

*Alicalgus tripartitus* gen. et sp. nov., a Caligid Copepod  
found on the Gills of *Sarda orientalis* (T. & S.)<sup>1</sup>

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THE NEW PARASITIC COPEPOD which forms the object of the present paper was found by the author on the gills of *Sarda orientalis* (T. & S.) at Owase, Mie Prefecture, Japan. It was rather small and its outward appearance was very peculiar. A closer examination revealed that it belongs to the suborder Caligoida and, according to the structure of the first and the last legs, ought to be classed within the family Caligidae. However, it cannot be referred to any of the hitherto known genera of this family, but evidently forms the type of a new genus, the diagnosis of which is given below. The parasite sticks to a host gill filament lengthwise, grasping it by the second maxillipeds and directing the tail to its free end. Unlike ordinary caligids, the new one does not appear to be capable of swimming, at least in the mature stage.

**ALICALIGUS** gen. nov.

**FEMALE.** Cephalon and first 3 thoracic segments fused into a strongly convex carapace, with its lateral parts bent ventrad as paired folds. Fourth segment small, without dorsal plates. Genital segment expanded, much larger than carapace. Abdomen likewise dilated, 1-segmented. Frontal plates with sucking disks. Cephalic appendages as in *Caligus*.

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First maxillae and sternal furca absent, second maxillae close to sides of mouth tube. First and last pairs of legs uniramous, 3-jointed. Other legs biramous, with rami 3-jointed in second pair, but 1-jointed in third pair. Endopodites of latter rudimentary. Caudal rami laminate.

**MALE.** In general appearance much different from female, but resembling ordinary caligid males. Carapace flattened; neither genital segment, nor abdomen expanded. First maxillae present. Otherwise as in female.

Type species: *Alicalgus tripartitus* n. sp.

*Alicalgus tripartitus* sp. nov.

Figs. 1, 2

5 females and 3 males. One of them, a female, has been selected as the holotype, others are paratypes. They are preserved in Mie Prefectural University.

**FEMALE.** Body divisible into 3 regions, connected one with another by narrowed articulation: carapace, fourth thoracic plus genital segments, and abdomen. Length 3.13 mm., carapace  $0.83 \times 1.00$  mm., fourth plus genital segments  $1.08 \times 1.68$  mm., abdomen  $1.30 \times 1.52$  mm., and egg strings  $1.62 \times 0.33$  mm. Opaque, whitish, without pigment.

Carapace quadrilateral in dorsal view, strongly convex above, with lateral parts curved ventrad as a pair of oblong folds. Front somewhat prominent medially, eyes close to anterior end. Dorsal surface uneven, more or less rugose, hardly divisible into dis-

