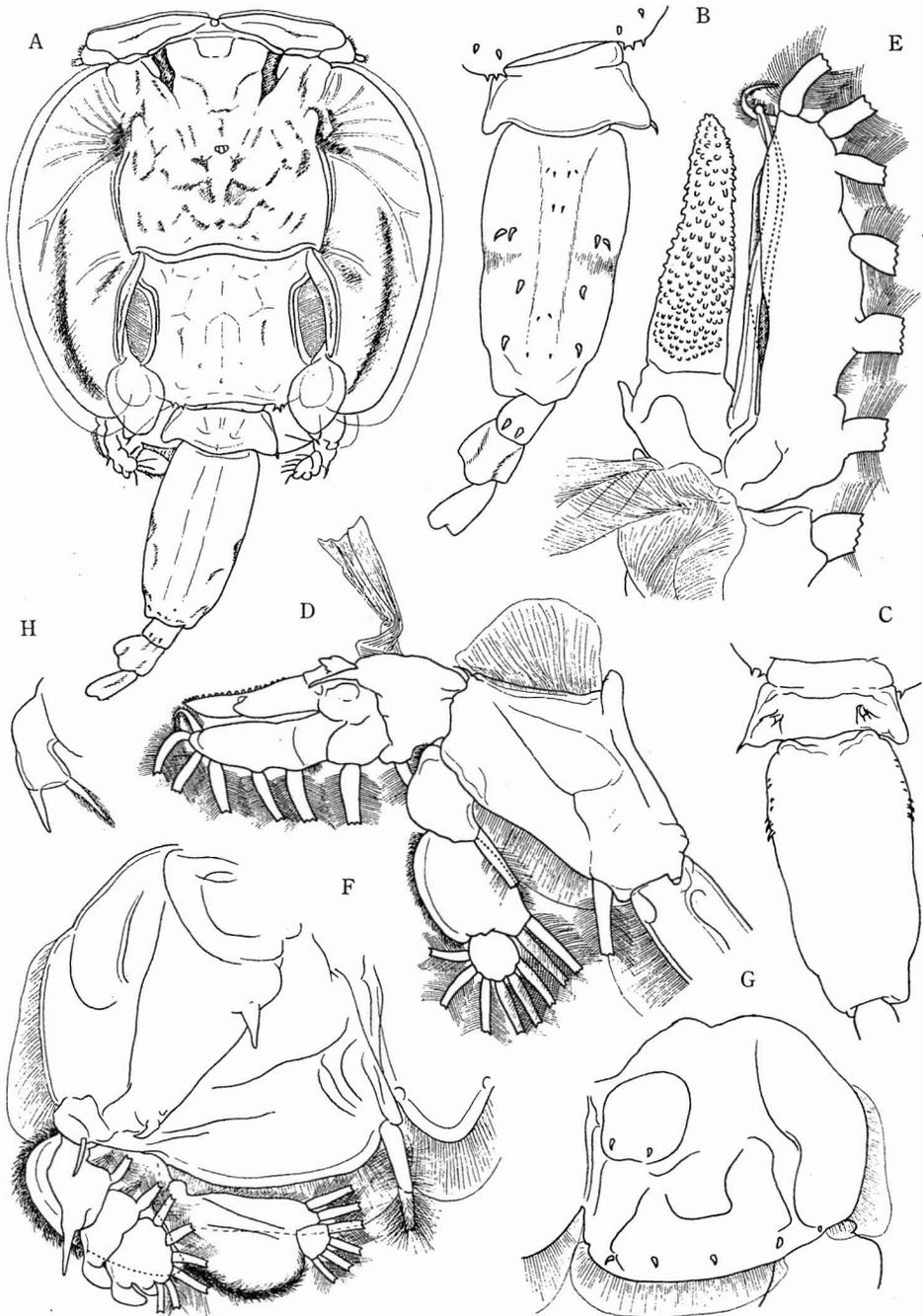


FIG. 3. *Alebion echinatus* Capart, male. A, dorsal aspect; B, free segments of body, dorsal aspect; C, same, ventral aspect; D, second leg; E, same, tip of exopodite, further enlarged; F, third leg, posterior face; G, same, anterior face; H, fourth leg.

A  $\times 10$ , B, C  $\times 14$ , D  $\times 41$ , E  $\times 83$ , F, G  $\times 34$ , H  $\times 170$ .

row of five spines; much feebler spinules are scattered on anterior face chiefly along margin. Plumose spines on the apron biarticulate, their distal article hairy all around its circumference. Caudal rami subterminal, obovate, with notched end where they bear three simple and one plumose spines, all short.

*Male* (Allotype, Figs. 2*b-l*, 3): Paler than female,  $9.2 \times 5.5$  mm.

Carapace resembling that of female in outline, frontal plates relatively wider, attaining  $3/5$  the entire width, and spinules on thoracic area smaller in number. Fourth thoracic segment  $2/7$  as wide as carapace,  $2/5$  as long as its own width, trapezoidal, with dorsal plates reduced into small, triangular lateral lobes ending in sharp spinule; posterior margin slightly convex on the median. Genital segment oblong, twice as long as wide and half as long as carapace. It carries a number of spines regularly arranged over dorsal face and those crowded along anterior parts of lateral borders on ventral face. Abdomen short and narrow, two-segmented, about  $2/5$  as long as preceding segment. First segment quadrilateral, with a pair of spines on dorsal side; second segment as long as the first, but widening backwards and with a round median boss at the end.

Spines on basal joint of first antennae thinner, more numerous, and covering somewhat wider marginal area than in female. Consecutive joints of second antennae peculiar in structure and articulating one with another at right angles. First joint has at outer distal angle a low triangular bulge with file-like surface, and articulates with second joint by inner distal angle. Second joint is cylindrical, and carries a sharp, proximally projecting spine at inner distal angle on posterior side and two round bosses with filed surface on terminal border, one on anterior and posterior sides respectively. Third joint is attenuating towards the curved tip, and furnished on inner border about the middle with a short conical process and along outer border with three low bosses, basal one of these being

tipped by a sharp spine and succeeding one bearing, in addition to it, a series of narrow folds resembling petals of a flower. Second maxillipeds somewhat feebler than in female, but similar in structure.

Exopodite of second legs complicated in structure: First joint shorter than corresponding one of female. Second joint bears at its outer distal angle a long, cylindrical process which extends alongside with outer margin of elongate third joint as far as to its tip. The process is thickly covered over its posterior face by minute papillae, and carries on the outside close to the base a short finger-like process and on the inside a long whip-like appendix, which reaches the tip of the process and ends in a small ciliated knob. Third joint is elongate, but narrower than others, and its outer border is grooved to receive the named appendix of second joint. Outer, triangular ridges on basal apron of third legs provided with no more than two spines. Fourth legs tipped by simple and plumose spine. Caudal rami damaged. In other characters as in female.

Preserved in Mie Prefectural University.

REMARKS. *A. echinatus*, found originally on *Sphyrna diplana*, is a parasite of *S. zygaena* in the present case. As already pointed out by Capart, the female of this parasite closely resembles that of *A. crassus* Wilson which infests the latter host. It is noteworthy that the two parasites on the same host are more nearly allied to each other than they are to any other species of the genus. They are also close to each other in the characters of the male. The fourth segment of the male *echinatus*, however, is not constricted in front to form a short neck as in *crassus*.

#### REFERENCES

- CAPART, A. 1953. Quelques copépodes parasites de poissons marins de la région de Dakar. *Inst. Franç. d'Afrique noire, Bul.* 15: 647-671.
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