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# *Megalorchestia pugettensis*

A beach hopper

Phylum: Arthropoda, Crustacea  
Class: Malacostraca  
Order: Amphipoda, Gammaridea  
Family: Talitridae

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**Taxonomy:** Some species of the genus *Megalorchestia*, including *M. pugettensis*, were originally described as members of *Orchestoidea* (e.g. *O. pugettensis*) (Bousfield 2007). These talitrid sand hoppers were divided into two groups: 4-dentate species from the southern hemisphere (*Orchestoidea*) and 5-dentate species from the northern hemisphere (*Megalorchestia*) by Brandt in 1851 (Bousfield 1982). *Megalorchestia* species-level designations are currently in need of further study as *M. columbiana* and *M. pugettensis* likely contain at least three species each (Bousfield 1982).

## Description

**Size:** Individuals up to 18 mm in length, excluding antennae (Bowers 1964). The illustrated specimen (from Coos Bay) is 17 mm in length.

**Color:** White, usually with three spots on last three coxae. The color pattern is particularly useful in *Megalorchestia* species identification (see Fig. 3, Bowers 1963). In particular, there are distinctive antero-posterior markings on the last three thoracic segments in *M. pugettensis* (see Fig. 4B, Bowers 1963).

**General Morphology:** The body of amphipod crustaceans can be divided into three major regions. The **cephalon** (head) or cephalothorax includes antennules, antennae, mandibles, maxillae and maxillipeds (collectively the **mouthparts**). Posterior to the cephalon is the **pereon** (thorax) with seven pairs of pereopods attached to pereonites followed by the **pleon** (abdomen) with six pairs of pleopods. The first three sets of pleopods are generally used for swimming, while the last three are simpler and surround the telson at the animal posterior. Talitrid amphipods are in the suborder Gammaridea, one of the largest groups of amphipods in marine and estuarine habitats. They have smooth bodies that are only slightly compressed, are commonly called beach hoppers and can be highly abundant on

coastal beaches, particularly at night (Bousfield 2007). *Megalorchestia* species are characterized by a short and stocky body, small eyes and short antennae (for key see Bousfield 1982).

## Cephalon:

**Rostrum:** Rostrum rounded and simple.

**Eyes:** Eyes large and oval in shape (Fig. 1).

**Antenna 1:** Short and slightly shorter than the third article of second antenna, especially in males (Fig. 1) (Barnard 1975).

**Antenna 2:** Massive peduncle of three articles that are, together, longer than the flagellum, especially in males (Fig. 1) (Barnard 1975). Flagellum of about 20 articles.

**Mouthparts:** Mandible without palp (Talitridae) and maxilliped article four not well developed. (Mouthparts not figured, see *Traskorchestia traskiana* in this guide).

## Pereon:

**Coxae:** The coxae, or first pereopod article, has first plate  $\frac{1}{2}$  as large as second plate (Fig. 1).

**Gnathopod 1:** In both sexes, the first gnathopod is simple and not subchelate. The strong dactyl is adapted for digging (Fig. 2) (Barnard 1975). Translucent processes ("blisters") are present on articles three and six.

