A Laboratory Key for the Identification of *Corophium* Species (Amphipoda, Corophiidae) of British Columbia

by Gernot Otte

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RAPPORT TECHNIQUE N°. 519

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by

Gernot Otte[1]

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West Vancouver, B.C.

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ABSTRACT

Otte, Gernot. 1975. A Laboratory Key for the Identification of *Corophium* Species (Amphipoda, Corophiidae) of British Columbia. Fish. Mar. Serv. Res. Dev. Tech. Rep. 519, 24 p.

A "working key" for the laboratory identification of the genus *Corophium* (Amphipoda, Corophiidae) from British Columbia is presented. Species from other areas of the northeast Pacific are mentioned and drawn. Descriptions from the original taxonomic literature, with some new remarks and drawings, are summarized in a convenient form for use by non-specialists. Suggestions for identification procedures are provided.

RESUME

Otte, Gernot. 1975. A Laboratory Key for the Identification of *Corophium* Species (Amphipoda, Corophiidae) of British Columbia. Fish. Mar. Serv. Res. Dev. Tech. Rep. 519, 24 p.

Présentation d'une "clé de travail" pour l'identification en laboratoire de crustacés amphipodes du genre *Corophium*, des côtes de Columbie Britannique. D'autres espèces du même genre provenant du Pacifique nord-est sont aussi mentionnées et figurées. Les descriptions sont celles données par les auteurs originaux; quelques nouvelles remarques et nouveaux dessins ont été ajoutés. Le tout a été résume sous une forme pratique, afin de pouvoir être efficacement utilisé par des non spécialistes. Des suggestions de procédure à employer pour faciliter l'identication spécifique sont aussi fournies.

INTRODUCTION

Increasing interest in applied ecology, especially projects concerned with environmental issues, is accompanied by a requirement for good biological literature to use for identification purposes. For environmental impact studies, it is preferable to identify organisms from surveys to the species level, and this is absolutely necessary for bioassay work. The taxonomic literature, however, is usually not readily available to the non-specialist. For the large and important group of marine and brackish-water benthic amphipods on the Pacific coast of Canada, there are almost no keys to work with.

The purpose of this report is to provide a working guide for the laboratory identification of the amphipod genus *Corophium* from British Columbia. *Corophium* is one of the most significant amphipod genera in marine and estuarine habitats, but it is also one of the more difficult groups to identify. For this genus, Shoemaker (1949) gives short descriptions of or remarks on all *Corophium* species found up to that time on the west coast of America. Unfortunately, he did not provide a key in this latter publication, and his drawings were only from new or typical west coast species. To identify other species, it is necessary to examine a number of other papers (e.g. Crawford 1937; Shoemaker 1934 to 1941), which complicates identification. The present paper is a "working key" to *Corophium* from B.C., prepared from the available literature, and from personal identifications by the author. Most of the figures are from Sars (1890) and Shoemaker's papers, but some have been drawn by the author.

The "working key" developed from the author's studies of benthic communities near a sewage outfall on the Fraser River estuary, British Columbia (Otte and Levings, MS, 1975).

SUGGESTIONS FOR THE IDENTIFICATION OF *COROPHIUM*

Initially, samples with many specimens should be examined to find both sexes and several age stages. Without experience, one should not attempt to identify a single specimen.

It is preferable to search first for adult males, which are the largest animals, with long antennae II bearing well-developed teeth on the fourth article (Figure 1). The adult males are the easiest to identify, and other specimens should then be separated into males and females. Juveniles usually cannot be identified without a great deal of experience, because all characters are variable and develop gradually until the adult stage is reached. Females can often be distinguished as soon as their oostegites begin to develop, but these structures can easily be confused with the gills in immature specimens. Well developed oostegites in adult females are larger than the gills and are flat with long bristles on both sides (Figure 2). Oostegites from either side of the body extend to the opposite side and overlap, forming a secure chamber within which the eggs develop.

The most useful characters to distinguish the species are the shape of antenna I, antenna II, the urosome, and the uropods, respectively. Sometimes the shape of the rostrum is useful. On the other hand, the lengths of the antennae are variable and therefore are not a reliable feature. Some characters mentioned in the key are subject to slight variation owing to environmental effects. For example, there can sometimes be an extra spine or a spine missing on the third article of antenna II in females. Nevertheless, the average specimen does fit the key or description.

This key should be used for quick orientation and for routine identification from a large number of samples. After consulting the original descriptions, identification of *Corophium* species should be easier using this

key, the new arrangements of original figures, and the new drawings. Workers are advised to refer to the full descriptions provided by Sars, Crawford, or Shoemaker in addition to the present key if there is any doubt about the species.

