

Key to the *Photis* (Amphipoda: Isaeidae) of the Southern California Bight
MALES
 (Modified from J.L. Barnard, 1962 and K.E. Conlan, 1983)

- 1a. Articles 4 and 5 of pereopod 4 normal, slender 2
- 1b. Articles 4 and 5 of pereopod 4 grossly enlarged *Photis elephantis*
- 2a. Gnathopod 2, article 6 with defining tooth or process on posterior margin 5
- 2b. Gnathopod 2, article 6 without defining tooth or process (though a spine may be present) 3
- 3a. Gnathopod 1 convex (evenly curved) (?); coxae 2, 3, and 4 very long and strap-like; coxa 5 large and triangular; gnathopod 2 excavate, defining corner quadrate *Photis* sp A
- 3b. Gnathopod 1, palm concave or excavate; coxae 2 through 5 of normal size and shape; gnathopod 2 not as above 4
- 4a. Coxa 1 antero-distally produced into small knob, with a fan of long stiff setae; gnathopods 1 and 2 "stepped" (deeply excavate, palms vertical), each with large defining spine *Photis* sp C
- 4b. Coxa 1 not produced and without fan of setae; gnathopod 1 concave; gnathopod 2, palm long, oblique, with two small, blunt palmar teeth ("protuberances"), and a small defining spine (**female unknown**) *Photis linearmanus*
- 5a. Gnathopod 2, palm transverse (defining tooth extends to, or beyond, a line perpendicular to dactyl hinge) 6
- 5b. Gnathopod 2, palm oblique (defining tooth falls short of line perpendicular to dactyl hinge) 16
- 6a. Gnathopod 1, article 5 subequal to article 6; gnathopod 2, palm with single defining tooth (palmar tooth present or absent) 7
- 6b. Gnathopod 1, article 5 longer than article 6; gnathopod 2, palm with double defining tooth mounted on a process that is cryptically separated from the hand, and produced medially (Note: in specimens < 2.5 mm, the palmar process may not be distinctly separate from the rest of the palm, though it will be produced medially) *Photis bifurcata*

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- 7a. Gnathopod 2, inner margin of the dactyl sinuous or notched, but lacking a tooth or medial swelling (Note: the dactyl of *Photis* sp OC1 and *P. californica* may appear thick throughout most of its length, narrowing distally, but it is not swollen medially) 10
- 7b. Gnathopod 2, inner margin of the dactyl with distinct tooth or medial swelling (the latter in specimens < 5.0 mm) 8
- 8a. Gnathopod 2, dactyl with blunt median tooth and large, distally upturned palmar tooth (specimen > 5.0 mm), or dactyl clearly swollen medially, narrowed distally and palmar tooth anvil shaped (with raised, flat surface opposite defining tooth); antenna 2, article 3 strongly geniculate (permanently bent downward); distinct pigment spot present on coxa 5 and antero-distal margin of gnathopod 1, article 6, just below dactyl ..*Photis brevipes*
- 8b. Gnathopod 2, dactyl with small, square median tooth, rest of dactyl evenly tapering; palmar tooth tapered (without raised, flat surface); antenna 2, article 3 not geniculate; coxa 5 and gnathopod 1, article 6 without pigment spot 9
- 9a. Gnathopod 1, palm excavate; coxa 1 ventral margin flat; gnathopod 2, article 2 broad *Photis parvidons*
- 9b. Gnathopod 1, palm convex; coxa 1 ventral margin rounded; gnathopod 2, article 2 narrow (female unknown) *Photis cf. parvidons*
- 10a. Gnathopod 1, palm concave or sinuous 11
- 10b. Gnathopod 1, palm convex or flat ~~11~~ 14
- 11a. Gnathopod 1, article 5 subequal to article 6, posterior margin elongate (approximately one-half length of anterior margin) and unproduced; article 6 sinuous, defining corner rounded; gnathopod 2, article 6 broad (approximately 1.5 times longer than wide), palmar tooth not square (rounded or tapered); head without anterior patch of pigment dorsally 12
- 11b. Gnathopod 1, article 5 shorter than article 6, posterior margin narrow and produced (lobate); article 6 distinctly concave, defining corner acute or quadrate; gnathopod 2, article 6 elongate (approximately 2 times longer than wide), palmar tooth squared; head with distinct anterior and posterior pigment patches dorsally *Photis macinerneyi*

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- 12a. Gnathopod 1, anterior margin of article 5 bare or weakly setose (0-3 setae, except in specimens > 5.0 mm); article 2, posterior margin setose; gnathopod 2, inner margin of dactyl swollen, distinctly narrowed distally; palmar tooth tapered (but not anvil shaped) or broadly rounded; coxae densely setose (> 10 setae along ventral margin) 13
- 12b. Gnathopod 1, anterior margin of article 5 densely setose (> 6 setae or setal bundles in specimens \leq 3.0 mm); article 2, posterior margin bare; gnathopod 2, inner margin of dactyl evenly curved, not narrowed distally; palmar tooth anvil shaped; coxae weakly setose (< 10 setae along ventral margin) *Photis* sp SD7
- 13a. Gnathopod 2, palmar tooth large, distally upturned or broadly rounded (in specimens < 3.0 mm); body often covered with many pigment spots (blotchy), head with distinct pigment patch dorsally along posterior margin, antenna 1 without line of pigment in peduncular articles; gnathopod 1, article 5, anterior margin weakly setose (may be dense in specimens > 5.0 mm) *Photis* sp OC1
- 13b. Gnathopod 2, palmar tooth tapered; body without numerous pigment spots, head without pigment patch dorsally, antenna 1 with line of pigment in peduncular articles; gnathopod 1, article 5, anterior margin bare *Photis californica*
- 14a. Gnathopod 1, palm convex; gnathopod 2 weakly excavate, palmar tooth extremely reduced, tapered, and blunt, not extending beyond dactyl hinge; coxa 5 with pigment spot (specimens < 3.0 mm) 15
- 14b. Gnathopod 1, palm flat (to minutely excavate); gnathopod 2 deeply excavate, palmar process tapered, extending beyond dactyl hinge; coxa 5 without pigment spot *Photis conchicola*
- 15a. Gnathopod 2, palm broad, nearly vertical, excavation shallow, its margin sinuous, the defining tooth poorly developed, the defining corner acutely produced; antero-distal margin of gnathopod 1, article 6, with pigment spot just below dactyl) *Photis brevipes* (immature)
- 2
- 15b. Gnathopod 1, palm distinctly excavate, excavation "V" shaped, defining tooth well developed; antenna 1, peduncular articles with line of pigment *Photis californica* (immature)

