Lysianassoidea of the NEP (Equator to Aleutians, intertidal to abyss): a review
dbcadien – 15 February 2007 (Revised 19 July 2011)

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Comments by Family/Group

The superfamily Lysianassoidea contains a number of families, and also a number of taxa of uncertain status which may eventually be viewed either as subfamilies, or full families within the superfamily. The fauna of the NEP is rich in these species, with most species level diversity in the Lysianassidae and the Uristidae. Fifteen families or proposed family level groups are represented in the NEP, containing 60 genera and around 155 species level taxa. No members of these lysianassoid families were treated in the amphipod section of the Taxonomic Atlas.

Inclusion of the Hyperiopsidae within the lysianassoids is somewhat controversial. While viewed as belonging there by some (i.e. Bousfield and Shih 1994, Bousfield 2001), results of other analyses differ. Berge *et al.* (2000) found the Hyperiopsidae, as used here, to be paraphyletic, with *Hyperiopsis* and *Parargissa* falling into separate clades. Their results also suggest that neither of these two parts of the Hyperiopsidae (as currently construed) are closely related to the lysianassoids. These results need further verification before they are adopted, but provide a different point of view to that espoused by Bousfield. Inclusion of at least two other groups, the Alicellidae and the valettiid groupare also disputed and will be discussed later.

Bousfield (1979) raised the family Lysianassidae to superfamily status, but did not explicitly divide it into several different families. He mentioned the subfamilies Lysianassinae and Uristinae suggested by Hurley (1963), and opined they "could justifiably be elevated to family status".

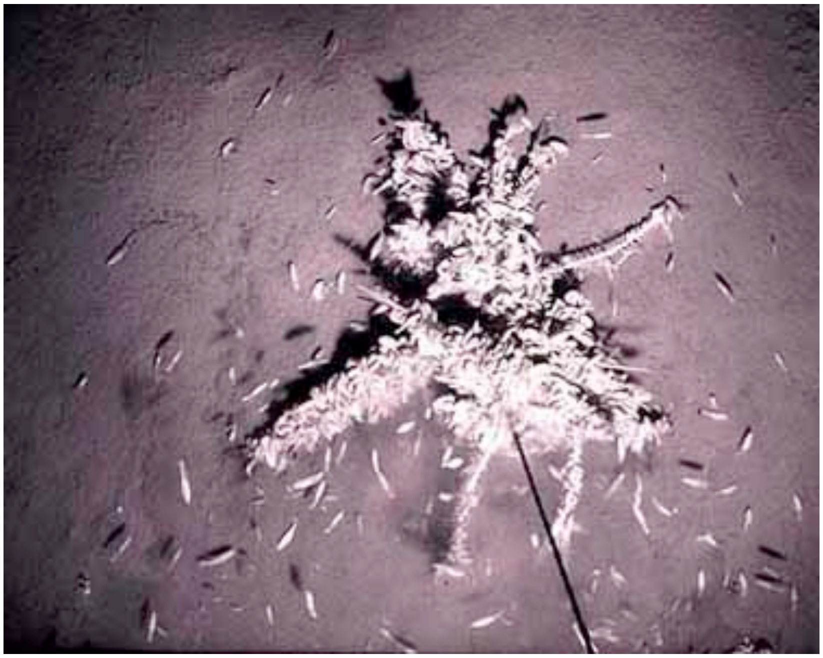
His diagnosis of the superfamily is: "Plesiomorphic, mainly smooth-bodied, weakly rostrate, often fossorial gammarideans, usually with strongly dimorphic terminal pelagic male bearing sensory brush setae on peduncular and basally conjoint flagellar segments of antenna 1, and both calceoli and brush setae on antenna 2; antenna 1 with strong accessory flagellum; eyes deep reniform, bulbous below; mouthparts highly modified; upper lip notched, epistome often anteriorly produced; lower lip tall, lacking inner lobes; mandibular molar reduced, palp slender; maxilla 1 inner plate narrow, 2-setose; outer plate with 9 apical spine-teeth; maxilla 2, plates narrow, weakly setose; maxilliped outer plate often enlarged, with strong cutting margin; coxal plates large, deep, 4th strongly excavate; coxae 5-7 posteriorly lobate; gnathopods 1 and 2 non-amplexing, markedly dissimilar, 1 variously subchelate, chelate or simple, 2 with characteristic elongate segment 3 and small microchelate propod and dactyl; pereopods 5-7 homopodous, bases expanded; brood plates sublinear; coxal gills often pleated, present on pereopod 7; pleopods normal; uropods lanceolate; rami subequal; uropod 3 foliaceous, outer ramus 2-segmented; telson lobes usually distally separated (narrowly), apices with minute notch and spine, or fused and entire, margin non spinose."

He later relaxed some of the specificity used above to include the broad diversity within the superfamily more completely (Bousfield 1982). At this point he suggested that the family Lysianassidae should be subdivided into at least 10 separate families, including elevation of the two extant subfamilies to full familial status.

By the time J. L. Barnard and Karaman (1991) covered the family, they were presenting keys to a series of coherent generic groups, the conicostomatins, pachynins, cyphocarins, and scopelocheirins, but did not treat these as subfamilies. They also did not choose to recognize the two subfamilies created earlier by Hurley, the Lysianassinae and the Uristinae. Their diagnosis of the family (still fully congruent with the superfamily concept of Bousfield) was much briefer and more inclusive: "Article 3 of gnathopod 2 elongate, remainder of appendage forming mitten apically; peduncle of antenna 1 short and stout, articles 2-3 much shorter than 1 and partly telescoped basally."

Lysianassoid Ecology

The ecology of lysianassoids has often been investigated. Members of the superfamily occupy varied niches and pursue a variety of life styles. Some are parasitic, as blood ectoparasites of fishes, or as brood parasites of decapods. Others are inquilinous and/or closely associated commensally with sponges, cnidarians, tunicates or echinoids. Most are free-living detritivores or predatory or scavenging carnivores.



The lysianassoid ***Hirondellea gigas*** swarming bait at 9605m in the Philippine Trench (Photo R. R. Hessler, SIO)

A large subset of the deep-sea species are known necrophages, and form the nucleus of the deep-sea necrophage community. This community, distributed world-wide in the deep sea, is important in recycling carcasses of larger organisms (Hessler *et al.* 1978; Ingram and Hessler, 1983; Jones *et al.* 1998; Klages *et al.* 2001; Lowry and Smith 2003; De Broyer *et al.* 2004; Smith and Baco 2003). A necrophage guild is also reported from shallow waters in some areas (Keable 1995, Ingólfsson and Agnarsson 1999). When the opportunity presents itself, lysianassoid species may act as opportunistic carnivores, feeding on sleeping (Stepien and Brusca 1985), or on injured fishes (Ide *et al*. 2006). Others routinely scavenge, even in areas inhospitable to their own metabolism. De Robertis *et al.* (2001) describe the behavior of a lysianassoid scavenger that feeds on carrion in the anoxic sub-sill portion of one Canadian fjord, essentially making feeding forays into the anoxic zone, then retreating into oxic waters to recover while digesting.

Necrophagic lysianassoids are usually taken in baited traps (Shulenberger and Hessler 1974, Thurston 1979, Biernbaum and Wenner 1993). These animals are often gorged with bait upon retrieval (Shulenberger and J. L. Barnard 1976), sometimes to the extent that the brood is forced from the marsupium by the volume of the expanded gut. The larger, more distensible gut is a morphological adaptation of necrophages (Sainte-Marie 1984), as is a mandible designed for efficient slicing of flesh (Dahl 1979, Steele and Steele 1993, Sainte-Marie 1984). Movements to and accumulation around bait seems moderated by both current velocity and by presence of potential predators (Lampitt *et al.* 1983). Initial attraction to the bait, and by extension to naturally occurring carrion on the seafloor, is through chemosensory odor recognition (Smith and Baldwin 1982, Bushdosh *et al.* 1982, Meador 1989, Ide *et al.* 2007). Such chemoreception is localized in the callynophore (Lowry 1986, Kaufmann, 1994), where the receptors also track pheromones as males locate females during reproductive searching. Feeding rates have been examined experimentally in situ (Smith and Present 1983), while gut content and stable isotope analyses have been used to confirm dietary intake (Sainte-Marie and Lamarche 1985, Graeve *et al.* 2001, Nyssen *et al.* 2002). Combined analysis of guts and mouthpart morphology has been performed for a few species (Arndt *et al.* 2005).

A writhing mass of lysianassoid necrophages retrieved from a baited trap in the west Atlantic (Photo at http://oceanexplorer.noaa.gov/explorations/03bump/logs/aug12/aug12.html)

Biogeographic and bathymetric distributions of the deep-sea necrophages tend to be large, and some suggest that pan-oceanic or cosmopolitan distributions are probable (Thurston 1990). Morphological evidence is equivocal, with variation between sites often no larger than variation within sites. Within trenches vertical distributions seem more definite than they do on open abyssal plains (Perrone *et al.* 2002, Blankenship *et al.* 2006), with discrete limits to vertical excursions of the species, often without overlap. Such specificity, despite equivocal morphological evidence, is supported by genetic studies which find discrete haplotypes restricted to localized areas or narrow bathymetric zones in broadly distributed species or species complexes (Bucklin *et al.* 1987; France 1993, 1994; France and Kocher 1996; France *et al.* 1992).

Another sizeable subset of the lysianassoids are bathy-, bentho-, or meso-pelagic. Collections of these animals are often with plankton nets, or other midwater sampling devices. J. L. Barnard (1954) and Brusca (1967) discussed a few locally collected bathy-pelagic species, but more complete samplings (from other areas) are reported by Shoemaker (1945), Thurston (1976a,b), and Birstein & Vinogradov (1958, 1960, 1970). Baited traps many hundreds or thousands of meters off the bottom are also often a source of actively swimming lysianassoids (Blankenship et al 2006). Like some other nectonic animals spending significant time in the water column, some lysianassoids are bioluminescent (i.e. *Cyphocaris challengeri*, Bowman 1967).

The members of the Opisidae are notable as ectoparasites of fishes (Bousfield 1987, Bousfield and Kabata 1988). The local SCB representative, *O. tridentata*, is recorded from a variety of fish hosts including *Sebastes mystinus* (blue rockfish), *S. maliger* (quillback rockfish), *S. ruberrimus* (yellow-eye rockfish), *Hexagrammos decagrammus* (kelp greenling), and *Squalus acanthias* (spiny dogfish)(Bousfield 1987). They are usually located near the dorsal fin. A second species, *Opisa odontochela*, is known from the boreal waters of Southeast Alaska. The modified first gnathopod, which is large and ovate with a long curved dactyl forming a pincher, seems related to the ectoparasitic live-style. A second lysianassoid family, the Trischizostomatidae, has a similar overall appearance to the opisids, and is also ectoparasitic on fishes (Bousfield and Kabata 1988). It is known from the Atlantic, but not yet from the Pacific.

The cebocarid *Paracyphocaris predator*, not recorded from the NEP, is reported to be an egg predator of oplophorid shrimp (Bowman and Wasmer 1984). The amphipod consumes the eggs within the marsupium, and is then carried as a false brood by the shrimp. Local cebocarids do not seem to share a symbiotic life-style, although one member of the genus *Lepidepecreela* is reportedly associated with sea urchins (Berge *et al.* 2004). The local representative has only been taken once, and not in any obvious association with a sea urchin. Since Berge *et al.* (2004) record that the first gnathopod of the commensal species they describe is larger than in other species in the genus, the commensal habitus may be restricted to their species and not general within the genus. They summarize known relationships between amphipods and echinoderms, updating Vader (1978).

Relationships between lysianassoids and sea anemones are well known, especially that between *Allogaussia recondita* (now *Orchomenella*) and the anemone *Anthopleura elegantissima* (Stasek 1958; Vader and Lönning 1973; Vader 1979, 1983; De Broyer and Vader, 1990). Associations of other lysianassoids with other anemones are reported (Ansel 1969, Vader 1983) but less well known. Some lysianassoids occur in commensal associations with sponges (Peattie and Hoare 1981, Vader 1984, Bellan-Santini 1990) including the local *Aristias sp A*, collected in abundance from within the vascular system of the hexactinellid sponge *Staurocalyptus dowlingi*. Other animals are also involved as hosts in symbiotic relationships with lysianassoid amphipods including brachiopods (Vader 1970), clams (Just 1979, Bellan-Santini 1990), and the solitary ascidian *Ascidia paratropa* (Schellenberg 1936). J. L. Barnard (1969a) mentions in most of his discussions of lysianassoid species from the California intertidal that they were taken in washings or scrapings of algae, sponges, bryozoans, or ascidians on or under rocks. He did not indicate individual host associations, however. Lowry and Stoddart (1983) suggest that the conical mouthparts of conicostomatid lysianassoids may be used as a buccal pump for pierce-and-suck feeding on anemone or sponge hosts. If proven, this would make them ectoparasites or micropredators rather than commensals.

While a number of shallow-water lysianassoids are associated with algae, the nature of that association is unclear. In most instances they are probably associated with epizoites of the algae rather than the alga itself. One species has been reported to be a grazer on algal tissues (Haggitt and Babcock 2003).

Life history attributes of a number of lysianassoids are tabulated by Sainte-Marie (1991), and months in which gravid females were observed by Wesławski and Legezynska (2002). Reproductive characteristics of *Cyphocaris challengeri* were investigated by Yamada and Ikeda (2000). Conlan (1991) reports that lysianassoids are non-mate guarders, which do not engage in precopulatory behavior, and have little morphological difference in secondary sexual characters. In some members of the superfamily, pelagic searches by males for stationary females on the bottom are reported, with the callynophore and the antennal aesthetascs the assumed chemosensory guides to the male movements. Such mate seeking water-column excursions may explain much of the observed diel movement of lysianassoids (Takekawa *et al.* 2004).

Not all members of the superfamily are as presented by Conlan, with little secondary sexual difference between males and females. In the conicostomatid group several genera are known to be protandrous hermaphrodites, with considerable difference in appearance between the male and female stages (Lowry and Stoddart 1986). In our fauna the two taxa *Ocosingo borlus* and *Fresnillo fimbriata* were found to be female and male of the same species (Lowry and Stoddart 1983). Both forms are now known as *Ocosingo borlus*. The more typical state alluded to by Conlan involves differences mainly in the antennae (see also Moore 1983).

In the absence of bait, the population density of soft-bottom lysianassoids is generally fairly low. They are encountered regularly in benthic samples, but in small numbers. In the intertidal zone populations are both more numerous and more aggregated (as in J. L. Barnard 1969a). Rarely lysianassoids may rise to the level of community dominants, as the cyphocaridid *Cyphocaris challengeri* does in Puget Sound (Lie 1974). It is in the necrophage community that lysianassoids are dominant, and almost exclusively there. One exception is the hydrothermal vent communities of the Pacific, where lysianassoids constitute over 99% of the amphipods taken (J. L. Barnard and Ingram 1990). Virtually all of this total is in one species, the lysianassid *Ventiella sulfuris*. This animal may also be a necrophage, but Mitcheli et al. 2002 suggest it is a grazer on bacterial films or a micropredator of larvae settled on the films. Interestingly, lysianassoids are totally absent from the vent areas of the Atlantic. Bellan-Santini and Thurston (1996) suggest that the ecological role of the Pacific vent lysianassoids is filled in the Atlantic by alvinocaridid shrimp.

Descriptions of some families and groups of lysianassoids are provided by Lowry and Springthorpe (2001). They include descriptions of the cebocarid group, Hyperiopsidae, Lysianassidae, and Scopelocheiridae. Diagnoses of the following are located in the cited references: Alicellidae (Lowry & De Broyer 2008), Aristiidae (Lowry and Stoddart 1997), conicostomatid group (Lowry and Stoddart 1983), Cyphocarididae (Lowry and Stoddart 1997), Endevouridae (Lowry and Stoddart 1997), Eurytheneidae (Stoddart and Lowry 2004), Hirondelleidae (Lowry & Stoddart 2010a), Lysianassidae (Lowry and Stoddart 1997), Opisidae (Lowry and Stoddart 1995), pachynid group (Lowry 1984), Sophrosynidae (Lowry & Stoddart 2010b), Uristidae (Hurley 1963), and Valettiopsidae (Lowry & De Broyer 2008). The diagnoses or description will be quoted in the discussions of the individual groups below. Other lysianassoid families and groups exist, but are not known to occur in the NEP. For instance the Amaryllidae are known from the West coast of South America (Lowry and Stoddart 1987) but are not known from north of the equator in this hemisphere.

Key to NEP lysianassoid genera – dbcadien 26 June 2007 (modified from keys by J. L. Barnard and Karaman 1991, Lowry 1984, Lowry and Stoddart 1997)

Note: to avoid use of mouthparts in this key, several genera occur in multiple couplets. Although awkward, this was preferred to examination of mouthparts. Where this occurs, the NEP species within the genus which key out there are indicated. Species in the genus from outside the NEP may not key correctly, and the key should be used with particular caution for any region outside the NEP.

