

Key to the Southern California Bight Isopods ¹

1. Body with slightly to highly distorted bilateral symmetry; female much larger than male; parasitic on other crustaceans[Epicaridea: Bopyridae]² 2
- Body with clear bilateral symmetry; females similar in size to males; not parasitic on other crustaceans 4
2. Pleopods appear triramous in adult female³; pereonite VI much longer than other pereonites; abdominal parasite of hermit crabs (e.g., *Parapagurodes*)..... *Stegophryxus hyphalus*
- Pleopods appear biramous in adult female; pereonite VI subequal in length to other pereonites 3
3. Pleonite 1 with dorsal-lateral papillae; pleopodal rami similar in size and shape in adult female, forming long, narrow branches (pleural lamellae); pereonites without lateral processes; abdominal parasite of callianassid mud-shrimps (e.g., *Upogebia*)
.....*Phyllodurus abdominalis*
- Pleonite 1 without dorsal-lateral papillae; pleopodal rami dissimilar in adult female, exopod long and narrow, endopod small and oval; pereonites with distinct posterolateral processes; branchial parasite of natantian shrimps (e.g., *Crangon*)*Argeia pugettensis*
4. Body with 5 pairs of pereopods; males with enlarged forceps-like mandibles, projecting in front of head; females and juveniles without enlarged mandibles[Gnathiidea]..... 5
- Body usually with 7 pairs of pereopods (6 pairs in manca)⁴; males without projecting, forceps-like mandibles; females with mandibles 10
5. Projecting, forceps-like mandibles absent; body often sac-like
..... *Gnathia* spp (females & juveniles)
- Projecting, forceps-like mandibles present; body never sac-like 6
6. Pleotelson triangular or subtriangular 7
- Pleotelson T-shaped 8
7. Frontal margin of cephalon (frons) forming broad and minutely crenulated plate; mandible outer margin smooth or with only weakly developed tooth; sides of pereon parallel; pleonal epimeres subacute and laterally directed; eyes dark *Gnathia crenulatifrons*
- Frontal margin of cephalon not as above, but produced anteriorly and trilobed; mandible with modest-sized outer tooth; pereon tapering in width posteriorly; no pleonal epimeres visible in dorsal view *Gnathia tridens*

8. Dorsum of cephalon tuberculate, frontal margin produced into a single large medial lobe; dorsum of cephalon and entire body densely hirsute, covered with long hairlike setae; pleonal epimeres laterally truncate, occurring as doublets (dorsal and ventral pair) on each side of pleonites *Gnathia sanctaerucis*
- Dorsum of cephalon with distinct or weak tubercles, frontal margin trilobed, not as above; cephalon and body moderately to weakly hirsute; pleonal epimeres subacute, occurring as a single pair on each pleonite 9
9. Cephalon wider than long, with anteromedial depression; outer margins of mandibles with distinct tooth, without setae or crenulations; eyes golden *Gnathia trilobata*
- Cephalon slightly longer than wide, without anteromedial depression; outer margins of mandibles without distinct tooth, but with small setose crenulations
..... *Gnathia productitridens*
10. Uropods operculate, modified into a pair of covers folded under the pleon and enclosing the pleopods[Valvifera]..... 11
- Uropods lateral or terminal, not as above 23
11. First 4 pairs of pereopods different from last 3 pairs of pereopods; pereopods I-IV slender, fringed with setae, directed anteriorly against ventral body wall; pereopods V-VII stout, prehensile; pereonite IV much longer ($> 2x$) than other pereonites [Arcturidae]..... 12
- All pereopods similar; length of pereonite IV subequal to other pereonites [Idoteidae] 13
12. Cephalon incompletely fused with pereonite I, indicated by a distinct lateral incision just behind the eye; antennal flagellum with ventral blade-like setae; dorsum of pereonite III smooth; dorsum of pereonite IV smooth or with medial swelling or spines
..... *Neastacilla californica*
- Cephalon completely fused with pereonite I, lateral margin entire; antennal flagellum lacking blade-like setae; dorsum of pereonites III-IV smooth or with posterior spines
..... *Idarcturus allelomorphus*
13. Antennae 2 shorter than antennae 1; flagellum of antennae 2 vestigial; pereonites III and IV much wider ($\approx 2x$) than pleon 14
- Antennae 2 much longer than antennae 1; flagellum of antennae 2 well developed, uniarticulate (clavate) or multiarticulate; pereonites III and IV not much wider (\approx subequal) than pleon 15

