

Amphipoda of the Northeast Pacific (Equator to Aleutians, intertidal to abyss): XXIV.
Leucothoidea - a review Donald B. Cadien, LACSD
22July2004 (revised 2Feb2015)

Preface

The purpose of this review is to bring together information on all of the species reported to occur in the NEP fauna. It is not a straight path to the identification of your unknown animal. It is a resource guide to assist you in making the required identification in full knowledge of what the possibilities are. Never forget that there are other, as yet unreported species from the coverage area; some described, some new to science. The natural world is wonderfully diverse, and we have just scratched its surface.

Introduction to the Leucothoidea

The superfamily Leucothoidea consists of only two families in the NEP, the Leucothoidae and the Pleustidae (Bousfield 2001). The family Anamixidae as used by Thomas (1997) is treated as a subfamily in McLaughlin et al (2005) within the family Leucothoidae. The pleustids are a much larger group of taxa in the NEP, divided into a series of subfamilies (Bousfield & Hendrycks 1994). Both families are almost always white in preservation, although they may be colorful or well patterned when alive. Like lysianassids, they tend to be difficult to manipulate because of their smooth carapaces.

Members of the superfamily have entire telsons, which generally lack distal setation or spination, and are often ventrally keeled. Accessory flagella are minute and scale-like, or absent altogether. No calceoli or brush setae on antennae. Eyes are round, medium-sized and lateral, never coalescing over the top of the head. The lower lip has well developed and/or medially fused median lobes. No coxal gill on P7. Uropods lanceolate, with the rami of 2 and 3 both unequal (Bousfield 1978).

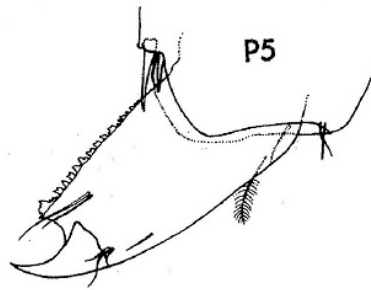
Diagnosis of the Leucothoidea

“ Apomorphic, rostrate, smooth-bodied, occasionally processiferous, crawling, clinging, or inquilinous marine gammaroideans, lacking a pelagic terminal male stage; antennae various, lacking calceoli or brush setae; peduncle of antenna 2 often strong; accessory flagellum minute or lacking; eyes rounded, medium, lateral mouthparts highly modified, apomorphic; upper lip with distinct median notch, lobes usually asymmetric; lower lip broad, inner lobes usually well developed or medially fused; mandible, molar usually small or lacking, incisor and lacinia strong, palp slender, reduced, or lacking; maxillae small, inner plates nearly bare; maxilla 1 outer plate with 6-7 apical spine teeth; maxilliped, plates small, inner may be fused to opposite member, palp strongly dactylate; coxal plates various, usually deep, 4th often very broadly expanded, excavate behind; coxae 5-7 posteriorly lobate; gnathopods 1 and 2 usually moderately to strongly amplexing, often strongly dissimilar, subchelate, chelate, carpochelate, or simple; peraeopods 5-7 homopodous, bases variously expanded or linear; brood plates large, broad; coxal gills simple, lacking on peraeopod 7; pleopods normal; uropods lanceolate, rami of 2 and often 3 markedly unequal; uropod 3, peduncle often elongate, outer ramus 1-segmented (2-segmented where inner ramus lacking), non-foliaceous; telson entire, usually with median ventral keel, distal margin bare or nearly so.” (Bousfield 1978).

Ecological Commentary

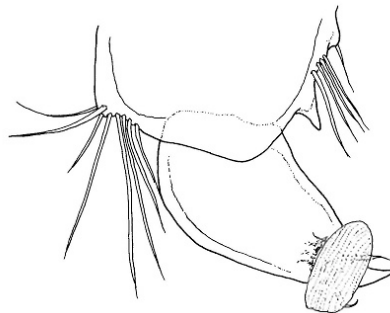
Members of the Leucothoidea have a relatively high degree of association with other animals. Leucothoids are usually associated as endocommensals with solitary or colonial tunicates (Chavanich et al 2007; Thiel 1999, 2000; Thomas 1979, White and Reimer 2012a), sponges (Crowe and Thomas 2002, Thiel 2000, Thomas and Klebba 2007, White and Reimer 2012b), or even bivalves (Thomas and Klebba 2007). They can also seek refuge within rubble bottoms, and while there may be definite species within that habitat with which they associate, these are not yet known (White and Reimer 2012c).

Pleustids have a more varied pattern of association. In several cases the amphipods are modified to allow or facilitate these inter-species bonds. In *Dactylopleustes*, for instance, the dactyls are modified into prehensile structures used to grasp the spines of the echinoderm on which they live (Vader, 1978, 1983).



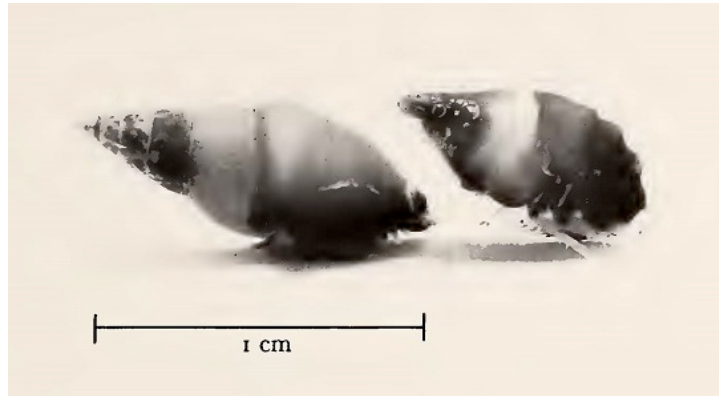
Prehensile dactyl of P5 in *Dactylopleustes echinoicus* (from Bousfield & Hendrycks 1995)

An even more specialized modification of body form is found in the atylopsine *Myzotarsa*, where a setal row has fused to form a concave plate mesially above the dactyl of each leg, which can be forced against the smooth carapace of a host crab to form a suction bond (Cadien and Martin 1999). Unlike other “suckers” such as those in cephalopods, there is no central pore used to add or remove fluid, and no attendant musculature for protrusion or retraction of the plate. Adhesion seems to depend strictly on the plate being appressed to the surface by movement of the leg itself. Release is accomplished by torsion on the leg which creates a strong-side/weak-side pressure differentiation in the plate, eventually finding release on the weak-side. Observations on living amphipods in vials show them walking on the glass by alternately pressing down on the setal plate, and then tilt/rotating it to release the adhesion. They look like window washers on a high-rise building, and use their “suction cups” in an exactly analogous manner.



Sucker on mesial face of P7 dactyl of *Myzotarsa anaxiphilius* (from Cadien & Martin 1999)

Some pleustids are free-living, but employ mimesis to appear like other types of animals. A particularly fine example of this is the species *Thorlaksonius platypus*, which adopts a stance sitting on an algal surface which strongly resembles the size, outline, and orientation of the columbellid snail *Alia carinata*. The coloration of the amphipod is also banded to closely resemble that of the mollusk shell (Crane 1969).



Alia carinata (left) and *Thorlaksonius platypus* (right), it's Batesian mimic (from Crane 1969)

The presence of vibrant coloration in such forms as *Chromopleustes oculatus* reflects an adaptation to a particular host, in this case a starfish. The color of the amphipod renders it cryptic on the host. Not all such colorful displays may be so limited. In some cases patterns may be more similar to a compound background than to a single host organism and the amphipod does not have a specific host.



Chromopleustes oculatus a distinctively patterned local species (Photo Leslie Harris)

A third variant of association is with a much larger host, which provides positional crypsis for the commensal amphipod. Such is the case with *Commensipleustes*

commensalis on the lobster *Panulirus interruptus*. The amphipods are porcelain white when alive, and are clearly visible on the pleopods of the lobster where they are found. The lobster, however, keeps this area hidden, providing positional crypsis to the amphipod.

List of NEP leucothoids based on McLaughlin et al (2005) with the addition of known provisionals. Species listed in SCAMIT Edition 9 (Cadien and Lovell 2014) are indicated with an asterisk (*)

Family Leucothoidae

Subfamily Anamixinae

Anamixis linsleyi J. L. Barnard 1955 (see Anamixis pacifica)

***Anamixis pacifica** (J. L. Barnard 1955) – SCB: 0-15m

Leucothoides pacifica J. L. Barnard 1955 (see Anamixis pacifica)

Nepanamixis torreanus Thomas 1997 – Tower Island, Galapagos, 1m

Nepanamixis vectoris Thomas 1997 – Pacific Panama, 4-8m

Subfamily Leucothoinae

***Leucothoe alata** J. L. Barnard 1959 – Morro Bay to San Diego: 0-30m

Leucothoe alata of Nagata 1965 non J. L. Barnard 1959 (see Leucothoe nagatai)

Leucothoe minima of J. L. Barnard 1952 non Schellenberg 1925 (see Leucothoe alata)

***Leucothoe nagatai** Ishimaru 1985 – San Francisco Bay to San Diego Bay: 0-5m

Leucothoe panpulco J. L. Barnard 1961 – off Central America at 9°N: 3570m

Leucothoe spinicarpa (Abildgaard 1789) (misid see Leucothoe sp.)

Leucothoe ushakovi Gurjanova 1951 – North Atlantic, Arctic, Cascadia Abyssal Plain, Oregon: 2787-3000m

Leucothoe sp A of Dickinson 1976 – San Diego Trough: 1215-1244m

***Leucothoe sp** – distribution uncertain based on erroneous identifications and possible sibling species cluster: shallow shelf depths

Family Pleustidae

Subfamily Pleustinae

Pleustes (Catapleustes) constantinus Bousfield & Hendrycks 1994b – Aleutians to British Columbia: 0-30m

Pleustes (Catapleustes) victoriae Bousfield & Hendrycks 1994b – British Columbia: 0m

Pleustes depressus Alderman 1936 (=Thorlaksonius depressus)

Pleustes platypus J. L. Barnard & Given 1960 (= Thorlaksonius platypus)

Thorlaksonius amchitkanus Bousfield & Hendrycks 1994b – Aleutians: 0-5m

Thorlaksonius borealis Bousfield & Hendrycks 1994b – Prince William Sound, Alaska to Oregon: 0-10m

Thorlaksonius brevirostris Bousfield & Hendrycks 1994b – SE Alaska to Central California: 0-35m

Thorlaksonius carinatus Bousfield & Hendrycks 1994b – SE Alaska to British Columbia: 0-50m

***Thorlaksonius depressus** (Alderman 1936) – Coos Bay, Oregon to La Jolla: 0-15m

- Thorlaksonius grandirostris** Bousfield & Hendrycks 1994b – British Columbia to Central California: 0m
- ***Thorlaksonius platypus** (Barnard & Given 1960) – SCB: 2-100m
- ***Thorlaksonius subcarinatus** Bousfield & Hendrycks 1994b – SE Alaska to SCB: 0-25m
- ***Thorlaksonius truncatus** Bousfield & Hendrycks 1994b – British Columbia to SCB: 6-30m
- Subfamily Mesopleustinae
- Mesopleustes abyssorum** (Stebbing 1888) – Morocco, Indian Ocean, Flores Sea, NWPacific, NEP from Oregon to Baja California: 694-3479m
- Pleustes abyssorum Stebbing 1888 (= Mesopleustes abyssorum)
- Subfamily Atylopsinae
- ***Myzotarsaanaxiphilius** Cadien & Martin 1999 – Santa Monica to Dana Pt.: 208-305m
- Subfamily Pleusymtinae
- Anomalosymptes coxalis** Hendrycks & Bousfield 2004 – N. British Columbia to Oregon: 8-25m
- Heteropleustes setosus** Hendrycks & Bousfield 2004 – British Columbia to Oregon: 6-73m
- Holopleustes aequipes** Hendrycks & Bousfield 2004 – British Columbia to central Oregon: 0-15m
- Kamptopleustes coquillus** Barnard 1971 – British Columbia to central Oregon: 3-60m
- Kamptopleustes spinosus** Hendrycks & Bousfield 2004 – SE Alaska to So. British Columbia: 2-65m
- Pleusymtes pacifica** Hendrycks & Bousfield 2004 – Aleutians to southern British Columbia: 2-60m
- ***Pleusymtes subglaber** (J. L. Barnard & Given 1960) – SCB: 9-183m
- Pleusymtes uncigera** (Gurjanova 1938) – NWP, in NEP from Alaska to British Columbia: 0-50m
- Pleustomesus medius** (Goes 1866) – Circumarctic, Sea of Okhotsk to SE Alaska: 5-62m
- Sympleustes subglaber J. L. Barnard & Given 1960 (=Pleusymtes subglaber)
- Sympleustes uncigera Gurjanova 1938 (=Pleusymtes uncigera)
- Subfamily Pleusirinae
- ***Pleusirus secorrus** Barnard 1969 – SE Alaska to San Diego: 0-25m
- Subfamily Dactylopleustinae
- Dactylopleustes echinoides** Bousfield & Hendrycks 1995b – British Columbia on Strongylocentrotus purpuratus: 0-2m
- ***Dactylopleustes sp A** SCAMIT 1988§ - SCB on Strongylocentrotus, Brisaster spp, and ?Lytechinus: 60-305m
- Subfamily Neopleustidae
- Neopleustes columbianus** Hendrycks & Bousfield 2004 – SE Alaska to So. British Columbia: 8-71m
- Shoemakeroides cornigera** (Shoemaker 1964) – Aleutians to SE Alaska: 100-1800m

Subfamily Stenopleustinae

***Gracilipleustes monocuspis** (Barnard & Given 1960) – SCB – Bahia San Cristobal, Baja California, Mexico: 37-158m

Stenopleustes monocuspis Barnard & Given 1960 (= Gracilipleustes monocuspis)

Subfamily Parapleustinae

***Chromopleustes lineatus** Bousfield & Hendrycks 1995– SE Alaska to Santa Barbara: 0-50m

***Chromopleustes oculatus** (Holmes 1908) – Bering Sea to San Diego: 0-20m

Chromopleustes sp 1 Bousfield & Hendrycks 1995§: 9-183m

***Commensipleustes commensalis** (Shoemaker 1952) – SCB – Bahia de Los Angeles, Gulf of California, Mexico: 5-60m

***Gnathopleustes den** (Barnard 1969) – SCB: 0m

Gnathopleustes pachychaetus Bousfield & Hendrycks 1995 – SE Alaska to Central California: 0-15m

***Gnathopleustes pugettensis** (Dana 1852) – SE Alaska to Santa Barbara: 0-70m

***Gnathopleustes serratus** Bousfield & Hendrycks 1995 – SE Alaska to SCB: 0m

Gnathopleustes simplex Bousfield & Hendrycks 1995 – British Columbia to southern Oregon : 0-15m

Gnathopleustes trichodus Bousfield & Hendrycks 1995 – British Columbia: 22m

***Incisocalliope bairdi** (Boeck 1871) – SCB: 30-150m

Incisocalliope derzhavini (Gurjanova 1938) – San Francisco Bay, introduced: 0-5m

***Incisocalliope newportensis** Barnard 1959 – SCB: 3-25m

Iphimedeia pugettensis Dana 1852 (= Gnathopleustes pugettensis)

Micropleustes nautiloides Bousfield & Hendrycks 1995 – S. British Columbia to Central California: 0-5m

***Micropleustes nautilus** (Barnard 1969) – Bering Sea to SCB: 0-5m

Neopleustes derzhavini Gurjanova 1938 (= Incisocalliope derzhavini)

Paramphitoe bairdi Boeck 1871 (= Incisocalliope bairdi)

Parapleustes americanus Bousfield & Hendrycks 1995b – Bering Sea to S. British Columbia: 0-50m

Parapleustes commensalis Shoemaker 1952 (=Commensipleustes commensalis)

Parapleustes den J. L. Barnard 1969 (=Gnathopleustes den)

Parapleustes nautilus J. L. Barnard 1969 (=Micropleustes nautilus)

Parapleustes oculatus Holmes 1908 (= Chromopleustes oculatus)

***Trachypleustes trevori** Bousfield & Hendrycks 1995b – Bering Sea to SCB: 0-15m

Trachypleustes vancouverensis Bousfield & Hendrycks 1995b – British Columbia: 0m

Comments by Family

Family Leucothoidae – Originally *Anamixis* and *Leucothoe* were allocated to separate families. Thomas (1997) continued this separation, treating the Anamixidae as valid despite the demonstration that *Anamixis* and *Leucothoides* were the same (Thomas

& Barnard 1983). Subsequently Anamixidae was reduced to subfamilial level within the Leucothoidae, as it is treated here. On-going molecular investigations by Thomas and co-workers are demonstrating that the familial separation is supported by molecular evidence, but these results are as yet unpublished.

Description: “*Head free, not coalesced with peraeonite 1; exposed; rostrum present, short or moderate or long; eyes present, well developed or obsolescent; not coalesced; 1 pair; not bulging. Body laterally compressed, or subcylindrical; cuticle smooth.*

Antenna 1 shorter than antenna 2, or subequal to antenna 2, or longer than antenna 2; peduncle with sparse robust and slender setae; 3-articulate; peduncular article 1 shorter than article 2, or subequal to article 2, or longer than article 2; antenna 1 article 2 subequal to article 3, or longer than article 3; peduncular articles 1-2 not geniculate; accessory flagellum present, or absent; antenna 1 calynophore present, or absent. Antenna 2 present; short, or medium length; articles not folded in zigzag fashion; without hook-like process; flagellum shorter than peduncle; less than 5-articulate, or 5 or more articulate; not clavate; calceoli absent.