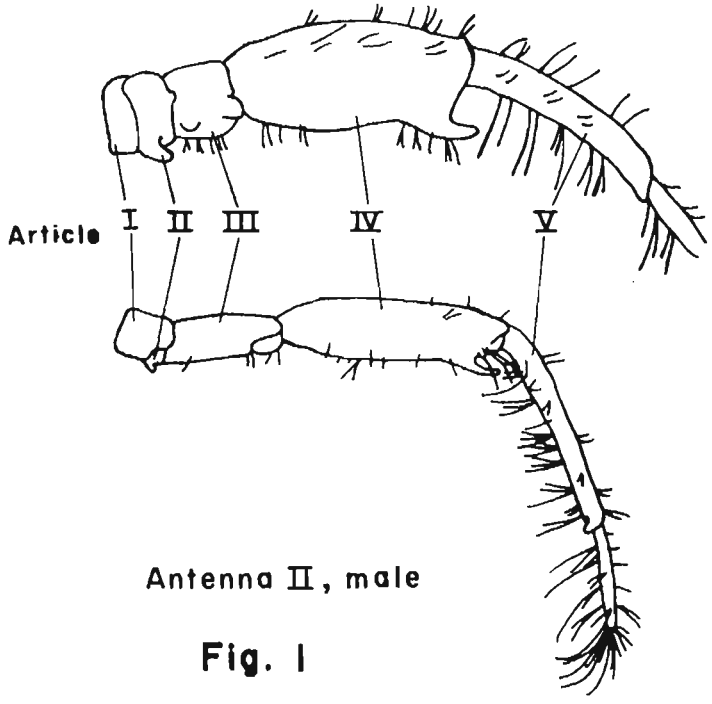


Figure 1: Antennae II of male *Corophium* spp., showing major features and numbering system for articles. Schematic drawing by the author.

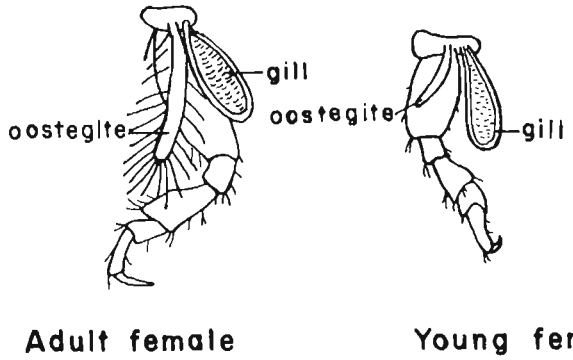
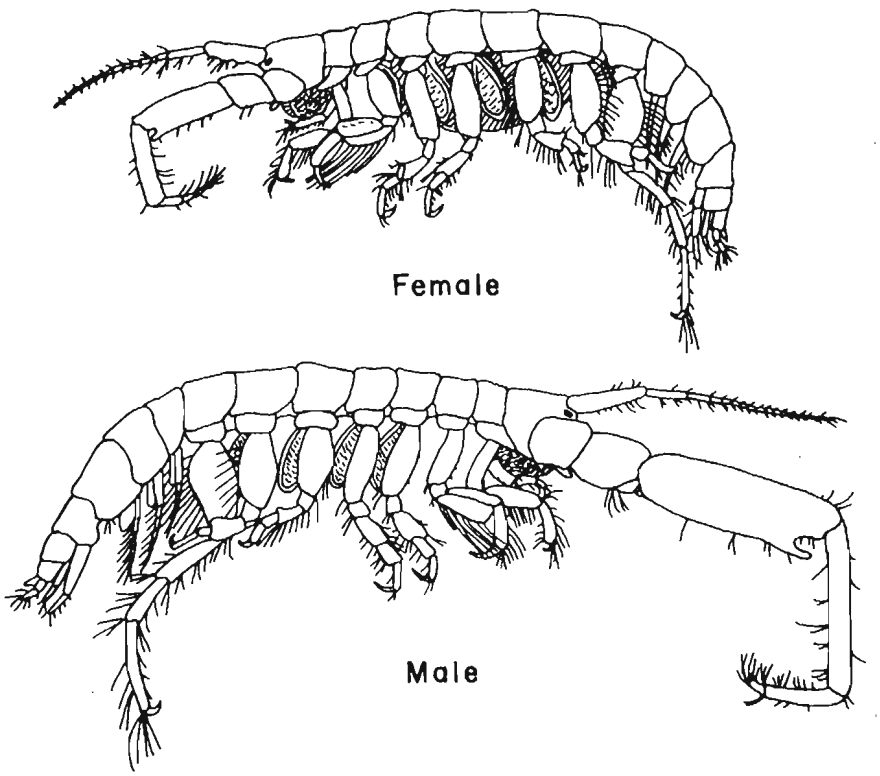


Figure 2: Morphology of oostegites in mature and immature females of gammarid amphipods. Schematic drawing by the author.

Corophium: Diagnosis of the genus

Body depressed ("isopod-like"). Head with eyes and anterior lobes (epistom).
Antenna I: equal to or shorter than antenna II; without accessory flagellum. Article three shorter than article one. Flagellum longer than article three, multiarticulate.

Antenna II: medium stout (often pediform), flagellum much shorter than article five and segments fused. Sexually dimorphic; in males often with weak teeth on article four and five. Coxal plates short and separated (not touching serially).
Mandibular palps weak and two-articulate.
Gnathopods alike between the sexes; gnathopod one subchelate.
gnathopod two simple, article four heavily setose.
Paraeopods with elongate dactyls.
Uropods one and two biramous, uropod three uniramous
and flattened, peduncle and ramus similar, urosomes fused or articulate.
Telson small, triangular (Fig. 3).



Corophium spec. (type)

Fig. 3

Figure 3: General features and body plan of genus *Corophium* (from Sars, 1890).

Table 1: Species of *Corophium* recorded from Pacific Coast of North America.

