
Idotea resecata

A valviferan isopod

Phylum: Arthropoda, Crustacea

Class: Multicrustacea, Malacostraca, Eumalacostraca

Order: Peracarida, Isopoda, Valvifera

Family: Idoteidae

Taxonomy: The genus *Idotea* was described by Fabricius in 1798, and although originally spelled *Idotea*, several authors adopted the spelling *Idothea*, since then. The genus *Pentidotea* was described by Richardson in 1905 and was reduced to subgeneric level by Menzies in 1950. The two subgenera (or genera), *Pentidotea* and *Idotea* differ by the articles on maxilliped palps, the former with five and the latter with four (Miller and Lee 1970), but are not always currently recognized (Rafi and Laubitz 1990). Furthermore, this character may vary with age and other characters may reveal more concrete differences to define the two (Poore and Ton 1993). Thus synonyms for *I. resecata* include, *Idothea resecata*, *Pentidotea resecata* and *Idotea Pentidotea resecata*. *Idothea rufescens* may also be a synonym having been described from an immature specimen (Menzies and Waidzunas 1948). We follow the most recent intertidal guide for the northeast Pacific coast (Brusca et al. 2007), which uses the name *Idotea resecata*.

Description

Size: Individuals 39–50 mm in length (Ricketts and Calvin 1952; Welton and Miller 1980) and can be 4 ½ times longer than wide (Richardson 1905).

Color: Light green, with black chromatophores when closely associated with *Zostera* and yellowish-brown when on kelp (Ricketts and Calvin 1952; Welton and Miller 1980). The body color is a result of carotenoids and carotenoproteins (for carotenoid pigments, see Lee and Gilchrist 1972) within the cuticle and may serve as camouflage

from fish predation (Best and Stachowicz 2012). Color polymorphism is high in the congener, *I. baltica* and variation is determined by habitat and predation pressure but not sexual selection (Jormalainen and Merilaita 1995).

General Morphology: Isopod bodies are dorso-ventrally flattened and can be divided into a compact **cephalon**, with eyes, two **antennae** and **mouthparts**, and a **pereon** (thorax) with eight segments, each bearing similar **pereopods** (hence the name “isopod”). Posterior to the pereon is the **pleon**, or abdomen, with six segments, the last of which is fused with the telson (the **pleotelson**) (see Plate 231, Brusca et al. 2007). The Isopoda can be divided into two groups: ancestral (“short-tailed”) groups (i.e. suborders) that have short telsons and derived (“long-tailed”) groups with long telsons. Valviferan (including the Idoteidae) are a distinct group of isopods (Brusca 1984) and have an elongated telson (Fig. 73, Ricketts and Calvin 1952).

Cephalon: Entire, not notched (compare to *Mesidotea entomon*, this guide), sides of head straight. First thoracic segment fused with head (Isopoda, Brusca et al. 2007).

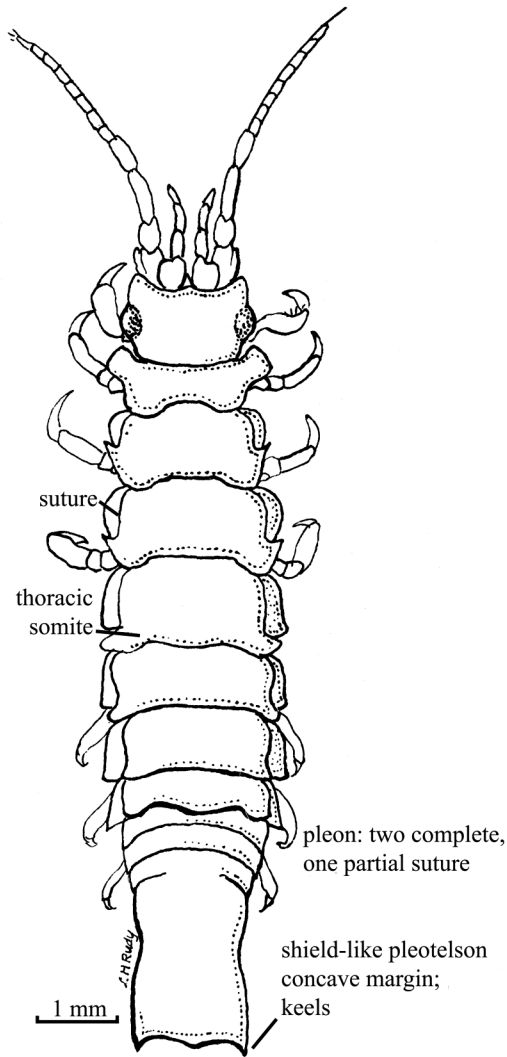
Eyes: Eyes oval, not markedly elongate transversely (Fig. 3).