*Mouthparts well developed or reduced. Mandible incisor dentate, or absent; lacinia mobilis present on both sides; accessory setal row without distal tuft; molar absent; palp present. Maxilla 1 present; inner plate present, weakly setose apically or without setae; palp present, not clavate, 1-1.5-2 -articulate. Maxilla 2 inner plate present; outer plate present. Maxilliped inner and outer plates well developed or reduced, palps present, well developed or reduced; **inner plates reduced**, separate; outer plates present or absent, small or vestigial; palp 4-articulate, article 3 without rugosities. Labium smooth.*

***Peraeon.** Peraeonites 1-7 separate; complete; sternal gills absent; pleurae absent.*

Coxae 1-7 well developed, none fused with peraeonites. Coxae 1-4 longer than broad or as long as broad or broader than long, overlapping, coxa 1 anteroventrally acuminate or coxae not acuminate. Coxae 1-3 not successively smaller, none vestigial or coxa 1 reduced or coxa 1 vestigial. Coxae 2-4 none immensely broadened.

*Gnathopod 1 not sexually dimorphic; smaller (or weaker) than gnathopod 2, or subequal to gnathopod 2; vestigial, hidden or partially hidden by coxa 2, or smaller than coxa 2, or subequal to coxa 2, or vestigial; gnathopod 1 merus and carpus not rotated; gnathopod 1 carpus/propodus not cantilevered; shorter than propodus, or longer than propodus; gnathopod 1 strongly produced along posterior margin of propodus, or not produced along posterior margin of propodus; dactylus large. **Gnathopod 2** sexually dimorphic, or not sexually dimorphic; carpocheate, or subcheate; **coxa larger than coxa 3; ischium short; merus not fused along posterior margin of carpus or produced away from it; carpus/propodus not cantilevered, carpus short, shorter than propodus or longer than propodus, strongly produced along posterior margin of propodus.***

Peraeopods heteropodous (3-4 directed posteriorly, 5-7 directed anteriorly), none prehensile. Peraeopod 3 well developed. Peraeopod 4 well developed. 3-4 not glandular; 3-7 without hooded dactyli, 3-7 propodi without distal spurs. Coxa well developed, longer than broad or as long as broad or broader than long; carpus shorter than propodus, not produced; dactylus well developed. Coxa subequal to coxa 3 or larger than coxa 3, not acuminate, with well developed posteroventral lobe or without

posteroventral lobe; carpus not produced. Peraeopods 5-7 with few robust or slender setae; dactyli without slender or robust setae. Peraeopod 5 well developed; shorter than peraeopod 6, or subequal in length to peraeopod 6; coxa smaller than coxa 4 or subequal to coxa 4, without posterior lobe; basis expanded or slightly expanded, subrectangular or subovate, with posteroventral lobe or without posteroventral lobe; merus/carpus free; carpus linear; setae absent. Peraeopod 6 shorter than peraeopod 7, or subequal in length to peraeopod 7; merus/carpus free; dactylus without setae. Peraeopod 7 with 6-7 well developed articles; subequal to peraeopod 5, or longer than peraeopod 5; similar in structure to peraeopod 6; with 7 articles; basis expanded or linear, without dense slender setae; dactylus without setae.

Pleon. Pleonites 1-3 without transverse dorsal serrations, without dorsal carina; without slender or robust dorsal setae. Epimera 1-3 present. Epimeron 1 well developed. Epimeron 2 without setae.

Urosome not dorsoventrally flattened; urosomites 1 to 3 free; urosomite 1 much longer than urosomite 2; urosome urosomites not carinate; urosomites 1-2 without transverse dorsal serrations. Uropods 1-2 apices of rami with robust setae, or without robust setae. Uropods 1-3 similar in structure and size. Uropod 1 peduncle without long plumose setae, without basofacial robust seta, without ventromedial spur. Uropod 2 well developed; without ventromedial spur, without dorsal flange; inner ramus subequal to outer ramus, or longer than outer ramus. Uropod 3 not sexually dimorphic; peduncle elongate; outer ramus shorter than peduncle, 1-articulate or 2-articulate, without recurved spines. Telson laminar; entire; longer than broad, or as long as broad, or broader than long; apical robust setae absent.” (from Lowry and Springthorpe 2001).

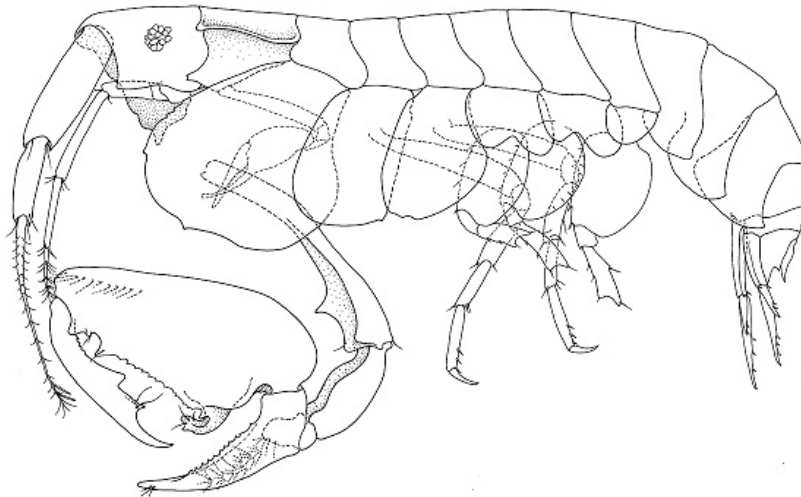
All leucothoids so far known are inquilinous on or in sessile invertebrates, usually sponges or ascidians (i.e. Thomas 1979). Only six valid species of the family are known from the NEP, along with a seventh species of unknown identity which has been confused in the past with *Leucothoe spinicarpa*. Several other names have been used, and these are listed above but unbolded, with reference to the current name for the animal referred to. The first record of the family was that of Barnard (1952) who recorded a species of *Leucothoe* from Morro Bay as *L. minima* Schellenberg. This was later corrected by Barnard in Barnard & Reish (1959), with the description of *Leucothoe alata* based on material from Newport Bay as well as the earlier material from Morro Bay. In the interim Barnard had described *Anamixis pacifica* (as *Anamixis linsleyi* and *Leucothoides pacifica*) in Barnard 1955.

Jim Thomas has worked on leucothoids for many years, and his discovery (along with Barnard) of the nature of the transformation molt (Thomas & Barnard 1983) showed previous nomenclatural practice among members of the family to be faulty. The transformation of the mature male in one molt to a form so different that it was placed in a different family was not previously imagined. Once it was, the genera *Anamixis* and *Leucothoides* had to be synonymized. So far, an equivalent transformation molt is not recorded in members of the genus *Leucothoe*. Members of the subfamily Anamixinae were monographed by Thomas (1997) who gave a thorough discussion of the anamorph and leucomorph forms for most known taxa, including *A. pacifica*. The profound structural differences between mature males and females in the Anamixinae are not found in the Leucothoinae.

Key to the Leucothoidae of the NEP (modified from Barnard 1975, and Thomas 1997)
 – D. Cadien 25 Jul11 (revised 30 Jan 2015)

1. Mandibular palp with a single article.....Anamixinae 2
 Mandibular palp with three articles.....Leucothoinae 4
2. Eyes with 9 ommatidia.....*Nepanamixis* 3
 Eyes with 12-20+ ommatidia.....*Anamixis pacifica*
3. Article 5 of gnathopod 1 with stout spine at apex; coxa 4 emarginate ventrally.....
*Nepanamixis vectoris*
 Article 5 of gnathopod 1 with small seta at apex; coxa 4 crenulate ventrally.....
*Nepanamixis torreanus*
4. Eyes absent.....*Leucothoe ushakovi*
 Eyes present.....5
5. Dactyl of G1 shorter than art. 3 of G 1.....6
 Dactyl of G1 about 1.5 times as long as art. 3 of G1.....7
6. Antenna 1 flagellum short, 6 segments in adult, first half the length of the second;
 accessory flagellum absent.....*Lecothoe nagatai*
 Antenna 1 flagellum moderate, 9-13 segments in adult, first longest; accessory
 flagellum feeble, but present.....*Leucothoe alata*
7. Eyes small, less than 20% of head height.....*Leucothoe panpulco*
 Eyes large, at least 35% of head height.....*Leucothoe* sp.*

*This species has been previously recorded from the area as *L. spinicarpa*. See <http://www.nova.edu/ocean/jthomas/POST-Leucothoe-binder-ver505.pdf> where J. D. Thomas lists incorrect identifications of this supposedly cosmopolitan species.



Anamixis papuaensis anamorph male (from Thomas 1997)

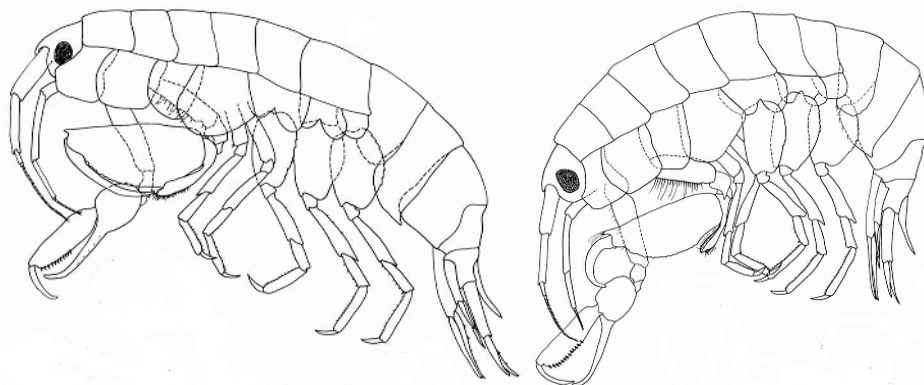
Anamixis – Originally erected to house only males, the relationship between those males and females of the genus *Leucothoides* was established by Thomas and Barnard 1983. *Anamixis*, being the older name, retained precedence and now includes all those species originally described in *Leucothoides* (contrary to the position adopted by Chapman 2007). Because the anamorph and leucomorph stages of anamixids were

separately described, many names have been submerged as synonyms once the connection between the two forms was established. *Anamixis pacifica* was described twice in the same paper (Barnard 1955), once as an *Anamixis*, and once as a *Leucothoides*. Since the leucomorph was described first, that specific name has page priority, thus *Anamixis pacifica* is the valid binomen of which *Anamixis linsleyi* is a synonym.

Diagnosis: “*In terminal males: Antennae long; anterior margin of head oblique or transverse, with or without anteroventral cusp; eyes with ommatidia compact and numerous, or reduced in number and diffuse; inner plates of maxilliped fused into apically rounded process, or with apical notch, outer plates lacking inner lobes in most taxa. Coxa 1 greatly reduced, remainder of gnathopod 1 present, small, occasionally reduced to fleshy remnant; carpus not inflated basally. Gnathopod 2, propodus with single row of mediofacial feeding setae. Telson 1.1-1.6 longer than wide.*” (from Thomas 1997)

Nepanamixis – Neither of the two described species from the NEP is known from more than the holotype, and the leucomorphs of both species remain unknown. The two are very similar, and both are tropical, *N. torreanus* from Tower Island in the Galapagos, and *N. vectoris* from Pacific Panama. Both were taken along with coral or coral rubble, but their host associations are unknown. Although the key above will separate the two, see Thomas 1997 for more detail.

Diagnosis: “*Terminal males: antennae relatively short, eyes with 9 scattered ommatidia, head margins rounded. Maxilliped, inner plates only partially fused, outer plates with inner lobes present or reduced to a small process. Coxa 1 moderately reduced. Gnathopod 1, carpus basally inflated, inner margin cusped; when armed, apex of propodus with terminal spine or bulbous process. Coxae 2 dominant or subequal to 3 and 4; margins of coxae 2-3 smooth, sparsely setose submarginally; ventral margin of coxae 4 distally produced or crenulate. Gnathopod 2, propodus with 2 rows of mediofacial setae, each row with 4 or more seta, hind margin straight or sinuous. Coxa 4 ventrally crenulate or excavate. Telson long, 1.80-2.10 or longer than wide, tapering apically.*” (from Thomas 1997)



Leucothoe spinicarpa male (left) and female (right) from Crowe (2006)

Leucothoe - Confusion in species identifications within this genus is widespread. This is particularly true of *Leucothoe spinicarpa*, the type. For many years the animal was viewed as cosmopolitan, and records of this species were made all over the world.

Closer examination in recent years has led to the establishment of numerous endemic species carved out of the “cosmopolitan” *L. spinicarpa*.

The name has been more adequately fixed recently by redescription of the species and designation of neotypes (Crowe 2006). Early descriptions were lacking in the details currently viewed as essential for proper species level discrimination. J. D. Thomas and coauthors have been going through the process, but many older records still need to be reexamined and corrected, including that of the species in local waters. The length of the dactyl on G1 is sufficient to separate our local *Leucothoe* sp (formerly *L. spinicarpa*), from the two other species that occur in California waters.

These two are extremely similar, and until very recently all such forms were recorded as *L. alata*. In early 2011 J. D. Thomas collected an unfamiliar form from introduced tunicates on the inside of Pt. Loma. The live coloration of the female was distinctive, and unlike any species he had seen previously. It proved to be *L. nagatai*, based primarily on the structure of mouthparts (maxillipeds, mandibles, maxilla 2, maxilla 1) although there are also external characters which can be used to separate *L. alata* and *L. nagatai*. It is likely that the species referred to as *Leucothoe* sp currently will prove to be new, although introduction must also be considered. It is also possible that a complex of species will be found once historic materials are reidentified. The hosts with which leucothoids are associated are often widely distributed by anthropogenic transfer on ship fouling. The majority of bay and harbor records of ascidians in Southern California are now of introduced forms (Lambert & Lambert 1998, 2003), and the potential for introduction of associated commensals remains significant and not fully evaluated.



Leucothoe nagatai ♀ from *Ciona intestinalis* on a buoy near the mouth of San Diego Bay, July 2011 (Photo J. D. Thomas, Nova University)

Three of the 6 *Leucothoe* species reported from the NEP are intertidal to sublittoral in distribution; *L. alata*, *L. nagatai*, and *L. sp* (formerly *spinicarpa*). The remainder are from deep bathyal/abyssal depths. One of these three must remain a species inquirendum, the provisional *Leucothoe sp A* of Dickinson (1976) from the San Diego Trough. Two other described species are also known from even deeper water, *L. panpulco* from off Central America, and *L. ushakovi*, reported by Dickinson (1976) from the Cascadia Abyssal Plain off Oregon.

Diagnosis: “Eyes, if present, generally well developed with 10 or more ocelli. Mandibular palp three articulate; right lacinia mobilis smaller than left. Maxilliped outer plates not reaching apex of palp article 1. Coxa 1–4 relatively equal in widths. Pereopods 5–7 bases generally expanded. Minimal to no sexual dimorphism.” (from White 2011)

Family Pleustidae – This large family seems to have the NEP as its evolutionary center. Its members in the region have been treated in a series of papers (Barnard and Given 1960, Bousfield and Hendrycks 1994a, 1994b, 1995; Hendrycks and Bousfield 2004). Barnard and Given start out dealing with the family by saying “Amphipoda of the family Pleustidae are among the more difficult to identify and classify.” This reflected well the status of the nomenclature of the group in 1960, fortunately there have been some advancements since. They listed only three species known previously from the NEP, *Parapleustes oculatus* of Holmes, *Pleustes depressus* of Alderman, and *Parapleustes pugettensis* of Dana. Barnard and Given added another four new species, and proposed alterations to the family concept. Holmes (1908) had also described a form whose family affinities were questionable, *Acanthopleustes annectens* n. gen. n. sp. from depths of between 600 and 1300m in the SCB. This is now allocated to *Amathillopsis*, in the Amathillopsidae, a family currently placed in the superfamily Iphimedioidea.

Although Barnard had earlier reported *Parapleustes bairdi* (Barnard 1956) and described *Incisocalliope newportensis* as n.gen. n.sp. in the Calliopiidae the previous year (Barnard in Barnard and Reish 1959), both species were synonymized with *Parapleustes pugettensis* in Barnard and Given. They also did not mention or include in their key *Parapleustes commensalis* of Shoemaker (1952). This situation remained essentially unchanged until 1967, when Barnard recorded and discussed *Mesopleustes abyssorum* from off Baja California in deep water (Barnard 1967). In 1969, he described three new pleustids and the new genus *Pleusirus* from the California intertidal zone (Barnard 1969). In 1971 he added yet another species, *Pleusymtes coquilla* from off Oregon.(Barnard 1971). Thus the recognized NEP pleustid fauna nearly doubled between 1960 and 1971, from 8 to 13 taxa.