Species	Description	recorded from
	Species with separate urosomes	
C. salmonis Stimpson	Shoemaker 1949	B.C., Washington, Alaska
C. brevis Shoemaker	Shoemaker 1949	B.C., Washington, Alaska, California
C. spinicorne Stimpson	Shoemaker 1949	B.C. Washington, Alaska
C. stimpsoni Shoemaker	Shoemaker 1941, 1949	California
	Species with fused urosomes	
C. acherusicum A. Costa	Shoemaker 1934; Crawford 1937	B.C., Alaska, California
C. insidiosum Crawford	Crawford 1937	B.C., Washington, California
C. crassicorne Bruzelius	Stebbing 1906, Crawford 1937 Shoemaker 1947	Alaska
C. baconi Shoemaker	Shoemaker 1934, 1949	California, Bering Sea
C. clarescense Shoemaker	Shoemaker 1949	Alaska
C. oaklandense Shoemaker	Shoemaker 1949	California
C. uenoi Stephenson	Crawford 1937	California, (Japan)
C. californianum Shoemaker	Shoemaker 1934, 1949	California (questionable species)

KEY TO THE *COROPHIUM* - SPECIES FROM THE PACIFIC COAST OF BRITISH COLUMBIA,CANADA

Segments of urosome separate A
Segments of urosome fused B

A

1a. Specimen with oostegites (♀♀) 4

b. Specimen without oostegites (♂♂ or juveniles) 2
(Juveniles not reliable to identify)

2a. Fourth article of antenna II stout and strong lower margin produced distally into a strong, forward-curving tooth (no small tooth above it):
C. spinicorne (Figure 4)

b. Fourth article of antenna II with lower margin produced distally into a strong curved tooth above which is a smaller tooth (sometimes difficult to observe) 3

3a. Third article of antenna II longer than or twice as long as article one, second article bearing a short, blunt, forward-curving gland cone. First article of antenna I with inner margin expanded into a broad rounding lobe which overlaps in fully grown males that of the opposite antenna:
C. salmonis (Figure 4)

b. Third article of antenna II approximately as long as article one. No gland-cone on article two. First article of antenna I on lower margin with a small distal spine and a downward-projecting protuberance proximally:
C. brevis (Figure 4)

4a. Gland-cone on antenna II, article two very prominent, curving forward, with a sharp, narrow apex. Fourth

article on lower margin produced distally into a strong forward-curving tooth; article five with a sharp tooth proximally:

C. spinicorne (Figure 5)

b. Without a distal tooth on antenna II, article five 5

5a. Third article of antenna II with two spines, one upon another, on inner surface; fourth article of antenna II with two spines: one at the distal end of the article and the other proximally to the center. First article of antenna I with a distal spine on lower margin:

C. salmonis (Figure 5)

b. Article four of antenna II with more than two spines 6

6. First article of antenna I rather broad dorsally, inner margin with two or three spines proximally and many long setae and lower margin with four or five spines and long setae. Antenna II short and stout, third article with three spines on lower distal corner. Article four bearing three equally spaced pairs of spines on lower margin:

C. brevis (Figure 5)

B

1a. Without oostegites; antenna II, article four with a large terminal tooth and a smaller one above (♂♂ or juveniles) 2

b. With oostegites; antenna II, article four with spines only (♀♀). 3

2a. Head with a lanceolate rostrum which is about one-third as long as the first article of antenna I. First article of antenna I with a lobe on inner surface about opposite

the middle of the rostrum. Penduncle of uropod one with only one (sometimes two?) distal spine on inner margin:

C. insidiosum (Figure 6)

b. Head with a very short, triangular rostrum. Peduncle of uropod one with three (sometimes two?) well spaced spines on inner margin:

C. acherusicum (Figure 6)

3a. Antenna II, article four with five spines: two pairs and a single terminal spine. Peduncle of uropod one with one distal spine on inner margin:

C. insidiosum (Figure 7)

b. Antenna II, article four with seven spines: three pairs and one single terminal spine. Peduncle or uropod one with three well spaced spines on inner margin:

C. acherusicum (Figure 7)

SOME REMARKS ON THE SPECIES OF BRITISH COLUMBIA

C. spinicorne: Front of head in both sexes slightly convex, but without rostrum. Uropod I: peduncle with sharp triangular distal lobe, outer margin with as many as twelve long setae and one terminal spine, inner margin with one terminal spine. Young females do not differ materially from the older females.
C. spinicorne is the largest species of *Corophium* on the West Coast of North America and has also been found in fresh water (Bousfield, 1958).

C. salmonis: Head with front between straight, slightly convex or with a very low central obtuse-angular projection and antenna II much longer than the entire body in fully grown specimens. Fifth article of antenna II armed proximally below with a sharp triangular tooth and distally with an acute downward-curving lobe. In both sexes uropod one with two or mostly three (sometimes 1 or 4) spines distally and three to six slender spinules on the outer margin of peduncles; inner margin with a single distal spine.

C. brevis: Head of both sexes with front triangular or slightly rostrate (Fig. 4H). Lateral lobes sharp and triangular. In males the lower margin of the fourth and fifth article and the flagellum bear groups of long setae. Second article of Antenna II in females with a gland cone broad distally and bearing a small apical spine. Uropod I: peduncle in both sexes with a sharp triangular lobe distally, a row of seven to eight spines on outer margin and a single distal spine on inner margin.

C. insidiosum: Head of males with a very long rostrum; head of females with a short rostrum. Rostrum of male reaches nearly half

way along article one of antenna I. Antenna II, article five with only one median spine on lower margin. Uropod I: outer margin of peduncle in both sexes with eight spines. This species is very similar to *C. crassicorne*, *C. acherusicum* and *C. bonelli*, but *C. crassicorne* and *C. bonelli* are not known yet from the American west coast.

C. acherusicum : Males: antenna scarcely setose. Antenna II, article 5 with a process near the base and a large blunt process terminally. Female: Antenna II, article two with a very prominent, forward curving lobe, with three stout spines on it: article five with two spines on lower margin.

