



B R E V I O R A

Museum of Comparative Zoology

CAMBRIDGE, MASS.

OCTOBER 11, 1956

NUMBER 64

RARE SPECIES OF COPEPODA, CALANOIDEA, TAKEN FROM THE IZU REGION

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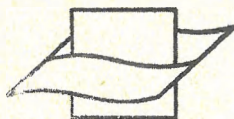
INTRODUCTION

The present paper is part of a report on the pelagic copepods of the Izu Region, the Pacific Coast of Middle Japan. About three hundred and twenty species have been described from that region and a list of the species has been published in "Records of Oceanographic Works in Japan," vol. 1, no. 1, 1953. However, owing to various difficulties, the descriptions and figures have not as yet been published.

The author wishes to express his thanks for help received from Dr. A. Fleminger, U. S. Fish and Wildlife Service, a fellow worker with whom he has had occasion to discuss various copepod problems during the past year, and Dr. Elisabeth Deichmann, Curator of Marine Invertebrates, in the M.C.Z., Cambridge, Mass. It is due to their efforts that he has now the pleasure of seeing this contribution in print.

RYOCALANUS gen. nov.

Diagnosis. Body elongate; head separate from first thoracic segment; fourth and fifth segments separate. Rostrum stout, one-pointed. Abdomen five-jointed in male. First antenna 24-jointed; eighth and ninth joints fused; male with right antenna transformed into grasping-organ; joints 23 and 24 fused, hinge between joints 22 and 23. Second antenna as in *Drepanopsis* Wolfenden, with three setae on inner margin of second joint of exopodite; first basal joint with a brush of hairs in posterior aspect. Mandible with slender palp; endopodite two jointed,



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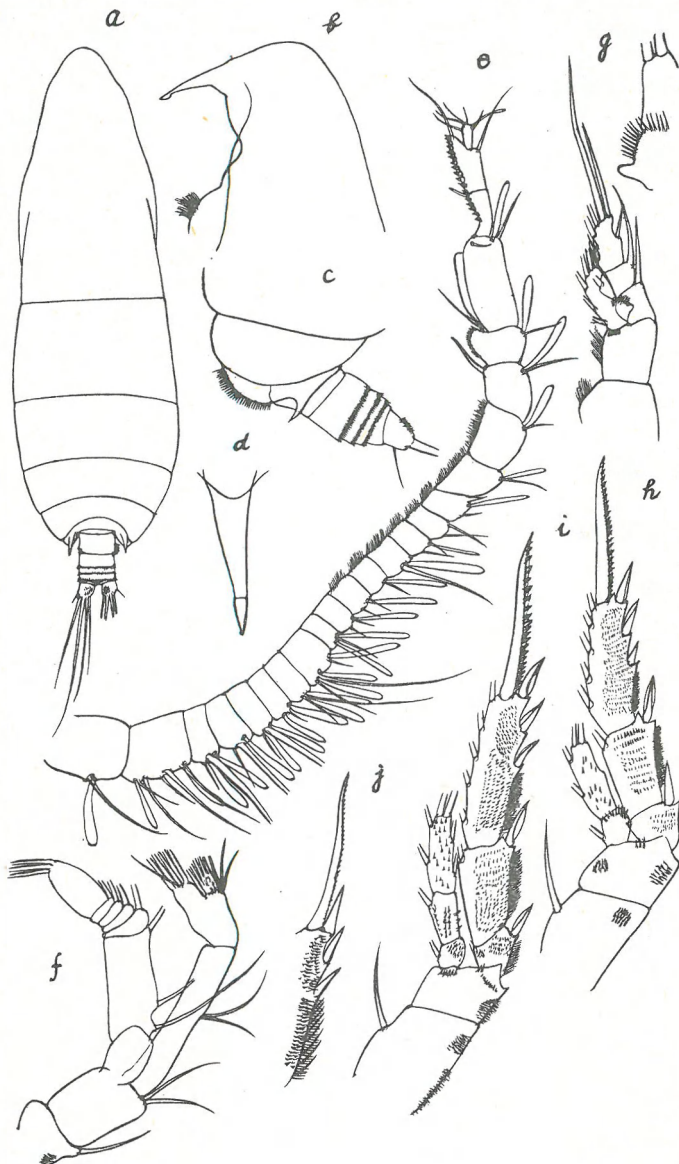