1a. Third pereopod chelate...*Ensayara*
1b. Third pereopod not chelate, simple..2
2a. First gnathopod chelate or subchelate...3
2b. First gnathopod simple, or dactyl vestigial.......................................41
3a. First gnathopod propod attached ventrally to carpus.............................*Opisa*
3b. First gnathopod propod attached dorsally to carpus...............................4
3c. First gnathopod propod attached terminally to carpus.............................5
4a. G1 subchelate, palm oblique, defined by short tooth.....................*Pachychelium*
4b. G1 chelate, fixed finger linear, curved up at tip..........................*Pachynus*
4c. G1 chelate, fixed finger curved downward distally.......................*Prachynella*
5a. G1 chelate...6
5b. G1 subchelate..9
6a. G1 carpus and propod elongate, narrow, subequal...........................*Stephonyx*
6b. G1 carpus and propod not elongate, subquadrate, propod longer than carpus.........7
7a. Dactyl of G1 closing across the fixed finger, like scissors..............*Sophrosyne*
7b. Dactyl of G1 closing against fixed finger...8
8a. Coxa 1 not shorter than coxa 2, distally expanded...............................K*yska*
8b. Coxa 1 strongly shortened, distally rounded..............................*Aristiopsis*
8c. Coxa 1 slightly shorter than coxa 2, distally tapering................*Paronesimoides*
9a. Mandibular palp absent...*Metacyphocaris*
9b. Mandibular palp present..10
10a. Coxa 1 reduced or vestigial, partially or completely covered by coxa 2...........11
10b. Coxa 1 not reduced, as long or nearly as long as coxa 2, roughly parallel to coxa 2, sides parallel or distally expanded..22
11a. Coxa 1 vestigial, scarcely wider than basis................................*Eurythenes*
11b. Coxa 1 reduced, but still much wider than basis.................................12
12a. Coxa 1 not tapering distally...13

12b. Coxa 1 tapering distally, usually strongly..14
13a. Coxa 1 slightly shorter than coxa 2, truncate, urosomite 1 with dorsodistal spine
.................................*Tectovalopsis* (*wegeneri* only, other species see couplet 21)
13b. Coxa 1 strongly shortened, rounded, urosomite 1 lacking ornament...........*Aristias*
14a. Lateral cephalic lobe bluntly mamilliform..15
14b. Lateral cephalic lobe obtusely to acutely produced...16
14c. Lateral cephalic lobe truncate...*Diatectonia*
15a. G2 propodus 90% of carpus length, both articles linear.........................*Paralicella*
(*P. vaporalis* only, for other species see couplet 25)
15b. G2 propodus ½ to 2/3 carpus length, both articles subquadrate............*Hirondellea*
[NOTE triplet]
16a. Uropod 2 inner ramus incised, telson not or barely tapering distally.....*Schisturella*
16b. Uropod 2 inner ramus incised, telson tapering distally.........................*Thrombasia*
16c. Uropod 2 inner ramus not incised..17
17a. Gnathopod 1 palm transverse..18
17b. Gnathopod 1 palm oblique...21
18a. Gnathopod 1 articles 5 and 6 subequal...19
18b. Gnathopod 1 article 6 longer than article 5...*Cedrosella*
19a. Telson cleft only 10% of length...*Ventiella*
19b. Telson cleft 50% or more...20
20a. Urosomite 1 with prominent posterodorsal tooth..................................*Valettiopsis*
20b. Urosomite 1 lacking tooth..*Valettietta*
21a. Uropod 3 rami more than twice as long as peduncle, distal article of outer ramus
only about 10% of ramal length...*Tectovalopsis*
21b. Uropod 3 rami slightly longer than peduncle, distal article of outer ramus about
1/3 length of the ramus...*Tryphosella*
22a. Eyelobe bluntly mammiliform...23
22b. Eyelobe obtusely to acutely produced...26
23a. Telson emarginate, epimeron 3 subquadrate...*Koroga*
23b. Telson cleft at least 60%, epimeron 3 rounded..24
24a. G2 propod nearly as long (80%) as carpus...25
24b. G2 propod more than half as long (60%) as carpus.......................*Abyssorchomene*
25a. Urosomite 1 with a single posterior tooth..*Transtectonia*
25b. Urosomite 1 with at most a low hump..*Paralicella*
26a. Urosomite 1 with a single dorsally directed tooth...27
26b. Urosomite 1 with a low hump or a carina, but not dorsally directed tooth............29
27a. Basis of pereopod 5 with two finger-like posterior spikes...........*Lepidepecreoides*
27b. Basis of pereopod 5 with or without a posterior lobe, but lacking spikes............28
28a. Epimeron 3 subquadrate...*Uristes*
(*entalladurus* only, other species see couplets 33, 41)
28b. Epimeron 3 with posteroventral tooth.......................................*Paracentromedon*
29a. Epimeron 3 with posteroventral tooth...30
29b. Epimeron 3 subquadrate..35
29c Epimeron 3 rounded..*Orchomene*
(*obtusa* only, other species see couplet 41)
30a. Urosomite 1 with at most a low hump...32

30b. Urosomite 1 with a carina..........31
31a. Epimeron tooth located on hind margin above posteroventral corner..........*Anonyx*
31b. Epimeron tooth at posteroventral corner, next to ventral margin.......*Orchomenella*
(*pacifica* only, for other species see couplets 34, 37, 39, 40)
32a. Antenna 1, basal flagellar segments fused; telson lobes well tapered, apices with a single spine..........33
32b. Antenna 1, basal flagellar segments separate; telson lobes weakly or not tapering, apices truncate with multiple spines..........*Psammonyx*
33a. Telson apices notched, spines inserted subterminally..........*Uristes*
(*perspinis* only, other species see couplets 28, 41)
33b. Telson apices entire, spines inserted terminally..........34
34a. Uropod 3 rami only slightly longer than peduncle..........*Orchomenella*
(*decipiens* only, for other species see couplets 31, 37, 39, 40)
34b. Uropod 3 rami significantly longer than peduncle..........*Hippomedon*
35a. Epimeron 3 posterior margin serrate..........36
35b. Epimeron 3 posterior margin smooth..........37
36a. Coxa 5 bearing posteroventral lobe..........*Orchomenella*
(*pinguis* only, other species see couplets 31, 34, 39, 40)
36b. Coxa 5 lacking posteroventral lobe..........*Rimakoroga*
37a. Urosomite 1 carinate..........38
37b. Urosomite 1 bearing at most a low rounded hump..........39
38a. Body widest at 5th coxa, presenting a “diamond” shape when viewed from above; article 3 of antenna 2 elongate..........*Lepidepecreum*
38b. Body not noticeably widest at the 5th coxa, at most fusiform rather than diamond shaped; article 3 of antenna 2 not elongate..........*Orchomenella*
(*holmesi* and *minuta* only, other species see couplets 31, 34, 37, 40)
39a. Telson entire, emarginate, or cleft no more than 40% of its length....*Orchomenella*
(*recondita* and *tabasco* only, other species see couplets 31, 34, 37, 39)
39b. Telson cleft 50% or more..........40
40a. Eyelobe acute, distally pointed..........*Uristes*
(*dawsoni* only, other species see couplets 28, 33)
40b. Eyelobe obtusely produced, rounded..........*Orchomene*
(all regional species except *obtusa*; see also couplet 29)
41a. Mouthparts formed into a conical bundle..........42
41b. Mouthparts formed into a quadrate bundle..........45
42a. Telson cleft at least 40%..........43
42b. Telson entire or emarginate..........44
43a. Uropod 2 inner ramus incised..........*Socarnoides*
43b. Uropod 2 inner ramus not incised..........*Acidostoma*
44a. Telson entire..........*Ocosingo*
44b. Telson emarginate..........*Stomacontion*
45a. G1 dactyl vestigial, hooded and/or hidden by sheaf of spines or setae..........46
45b. G1 dactyl not vestigial, not hidden by hood, setae or spines..........49
46a. Coxae 1 and 2 reduced, partially hidden by coxa 3..........*Anisocallisoma*.
46b. Coxae 1 and 2 not reduced..........47

47a. Antenna 1 peduncle article 1 bearing posterodistal tooth..........................*Ichnopus*
47b. Antenna 1 peduncle article 1 lacking posterodistal tooth....................................48
48a. G1 propod longer than carpus, tapering...*Paracallisoma*
48b. G1 propod shorter than carpus, linear...*Scopelocheiropsis*
49a. Coxa 1, 1 and 2, or 1-3 reduced..50
49b. No anterior coxa reduced..55
50a. Coxa 1 reduced, coxa 2 not reduced...*Centromedon*
50b. Coxa 1 and two both reduced..51
51a. Coxa 1, 2, and 3 all reduced and partially covered by coxa 4................*Cyphocaris*
51b. Coxa 3 not reduced..52
52a. Epimeron 3 with posteroventral tooth...53
52b. Epimeron 3 lacking posteroventral tooth...54
53a. Uropod 3 outer ramus uniarticulate..*Parargissa*
53b. Uropod 3 outer ramus biarticulate..*Procyphocaris*
54a. Epimeron 3 subquadrate..*Cyclocaris*
54b. Epimeron 3 posterior margin notched, truncate and serrate.............*Lepidepecreela*
55a. Telson cleft more than 50% of length...56
55b. Telson entire or emarginate..59
56a, Urosomite1 with multiple posterior teeth...*Apotectonia*
56b. Urosomite 1 lacking teeth, with saddle or low hump..57
57a. Eyelobe truncate..*Alicella*
57b. Eyelobe obtusely to acutely produced...58
58a. Telson tapering to distal truncation, cleft 90%, each lobe tipped with multiple large spines...*Waldeckia*
58b. Telson acute to rounded, cleft not more than 70%, each lobe bearing a single terminal spine...*Socarnes*
59a. Telson entire, uropod 2 inner ramus incised..60
59b. Telson emarginate, uropod 2 inner ramus not incised..61
60a. Uropod 3 outer ramus uniarticulate..62
60b. Uropod 3 outer ramus biarticulate..*Dissiminassa*
61a. Uropod 3 outer ramus uniarticulate..*Hyperiopsis*
61b. Uropod 3 outer ramus biarticulate...*Aruga*
62a. Eyelobe obtusely produced..63
62b. Eyelobe truncate, slightly crenulate..................................*Macronassa macromera*
63a. Epimeron 3 quadrate, uropod 3 rami strongly attenuated ....*Shoemakerella*
63b. Epimeron 3 produced posteriorly into a quadrate plate, uropod 3 rami not strongly attenuated...*Macronassa pariter*

Index to family and group placement of generic taxa in the superfamily Lysianassoidea (synonyms are listed unbolded where they occur in NEP literature)

Abyssorchomene – Uristidae
Acidostoma – conicostomatid group
Acontiostoma – conicostomatid group
Alicella – Alicellidae
Allogaussia – Lysianassidae
Anisocallisoma – Scopelocheiridae
Anonyx – Uristidae
Apotectonia – Alicellidae
Aristias – Aristiidae
Aristiopsis – Lysianassidae
Aruga – Lysianassidae
Cedrosella – Lysianassidae
Centromedon – Uristidae
Cyclocaris – cebocaris group
Cyphocaris –Cyphocarididae
Diatectonia – Alicellidae
Dissiminassa – Lysianassidae
Ensayara – Endevouridae
Eurythenes – Eurytheneidae
Fresnillo – see Ocosingo
Hippomedon – Lysianassidae
Hirondellea – Hirondelleidae
Hyperiopsis – Hyperiopsidae
Ichnopus – Uristidae
Katius – see Eurythenes
Koroga – Uristidae
Kyska – Uristidae
Lepidepecreela – cebocaris group
Lepidepecreoides – Lysianassidae
Lepidepecreum – Lysianassidae
Lysianopsis – Lysianassidae
Macronassa – Lysianassidae
Metacyphocaris – cebocaris group
Ocosingo – conicostomatid group
Opisa - Opisidae
Orchomene – Lysianassidae
Orchomenella – Lysianassidae
Pachychelium – Pachynidae
Pachynus – Pachynidae
Paracallisoma – Scopelocheiridae
Paracentromedon - Lysianassidae
Paralicella – Alicellidae
Parargissa – Hyperiopsidae
Paronesimoides - Lysianassidae
Prachynella - Pachynidae
Procyphocaris – Cyphocarididae
Psammonyx – Lysianassidae
Pseudokoroga - Lysianassidae
Rimakoroga – Lysianassidae
Schisturella - Lysianassidae
Scopelocheiropsis – Scopelocheiridae
Scopelocheirus - Scopelocheiridae
Shoemakerella – Lysianassidae
Socarnes - Lysianassidae
Socarnoides – conicostomatid group
Sophrosyne – Sophrosynidae
Stephonyx - Uristidae
Stomacontion – conicostomatid group
Tectovalopsis – Alicellidae
Thrombasia - Lysianassidae
Transtectonia – Alicellidae
Tryphosella – Lysianassidae
Uristes – Uristidae
Valettietta – Valettiopsidae
Valettiopsis – Valettiopsidae
Ventiella - Uristidae
Waldeckia – Lysianassidae
Wecomedon – Lysianassidae

Listed in the families and groups below are a series of provisional species recorded by Dickinson in his 1976 thesis. No descriptions of these species were ever circulated or published, and so no application of these names is possible. They are listed here as an indication of the diversity within the group only, and will not be keyed or otherwise discussed, except where they constitute the sole record of the genus within the NEP (i.e. *Waldeckia sp a*). He subsequently published a subset of his research dealing with the amphipods of the Cascadia Abyssal Plain (Dickinson and Carey 1978) but moved on to other things before describing the provisionals introduced in his thesis.

NEP Lysianassoidea from McLaughlin *et al.* (2005) augmented by known provisional taxa. *= Taxa on the SCAMIT Ed 4 list + addenda. Valid taxa bolded, synonyms not. (family/groups follow Ed. 5 revisionary suggestions; arrangement is alphabetical)

Family Alicellidae

- **Alicella gigantea** Chevreux 1899 – cosmopolitan; 1720-5865m
- **Apotectonia heterostegos** J. L. Barnard and Ingram 1990 – Galapagos; 2451-2518m
- **Diatectonia typhodes** J. L. Barnard and Ingram 1990 – Hamilton Guyot; 1790m
- **Paralicella caperesca** Shulenberger and J. L. Barnard 1976 –North Atlantic, NEP to San Clemente Basin; 1875-5940m
- **Paralicella tenuipes** Chevreux 1908 – abyssal Pacific and Atlantic Oceans; 5720m
- **Paralicella vaporalis** J. L. Barnard & Ingram 1990 – Hess Guyot to Jasper Seamount; 706-1740m
- **Tectovalopsis diabolus** J. L. Barnard and Ingram 1990 – East Pacific Rise at 13°N; 2635m
- **Tectovalopsis fusilus** J. L. Barnard and Ingram 1990 – off Pta. San Telmo, Mexico; 2884m
- **Tectovalopsis nebulosus** J. L. Barnard and Ingram 1990 – Jasper Seamount; 706m
- **Tectovalopsis regelatus** J. L. Barnard and Ingram 1990 – Hess Guyot; 1740m
- **Tectovalopsis wegeneri** J. L. Barnard and Ingram 1990 – East Pacific Rise at 13° N; 2635m
- **Transtectonia torrentis** J. L. Barnard and Ingram 1990 – East Pacific Rise at 13°N; 2630-2635m

Family Aristiidae

- **Aristias androgans** J. L. Barnard 1964 – Aleutians; 890m
- **Aristias expers** J. L. Barnard 1967 – Baja Abyssal Plain;2398-2475m
- **Aristias pacificus** Schellenberg 1936 – British Columbia; 22-30m
- **Aristias tumidus** (Krøyer 1846) – NWP to Aleutians; 30-270m
- **Aristias veleronis** Hurley 1963 – Puget Sound; 0-18m

***Aristias sp A** SCAMIT 1985§ - off Pt. Loma; 168m

Family “cebocaris group”

Cyclocaris guilelmi Chevreux 1899 – Cosmopolitan, meso-bathy-abysso-pelagic; 200-2200m

Lepidepecreela charno J. L. Barnard 1966 – San Clemente Basin; 1895m

Metacyphocaris helgae W. M. Tattersall 1906 – Cosmopolitan, bathypelagic; 600-1200m

Family “conicostomatid group”

***Acidostoma hancocki** Hurley 1963 – Monterey to Baja California; 18-182m

Acidostoma obesum ortum J. L. Barnard 1967 – Baja Abyssal Plain; 2398-2475m

Acontiostoma sp of Hurley 1963 (see Stomacontion sp)

Fresnillo fimbriata J. L. Barnard 1969 (see Ocosingo borlus)

***Ocosingo borlus** J. L. Barnard 1964 – Central California to Northern Baja California; 0-180m

***Socarnoides illudens** Hurley 1963 – Oregon to SCB; 20-156m

Stomacontion sp (Hurley 1963) – San Pedro Seashelf; 20m

Family Cyphocarididae

Cyphocaris anonyx Boeck 1871 – Cosmopolitan, off Catalina in SCB; 1033-1182m

Cyphocaris challengeri Stebbing 1880 – Cosmopolitan, in NEP from Alaska to SCB; 0-3000m

Cyphocaris faurei K. H. Barnard 1916 – Cosmopolitan, in the NEP off Baja California; 554-1108m

Cyphocaris kincaidi Thorsteinson 1941 (see Cyphocaris challengeri)

Cyphocaris latirama Hendrycks and Conlan 2003 – off Pt. Conception; 3450-4050m

Cyphocaris richardi Chevreux 1905 – Cosmopolitan, San Nicholas Basin to Baja California; 1163-1790m

Procyphocaris indurata (K. H. Barnard 1925) – South Africa, Australia, New Caledonia, NEP off Pt. Conception; 1280-4050m