REMARKS FOR IDENTIFICATION OF SPECIES FROM THE WEST COAST OF NORTH AMERICA WHICH MAY ALSO BE FOUND IN B.C. (see P.5)

Species with urosomes separate

C. stimpsoni: like *C. salmonis*, but a little smaller. The female cannot be distinguished from the female of *C. salmonis*. Male: antenna I, article one with a downward and forward curving lobe proximally, without spines on lower margin and without the dorsal expansion of this article. The proximal tooth on the lower margin of the fifth article of antenna II closes within the large tooth of the fourth article. Third article of this antenna shorter as in *C. salmonis* (Figure 8).

Species with fused urosomes

C. crassicorne: males have small eyes and sharp eyelobes (longer than the rostrum). First article of antenna I enlarged, with spines on inner and lower margin. Females are easy to identify from the form of article four, antenna II (distinctive at all ages) (Figure 8).

C. baconi: Males: antenna II, article four with two terminal teeth (the large one may be curved horizontally inward), article five with a long hooked terminal tooth on inner margin.
Females: antenna II, segment four with three well spaced spines on lower margin (Figure 8).

C. clarencense: Similar to *C. insidiosum*. Males have a long spear-shaped rostrum; the first article of antenna I has no lobe on the inner surface and no spines on inner margin but two spines on lower margin. In the females, the first article of antenna I has two spines only on the inner margin and three spines on lower margin. Only one record from Alaska in 1913 (Figure 9).

C. oaklandense: Sexes alike. Article four of antenna II with both characters: the tooth of the males and the spines of the females; with a strong,distal tooth and groups of spines on the lower margin (Figure 9).

C. uenoi: very close to *C. bonelli* and *C. insidiosum*. Females are distinguished by having only three spines in a longitudinal row on the lower margin of article four, antenna II. Adult males are distinguished from *C. insidiosum* by the absence of an out-growth on the inner surface of article one, antenna I. Young males are alike with young males of *C. insidiosum*.

C. californianum: Antenna II, article 4 with a complex terminal tooth reaching nearly to the end of article five. Only a single male has been discovered so far. Questionable species; cf Bernard (1960).

ACKNOWLEDGEMENTS

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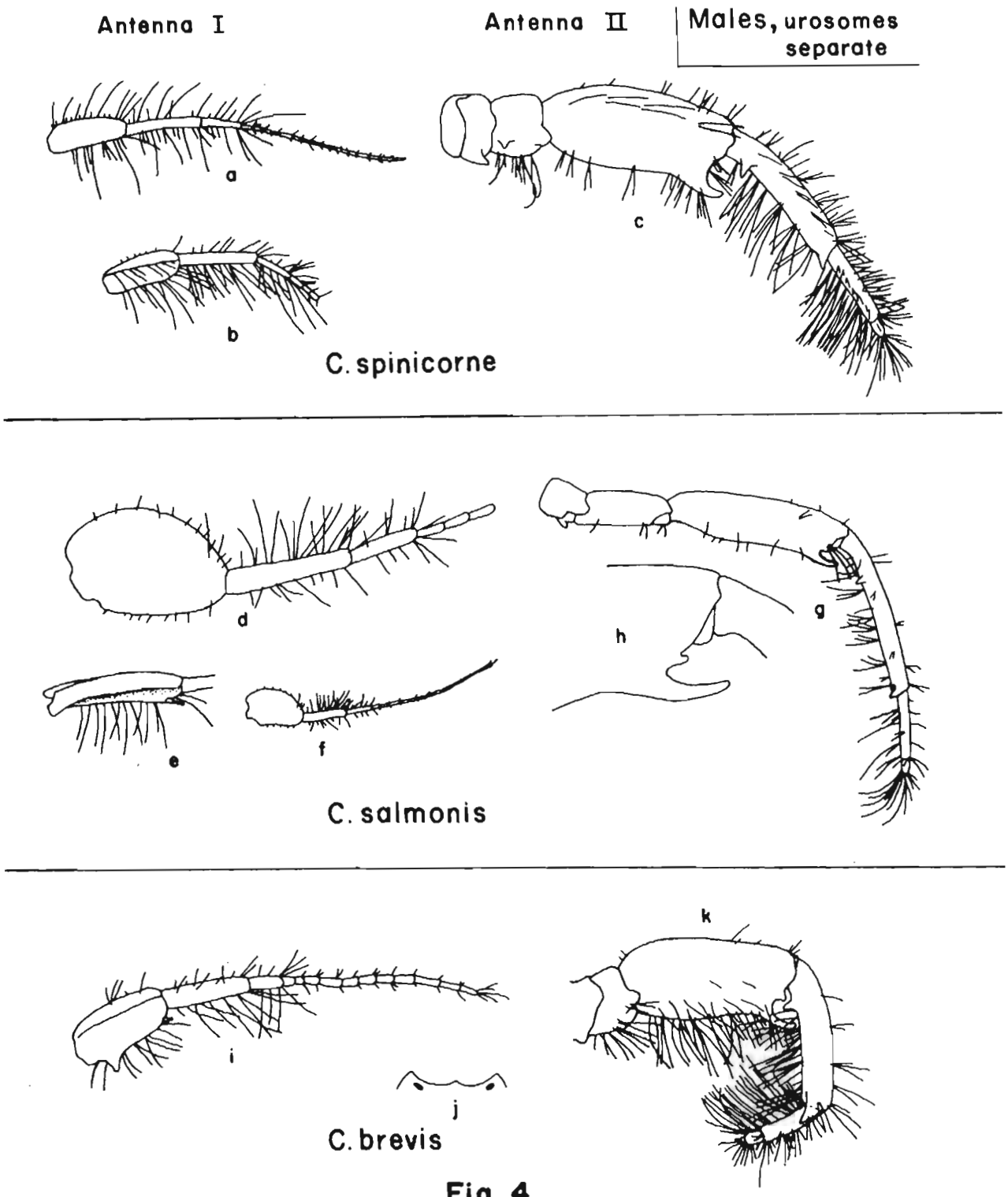