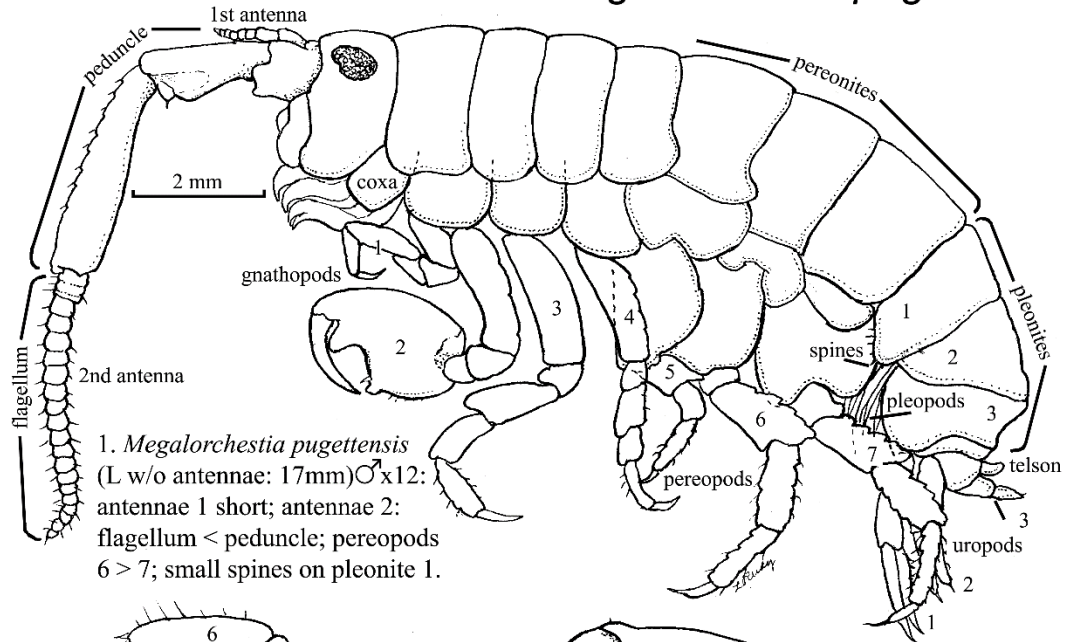
**Gnathopod 2:** Large and subchelate in males (Figs. 1, 3) and simple in females (not figured, more like gnathopod one).

**Pereopods 3 through 7:** Pereopod six longer than seven (Fig. 1).

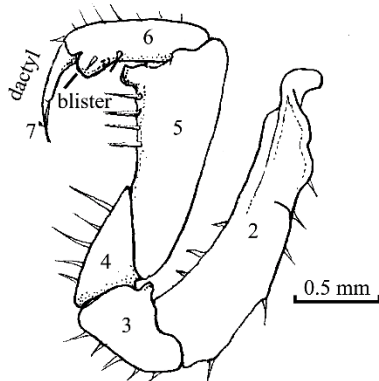
## Pleon:

**Pleonites:** Pleonites five and six separate, not fused (Talitridae). Anteroventral margin of pleonite one is with 1–7 spines (Fig. 1). Three biramous pleopods (with small breathing organs within pleosome) and the third pleopod is about equal in size to first and second (not figured).

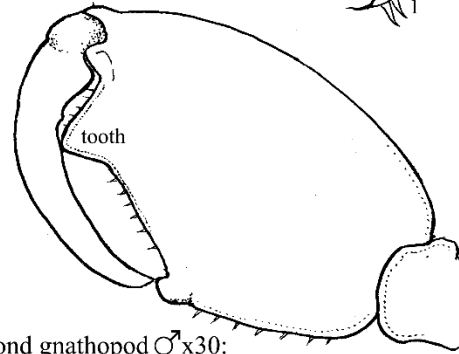
# Megalorchestia pugettensis



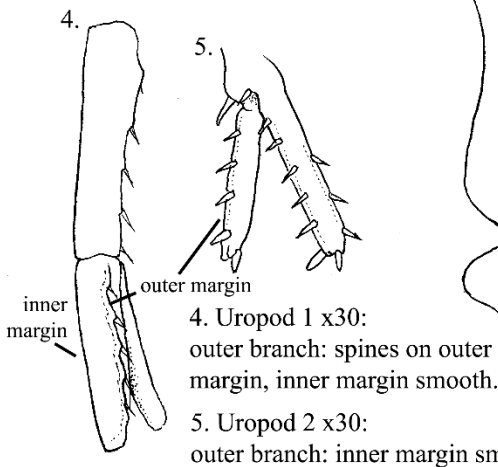
1. *Megalorchestia pugettensis*  
(L w/o antennae: 17mm) ♂ x12:  
antennae 1 short; antennae 2:  
flagellum < peduncle; pereopods  
6 > 7; small spines on pleonite 1.