Nothing changed in the next 20+ years in the published literature, although SCAMIT erected *Dactylopleustes sp A* in 1988. By 1994 description of many new pleustid taxa was underway.. In the initial installment (Bousfield and Hendrycks 1994a) a series of subfamilies were established within the Pleustidae, available characters for the group were reviewed and new ones proposed, and a single new genus and species was described. This was a Bering Sea species, which falls outside the scope of the current commentary.

In the next section (Bousfield and Hendrycks 1994b) a dozen new species in the subfamily Pleustinae were introduced, nine of them from the NEP south of the Bering sea and Arctic. The next year the subfamilies Parapleustinae, Dactylopleustinae, and Pleusirinae were covered (Bousfield and Hendrycks 1995). Several new genera were erected, as well as a number of species. Cadien and Martin added the sucker-foot crab commensal *Myzotarsa anaxiphilius* in 1999, a species taken in our trawls. The final additions to the pleustid fauna to date were made by Hendrycks and Bousfield (2004).

While SCAMIT does not use subfamily information as a rule, there are exceptions. One of those should be this group, where so many species are known from the NEP. Bousfield & Hendrycks (1994a) provide a key to the subfamilies of Pleustidae. This should be used to place species in the appropriate subfamilial context (alternatively, if you know what it is, just go to the appropriate subfamily directly). Eight of the twelve subfamilies occur in the NEP from the Aleutians south to the Equator. They are discussed below.

Diagnosis: “Body small to medium large, often broadened anteriorly, usually toothed or carinated dorsally, especially on the pleon; surface often strikingly coloured or maculated. Urosome 2 short, often dorsally occluded by segments 1 and 3. Head deep, variously (often strongly) rostrate; anterior head lobe pronounced, acute or rounded, rarely incised; inferior antennal sinus distinct, inferior lobe acute, or produced. Eyes typically large, well pigmented, subrotund to subrectangular. Antennae short to medium-long, slender, lacking calceoli. Antenna 1 longer than 2, peduncular segment 1 large, often produced distally; segments 2 and 3 often short; accessory flagellum minute or lacking. Buccal mass shallow to medium deep, regressed slightly behind head.

Upper lip apically notched or incised; lobes usually asymmetrical; epistome with rounded median anterior ridge. Lower lip, inner lobes varying from tall and narrow to broad and squat; outer lobes; from large and closely approximated to small, rounded and widely separated.

Mandible well developed. Molar present, basically with strong, apical, triturating surface, secondarily reduced, setulose or smooth, non-tritulative. Spine-row strong, blades often thickened, pectinate, blade-like, or “molarized”. Left lacinia multi-dentate (6l-12+ teeth); right lacinia present in primitive subfamilies, lacking in advanced groups; incisor strongly toothed. Maxilla 1, inner plate small, with few (0-4) apical setae; outer plate with 9 (6-17) tall pectinate spines; palp large, 2-segmented, apically spinose and setose. Maxilla 2, inner plate shorter, often broader than outer, lacking facial row of setae, but inner margin usually with 1-2 large plumose setae. Maxilliped strongly developed; outer plate basically large, with convex outer margin, secondarily reduced, slender, columnar in form; inner plate often short, apex subtruncate, bearing setae and spines of large or small types, inner margin with masticatory setae or spines; palp large, semi-raptorial, segment 2 largest, segment 3 often produced apically beyond base of slender dactyl.

Coxae 1-4 usually large, deeper than corresponding peraeonal plates, increasing posteriorly; mid-point of hind margins occasionally weakly processiferous; lower hind corner usually with small cusp(s); coxa 1 often short, modified; coxa 4 excavate behind.

Gnathopods 1 and 2 variously (often strongly) subchelate, occasionally simple, usually subsimilar (2 larger), occasionally sexually dimorphic; palm often with median tooth, postero-distal angle with stout spine cluster(s); carpus not longer than propod,

hind lobe often narrow, deep; basis with setose anterior margin; dactyls with short unguis.

Peraeopods 2-7 normal, little modified, segments spinose, rarely setose, dactyls strong. Peraeopods 3 and 4 subequal (3 longer). Peraeopods 5-7 regularly homopodous (Similar in size and form); coxae postero-lobate, usually rounded behind, occasionally ridged laterally; bases expanded, rounded behind, not distally narrowing, segment 4 variously overhanging shorter segment 5 behind.

Pleon side plates large, overlapping, hind corners usually acuminate, hind margin smooth or serrated. Pleopods large. Uropod 3, rami lanceolate, margins spinose (lacking plumose setae), inner ramus the longer, both rami longer than peduncle. Telson short to medium, with mid-ventral keel; margins smooth or setulose (not spinose); apex variously rounded, rarely incised.

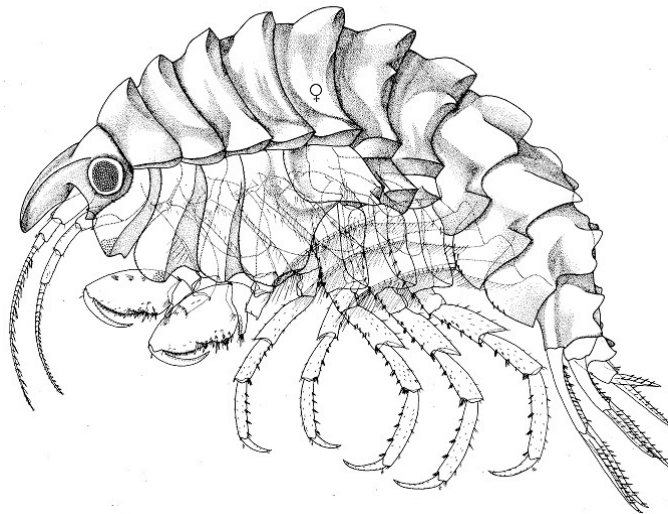
Coxal gills primarily small and sac-like, secondarily large and plate-like, on peraeopods 2-6, rarely on peraeopod 7.

Brood plates on peraeopods 2-4 large, broad, on 5 small, margins with numerous simple setae.

Mature male typically smaller than mature female.” (from Bousfield and Hendrycks 1994).

Subfamily Pleustinae

Only two species in this subfamily are currently recorded from the SCAMIT Ed.9 listing (Cadien & Lovell 2014). Distributional information in Bousfield & Hendrycks (1994b) indicates that these two, *Thorlaksonius platypus* and *T. depressus*, were the only subfamily members occurring in California. Since their review two additional species *T. brevirostris* and *T. grandirostris* have been taken in the central California intertidal during Introduced Species Surveys (ISS). An additional two species have now been found in the Southern California Bight (SCB) in either ISS or regional monitoring; *T. subcarinatus* and *T. truncatus*. The remaining taxa are all from boreal or Arctic areas to the north. A key to *Thorlaksonius* is provided on pg. 39 of Bousfield and Hendrycks 1994b.



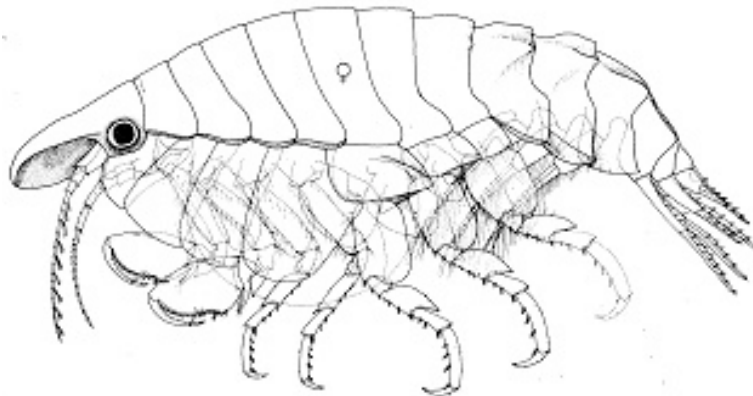
Pleustes victoriae (from Bousfield and Hendrycks 1994b)

Pleustes – A genus of sixteen species confined to the holarctic region, and most prominent in the Arctic and Boreal North Pacific, with numerous representatives on both the eastern and western flanks of that ocean. Within the NEP only two species have been taken south of the Aleutians. Previous records of the genus from California all referred to species transferred to their new genus *Thorlaksonius* by Bousfield and Hendrycks (1995).

Diagnosis: “*Body large at maturity (15-28 mm). Peraeon and pleon segments moderately to strongly carinate and/or toothed dorsally and mid-laterally; peraeon segments 1-4 usually not (or weakly) carinate mid-laterally (dorso-laterally), not inferior laterally, nor strongly laterally; pleon segment 3 usually lacking acute postero-lateral cusp. Head, rostrum usually strong, slender, tip acute or occasionally truncate, dorsal median depression shallow; lateral ridges arising fully supra-orbitally, lower margin straight or slightly concave. Mandible: blade row with numerous (20-30+) blades; palp segment 3 with numerous (11-16+) baso-facial setae. Maxilla 1, palp segment 1, lateral process strongly developed. Maxilliped, outer plate usually with 2 apical spines.*

Coxal plates 1-4' facially smooth or with faint vertical mid-rib only; lower margin appearing straight or slightly curved, hind corners squarish or rounded, not excavate or incised. Coxae 5-7, usually acute, produced behind, laterally ribbed, not toothed. and setose. Gnathopods 1 & 2, propods, distal group of posterodistal spines not extending onto outer palmar margin, and not beyond corresponding inner marginal spines; dactyl-tip depression (between distal and penultimate spine groups) usually large angle of "step-down" margin steep, (usually >45° to line of palmar margin).

Peraeopods 5-7, segments usually little stronger and dactyls not noticeably longer than in peraeopods 3-4; bases, hind margins gently rounded or straight, rarely concave, hind lobes usually rounded. Uropods relatively short; uropod 1 not longer than pleon segment 3 and urosome segments 1-3 combined. Telson typically short, squarish, slightly broadened distally.” (from Bousfield & Hendrycks 1994a)



Thorlaksonius grandirostris (from Bousfield & Hendrycks 1994a)

Thorlaksonius – All but four of the eleven species in the genus were established by Bousfield & Hendrycks (1994a) as the genus was erected. The others had been described as *Pleustes* species, and were transferred to *Thorlaksonius*. While all members of *Pleustes* are restricted to cool waters of the boreal, subarctic and arctic zones, several *Thorlaksonius* range south into temperate waters along the coast of California. The genus is endemic to the North Pacific, with members both in the NWP (2 species) and the NEP

(9 species). A key to the genus was provided by Bousfield & Hendrycks (1994a); no provisionals are currently recorded from the region.

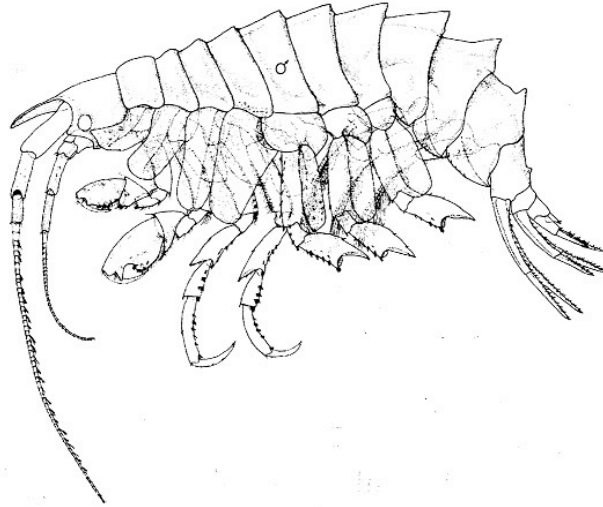
Diagnosis: “*Body small to medium in size, broad, heavy. Carinae relatively weak, variably on pleon and posterior peraeon, weak or lacking on urosome. Peraeon segments 14 totally lacking mid-dorsal, dorso-lateral, and mid-lateral teeth or carinae. Head, rostrum deep, blunt (apex deflexed, rounded, or truncate, seldom acute), mid-dorsally flat or slightly humped(not depressed), lateral ridges arising anteroorbitally; trending (often conspicuously) to sexual dimorphism (longer and more slender in males). Antenna 1, peduncular segments 2 & 3 very short. Coxae 1-4 large, deep, facially smooth or with light mid-rib; lower margin nearly straight, never scalloped or incised behind; hind corner squarish. Coxae 5-6 with weak lateral ridge, acute posteriorly; coxa 7 variably ridged and toothed.*

Mouthparts apomorphic. Mandible: palp segment 3 with 0-1 (rarely 3-5) basofacial setae; spine row short (15-20 blades). Maxilla 1, palp segment 1, lateral shelf prominent, often strongly setose. Maxilla 2, inner plate, basal plumose seta very weak, usually lacking. Maxilliped, palp stout; outer plate small, slender, apex 2-4 spinose; inner plate with 6-9 apical and 2-3 subapical inner marginal spines. Gnathopod 1, propod slightly more slender than 2; postero-distal spines in 3 groups, distal group extending submarginally along palmar margin (4-12 spines), distal spine often conspicuously enlarged; inner marginal spines few (3-4), subequal; angle of palmar "step-down" margin gentle, not abrupt $\approx 45^\circ$); D-TD shallow, small; carpal hind lobes slender, well-developed; meral process strong. Peraeopods 3 & 4 generally more slender and dactyls shorter than in peraeopods 5-7. Peraeopods 5-7, segments relatively short and stout; bases weakly ridged laterally, postero-distally rounded, hind margin convex (usually) or nearly straight; segment 4 usually strongly overhanging segment 5 behind. Pleon plates 1-3, basal hind marginal cusps very weak or lacking.

Urosome .1., lateral ridge low, shallowly incised. occasionally raised and prominent. Uropods 1 & 2, rami slender, serially spinose, inner ramus longer than peduncle. Uropod 3, inner ramus short, - 60% length of outer ramus, tips not exceeding rami of uropod 2. Telson relatively long, length up to 1.5 times width, slightly narrowing or little broadened distally. Coxal gills often unequal in size; gill on peraeopod 2 often sublinear, gill on peraeopod 6 usually smaller than on peraeopod 5.” (from Bousfield & Hendrycks 1994a)

Subfamily Mesopleustidae

The subfamily contains only the genus *Mesopleustes*, which is monotypic. It is relatively broadly distributed in deep waters, but not particularly commonly found in samples.



Mesopleustes abyssorum (from Hendrycks and Bousfield 2004)

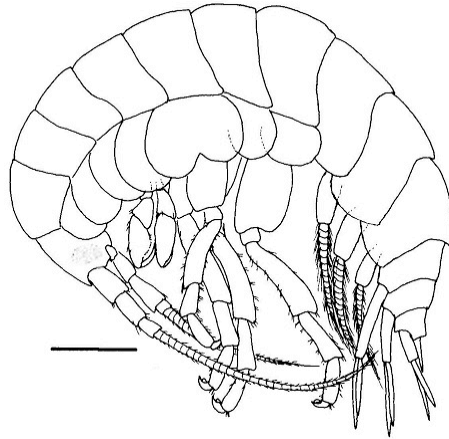
Mesopleustes – The single species in the genus is represented in the NEP. *Mesopleustes abyssorum* is reported from abyssal depths off Baja California by Barnard (1967), and from the Cascadia Abyssal Plain off Oregon by Hendrycks and Bousfield (2004). We don't expect to see this animal in any of our monitoring collections unless we begin monitoring in abyssal depths. If interested, please consult Barnard's description of the animal and commentary in his Cedros Trench paper (1967), Hendrycks and Bousfield's recent description and illustration, or Stebbing's original diagnosis (1888).

Diagnosis: "Body large, robust, carinated middorsally on peraeon, pleon, and urosome 1; urosome segment 2 dorsally free. Head, rostrum strong. Antenna 1, peduncular segments 1-3 strong, lacking distal processes; accessory flagellum minute. Antenna 2 short. Upper lip slightly emarginate apically. Lower lip, inner lobes lacking. Mandibular molar large, grinding surface with triturative ridges, molar seta short; left lacinia 6-dentate; right lacinia bifurcate; palp medium long, Maxilla 1, inner plate with 3-4 apical setae; outer plate with 11 apical spine-teeth. Maxilla 2, inner plate slightly elongate, with subapical inner marginal seta. Maxilliped, inner plate not shortened, apex with 5 "button" spines; outer plate large, broad; palp segment 3 not produced distally. Coxa 1 bent forwards distally. Coxae 2-4 abruptly deeper, narrowing distally, ribbed medially. Coxae 5-6 shallowly posterolobate. Coxal gills medium, saclike, on peraeopods 2-6. Gnathopods strongly subchelate, dissimilar in form and size; carpus short; propodal palms with median tooth. Gnathopod 2, palmar margin excavate. Peraeopods 3-4 strong; segment 5 short; dactyls strong; peraeopods 5-7 strong, subsimilar, bases narrow, posterodistal lobes distinct, rounded. Pleopods strong, not sexually dimorphic. Epimeral plate 3, bind corner acuminate. Uropod 1, peduncle lacking distolateral spine, rami subequal. Uropods 2 & 3, outer ramus shorter than inner. Telson medium long, apically notched, keeled medially; penicillate setae distally inserted." (from Hendrycks & Bousfield 2004)

Subfamily Atylopsinae

Primarily an austral subfamily whose only local representative is a commensal. The subfamily contains but two genera; *Atylopsis*, with four species, and the monotypic

Myzotarsa. The genus *Domicola*, which Cadien and Martin (1999) suggested should be placed in the Atylopsinae is currently allocated to the Stenopleustinae (Lowry 2014a).