14. Pleon rounded dorsally, with large anterior and posterior swellings; pleotelson without dorsal transverse ridge, about as long as wide (L:W = 1.0–1.2), relatively broad, lateral margins rounded (convex) and curving posteriorly to obtuse point; pereonite IV margins of females form acute posterolateral projections *Edotia sublittoralis*
- Pleon not rounded dorsally; pleotelson with dorsal transverse ridge at midlength, distinctly longer than wide (L:W \geq 1.4), relatively narrow, and tapering sharply after midlength to an acute apex; pereonite IV margins of females angular, but do not form acute posterolateral projections *Edotia* sp B
15. Pleon 2-segmented (pleonal formula = 0 + 1, 1 partial pleonite + pleotelson); cephalon and pereonites with or without dorsal sculpturing of variable tubercles or humps 16
- Pleon 4-segmented (pleonal formula = 2 + 1, 2 free pleonites, 1 partial pleonite, and pleotelson); cephalon and pereonites without dorsal sculpturing 20
16. Antennae 2 flagellum uniarticulate, flagellar article large and clavate, subequal in length and width to article 3 of peduncle; cephalon with single large bilobed hump or tubercle *Eusymmerus pseudoculata*
- Antennae 2 flagellum multiarticulate, flagellar articles much smaller than articles of peduncle, not clavate; cephalon smooth or with three pairs of dorsal tubercles 17
17. Cephalon and pereonites smooth, without dorsal tubercles or rugae; pleotelson emarginate (concave) along posterior margin *Synidotea harfordi*
- Cephalon with three pairs of dorsal tubercles, a tubercle in front of each eye, a pair of anteromedial tubercles, and a pair of intraocular tubercles; pereonites with distinct dorsal tubercles, rugae, or both; pleotelson rounded posteriorly, spatulate 18
18. Lateral margins of adult body roughly parallel, widest part of pereon subequal in width to pleotelson; pleotelson widest medially to posteriorly; dorsal sculpturing general reduced to low, conical tubercles on cephalon and medial row of conical tubercles along pereon; eyes small and lightly pigmented *Synidotea calcarea*
- Lateral margins of adult body not parallel, generally widest at pereonites III–IV; pleotelson widest anteriorly; dorsal sculpturing variable, pereonites with 3–4 longitudinal rugae on lateral areas; eyes relatively large and heavily pigmented 19
19. Flange present on upper third of basis of pereopods II–VI in adults, usually very small (i.e., poorly developed) and difficult or impossible to see in juveniles and manca; anteromedial

- tubercles of cephalon generally large and highly variable with size, becoming broad, flattened (flag-like), and projecting anteriorly *Synidotea magnifica*
- No flange present on pereopods II–VI in adults; anteromedial tubercles of cephalon relatively small, narrowly rounded or conical, not flag-like *Synidotea media*
20. Maxillipedal palp 4-segmented in adults⁵ 21
- Maxillipedal palp 5-segmented in adults, article 5 much smaller than other articles..... 22
21. Coxae VI not reaching posterior margin of respective pereonite; posterior margin of pleotelson rounded, with an elongate median projection; frontal process narrow with pointed apex *Idotea fewkesi*
- Coxae VI reaching posterior margin of respective pereonite; posterior margin of pleotelson triangular, with or without a minute median projection; frontal process apically blunt *Idotea urotoma*
22. Posterior margin of pleotelson concave, without a median projection, posterolateral corners sharply pointed in adults (may be slightly rounded in juveniles); frontal process long with pointed apex *Idotea resecata*
- Posterior margin of pleotelson with small, but distinct, median projection, posterolateral corners rounded; frontal process long with rounded apex *Idotea montereyensis*
23. Uropods lateral, hinged on the anterolateral margins of the pleotelson, may be greatly reduced 24
- Uropods terminal or nearly so, hinged on the posterior margins of the pleotelson, usually minute and styliform [Asellota] 52
24. Body very elongate, L:W ratio > 6:1 [Anthuridea]..... 25
- Body not elongate, L:W ratio < 4:1 [Flabellifera]..... 30
25. Mouthparts forming an anteriorly directed cone-like structure under the head, adapted for piercing and sucking 26
- Mouthparts not forming a ventral cone-like structure, adapted for biting and chewing 27
26. Pereon comprised of 7 distinct, well developed pereonites and 7 pairs of pereopods; pereonite VII about 50% as long as pereonite VI *Paranthura elegans*
- Pereon comprised of 6 distinct pereonites and 6 pairs of pereopods; pereonite VII minute, less than 20% as long as pereonite VI *Califanthurus squamosissima*
27. Pleotelson with 3 raised dorsal longitudinal ridges or carinae; uropodal exopods curve up and over base of pleotelson *Haliophasma geminata*