Family Endevouridae

Ensayara ramonella J. L. Barnard 1964 – Bahia San Quintin; 2-3m

Family Eurytheneidae

Eurythenes gryllus (Lichtenstein in Mandt1822) – cosmopolitan; 870-7800m

Eurythenes obesus (Chevreux 1905) – cosmopolitan; 128-5610m

Gammarus gryllus Lichtenstein in Mandt 1822 (see Eurythenes gryllus)

Katius obesus Chevreux 1905 (see Eurythenes obesus)

Family Hirondelleidae

Hirondellea brevicaudata Chevreux 1910 – Atlantic Ocean, Pacific north of Hawaii; 3000-5940m

Hirondellea fidenter J. L. Barnard 1966 – San Nicholas Basin; 1227m

Hirondellea glutonis J. L. Barnard and Ingram 1990 – East Pacific Rise at 13°N to Galapagos; 2491-2635m

Hirondellea guyoti J. L. Barnard and Ingram 1990 – Hess Guyot; 1740m

Family Hyperiopsidae

Hyperiopsis sp of Hendrycks and Conlan 2003 – off Pt. Conception; 3450m
Hyperiopsis sp CS1 Cadien 2004§ - Oregon; 1372m
Parargissa americana J. L. Barnard 1961 – Gulf of Panama; 3570m

Family Lysianassidae

Subfamily Lysianassinae

Ambasiopsis fomes J. L. Barnard 1967 (see Cedrosella fomes)
Aruga dissimilis (Stout 1913) (see Dissiminassa dissimilis)
***Aruga holmesi** J. L. Barnard 1955 – Florida, Monterey Bay to Ecuador; 0-183m
Aruga macromerus Shoemaker 1916 (see Macronassa macromerus)
***Aruga oculata** Holmes 1908 – Monterey to SCB; 1-457m
Cedrosella fomes (J. L. Barnard 1967) – Baja Abyssal Plain; 3705-3745m
***Dissiminassa dissimilis** (Stout 1913) – Tomales Bay to Galapagos; 0-73m
Lysianax cubensis Shoemaker 1897 (see Shoemakerella cubensis)
Lysianopsis holmesi J. L. Barnard 1955 (see Aruga holmesi)
Lysianopsis (?) macromerus (Shoemaker 1916) (see Macronassa macromerus)
Lysianopsis oculata Holmes 1908 (see Aruga oculata)
Lysianassa pariter J. L. Barnard 1969 (see Macronassa pariter)
Macronassa macromera (Shoemaker 1916) – Cayucos to Cabo San Lucas; 0m
Macronassa pariter (J. L. Barnard 1969) – Cayucos to La Jolla; 0m
Nannonyx dissimils Stout 1913 (see Dissiminassa dissimilis)
Shoemakerella cubensis (Stebbing 1897) – Trans-isthmic; Gulf of Mexico and Caribbean, and NEP from Coronados Islands to Gulf of California; 6-20m
***Socarnes hartmanae** Hurley 1963 – Central California to SCB; 89m
Socarnes vahlii (Krøyer 1838) – Circumarctic-Boreal, North Atlantic, NWPacific NEP from Bahia San Cristobal, Baja California; 8-300m
Waldeckia sp a of Dickinson 1976 – Oregon; depth unknown

Subfamily Tryphosinae

Allogaussia recondita Stasek 1958 (see Orchomenella recondita)
Aristiopsis tacita J. L. Barnard 1961 – Tasman Sea, off Baja California; 842-3580m
Aristiopsis tacitus J. L. Barnard 1961 (see Aristiopsis tacita)
Centromedon pavor J. L. Barnard 1966 – Oregon to Monterey Bay; 84-200m
Hippomedon coecus (Holmes 1908) – Monterey Bay; 102-105m
***Hippomedon columbianus** Jarrett & Bousfield 1982 – British Columbia to SCB; 4-67m
Hippomedon keldyshi Vinogradov 1994 – vents off California; 3041m
Hippomedon strages J. L. Barnard 1964 – Equador; 2861-2864m
***Hippomedon subrobustus** Hurley 1963 – SCB; 30-150m
***Hippomedon tenax** J. L. Barnard 1966 – SCB; 88m
Hippomedon tracatrix J. L. Barnard 1971 – Oregon; 2800m
Hippomedon wecomus J. L. Barnard 1971 (see Psammonyx wecomus)
***Hippomedon zetesimus** Hurley 1963 – SCB; 30-150m
***Hippomedon sp A** Diener 1990§ - SCB; 30-150m

Hippomedon sp b of Dickinson 1976 – Oregon, depth unknown
Lepidepecreoides nubifer J. L. Barnard 1971 – Oregon; 2860m
Lepidepecreum californiensis Vinogradov 1994 – East Pacific Rise; 2779m
Lepidepecreum comatum Gurjanova 1962 – NWP to Oregon; 40-950m
Lepidepecreum eoum Gurjanova 1938 – Sakhalin Id. NWP to Aleutians; 0-130m
***Lepidepecreum garthi** Hurley 1963 – Oregon to SCB; 30-225m
***Lepidepecreum gurjanovae** Hurley 1963 – Japan to SCB;135-950m
Lepidepecreum kasatka Gurjanova 1962 – NWP to Central California; 123-229m
Lepidepecreum magdalenensis (Shoemaker 1942) –Bahia San Ramon to Bahia Magdalena, Baja California; 3-11m
***Lepidepecreum serraculum** Dalkey 1998 – Alaska to Mexican border; 0-150m
Lepidepecreum n. sp. Cadien 2003§ - Slope of San Pedro Sea Shelf; 643m
Lepidepecreum sp a of Dickinson 1976 – Oregon, depth unknown
Orchomene abyssorum Stebbing 1888 (see Abyssorchomene abyssorum in Uristidae)
***Orchomene anaquelus** J. L. Barnard 1964 – SCB; 38-92m
Orchomene distincta Birstein and Vinogradov 1960 (see Abyssorchomene distinctus in Uristidae)
Orchomene gerulicorbis Shulenberger and J. L. Barnard 1976 – off Northern Baja California; 5720m
Orchomene limodes Meador & Present 1985 – La Jolla; 55-176m
Orchomene magdalenensis (Shoemaker 1942) (see Lepidepecreum magdalenensis)
Orchomene obtusa (G. O. Sars 1891) – North Atlantic, NWP, Monterey Bay; 200-1505m
Orchomene tabasco J. L. Barnard 1967 (see Orchomenella tabasco)
Orchomenella affinis Holmes 1908 (see Orchomene obtusa)
***Orchomenella decipiens** Hurley 1963 – Monterey to Bahia San Cristobal, Baja California; 35-793m
Orchomenella magdalenensis Shoemaker 1942 (see Lepidepecreum magdalenensis)
Orchomenella minuta (Krøyer 1846) – Circumarctic, NEP to Chignik Bay, Gulf of Alaska; 25-160m
***Orchomenella pacifica** Gurjanova 1938 – NWP, Japan Sea, Okhotsk, NEP from Monterey to SCB; 46-780m
***Orchomenella pinguis** (Boeck 1861) – Mediterranean, amphi-Atlantic, NWP, NEP Laguna Beach; 1-85m
Orchomenella recondita (Stasek 1958) – Southern Oregon to Moss Beach, northern California; 0m
Orchomenella tabasco (J. L. Barnard 1967) – off Baja California; 1720-1748m
Orchomenopsis obtusa G. O. Sars 1895 (see Orchomene obtusa)
Paracentromedon sp a of Dickinson 1976 – Oregon, depth unknown
Paronesimoides voightae Larsen 2007 – Juan de Fuca Ridge vent area; 2213-2656m

Psammonyx longimerus Jarrett & Bousfield 1982 – British Columbia to Oregon; 0-200m
Psammonyx similis (Jarrett & Bousfield 1982) – North Bering Sea to British Columbia; 0-29m
Psammonyx wecomus (J. L. Barnard 1971) – SE Alaska to Oregon; 0-100m
Pseudokoroga rima J. L. Barnard 1964 (see Rimakoroga rima)
Pseudonesimus abyssi Chevreux 1926 (see Schisturella abyssi)
***Rimakoroga rima** (J. L. Barnard 1964) – Port Hueneme to Punta Canoas; 2-30m
Schisturella abyssi (Chevreux 1926) – Cosmopolitan, in NEP off Baja California 2667-2702m
Schisturella cedrosianus J. L. Barnard 1967 – Off Baja California; 1720-1748m
***Schisturella cocula** J. L. Barnard 1966 – off Pt. Conception; 162m
***Schisturella dorotheae** (Hurley 1963) – SCB; 111-406m
Schisturella grabensis J. L. Barnard 1967 – off Baja California; 1720-1748m
Schisturella hansgeorgi Larsen 2007 – Juan de Fuca Ridge vent area: 2213m
Schisturella spinirama Hendrycks and Conlan 2003 – off Pt. Conception; 3580m
Schisturella totorami J. L. Barnard 1967 – Santa Monica Bay; 183m
*Schisturella tracalero (J. L. Barnard 1966) (see Thrombasia tracalero)
Schisturella zopa J. L. Barnard 1966 – Catalina Submarine Canyon; 914m
Thrombasia tracalero J. L. Barnard 1966 – Santa Monica Bay; 167m
Tryphosa coeca Holmes 1908 (see Hippomedon coecus)
Tryphosa index J. L. Barnard 1966 (see Tryphosella index)
Tryphosella californica (Hurley 1963) – SCB; 416-628m
Tryphosella index (J. L. Barnard 1966) – SCB; 1620m
Tryphosella metacaecula J. L. Barnard 1967 – off Baja California; 791-842m
Tryphosella sp a of Dickinson 1976 – Oregon; depth unknown
Wecomedon similis Jarrett & Bousfield 1982 (see Psammonyx similis)
Wecomedon wecomus (J. L. Barnard 1971) (see Psammonyx wecomus)

Family Opisidae

Opisa odontochela Bousfield 1987 – SE Alaska; 73m
***Opisa tridentata** Hurley 1964 – Aleutians to SCB; 17-183m

Family Pachynidae

Pachychelium sp SD1 Pasko & Nestler 2003 – Santa Barbara Channel to San Diego; 75-88m
***Pachynus barnardi** Hurley 1963 – Oregon to Baja California; 12-800m
***Prachynella lodo** J. L. Barnard 1964 – Japan, Monterey to Bahia San Cristobal; 10-157m
Prachynella sp A SCAMIT 2007 – Tanner Basin to Baja California; 700-1150+m

Family Scopelocheiridae

Anisocallisoma armigera Hendrycks and Conlan 2003 – off Pt. Conception; 3450-4050m
Paracallisoma coecum (Holmes 1908) SCB; 1207-1902m
Paracallisoma spinipoda Hendrycks and Conlan 2003 – off Pt. Conception; 3450-4050m

Scopelocheiropsis abyssalis Schellenberg 1926 – Atlantic, Antarctic, NEP off Pt. Conception; 3000-4000m

Scopelocheirus coecus Holmes 1908 (see Paracallisoma caecum)

Family Sophrosynidae

Sophrosyne californica Lowry and Stoddart 2010b – known only from Tanner Basin, offshore Southern California, 1298m

Sophrosyne robertsoni Stebbing and Robertson 1891 – see Sophrosyne californica

Family Uristidae

Abyssorchomene abyssorum (Stebbing 1888) - South Atlantic, New Zealand, Galapagos; 550-4330m

Abyssorchomene distinctus (Birstein and Vinogradov 1960) - Palau to East Pacific Rise at 13°N; 2000-4732m

Anonyx adoxus Hurley 1963 – Oregon to Monterey Bay; 18-98m

Anonyx anivae Gurjanova 1962 – Sea of Okhotsk to Vancouver Id.; 42-45m

Anonyx attenuatus Steele 1989 – Bering Sea and Aleutian Ids.; depth ?

Anonyx beringi Steele 1982 – Aleutian Islands to Gulf of Alaska; 16-22m

Anonyx carinatus (Holmes 1908) – Gulf of Alaska to San Diego; 15-225m

Anonyx comecrudus J. L. Barnard 1971 – Oregon; 80-150m

Anonyx dalli Steele 1983 – Bering Sea, Aleutian Islands to Gulf of Alaska; depth ?

Anonyx dorotheae Hurley 1963 (see Schisturella dorotheae in Lysianassidae)

Anonyx eous Gurjanova 1962 - NWP, Sea of Okhotsk to northern British Columbia; 42-45m

Anonyx epistomicus Kudrjashov 1965 – Okhotsk Sea to Aleutians; depth ?

Anonyx filiger Stimpson 1864 (a Lepidepecreum, and nomen dubium)

Anonyx gurjanovi Steele 1986 – NWP Sea of Japan, Okhotsk, Bering Sea NEP southern British Columbia to outer coast of Washington; 10m

Anonyx hurleyi Steele 1986 – British Columbia to Puget Sound; shallow

Anonyx laticoxae Gurjanova 1962 – NWP, Kuriles, Okhotsk, NEP Alaska to Vancouver Island; 150m

Anonyx lebedi Gurjanova 1962 – NWP Sea of Japan, to Vancouver Id.; 280m

***Anonyx lilljeborgi** Boeck 1870 – Amphi North Atlantic, circumarctic, NWP Sea of Japan to SCB in the NEP; 20-900m

Anonyx makarovi Gurjanova 1962 – Western boreal Atlantic, Arctic, NWP Sea of Japan to Gulf of Alaska in NEP; 40-126m

Anonyx minutus Krøyer 1846 (see Orchomenella minuta in Lysianassidae)

Anonyx multiarticulatus (Pearse 1913) – NWP to Puget Sound; depth ?

Anonyx nugax (Phipps 1774) - Boreal North Atlantic, circumarctic, NWP Sea of Japan to SE Alaska in NEP; 0-1000m

Anonyx ochoticus Gurjanova 1962 – North Atlantic, Arctic, NWP Sakhalin Id. to Vancouver Island in NEP; 250-2000m

Anonyx peterseni Steele 1986 – NWP to Vancouver Island; depth ?

Anonyx pinguis Boeck 1861 (see Orchomenella pinguis in Lysianassidae)

Anonyx pseudeous Steele 1991 – Arctic Alaska to northern British Columbia; depth?

Anonyx sarsi Steele & Brunel 1968 – Boreal North Atlantic, circumarctic, NEP Bering Sea, Aleutians to SE Alaska; 10-50m

Anonyx schaefferi Steele 1986 – NWP Sea of Japan, NEP Bering Sea to Aleutian Islands; depth?

Anonyx sculptifer Gurjanova 1962 – Sea of Japan to Gulf of Alaska; 49m

Anonyx shoemakeri Steele 1983 - Aleutian Islands; depth ?

Anonyx tumidus Krøyer 1846 (see Aristias tumidus in Aristiidae)

Cancer nugax Phipps 1774 (see Anonyx nugax)

Chironesimus multiarticulosus Pearse 1913 (see Anonyx multiarticulosus)

Euonyx laqueus J. L. Barnard 1967 (see Stephonyx laqueus)

Euonyx mytilus J. L. Barnard and Ingram 1990 (see Stephonyx mytilus)

Ichnopus pelagicus Schellenberg 1926 – Southwestern Pacific, NEP from Costa Rica south to equator; in upper 150m of water column offshore

Koroga megalops Holmes 1908 – Cosmopolitan; 500-2200m

Kyska dalli Shoemaker 1965 – Aleutians; 11-15m

Lakota carinata Holmes 1908 (see Anonyx carinatus)

Stephonyx laqueus (J. L. Barnard 1967) - San Clemente Basin to 13° N on the East Pacific Rise; 1187-2800m

Stephonyx mytilus (J. L. Barnard and Ingram 1990) - Galapagos; 2337-2635m

Uristes californicus Hurley 1963 (see Tryphosella californica in Lysianassidae)

Uristes dawsoni Hurley 1963 –SCB; 203-434m

***Uristes entalladurus** J. L. Barnard 1963 – SCB; 0-18m

Uristes induratus K. H. Barnard 1925 (see Procyphocaris indurata in Cyphocarididae)

Uristes perspinis J. L. Barnard 1967 – Baja California; 1720-1748m

Ventiella sulfuris J. L. Barnard and Ingram 1990 – Galapagos to East Pacific Rise at 13°N; 2450-2676m

Family Valettiopsidae

Valettietta cavernicola Stock and Iliffe 1990 – Galapagos, anchihaline caves; 17-29m

Valettiopsis concava Hendrycks 2007 – Monterey Bay to Pt. Conception; 3607-4100m

Valettiopsis dentata Holmes 1908 – Cosmopolitan; 183-4300m

COMMENTS BY FAMILY/GROUP ON NEP LYSIANASSOID GENERA

Alicellidae – consisting of the genera *Alicella* and *Paralicella*, and a suite of genera transferred from the valettiopsid group (by Lowry and De Broyer 2008), this family contains large scavenging necrophage species exclusively. Among them are the largest known amphipods, *Alicella gigantea* (see J. L. Barnard and Ingram 1986). They are similar in some respects to the cebocarids, the Eurytheneidae, and the valettiopsids. In their formal erection of the family, replacing the informa "alicellid group" established by Dahl (1959), Lowry and De Broyer suggest that this group does not belong among the lysianassoids because its members posess a right lacinia mobilis, do not have a mitten-shaped gnathopod 2, and have calceoli unlike those expected in lysianassoids (Lincoln and Hurley 1981). They did not, however, suggest another superfamilial alignment for this family. It's position remains unresolved, perhaps requiring the eventual establishment of a new superfamily to accomodate it.