Myzotarsa anaxiphilius a crab and barnacle symbiont (from Cadien & Martin 1999)

Myzotarsa – *Myzotarsa anaxiphilius* is unlikely to be taken off its host crabs, and so is a feature of trawl rather than infaunal collections. It can be immediately recognized by the presence of round to oval suckers on the mesial faces of the dactyls. These are not large, but are clearly visible under a dissecting microscope. This structure has no counterpart elsewhere in the Gammaroidea. The animal is found on both local species of *Paralithodes*, and not yet on any other host. It may occur under the abdomen of the crab whether the crab has a barnacle parasite or not. The amphipod is apparently an egg parasite of both the parasitic barnacle, or in its absence, the crab.

Diagnosis: “As for subfamily (Bousfield and Hendrycks, 1994a: 34) except: antenna 1 bearing one-articled accessory flagellum; upper lip barely notched, symmetrical; epistome produced; left mandible lacinia 7-dentate; maxilla 1 inner plate fully setose on medial margin; maxillipedal palp dactyl somewhat falcate; gnathopods robust, strongly subchelate, carpus with posterior lobe, propodus with midpalmar tooth in male (not in female); pereopod dactyl not simple, modified for adhesion; uropod 3 rami lanceolate; telson centrally keeled.” (from Cadien & Martin 1999)

Subfamily Pleusymtinae

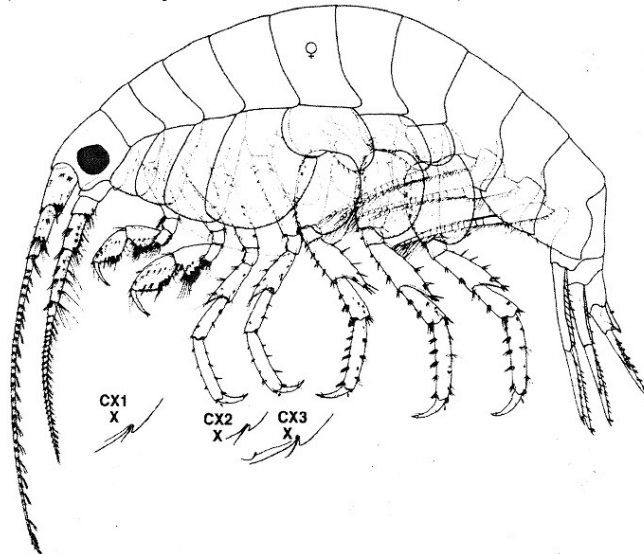
The subfamily, which currently consists of nine genera (Lowry 2014b) has representatives of six in the NEP, although only a single species occurs in the SCB, *Pleusymtes subglaber*. Hendrycks and Bousfield (2004) provide a key to the genera in the subfamily but no comprehensive key to the genus *Pleusymtes*. None is needed for identification of these animals in the SCB, as the southern range end of the most closely distributed species is Central Oregon. There is the possibility of introduction, however, so examine all *Pleusymtes subglaber* with some care to assure they match the species description.

Anomalosymptes – A monotypic genus consisting only of *A. coxalis*, the type, from boreal waters between British Columbia and the central Oregon coast.

Diagnosis: “Body smooth, lacking mid-dorsal carinations. Urosome 2 not occluded dorsally. Rostrum medium strong, slightly exceeding anterior head lobe. Antenna 1, peduncular segment 1 enlarged, with strong anterodistal process overhanging

segment 2; segments 2 & 3 short, combined length $\approx 0.7x$ segment 1. Accessory flagellum small, 1-segmented. Antenna 2 shorter than 1, peduncular segment 5 longer than 4. Upper lip shallowly notched apically, lobes slightly asymmetrical. Lower lip, inner lobes not developed. Mandible, left lacinia 8-dentate, right lacinia lacking but distal blade of spine row expanded; molar process strong, grinding surface with ridged margin; palp stout. Maxilla 1, inner plate with single apical seta; outer plate with 9 tall apical spine teeth; palp slender, proximal segment bare. Maxilla 2, inner plate little broadened, slightly shorter than outer plate, two inner marginal stout setae inserted adjacent to apical setae. Maxilliped, inner plate slender truncate apex with 3 apical button spines; outer plate normal; palp large, segment 2 longest; segment 3 broadest, subequal in length to slender dactyl. Coxa 1 bent forwards distally, anterior margin shallowly concave. Coxal plates 2-4 abruptly much deeper, narrow. Coxae 1-3 with distinct posterior cusp and 2-3 smaller supernumerary cusps. Coxa 4 very deeply excavate posteroproximally. Coxae 5-7 very deep, shallowly posterolobate. Coxal gills small, saclike, lacing on peraeopod 7. Brood plates medium large, subovate. Gnathopods 1&2 medium strong, closely subsimilar in size and form; bases almost devoid of marginal setae; propodal palmar margins smoothly oblique and convex, lacking submedial tooth, with weak spine clusters at posterodistal angle; hind margin short; dactyl slender. Gnathopod 2, merus with small posterodistal tooth; carpus short, posterior lobe narrow, masking base of propod.

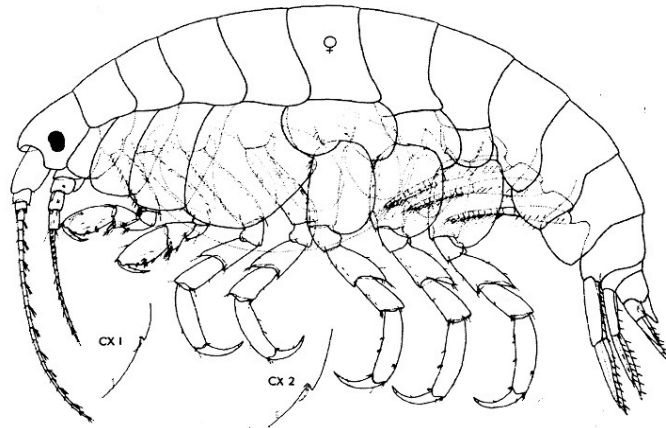
Peraeopods 3-7 slender, segment 5 slightly shorter than 4 & 6, dactyls medium long. Peraeopods 5-7, bases narrow, increasing in size posteriorly. Peraeopod 7, basis distinctly deeper, narrower, posterodistal lobe deep, hind margin nearly straight. Epimeral plate 3, hind corner nearly squared. Pleopod rami short, not sexually dimorphic. Uropod 1, peduncle lacking distolateral stout spine. Uropods 2 & 3, outer ramus distinctly the shorter. Telson elongate, subrectangular, proximomedially keeled, notched apically.” (from Hendrycks & Bousfield 2004)



Heteropleustes setosus with detail of the ventral armature of coxa 1-3 (from Hendrycks & Bousfield 2004)

Heteropleustes – A small genus endemic to the North Pacific, with one species in the NWP, and one in the NEP. The latter, *H. setosus*, ranges from British Columbia to central Oregon associated with sponges in sublittoral depths.

Diagnosis: “Body smooth, not middorsally carinated. Urosome 2 dorsally narrowed but not occluded. Head, rostrum small, not exceeding rounded anterior head lobe. Eyes large, rounded. Antenna 1, peduncular segment 1 somewhat enlarged, normal, lacking posterodistal acute process; peduncular segment 2 not reduced, segment 3 short; accessory flagellum minute, subtriangular. Antenna 2 distinctly shorter than antenna 1; peduncular segment 5 longer than 4, surfaces and margins setose. Upper lip shallowly notched, slightly asymmetrical. Lower lip, inner lobes flat, broad; outer lobes widely separated. Mandible, left lacinia 6-7 dentate, right lacinia lacking; molar strong, with pavement-type grinding surface; left blades thickened, right blades slender; palp large. Maxilla 1, inner plate with single apical seta; outer plate with 9 tall apical spine teeth; palp stout, with 4 apical spines and subapical row of setae; proximal segment lacking marginal seta. Maxilla 2, inner plate short, broad, with 1-2 stout inner marginal setae inserted near apical setae. Maxilliped, inner plate short, broad, with 2 apical button spines; outer plate narrowing and rounded apically; palp strong, segment 2 longest; segment 3 simple, length subequal to nearly straight dactyl. Coxal plates 1-4 medium deep, increasing regularly posteriorly; coxae 1-3 each with single small posterior cusp; coxa 1 rounded, not bent forwards distally. Coxae 5 & 6 distinctly posterolobate. Coxal gills medium, saclike, lacking on peraeopod 7. Gnathopods 1 & 2 small to medium, subsimilar in form, sexually dimorphic; gnathopod 2 larger than 1. Palmar margin of propod convex, oblique, with 1-4 submedian teeth and 2-4 clusters of spines at posterodistal angle; hind margin weakly setose; inner face of propods with subparallel clusters of long setae; carpus elongate, inner face with row of setal clusters; posterior lobe broad, shallow, setose; merus with small posterodistal tooth. Peraeopods 3-4 slender; segment 5 slightly shortest; dactyls short. Peraeopods 5-7 closely subsimilar; bases equally broad, posterior margins convex, posterodistal lobes shallow, rounded; dactyls short, slightly curved. Epimeral plates 1-3, hind corners acute, not forming “hook”. Pleopods slender, inner ramus longer than outer ramus. Pleopods 2 and 3 may be sexually dimorphic, wherein distal seta(e) of inner ramus are modified. Uropod 1, peduncle with distolateral spine. Uropods 2 & 3, outer ramus distinctly the shorter. Telson elongate, narrowing distally to subacute apex; paired penicillate setae proximal to mid margin” (from Hendrycks & Bousfield 2004).

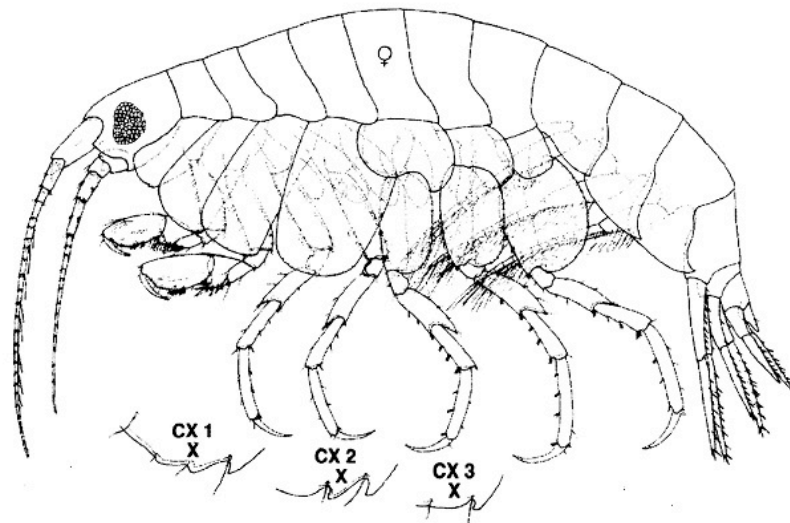


Holopleustes aequipes with detail of the ventral armature of coxa 1-2 (from Hendrycks & Bousfield 2004)

Holopleustes – A monotypic endemic genus whose sole species ranges between British Columbia and central Oregon in the intertidal zone.

Diagnosis: “Body smooth, lacking dorsal carinations. Urosome 2 narrowed but not occluded dorsally. Rostrum medium strong, deep, exceeding blunt anterior head lobe. Eyes small, short reniform. Antenna 1, peduncular segment 1 thickened, with short thickened anterodistal process; peduncular segments 2 & 3 very short. Accessory flagellum evanescent. Antenna 2 shorter and more slender; peduncular segments 4 & 5 short. Upper lip weakly notched and slightly asymmetrical. Lower lip, inner lobes weak, sloped. Mandible, left lacinia 11- dentate, right lacinia lacking; molar process weak, with small pavement-type grinding surface; blades 6-8, slender; palp short, stout, with single strong basal "A" seta, 3 distal "D" setae and 3-4 apical medium length "E" seta. Maxilla 1, inner plate with single apical setae; outer plate with 9 slender apical spine teeth; palp very broad, weakly armed, proximal segment bare. Maxilla 2, inner plate broadened; inner marginal setae adjacent to apical setae. Maxilliped, inner plate short, not broadened, with 3 small apical button spines; outer plate medium large, apically rounded; palp relatively small, segments short, subequal; dactyl heavy, nearly straight.

Coxa 1 rounded below, very slightly anterodistally flexed. Coxal plates 2-4 sharply larger, wider, and deeper, increasing regularly posteriorly; coxae 1-3 with single minute posterodistal cusp. Coxa 5 aequilobate, 6 shallowly posterolobate. Coxal gills large, broadly saclike. Brood plates large, subovate. Gnathopods weak, slightly unequal in size; palmar margins smoothly convex and oblique, lacking submedial tooth, with 2 clusters of spines at posterodistal angle, hind margin nearly bare. Gnathopod 2, merus posterodistal tooth lacking; carpus medium, lobe shallow. Peraeopods 3-7 relatively short and stout, segment 5 slightly shorter than 4. Peraeopods 5-7 closely subsimilar in size and form; bases generally broad, hind margins convex; dactyls strong. Epimeral plate 3, hind corner square. Pleopods relatively small, short, not sexually dimorphic. Uropod 1, peduncle with very weak distolateral spine; outer ramus slightly the shorter. Uropods 2 & 3, outer ramus not greatly shorter than inner ramus. Telson short, subrectangular, rounded apically; penicillate setae median, submarginal “ (from Hendrycks & Bousfield 2004)



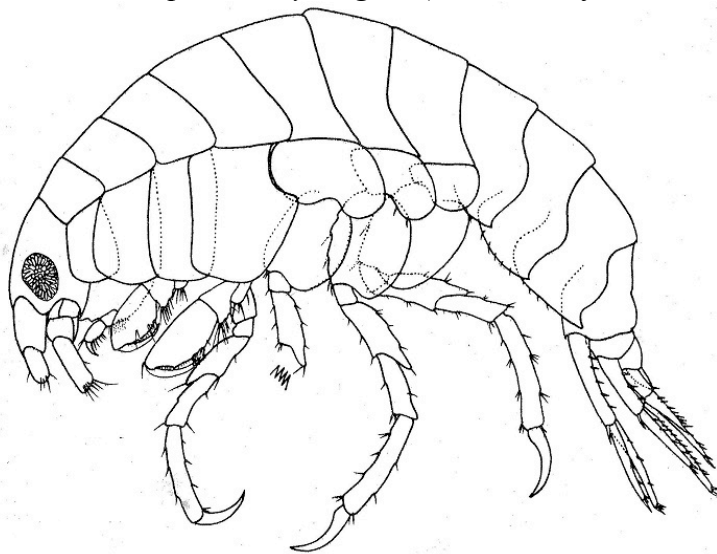
Kamptopleustes coquillus with detail of the coxa 1-3 ventral armature (from Hendrycks & Bousfield 2004)

Kamptopleustes – A small amphi-North Pacific genus with one species in Japan, and two in the NEP. It has not been detected in the temperate waters of California, and is

currently known only as far south as central Oregon. Although not providing a key to the NEP species, Hendrycks & Bousfield (2004) state the following “*Kamptopleustes spinosus* differs from *K. coquillus* in the larger eye, short peduncular segment 2 of antenna 1, short and more sharply bent coxa 1, and more slender peraeopods.”

Diagnosis: “*Body dorsally smooth. Urosome 2 narrow but not dorsally occluded. Head rostrum short, not exceeding anterior head lobe. Antenna 1, peduncular segment 1 large, with posterodistal process; segments 2 - 3 medium; accessory flagellum minute, flat. Antenna 2, peduncular segments with median marginal setal clusters. Upper lip strongly asymmetrical. Lower lip, inner lobes flat, broad. Mandibular left lacinia 8-9 dentate; molar reduced, with "pavement"-type grinding surface; blades 6-8, distalmost blades on right side with expanded chisel-like tip; palp medium. Maxilla 1, inner plate with single apical seta; palp broad, with 8-10 apical spines, segment 1 with outer marginal seta. Maxilla 2, inner plate broadened, inner marginal stout seta slightly separated from apical setae. Maxilliped, inner plate apically subtruncate, with 4 "button" spines; outer plate narrowing, with mediolateral tooth; palp segments subequal; dactyl slender, curved. Coxal plate 1 short, distinctly directed forwards anterodistally. Coxae 2-4 abruptly larger, deeper than broad. Coxae 1-3 with 1-4 small to medium posterodistal cusps. Coxae 5 & 6 medium deep posterolobate.*

Gnathopods small to medium, subsimilar in form; merus with minute posterodistal tooth; carpus short to medium; propodal palmar margins lacking spines, except at posterodistal angle, submedian tooth vestigial. Peraeopods 5-7 subsimilar in size; bases increasingly broad, posterodistal lobes shallow, posterior margins nearly straight; dactyls medium slender. Epimeral plates 2 & 3, hind corner produced, acuminate. Uropod 1, peduncle with distolateral spine; rami sub-equal. Uropod 2, outer ramus slightly to distinctly shorter than inner ramus. Uropod 3, length of outer ramus about 0.76x inner ramus, apex lacking spine(s). Telson linguiform, longer than broad, apex rounded; submarginal penicillate setae slightly distad of midpoint. Coxal gills, small to medium, sac-like. Brood plates very large.” (from Hendrycks & Bousfield 2004)



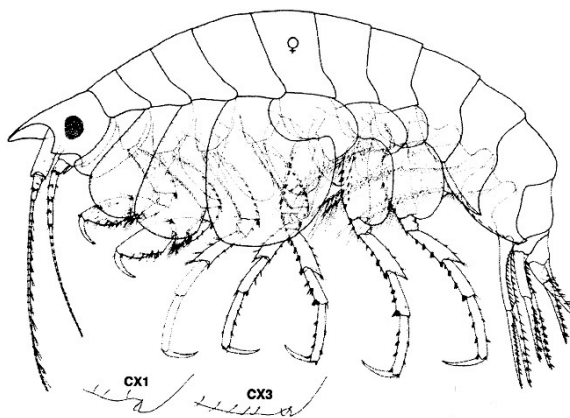
Pleusymtes subglaber (from J. L. Barnard & Given 1960)

Pleusymtes – This large genus (24 species according to Lowry 2014c), is holarctic in distribution, with most of the species restricted to the North Pacific. Three are

recorded from the study area in the NEP, one of which ranges south into the SCB. Hendrycks & Bousfield (2004) provide a key which separates the genus into several subgroups of more closely related species. Two of these, the *P. pacifica* subgroup, and the *P. pribilofensis* subgroup, have representatives in the NEP. The first group includes both *P. pacifica* and *P. subglaber*, while the latter houses *P. uncigera*. The authors do not provide a key, but characters separating the species are identified in the text. It should be noted here that Hendrycks & Bousfield list *P. derzhavini* as a *Pleusymtes*, while it actually belongs in another subfamily as *Incisocalliope derzhavini* (Bousfield & Hendrycks 1995). Gurjanova only describes one species, *Neopleustes derzhavini* in her 1938 paper, which cannot be two species in two different subfamilies.