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MALES
 (Modified from J.L. Barnard, 1962 and K.E. Conlan, 1983)

- 16a. Gnathopod 1 convex; eye "normal" sized 19
- 16b. Gnathopod 1 scarcely sinuous to distinctly concave; eye large for the genus 17
- 17a. Gnathopod 1, palm scarcely sinuous; gnathopod 2, dactyl inner margin without tooth; palmar excavation narrow (i.e., distance between defining tooth and opposing margin of palmar process is less than one-third the width of article 6) 18
- 17b. Gnathopod 1 palm distinctly excavate; gnathopod 2, dactyl with small, proximal tooth on inner margin; palmar excavation wide (i.e., distance between defining tooth and opposing margin of palmar process is approximately one-half the width of article 6)
 *Photis macrotica*
- 18a. Palmar tooth poorly produced, not extending beyond dactyl hinge; specimen from depths ≤ 100 m, length ≤ 2.5 mm *Photis macrotica* (immature)
- 18b. Palmar tooth produced beyond dactyl hinge; specimen from depths ≥ 300 m
 *Photis chiconola*
- 19a. Gnathopod 2, palm not noticeably long, nor strongly oblique, bearing only one palmar tooth, in addition to the defining tooth 20
- 19b. Gnathopod 2, palm long and strongly oblique, bearing two teeth: a large tooth near the dactyl hinge, and smaller median tooth, in addition to the defining tooth... *Photis viuda*
- 20a. Gnathopod 2, palmar tooth tapered, or blunt and barely visible; gnathopod 1, article 5 sub-equal to article 6, posterior margin less than or equal to one-half the length of anterior margin 21
- 20b. Gnathopod 2, palmar tooth square or blunt; gnathopod 1, article 5, longer than article 6, posterior margin greater than one-half the length of anterior margin *Photis lacia*
- 21a. Eye lobe, blunt and triangular (dorsal and ventral margin straight or nearly so); ventral margin of coxa 1 not scalloped; gnathopod 2, palmar tooth poorly developed (blunt or absent); specimen < 2.0 mm 22
- 21b. Eye lobe distinctly acute (dorsal and ventral margins concave); ventral margin of coxa 1 scalloped; gnathopod 2, palmar tooth tapered *Photis* sp B

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MALES
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- 22a. Antenna 2, article 3 geniculate; coxa 5 with pigment spot and peduncular articles of antenna 1 often with line of pigment *Photis californica* (immature)
- 22b. Antenna 2, article 3 not geniculate; body pigment, diffuse, coxa 5 without pigment spot and peduncular articles of antenna 1 unpigmented *Photis parvidons* (immature)

Note: Male of *Photis* sp E SCAMIT are undescribed.

DRAFT NOT FOR DISTRIBUTION

1 ♂ seen Fairbairn

is *P. laevis* ^{ok}

Photis sp LA1 bombs here.

It has straight oblique G1 palm, normal eye, G2 has large defining tooth separated from palm by narrow V shaped groove. No palmar tooth, mid palmar area extended as a serrulate lamella, dactyl has no tooth, narrow w/step distally. coxae of 3, 4, 5 darkly pigmented. Animal otherwise white, glossy. About size of *P. cal.*

Key to the *Photis* (Amphipoda: Isaeidae) of the Southern California Bight
FEMALES
(Modified from Conlan, 1983)

- 1a. Articles 4 and 5 of pereopod 4 normal, slender 2
- 1b. Articles 4 and 5 of pereopod 4 grossly enlarged *Photis elephantis*
- 2a. Gnathopod 2, palm without palmar tooth, or defining tooth (though a spine may be present) 3
- 2b. Gnathopod 2, palmar process emarginate, and defining tooth large *Photis* sp E
- 3a. Gnathopod 2, palm convex to nearly flat 4
- 3b. Gnathopod 2, palm excavate or sinuous 8
- 4a. Coxae 2, 3, and 4 very long and strap-like; coxa 5 large and triangular *Photis* sp A
- 4b. Coxae 2 through 4 normal, not long and strap-like; coxa 5 not large and triangular ... 5
- 5a. Eye lobe distinctly acute (dorsal and ventral margins concave); eye small and diffuse; ventral margin of coxa 1 scalloped *Photis* sp B
- 5b. Eye lobe blunt, triangular (dorsal and ventral margin straight or nearly so); eye normal; ventral margin of coxa 1 not distinctly scalloped 6
- 6a. Coxa 1 antero-distally produced into small knob, with a fan of long stiff setae; gnathopods 1, palm scarcely sinuous; gnathopods 1 and 2 with large, stout defining spine; antenna 1, peduncular article 1 short, barely exceeding eye lobe *Photis* sp C
- 6b. Coxa 1 not produced and without fan of setae; gnathopod 1 convex; gnathopods 1 and 2, defining spine ordinary; antenna 1, peduncular article 1 long, exceeding eye lobe by one-half its length 7
- 7a. Gnathopod 1, article 5 longer than article 6; posterior margin more than one-half anterior margin; coxae 1-5 often with vertical band of pigment; body without numerous pigment spots *Photis lacia*
- 7b. Gnathopod 1, article 5 shorter than article 6; posterior margin one-third anterior margin; body with numerous pigment spots (blotchy); head with distinct anterior and posterior pigment patches dorsally *Photis macinerneyi*

Key to the *Photis* (Amphipoda: Isaeidae) of the Southern California Bight
FEMALES
(Modified from Conlan, 1983)