- Pleotelson without dorsal ridges or carinae; uropodal exopods may or may not curve up over base of pleotelson 28
- 28. Pleonites 1-5 fused only along the dorsal midline, segments free laterally and visible in dorsal view; uropodal exopods short, about 50% length of endopods and pleotelson, curving up and partially over base of pleotelson; uropodal endopods narrow, about 50% as wide as pleotelson *Amakusanthura californiensis*
- Pleonites 1-5 completely fused dorsally; uropodal exopods relatively long, greater than 50% length of endopods and pleotelson, may or may not cover dorsum of pleotelson; uropodal endopods broad, subequal in width to pleotelson 29
- 29. Dorsal surface of pereon pigmented with complete or nearly complete dark rings on pereonites II-VI and a posterior transverse band on pereonite VII; uropodal exopods partially cover dorsal surface of pleotelson *Mesanthura occidentalis*
- Dorsal surface of pereon covered with diffuse pigment splotches, but without pigment rings; uropodal exopods do not cover base of pleotelson *Cyathura munda*
- 30. Uropods greatly reduced with small claw-like exopod, generally not visible in dorsal view; burrowing in algal holdfasts or wood 31
- Uropods not as above, clearly visible in dorsal view as an expanded and flattened “tail fan” or as long caudal processes 32
- 31. Mandibles without a rasp or file-like ridges; burrowing in algal holdfasts
..... *Limnoria algarum*
- Mandibles with a rasp or file-like ridges; burrowing in wood *Limnoria sp*
- 32. Pleon composed of 3 or fewer free pleonites plus pleotelson 33
- Pleon composed of 4–5 free pleonites plus pleotelson 40
- 33. Pleon composed of 3 free pleonites plus pleotelson; body strongly depressed and broad, platter-like; dorsum of pereonites and pleonites with distinct medial carinae
..... *Heteroserolis carinata*
- Pleon composed of 1–2 dorsally visible free pleonites plus pleotelson 34
- 34. Uropods uniramous; pereopod I distinctly subchelate, propodus subovate and broad (at least 5x as wide as dactylus) 35
- Uropods biramous, although endopod may be quite reduced; pereopod I ambulatory or weakly prehensile, propodus narrow (less than 2x as wide as dactylus) 36