Diagnosis: “Body smooth. Head, rostrum weak or indistinct. Eyes medium large, rhomboidal. Antenna 1, peduncular segment 1 often enlarged, with posterodistal acute process. Accessory flagellum present, minute. Upper lip, apical lobes variously asymmetric. Lower lip, inner lobes weak, narrowly sloped. Mandible, left lacinia 7-8 dentate, right lacinia lacking; molar strong, columnar, with pavement-type grinding surface; blades 6-8 on left, 6-12 on right; palp stout, more than twice length of body of mandible, with single strong basal A seta. Maxilla 1, outer plate with 9 tall apical spine teeth, inner plate with 1-2 apical setae. Maxilliped, inner plate short, broad, with 4 small apical spine teeth; outer plate narrow; palp strong, segment 2 usually longer than 1; segment 3 simple, without apical projection. Coxal plates 1-4 medium deep, increasing regularly posteriorly; coxae 1-3 variously with single posterior tooth or cusp; coxa 1 rounded, not markedly bent forwards distally. Coxae 5-7 posterolobate. Gnathopods weak to medium strong, slightly unequal in size and form, not sexually dimorphic; palmar margins usually with submedial triangular tooth or cusp. Gnathopod 2, merm with posterodistal tooth or spine; carpal lobe often narrow. Peraeopods 1-2 slender, segment 5 slightly shorter than 4 & 6. Peraeopods 5-7, bases generally broad, hind margins convex.

Epimeral plate 3, hind corner square, acute, or with cusp or tooth, forming a small hook. Pleopods stout, natatory, not sexually dimorphic. Uropod 1, peduncle with distolateral stout spine. Uropods 2 & 3, outer ramus distinctly the shorter. Telson subrectangular or narrowing distally, longer than wide.” (from Hendrycks & Bousfield 2004)



Pleustomesus medius with detail of coxa 1 & 3 ventral armature (from Hendrycks & Bousfield 2004)

Pleustomesus – A predominantly Arctic genus of three species, with one ranging into the NEP as far south as southeastern Alaska on shallow muddy bottoms.

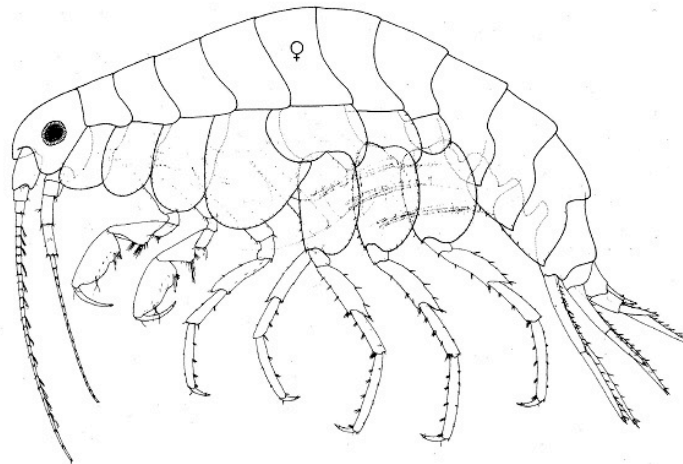
Diagnosis: “Body smooth or slightly “humped” on pleon. Urosome 2 dorsally narrowing. Rostrum strong, greatly exceeding acute anterior head lobe. Antenna 1, peduncular segment 1 elongate, posterodistal lobe weak or lacking; segments 2 & 3 short; accessory flagellum minute, flat. Upper lip asymmetrically bilobate. Lower lip, inner lobes medium, angled. Mandible, molar process large, cylindrical, with “pavement” or “cobble” grinding surface; left lacinia 7-dentate; blades 6-8, thick, spine-like; palp relatively short. Maxilla 1, inner plate with single apical seta; outer plate with 9 apical spines; palp relatively broad, with 7-8 apical spines; proximal segment with distal seta. Maxilliped, inner plate with 4 apical “button” spines; outer plate regular, tall; palp segment 3 regular, equal to segment 2; dactyl slender, curved.

Coxal plate 1 short, directed forwards anterodistally. Coxae 2-4 abruptly deeper and very broad. Coxae 13 with single medium to large posterodistal cusp. Coxae 5 & 6 deeply posterolobate. Coxal gills medium large. Gnathopods 1 & 2 similar in form, 2 larger than 1; merus with small posterodistal tooth; carpus medium to elongate; propod, palmar margin lacking submedian tooth, posterodistal angle with clusters of stout spines.

Peraeopods 5-7 subequal in length, bases increasingly broad posteriorly, hind margins convex; dactyls medium long, slender. Epimeral plates 2- 3, hind corners produced, acute. Pleopods normal, strong. Uropod 1, peduncle with short distolateral spine; rami subequal. Uropod 2, outer ramus a little shorter than inner ramus. Uropod 3, outer ramus > 2/3 inner ramus. Telson longer than broad, flat, apical margin rounded, penicillate setae lateromedial; ventral keel median. “ (from Hendrycks & Bousfield 2004)

Subfamily Pleusirinae

A single member, *Pleusirus securus*, occurs in the SCB. It is easily distinguished from other family members by the structure of the gnathopods.



Pleusirus securus (from Bousfield & Hendrycks 1995)

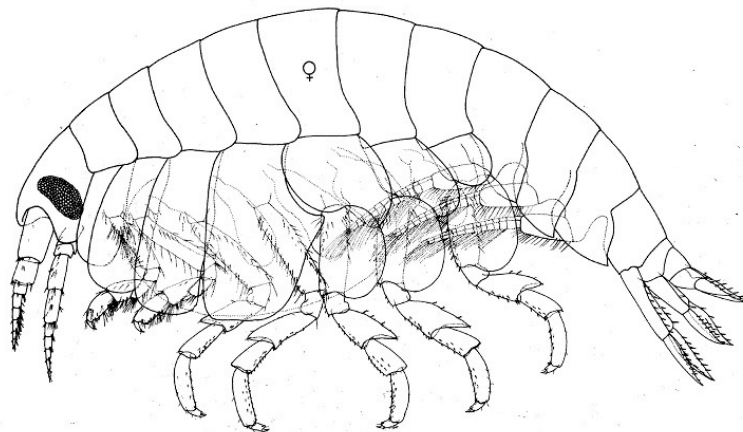
Pleusirus – A monotypic endemic genus. The type ranges from southeastern Alaska into the SCB. The distinctive triangular carpi of the gnathopods immediately separates it from all other pleustids in the region.

Diagnosis: “With the characters of the subfamily, and in addition: Antenna 1, peduncular segment 1 with posterodistal process; flagellar segments, posterior marginal aesthetascs paired, prominent. Mandibular blades thick, distally pectinate; incisor 7-8-dentate, third tooth largest. Maxilla 1, palp segment 1 with "shoulder" seta. Maxilla 2, inner plate not broadened, lacking inner marginal plumose seta. Maxilliped, inner plate with stout inner marginal and apical spines. Gnathopods 1 & 2, bases slender, margins not strongly setose; propod, hind margin smooth; dactyl slender. Peraeopods 5-7, coxae deep, postero-lobate, hind lobes rounded, segment 5 not longer than 4. Uropods 1 & 2, inner ramus longer than peduncle. Uropods 2 & 3, outer ramus short. Telson rounded, penicillate setae median.

Male: Antennal segments with prominent aesthetascs; peraeopods 5-7 relatively slender; dactyls relatively long, slender, nearly straight.” (from Bousfield & Hendrycks 1995)

Subfamily Dactylopleustidae

An exclusively commensal subfamily of small animals associated with echinoid hosts. There is some suggestion that the amphipod species are host specific, but this is not supported for our local species *Dactylopleustes* sp A. This animal has been taken in association with several different outer shelf and upper slope echinoids. Dactyls of the legs are modified for clinging to the spines of the echinoid with an excavation on their ventral margin across which a stiff seta closes, forming a clip. Distinguishing between members of the genus is difficult, and *D.* sp A requires a more precise description than currently offered by the SCAMIT voucher sheet. Given that its nearest relative, *D. echinoides* is reported from different hosts and lives at intertidal/shallow subtidal depths, we are not likely to confuse it with the local shelf form.



Dactylopleustes echinoides (from Bousfield & Hendrycks 1994b)

Dactyloplestes – The genus, which is another North Pacific endemic, has four described species, and one provisional from the SCB. A key to the described forms is provided by Tomikawa et al (2004). Hosts are definitely known for *D. yoshimurai* (*Strongylocentrotus intermedius*) and for *D. echinoicus* (*S. polyacanthus*), but no host association was noted for *D. obsolescens*, and that of *D. echinoides* is unclear. *Strongylocentrotus purpurascens* are common where that species was taken, but the amphipods were not directly observed on that host. Although *D.* sp A have been taken on *Strongylocentrotus fragilis*, especially on the oral membrane, they have also been taken

on irregular urchins of several genera and species which co-occur. Since these samples are collected by trawling from outer shelf and upper slope environments, the possibility that their occurrence on these other echinoids a result of the catch methodology must be considered. It would be convenient to say that all members of the genus are obligate associates with hosts in the genus *Strongylocentrotus*, but data are not fully consistent with that.

Diagnosis: “*Body small, smooth above, lysianassiform; coxae deep, legs short. Head, rostrum short, about equal to broadly rounded anterior head lobe; inferior antenna 1 sinus shallow. Antenna 1 not longer than antenna 2, segment 2 short, segment 3 very short, flagellum shorter than peduncle; Antenna 2, flagellum shorter than peduncle.*

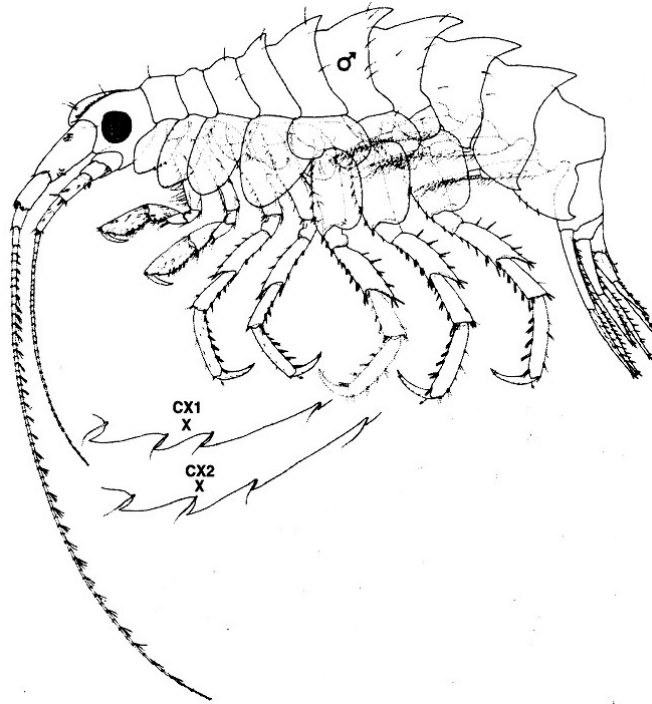
Mouthparts highly modified. Lower lip, inner lobes tall, outer lobes large, oblique to nearly horizontal. Mandible, molar forming a smoothly rounded protuberance beneath 6- 8 slender blades; left lacinia with 6-7 rounded teeth; palp slender; segment 1 short, segment 2 weakly setose; segment 3 with few pectinate inner marginal setae. Maxilla 1, outer plate short, broad, apical spines slender, innermost strongest. Maxilla 2, outer plate with heavy spinelike apical setae. Maxilliped, plates weakly armed; inner plate lacking distal "button" spines, outer plate, inner margin concave, apex weakly spined; palp short, segment 2 shortest, segment 3 longest, with medio-distal row of spines; dactyl slender.

Coxal plates 1-4 very deep, broad, much deeper than body plates; coxa 1 distinctly smallest, but not expanded distally; hind cusps 2-5 per plate, small. Gnathopods small, short, subequal, subsimilar, non sexually dimorphic; bases slender, anterior margin setose (more strongly in Gnathopod 1); merus rounded distally; carpus shallow-setose behind, length about equal to propod; palm very short, convex, with few short spines at postero-distal angle, long hind margin with groups of pectinate setae; dactyl short, smooth. Peraeopods 3-7 short, segmental margins short-spinose; dactyls very short, body heavy, inner margin nearly straight, micro-crenulated. Peraeopods 5-7 regularly homopodous, coxae very deep, hind lobes rounded below; bases broad evenly rounded behind. Pleon side plates medium deep, broad, smooth below, hind corners acuminate. Pleopod peduncles short, rami with reduced numbers of segments, not sexually dimorphic.

Uropods 1 & 2 short, stout; rami suramceolate, margins serially spinose, tips not spinose. Uropod 3, peduncle short, stout, rami broad-lanceolate, inner ramus distinctly the larger. Coxal gills largest on peraeopods 4 & 5, smallest on peraeopod 6. “ (from Bousfield & Hendrycks 1995)

Subfamily Neopleustidae

While there are two members in the NEP (see list above), neither occurs south of British Columbia. These species have not been reported by SCAMIT agencies, and are not expected to occur in the SCB.

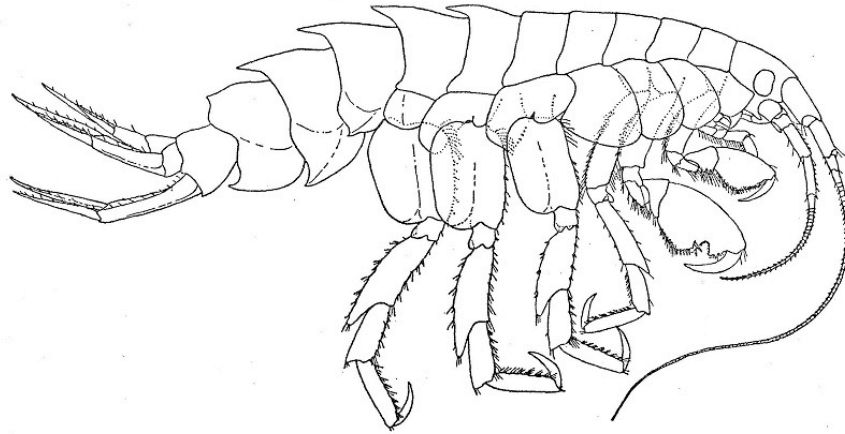


Neopleustes columbiae with detail of coxa 1 & 2 ventral armature (from Hendrycks & Bousfield 2004)

Neopleustes – A small northern genus of six species with representatives in the North Pacific and the North Atlantic. Only one of the former occurs in the NEP, *Neopleustes columbiae*. Hendrycks & Bousfield (2004) provide a key to the family which separates the genera and species.

Diagnosis: “Body middorsally carinate or mucronate, rarely smooth. Rostrum medium to strong, often keeled. Antenna 1 elongate, often longer than body. Antenna 2 distinctly shorter than antenna 1. Lower lip, outer lobes oblique, widely separated by low flat inner lobes. Mandibular molar process small, thumb-like, without triturating surface; left lacinia 9dentate; palp powerful, length exceeding by 2-3 times that of the mandibular body. Maxilla 2, inner plate, inner marginal seta set apart basally from apical setae. Maxilliped, inner plate truncate, with 4 apical button spines; outer plate slender; palp segments slender; segment 3 with short, outer distal conical projection, dactyl articulated from its medial side. Coxa 1-4 medium, increasing in size posteriorly; coxa 1 not bent forwards distally, posterodistally cusped. Coxal gills medium, sac-like.