Fig. 4

Figure 4: *C. spinicorne* ♂ a) right antenna I from above; b) right antenna I, side view; c) left antenna II, inside view;

C. salmonis ♂ d) right antenna I, enlarged; e) right antenna I, side view; f) right antenna I from above; g) left antenna II, inside view; h) tooth, enlarged;

C. brevis ♂ i) right antenna I, side view; j) rostrum; k) left antenna II, inside view.

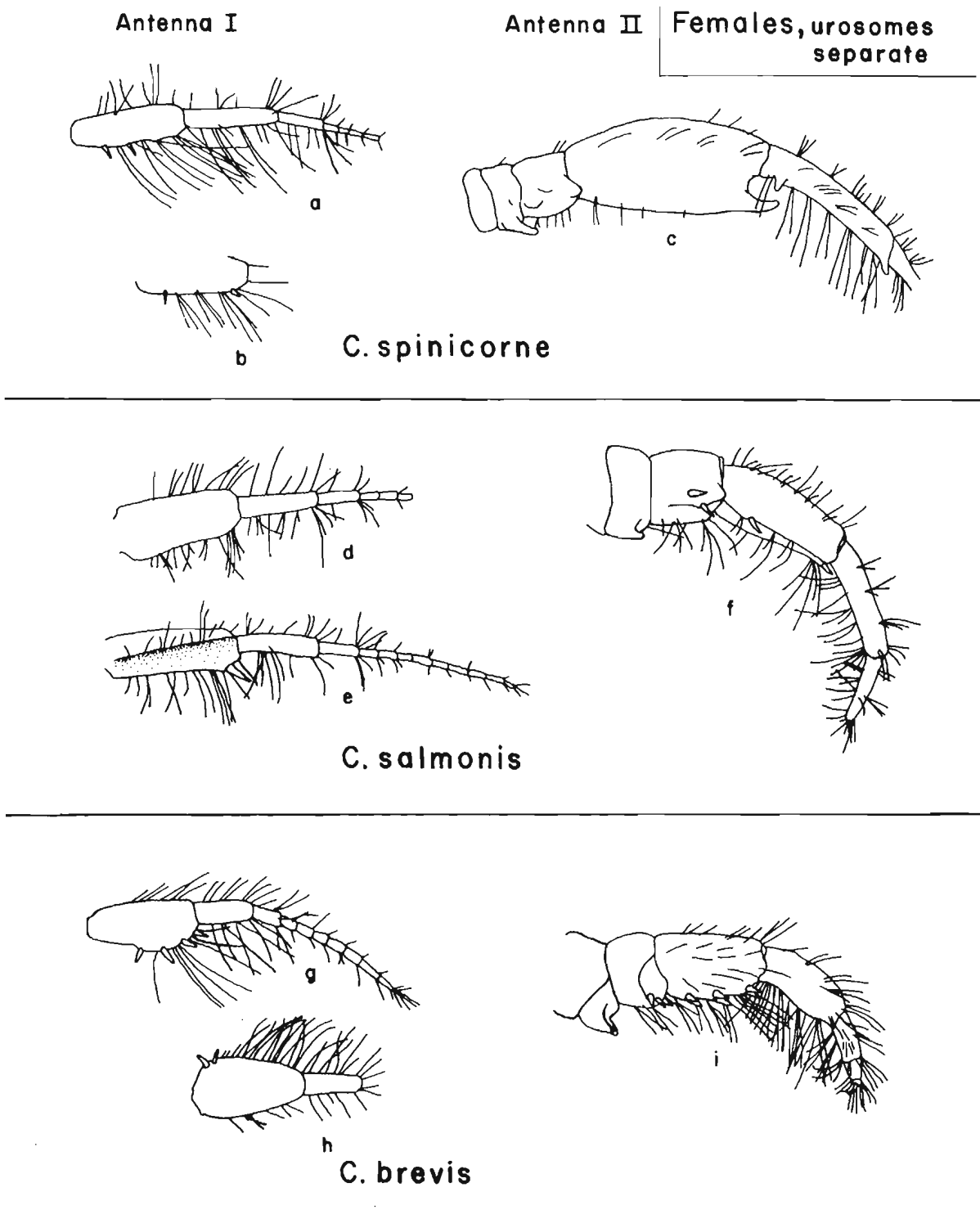
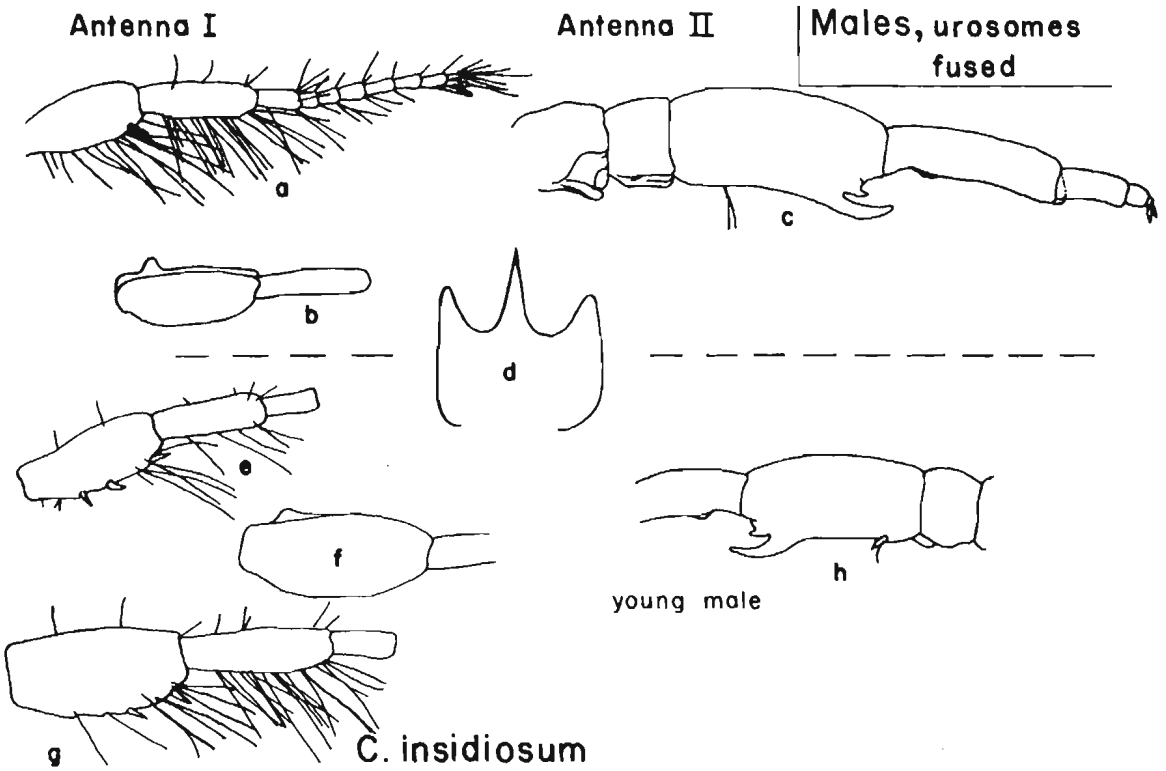