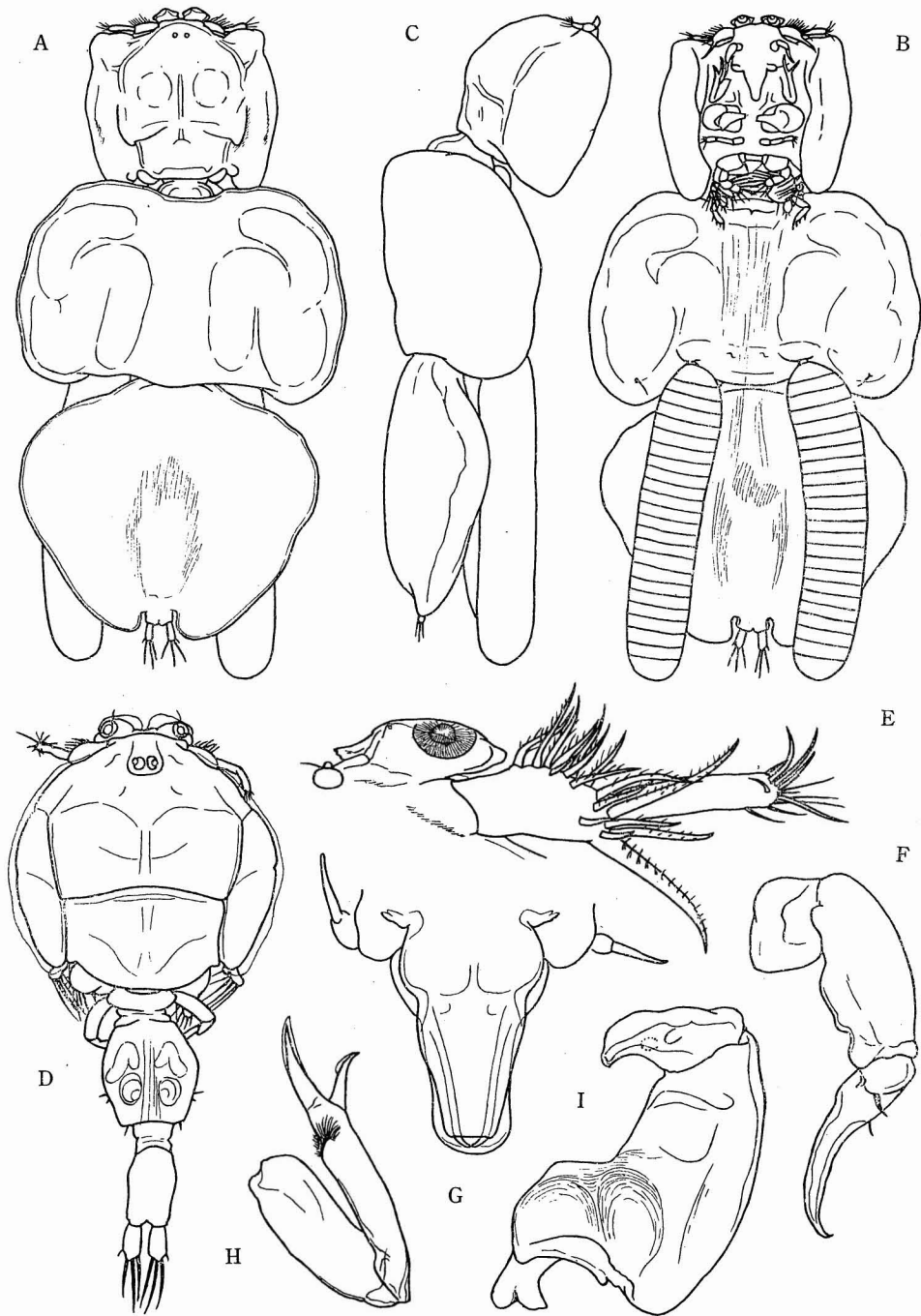


FIG. 1. *Alicaligus tripartitus* n. sp. A-C, dorsal, ventral, and lateral aspects of female; D, dorsal aspect of male; E-I, female; E, first antenna with sucking disk, ventral aspect; F, second antenna; G, mouth tube and second maxillae; H, first maxilliped; I, second maxilliped. A-C  $\times 27$ , D  $\times 47$ , E, G, H  $\times 170$ , F  $\times 340$ , I  $\times 120$ .

TABLE 1  
ARMATURE OF THE LEGS OF *Alicalgus tripartitus* N. SP.

LEGS	BORDERS	STERNAL PLATE	PROTOPODITE		EXOPODITE			ENDOPODITE		
			I	II	I	II	III	I	II	III
I.....	outer inner		1p 1p		1h c	4H c				
II.....	outer inner	f	1P, 1rh	f, 1h f, 1rh	f, 1H c, 1P	1H c, 1P	1rh, 1h, 1Q 5P	C 1P	C c, 2P	6P
III.....	outer inner	f	C, 1h 1P, f, 1rh, CC		1H', 2CC 1p, 2H			C 1P		
IV.....	outer inner		1p		1H	3H				

Abbreviations in the table: C, row of cirri; CC, area covered with cirri; c, row of hairs; f, membranous flange; H, longer spine; h, shorter spine; H', hook; P, longer plumose spine; p, shorter plumose spine; Q, spine ciliated on one side, rimmed with membrane on the other; rh, rudimentary spine. Roman numerals indicate the numerical orders of legs, or of joints composing them, and Arabic the numbers of spines or other structure with which they are armed.

tinct areas; grooves bordering areas largely obliterated leaving a pair of L-shaped wrinkles on posterior region. Fourth thoracic segment small, 0.3 as wide as carapace, one-third as long as wide, and narrowed anteriorly. Genital segment longer than carapace, more than a half wider than its own length; lateral parts expanded as a pair of wings, slightly bent ventrally, with well-rounded margins. Anterior margin with shallow median depression to receive the preceding segment, posterior margin with insignificant obtuse lobe on either side. Abdomen expanded as a flattened, cordiform region which is only slightly narrower than genital one, but longer, and wider anteriorly than posteriorly. Its anterior end abruptly narrowed for articulation with genital segment, posterior end produced as pair of blunt lobes with shorter, narrower, quadrate, median lobe between them.