35. Posterior margin of pleon with pair of short posterior projections; uropods narrow proximally, then expanding at least twofold for about 80% of their length, and then tapering to an acute point; pleotelson broadly triangular, about 1.5x as wide proximally as long, apex without notch *Bathycopoea daltonae*
- Posterior margin of pleon without posterior projections; uropods styliform, widest proximally and tapering evenly to an acute point; pleotelson triangular, about 1.2x as wide as long, apex notched or funnel-like *Ancinus granulatus*
36. Uropodal exopod of males developed into long caudal process extending beyond posterior margin of pleotelson, at least 2x as long as reduced endopod; pleotelson with "complex" posterior incision or notch 37
- Uropods and pleotelson not as above 39
37. Pleotelson apical notch with pronounced medial tooth that extends posteriorly beyond the level of the notch opening; surface of body densely granulated *Discerceis granulosa*⁶
- Pleotelson apical notch lacking medial tooth or has a medial tooth which does not extend posteriorly beyond the level of the notch opening; body not densely granulated 38
38. Pleotelson lacking medial tooth at base of notch; uropodal exopod armed with 4 outer spines *Paracerceis cordata*⁶
- Pleotelson with small medial tooth at base of notch, tooth does not extend to or beyond notch opening; uropodal exopod without spines *Paracerceis sculpta*⁶
39. Pleotelson apically produced into a rhomboid process; lateral margins of pleotelson deeply indented for uropods *Exosphaeroma rhomburum*⁶
- Pleotelson not as above unidentified *Sphaeromatidae*
40. Pereopods I–III ambulatory (dactylus shorter than propodus) 41
- Pereopods I–III prehensile or subprehensile (dactylus as long or longer than propodus) .. 42
41. Antennae 1 geniculate, basal articles thin and extending straight in front with second articles affixed at right angles to the first, thus directing the antennae laterally; peduncle of antennae 2 with 4 articles; posterolateral margins of pleonite 5 produced slightly, not obscured by pleonite 4; uropodal rami truncate distally, exopod does not extend to posterior margin of pleotelson; posterior margin of pleotelson broad, indented, apical indentation with about 4 simple spines and setae set between a pair of larger, marginal teeth *Eurydice caudata*
- Antennae 1 normal, not geniculate as above; peduncle of antennae 2 with 5 articles; pleonite 5 obscured laterally by pleonite 4; uropodal rami with large notch distally (not truncate),

- exopod extends beyond pleotelson; pleotelson triangular with rounded apex, apex with 8-9 stout spines *Cirolana diminuta*
42. Pereopods IV-VII ambulatory 43
 — Pereopods IV-VII prehensile; adults parasitic on fishes 47
43. Dorsal surface of pleon tuberculate, with small to medium tubercles present on posterior margins of at least pleonites 3-5 44
 — Pleon without tubercles 45
44. Cephalon without tubercles; frontal lamina rounded anteriorly; pleonites 1-5 with rows of setae along posterior margins, pleonites 2-5 tuberculate posteriorly, largest tubercles located medially and submedially; pleotelson triangular, with lateral incisions; entire dorsum densely covered with bifid golden setae *Excorallana truncata*
 — Cephalon with 5 tubercles (male) or without tubercles (female); frontal lamina pentagonal; pleonites 1-5 without dorsal setae, pleonites 3-5 with small tubercles on posterior margins; pleotelson widely rounded posteriorly, not triangular, without lateral incisions
 *Tridentella quinicornis*
45. Antenna 1 with first 2 peduncular articles greatly expanded (dilated), article 2 with a gradual distal process that extends at least $1/4-1/2$ distance into article 3; maxillipedal palp 5-segmented *Aega lecontii*
 — Peduncular articles of antenna 1 normal, not greatly expanded; maxillipedal palp 3-segmented, apical article very small 46
46. Uropodal peduncle very long medially, extending more than 75% length of endopod; merus of pereopods I-III with 3 blunt spines; frontal lamina expanded anteriorly, spatulate
 *Rocinela belliceps*
 — Uropodal peduncle extends medially less than 40% length of endopod; pereopods I-III with acute spines on merus; frontal lamina narrow, not expanded *Rocinela angustata*
47. Pleopods and uropods heavily setose, adapted for swimming [juvenile Cymothoidae]..... 48
 — Pleopods and uropods not setose [adult Cymothoidae] 49
48. Uropodal rami dissimilar in shape, endopod broader than exopod; endopod triangular with broad truncate to slightly sinuous distal margin, outer distal corner with distinct spine; exopod widest at midlength and tapering distally to an obtuse point; apex of pleotelson narrowly rounded *Nerocila acuminata*