Alicella – Monotypic, containing only the type *Alicella gigantea*. This huge animal (reaching a length of 340mm fide J. L. Barnard and Karaman 1991) lives in the abyss, apparently worldwide. Specimens taken from seabird stomachs are assumed to be from dead specimens floating at the surface. The animals are near neutrally buoyant due to lipid droplets between the flesh and the carapace. Addition of any gas generated by decomposition of a dead individual would rapidly make the corpse positively buoyant, and rocket it to the surface. A thorough redescription of the animal and discussion of the information known at the time is provided by J. L. Barnard and Ingram (1986).

Apotectonia – J. L. Barnard and Ingram (1990) present a series of keys which separate the new taxa they propose from each other, and from other similar deep sea lysianassoid genera (*Alicella*, *Paralicella*, *Eurythenes*, *Ventiella*, *Schisturella*). These keys should be consulted in separating the genera of this group. A single species in the genus is known, *A. heterostegas*, taken from near vents in the Galapagos Rift area. It was not found at sites on the East Pacific Rise.

Diatectonia – The single species, *D. typhodes*, is known only from Hamilton Guyot. It should be keyed from other members of the alicellids and valettiopsids using the keys to genera in J. L. Barnard and Ingram (1990).

Paralicella – Three of the five known members of the genus are reported from the NEP, all from deep water (see J. L. Barnard and Shulenberger 1976, Shulenberger and J. L. Barnard 1976). These large necrophagic scavengers are found on abyssal plains and in trenches. J. L. Barnard and Ingram (1990) characterize the genus as bathy- and abysso-pelagic. They provide a key to the species (loc. cit., pg. 39) which suffices to separate the NEP forms. Although *P. vaporalis* is known from as shallow as 706m, it is only known from offshore seamounts and guyots, and is extremely unlikely to venture into the Southern California Borderland where it might be captured in regional sampling. *P. caperesca* have been taken by trawling at 1875m over the San Clemente Basin, which has a fauna with abyssal rather than bathyal affinities (France 1994). Unless we push much deeper in future sampling, we will not encounter these animals.

Tectovalopsis – Unlike the other new genera established in the group by J. L. Barnard and Ingram (1990). this genus has multiple members in the vent communities of the NEP. Five new species of *Tectovalopsis* were created. They can be separated by use of the specific keys produced by J. L. Barnard and Ingram (1990, pp. 57-58).

Transtectonia – Monotypic, with only the species *T. torrentis*. This form was not taken in the Galapagos Rift area, and is currently endemic at vent sites near 13°N on the East Pacific Rise. Once again, the keys in J. L. Barnard and Ingram (1990) can be used to separate the genus from others similar genera..

Family Aristiidae - Diagnosis "Head: deeper than long. Antennae: calceoli absent. Epistome and upper lip: fused, usually with a central notch. Mandible: incisors small or large, usually asymmetrical, left straight, minutely serrate, right straight or slightly convex, smooth; left lacinia mobilis a small peg or absent; accessory setal row without distal setal tuft; molar present or absent, if present a smooth, weakly setose flap. Maxilla 1: inner plate usually strongly setose, always more than 2 pappose setae, outer plate broad or very broad; setal-teeth in a modified 7/4 arrangement; palp large, 2-articulate. Maxilliped: outer plate with or without apical simple, slender setae, without apical robust setae. Gnathopod 1: simple, subchelate or parachelate. Coxa 1: vestigial; coxa 2 small or large; coxa 3 large. Pereopods 3-7 simple, propodus with distal spur (rarely absent). Telson: entire or cleft." (Lowry and Stoddart 1997)

Aristias - several representatives of the genus occur in the NEP, all probably associated symbiotically with other organisms. *Aristias sp A* (which may eventually prove to belong to one of the identified species) occurs in association with the hexactinellid sponge *Staurocalyptus dowlingi* at outer shelf depths in the SCB, living both inside the central cavity of the sponge, and within the sponge canal system. *Aristias pacificus* was described from the solitary ascidian *Ascidia paratropa*. Hosts of other NEP members of the genus are not yet known. *Aristias tumidus*, illustrated below, is known only from the NW Pacific east as far as the Aleutian Islands, not occurring in either the boreal or temperate portions of the NEP. It is reportedly taken in association with the tunicate *Molgula retortiformis* (Shoemaker 1955). A key to the genus in the NEP is provided below:

Aristias tumidus from the arctic NWP (Photo by Zosia Joanna Legezynska)

Key to NEP *Aristias* species (modified from Gurjanova 1962) dcadien, 6 Jan 2007

1a. Eyes absent or obscure, suggested only by tissue density..2
1b. Eyes present, pigmented, obvious..3
2a. Telson cleft 1/3 length or less...*A. expers*
2b. Telson cleft 2/3 length or more...*A androgans*
3a. Inner ramus of uropod 3 shorter than segment 1 of outer ramus...............*A. tumidus*
3b. Inner ramus of uropod 3 equal to or longer than segment 1 of outer ramus.............4
4a. Telsonic apices each bearing two stout spines..*A. pacificus*
4b. Telsonic apices each bearing a single stout spine..5
5a. Uropod 1 peduncle bearing 4-5 spines on lateral margins; posterior lobe of basis of pereopod 7 with 4 posterior denticles; epimeron 1 shield shaped, bearing a small but acute spine ventrally..*A. veleronis*
5b. Uropod 1 peduncle bearing 12-14 spines on lateral margins; posterior lobe of basis of pereopod 7 with 7-12 posterior denticles; epimeron 1 subquadrate, lacking spine on posteroventral corner..*A. sp A*

"Cebocaris" group – Members of this group are all swimmers, and are in general known as meso- or bathypelagic taxa. The group does contain, however, the genus *Lepidepecreela*, some members of which have demonstrated symbiotic relationships with benthic taxa. Whether or not the swimming habitus also applies to the commensal *Lepidepecreela* taxa is not known.

Description. "**Head** free, not coalesced with pereonite 1; exposed, or concealed or partially concealed; **much deeper than long**; rostrum absent; eyes absent. Body laterally compressed; cuticle smooth.

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

Mouthparts well developed or reduced. *Mandible* incisor smooth, or left minutely dentate, right smooth; lacinia mobilis present on left side only, or absent; accessory setal row without distal tuft; molar present or absent, medium, non-triturative; **palp present**. *Maxilla 1* present; inner plate present, strongly setose along medial margin or weakly setose apically; palp present, not clavate, 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 well developed, separate; outer plates present, large or small; palp 4-articulate, article 3 without rugosities. *Labium* smooth.

Pereon. Pereonites 1-7 separate; complete; sternal gills absent; pleurae absent. *Coxae 1-7* well developed, none fused with pereonites. *Coxae 1-4* longer than broad or as long as broad or broader than long, overlapping, coxae not acuminate. *Coxae 1-3* not successively smaller, coxa 1 vestigial or coxae 1-2 vestigial or coxae 1-3 vestigial. *Coxae*

2-4 none immensely broadened.

Gnathopod 1 not sexually dimorphic; smaller (or weaker) than gnathopod 2; smaller than coxa 2, or subequal to coxa 2; gnathopod 1 merus and carpus not rotated; gnathopod 1 carpus/propodus not cantilevered; subequal to propodus, or longer than propodus; gnathopod 1 not produced along posterior margin of propodus; dactylus large. *Gnathopod 2* not sexually dimorphic; simple, or subchelate; coxa smaller than but not hidden by coxa 3, or smaller than and mostly hidden by coxa 3, or subequal to but not hidden by coxa 3; ischium elongate; merus not fused along posterior margin of carpus or produced away from it; carpus/propodus not cantilevered, carpus elongate, longer than propodus, not produced along posterior margin of propodus.

Pereopods heteropodous (3-4 directed posteriorly, 5-7 directed anteriorly), **some or all prehensile**. *Pereopod 3* well developed. *Pereopod 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 or expanded distally; **carpus** shorter than propodus or subequal to propodus, **produced anteriorly**; 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. *Pereopods 5-7* with few robust or slender setae; dactyli without slender or robust setae. *Pereopod 5* well developed; shorter than pereopod 6; coxa smaller than coxa 4 or subequal to coxa 4 or larger than coxa 4, with ventrally produced posterior lobe or without posterior lobe; basis expanded or slightly expanded or linear, subrectangular or subovate, with posteroventral lobe or without posteroventral lobe; merus/carpus free; carpus linear; setae absent. *Pereopod 6* subequal in length to pereopod 7; merus/carpus free; dactylus without setae. *Pereopod 7* with 6-7 well developed articles; longer than pereopod 5; similar in structure to pereopod 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, or 1 free, 2 and 3 coalesced; urosomite 1 shorter than urosomite 2, or longer than urosomite 2; urosome urosomites not carinate; urosomites 1-2 without transverse dorsal serrations. *Uropods 1-2* apices of rami 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 shorter than outer ramus, or subequal to outer ramus, or longer than outer ramus. *Uropod 3* not sexually dimorphic; peduncle short or elongate; outer ramus longer than peduncle, 1-articulate or 2-articulate, without recurved spines. *Telson* laminar; deeply cleft, or moderately cleft, or entire; longer than broad, or as long as broad, or broader than long; apical robust setae present, or absent. (Lowry and Springthorpe 2001)

Cyclocaris guilelmi a cebocarid amphipod (Photo: Zosia Joanna Legezynska)

Cyclocaris – One of the two species in this genus occurs in the NEP, *C. guilelmi* (see photograph above). While this species seems cosmopolitan in the world ocean, its congener has a restricted distribution in the South Pacific (J. L. Barnard and Karaman 1991). This second species *C. tahitiensis* has been reported from vent collections along the East Pacific Rise at 21° N by Vinogradov (1993), the first record outside the type locality. Until more details are available, this record is viewed as provisional. These animals are pelagic, having an appearance similar to some hyperiids. *Cyclocaris guilelmi* was the most numerous of the species of pelagic gammaridians taken during the Vityaz cruises in the NWP (Birstein and Vinogradov 1970), but was smaller than many of the other lysianassoids at only 3-8mm length. J. L. Barnard (1959) figures the species well, but does not provide a whole body illustration (for which see the photograph above).

Lepidepecreela – The single NEP representative of the genus, *L. charno*, is probably a bathypelagic species. It was taken at 1895m in the San Clemente Basin; the female holotype remaining unique. J. L. Barnard (1966b, Figure 17) provides good illustrations, and also a key to the genus as known at the time. As mentioned earlier, at least one member of this genus is associated with an echinoid (Berge *et al.* 2004). There is nothing to suggest such an association for the local taxon, although several echinoids occur in abundance at the depth from which it was taken.

Metacyphocaris – Monotypic, containing only *M. helgae*. Shoemaker (1945) discusses this taxon, and repeats earlier records, including Thorsteinson's (1941) record from the Gulf of Alaska, which established the presence of the species in the NEP. Hurley (1963) reproduces Tattersall's figure of the anterior of the species, and provides additional records from the NEP. Another pelagic species taken in or over deep water, and unlikely to feature in collections made within the Southern California Borderland.

"Conicostomatid" group – Description "Species of the conicostomatid group...are characterized by robust bodies with the mouthparts grouped in a conical bundle beneath the head, deep coxae with short stocky legs and a compact urosome. The antennae are short in both males and females, but the accessory flagellum can be completely absent, small, or as long as the primary flagellum. Calceoli are not present. The head is small and may be completely or partially concealed by pereonite 1 and coxa 1. The conical or subconical mouthpart bundle is prominent. The mandible is narrow and elongate, with an incisor that may vary from well-developed to vestigial but always has a smooth cutting edge. The molar is vestigial or absent. The mandibular palp, which is always 3-articulate, is attached proximal to the molar and often extremely proximally. The palp of maxilla 1 may vary from 2-articulate to absent. The maxilliped dominates the mouthpart bundle with its greatly enlarged outer plates. The inner plates are usually elongate and styliform but occasionally are short and subquadrate. Maxillipedal palps are 3- or 4-articulate, but article 4, if present, is always small. The coxae are large and deep and coxa 4 has a well-developed posteroventral lobe. Gnathopod 1 is simple, moderately developed, neither styliform nor powerful. Gnathopod 2 may be minutely subchelate or minutely chelate and occasionally the dactyl is absent. The pereopods are short and stocky with article 4 of pereopods 5 to 7 expanded posteriorly. Gills are present from gnathopod 2 to pereopod 6, except in one genus, *Phoxostoma*, which has a vestigial gill on pereopod 7. The urosomites are compact, not coalesced and bear short uropods in which the rami may be reduced or absent. The telson is flat or hemiacetabulate, slightly to deeply incised, occasionally entire." (Lowry and Stoddart 1983)

Acidostoma – Two species are reported from the NEP, one from shelf depths, and one from the Baja Abyssal Plain. *Acidostoma hancocki* is relatively common in coarse sediments with shell hash on the inner shelf in the SCB. *Acidostoma obesum ortum* is uncommon, known only from a few females and juveniles from the type locality. J. L. Barnard (1967) differentiates *A. obesum ortum* from *A. hancocki* by its longer telson and blunter tooth on the third epimeron. See Hurley (1963) for *A. hancocki* description.

Ocosingo – A single species is known from the NEP, and a second species from New Zealand (Lowry and Stoddart 1984). *Ocosingo borlus* was described by J. L. Barnard (1963a) from shallow water off northern Baja California and San Diego, California. He later refound it in intertidal samples from central California (J. L. Barnard 1969a). In the latter publication he described a new genus and species, *Fresnillo fimbriatus*, which he noted was quite similar to *Ocosingo* in many respects. Lowry and Stoddart (1983), in establishing the conicostomatid group, reviewed the existing genera. They synonymized the two genera, suggesting that *Fresnillo* was based on the secondary male form of *Ocosingo borlus*. This paralelled the morphology of secondary males seen in other genera within the group. They covered the sexual morphology of these animals again in a later publication (Lowry and Stoddart 1986) which reported on protandrous hermaphroditism in the lysianassoids. This was revisited (Lowry and Stoddart 1997) in their description of the genus *Eclecticus*. Good descriptions of *O. borlus* are presented in J. L. Barnard (1963a, 1969a), which should be consulted for identification.

Socarnoides – J. L. Barnard and Karaman (1991) place 4 species in this genus, excluding *S. indentata* Ledoyer 1986 ("not this genus"): the holotype *S. kergueleni* from the Subantarctic; *S. unidentatus* from the Magellanic region; *S. eugenovi* from the subArctic north Atlantic, and the Boreal NWP; and *S. illudens* from the NEP. The local species is infrequently taken although ocurring relatively broadly at shelf depths. No whole animal figure of *S. illudens* is presented by Hurley (1963), but the appropriate parts are illustrated, the animal is described, and a key to some related genera is provided.

Stomacontion – A single species of a single unnamed taxon is known from the NEP. It was reported as *Acontiostoma* sp by Hurley (1963) based on a single small specimen taken among tunicates on rocky bottom on the San Pedro Seashelf at 20m. He declined to name or fully describe the taxon based on this inadequate material. His illustration shows a typical urosome for either *Acontiostoma* or *Stomacontion*, two genera which have frequently been synonymized. Unfortunately he neither illustrated nor described the head of the specimen, which would have made the generic choice more obvious. The record has been transferred to *Stomacontion* based on Hurley's statement that *Acontiostoma pepini* and *A. kergueleni* were the taxa most similar to the material at hand. *Acontiostoma pepini* is the generotype of *Stomacontion*, and *A. kergueleni* is a synonym of it. The two genera have been maintained valid since arguments in favor of that approach were made by Lowry and Stoddart (1983) in their review of the conicostomatid genera. In their allocation of species level taxa J. L. Barnard and Karaman (1991) did not place Hurley's record in either *Acontiostoma* or *Stomacontion*, both of which they retained as valid genera. No additional material of this animal has come to light since, and it remains an undersampled mystery. If the specimen can be located in the collections of the Allan Hancock Foundation now on deposit at the Natural History Museum of Los Angeles County, perhaps more light can be shed on the proper placement of this taxon.

Family Cyphocarididae – members of this family are usually taken in midwater collections, but also figure prominently in some benthic collections. They are very common in Puget Sound, where they are routinely taken in benthic grab samples. It is likely that the animals spend a significant amount of their time swimming, although they are based on the bottom.