Figure 1. *Ryocalanus infelix* n. sp. a, Complete animal, dorsal view; b, head, lateral view; c, last thoracic segment and abdomen, lateral view; d, rostrum; e, grasping antenna; f, second antenna; g, first leg and proximal outer margin of endopodite; h, second leg; i, third leg; j, third joint of exopodite of fourth leg.



shorter than exopodite. First maxilla as in *Mimocalanus* Farran, but exopodite, second basal joint and lobes slender. Second maxilla as in *Pseudocalanus* Boeck; fifth lobe largest. Maxilliped as *Drepanopsis* Wolfenden except that distal two joints are furnished with well developed setae on outer margin. Swimming legs as in *Spinocalanus* Giesbrecht and *Monacilla* Sars except that distal joint of exopodite of first leg with a spine on outer margin at about mid-length of joint. Fifth pair of legs of male as in *Pseudocalanus*. Type species, *Ryocalanus infelix* n. sp.

RYOCALANUS INFELIX sp. nov.

Description. Male: Length, 2.18 mm.; cephalothorax, 1.93 mm.; abdomen, 0.25 mm.; head separate from first thoracic segment; last two thoracic segments separate; cephalothorax elongate, ovate; head contracted anteriorly; last thoracic segment produced into an acute spine on each side, ventrally directed; ventral margin of segment furnished with fine spinules; rostrum one point and acute, in lateral view with a notch on posterior surface near distal end.

Abdomen five-jointed; segments and furca with proportional length of 32, 18, 11, 7, 14, 18 = 100; first abdominal segment about half as long as wide, with fine spinules on distal corner of right side; second to fourth segments with spinules on distal margin; furcal ramus wider than long, with five setae, outermost seta short and slender; dorsal surface of ramus with minute spinules; appendicular seta short.

Left first antenna damaged, with distal joints missing; joints eight and nine incompletely fused on anterior margin; joints with following proportional lengths:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	20	14	5	5	5	5	4	7	5	6	6	6	6	6

Right antenna a grasping organ, extending to distal margin of second thoracic segment; joints eight and nine completely fused; joints 18 to 22 inflated; joint 20 with a strong seta on posterior margin; joint 21 with fine denticles and a seta on posterior margin; joint 22 highly chitinized on posterior margin and with a short distal seta; joint 23 and 24 incompletely separated, forming a comb-like projection with 19 denticles on posterior margin; posterior margin with a minute seta at junc-