- Uropodal rami similar in shape; terminal margins of endopods and exopods rounded, lateral margins roughly parallel along entire length; distal edge of endopods without spines; apex of pleotelson broadly rounded *Livoneca* spp
49. Cephalon not immersed in pereonite I, posterior margin of cephalon produced into 3 lobes (i.e., trisinuate); posterolateral margins (coxae) of all or just posterior pereonites produced into acute or subacute angles *Nerocila acuminata*
- Cephalon more or less immersed in pereonite I, posterior margin of cephalon not trisinuate or only weakly sinuate; posterior margins of coxae rounded or with subacute angles 50
50. Pereon strongly convex dorsally; cephalon subquadrate, with weakly trisinuate posterior border; pleotelson tapering posteriorly to an acutely rounded apex *Livoneca convexa*
- Pereon not strongly convex dorsally; cephalon not subquadrate, posterior margin not trisinuate; pleotelson relatively broad, not narrowing abruptly 51
51. Frontal margin of cephalon not produced; coxae VI–VII with rounded margins, extending to and usually beyond the posterior margins of their respective pereonites; posterior pereopods of females with well developed carinae; pleotelson usually about 2x wider than long *Livoneca vulgaris*
- Frontal margin of cephalon produced, coxae VI–VII forming subacute posterolateral angles, not reaching posterior margins of respective pereonites; posterior pereopods of females without well developed carinae; pleotelson only 1–1.2x wider than long at most
..... *Livoneca californica*
52. Pereopods V–VII expanded and natatory, with enlarged, paddle-like carpi and propodi 53
- Pereopods V–VII “normal,” without enlarged, paddle-like carpi and propodi 55
53. Cephalon with a broad, indented (bilobed), and laterally flaring rostrum; pereonites V–VI fused dorsally, pereonite VII smaller and narrower than pereonites V–VI; uropods short, biramous, although exopod very small *Belonectes* sp A
- Cephalon not as above; pereonites V–VI separate, not fused dorsally 54
54. Pereonites I–IV with large pedestal setae on anterior dorsal margins; pereonites V–VII narrowing posteriorly; pleotelson subtriangular in dorsal view *Ilyarachna acarina*
- Pereonites without pedestal setae; pereonites V–VII subequal in width; pleotelson somewhat inflated and rounded in dorsal view *Munnopsurus* sp A
55. Body generally parallel, pleotelson subequal in width to pereon 56
- Body not parallel, pleotelson much narrower than widest pereonite 60

56. Eyes absent; uropods elongate, endopod much longer than exopod
 *Caecianiropsis psammophila*
 — Eyes present; uropods not as above 57
57. Eyes relatively small, located near lateral margins of cephalon; uropods short, composed of
 thick peduncle with large medial curved spine at distal end and very small exopod and
 endopod 58
 — Eyes relatively large and bulging, removed from lateral margins of cephalon; uropods long,
 conspicuous, rami subequal to peduncle 59
58. Basal article of antennae 1 with large distolateral process, bearing about 6 sharp, flat spines
 curving toward article 2; cephalon with distinctive indentation below the eyes; L:W ratio >
 4:1 *Joeropsis concava*
 — Basal article of antennae 1 lacking spinose projection; cephalon without indentation below
 eyes; L:W ratio < 4:1 *Joeropsis dubia*
59. Pereonite I trilobed laterally in dorsal view (i.e., epimeral lobe visible); posterior margin of
 pleotelson extends beyond the level of the posterolateral spines; maxilliped with 3 coupling
 hooks *Janiralata occidentalis*
 — Pereonite I bilobed laterally in dorsal view (i.e., epimeral lobe not visible); posterior margin
 of pleotelson does not extend beyond the level of the posterolateral spines; maxilliped with 2
 coupling hooks *Janiralata solasteri*
60. Lateral margins of pereonites heavily denticulate or serrate..... 61
 — Lateral margins of pereonites not denticulate or serrate..... 62
61. Anterior margin of cephalon (frons) rounded; cephalon with 2 granulate tubercles above
 antennal bases *Paramunna* sp A
 — Anterior margin of cephalon (frons) quadrate; cephalon lacking granulate tubercles
 *Paramunna quadratifrons*
62. Eyes absent; most pereonites with distinct lateral spines, spines > 2x long as wide 63
 — Eyes present; pereonites without distinct lateral spines 64
63. Basal article of antennae 1 with large curved anterolateral projection on distal margin;
 surface of body rough with apparent microscales; projecting spine on coxa VII large.....
 *Pleurogonium* sp A
 — Antennae 1 without anterolateral projection; surface of body smooth to lightly scaled; coxa
 VII spine reduced or absent *Pleurogonium californiense*