Fig. 5

Figure 5: *C. spinicorne* ♀ a) right antenna I, side view: b) right antenna I of another specimen; c) left antenna II, inside view (drawing by the author from a Fraser estuary specimen);

C. salmonis ♀ d) right antenna I from above; e) right antenna I, side view; f) left antenna II inside view;

C. brevis ♀ g) right antenna I, side view; h) right antenna I from above; i) left antenna II, inside view.



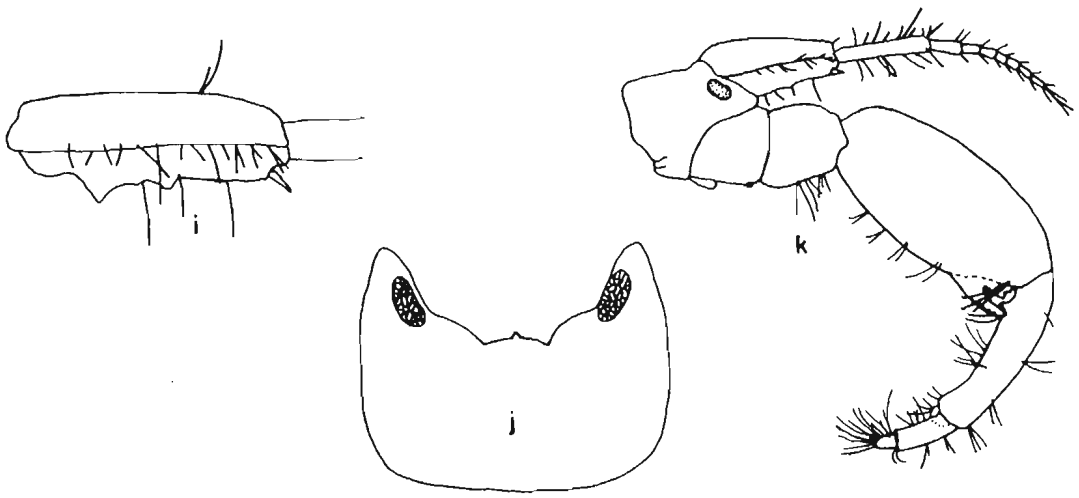
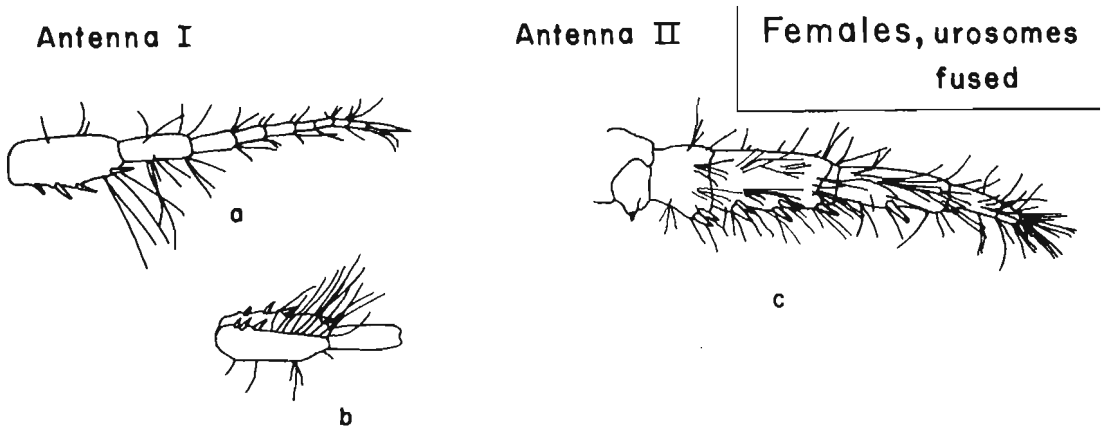