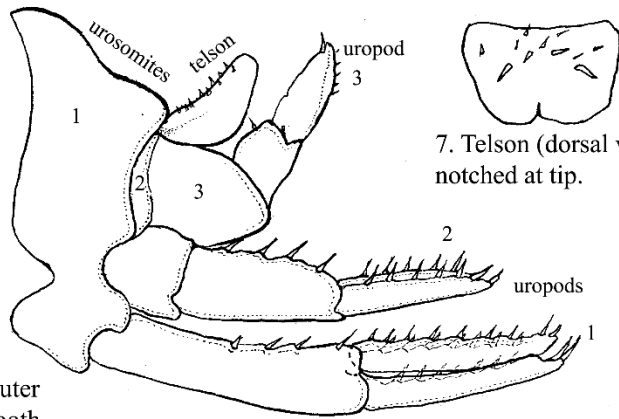
2. First gnathopod ♂ x30:  
dactyl simple, strong;  
blister on article 6.



3. Second gnathopod ♂ x30:  
chela large, powerful; tooth on palm.



4. Uropod 1 x30:  
outer branch: spines on outer  
margin, inner margin smooth.  
5. Uropod 2 x30:  
outer branch: inner margin smooth.



6. Urosome x30:  
uropod 3: ramus broad, as long as peduncle.

7. Telson (dorsal view):  
notched at tip.

**Urosomites:** Three pairs of uropods: 1) outer branch with marginal spines (Fig. 4) and no interramal spine (not figured) and inner branch with double row of spines; 2) outer branch without spines on inner margin (Figs. 5, 6); 3) one branch (Talitridae) and ramus broad distally and about as long as peduncle (Fig. 6) (Barnard 1975).

**Epimera:**

**Telson:** Telson spinose, notched at posterior-most tip (Figs. 1, 6, 7) and is often lost in collecting.

**Sexual Dimorphism:** Second gnathopods very large and powerful in males, but simple in females and young.

**Possible Misidentifications**

The Talitridae are a family of gammarid amphipods called beach hoppers and are ubiquitous in damp sands, where they live within clumps of seaweed. They survive well in air. Talitridae are characterized by a single branched third uropod (Figs. 1, 4) and a mandible without a palp (not figured, see *Traskorchestia traskiana* in this guide). Nine local talitrid species are currently reported (Bousfield 2007) including six *Megalorchestia*, two *Traskorchestia* and one *Transorchestia* species. Some authors differentiate *Megalorchestia* species as sand hoppers (intertidal on sandy beaches), while *Traskorchestia* species as beach fleas (intertidal in coastal leaf-litter) (Bousfield 1982; Pelletier et al. 2011).

The genus *Megalorchestia* are found on exposed beaches and are usually larger than *Traskorchestia*. Species in the latter genus have subchelate first gnathopods, not simple ones, and slender first gnathopod dactyls, not heavy ones. The seventh pereopods are also longer than the sixth, while the reverse is true in *Megalorchestia*. The third uropods narrows and branches in *Traskorchestia*, but is not broad.

*Megalorchestia californiana*, is the largest species in the Puget Sound area and (Kozloff 1974) is found on long stretches beaches with fine sand, high in the intertidal (Bowers 1963). It has a second antenna with a long flagellum (males), spines on the inner margin of the outer rami of the second uropod. The females have a translucent process on article five of the first gnathopod

and the pleopod rami are short. Sexual dimorphism is strong in *M. californiana* and males have enlarged second gnathopods and elongated antennae with peduncle that is orange to red in color (Iyengar and Starks 2008). *Megalorchestia californiana* is often found with the smaller congener, *M. benedicti* (Bousfield 2007). *Megalorchestia benedicti* is a small species (9–13 mm), and is found on fine sand beaches. Its pleonites have 1–5 spines on their posterior margins, making it potentially confused with *M. pugettensis*. Its telson is notched, however, and it lacks the characteristic translucent blister on the sixth article of the male gnathopod of *M. pugettensis*.