64. Pereonites I–IV longer than pereonites V–VII, best viewed at lateral coxal margins;
 antennae 1 and 2 subequal in length *Munnogonium tillerae* ⁷
 — Pereonites I–VII subequal in length, best viewed at lateral coxal margins (i.e., posterior
 pereonites may appear ‘anteriorly-to-posteriorly’ compressed when viewed dorsally);
 antennae 2 much longer (> 2x) than antennae 1 65
65. Anterior margin of cephalon and lateral margins of pereonites with spines or spine-like
 setae; antennae 1 flagella with 5-6 segments, middle flagellar articles (i.e., articles 3-4 or
 3-5) elongate, much longer than articles 1-2 and terminal article *Munna spinifrons*
 — Cephalon and pereonites lacking spines; antennae 1 flagella not as above 66
66. Uropods with spine-like protuberances; lateral margins of pleotelson with 2–3 large
 articulated spines; pleotelson broad medially, nearly as wide as long .. *Munna stephensi*
 — Uropods thin, leaf-like, lacking spines; lateral margins of pleotelson with about 6 serrations
 or teeth; pleotelson longer than wide *Uromunna ubiquita*
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Footnotes

1. Several species included in the above key have not been reported from infaunal and epibenthic monitoring programs in the Southern California Bight, but have been reported from other benthic surveys in the region (e.g., see Menzies and Barnard, 1959, Iverson and Wilson, 1981). These species include the idoteid *Eusymmerus pseudoculata*, the anthurid *Mesanthura occidentalis*, the ancinid *Bathycopea daltonae*, and the paramunnid *Paramunna quadratifrons*.
2. Two additional species of bopyrid isopods have been collected in the SCB that are not included in the present key (D. Cadien, pers. comm.), but will be added to future editions. One species, *Munidion pleuroncodis* Markham, 1975, is found on the pelagic galatheid "red crab" *Pleuroncodes planipes* Stimpson, 1860. See Markham (1975) for a review of the genus *Munidion* and for the original description of *M. pleuroncodis*. This species was also collected during Phase I of the MMS Santa Maria Basin Project and is described and illustrated in volume 11 of the MMS Atlas (see Wetzler and Brusca, 1997). The second species was found infesting the alpheid shrimp *Automate* sp A SCAMIT, 1996 and bears the tentative identification of "*Probopyrus*" sp A in the County Sanitation Districts of Los Angeles County database. However, it is likely that this generic placement is incorrect, since all species correctly assigned to *Probopyrus* are parasites of palaemonid shrimps (John Markham, pers. comm.). In addition, no species of *Automate* has ever been recorded as a bopyrid host. Finally, a number of other bopyrids are also likely to occur in southern California waters; see Table 1 in Markham (1992) for a listing of these species and their host genera.
3. The "triramous" pleopods characteristic of the bopyrid genus *Stegophryxus* actually represent biramous pleopods combined with the lateral plates of each respective pleomere (see Markham, 1974). These lateral extensions appear identical to the pleopodal rami and also arise from a common peduncle, thus giving the appearance of a triramous appendage.
4. The 7th pereonite is reduced and the 7th pereopods are absent in the anthurid isopod, *Califanthura squamosissima*.
5. The number of maxillipedal palp articles may vary between the right and left sides of an individual in the genus *Idotea*, resulting in a count of 4 articles on one side and 5 articles on the other (i.e., 5-segmented species may have only 4 segments on one side in some cases). Consequently, a 4-segmented count on one side should be verified by examining the other maxilliped.
6. In the above key, identification of the sphaeromatids *Discerceis granulosa*, *Exosphaeroma rhomburum*, *Paracerceis cordata*, and *Paracerceis sculpta* are based on adult male specimens only. Female and juvenile or immature sphaeromatids are difficult to identify reliably and key here to "unidentified Sphaeromatidae." See Harrison and Ellis (1991) for a more detailed discussion and for a key to the sphaeromatid genera of the world.
7. See Wilson (1997) for discussion of the provisional synonymy of *Munnogonium erratum* with *M. tillerae*.

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