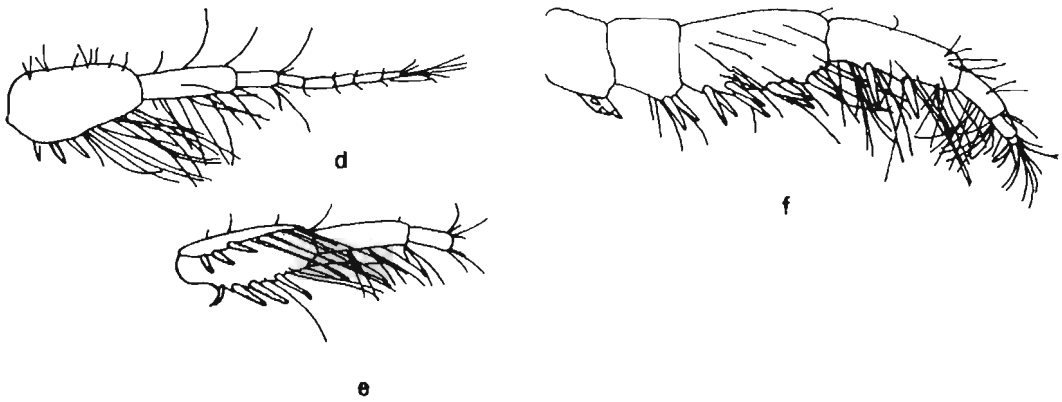
Fig.6

Figure 6: *C. insidiosum* ♂ a) antenna I, side view; b) right antenna I from above; c) antenna II of mature male; d) head with rostrum and lateral lobes: e) antenna I, side view; f) antenna I, top view; g) antenna I, side view; h) antenna II, side view;

C. acherusicum ♂ i) left antenna I, side view; j) head with rostrum; k) anterior part of animal with antennae I and II.



C. insidiosum



C. acherusicum

Fig. 7

Figure 7: *C. insidiosum* ♀ a) antenna I, side view; b) antenna I, top view with spines or inner and lower margins; c) antenna II, inside view;

C. acherusicum ♀ d) left antenna I from above; e) left antenna I with spines on inner and lower margin; f) left antenna II, inside view.