Diagnosis: "Head: much deeper than long. Antennae: calceoli present or absent. Epistome and upper lip separate. Mandible: incisors small, convex, symmetrical; left lacinia mobilis a stemmed, distally serrate blade; accessory setal row without distal setal tuft; molar columnar, triturating. Maxilla 1: inner plate usually strongly setose, always more than 2 pappose setae; outer plate broad, setal-teeth in a 6/5 arrangement; palp large, 2 articulate. Maxilliped: outer plate with or without apical slender pappose setae, without apical robust setae. Gnathopod 1: simple or weakly subchelate. Coxa 1: vestigial; coxa 2 very small; coxa 3 vestigial or large. Pereopods 3-7: simple or weakly prehensile, propodus without distal spur. Telson: deeply cleft." (Lowry and Stoddart 1997)

Cyphocaris challengeri, a common component in the benthic community of Puget Sound and the west coast of British Columbia (Photo from Fisheries and Oceans Canada)

Cyphocaris – As can be seen in the accompanying photograph of *C. challengeri*, *Cyphocaris* species appear somewhat different from many lysianassoids, particularly benthic forms. Their swimming activities are facilitated by a slim, relatively elongate body, and a modified head somewhat reminiscent of the galeate head of synopiids. Adults are outlandishly outfitted with head spikes, large and often long saw-blades or smooth spikes extending back from the basis of the 5th pereopod, and other distinctive features. Conveniently, Schellenberg (1926b) provides in his Plate V whole body illustrations of each of four of the five species recorded from the NEP; *C. anonyx*, *C. challengeri*, *C. faurei*, and *C. richardi* (the fifth species, *C. latirama*, lacks both a produced head and a posterior projection on the basis of P5, so can be easily separated from the other species). He provides illustrations of the 5th legs of these species in Text Figure 2. Features of the head and the protuberance on the 5th leg (or lack thereof in *C. richardi*) seem highly distinctive. One should, however, also pay attention to the variation in these features illustrated by Schellenberg (1926b), Bowman and McCain (1967), and others (i.e. Shoemaker 1945, Fig. 1; J. L. Barnard 1954, Plt. 2). There is considerable variation with size and age in some features, and in proportions, so be careful in your examination and evaluation of these animals.

Behavior of males, females, and juveniles may also dictate that you will see only a small subset of the population in any given sample. Thurston (1976a) documents the distribution of various parts of the *C. challengeri* population over time during a series of midwater tows in the North Atlantic. He found that adult males and adult females occupied different vertical segments of the water column, and that they were both generally separated from the juveniles. Brusca (1967) summarized the day/night distribution of *C. richardi* off California, but did not segregate by sex.

Procyphocaris – Looks much more like a "typical" lysianassoid, lacking the head and leg extravagances of *Cyphocaris*. There is only a single NEP record for any member of the genus, from deep water off Pt. Conception (Hendrycks and Conlan 2003). They record *P. indurata*, originally known from Africa. The genus was erected by J. L.

Barnard (1961) to house his *P. primata*, which has been recognized as a synonym of the earlier *Uristes induratus* of K. H. Barnard (1925). Records of *P. indurata* from elsewhere in the depths of the world ocean demonstrate it will probably prove to be cosmopolitan. The genus is now monotypic with the synonymy of the two species listed in J. L. Barnard and Karaman (1991) as comprising it. It is distinguished from other cyphocaridid genera by details of the mandibular palp and molar (J. L. Barnard 1961)

Family Endevouridae – Diagnosis: "Head: as long as deep or deeper than long. Antennae: calceoli absent. Epistome and upper lip separate. Mandible: incisors small, convex, symmetrical; lacinia mobilis absent; accessory setal row with distal setal tuft; molar smooth or weakly ridged; setose or not. Maxilla 1: inner plate with less than 2 apical setae; outer plate narrow, with setal-teeth in a modified 6/5 arrangement; palp large, 2-articulate. Maxilliped: outer plate without apical slender or robust setae. Gnathopod 1: simple. Coxae 1-4 large, longer than broad, overlapping. Pereopod 3: subchelate or chelate, propodus enlarged. Pereopods 4-7 simple, propodus without distal spur. Telson: entire." (Lowry and Stoddart 1997). The family contains two genera, one in the NEP.

Ensayara – With the type *E. ramonella* in the NEP, and other species from New Zealand, Mauritius, and the Mediterranean (Lowry and Stoddart 1983). Six additional species have been described in the genus since: *E. denarius* from Japan (Hirayama 1985), *E. microphthalma* from Madagascar (Ledoyer 1986), *E. entrichoma* from Bermuda (Gable and Lazo-Wazem 1990), *E. jumanae* from Belize (J. L. Barnard and Thomas 1990), and *E. kermadecensis* and *E. ursus* from New Zealand (Kilgallen 2009). *Ensayara ramonella* was described from Bahia San Quintin on the West coast of Baja California. The original description (J. L. Barnard 1964a) should be consulted for details. Like the type genus of the family *Endevoura*, *Ensayara* has a large chelate 3rd pereopod. This is much more prominent than either the simple 1st gnathopod, or the typically mitten-shaped 2nd gnathopod. No other NEP genus or species shares this character. *Ensayara ramonella* has been recorded only from the type locality to date. [Please note: Ledoyer (1986) listed the two species he discussed as *Ensaraya* throughout his text; a lapsus]

Eurytheneidae – The family contains only the genus *Eurythenes*. Diagnosis "Head exposed, much deeper than long, not extending much below insertion of antenna 2, without cheek notch. Antennae with calceoli present in male, absent in female. Antenna 1 with well developed two-field callynophore in male and female. Antenna 2 peduncular article 3 without distal hook. Mouthpart bundle subquadrate. Epistome and upper lip separate. Mandible incisors present, well developed, symmetrical, convex, smooth; right lacinia mobilis absent; accessory setal row without distal setal tuft; molar a setose tongue, with small triturating surface; palp present, inserted approximately mid-anteriorly. Maxilla 1 inner plate with more than two apical pappose setae; outer plate narrow with setal-teeth in 8/3 crown arrangement, setal-teeth large, ST6 and ST7 slender, ST7 slightly displaced from ST6; palp large, with apical robust setae. Maxilla 2 inner plate significantly shorter than outer plate. Maxilliped outer plate present, medial setae small, blunt or bead-shaped; palp four-articulate, article 4 well developed. Gnathopod 1 subchelate to parachelate; coxa vestigial; merus and carpus not rotated; carpus short; propodus large, palm straight to convex; dactylus slightly curved, not hidden by setae.

Gnathopod 2 coxa small, shorter than coxa 3. Pereopods all simple; distal spurs absent. Pereopod 3 coxa large. Pereopod 4 coxa large with well developed posteroventral lobe. Pereopod 5 coxa with anterior and posterior lobes subequal. Uropod 2 inner ramus without constriction. Uropod 3 biramus. Telson present, cleft." (Stoddart and Lowry 2004)

Eurythenes – *Eurythenes* are very widely distributed abyssal scavengers. Speciation in the genus has been controversial. We currently have two species listed as occurring in the NEP, *E. gryllus* and *E. obesus*. While some consider the two species synonyms, evidence presented by Thurston and Bett (1995, but see also J. L. Barnard 1961) validates their separation. *E. obesus* was originally described in a different genus, *Katius*, and is found under that name in some literature (i.e. Shoemaker 1920,1956). While *E. gryllus* is recorded from appropriate habitat all over the globe, genetic investigations (France and Kocher 1996) suggest that what is currently viewed as a single taxon morphologically has significant haplotype disparity genetically. One of these differing haplotypes has recently been separated as a third species in the genus (Stoddart and Lowry 2004) with a disjunct distribution in the southern Pacific and the tropical western Atlantic. A table of characters differentiating these three is presented by Senna (2009).

These amphipods grow quite large, with adult sizes to at least 120mm. They are active necrophagic scavengers, and are routinely taken in baited traps. *In situ* observations are reported by Bowman and Manning (1972), and Smith and Baldwin (1984) comment on the natural history of the animal, and Thurston et al. (2002) on its population structure. A thorough and extensive summary of the literature on *E. gryllus* is provided by Stoddart and Lowry (2004), which should be consulted for additional information not provided by the references cited above.

Family Hirondelleidae - Description. "**Head** free, not coalesced with pereonite 1; exposed; deeper than long; anteroventral margin rounded or oblique, anteroventral corner subquadrate or absent; rostrum absent; eyes present, well developed or obsolescent, or absent; not coalesced; 1 pair, or trioculate; not bulging. Body laterally compressed; cuticle smooth.

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

Mouthparts well developed. **Mandible incisor smooth**; lacinia mobilis present on left side only; accessory setal row without distal tuft; molar present, medium, non-triturative; palp present. *Maxilla 1* present; inner plate present, weakly setose apically; palp present, not clavate, 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 well developed, separate; outer plates present, small; palp 4-articulate, article 3 without rugosities. *Labium* smooth.

Pereon. Pereonites 1-7 separate; complete; sternal gills absent; pleurae absent.

Coxae 1-7 well developed, none fused with pereonites. *Coxae 1-4* longer than broad, overlapping, coxae not acuminate. **Coxae 1-3** not successively smaller, **coxa 1 vestigial**. *Coxae 2-4* none immensely broadened.

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

Pereopods heteropodous (3-4 directed posteriorly, 5-7 directed anteriorly), none prehensile. *Pereopod 3* well developed. *Pereopod 4* well developed. 3-4 not glandular; 3-7 without hooded dactyli, 3-7 propodi without distal spurs. Coxa well developed, longer than broad; carpus shorter than propodus, produced anteriorly or not produced; dactylus well developed. Coxa larger than coxa 3, not acuminate, with well developed posteroventral lobe; carpus not produced. *Pereopods 5-7* with few robust or slender setae; dactyli without slender or robust setae. *Pereopod 5* well developed; subequal in length to pereopod 6; coxa smaller than coxa 4, without posterior lobe; basis expanded, subrectangular, without posteroventral lobe; merus/carpus free; carpus linear; setae absent. *Pereopod 6* subequal in length to pereopod 7; merus/carpus free; dactylus without setae. *Pereopod 7* with 6-7 well developed articles; subequal to pereopod 5, or longer than pereopod 5; similar in structure to pereopod 6; with 7 articles; basis expanded, 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 subequal to urosomite 2, or longer than urosomite 2; urosome urosomites not carinate; urosomites 1-2 without transverse dorsal serrations. *Uropods 1-2* apices of rami 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 longer than peduncle, 2-articulate, without recurved spines. *Telson* laminar; moderately cleft; longer than broad; apical robust setae present, or absent" (Lowry and Springthorpe 2001)

Hirondellea – While a definition of the monotypic family was available on-line, it was not officially erected until the publication of Lowry and Stoddart (2010) who reviewed the Australian representatives of the genus, and provided a key to the extant species. J. L. Barnard and Karaman (1991) list seven species in the genus, all from deep water, and most from trenches. Two additional species were described by J. L. Barnard and Ingram (1990) from vents in the NEP. Another species was added by Horton and Thurston (2009), and five more by Lowry and Stoddart (2010). All are necrophages, and are usually taken in large numbers in baited traps (see *in situ* photo of *H. gigas* at the bottom of the Philippine Trench on pg. 3). *Hirondellea* are an order of magnitude smaller than the largest of the alicellid necrophages (*Alicella gigantea*), and probably do not exceed 35mm in length.

Hirondellea gigas from 10900m in the Challenger Deep section of the Mariana Trench,currently the deepest capture record of an amphipod

Of the four species reported from the NEP, only one – *H. fidenter* is from an area which might reasonably be sampled by public agencies at some point in the future. It was taken from the San Nicholas Basin, within the Southern California Borderland. The other three are from much further afield; *H brevicaudata* from abyssal traps well away from shore, *H. guyoti* from the Hess Guyot, and *H. glutonis* from vents on the East Pacific Rise at 13°N and the Galapagos Rift zone. All species are keyed by J. L. Barnard and Ingram (1990), and their key should easily separate all of the NEP taxa.

Family Hyperiopsidae – Diagnosis: " Accessory flagellum well developed. Article 1 of primary flagellum on antenna 1 formed of fused basal articles, elongate. Article 5 of peduncle on antenna 2 very short. At least one palp of maxilla 1 bent or claviform. Gnathopods feeble. Article 4 of pereopods 3-4 greatly elongate relative to article 5. (J. L. Barnard and Karaman 1991)

The family consists of only two genera, both represented in the NEP. A key to separate the two is provided by J. L. Barnard and Karaman (1991, pg. 373). Inclusion of this family within the lysianassoids remains controversial, and is contraindicated by some phylogenetic analyses (i.e. Berge, Boxshall and Vader 2000).

Hyperiopsis – A small genus of seven described species (J.L. Barnard and Karaman 1991), none of which are known from the NEP. There are, however, records of several different taxa in the region which remain provisional. Hendrycks and Conlan (2003) record a species of *Hyperiopsis* from off Point Conception at 3450m. The specimen was immature. They noted it was similar to, but differed from, *Hyperiopsis laticarpa* from the Western Pacific. Since the single specimen was too immature to sex they declined to describe the material. Their *H. sp*. record does not reflect the same animal as the second regional provisional, *Hyperiopsis sp CS1* from 1372m off Oregon. The later species is strongly characterized by a long rostrum, unusual in the genus.

Parargissa – The genus contains 6 species, most described from the Western Pacific (J. L. Barnard and Karaman 1991). A single species is reported from the NEP, *P. americana*. We treat it here as a full species, although it is often only accorded subspecific status as *P. galatheae americana* (i.e. J. L. Barnard and Karaman 1991). The animal is known only from the initial collection at 3750m between Acapulco and Panama. The unique female holotype is rather large at 42mm. J. L. Barnard (1961) illustrates the differences between this and the closely related *P. galatheae.*

Family Lysianassidae - Diagnosis: "Head: exposed, concealed or partially concealed; as long as deep, longer than deep or deeper than long. Antennae: calceoli present or absent. Epistome and upper lip: separate or fused. Mandible: incisor smooth; lacinia mobilis present on left side only or absent; accessory setal row without distal setal tuft; molar present or absent, if present vestigial, small or medium size, setose with reduced triturating patch, fully setose, or a smooth nonsetose flap. Maxilla 1: inner plate weakly setose (6 or less) or without setae; outer plate narrow, with 11 setal-teeth in 6/5 or modified 6/5 arrangement; palp small or large, 1- or 2-articulate, with or without terminal robust setae. Maxilliped: without apical robust setae. Coxae 1 to 4 longer than broad, overlapping; coxa 1 fully developed or slightly reduced. Gnathopod 1: simple, occasionally weakly subchelate or parachelate. Pereopods simple. Telson usually entire, occasionally deeply moderately or weakly cleft or notched." (Lowry and Stoddart 1997)

Within this family various authors have reached different conclusions regarding synonymy and validity at generic and subgeneric levels. This is particularly true in the cluster of genera including *Orchomene*, *Orchomenella*, *Orchomenopsi*s, *Allogaussia*, and *Abyssorchomene*. Discussion of these issues will be provided under the genus *Orchomene* below. The best supported case appears to be that developed by De Broyer in a long series of papers dealing with *Orchomene* and related forms in the southern ocean. In general his conclusions will be followed here. Similar problems have persisted regarding the cluster of *Aruga*, *Lysianopsis*, and *Shoemakerella*. These genera were synonymized in Hurley (1963) following the suggestions of some earlier workers. Since then they have been treated as valid genera by Lowry and Stoddart (1997), and are so treated here. These two histories exemplify the trend of lysianassid taxonomy, with the recognition of increasingly small features as forming valid generic boundaries in convergent clusters of species. In particular, the separation of species typified by either the 7/4 or 6/5 terminal spine-seta arrangements on the maxilla 1 outer plate has helped recognition of evolutionary trajectories within the group. [The usage of spine formulae and the various arrangements are detailed in Lowry and Stoddart 1992]

These spine formulae are among the characters used to divide the family into Lysianassidae s.s. and Tryphosinae by Lowry and Stoddart (1997). Along with the recognition that Hurley's subfamily Uristidinae should be elevated to full familial status, this division redrew the concept of Lysianassidae in the broad sense. The gradual removal of it's former members into newly created family level groups finalized the progression from a generalized Lysianassidae to one characterized by a series of generic clusters, and eventually a restricted and sub-divided Lysianassidae plus many smaller family, and family level groups not yet formally named.

Aristiopsis – A single member of this genus has been reported from the NEP, taken on the Baja Abyssal Plain (J. L. Barnard 1967). This is a very significant range extension from the Tasman Sea where the holotype of *Aristiopsis tacita* was taken (J. L. Barnard 1961). The animal has not been seen since, although the distance between the two captures suggests that it is widespread if not common. The genus differs from *Aristias* in the nature of the mandibular molar, the attachment of the mandibular palp, and the condition of the inner lobes of maxilla 1 (J. L. Barnard 1961). The genus is sometimes placed in the family Aristiidae, but lacks the family level synapomorphy of distal pereopodal spurs.

Aruga – The genus is small, containing only three species (J. L. Barnard and Karaman 1991). Subsequently *Aruga subantarctica* was removed to the genus *Lysianopsis* (Lowry and Stoddart 1997) leaving only the two species from the NEP in the genus. These two, *Aruga holmesi* and *A. oculata* both occur in shallow waters within the SCB, and both are reported by local monitoring agencies. They can easily be distinguished by the condition of the third epimeron, which is convexly rounded in *A. holmesi*, and truncated subquadrate in *A. oculata*. Holmes (1908) and J. L. Barnard (1955) should be consulted for the original descriptions. The latter also presents the possibility that *Nannonyx dissimilis* of Stout might be an *Aruga*, a placement later rejected in favor of formation of a new genus to receive it (J. L. Barnard and Karaman 1991).

Hurley (1963, pp. 67-73) considered *Aruga*, along with the genus *Shoemakerella*, to be synonyms of the genus *Lysianopsis*. Some workers accepted his arguments, but in recent years *Aruga* has been viewed as valid, as has *Shoemakerella* (see Lowry and Stoddart 1997). Generic boundaries within the lysianassids are subject to frequent and heated debate, with a series of different views on the validity or invalidity of genera. We follow the revisionary treatments of Lowry and Stoddart here, accepting *Aruga* as valid and separable from other related genera within the family Lysianassidae.