Gnathopods 1 & 2 weakly subchelate, subsimilar; meral tooth weak or lacking; carpus elongate, shorter than propod, posterodistal lobe shallow; propod with short, oblique, weakly toothed palmar margin; posterior margin setose. Peraeopods 5-7 regular, homopodous, bases usually convex behind. Epimeral plates 2 & 3, hind corners acute, produced. Uropod 1 with distolateral peduncular spine; rami subequal. Telson with proximal keel.” (from Hendrycks & Bousfield 2004)



Shoemakeroides cornigera (from Shoemaker 1964)

Shoemakeroides – An Arctic/North Pacific endemic genus of two species, one of which ranges into the northern portion of our study area. The two are keyed in the family key, and both constituent species are described in Hendrycks & Bousfield (2004).

Diagnosis: “Body strongly carinate on peraeon segments 6 & 7 and pleon. Urosome 2 occluded dorsally or nearly so. Rostrum short, lacking anterodorsal ridge. Antenna 1 much longer than antenna 2; peduncular segments 1 & 2 long, lacking distal processes; segment 3 short; accessory flagellum minute, flat, with short apical setae. Antenna 2, peduncular segments 4 & 5 subequal, margins bare. Upper lip shallowly notched apically and slightly asymmetrical. Lower lip, inner lobes prominent, “humped”, outer lobes widely apart. Mandibular molar small, stub-like, triturating surface very small or lacking; left lacinia 8-10-dentate, right lacinia lacking; blades 8-14, slender; incisors irregularly toothed; palp stout, elongate, segment 3 with 11-14 distal E setae and 2-3 medium length apical setae. Maxilla 1, inner plate single seta present or lacking (may be fringed with fine setules); outer plate with 9 apical spines; palp broadened, with 7 apical spines and fine surface setules; proximal segment may have marginal seta. Maxilla 2 inner lobe little broadened, with 1-2 inner marginal stout setae somewhat remote from apical setae. Maxilliped, inner plate broadened, with 6 apical button spines; outer plate short; palp large, segments subequal in length, segment 3 slightly produced distally; dactyl slender curved. Coxae 1-4 short, rounded, slightly increasing in depth and size. Coxa 1 hatchet-shaped, slightly produced forward distally, with minute posterodistal cusp. Coxa 5 & 6 posterolobate.

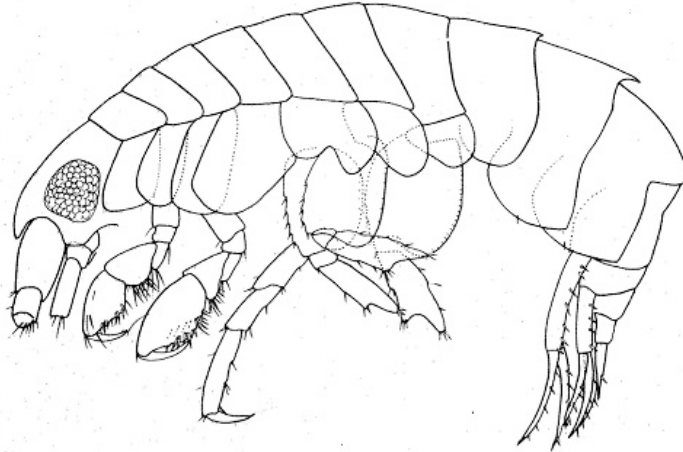
Gnathopods powerful, dissimilar in size and form, not sexually dimorphic (Shoemaker loc. cit). Gnathopod 1, basis, anterior margin setose distally; carpus medium, lobe broad, shallow; propodal palmar margin smooth, with submedian tooth, lacking spines except at posterodistal angle; hind margin strongly setose; dactyl medium. Gnathopod 2, merus with small postero-distal tooth; carpus short, lobe narrow; palmar margin irregular, excavate, with spines at posterodistal angle leading onto palm, with large bifid tooth near hinge, hind margin setose; dactyl strong.

Peraeopods 3-7 strong, segment 4 longest, 5 shortest; dactyls strong. Peraeopods 5-7, bases narrow, increasing posteriorly, hind margin nearly straight. Epimeral plate 3, hind corner produced, acuminate. Uropod 1, peduncle with distolateral spine, peduncle about as long as the subequal rami, Uropod 2, outer ramus distinctly shorter. Uropod 3, outer ramus -1/2 length of inner ramus.

Telson linguiform, longer than wide, keeled slightly proximally, distal margins with a few short spines.” (from Hendrycks & Bousfield 2004)

Subfamily Stenopleustinae

The single NEP representative occurs locally. Described by Barnard and Given (1960) as *Stenopleustes*, *Gracilipleustes monocuspis* was transferred to a newly minted genus by Hendrycks and Bousfield (2004). The animal occurs sparingly in the SCB, and can be easily recognized among the local pleustids by present of dorsal teeth on the pereonites.



Gracilipleustes monocuspis (from Barnard & Given 1960)

Gracilipleustes – Lowry (2014d) lists two taxa in the genus, while Hendrycks & Bousfield (2004) list three. Their species *Gracilipleustes inermis* (Shoemaker 1949) seems to be submerged within *G. gracilis* by Lowry, but this is not explicit. When erected by Shoemaker it was viewed as a subspecies of *Stenopleustes gracilis* of Holmes 1905 by Shoemaker. Both *G. gracilis* and *G. inermis* are reported from the Atlantic coast of the United States (Hendrycks & Bousfield 2004), while *G. monocuspis* is reported from local SCB waters. Regardless of whether or not two species are accepted from the western Atlantic, only a single species in the genus is known from the NEP.

Diagnosis: “*Body small, occasionally dorsally mucronate. Rostrum short. Antennae slender, subequal in length. Accessory flagellum evanescent. Eyes large, round or rhomboidal. Mandible, molar small, cylindrical, slightly compressed; palp segment 3 narrowing distally. Maxilliped, inner and outer plates regular, not reduced. Coxal plates 1-4 medium shallow, posterodistal cusps very weak or lacking. Gnathopods slender, subsimilar in form, gnathopod 2 larger than 1; basal segments, anterior margins weakly setose; carpal segment medium long, shorter than propod, lobes shallow to medium deep; propod, palmar margin smoothly convex, tooth vestigial or lacking. Peraeopods slender, peraeopods 5-7 slightly increasing in length posteriorly; dactyls elongate. Epimeral plate 3, hind margin serrate, corner squared. Telson short, margins setose.*” (from Hendrycks & Bousfield 2004)

Subfamily Parapleustinae

Most of the local pleustids fall into this subfamily, as do those reported on the SCAMIT Ed. 9 list. The nomenclatural history is convoluted for some members. One

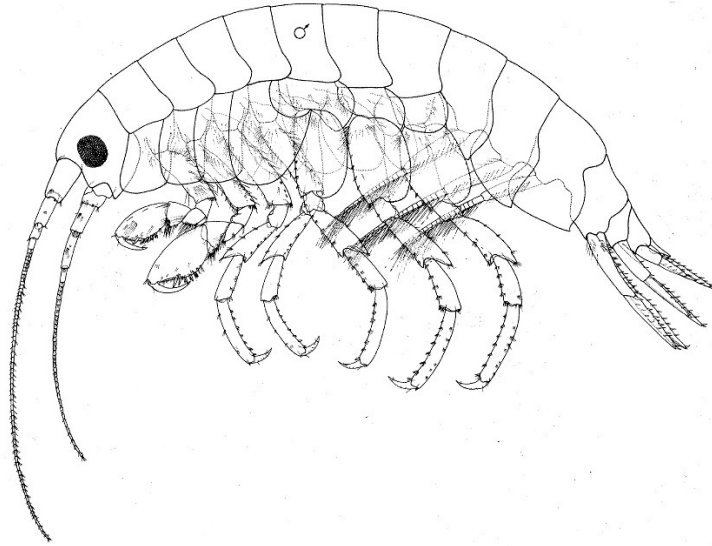
local species not reported by SCAMIT agencies in their monitoring is *Commensipleustes commensalis*, a symbiont living on the abdomens of spiny lobster. The species is frequently encountered, if looked for, within our area.

A key to the parapleustine genera is provided on pg. 68 of Bousfield and Hendrycks 1995. While there are likely to be problems with the key, I am not preparing a modified key at this time. When you begin to work with their key, we can construct an alternate (hopefully easier) key together.

Members of five genera are known to occur in the SCB; *Commensipleustes*, *Chromopleustes*, *Gnathopleustes*, *Incisocalliope*, and *Micropleustes*. Historic data records will generally not refer to these genera, but to *Parapleustes* instead. The synonymy of *Incisocalliope* with *Parapleustes* by Barnard and Given (1960) persisted until the genus was resurrected by Bousfield and Hendrycks (1995). Earlier reports of *Parapleustes bairdi* and the description of *Incisocalliope newportensis* by Barnard (in Barnard and Reish 1959) were synonymized in Barnard and Given with *Parapleustes pugettensis* of Dana. Consequently, nearly all records of species in this subfamily between 1970 and 1995 were of *Parapleustes pugettensis*. All these older data records of *P. pugettensis* from the SCB need reexamination, since it is primarily distributed to the north, reaching a southern range limit (based on specimens examined by Bousfield and Hendrycks) of Santa Barbara. It is possible that the species, now *Gnathopleustes pugettensis*, does occur further south, but it seems more likely that the old records represent misidentifications based on the description of *P. pugettensis* by Barnard and Given, and their synonymies.

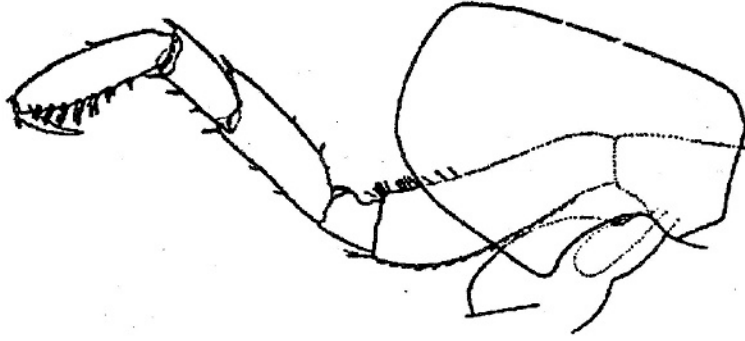
Their interpretation of *P. oculatus* of Holmes was also questioned in Bousfield and Hendrycks (1995), where the new genus *Chromopleustes* was erected, and a new species was described. *Chromopleustes oculatus* was redescribed, and differences were found between the specimens from Southern California illustrated by Barnard and Given, and the specimens of *C. oculatus* examined from the Puget Sound area. Bousfield and Hendrycks identified their northern material as conspecific with that of Holmes (1908) while relegating the material described by Barnard and Given to a provisional taxon, *Chromopleustes* sp 1. It is not clear if the *Chromopleustes oculatus* recorded on the SCAMIT Ed. 4 list actually refers to that species, or should be *C. sp 1*. For that matter, it is not clear if the provisional is warranted. The problem needs clarification at a future SCAMIT meeting. *Chromopleustes* species, as the name suggests, are quite colorful in life.

Chromopleustes – A small genus of three described species, all from the North Pacific; *C. johanseni* from the NWP, and *C. lineatus* and *C. oculatus* from the NEP. Bousfield & Hendrycks (1995) also view the specimens described as *Pleustes oculatus* by J. L. Barnard and Given (1960) as not representing Holmes *P. oculatus* of 1908. They erected a provisional, *Chromopleustes sp 1* for those specimens, which were collected in the SCB. Recently a second species of *Chromopleustes* was taken, which differs from all others in color as well as in details of setation and appendage shape. This has not yet had a voucher sheet prepared for it, and is not listed in consequence. It was also taken within the SCB, and was initially thought to be a *Myzotarsa* because of its occurrence on the abdomen of a king crab. Upon laboratory examination this proved not to be the case. Once a description is prepared, four genus members will be known from the NEP, two provisional.



Chromopleustes lineatus (from Bousfield and Hendrycks 1995)

Diagnosis: “Body smooth above. Head, rostrum very short; inferior antennal sinus short, nearly right-angled. Eyes large, nearly round. Antennae well-developed, slender, very weakly setose and/or spinose; flagella elongate. Antenna 2 distinctly the shorter; accessory flagellum extremely minute or lacking. Mouthparts strongly modified. Upper lip deeply notched, lobes markedly asymmetrical. Lower lip very wide, deep, outer lobes slender, rounded very oblique. Mandible, left incisor with numerous (>15), right incisor with 9-12, dentations or serrations; left lacinia multicuspate (>20); blades tall, slender, numerous (10-15), some with basal "satellite" setae; palp segments relatively short, segment 2 medially sparsely setose. Maxilla 1, apical spines of outer plates numerous (13-17), slender tall; inner plate with single minute apical seta; palp distally widened, with 6-8 apical spines and several closely subapical setae. Maxilla 2, inner plate not broadened, inner marginal plumose setae slender. Maxilliped, segment 3 (outer plate segment) strikingly enlarged, much longer and larger than palp segment 1; segments 2 & 3 short, dactyl strong; inner plate with 2-3 stout inner marginal setae. Coxal plates medium, little (or not) deeper than corresponding body plates; coxa 1 not broadened or bent distally; postero-distal notch single, minute. Gnathopods small to medium strong, distinctly sexually dimorphic; propod and carpus elongate (especially in female), shorter, broader and stouter in male; palm of propod much shorter than posterior margin, straight, oblique, lined with short setae, lacking median tooth; carpal lobe shallow, medium to broad. Gnathopod 1, basis with proximo-posterior "hump". Peraeopods 3-7 stout, medium long, weakly spinose, segment 5 strong; dactyls short, strong. Peraeopods 3 & 4, margins weakly spinose, lacking special setae. Peraeopods 5-7 regularly homopodous, bases somewhat narrowed behind. Pleon side plates very broad, medium deep, hind corners acuminate but not produced. Pleopods normal, strong, not sexually dimorphic. Urosome short, segment 2 not occluded dorsally. Uropods regularly spinose; rami of uropods 1 & 2 distinctly longer than respective peduncles; outer ramus slightly the shorter. Uropod 3, rami much longer (3X) than peduncle, outer ramus distinctly the shorter. Telson medium-long, rounding apically. Coxal gills large, plate like.” (from Bousfield & Hendrycks 1995)



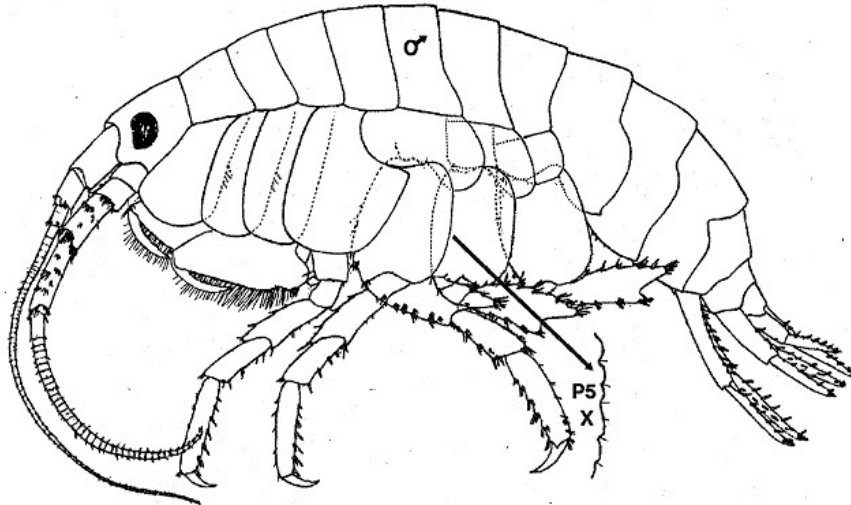
P7 of *Commensipleustes commensalis* showing closure of the dactyl against the spinose margin of the propod to form a prehensile grasping structure (from Bousfield and Hendrycks 1995)

Commensipleustes – A monotypic commensal genus endemic in the NEP. To this point the only known host is the California Spiny Lobster, *Panulirus interruptus*. The amphipods are found on the pleopods of the host, usually in association with egg bearing females. Egg parasitism may be suspected because of this. The modified propod dactylus gripping organ of the genus appears more plesiomorphic than those of the obligate commensal genera *Dactylopleustes* and *Myzotarsa*.

Diagnosis: “Head, rostrum about equal to rounded anterior lobe. Eyes medium large, black. Antennae slender, peduncles short, flagella short (C 15 segmented). Upper lip, medium notch shallow, lobes slightly asymmetrical. Lower lip inner lobes deep medium wide, rounded; outer lobes small, ovate, oblique. Mandible, molar process relatively strong, apex slightly triturative(?); spine row with numerous (10+) blades; left lacinia 10-dentate; palp segment 3 slender, with 2 inner marginal pectinate “D” spines. Maxilla 1, inner plate small, with single apical seta; palp segment 1 lacking shoulder seta(e) segment 2 stout, apex obliquely rounded, with 8 short spines, and a facial row of 3 setae. Maxilla 2, inner plate regular, with single inner marginal plumose setae.