Frontal plates a pair of small, transversely fusiform lobes, separated by a median sinus; each lobe with an oval sucking disk on ventral face, not covering first antenna. First antennae with apical joint rodshaped, tipped by stiff setae, basal joint more slender than usual, but fringed with relatively longer plumose

spines. Terminal joint of second antennae with sharp, slightly curved tip and 2 basal spinules, preceding joint about as long as terminal, but broader, with rugged posterior border, basal joint very short. Mouth tube broad, conical. First maxillae absent. Second maxillae close to side of base of mouth tube, with swollen base and fusiform apex. First maxillipeds end in 2 unequal, sharp, winged claws and with transverse row of setae a little before base of claws. Palm of second maxillipeds with strong basal bulge on inner side, claw with 2 papillae, one on each side of broad base. (Terminal part of the claw was unfortunately damaged when the body was detached from the host gill in all specimens.) Sternal furca wanting. All pairs of legs small and feeble. Setae fringing spines of legs rather sparser than in ordinary caligids. Armature of each pair of legs as indicated in Table 1.

First legs devoid of any spines on inner border of third joint; terminal spines unequal in length, with or without fringing hairs. Rudiment of endopodite in the form of relatively large, conical lobe. External spine on first two exopodite joints of second legs well-developed and pectinate on two opposite sides;

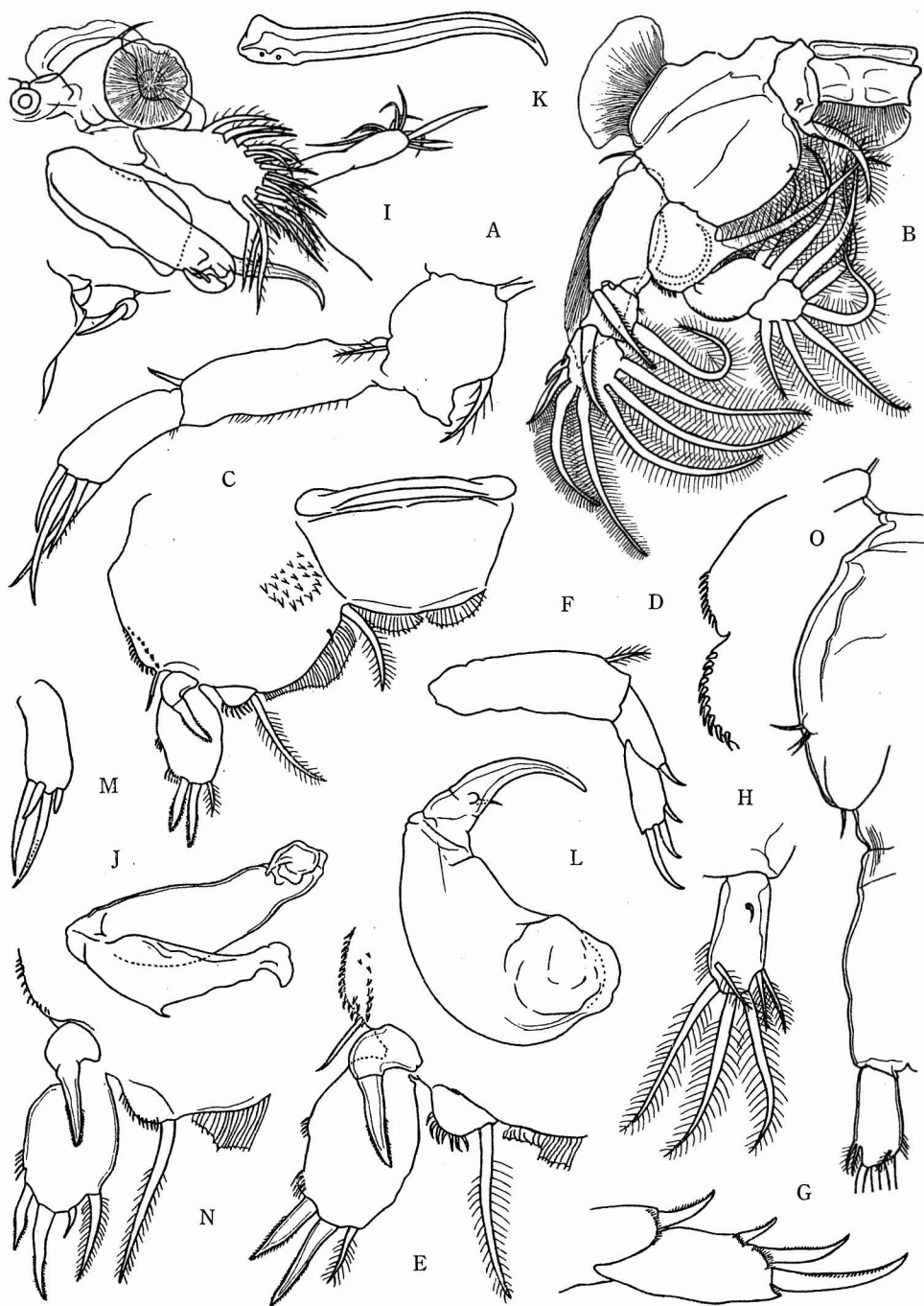


FIG. 2. *Alicaligus tripartitus* n. sp. A-H, female; I-O, male. A, first swimming leg; B, second leg; C, third leg; D, external border of first two endopodite joints of second leg; E, rami of third leg; F, fourth leg; G, apical part of same; H, caudal ramus, ventral aspect; I, frontal plate, first and second antennae, first and second maxillae, in situ; J, second antenna; K, first maxilla; L, second maxilliped; M, apical joint of first leg; N, rami of third leg; O, posterior part of body, ventral aspect. A, D, E, G, K, M, N  $\times 340$ , B, F, H, I  $\times 170$ , C, J  $\times 202$ , L, O  $\times 120$ .