- 8a. Eye large for the genus 9
- 8b. Eye "normal" 10
- 9a. Gnathopod 1, palm concave or sinuous; specimen from depths ≥ 300 m
..... *Photis chiconola*
- 9b. Gnathopod 1, palm convex; specimen from depths ≤ 100 m *Photis macrotica*
- 10a. Gnathopod 1, palm concave or sinuous (the latter obvious in specimens ≥ 2.5 mm)..11
- 10b. Gnathopod 1, palm convex, flat or scarcely sinuous (the latter apparent in specimens
 > 5.0 mm at 100X magnification) 13
- 11a. Gnathopod 2, palm distinctly concave, defining corner rounded; body and head without
pigment patches 12
- 11b. Gnathopod 2 scarcely oblique, palm nearly vertical, weakly excavate, its margin sinu-
ous, the defining corner acutely produced; body often covered with many pigment spots
(blotchy), head with distinct pigment patch dorsally along posterior margin
..... *Photis* sp OC1
- 12a. Gnathopod 2, article 2 broad (width more than one-half length, W:L = 0.6), strongly
produced antero-distally; gnathopod 1, article 2, broad, posterior margin convex antenna
1, peduncular articles with pigment stripes; coxa 5 with pigment spot.....
..... *Photis californica*
- 12b. Gnathopod 2, article 2 narrow, (width less than one-half length, W:L = 0.4), not pro-
duced antero-distally or only weakly so; gnathopod 1, article 2, narrow, posterior
margin nearly straight; antenna 1, peduncular articles without pigment stripes; coxa 5
without pigment spot *Photis parvidons*
- 13a. Gnathopod 2, article 2 strongly produced antero-distally; coxae 1-5 densely setose
(> 15 setae along ventral margin; setae approximately equal to or exceeding width of
coxae)..... 14
- 13b. Gnathopod 2, article 2 not produced or weakly so; coxae 1-5 weakly setose (≤ 10 setae
along ventral margin; setae generally one-half to two-thirds width of coxae) 15

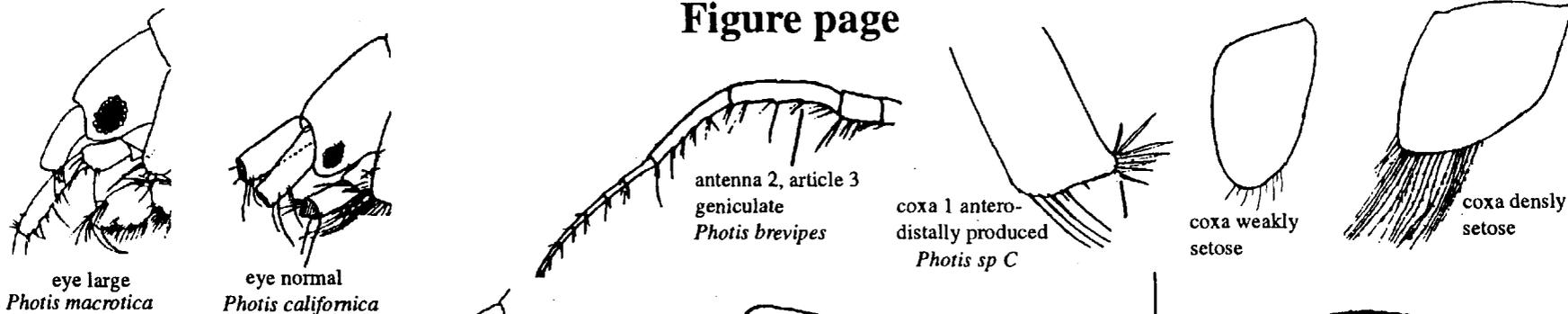
Key to the *Photis* (Amphipoda: Isaeidae) of the Southern California Bight
FEMALES
(Modified from Conlan, 1983)

- 14a. Gnathopod 2 scarcely oblique, palm nearly vertical, weakly excavate, its margin sinuous, the defining corner acutely produced; antenna 2, article 3 strongly geniculate; distinct pigment spot present on coxa 5 and antero-distal margin of gnathopod 1, article 6, just below dactyl *Photis brevipes*
- 14b. Gnathopod 2 distinctly oblique, excavate, defining corner not acutely produced; antenna 2, article 3 not strongly geniculate; pigment pattern otherwise *Photis conchicola*
- 15a. Gnathopod 1, article 5 posterior margin short (less than one-third anterior margin) and produced (lobate); gnathopod 2 defining corner bulging *Photis viuda*
- 15b. Gnathopod 1, article 5 posterior margin, normal (greater than one-third anterior margin) and unproduced; gnathopod 2 defining corner rounded, but not bulging 16
- 16a. Gnathopod 1, palm oblique, elongate (\geq two-thirds the length of anterior margin), nearly flat; article 2, posterior margin setose (each over twice the width of article 2)
..... *Photis bifurcata*
- 16b. Gnathopod 1, palm scarcely sinuous, approximately one-third to one-half the length of anterior margin; article 2 bare, except for 1-4 very short setae (each less than one-half the width of article 2) *Photis* sp SD7

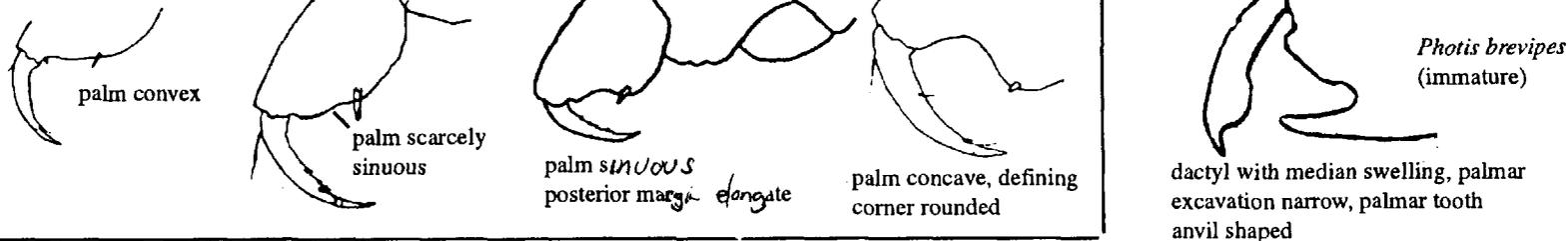
Note: Females of *Photis linearmanus* and *Photis cf parvidons* are still unknown.