*Megalorchestia corniculata*, another large species, is found on short stretches of coarse sand beaches with lots of protection (Bowers 1963), seaweed and a steep slope. It has short second antennal flagella and spineless inner margins on the outer rami of its second uropods, like *M. pugettensis*. However, it has an entire, not a notched, telson, and no spines on the margin on its first pleonites. *Megalorchestia columbiana*, found on coarse sand beaches with little seaweed, has long second antennal flagella and no spines on the margins of its pleonites. Unlike *M. californiana*, it has no translucent process on female gnathopod one and its pleopod rami are  $\frac{1}{2}$  to  $\frac{3}{4}$  the length of the peduncle. It can be as long as 22 mm (Bowers 1964). Finally, *M. minor* is a primarily southern species with distribution that is rarely north of San Simeon near Point Conception. Individuals are found on surf-exposed sandy beaches and are up to 15 mm in length (Bousfield 1982, 2007).

**Ecological Information**

**Range:** Information on the range of *M. pugettensis* is unknown outside the west coast of North America (e.g. central California to Alaska, Bousfield 1982, 2007).

**Local Distribution:** Coos Bay distribution in several locations along the South Slough and open coastal beaches.

**Habitat:** Under debris on coarse sand beaches with little seaweed (Barnard 1975). Sand hoppers (*Megalorchestia* species) are differentiated from beach fleas (*Traskorchestia* species) in that the former

group tend to modify their habitat substrate, while the latter does not (Bousfield 1982).

**Salinity:**

**Temperature:**

**Tidal Level:** Above tide level, likes dampness, but avoids complete immersion in seawater.

**Associates:** Rhabditid nematodes are found under the dorsal pereonites in *M. californiana* and *M. corniculata* (Rigby 1996). Talitrid amphipods also host and transport mites of Uropodina, Dermanyssina and Acaridida (Pugh et al. 1997).

**Abundance:** Not as common as *Traskorchestia traskiana* in Coos Bay.

### Life-History Information

**Reproduction:** Most amphipods have separate sexes with some sex determination correlated with environmental conditions (Straude 1987). Females brood embryos in an external thoracic brood chamber and irrigate embryos with a flow of water produced by pleopod movement. Development within this brood chamber is direct and individuals hatch as juveniles that resemble small adults, with no larval stage. Little is known about the reproduction and development in *M. pugettensis*, but in congeners *M. californiana* and *M. corniculata*, pairing occurs in spring and young carried until they are 3 mm in length (Bowers 1964).

**Larva:** Since most amphipods are direct developing, they lack a definite larval stage. Instead this young developmental stage resembles small adults (e.g. Fig. 39.1, Wolff 2014).

**Juvenile:**

**Longevity:** The longevity of *M. pugettensis* is not known, but the possible life-span of the congener, *M. californiana* is two years maximum (Bowers 1964).

**Growth Rate:** Growth occurs in conjunction with molting. In the pre-molting period the epidermis separates from the old cuticle and a dramatic increase in epidermal cell growth occurs. Post-molt individuals will have soft shells until a thin membranous layer is deposited and the cuticle gradually hardens. During a molt arthropods have the ability to regenerate limbs that were previously autotomized (Kuris et al. 2007).

**Food:** Scavenges detritus from beach debris. The closely related *M. californiana* and *M. corniculata* are omnivorous, macrophagous, and partial to seaweed (e.g. *Macrocystis* and *Saccorhiza*, Lastra et al. 2008), wet cardboard and the bodies of other arthropods. However, individuals avoid putrefied matter.

**Predators:** Shorebirds and other birds (e.g. Varied Thrushes, *Ixoreus naevius*, Egger 1979). Talitrid amphipods are prey for a variety of intertidal and terrestrial predators and it has been suggested that they represent a trophic link between the detritus of beach wrack and terrestrial ecosystems (via Pacific herring, Morrill and Spicer 1998; Fox et al. 2014).

**Behavior:** Many talitrid amphipods, including *M. pugettensis*, are nocturnal, potentially in an effort to avoid diurnal birds, for better moisture and temperature conditions for feeding, and because they are sensitive to light (Bowers 1964). The common term beach hopper comes from the ability of talitrid amphipods to jump using powerful extensor muscles and uropods (Bowers 1964; Iyengar and Starks 2008).