Despite the prevalence of cognate species pairs in the tropical west Atlantic and east Pacific now separated by the closure of the Isthmus of Panama, *Aruga holmesi* is found across the barrier. It was reported as widely distributed on the Florida Middle Ground by Lowry and Stoddart (1997), and is even more broadly distributed in the eastern Pacific. Why this animal has not evolved into two distinct cognates since the closure of the land bridge as so many others have (i.e. cognate pairs in *Ensayara*, *Rimakoroga*, and *Dissiminassa*) remains an unanswered question.

Cedrosella – Originally described as *Ambasiopsis fomes* by J. L. Barnard 1967 (“the generic assignment of the species is uncertain” loc. cit. pg. 50), this species was transferred to the newly created *Cedrosella* by J. L. Barnard and Karaman (1987). The genus remains monotypic. *C. fomes* was taken on the Baja Abyssal Plain, and is known only from the small, unique male holotype. J. L. Barnard and Karaman (1991) contrast its characters with those of other similar lysianassoids.

Centromedon – A northern hemisphere boreo-arctic genus of five species (J. L. Barnard and Karaman 1991), with species submerging at increasing distance from the pole. A single species is known from the sub-arctic NEP, *Centromedon pavor*, described initially from 84m in Monterey Bay. It is now known from central California to central Oregon, and from depths of 84-200m. Despite its relatively shallow occurrence, the species lacks eyes. Only three specimens are mentioned in the literature; the holotype and a paratype from Monterey, and a small male from off Oregon. Both the illustrations of the original description (J. L. Barnard 1966a) and the later description (J. L. Barnard 1971) should be consulted to confirm identification.

Dissiminassa – The genus was created by J. L. Barnard and Karaman (1991) to house *Nannonyx dissimilis* Stout 1913. A second species has been described from Florida by Lowry and Stoddart (1997), *D. homosassa*. These are the only two species known for the genus.

The lysianassid ***Hippomedon columbianus*** (Photo courtesy MBARI)

It appears to be closely related to *Aruga* (Lowry and Stoddart 1997). Shoemaker (1942) and J. L. Barnard (1969a) both provided good redescriptions and illustrations of *D. dissimilis*, and are probably better sources for information than the original description. J. L. Barnard also provided a key to separate the species of *Lysianassa* from California (loc. cit. pg. 186). These species are now allocated to the genera *Aruga*, *Dissiminassa*, and *Macronassa*, but the key still functions well and might be used for separation of these related forms. Known primarily from intertidal and fouling occurrences in California, members of the genus occur to 73m depths in both the eastern Pacific and western Atlantic.

Hippomedon – One of the earlier lysianassoid genera, many species originally described as *Hippomedon* have been later removed to other genera. The concept of the genus was revised and (hopefully) refined by Jarrett and Bousfield in 1982. J. L. Barnard and Karaman (1991) seem to have accepted their redefinition of the genus. They list 49 species in the genus, with another 6 species described by 2004 (Vader 2004). The genus is known worldwide in cool or cold waters, and from the intertidal to abyssal plains. In the NEP there are records of 10 species assigned to *Hippomedon*. One of these taxa is a provisional from off Oregon erected by Dickinson, for which we have no information. A second species, *H. keldyshi* was described from deep water in the NEP. These two species are not covered in the key to the genus constructed for SCAMIT by Doug Diener when his *H. sp A* was introduced. While this key remains useful (and recommended for use) it includes a number of forms which are only known from the Arctic or the NW Pacific. When using the key please keep in mind that not all of the included species occur in our study area. If you arrive at an identification of one of these species, please carefully consult the description of the animal prior to accepting the indicated identification. We already have far too many spurious records of taxa which do not occur in our area (such as *H. denticulatus*) based on confusion introduced by previous misidentifications and misinterpretations in the literature (see for example the discussion of *Hippomedon* species in J. L. Barnard 1971). While the Dickinson species must remain unkeyed, *H. keldyshi* would key out to *H. propinquus* in the Diener key. Since *H. propinquus* is not currently known from validly identified NEP specimens, animals that key here may be presumed to be *H. keldyshi* and validated by checking against the illustrations of the species in Vinogradov (1994).

Lepidepecreoides – A small genus, consisting of four species (Lowry and Stoddart 2002b). Only *L. nubifer* is known from the NEP. Although at one time also reported from the Cape Basin off South Africa (Griffiths 1977), this animal has been subsequently described as a new species (Lowry and Stoddart 2002b), and *L. nubifer* remains endemic off Oregon. Our species is immediately recognizable from among other NEP lysianassoids by the combination of the fingerlike crest on the first urosomite and the narrow process on the hind margin of the basis lobe of P5. The species is well described by J. L. Barnard (1971).

The lysianassid ***Lepidepecreum umbo*** (Photo: Zosia Joanna Legezynska)

Lepidepecreum – A large genus, with 37 described species worldwide (Lowry and Stoddart 2002b). Eight described and two provisional species in the genus are reported from the NEP, but one of the provisionals is moot due to lack of specimens or description (*L. sp. a* of Dickinson). There are, then, nine species level *Lepidepecreum* taxa in the NEP. The biology of these animals remains unknown (Lowry and Stoddart 2002b), but most species are associated with the waters of the Continental Shelf and slope. *L. californiensis* forms an exception, being taken at 2779m in association with hydrothermal activity, but not with active venting (Vinogradov 1994). Species can usually be distinguished by the shapes and patterns of teeth or dorsal cusps on the pereonites, pleonites, and urosomites. Four species are known from shelf and slope depths in the SCB, a fifth from the Central California slope, and a sixth from the Central California slope apron or near-shore abyssal zone. The species known as *Lepidepecreum sp A* in early SCAMIT lists and discussions was described as *L. serraculum* by Dalkey (1998).

No key to the members of the genus in the NEP is available except those of Gurjanova (1962) and Hurley (1963), neither of which is comprehensive. An attempt is made below to provide a comprehensive key to the known described and provisional species which occur in the NEP.

Key to the known ***Lepidepecreum*** from the NEP – dcadien 15 July 2007
(a provisional species will be added at a later date)

1a. No dorsal carination or dentition on posterior margin of any pleonal or pereonal somite..*magdalenensis*
1b. Dorsum not smooth, bearing carina or posterodorsal teeth on some or all pleonal or pereonal segments..2
2a. Third pleonal segment with prominent tooth or process distodorsally...........4
2b. Third pleonal segment lacking prominent tooth or process, bearing at most a low rounded knob distodorsally...3
3a. Urosomite 1 with dorsal process bluntly truncate..........................*serraculum*
3b. Urosomite 1 with dorsal process posteriorly upswept and acuminate.............. ....*gurjanovae*
4a. No pereonites dorsally carinate or dentate, weak posterodorsal tooth on pleonite 2, strong posteriorly directed tooth on pleonite 3...............*kasatka*
4b Some pereonites dorsally carinate and/or dentate...5
5a. Pereonites 4-7 bearing a low carina for at least some of their length, dorsal processes or posterodorsal teeth lacking..*eoum*
5b. Some pereonites bearing posterodistal teeth.. 6
6a. Posterodistal teeth on only pereonites 5-7, pleon and urosomite 1.................. ....*californiensis*
6b. Posterodistal teeth and/or processes beginning at pleonal segment 2-4..........7
7a. Posterodistal ornament beginning at pereonite 4; head bearing double carina anteriorly, separated by furrow; coxa 5 lacking lateral plate-like boss ....*comatum*
7b. Posterodistal ornament beginning at pereonite 2 or 3; head lacking double carina; coxa 5 bearing lateral plate-like boss....................................*garthi*

Macronassa – Like *Aruga*, *Macronassa* consists solely of two species from the NEP, *M. macromerus* and *M. pariter*. Both are predominantly intertidal, but range into the shallow shelf. They are associated with invertebrate turfs, or with mussel beds, algae or other complex habitats. J. L. Barnard and Karaman (1991) described the genus, and differentiate it from other related forms. The two species are described and characters which allow their separation are presented in J. L. Barnard (1969a), where both are called *Lysianassa*.

Orchomene – At least one of the forms listed as from the Pacific by McLaughlin et al, *Orchomene nugax*, is only known from the Bering Sea above the Aleutian chain, and is outside the coverage area of this review. Before considering the genus further, it might be wise to visit the results of the study of intraspecific variation in *Orchomene limodes* performed by Meador and Present (1985). Studies of this type are too rarely allowed by the collected material. Situations where the will to perform tiring and repeated analysis of numerous individuals exist are even less common. The above authors examined the variability of 35 different characters, and found no variation in the following: shape of lateral lobe of the head, shape of the epistome, ornamentation of posterior margin of third pleonal epimeron, shape of posterodistal corner of third pleonal epimeron, orientation of tip of dactyl to edge of palm in gnathopod 1, location of insertion of mandibular palp, extension of posteroventral lobe of article 1 of pereopod 6 relative to anterior lobe, number of spines or teeth on apex of maxilliped outer plate, number of spines on medial surface of maxilliped outer plate. These characters might be fruitfully examined in other members of the genus, with the implicit and unproven assumption that the pattern of variability will differ little among congeners.

The genus has been a source of confusion for some time. J. L. Barnard has alternatively combined and separated the genus from the similar genera *Orchomenella* and *Orchomenopsis* (see for instance his discussion of these groups in 1964a). De Broyer is involved in a long term analysis of the genus, and has separated *Orchomene* sensu J. L. Barnard 1969b into four genera: *Orchomene* s.s., *Orchomenella*, *Allogaussia*, and *Abyssorchomene* (De Broyer 1985a, b). His results have had a degree of acceptance, but some have reached other conclusions. Oleröd (1975), for instance, agrees with the retention of *Orchomene* and *Orchomenella* as valid genera, but also finds evidence in mouthpart structure for retention of *Orchomenopsis* as a separate genus rather than a subgenus as proposed by De Broyer. Both *Allogaussia* and *Abyssorchomene* have been treated as subgenera within *Orchomene* by some subsequent authors, and this is in part reflected in the placement of species by McLaughlin *et al.* (2005).

J. L. Barnard and Karaman (1991) opted to treat *Orchomene* as a "supergenus" and include within it those species placed in *Orchomenella*, *Orchomenopsis*, *Allogaussia*, *Orchomenyx*, and *Abyssorchomene*. This amalgamation produced a huge genus of 85 taxa. They did offer some preliminary guidelines for separation of the included taxa, which they viewed as either valid genera or valid subgenera of *Orchomenella*. They viewed *Orchomene*, *Orchomenella*, *Allogaussia*, and *Abyssorchomene* as valid taxa at the generic level, indicating acceptance of De Broyer's proposal. J.L. Barnard and Ingram (1990) offered almost the same take on the generic taxa in the *Orchomene* s. l. complex as did J. L. Barnard and Karaman (1991), with some interesting tweaks. Since the final adjustments to the monograph published in 1991 were made in 1986, the paper with

Ingram provided a view of J. L. Barnard's evolving thinking on these issues. Virtually the same wording is used in describing the situation in the two papers, but the parenthetical entries in the synonymy were changed in some cases. Thus *Orchomene*, *Orchomenella*, *Orchomenopsis*, and *Abyssorchomene* are treated as valid subgenera of *Orchomene*, while *Allogaussia* was retained as a valid genus (J. L. Barnard and Ingram 1990, pg. 20). Why these changes in generic valuation were made is not clear from the content of the paper. The wording of his "summary of the sketchy details" separating the parts of *Orchomene* s. l. is identical in the 1990 and 1991 papers, with one exception – the substitution of "distinctions" for "details" in the paper with Ingram. Since the evidence remains precisely the same as discussed in J. L. Barnard and Karaman (1991) the rationale for the change is opaque. Without J. L. Barnard around to explain his thinking it seems unwise to accept the later changes (later although actually published earlier) embodied in J. L. Barnard and Ingram (1990), especially since De Broyer has shown no subsequent tendency to modify or question his cladistic results.

Consequently *Allogaussia* remains a valid genus, as do *Orchomene*, *Orchomenella*, and *Abyssorchomene*. The placement of *Allogaussia recondita* was discussed by De Broyer and Vader (1990). They made it clear that, while *Allogaussia* is a valid genus, it contains only three Antarctic species, and *A. recondita* belongs in *Orchomenella*.

J. L. Barnard (1964a) provides a key to the genus *Orchomene* as he viewed it at the time. This includes *Orchomene*, *Orchomenella*, and *Abyssorchomene* species as allocated here. Virtually all of the species known from the NEP are included in the key, exceptions being *Abyssorchomene distinctus* Birstein and Vinogradov 1960, *Orchomene gerulicorbis* Shulenberger and J. L. Barnard 1976, and *Orchomene limodes* Meador and Present 1985. As the key includes the world species it is a bit cumbersome, but workable. For routine use the pictorial key to the lysianassids taken in the San Diego program is very useful, and covers all of the taxa frequently encountered in the SCB within the *Orchomene*/*Orchomenella*/*Abyssorchomene* complex. The key will get you to species, but confirm generic allocation using the present document. Hirayama (1986) discusses the genus in Japan, where he reports only five species, one (*Orchomene pinguis*, now placed in *Orchomenella*) also occurring in the NEP.

Orchomenella minuta, a lysianassid (Photo: : Zosia Joanna Legezynska)

Orchomenella – [see also discussion above under the genus *Orchomene*]. De Broyer (1985a, b) presented a part of his cladistic analysis of the "Orchomene" s. l. group. Within this he indicated that *Orchomenella* consisted of four subgenera; *Orchomenella* s. s., *Orchomenopsis*, *Orchomenyx*, and an unnamed group to house the species *pacifica*, *magdalenensis*, and *tabasco*. Lowry and Stoddart (2002a) have since transferred *O. magdalenensis* to *Lepidepecreum*, but did not also explicitly transfer the other two species. Given the similarities between them, this is likely to happen in future, and the unnamed subgenus of *Orchomenella* should conveniently disappear. As with the species of *Orchomene*, *Orchomenella* can be keyed using J. L. Barnard (1964a, pg. 86-89). *Orchomenella tabasco* is not included there, but should be recognizable using the characters mentioned by J. L. Barnard in his discussion of the species (1967, pg. 68). The remaining NEP taxa now placed in *Orchomenella* are all represented in the key.

Paracentromedon - The only record of the genus in the NEP is based on a provisional species erected by Dickinson in his thesis. The identity of this form is moot. J. L. Barnard and Karaman (1991) list 5 species in the genus, all from the Atlantic. If Dickinson's generic allocation of his provisional is accurate, the record from off Oregon would be a considerable broadening of the range of the genus. *Paracentromedon* differs from closely related genera by the length of article 3 of the mandibular palp and the cleft in the telson (see key to genera in Jarrett and Bousfield 1982).

Paronesimoides – A very small genus of apparently obligate associates with submerged wood. A species was just described from submerged oak blocks placed on the bottom in the Juan de Fuca Ridge vent system (Larsen 2007). This is the first record of the genus in the NEP, and only the second member of the genus described. The generotype, *P. lignivorus* was described by Pirlot (1933) from the Celebes Sea. Both live at lower bathyal or upper abyssal depths. The genus is in the subfamily Tryphosinae. It is not closely related to any other lysianassoids known from the NEP, and can be differentiated from other genera as indicated in the generic key.

Psammonyx – The genus has been recently treated by Budnikova (2005) who described two new species. One of these bridged the small gap between *Psammonyx* and *Wecomedon*, forcing the collapse of that genus. The resulting *Psammonyx* now contains eleven species, of which only three are reported from the NEP. All three of these species are described and keyed by Jarrett and Bousfield (1982), who erected *Wecomedon*, and placed two of the species in their new genus. Both of these species are now placed in *Psammonyx*. Of the two *P. similis* is the more northern, distributed from the Bering Sea to British Columbia. *Psammonyx wecomus* overlaps the former in SE Alaska, and ranges south to Oregon. While the two species are quite similar, *P. similis* bears a much longer more slender tooth on the third epimeron, and other less visible differences. Both have a posteroventral tooth on the 3rd epimeron which lacks a defining notch. This is present in the similarly distributed *P. longimeris*, and allows its easy separation from the other two. All three look very much like species of *Hippomedon*, to which they are apparently closely related.

Rimakoroga – Originally described as *Pseudokoroga rima* by J. L. Barnard (1964a) it was later transferred to a new genus *Rimakoroga* by J. L. Barnard and Karaman (1987). There is now a second species in the genus, *R. floridana* Lowry and Stoddart 1997. The two are closely related, if not cognates. They can be distinguished by the structure of the male G1.

Schisturella – The genus occurs world-wide, and had 12 species (J. L.Barnard and Ingram 1990), 9 of which were reported from the NEP. Those authors provide a key to species, including *Ventiella sulfuris*, a species that resembles *Schisturella* in most respects. We treat *S. cedrosensis* as a full species here, following McLaughlin et al (2005) rather than leaving it as a subspecies of *S. robusta* as do J. L. Barnard and Ingram. This was not followed by Larsen (2007) who retained it as a subspecies in his new key, which includes his newly described 13th species in the genus. With the removal of *Thrombasia* from the synonymy of *Schisturella* and its return to the Tryphosinae within the Lysianassidae by Lowry & Stoddart (2011) this number again stands at 12.