Key to the *Photis* from the Southern California Bight

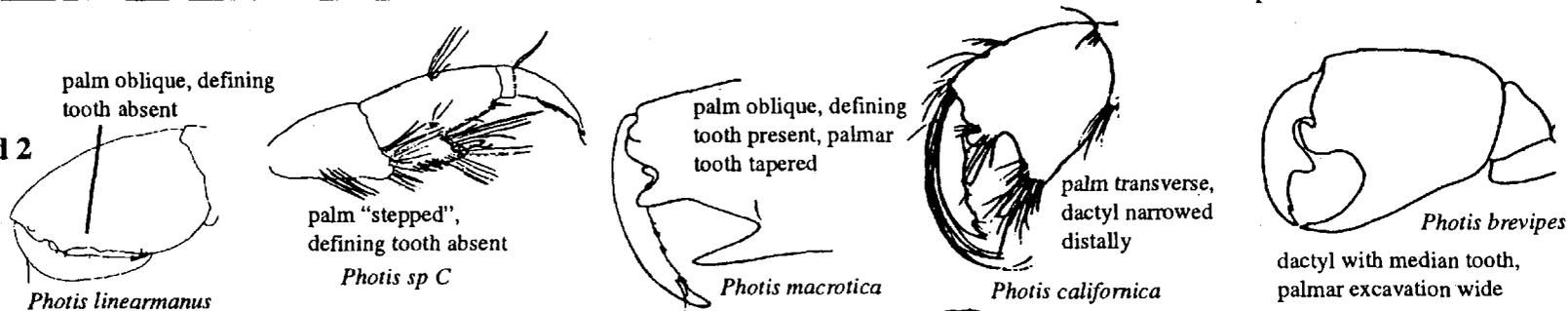
Figure page



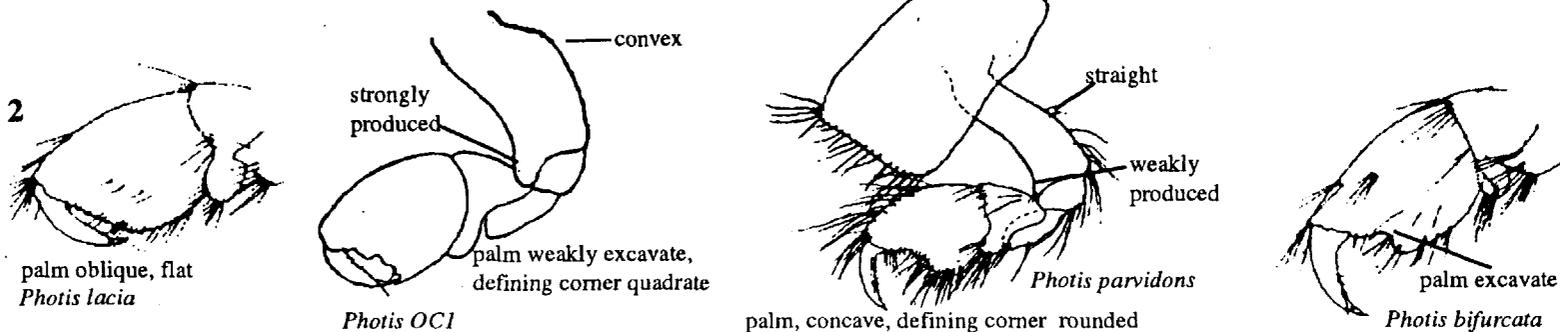
Gnathopod 1



Gnathopod 2 MALE



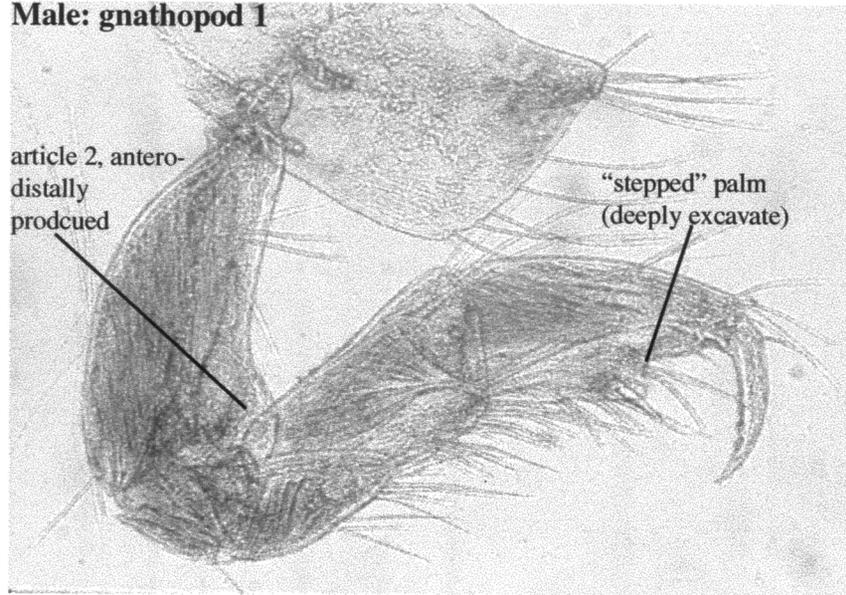
Gnathopod 2 FEMALE



Photis sp C MEC

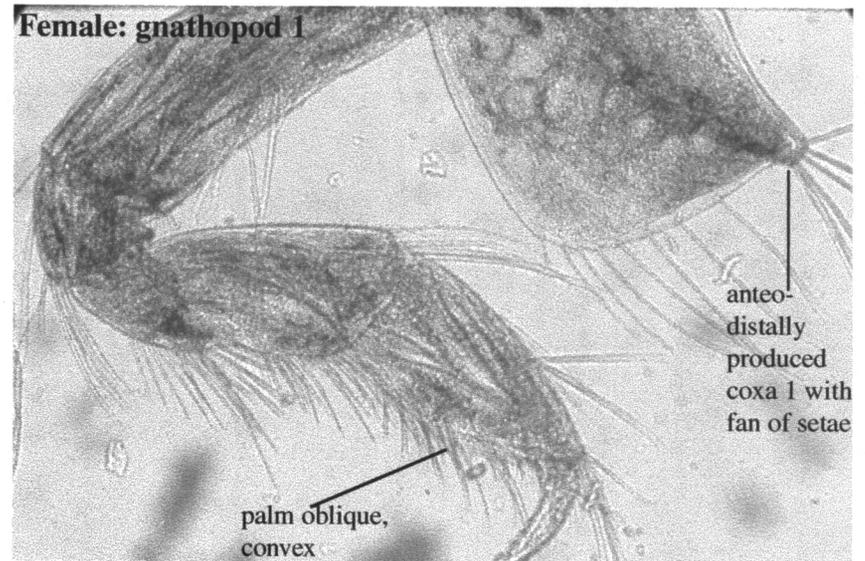
Male specimen: 3.5 mm

Male: gnathopod 1

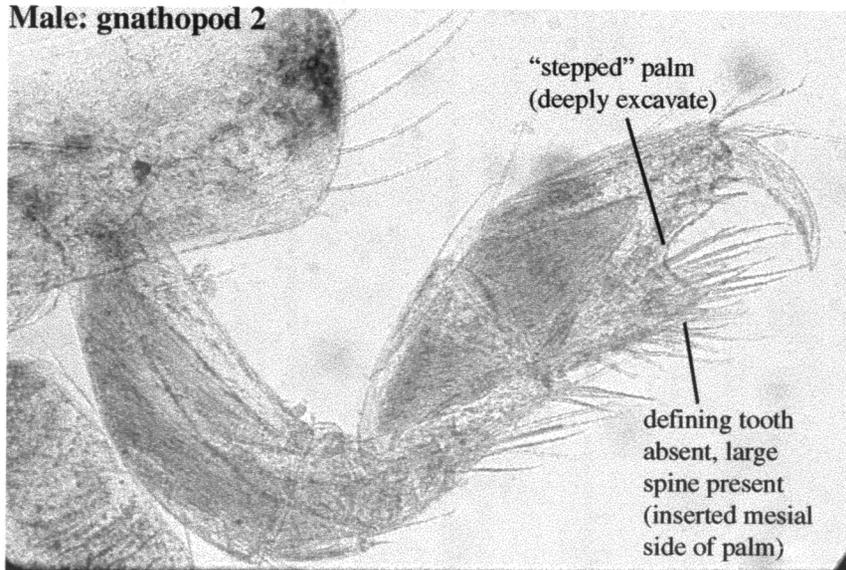