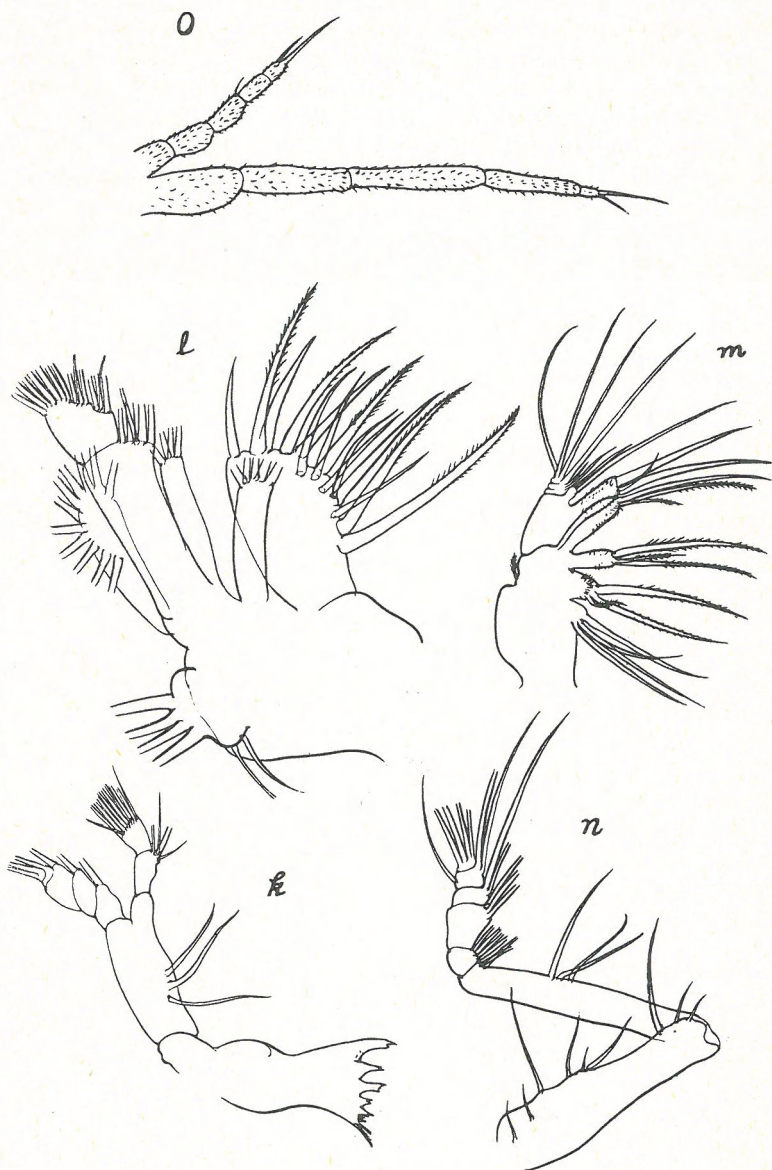


Figure 2. *Ryocalanus infelix* n. sp. *k*, mandible; *l*, first maxilla; *m*, second maxilla; *n*, maxilliped; *o*, fifth pair of legs.

tion with joint 24; joint 25 with five setae and an aesthetask; joints 12-19 with hairs on posterior margin.

Second antenna with exopodite about as long as endopodite; exopodite seven-jointed, second joint with three marginal setae; distal joint of endopodite with eight plus six setae. Mandible with exopodite slightly longer than endopodite; exopodite five-jointed; endopodite two-jointed; distal joint of endopodite with ten setae; second basal joint with three setae; cutting edge with eight teeth. First maxilla well developed; outer lobe with four long and two short setae; exopodite with eleven setae; endopodite with seven plus six plus four setae; second basal joint with five setae; third inner lobe with four; second inner lobe with five setae; first inner lobe with 14 spines. Second maxilla normal; first lobe with four setae, second to fifth lobe, each with three setae; sixth lobe with two setae, distal one short, endopodite with six setae; first basal joint with an outer marginal seta. Maxilliped slender; outer marginal seta on fourth and fifth joint of endopodite long; second joint of endopodite the largest.

First leg with three-jointed exopodite and one-jointed endopodite; outer edge spine on joints of exopodite long, third joint with four inner marginal setae and two outer marginal spines, distal half of outer margin hollowed; endopodite with three marginal setae, two apical setae and a process on proximal outer margin; second basal joint with row of spinules on inner distal margin at base of endopodite; exopodite of right leg with an abnormal structure, inner marginal setae on second and third joints of exopodite converted into strong spines. Second leg with three-jointed exopodite and two-jointed endopodite; joints of exopodite — especially second and third — densely covered with fine spinules on posterior surface; third joint with five inner marginal setae; posterior surface of joints of endopodite with groups of spinules; terminal spine of exopodite with 23 teeth connected with what appears to be a thin lamella; outer margin of second joint, and proximal section of third joint of exopodite with acicular spines and a row of slender, curved spines (as in Figure 1 *h*); this arrangement of spinules observed also in exopodite of third and fourth legs; basal joint with groups of minute spinules; third leg with three-jointed exopodite and endopodite; joints of exopodite and endopodite with spinules on posterior surface as