Maxilliped, inner plate with 3 apical “button” spines and 2 slender spines; outer plate, apex with 2 slender spines, segment 3 lacking distal pectinations; palp relatively short, curved. Coxae 1-3 relatively narrow, 1 not expanded distally. Lower margins gently convex, hind cusp minute. Coxa 4 not broader than deep. Gnathopods medium strong, closely subequal, not sexually dimorphic (?). Gnathopod 1, basis, anterior margin strongly short-setose; hind margin weakly so merus lacking distal process; carpus, hind lobe relatively broad, rounded below; propod relatively short, not expanding distally; palm oblique, convex, median tooth apparently lacking.

Peraeopod 3 & 4, basis, antero-distal margin with short setae; segment 5 short, length < segment 4; segment 6 stout, hind margin distally with groups of stout spines against which the dactyl closes, forming a grasping organ. Peraeopods 5-7 homopodous, short, stout; bases medium; segment 5 short; segment 6, anterior marginal spines and dactyl forming a grasping organ, as in peraeopods 3 & 4. Pleon plates 2 & 3, hind corners mucronate, slightly produced. Uropods 1 & 2, relatively short, little or not exceeding uropod 3. Uropod 3, inner ramus relatively long. Telson linguiform, medium, distally narrowing to rounded apex.” (from Bousfield & Hendrycks 1995)



Gnathopleustes den with detail of the P5 basis posterior margin
(from Bousfield & Hendrycks 1995)

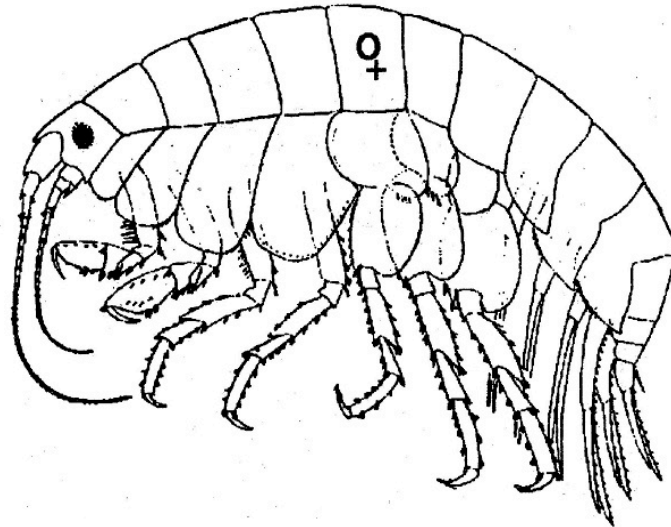
Gnathopleustes – While *Gnathopleustes pugettensis* is present in historic data, as mentioned above, it probable it does not occur, or occurs only very rarely, in the SCB. *Gnathopleustes den* was described from the intertidal zone at Corona Del Mar, but has not been reported by SCAMIT agencies in routine monitoring, probably because of habitat (although it was reported in B'08 regional sampling). *Gnathopleustes serratus*, a more northern form generally, was reported from intertidal samples within the SCB collected during ISS surveys. These species can be distinguished using the key to *Gnathopleustes* provided by Bousfield and Hendrycks (1995, p. 83).

Diagnosis: “Body smooth above. Head, rostrum shorter than bluntly rounded anterior lobe; inferior antennal sinus broadly incised. Eyes medium large, subrotund. Antennae well-developed; posterior margins often setose. Antenna 1 the longer, peduncular segment 2 short; accessory flagellum minute, apex 2-3 setose. Antenna 2, peduncle strong, flagellum often with special thickened setae. Mouthparts strongly modified. UL shallowly notched, lobes asymmetrical. Lower lip broad, outer lobes rounded, oblique. Mandible: incisor regularly toothed; left lacinia 7-10 dentate; blades 4-12 in number, stout, distally chisel shaped; molar body reduced, slender, apex fuzzy; palp normal, segment 1 short, segment 2 medially setose. Maxilla 1, outer plate with 9 tall slender apical spines; palp with subapical facial setae. Maxilla 2, inner plate little expanded; maxilliped, palp strongly dactylate, segment 2 largest; outer plate segment longer than palp segment 1, not enormously developed; inner plate short, inner marginal setae numerous (4-9).

Coxal plates wide, deeper than corresponding body plates; coxa 1 broadened distally, hind margin spinose near basis, postero-distal notch single, small. Gnathopods 1 & 2 large, subequal (Gnathopod 2 larger), variously sexually dimorphic; basis stout, with antero-distal setal group; merus with slight distal process; carpus, posterior lobe short, deep (especially in male); propods subovate, palms strongly oblique, elongate, convex, palmar tooth distinct, near hinge; palmar margin tending to be lined with special thickened or bladelike setae; postero-distal angle with 2-4 groups of spines, hind margin short, bare, or longer, setose. Peraeopods 3-7 stout, spinose, normal; segment 5 strong,

moderately overhung proximally by segment 4; dactyls medium strong, curved. Peraeopods 3 & 4, margins of segments 4, 5 & 6 may bear special thickened setae. Peraeopods 5-7 regularly homopodous, bases broad, convex behind.

Pleon side plates broad, deep, hind corners acuminate but not strongly produced. Pleopods strong, normal, not sexually dimorphic. Urosome short, segment 2 nearly occluded dorsally. Uropods 1 & 2 regularly spinose; uropod 1, rami subequal; uropod 2, outer ramus the shorter. Uropod 3, outer ramus distinctly the shorter. Telson elongate, narrowing distally; dorsal penicillate setae about mid-point from base. Coxal gills large, broad.” (from Bousfield & Hendrycks 1995)



Incisocalliope aestuarinus, a western Atlantic species (from Bousfield & Hendrycks 1995)

Incisocalliope – The genus was erected by J. L. Barnard in 1959, and later synonymized by him with *Parapleustes*. It was resurrected by Bousfield and Hendrycks 1995. It contains eight described species, all but one of which are known from the North Pacific. Three of these are reported from the NEP, two apparently native, and the third introduced from the NWP. *Incisocalliope newportensis* may be a bay-only form, while *I. bairdi* lives offshore, but this remains to be fully demonstrated. *I. bairdi*, when live, has a translucent white base color overlain by a scattering of tiny red spots concentrated in the bases of the legs. Eyes black in life. *I. derzhavini* has been reported introduced into San Francisco Bay, and is listed as an exotic introduction in McLaughlin et al (2005). It could migrate south with coastal shipping, but there is as yet no evidence that it has done so. A key to the species of *Incisocalliope* is provided by Bousfield and Hendrycks (1995, p. 96).

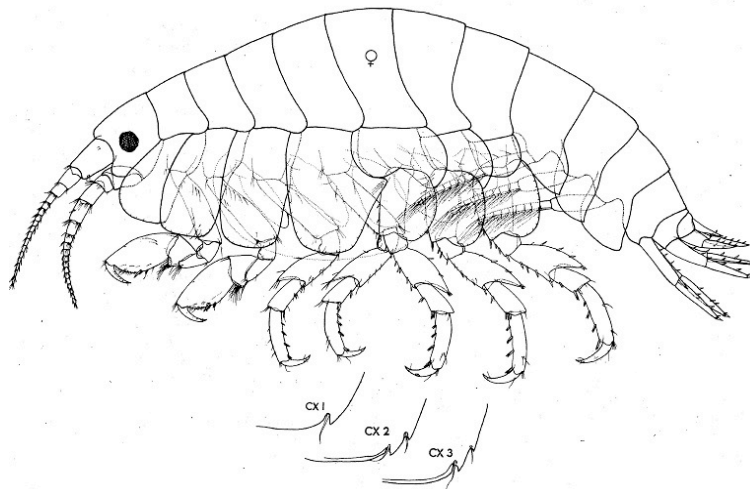
Diagnosis: “Body small to medium, slender, smooth above. Head, rostrum short, little exceeding rounded anterior headlobe. Eye small, medium rounded to ovate. Antennal flagella slender, nearly bare; antenna 1 longer than antenna 2. Antenna 1, peduncular segments 2 & 3 short, peduncle 1 lacking postero-distal cusp; accessory flagellum minute, triangular. Mouthparts modified. Upper lip, median notch deep, lobes asymmetrical. Lower lip broad, squat, outer lobes steeply oblique. Mandible, molar reduced to a small setulose knob; left lacinia 9-12 dentate; blades numerous (9-14), unmodified; incisors 8-dentate; palp segment 2 medially sparsely setose, segment 3 longest, apically truncate, segment 1 medium. Maxilla 1, inner plate with 1 apical seta;

outer plate with 9 medium strong pectinate spine-teeth; palp not broadened, surface setulose, apex rounded, with few spines, segment 1 with lateral seta(e). Maxilla 2, inner plate little broadened, inner margin with single large plumose seta. Maxilliped, inner plate with few (2-4) "button" spines; segment 3 longer than palp segment 2; outer plate columnar, palp segment 3 largest, segment 3 often with short inner distal spine-teeth; dactyl slender. Coxal plates 1-4 medium deep; coxa 4 largest & strongly excavate behind; coxa 1 shortest, slightly expanding distally; hind cusps small, single or double.

Gnathopods 1 & 2, variously (mainly strongly) subchelate, subequal, not sexually dimorphic. Gnathopod 1, basis normal, anterior margin often strongly setose; meral process weak; carpus short, deep; propod, palm convex, with median tooth, not continuous with weakly setose posterior margin; postero-distal angle with 2-3 spine groups not extending onto palm. Peraeopods of medium length and stoutness, segments spinose but not setose; segment 4 slightly longer than and distally overhanging segment 5; dactyls medium, curved. Peraeopods 5-7 homopodous, increasing slightly posteriorly; coxae medium deep, rounded behind; bases broad, hind margin nearly flat. Pleon segments normal, hind corners acuminate (but not hooked), lower margins lightly spinose. Pleopods normal, not sexually dimorphic, rami medium strong. Uropods 1 & 2 extending to or beyond uropod 3, rami spinose. Uropod 1, inner ramus slightly the longer. Uropod 2, outer ramus distinctly the shorter. Uropod 3, rami relatively short, inner ramus distinctly the longer.

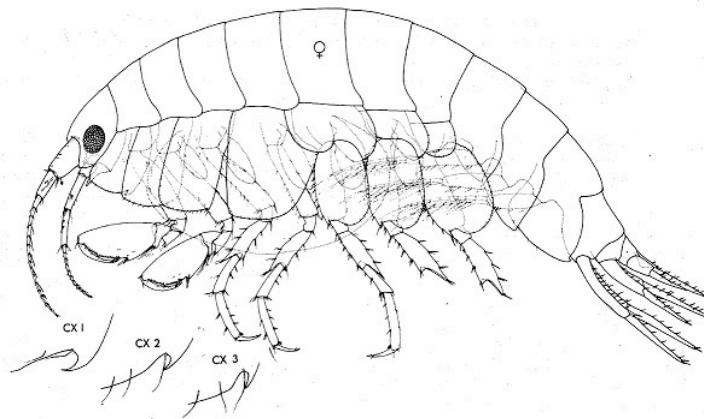
Telson medium long, keeled proximally below, apex rounded, with small paired notch and seta. Coxal gills undescribed. Brood plates large, broad." (from Bousfield & Hendrycks 1995)

Micropleustes – *Micropleustes nautilus* is reported from the intertidal and shallow sublittoral of the SCB, down to a depth of 5 m. It is represented on the SCAMIT Ed. 9 list, but is not often taken by monitoring agencies because of its very shallow habitat. Bousfield and Hendrycks provide a key to the species in the genus (1995, p. 113), but you should also take a look at the original description and discussion in Barnard 1969.



Micropleustes nautilus with detail of the coxal armature (from Bousfield & Hendrycks 1995)

Diagnosis: “Body small, smooth to slightly rugose above. Head, rostrum very short; headlobe subacute; inferior antennal sinus elongate, shallow. Eyes small, roundish. Antennae short, subequal, flagella little longer than respective peduncles, weakly setose; accessory flagellum minute. Antenna 1 slightly the longer in male. Mouthparts somewhat modified. Upper lip shallowly and submedially notched, lobes slightly asymmetrical. Lower lip wide, inner lobes deep, outer lobes oblique, rounded. Mandible: incisor with few (6-8) teeth; left lacinia 6-9 cusped; blades medium heavy, distally pectinate, 7-9 in number; molar small, apex blunt, weakly setulose; palp segments relatively short, stout; segment 2 with few (3-8) inner marginal setae; segment 3 subequal with few (5-10) inner marginal pectinate setae. Maxilla 1, outer plate with 9 tall apical spine-teeth; inner plate with single apical setae, occasionally lacking; palp segment 2 normal, apex with 4 short spines, segment 1 with 1+ outer marginal setae. Maxilla 2, inner lobe slightly broadened, inner margin often with 2 plumose setae. Maxilliped, segment 3 not conspicuously enlarged, longer than palp segment 1; dactyl strong, palp segment 3 lacking distal process; inner plate with 1-2 stout, apically pectinate inner marginal setae. Coxal plates large, broad, deep; coxa 1 not broadened or bent forward distally; postero-distal notch minute, often multiple (2-4). Gnathopods small to medium strong, not sexually dimorphic; propod tending to elongation; carpus variable, hind lobe short or lacking; palm of propod shorter than posterior margin, smoothly convex, lacking median tooth, postero-distal angle with 1-2 groups of spines. Peraeopods 3-7 short, medium stout, normally spinose; segment 5 distinctly shorter than 4; dactyls normal, strong. Peraeopods 5-7 regularly homopodous, bases very broad. Pleon side plates deep, medium broad, hind corners little produced. Pleopods normal, not sexually dimorphic, rami subequal, slightly longer than peduncles. Urosome short, segment 2 nearly occluded dorsally. Uropods short; rami of uropod 1 and uropod 2 subequal, outer slightly the shorter, sparsely spinose, about equal in length to peduncle. Uropod 3 short, extending less than twice length of telson; outer ramus distinctly the shorter. Telson elongate, dorso-lateral penicillate setae markedly distal. Coxal gills of two types: anterior two pairs slender, sublinear; posterior three pairs larger, plate like, smallest on peraeopod 6.” (from Bousfield & Hendrycks 1995)



Parapleustes americanus with details of coxal armature (from Bousfield & Hendrycks 1995)

Parapleustes – While many records of “*Parapleustes*” exist from the NEP, all but a very few refer to taxa now distributed to other genera. Twelve described species are retained in this genus (Lowry 2014e). Only two are reported from the Northeast Pacific

by Bousfield & Hendrycks (1995), the remaining species are known from other waters; a few from the Atlantic, and a number from the NWP. Neither of the NEP species penetrate into temperate waters.

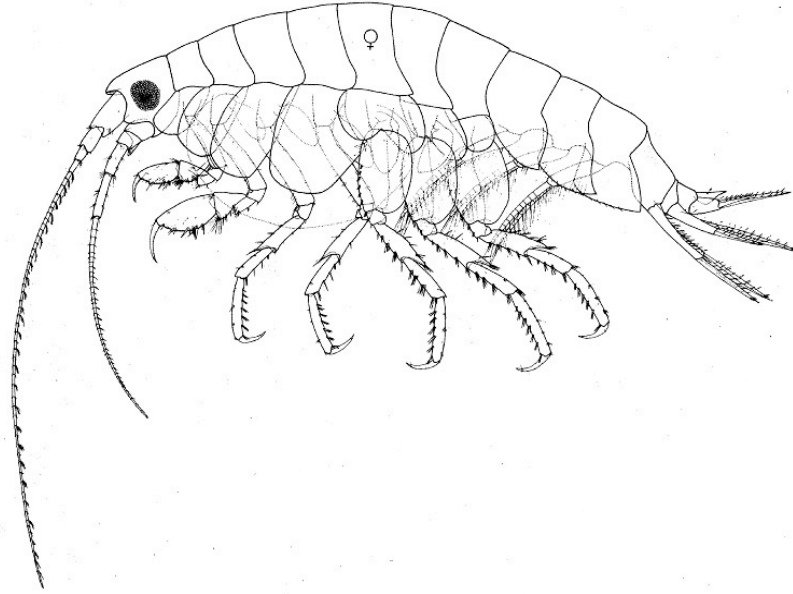
Diagnosis: “*Body small, smooth above. Head, rostrum very short; anterior head lobe subacute; inferior antennal sinus broadly incised. Eye medium, elliptical to roundish. Antennae slender, medium long, weakly setose. Antenna 1 typically the longer; peduncle 3 short; peduncle 1, distal process weak; accessory flagellum minute.*

Mouthparts modified. Upper lip shallowly notched, lobes asymmetrical. Lower lip medium wide, squat; outer lobes thick, rounded, oblique. Mandible: molar reduced to a blunt setulose knob; incisor irregularly toothed, distal teeth smaller; left lacinia 8-10 dentate; blades 5-12 in row, stout, weakly molarized; palp slender, segment 3 with few (3-5), posterior marginal "D" spines; maxilla 1, outer plate with 9 mainly tall apical spines; palp not broadened, with -4 apical spines and several oblique subapical (facial) setae. Maxilla 2, inner plate little broadened, with marginal plumose seta. Maxilliped, palp strong, dactyl strong, segment 3 lacking distal process; segment 2 largest; outer plate short, little or no longer than inner, 1(2) apical spines; inner plate with few apical button spines and few marginal setae.