Female specimen: 4.25 mm

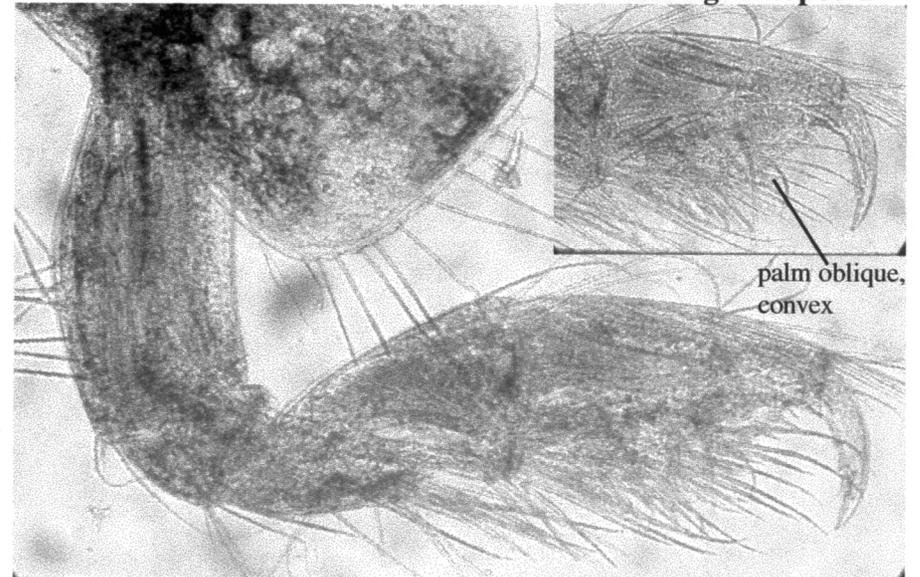
Female: gnathopod 1



Male: gnathopod 2

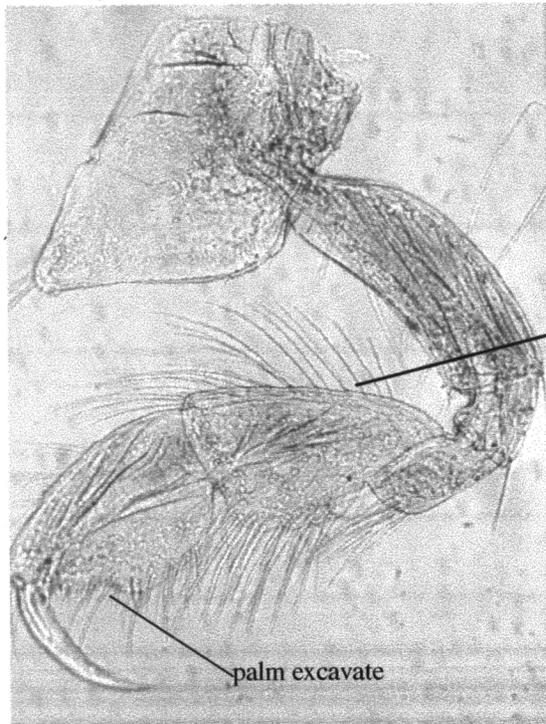


Female: gnathopod 2



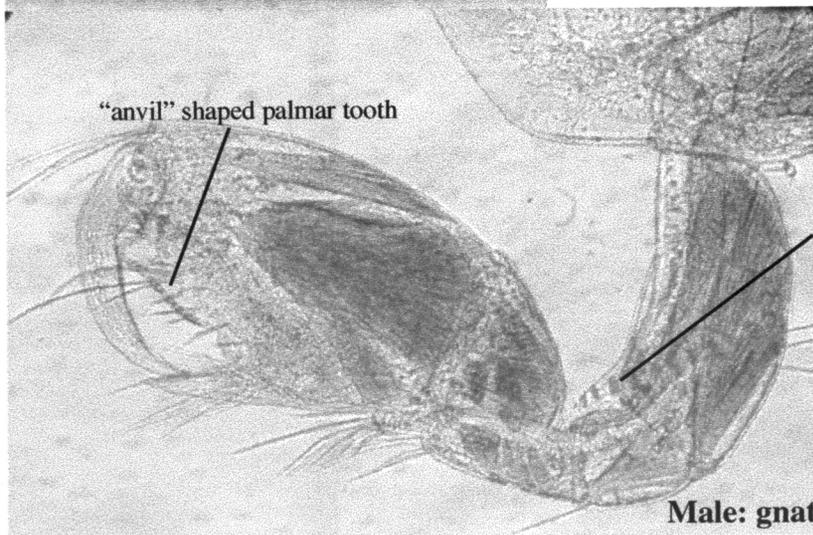
Malespecimen: 2.5 mm

Male: gnathopod 1



article 5, longer than article 6, anterior margin densely setose

palm excavate



"anvil" shaped palmar tooth