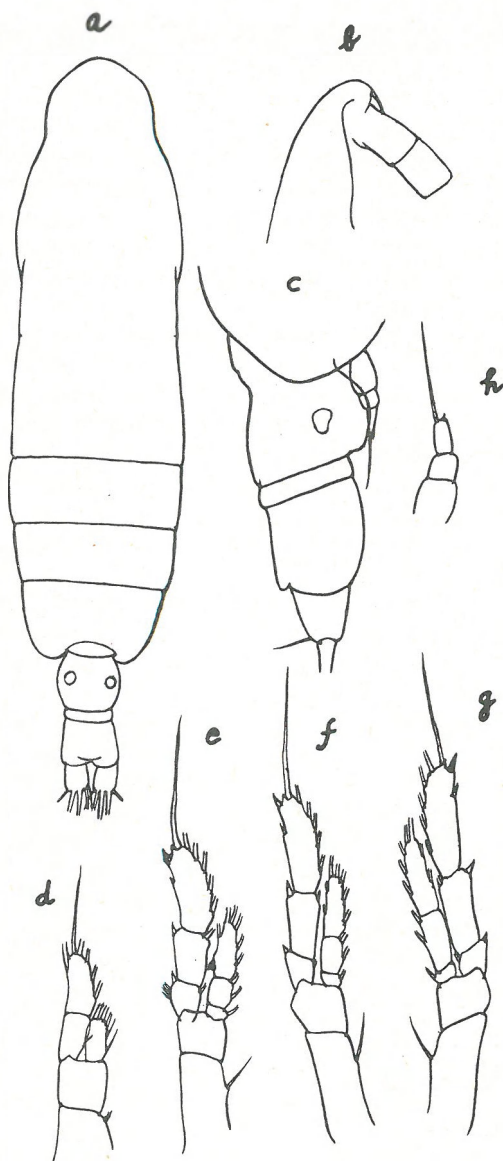


Figure 3. *Calocalanus gracilis* n. sp. a, Complete animal, dorsal view; b, head, lateral view; c, last thoracic segment and abdomen, lateral view; d, first leg; e, second leg; f, third leg; g, fourth leg; h, fifth leg.

in second leg; terminal spine of exopodite with 25 teeth; third joint of endopodite with six setae in all. Fourth leg with three-jointed exopodite and endopodite, and of similar structure as third leg; terminal spine of exopodite finely serrate.

Fifth pair of legs with five joints on each side; left leg much longer than right; terminal joints of each leg with two unequal apical spines; right leg with an outer edge spine on third joint.

Material. One adult male from a vertical haul, 1410 m.-0 m., near Izu, Suruga Bay, Japan (November 1938).

Material deposited. Kyushu University.

Remarks. The species appears to be allied to the genus *Autanepsis*, described by Wolfenden (1911, Report Deutsche Südpolar Expedition), in the structure of the swimming legs, but the mouth parts are entirely different. The grasping antenna of the present species differs from those found in the members of the tribe Heterarthrandria which have a movable articulation between the joints 18 and 19. The structure of the first to fourth legs resembles those of the Pseudocalanidae, yet the peculiar structure of the grasping antennae has not — as far as I am aware — been reported in the species hitherto described. At the present moment I therefore place this curious species in a new genus, under the name *Ryocalanus infelix*, in memory of my only son who lost his life in his early boyhood.

CALOCALANUS GRACILIS n. sp.

Description. Female: Length, 0.62 mm. Body slender, cephalothorax 3.5 times as long as wide; abdomen contained 4.8 times in length of cephalothorax. Abdomen with three segments, segments and rami with proportional lengths of 40, 8, 32, 20 = 100; genital segment as long as wide; furcal rami as long as wide.

Terminal joints of first antennae missing; length of the remaining joints as follows:

Joint	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	3.2	4.1	2.3	1.8	2.3	2.3	2.3	3.2	1.8	1.8	2.0	2.3	2.7	2.7

Swimming legs small; first leg with two-jointed exopodite and one-jointed endopodite; first basal joint with small spines on inner distal margin near the middle. Second to fourth leg each with three-jointed exopodite and three-jointed endopodite. First joint of exopodite of second leg with four small spines on outer

margin at base of outer edge spine. Third and fourth legs with joints of endopodite devoid of groups of spines on posterior surface; leaf-like spines of second and third joints of exopodite also absent. Fifth pair of legs three-jointed; terminal joint about as long as first joint, with an end-spine of similar length as the three joints taken together, and with a minute spine on outer distal corner.

Material. One adult female from a vertical haul, 50-0 m., near Izu, Suruga Bay, Japan (August 1937).

Material deposited. Kyushu University.

Remarks. Resembles *C. tenuis* Farran in dorsal view, but the small size and the structure of the swimming legs separate it from the latter which was originally described from the Bay of Biscay.