basal spine on outer border of third joint rudimentary, middle one stouter, apical one ciliated on inside, winged on outside. Exopodite of third legs obovate, with two outer, finely pectinate spines and inner plumose one; apical portion of basal hook elongate, straight, and doubly edged with fine pectination. Endopodite small lunular lobe indistinctly separated from basal apron. Ventral face of latter with short cirri covering small area close to boundary with median plate. Fourth legs 3-jointed. Apical spines graded in length from within outwards, middle one subequal to one on penultimate joint, each finely pectinate and accompanied at base by transverse row of minute spinules. Genital segment with short spine on ventral face of each posterolateral lobe. Caudal rami terminal, oblong, armed with 3 plumose spines at end, another similar, but much shorter, at inner distal angle, two at outer angle, and minute cirrus on ventral face near anterior end, also with row of hairs on inner border. Egg tubes relatively broad not extending much beyond abdominal end.

MALE. Similar to other caligid males in general appearance;  $1.45 \times 0.79$  mm., excluding caudal rami. Transparent, colorless.

Carapace half length of body, about as long as wide, orbicular, with well-rounded sides, and slightly convex above; anterior border narrow. Dorsal ribs forming **H**, dividing carapace into narrow lateral and broad central areas. Longitudinal ribs straight, slightly divergent forward, reaching nearly to carapace margin, each united to margin by short diagonal rib. Transverse rib at posterior three-fifths of carapace, only slightly arched forward. Eyes close to anterior end of cephalic area. Thoracic area broadly rounded on free margin, which extends beyond lateral lobes. Sinuses undeveloped. Fourth thoracic segment about one-fourth as wide as carapace, half as long as wide, widest through limb bases, having acuminate sides and short, more or less rugose, posterior waist. Genital segment two-fifths as long as and two-fifths as wide as carapace,

barrel-shaped, with broadly rounded sides. Abdomen slightly longer than preceding segment, but narrower, and 2-segmented; anterior segment short, somewhat wrinkled on surface and irregular on sides, posterior segment much longer, oblong, with even sides and bifurcate end.

Frontal plates small, but prominent, and separated by broad median sinus, each with broad membrane and short spinule as well as circular disk. Terminal joint of second antennae short but sharp, prehensile claw, with one spine; second joint columnar and folded over basal joint which articulates with sternum by broad base. Each first maxilla an elongate spine, with slightly curved tip. Palm of second maxillipeds with large basal bulge on anterior face; claw elongate, sharp, well-curved, with short spinule on posterior face and papilla on other face. Exopodite of third legs with short extra spine next outside innermost spine, their basal apron without spine on outer margin. Genital segment with fifth and sixth leg rudiments on ventral surface, fifth somewhat behind center of segment on either side as papilla tipped by 3 spinules, sixth represented by broad, longitudinal ridge at each posterolateral angle with single spinule remaining. Otherwise as in female.

REMARKS. *Alicalgis* appears to be more or less nearly allied to *Caligodes* Heller, *Parapetalus* Steenstrup and Lütken, and *Abasia* Wilson, all of which have the posterior body segments either expanded or elongate. It may be distinguished from the species already known in those genera by one or a combination of the following characters: the fourth segment is very small in size, the genital segment has no processes of any kind, and the abdomen is not only elongate, but also expanded. Although the new genus resembles most closely *Parapetalus hirsutus* (Bassett-Smith) in the constitution of those segments, it is much different in the mode of life and in the structure of the carapace. The present species clings to the host gills without moving

about, whereas *P. hirsutus* crawls over the inside of the gill operculum, and is, further, capable of swimming to a certain extent. The carapace in the former has the lateral parts folded over ventrally and is not flattened as in the latter. In this point, *Alicalgus* differs from *Caligodes* also, but resembles *Abasia*. The carapace of *Alicalgus*, however, is not produced forward as a narrowed neck and is furnished with sucking disks on the frontal plates. In addition the genital segment and the abdomen are relatively broader than in *Abasia*. *Alicalgus* differs, finally, from any of the known genera in that the third legs have 1-jointed rami, the inner member of which is almost rudimentary.

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