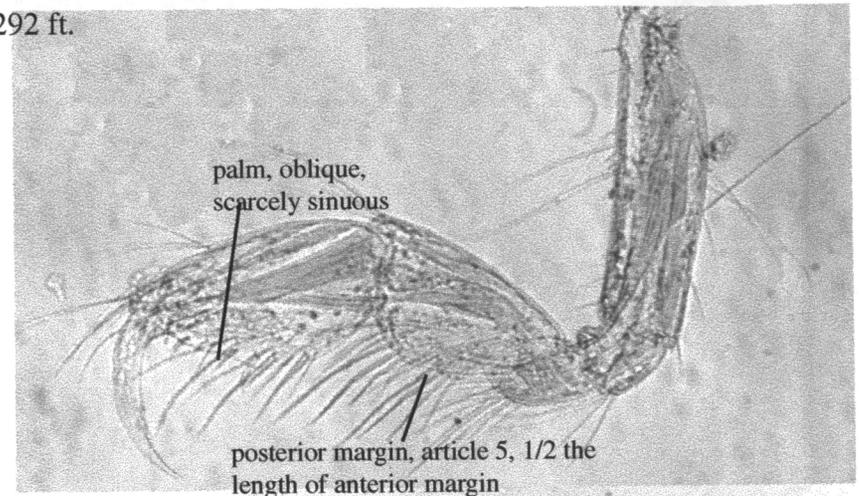
antero-distally produced w/ stridulation ridges

Male: gnathopod 2

***Photis* sp SD7**
specimens from station
B-11 (1), 1/8/97, 292 ft.

Female specimen: 3.4 mm

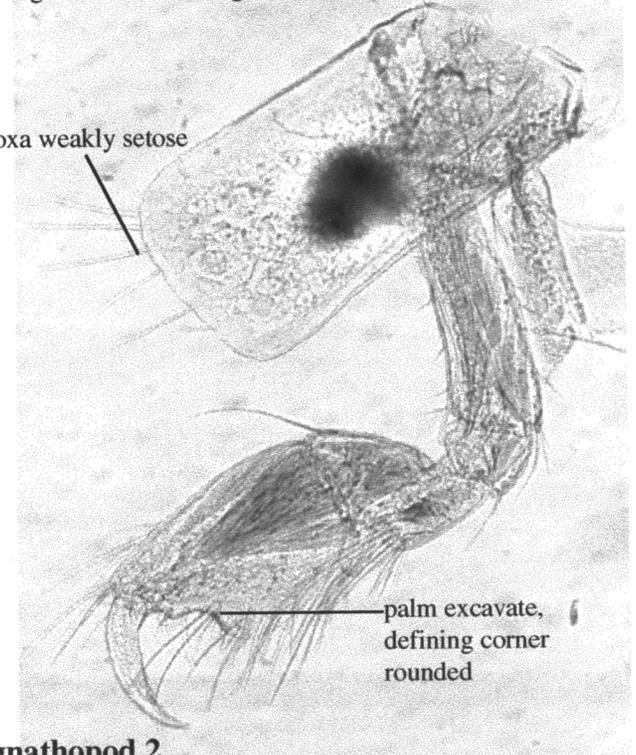
Female: gnathopod 1



palm, oblique, scarcely sinuous

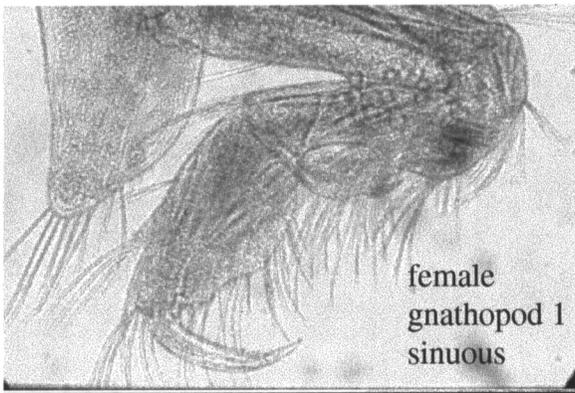
posterior margin, article 5, 1/2 the length of anterior margin