Coxal plates wide, deeper than respective body plates; lower margins straight, hind notch(es) distinct; coxa 1 little smaller than 2, slightly expanded distally. . Gnathopods medium large, closely subequal, little or not sexually dimorphic; propods broadening distally, palms smoothly convex, usually with central median tooth, posterodistal angle with 1-2 clusters of spines not extending onto palm; hind margin smooth, about equal in length to palm; carpus usually short, hind lobe deep; postero-distal process of merus acutely produced; bases slender, antero-marginal setae distally restricted. Peraeopods 3-7 slender, weakly spinose; segment 5 and dactyls slender, relatively long. Peraeopods 3-4, margins of segments 4-6 weakly spinose, lacking special setae. Peraeopods 5-7 regularly homopodous, bases broad, convex behind.

Pleon plates broad, deep, smooth behind, hind corners weakly acuminate. Pleopods strong, not sexually dimorphic. Urosome short; urosome 2 not occluded dorsally. Uropods ' 1 & 2 rami slender, tips spinose, usually extending beyond uropod 3. Uropod 1, peduncle with distinct latero-distal spine; rami subequal in length. Uropod 2, inner ramus the longer. Uropod 3, inner ramus markedly the longer. Telson medium long, narrowing, subacute; dorsal penicillate setae slightly distad (of middle). Coxal gills saclike, medium, unequal, smallest anteriorly. “ (from Bousfield & Hendrycks 1995)

Trachypleustes – An endemic NEP genus known from only two described species, one of which is reported from the SCB. In older data these would have been viewed either as *Parapleustes pugettensis*, or perhaps *Incisocalliope bairdi*.



Trachypleustes trevori (from Bousfield and Hendrycks 1995b)

Diagnosis: “A group of small, smooth-bodied pleustids having short antenna 1 peduncular segments, unequal gnathopods, slender legs, slender unequal rami of uropods, and heavily chitinized, "molarized", or otherwise strongly modified mandibular blades. Body smooth above, slender. Head small; rostrum slightly produced beyond subacute head lobe. Eyes large. Antennae slender, elongate. Antenna 1, peduncle 1 large, without postero-distal process; segment 2 medium short; accessory flagellum minute, triangular, with a few apical setae. Antenna 2, peduncular segments 4 & 5 subequal, setose; flagellum elongate. Mouthparts strongly modified. Upper lip moderately incised and asymmetrical. Lower lip broad, squat, outer lobes oblique. Mandible, molar minute; spine row with few (4-6), strongly thickened and flattened blades; left lacinia irregularly 10- 11 dentate; incisor multidentate; palp, segment 3 longest, medial pectinate setae numerous (12+); segment 2 sparsely setose medially. Maxilla 1, outer plate short, spines tall; palp long, apex with slender spines and setae, segment 1 lacking lateral setae; inner plate 1-setose. Maxilla 2, inner plate medium broad, with 1 large inner plumose seta; maxilliped, palp and dactyl strong; inner plate short, apex sloping, with 3- 5 button-teeth and 4-6 inner marginal setae; outer plate narrow, apex and inner margin slender-spinose. Coxal plates 1-4 increasing in size posteriorly; coxa 1 small, not expanded distally; coxa 2-4 deeper than body plates; lower margins nearly straight, with hind cusp. Gnathopods 1 & 2 weakly subchelate, similar in form but unequal in size, not sexually dimorphic; gnathopod 2 distinctly the larger. Gnathopod 1, basis weakly setose anteriorly; carpus shallow, more than half length of propod; length of palm oblique, with small median tooth; length about equal to smooth hind margin; postero-distal angle with 2 groups of spines; dactyl slender. Gnathopod 2, carpus shorter, hind lobe deeper, anterior margin about half length of propod; 2- 3 spine groups at posterior angle. Peraeopods 3-7 slender, dactyls normally developed. Peraeopods 5-7 normally homopodous; bases regularly broad and rounded behind; segment 4 (merus) postero-distal process strongly overhanging segment 5. Pleon plates 1-3 regular; lower margins spinose, hind corners variously acuminate. Pleopods strong, not sexually dimorphic. Urosome 2 not occluded dorsally. Uropods 1 & 2 slender, marginally strongly spinose;

rami unequal, inner ramus longer than peduncle. Uropod 3, rami markedly unequal, strongly spinose. Telson medium, apex rounded; penicillate setae slightly proximal to midpoint. Coxal gills small to medium, saclike, largest on pereopods 4 & 5." (from Bousfield & Hendrycks 1995

Literature Cited

- Alderman, A. L. 1936.** Some new and little known amphipods of California. *University of California Publications in Zoology* 41(7): 53-74.
- Barnard, J. Laurens. 1952.** Some Amphipoda from central California. *The Wasmann Journal of Biology* 10(1): 9-36.
- , **1955.** Two new spongicolous amphipods (Crustacea) from California. *Pacific Science* 9(1): 26-30.
- , **1956.** Two rare amphipods from California with notes on the genus *Atylus*. *Bulletin of the Southern California Academy of Sciences* 55(1): 35-42.
- , **1961.** Gammaridean Amphipoda from Depths of 400 to 6000 Meters. IN: *Galathea Report 5*: 23-128. Copenhagen: Danish Science Press, Ltd.
- , **1964a.** Los Anfipodos Bentonicos Marinos de la Costa Occidental de Baja California. *Revista De La Sociedad Mexicana De Historia Natural XXIV*: 205-251.
- , **1967.** Bathyal and Abyssal gammaridean Amphipoda of Cedros Trench, Baja California. *United States National Museum Bulletin* 260: 1-205.
- , **1969.** Gammaridean Amphipoda of the Rocky Intertidal of California: Monterey Bay to La Jolla. *United States National Museum Bulletin* 258: 1-230.
- , **1971.** Gammaridean Amphipoda from a Deep-Sea Transect off Oregon. *Smithsonian Contributions to Zoology* 61: 1-86.
- , **1974.** Gammaridean Amphipoda of Australia, Part II. *Smithsonian Contributions to Zoology* 139: 1-148.
- , **1975.** Identification of gammaridean amphipods. Pp. 314-366 IN: Smith, Ralph I., and James T. Carlton (eds.). *Light's Manual: Intertidal Invertebrates of the Central California Coast*. 3rd Edition. University of California Press, Berkeley, California, U.S.A. 716pp.
- , **and Robert R. Given. 1960.** Common pleustid amphipods of Southern California with a projected revision of the family. *Pacific Naturalist* 1(17): 37-48.
- , **and Donald J. Reish. 1959.** Ecology of Amphipoda and Polychaeta of Newport Bay, California. *Allan Hancock Foundation Publications, Occasional Paper* 21: 1-106.
- Boeck, Axel. 1871.** Crustacea Amphipoda Borealia et Arctica. *Forhandlinger i Videnskabs-Selskabet i Christiania* 1870: 83-280.
- Bousfield, Edward L. 1979a.** A revised classification and phylogeny of the amphipod Crustacea. *Transactions of the Royal Society of Canada* 4(14): 343-390.
- , **2001.** An updated commentary on phyletic classification of the amphipod Crustacea and its application to the North American fauna. *Amphipacifica* 3(1): 49-119.

- , and **Ed A. Hendrycks. 1994a.** A revision of the family Pleustidae (Crustacea: Amphipoda: Leucothoidae), Part 1. Systematics and biogeography of component subfamilies. *Amphipacifica* 1(1): 17-57.
- , and -----, **1994b.** The amphipod superfamily Leucothoidea on the Pacific Coast of North America. Family Pleustidae, subfamily Pleustinae. Systematics and biogeography. *Amphipacifica* 1(2): 3-69.
- , and -----, **1995b.** The amphipod family Pleustidae on the Pacific coast of North America: Part III. Subfamilies Parapleustinae, Dactylopleustinae, and Pleusirinae. Systematics and distributional ecology. *Amphipacifica* 2(1): 65-133.
- Cadien, Donald B. and Lawrence L. Lovell. (2014).** *A Taxonomic Listing of Benthic Macro- and Megainvertebrates from Infaunal & Epifaunal monitoring and research programs in the Southern California Bight.* Los Angeles, California, USA: 186.
- and **Joel W. Martin. 1999.** *Myzotarsa anaxiphilius*, new genus, new species, an atylopsine amphipod (Gammaridea, Pleustidae) commensal with lithodid crabs in California. *Journal of Crustacean Biology* 19(3): 693-711.
- Chapman, John W. 2007.** Gammaridea. Pp. 545-618 IN: Carlton, James T. (ed.). *The Light and Smith Manual: intertidal invertebrates from Central California to Oregon.* 4th edition. University of California Press, Berkeley, California, U.S.A. 1001pp.
- Chavanich, Suchana, Nimmanoradee Ketdecha, Voranop Viyakarn, and Somchai Bussarawit. 2007.** Preliminary surveys of the commensal amphipod, *Leucothoe spinicarpa* (Abildgaard, 1789) in the colonial tunicate, *Ecteinascidia thurstoni* Herdman, 1891, in the Andaman Sea, Thailand. The Nagisa World Congress: 97-101.
- Crane Jr., Jules M. 1969.** Mimicry of the gastropod *Mitrella carinata* by the amphipod *Pleustes platypa*. *Veliger* 12(2): 200.
- Crow, Stacie E. 2006.** A redescription of *Leucothoe spinicarpa* (Abildgaard, 1789) based on material from the North Atlantic (Amphipoda: Leucothoidea). *Zootaxa* 1170:57-68.
- , and **James D. Thomas. 2002.** Abundance and distribution of commensal amphipods from common marine sponges of Southeast Florida. Pp. 105-110 IN: *Modern Approaches to the Study of Crustacea.* Elva Escobar-Briones, and Fernando Alvarez, eds.. Kluwer Academic/Plenum Publishers, New York, New York, U.S.A.. 355pp.
- Gurjanova, Eupraxie F. 1938.** Amphipoda Gammaridea of Siauku Bay and Sudzukhe Bay (Japan Sea). Reports of Japan Sea Hydrobiological Explorations, Zoological Institute of the Academy of Sciences of the USSR in 1934 1: 241-404.
- Hendrycks, Ed A., and Edward L. Bousfield. 2004.** The amphipod family Pleustidae (mainly subfamilies Mesopleustinae, Neopleustinae, Pleusymtinae, and Stenopleustinae) from the Pacific coast of North America: systematics and distributional ecology. *Amphipacifica* 3(4): 489-543.

- Holmes, Samuel J. 1908.** The Amphipoda Collected by the U. S. Bureau of Fisheries Steamer 'Albatross' off the West Coast of North America, in 1903 and 1904, with Descriptions of a New Family and Several New Genera and Species. *Proceedings of the United States National Museum* XXXV(1654): 489-543.
- Ishimaru, Shen-ichi. 1985c.** A new species of the genus *Leucothoe* (Amphipoda, Gammaridea, Leucothoidae) from Japan) *Proceedings of the Japanese Society of Systematic Zoology* 30:46-52.
- Lambert, Charles C. and Gretchen Lambert. 1998.** Non-indigenous ascidians in southern California harbors and marinas. *Marine Biology* 130:675-688.
- **2003.** Persistence and differential distribution of nonindigenous ascidians in harbors of the Southern California Bight. *Marine Ecology Progress Series* 259:145-161.
- Lowry, James K. 2014a.** Stenopleustinae Bousfield & Hendrycks, 1994. IN: Horton, Tammy, Lowry, James K., and De Broyer, Claude. (2013 onwards) World Amphipoda Database. <http://www.marinespecies.org/aphia.php?p=taxdetails&id=549301>
- **2014b.** Pleusymtinae Bousfield & Hendrycks, 1994, IN: Horton, Tammy, Lowry, James K., and De Broyer, Claude. (2013 onwards) World Amphipoda Database. <http://www.marinespecies.org/aphia.php?p=taxdetails&id=390793>
- **2014 c.** *Pleusymtes* J. L. Barnard, 1969. IN: Horton, Tammy, Lowry, James K., and De Broyer, Claude. (2013 onwards) World Amphipoda Database. <http://www.marinespecies.org/aphia.php?p=taxdetails&id=101732>
- **2014 d.** *Gracilipleustes* Hendrycks & Bousfield, 2004 . IN: Horton, Tammy, Lowry, James K., and De Broyer, Claude. (2013 onwards) World Amphipoda Database. <http://www.marinespecies.org/aphia.php?p=taxdetails&id=549750>
- **2014 e.** *Parapleustes* Buchholz, 1874. IN: Horton, Tammy, Lowry, James K., and De Broyer, Claude. (2013 onwards) World Amphipoda Database. <http://www.marinespecies.org/aphia.php?p=taxdetails&id=101729>
- **, and Roger T. Springthorpe (2001 onwards).** Amphipoda: Families and Subfamilies. Version 1: 1 September 2001. <http://crustacea.net/>
- McLaughlin, P. A., D. K. Camp, M. V. Angel, E. L. Bousfield, P. Brunel, R. C. Brusca, D. B. Cadien, A. C. Cohen, K. Conlan, L. G. Eldredge, D. L. Felder, J. W. Goy, T. A. Haney, B. Hann, R. W. Heard, E. A. Hendrycks, H. H. Hobbs III, J. R. Holsinger, B. Kensley, D. R. Laubitz, S. E. LeCroy, R. Lemaitre, R. F. Maddocks, J. W. Martin, P. Mikkelsen, E. Nelson, W. A. Newman, R. M. Overstreet, W. J. Poly, W. W. Price, J. W. Reid, A. Robertson, D. C. Rogers, A. Ross, M. Schotte, F. R. Schram, C.-T. Shih , L. Watling, and G. D. F. Wilson. 2005.** *Common and Scientific Names of Aquatic Invertebrates from the United States and Canada - Crustaceans*. Bethesda, Maryland, U. S. A.: American Fisheries Society. 565pp.
- Nagata, Kizo. 1965a.** Studies on marine gammaridean Amphipoda of the Seto Inland Sea I. *Publications of the Seto Marine Biological Laboratory* 13(2):131-170.
- Shoemaker, Clarence R. 1949.** Three new species and one new variety of amphipods from the Bay of Fundy. *Journal of the Washington Academy of Sciences* 39(12): 389-398.

- , **1952**. A new species of commensal amphipod from a spiny lobster. *Proceedings of the United States National Museum* 102(3299): 231-233.
- , **1964**. Seven new amphipods from the West Coast of North America with notes on some unusual species. *Proceedings of the United States National Museum* 115(3489): 391-430.
- Stebbing, Thomas R. R. 1888**. Report on the Amphipoda collected by H.M.S. Challenger during the years 1873-76. *Report on the Scientific Results of the Voyage of H.M.S. Challenger during the Years 1873-76: Zoology* 29(1-3): 1-1737.
- Thiel, Martin. 1999**. Host-use and population demographics of the ascidian-dwelling amphipod *Leucothoe spincarpa*: indication for extended parental care and advanced social behaviour. *Journal of Natural History* 33: 193-206.
- , **2000**. Population and reproductive biology of two sibling amphipod species from ascidians and sponges. *Marine Biology* 137: 661-674.
- Thomas, James D. 1979**. Occurrence of the amphipod *Leucothoides pottsi* Shoemaker in the tunicate *Echinascidia turbinata* Herdman from Big Pine Key Florida, U.S.A. *Crustaceana* 37(1): 107-109.
- , **1997**. Systematics, ecology and phylogeny of the Anamixidae (Crustacea: Amphipoda). *Records of the Australian Museum* 49: 35-98.
- , **and J. Laurens Barnard. 1983**. Transformation of the *Leucothoides* morph to the *Anamixis* morph (Amphipoda). *Journal of Crustacean Biology* 3(1): 154-157.
- , **and Kristine N. Klebba. 2007**. New species and host associations of commensal leucothoid amphipods from coral reefs in Florida and Belize (Crustacea: Amphipoda). *Zootaxa*, 1494: 1-44.
- Tomikawa, Ko, Ed A. Hendrycks, and Shunsuke F. Mawatari. 2004**. A new species of the genus *Dactylopleustes* (Crustacea: Amphipoda: Pleustidae) from Japan, with a partial redescription of *D. echinoides* Bousfield and Hendrycks, 1995. *Zootaxa* 674: 1-14.
- Vader, Wim. 1978**. Associations between amphipods and echinoderms. *Astarte* 11: 123-134.
- , **1983**. Prehensile pereopods in gammaridean Amphipoda. *Sarsia* 68: 139-148.
- White, Kristine N. 2011**. A taxonomic review of the Leucothoidae (Crustacea: Amphipoda). *Zootaxa* (3078): 1-113.
- **and James D. Reimer. 2012a**. Commensal Leucothoidae (Crustacea, Amphipoda) of the Ryukyu Archipelago, Japan. Part I: ascidian-dwellers. *ZooKeys* (163): 13-55.
- **and ----- . 2012b**. Commensal Leucothoidae (Crustacea, Amphipoda) of the Ryukyu Archipelago, Japan. Part II: sponge-dwellers. *ZooKeys* (166): 1-58.
- **and ----- . (2012c)**. "Commensal Leucothoidae (Crustacea, Amphipoda) of the Ryukyu Archipelago, Japan. Part III: coral rubble-dwellers." *ZooKeys*(173): 11-50.