Descriptions of the reported NEP species are located as follows: *abyssi* (J. L. Barnard 1967, but see also Chevreux 1926), *cedrosianus* (J. L. Barnard 1967), *cocula* (J. L. Barnard 1966), *dorotheae* (Hurley 1963 [as *Anonyx*]), *grabensis* (J. L. Barnard 1967), *hansgeorgi* (Larsen 2007), *spinirama* (Hendryckx and Conlan 2003), *totorami* (J. L. Barnard 1967), *zopa* (J. L. Barnard 1966).

The uristid ***Schisturella pulchra***, type species of the genus ***Schisturella***
(Photo by Zosia Joanna Legezynska)

Shoemakerella – This small genus consists only of *S. lowryi* from Bermuda, and *S. cubensis*, a trans-isthmic species with populations in both the Caribbean/Gulf of Mexico, and in the Gulf of California/Baja California areas. The species appears to be rare in the western portion of its distribution. The genus is rather closely similar to *Aruga*, and was placed along with that genus in the synonymy of *Lysianopsis* Holmes 1905 by Hurley (1963, pg. 67). Barnard and Karaman (1991) and later Lowry and Stoddart (1997) consider all three valid and separable genera. All three occur in the Gulf of Mexico/Caribbean region, but only *Aruga* and *Shoemakerella* in the NEP. *Shoemakerella* differs from the two other very closely related genera in its broad inner plate of maxilla 2, and single article of the uropod 3 outer ramus.

Socarnes – Two members of this genus are reported from the NEP, *S. hartmanae*, an endemic described from the SCB (Hurley 1963), and *S. vahlii*, a widely distributed form reported from the outer coast of Baja California (J. L. Barnard 1964a). The genus had five species in 1991 (J. L. Barnard and Karaman 1991) to which Lowry and Stoddart (1994) added another three. Hurley (1963) provides characters which separate his new species from other *Socarnes*, but does not provide a key. *Socarnes hartmanae* can be separated from *S. vahlii* easily on the basis of the third epimeron posterior margin; with a strong tooth in *S. hartmanae*, and rounded in *S. vahlii* (see description in Gurjanova 1962).

Thrombasia - A monotypic genus based on *T. tracalero* J. L. Barnard 1966 from Santa Monica Bay. It was placed in the synonymy of *Schisturella* by Barnard & Karaman 1991, but was reinstated as valid by Lowry and Stoddart (2011) in their review of *Tryphosella* and other tryphosines. It is very close to *Tryphosella*, differing in details of the mandibular palp attachment, maxillary dentition, and telson (Lowry & Stoddart

2011). This reemphasizes the difficulty in separation of the family Uristidae from the Lysianassidae, particularly those in the subfamily Tryphosinae.

The lysianassid ***Tryphosella schneideri*** (Photo: Zosia Joanna Legezynska)

Tryphosella – A large genus badly in need of revision. J. L. Barnard and Karaman (1991) maintain it is not distinct from *Uristes*, which is now in another family (see discussion under *Uristes* in Uristidae as well). Lowry and Stoddart (2011) have revisited all 79 species allocated to the genus worldwide, retaining 40, excluding 15 (mostly to Uristidae), and were unable to allocate 24 taxa with certainty. They also removed several species to a new genus, *Photosella*, which bears a photophore on the 5th leg basis. Lowry and Stoddart (1997) in their discussion of a new species of *Tryphosella* from Florida, casually transferred *Uristes californicus* Hurley 1963 to *Tryphosella*, then contrasted it with their new taxon

. This lead was not followed by McLaughlin et al 2005, but is adopted here. With that addition there are four species currently assigned to the genus in the NEP.
One of these is an unrecognizable provisional from off Oregon, so functionally there are three species; *T. californicus*, *T. index*, and *T. metacaecula*. Since the genus contained 54 species in 1991 (J. L. Barnard and Karaman 1991) and seven additional species were added by 2004 (Vader 2004), it is clear that the evolutionary center of the genus is not in the NEP. *Tryphosella* species are known from all over the world, and from the intertidal to the abyss. Interestingly, of the three local species, only the deepest dwelling (*T. index*, 1620m) bears noticeable eyes. The three species can be distinguished by the eyes (*T. index*), vs. eyes absent (*T. californica* and *T. metacaecula*); and the telson, which bears dorsal spines in *T. californica* and lacks them in *T. metacaecula*. In their review of the genus (2011), Lowry and Stoddart placed *T. californica* and *T. metacaecula* as definite members of their revised *Tryphosella*. *T. index*, however, was considered to be probably a tryphosine, but was lacking sufficient information on key characters to allow a firm assignment.

Waldeckia – The only record of this genus in the NEP is the provisional species *Waldeckia sp a* established by Dickinson in his 1976 thesis. No definition or description of the animal was ever offered, so its identity remains a mystery. The genus is known from the NW Pacific (Hirayama 1985, Hirayama and Kikuchi 1980), but there are no NEP records other than that of Dickinson from the slope and abyssal plain off Oregon. It is possible that what Dickinson had was the species later described by Hirayama and Kikuchi, but this remains only speculation. Such trans-oceanic distributions are not uncommon in gammarid amphipods, particularly in bathyal and abyssal forms.

Family Opisidae - **Description "Head** free, not coalesced with pereonite 1; exposed**;** deeper than long**;** rostrum absent**;** eyes present, well developed or obsolescent, or absent; not coalesced; 1 pair; not bulging. Body laterally compressed; cuticle smooth**.**

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

Mouthparts well developed. *Mandible* incisor smooth, or left minutely dentate, right smooth (?); lacinia mobilis present on left side only, or absent; accessory setal row without distal tuft; molar present or absent, medium, non-triturative; palp present. *Maxilla 1* present; inner plate present, weakly setose apically or without setae; palp present, not clavate, 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 well developed, separate; outer plates present, very large or large; palp 4-articulate or 3-articulate, article 3 without rugosities. *Labium* smooth.

Pereon. Pereonites 1-7 separate; complete; sternal gills absent; pleurae absent. *Coxae 1-7* well developed, none fused with pereonites. *Coxae 1-4* longer than broad, overlapping, coxae not acuminate. *Coxae 1-3* not successively smaller, none vestigial or coxa 1 reduced. *Coxae 2-4* none immensely broadened.

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

Pereopods heteropodous (3-4 directed posteriorly, 5-7 directed anteriorly), none prehensile. *Pereopod 3* well developed. *Pereopod 4* well developed. 3-4 not glandular; 3-7 without hooded dactyli, 3-7 propodi without distal spurs. Coxa well developed, longer than broad; carpus shorter than propodus, not produced; dactylus well developed. Coxa larger than coxa 3, not acuminate, with well developed posteroventral lobe; carpus not produced. *Pereopods 5-7* with few robust or slender setae; dactyli without slender or robust setae. *Pereopod 5* well developed; shorter than pereopod 6, or subequal in length to pereopod 6; coxa smaller than coxa 4, with ventrally produced posterior lobe; basis expanded or slightly expanded, subovate; merus/carpus free; carpus linear; setae absent. *Pereopod 6* subequal in length to pereopod 7; merus/carpus free; dactylus without setae. *Pereopod 7* with 6-7 well developed articles; subequal to pereopod 5, or longer than pereopod 5; similar in structure to pereopod 6; with 7 articles; basis expanded, 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 longer than urosomite 2, or much longer than urosomite 2; urosome urosomites not carinate; urosomites 1-2 without transverse dorsal serrations. *Uropods 1-2* apices of rami 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 shorter than outer ramus, or subequal to outer ramus. *Uropod 3* not sexually dimorphic; peduncle short or elongate; outer ramus shorter than peduncle or longer than peduncle, 1-articulate or 2-articulate, without recurved spines. *Telson* laminar; deeply cleft, or entire; longer than broad; apical robust setae present, or absent." (Lowry and Springthorpe 2001)

Opisa – Species of *Opisa* are easily recognized in samples. They have very large first gnathopods, with an oval, almost circular propodus sporting a large defining tooth. Against this closes a large curved dactyl. The palm is excavate behind the defining tooth, leaving a large gape when the dactyl is closed. This is well illustrated by Hurley (1963) and by Bousfield (1987). This dactylar structure alone will identify them as *Opisa* in the NEP. In other areas another family, the Trischizostomatidae, has similar gnathopod 1 structure, and can be confused with *Opisa*. There are two species known from the NEP, *O. odontochela* from SE Alaska, and *O. tridentata* from the entire coast – from the Aleutians to the SCB. In the south, any *Opisa* is *tridentata* (but check against the description anyway). In the north, where the distribution of the two species overlaps, they can be differentiated without much difficulty by: 1) epimeron 3 posterior margin serrate (*O. tridentata*) or smooth (*O. odontochela*); and 2) G1 palm strongly excavate, dactylar gape pronounced (*O. tridentata*) vs. G1 palm hardly excavate, dactylar gape obscure, nearly lacking (*O. odontochela*). A key separating the species in the genus in North America is presented by Bousfield (1987). While members of the genus are known fish ectoparasites, we usually see them in benthic samples separated from the hosts. It is assumed that, like some other blood parasites, the animals drop off the host for bouts of digestion on the bottom, locating new hosts when they are again hungry.

Family Pachynidae – Description " ...characterized by gnathopod 1, which has a peculiarly compressed carpus and enlarged propodus. The proximal articles of the flagellum of antenna 1 are usually fused and bear rows of aesthetascs; calceoli are never present on either antenna. On the mandible, the molar is always absent, the incisor has a smooth cutting edge, and the left lacinia mobilis and the accessory spines may or may not be present or a serrate blade (lamina dentata) may be present. The mandibular palp is always 3-articulate. On maxilla 1 the inner plate is usually small and may or may not have terminal setae, the outer plate has from 11 to 4 spine-teeth. The palp may be present or absent; if present it bears either terminal articulating spines or setae. The maxillipeds may or may not have inner plates, the outer plates are always at least moderately enlarged and the palp is usually 4-articulate, occasionally 4-articulate. Gnathopod 1 may be subchelate, parachelate or chelate and the palm may be defined by a simple spine, a complex spine, a projecting tooth or not at all, but the carpus is always compressed and the propodus is always enlarged. Gnathopod 2 is a typical lysianassoid mitten which is usually minutely subchelate, but occasionally the dactyl and palm are enlarged. Coxa 4 usually has a well developed posteroventral lobe but occasionally this lobe is absent or poorly developed. Article 4 of pereopods 5 and 6 is usually expanded posteriorly. Uropods 1 and 2 are biramus. Uropod 3 is usually biramus, occasionally uniramus, with the outer ramus always 2-articulate. The telson is small, entire, and slightly broader than long." (Lowry 1984)

Pachychelium – Two specimens of an undescribed species in this genus are known from the NEP. Collected in the monitoring program of the City of San Diego, *Pachychelium sp SD1* came from relatively shallow water off Pt. Loma. A second specimen was taken in the Bight '03 regional monitoring off the east end of Anacapa Island in the Santa Barbara Channel. The animal is small, but bears the distinctive chela of the genus (Alonso de Pina 1993, Lowry 1984), clearly separating it from other members of the Pachynidae. Of the four species in the genus, the present specimen is most similar to *P. davidis* from the Davis Strait off Greenland. Lowry (1984) correctly states that the genus is bipolar, with the type species from the Arctic (Davis Strait), and the other three described forms from Antarctic or Subantarctic waters. The presence of a new species in the temperate waters of the NEP is zoogeographically anomalous, as was the detection and description of a 5th species in the genus from temperate waters off Argentina (Alonso de Pina 1993). That species, *Pachychelium barnardi*, was reported from shallow shelf waters in the holdfast of *Macrocystis pyrifera*. Perhaps the California species is similarly associated with kelp holdfasts, but many have been examined locally, without turning up other *Pachychelium* specimens. The bipolarity of the genus is becoming less marked as additional collections trickle in from cool, but non-polar waters. Given the scarcity of specimens for all species in the genus, the geographic records may only reflect inadequate material of animals that occupy a special and usually unsampled niche.

Pachynus – Bulycheva (1955) established the genus for *P. chelatum* from the shallow shelf of the Japan Sea in the NWP. Hurley (1963) described the second species, *P. barnardi,* from local waters. The two other members of the genus were described from Australian waters by Lowry (1984). As in most other genera of the family, the structure of gnathopod 1 is characteristic, separating *P. barnardi* from *Pachychelium* and *Prachynella* in the NEP.

Prachynella – Lowry (1984) noted the differences between the anoculate deep-water *Prachynella* described by J. L. Barnard 1967, and the oculate shallow-water form he described in 1964. He suggested that there were probably several species of

Prachynella in Californian waters; I agree. Having additional material of *Prachynella* from the Tanner Basin, I am erecting a second species in the genus, *Prachynella sp A* SCAMIT 2007, to house the anoculate deep-water form. This is clearly not the same as the holotype (as redescribed by Lowry 1984), or other shallow water specimens of *Prachynella lodo* taken in SCB waters or in Japan (Hirayama 1985). John Chapman (in lit.) suggested the hypothesis that *Pachynus barnardi* and *Prachynella lodo* were just differing sexes of one species. This seems very unlikely, given the differences in mouthpart morphology which place the genera in different groupings within the family (Lowry 1984). It does, however, point out the lack of information on sexual dimorphism in the Pachynidae, and urges careful attention to sexing of collected individuals of both these taxa. While I am skeptical about the hypothesis, it deserves corroboration or refutation on the basis of complete and careful analysis of specimens.

Family Scopelocheiridae – Members of this family have very peculiar first gnathopods, which are simple, and characteristically end in a sheaf of setae or spines which obscures the dactyl. In some forms the dactyl itself is displaced ventrally, and inserted subterminally on the propod. The dactyls also frequently bear accessory teeth (see for instance the structure of the G1 dactyl in *Anisocallisoma armifera*). There are eight genera in the family, three of which occur in the NEP.

Diagnosis "Head: as long as or longer than deep. Antennae: calceoli present or absent. Epistome and upper lip separate. Mandible: incisors usually symmetrical, sometimes asymmetrical, large, with straight or convex margins; left lacinia mobilis a stemmed, distally expanded, smooth or irregularly cusped blade, occasionally a cusped ped; accessory setal row without distal setal tuft; molar present or absent, if present, a narrow column with small triturating surface or a small non-setose triangular flap. Maxilla 1: inner plate usually strongly setose, always more than 2 pappose setae; outer plate broad, with 6-11 setal-teeth in a 7/4 or modified 7/4 arrangement; palp large, 2-articulate. Maxilliped outer plate with or without apical slender simple or pappose setae, with or without apical robust setae. Gnathopod 1: simple, dactylus reduced, complex, setose. Coxae 1 to 4: large, longer than broad, overlapping. Pereopods 3-7: usually simple, sometimes prehensile, propodus without distal spur. Telson: moderately to deeply cleft." (Lowry and Stoddart 1997)

Anisocallisoma – Erected by Hendrycks and Conlan (2003) for the NEP species *armigera*, the genus has closest resemblances to *Eucallisoma*. The two genera can be easily separated by the characters tablulated by Hendrycks and Conlan (Pg. 2315). The species has only been collected in sediment traps in very deep water off Pt. Conception, but may eventually prove to be more widespread as additional material becomes available.

Paracallisoma – Two NEP species are recorded in this genus; *P. coecum*, and *P. spinipoda*. Hurley (1963, pg. 62-64) considers the case presented by Birstein and Vinogradov (1960) and adopted by Gurjanova (1962) that *P. coecum* is a junior synonym of *P. alberti*. He declined to accept the case, feeling that additional information was needed. J. L. Barnard and Karaman (1991) follow this same path, treating both as valid taxa. Holmes (1908) described the female, and J. L. Barnard (1954) described a male *P. coecum* as well. Hendrycks and Conlan (2003) described only the male and an unsexed juvenile of their species *P. spinipoda*. They felt it could be clearly differentiated from the other species in the genus by the presence of subchelate pereopods 3-6 (among other characters), the elongate spinose propodi of which appear almost prehensile. This is very different from the condition described for *P. coecum*, and should allow the two taxa to be separated with ease. Distribution of *P. coecum* vertically off California is documented by Brusca (1967).

Scopelocheiropsis – The monotypic *S. abyssalis*, previously known from the Atlantic and the Antarctic (J. L. Barnard and Karaman 1991), was reported from off Pt. Conception by Hendrycks and Conlan (2003). Their material consisted of a single female from a sediment trap, but the condition of the specimen allowed confident allocation to this species. Not only was the specimen the first known from the Pacific, but it also represented a new depth record of 4000m. More complete illustrations of the species are found in Schellenberg (1926a, b).

Family Sophrosynidae - Description "*Head* exposed, slightly longer than deep, without cheek notch. *Antennae* calceoli absent in male and female. *Antenna 2* peduncular article 3 without distal hook. *Epistome and upper lip* fused. *Mouthpart bundle* subquadrate. *Mandible* incisors present, well developed, symmetrical, straight, smooth; left lacinia mobilis rod-like, right lacinia mobilis absent; accessory setal row absent, without distal setal tuft; molar absent; palp present, inserted distally to extremely distally. *Maxilla 1* inner plate with 2 or less apical pappose setae; outer plate with 2 apical primary setal-teeth and vestigial setal-teeth down medial face; palp large, with apical robust setae. *Maxilla 2* inner plate subequal to or slightly shorted than outer plate, or inner plate significantly shorter than outer plate; inner plate without oblique row of facial setae. *Maxilliped* coxa and basis normal; outer plate present, medial setae absent, apical slender setae present; palp 4-articulate, article 4 well developed.