coxa weakly setose



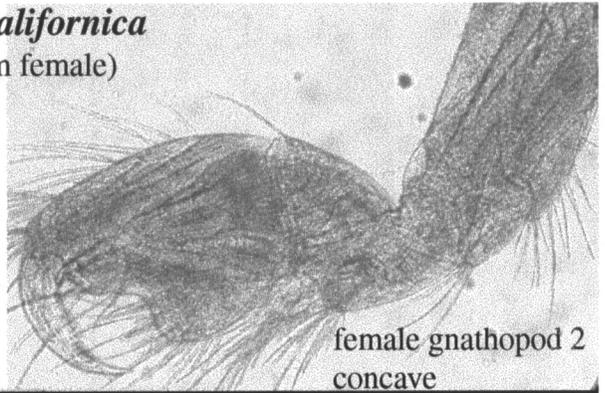
palm excavate, defining corner rounded

Female: gnathopod 2

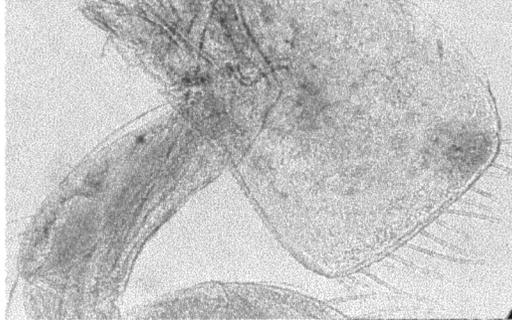


female
gnathopod 1
sinuous

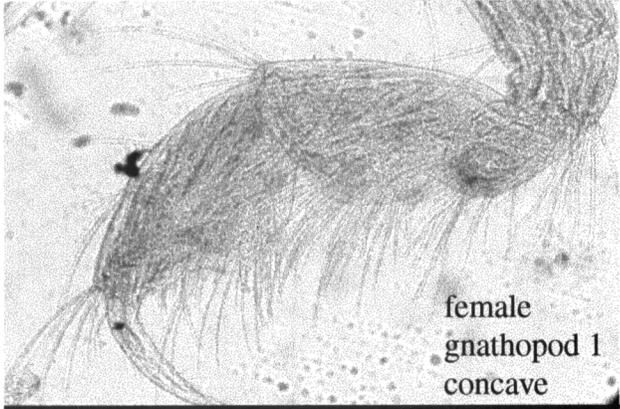
Photis californica
(4.7 mm female)



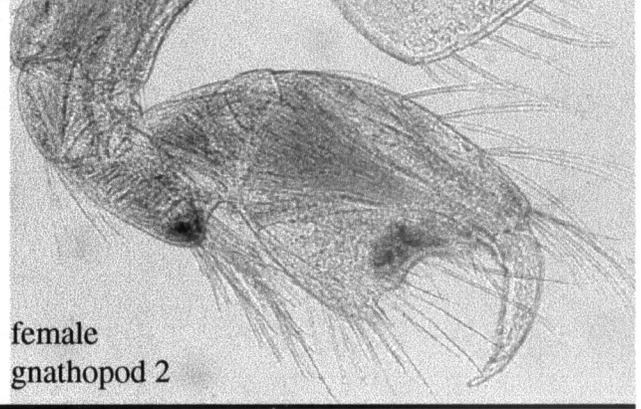
female gnathopod 2
concave



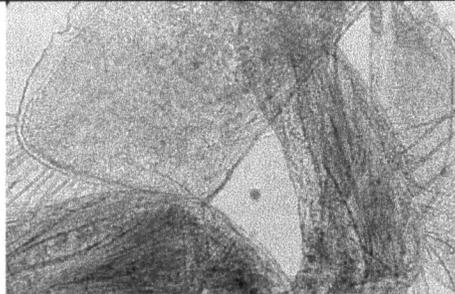
Photis sp OC1 MEC
(5.75 mm female)



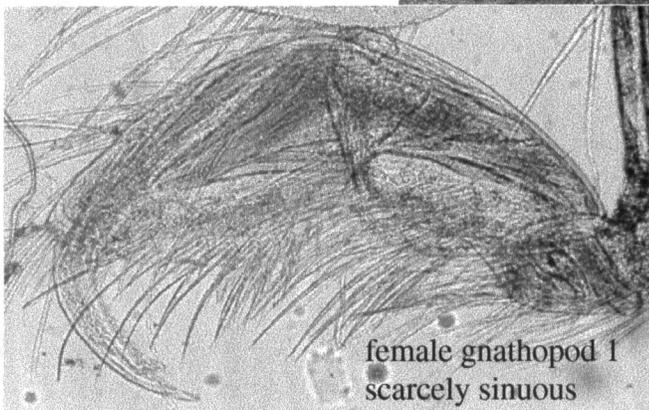
female
gnathopod 1
concave



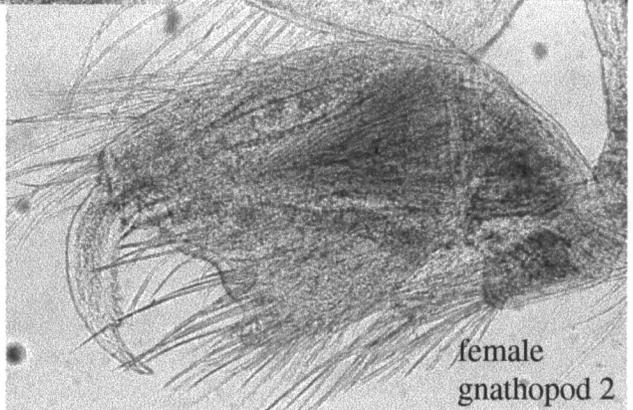
female
gnathopod 2



Photis brevipes
(5.6 mm female)