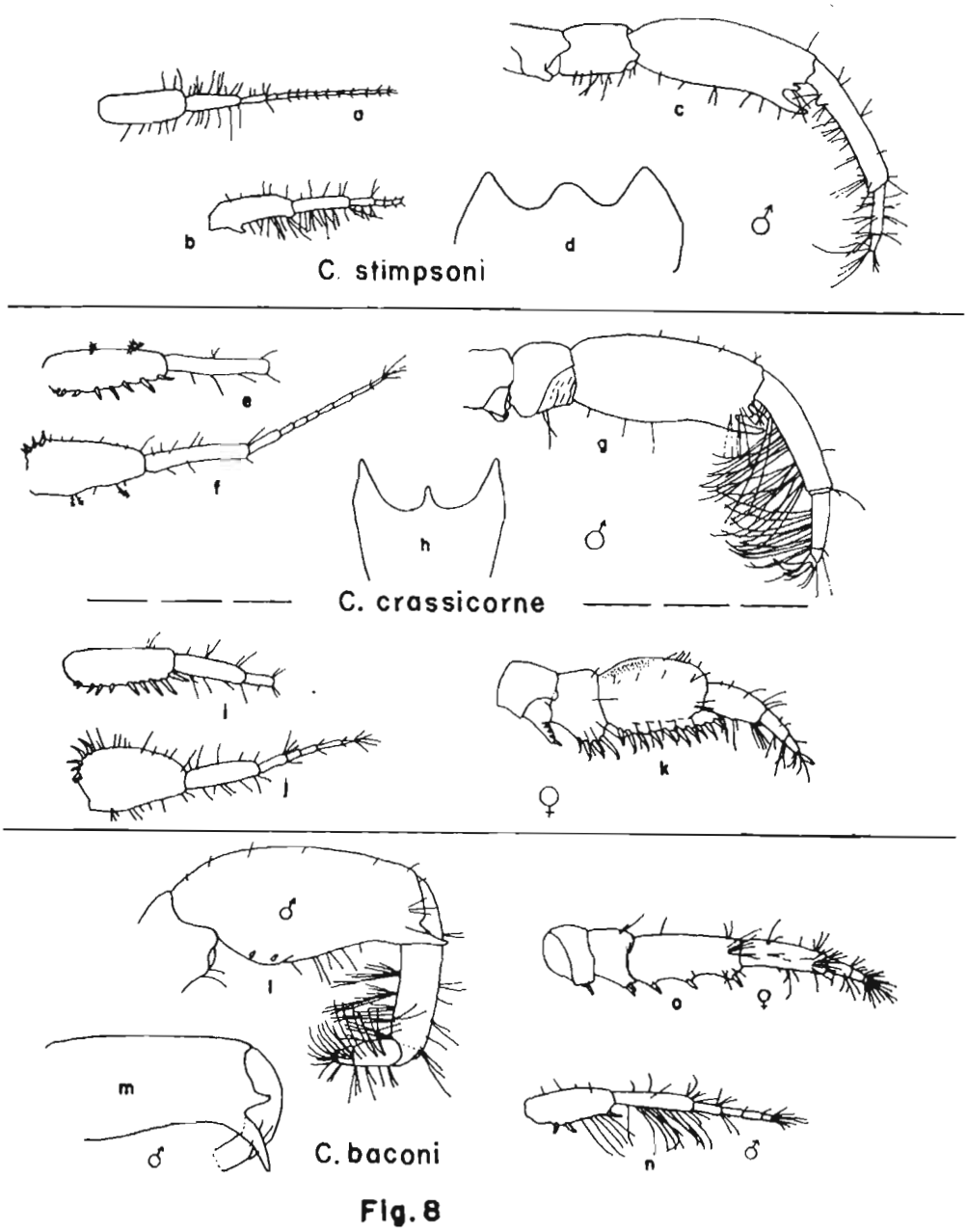


Fig. 8

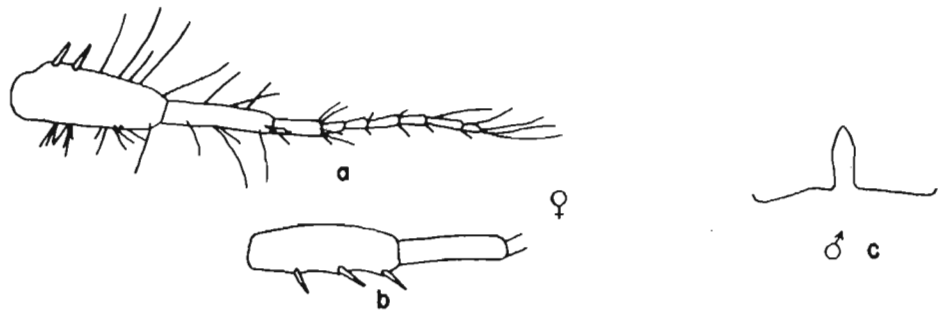
Figure 8: *C. stimpsoni* ♂ a) right antenna I from above; b) right antenna I, side view: c) right antenna II, inside view; d) head from above;

C. crassicorne ♂ e) antenna I, side view; f) right antenna I, top view: g) antenna II, side view; h) head with rostrum and lateral lobes.

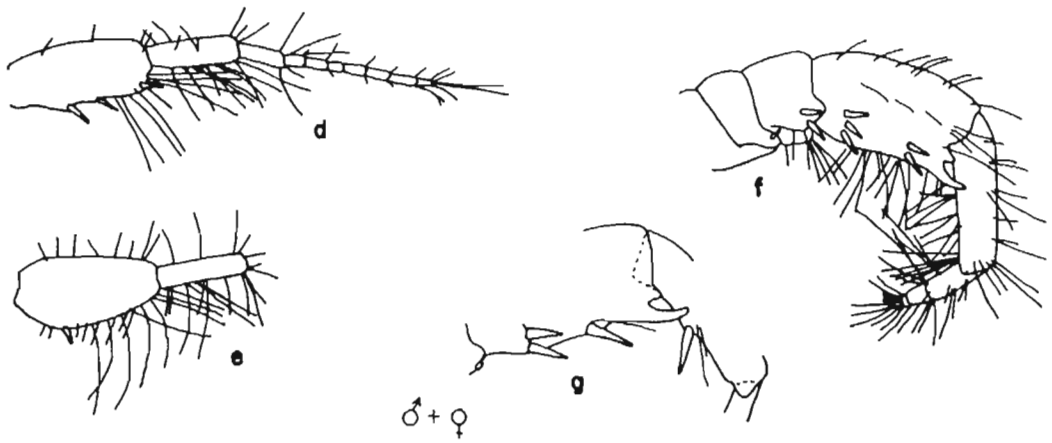
C. crassicorne ♀ i) antenna I, side view; j) right antenna I, top view; k) antenna II, side view;

C. baconi ♂ l) left antenna II, inside view; m) antenna II, top view; n) antenna I, side view;

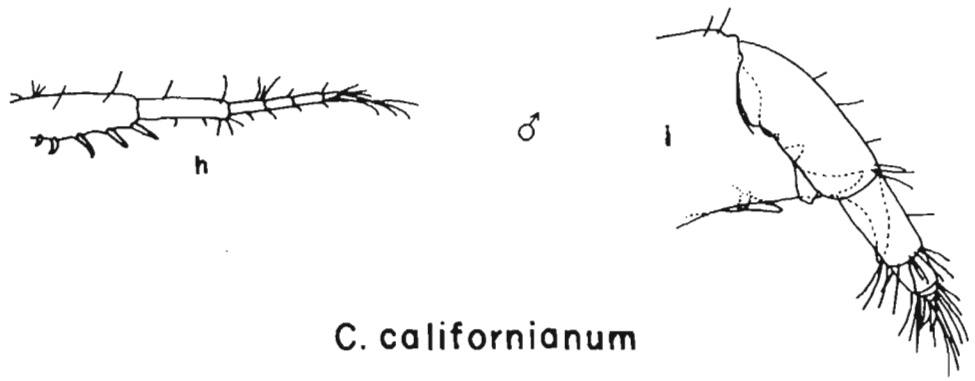
C. baconi ♀ 0) antenna II, inside view.



C. clarencence



C. oaklandense



C. californianum

Fig. 9

Figure 9: *C. clarencense:* a) right antenna I from above ♀ b) right antenna I, side view; ♀ c)rostrum; ♂

C. oaklandense ♂♀ d) left antenna I, inside view; e)left antenna I from above; f) left antenna II, inside view; g) left antenna II from another specimen;

C. californianum ♂ h) right antenna I, side view; i) antenna II, side view, enlarged.