### Bibliography

1. BARNARD, J. L. 1975. Phylum Anthropoda: Crustacea, Amphipoda: Gammaridea, p. 313-366. *In*: Light's manual: intertidal invertebrates of the central California coast. S. F. Light, R. I. Smith, and J. T. Carlton (eds.). University of California Press, Berkeley.
2. BOUSFIELD, E. L. 1982. The Amphipod superfamily Talitroidea in the northeastern Pacific region. National Museums of Canada, Ottawa.
3. —. 2007. Talitridae, p. 611-618. *In*: The Light and Smith manual: intertidal invertebrates from central California to Oregon. J. T. Carlton (ed.). University of California Press, Berkeley, CA.
4. BOWERS, D. E. 1963. Field identification of five species of Californian beach hoppers (Crustacea: Amphipoda). *Pacific Science*. 17:315-320.

5. —. 1964. Natural history of two beach hoppers of the genus *Orchestoidea* (Crustacea: Amphipoda) with reference to their complementary distribution. *Ecology*. 45:677-696.
6. EGGER, M. 1979. Varied thrushes feeding on Talitrid amphipods. *Auk*. 96:805-806.
7. FOX, C. H., R. EL-SABAawi, P. C. PAQUET, and T. E. REIMCHEN. 2014. Pacific herring *Clupea pallasii* and wrack macrophytes subsidize semi-terrestrial detritivores. *Marine Ecology Progress Series*. 495:49-64.
8. IYENGAR, V. K., and B. D. STARKS. 2008. Sexual selection in harems: male competition plays a larger role than female choice in an amphipod. *Behavioral Ecology*. 19:642-649.
9. KOZLOFF, E. N. 1974. Keys to the marine invertebrates of Puget Sound, the San Juan Archipelago, and adjacent regions. University of Washington Press, Seattle.
10. KURIS, A. M., P. S. SADEGHIAN, J. T. CARLTON, and E. CAMPOS. 2007. Decapoda, p. 632-656. *In: The Light and Smith manual: intertidal invertebrates from central California to Oregon*. J. T. Carlton (ed.). University of California Press, Berkeley, CA.
11. LASTRA, M., H. M. PAGE, J. E. DUGAN, D. M. HUBBARD, and I. F. RODIL. 2008. Processing of allochthonous macrophyte subsidies by sandy beach consumers: estimates of feeding rates and impacts on food resources. *Marine Biology*. 154:163-174.
12. MORRITT, D., and J. I. SPICER. 1998. The physiological ecology of talitrid amphipods: an update. *Canadian Journal of Zoology*. 76:1965-1982.
13. PELLETIER, A. J. D., D. E. JELINSKI, M. TREPLIN, and M. ZIMMER. 2011. Colonisation of beach-cast macrophyte wrack patches by talitrid amphipods: a primer. *Estuaries and Coasts*. 34:863-871.
14. PUGH, P. J. A., P. J. LLEWELLYN, K. ROBINSON, and S. E. SHACKLEY. 1997. The associations of phoretic mites (Acarina: Chelicerata) with sandhoppers (Amphipoda: Crustacea) on the South Wales coast. *Journal of Zoology*. 243:305-318.
15. RIGBY, M. C. 1996. The epibionts of beach hoppers (Crustacea: Talitridae) of the North American Pacific coast. *Journal of Natural History*. 30:1329-1336.
16. STRAUDE, C. P. 1987. Phylum or subphylum Crustacea, class Malacostraca, order Amphipoda, p. 424-431. *In: Reproduction and development of marine invertebrates of the northern Pacific coast*. M. F. Strathmann (ed.). University of Washington Press, Seattle, WA.
17. WOLFF, C. 2014. Amphipoda, p. 206-209. *In: Atlas of crustacean larvae*. M. J.W., J. Olesen, and J. T. Høeg (eds.). Johns Hopkins University Press, Baltimore.