female gnathopod 1
scarcely sinuous

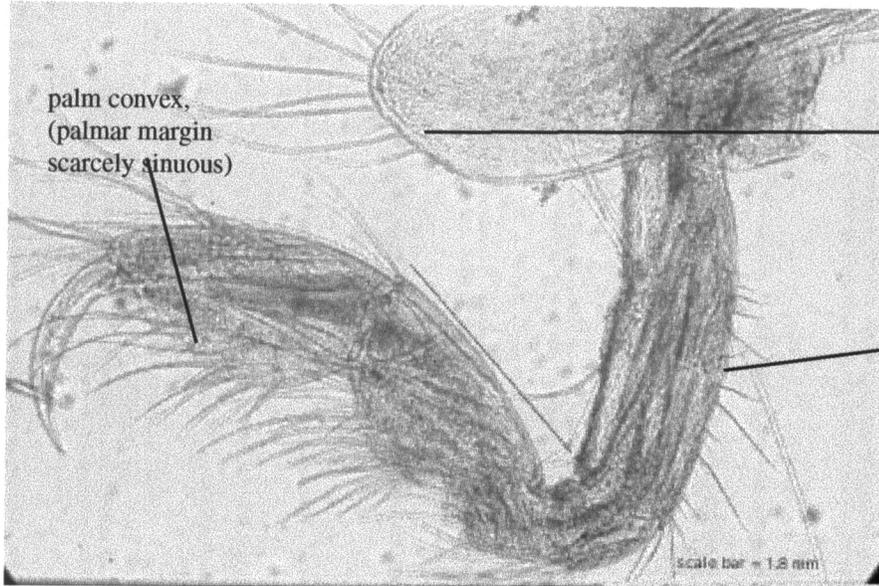


female
gnathopod 2

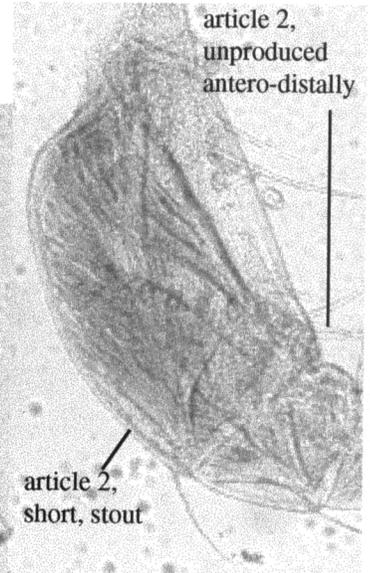
Photis cf. parvidons

Images from 3.5 mm male
Station A-3 (3), 4 Oct 1994, 262 ft

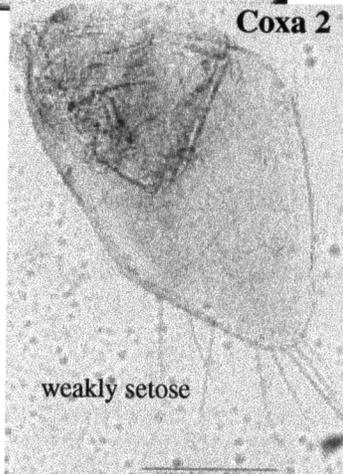
Gnathopod 1



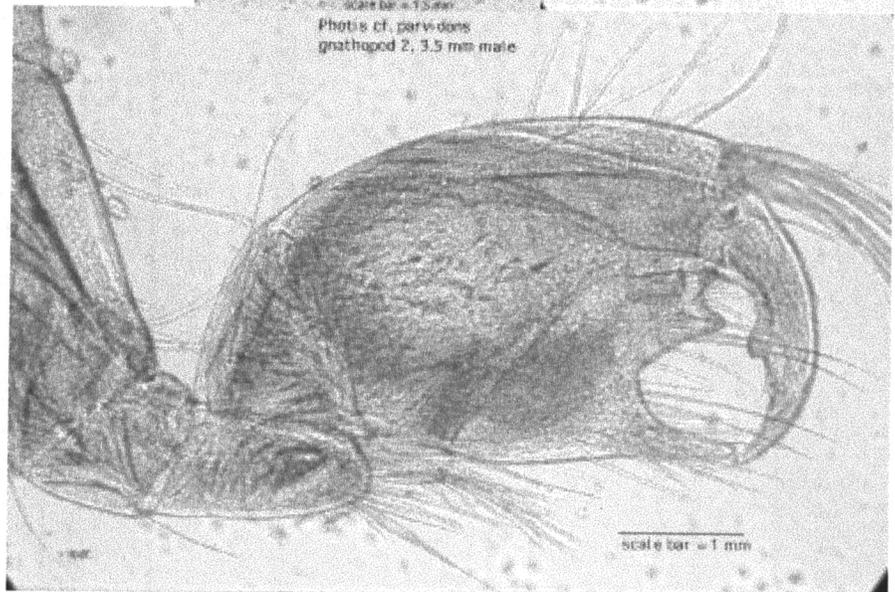
Gnathopod 2



Coxa 2



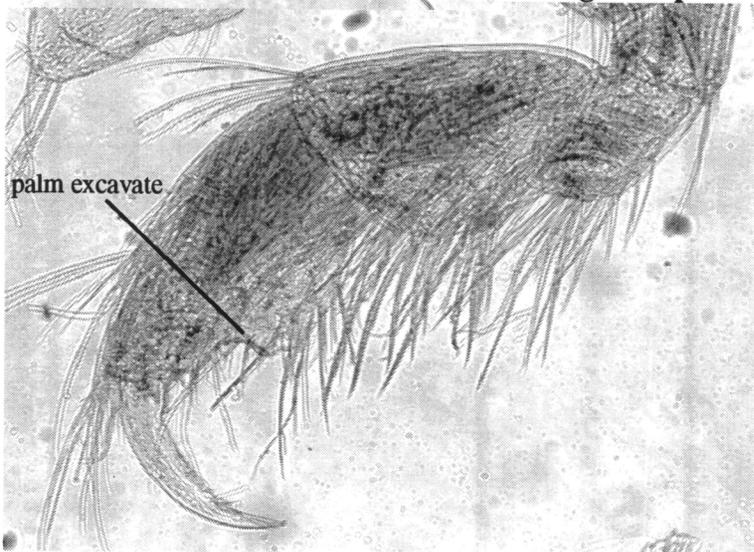
Gnathopod 2



Male gnathopod 1



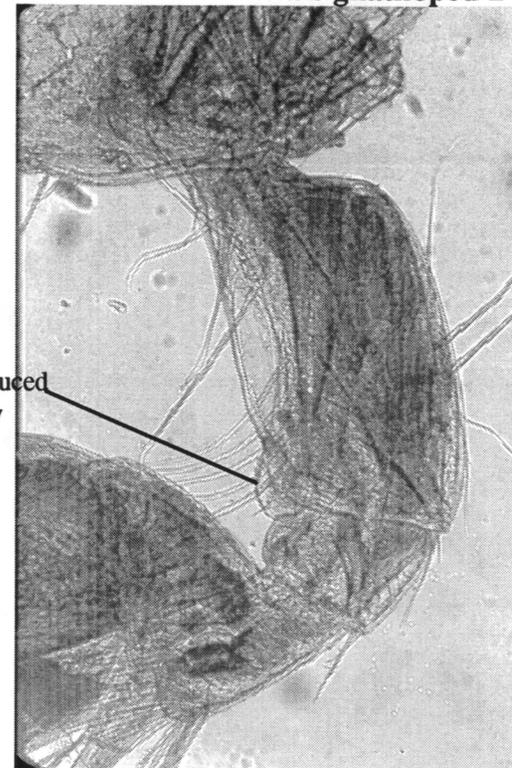
Male gnathopod 1



Photis parvidons

Images from 3.25 mm male
Station E-14 (1), 9 Jan. 1997, 320 ft

Male gnathopod 2



Male gnathopod 2