Gnathopod 1 slightly chelate; coxa large, about as long as coxa 2; merus and carpus not rotated; ischium short; carpus compressed; propodus large; dactylus slightly curved. *Gnathopod 2* coxa large, subequal in size to coxa 3; propodus subquadrate to rectangular (less than 4 x as long as broad), with complex setae; dactylus minute. *Pereopods* all simple; distal spurs absent. *Pereopod 4* coxa with well developed or weak posteroventral lobe. *Pereopod 5* coxa anterior and posterior lobes subequal. *Pereopod 6* coxa posterior lobe subequal to, slightly longer than or much deeper than anterior lobe.

Uropod 2 inner ramus without constriction. *Uropod 3* rami biramous; outer ramus 2-articulate. *Telson* present, cleft or entire." (from Lowry and Stoddart 2010b)

Sophrosyne – J. L. Barnard and Karaman (1991) list three species in the genus; *S. hispana* from the temperate east Atlantic, *S. murrayi* from the sub-Antarctic Kerguelen Islands, and the widely distributed *S. robertsoni*. Kilgallen, Myers, and McGrath (2007) examined new material and clarified the characters separating *S. hispana* and *S. robertsoni*. The genus was expanded to 14 taxa worldwide by Lowry and Stoddart (2010b). Much of the increase came from descrimination of sibling taxa from records of *S. robersoni* and *S. hispana*. This was the case in Southern California, where specimens attributed to *S. robertsoni* by Barnard (1966), were described as *S. californica* by Lowry and Stoddart. The male of this species is currently not known, but is presumed similar to the male of *S. robertsoni* as described by Moore (1983) The NEP representative of the genus can be separated from *Scisturella* and similar local forms by its unreduced coxa 1.

Family Uristidae – Description "Body smooth, not carinate or rostrate, first segment not produced in cap or spine over head. Eyes normal or absent, may sometimes meet in midline. Urosome segments 2 and 3 not fused. Telson present, entire to deeply cleft. Pereopod 3 basis not produced in long spine or process posteriorly. Mouthparts not styliform. Antenna 1, peduncle generally not carinate. Antenna 2 peduncle, none of segments noticeably dilated. Mandible has distinct cutting edge which is not strongly dentate; molar process small or obsolete, palp of 3 segments. Maxilla 1, palp of 2 distinct segments. Maxilliped, inner plates well developed, may be almost as long as outer; outer plates , inner margin straight, crenulate, outer margin convex, distally rounded, generally not toothed; palp of 4 segments, 4th usually well-developed but may be rudimentary. Sideplates 1 and 2 not appreciably smaller than 3 and 4; sideplate 1, lower front angle not hidden by sideplate 2. Gnathopod 1, not enormously developed, subchelate or imperfectly subchelate, finger not concealed amongst setae. Gnathopod 2, minutely chelate or minutely subchelate, dactylus present. Pereopods not prehensile, segment 7 generally not noticeably long; pereopods 3-5 segments 3 to 7 not greatly expanded. Uropod 3 biramus." (Hurley 1963)

Abyssorchomene – Created by De Broyer based on a cladistic analysis of the complex of species centered on *Orchomene*, this genus has two members in the NEP, and at least three others elsewhere (Bellan-Santini 1990). The NEP taxa are treated in J. L. Barnard and Ingram (1990) as *Orchomene* species, with *Abyssorchomene* relegated to subgeneric status. This placement is rejected here based on De Broyer's findings, and *Abyssorchomene* is viewed as a valid generic level taxon (see discussion under *Orchomene*). They characterize the taxon as having a mandibular molar like that of *Orchomene*, a maxilliped like that of *Orchomenella* and a gnathopod 1 like that of *Orchomenopsis*. This sort of structural convergence is one of the factors that convinced J. L. Barnard that more information was needed before the systematics of the lysianassids could be firmly established. His untimely death prevented further contributions by him to this resolution. Both *A. abyssorum* and *A. distinctus* occur on abyssal plains, and were taken in association with hydrothermal venting areas in the NEP.

It is not clear if either of the two reported species are identical with the forms reported by France (1994) from the San Clemente Basin. His maintenance of two morphologically separable forms, *Abyssorchomene* sp. 1 and *Abyssorchomene* sp. 2 is suggestive, but must remain inconclusive. Since both were taken at significantly shallower depths than either of the two other species reported from the NEP, and in a different ecological context, it is more likely that they represent as yet unnamed species in the genus from the area.

Anonyx – A large genus, with 45 species (J. L. Barnard and Karaman 1991), which has since grown even larger (to 54 species, Vader 2004). A number of investigators, most prominently D. J. Steele, have worked with the group. The genus was treated extensively by Gurjanova (1962), who described several new *Anonyx* species, predominantly from the NWP. Steele (1979c) summarized the distribution of the genus in the NWP, NEP, and Arctic and indicated the north Pacific as the apparent center of origin of the genus. Work with Alaskan *Anonyx* material began with Steele and Brunels (1968) investigation of the Arctic and western North Atlantic species in the genus. Several forms which range into the boreal and even temperate waters of the NEP are included there. He added additional comments to that work (Steele 1969) before producing a series of papers on the taxonomy and zoogeography of *Anonyx* species from the North Pacific (Steele 1982, 1983, 1986, 1989, 1991). He has also commented on variability in some meristic characters within members of the genus (Steele 1979b). A relatively large number of forms are listed in McLaughlin et al (2005) as being distributed in the NEP, but *A. barrowensis* and *A. bispinosus* apparently have distributions only within the Arctic zone above the Aleutians in the Bering Sea and are not represented in the present study area. Others should not be included in *Anonyx*. Lowry and Stoddart (2002a) treated *A. filiger* as a *Lepidepecreum*, designating it a nomen dubium and unrecognizable.

Among the uristids *Anonyx* is most closely related to *Kyska* (see below) and to *Ichnopus* in having a mandibular molar consisting of a setose tongue with no triturative surface (Lowry and Stoddart 1992). NEP species of *Anonyx* are mostly actic-boreal or boreal in distribution. Of the 24 species reported from the NEP, only seven range south of British Columbia, and only three into California waters. In the latter group only *A. lilljeborgi* has been placed on the SCAMIT list. [please note: the spelling of species named after Dr. Liljeborg can be correct either with or without the double "l", depending on their original formulation. Since the difference stems from conventions of translitteration in different languages, there is no single correct way.] A key to the California forms is available in Hurley (1963, pg. 103). His *Anonyx dorotheae* has been removed to the genus *Schisturella.*

Ichnopus – A predominantly Indo-Pacific genus of sixteen species (Lowry and Stoddart 1992) with a single species reported from the NEP, *Ichnopus pelagicus*. Most of the species are from the tropical Pacific, with Tethyan relicts in the eastern North Atlantic and Mediterranean. Barnard (1964c) illustrates *I. pelagicus*, and provides the record which places the species into the NEP. It is fully redescribed by Lowry and Stoddart (1992), who also provide a key to the genus worldwide. It is related to *Kyska* and *Anonyx*, but has gnathopodal characters which are of scopelocheirid form. In the NEP generic key it is found along with the other genera with vestigial or obscured dactyl on the first gnathopod. In the case of *I. pelagicus*, however, the dactyl is mostly visible, with some setae and accessory dactylar teeth serving to obscure it slightly. Most species with this gnathopod type are deep water and blind. *Ichnopus pelagicus* has well defined prominent eyes, and is found in the upper 200 m of the water column over off-shore deep bottoms.

Koroga – A monotypic cosmopolitan genus containing *Koroga megalops*. J. L. Barnard (1964b) illustrates the animal well, providing views of all the appendages and mouthparts illustrated in the original description (Holmes 1908) and adding more. The species was originally taken in deep-water in SE Alaska, but is now known virtually worldwide. J. L. Barnard and Karaman (1991) characterize it as abysso-/bathypelagic, with a reported depth range of 500-2200m.

Kyska - Consisting only of *Kyska dalli*, the genus is restricted to the NEP, in the shallows around Kyska Island in the Aleutians. Shoemaker (1964) fully illustrates the species, commenting that it is very like *Anonyx nugax* in general aspect. The genus is separated from other similar forms, including *Anonyx*, by the chelate G1 in both sexes, the short robust antennae, and the absence of calceoli in the male. Lowry and Stoddart (1992) characterize this as a member of the anonychine group within the uristids, which includes only the genera *Anonyx*, *Ichnopus*, and *Kyska*, and is characterized by a mandibular molar consisting of a setose tongue with no triturative surface.

Stephonyx - A modest sized genus of 11 species (Senna and Sereno 2007, and Diffenthal and Horton 2007 each added one to the 9 listed by J. L. Barnard and Ingram in 1990). Two of these, *S. laqueus* (see photo above) and *S. mytilus* occur in the NEP. There is not currently a comprehensive key to the genus. Keys provided by Senna and Sereno and by Diffenthal and Horton each omit the species described by the other. Both of their keys, however, include the NEP species. *S. mytilus* is described in J. L. Barnard and Ingram 1990. J. L. Barnard (1967) describes and figures *S. laqueus*. France (1994) reported *S. laqueus* from trawls in the San Clemente Basin at a depth of 1875m. The two NEP species are most easily separated grossly by the presence of a posteroventral tooth on the second epimeron of *S. mytilus*, absent in *S. laqueus*. Members of the genus are not easily distinguished from members of other similar genera, and the generic key should be used to place them in *Stephonyx*. Lowry and Stoddard (1989) created the genus, differentiating its scavenging members from the commensal genus *Euonyx*, where they had previously been placed. No members of the latter genus are known from the NEP.

The uristid ***Stephonyx laqueus*** photographed from the 13°N area of the East Pacific Rise. The specimen was collected in the vicinity of hydrothermal vents (Photo: T. Haney)

Uristes – As remarked under *Tryphosella* in Lysianassidae, J. L. Barnard and Karaman (1991) recommend that the species of *Tryphosella* and *Uristes* be pooled as species inquirenda pending reanalysis. Since this places together members of two genera now in separate families it presents us with a conundrum. The question which must be answered is whether or not a better method of separating these two genera has been found in the intervening years. The above authors present the "traditional" and presumably inadequate method as "(1) small head in *Uristes*, large in *Tryphosella*; (2) short carpus of gnathopod 1 in *Uristes*, longer in *Tryphosella*; and (3) small and ordinary prebuccal region in *Uristes*, large and protuberant epistome in *Tryphosella*."

The genus had 22 species allocated to it by J. L. Barnard and Karaman (1991), of which four were from the NEP. One of these, *U. californicus*, has since been removed to *Typhosella* (Lowry and Stoddart 1997). J. L. Barnard (1967) mentions the close similarity in many characters of his *Orchomene tabasco* (now *Orchomenella*) and *Uristes dawsoni*. While the two do offer close resemblance, he provides a series of characters in which they differ. Since SCAMIT members have yet to record *U. dawsoni* from sampling off our coast, the most likely species we might encounter is *U. entalladurus* (J. L. Barnard 1963b). This is normally found on very shallow wave-swept sandy bottoms, and has been encountered in the most shallow samples taken in environmental monitoring surveys in the SCB. *U. entalladurus* can be easily distinguished from both *U. dawsoni* and *U. perspinis* by having a large acute reflexed process on the first urosomite (J. L. Barnard 1963b, Figure 5).

Ventiella – Newly established by J. L. Barnard and Ingram (1990) it remains monotypic. *Ventiella sulfuris* is present at NEP vent sites in huge numbers, forming over 99% of the amphipods sampled around vents (J. L. Barnard and Ingram 1990). Those authors studied material from both the Galapagos Rift zone, and from the East Pacific Rise, and did not detect sufficient morphological variability to establish two species. Genetic information (France *et al.* 1992) suggests that the populations in the two geographically separate areas are also genetically separate, and show virtually no evidence of gene flow between them. Within an area, such as at various sites along an axial ridge separated by up to 1200 km, genetic differences were very slight (France *et al.* 1992). This low level of genetic difference in contiguous or nearly contiguous portions of the population emphasizes the genetic differences between the populations of this "species" at the Galapagos and East Pacific Rise vent systems. No second species has yet been differentiated, but the genetic data suggest that perhaps new morphological characters might yield a separation which reflects the genetic makeup of the two populations. The genus bears considerable similarity in appearance to *Schisturella*, and is keyed with species of that genus in J. L. Barnard and Ingram (1990)(see under **Schisturella** above). Additional distributional information is presented by Vinogradov (1993).

Family Valettiopsidae - The composition of this group, and its placement, have been in dispute. Thurston (1989), for instance, has recommended that the genera *Valettiopsis* and *Valettietta* be removed from the lysianassoids because of their possession of a toothed incisor process. Lincoln and Thurston (1983) used the shared possession of a toothed incisor to place *Alicella* with *Valettiopsis*, *Valettietta*, and *Valettia*. While they viewed all these genera with a toothed incisor as having a "broadly similar facies", they suggested that *Valettia* was not closely affiliated with the others. De Broyer (1985a) also raised the same concerns, stating that the group would be removed from the lysianassoids and placed in their own family. Lowry and De Broyer (2008) formally separated and described the family, reallocating some genera formerly assigned to the "valletiopsid group" to the Alicellidae. Relationships remain controversial, but the group is retained here within the lysianassoids pending further resolution. It is explicitly referred to as “not lysianassoid” by Lowry and De Broyer (2008), who compare it to eusiroids, but do not ultimately place the family within a superfamily..

Description. “**Head** free, not coalesced with pereonite 1; exposed; as long as deep, or deeper than long; anteroventral margin weakly recessed, anteroventral margin moderately excavate, anteroventral corner subquadrate; **rostrum absent**; eyes absent. Body laterally compressed; cuticle smooth.

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

Mouthparts well developed. *Mandible* incisor dentate; lacinia mobilis present on both sides; accessory setal row without distal tuft; molar present, medium, triturative; palp present. *Maxilla 1* present; inner plate present, strongly setose along medial margin; palp present, not clavate, 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 well developed, separate; outer plates present, small; palp 4-articulate, article 3 without rugosities. *Labium* smooth.

Pereon. Pereonites 1-7 separate; complete; sternal gills absent; pleurae absent. *Coxae 1-7* well developed, none fused with pereonites. *Coxae 1-4* longer than broad, overlapping, coxae not acuminate. *Coxae 1-3* not successively smaller, none vestigial or coxa 1 reduced. *Coxae 2-4* none immensely broadened.

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

Pereopods heteropodous (3-4 directed posteriorly, 5-7 directed anteriorly), none prehensile. *Pereopod 3* well developed. *Pereopod 4* well developed. 3-4 not glandular; 3-7 without hooded dactyli, 3-7 propodi without distal spurs. Coxa well developed, longer than broad; carpus shorter than propodus or subequal to propodus, not produced; dactylus well developed, or small or poorly developed. **Coxa** larger than coxa 3, not acuminate, **with small posterior lobe**; carpus not produced. *Pereopods 5-7* with few robust or slender setae; dactyli without slender or robust setae. *Pereopod 5* well developed; shorter than pereopod 6, or subequal in length to pereopod 6; coxa smaller than coxa 4, without posterior lobe or equilobate; basis expanded, subrectangular or subquadrate, with posteroventral lobe or without posteroventral lobe; merus/carpus free; carpus linear; setae absent. *Pereopod 6* subequal in length to pereopod 7, or longer than pereopod 7; merus/carpus free; dactylus without setae. *Pereopod 7* with 6-7 well developed articles; longer than pereopod 5; similar in structure to pereopod 6; with 7 articles; basis expanded or slightly expanded, 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* setose.

Urosome not dorsoventrally flattened; urosomites 1 to 3 free; urosomite 1 longer than urosomite 2, or much longer than urosomite 2; urosome urosomite 1 carinate, or urosomites not carinate; urosomites 1-2 without transverse dorsal serrations. *Uropods 1-2* apices of rami 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 short; outer ramus longer than peduncle, 2-articulate, without recurved spines. *Telson* laminar; deeply cleft; longer than broad; apical robust setae present." (Lowry and Springthorpe 2001)

Valettietta - The genus is only represented within the NEP fauna by a single species, *V. cavernicola*, an anchihaline form from the Galapagos (Stock and Iliffe 1990). The authors acknowledge that all other members of the genus are from deep water, but note that such deep-water/cave faunal connections are not uncommon. The species is known from a few small individuals, and is presumably restricted to its anchihaline habitat. It should not be taken in either fully saline waters, or outside caves.

Valettiopsis concava (Photo courtesy MBARI)

Valettiopsis –Two recent treatments of the genus have appeared, that of Serejo and Wakabara (2003) and that of Horton (2004). Each described new taxa, bringing the total number of species in the genus to seven. Horton provides a key to all species. Hendrycks (2007) adds another species to the genus, and provides a new key which supercedes those of recent revisions. The best known species recorded from the NEP is *V. dentata* of Holmes. Horton reexamined the holotype, and provides some additional illustrations to augment those provided in the original description (Holmes 1908). Hurley (1963) examined a large lot of specimens from the Coronado Submarine Canyon, finding minor differences (not specified) from Holmes' description. J. L. Barnard (1967) illustrates material taken off Baja California. Hendrycks new species is easily separable from Holmes species by the dorsal carinations of the pereonites and pleonites in *V. concava*, lacking in *V. dentata*.

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