Antenna 1:

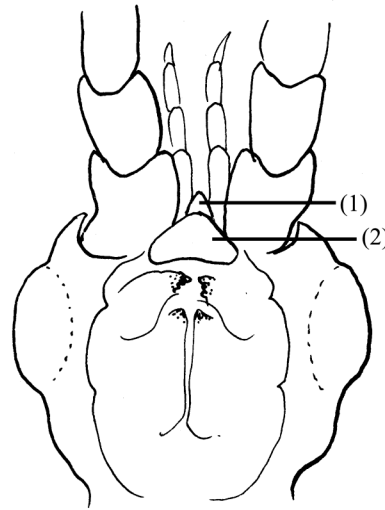
Antenna 2: The number of flagellum segments on the second antennae increase with individual size (Menzies and Waidzunas 1948).

Mouthparts: Maxilliped palp with five articles (although juveniles may have only four, Poore and Ton 1993) and one coupling hook (Fig. 4). The number of setae on the

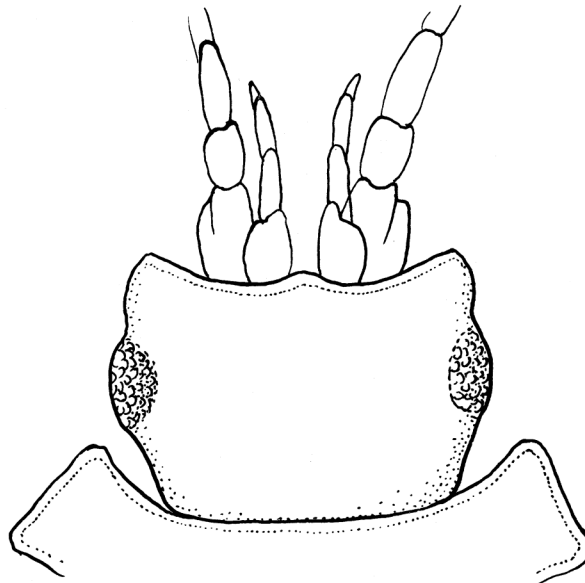
Idotea resecata



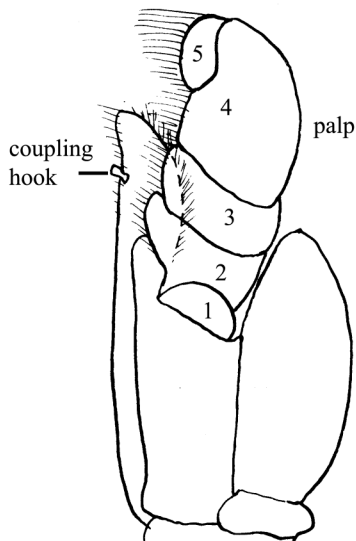
1. *Idotea resecata* x12:
 Idoteidae: body elongate, depressed,
 legs nearly alike, ambulatory;
 seven free thoracic segments.



2. Head (ventral view) x36:
 Frontal process (1) narrow, pointed,
 and exceeds frontal lamina (2).



3. Head:
 entire, not notched
 eyes not elongate or pear-shaped
 but oval; sides of head straight.



4. Maxilliped:
 one coupling hook
 five article palp.

maxilliped increases with individual size (Menzies and Waidzunus 1948).

Rostrum: Slight rostrum (Fig. 3) with frontal process narrow, pointed and exceeding frontal lamina visible from ventral side (Fig. 2).

Pereon: Body elongate and depressed with thorax composed of seven segments (Fig. 1) (Brusca et al. 2007).

Peronites: All seven thoracic somites (pereonites) are free (Idoteidae) with epimeral sutures visible dorsally (except the first somite) (Fig. 1).

Pereopods: Seven pairs of ambulatory and similar walking legs (Fig. 1).

Pleon: Short pleon with six pleonites (Brusca et al. 2007).

Pleonites: Two pleonites complete, with one partial horizontal suture (Fig. 1).

Pleopods: Appendages of the pleon include five respiratory pairs and a single pair of uropods (Brusca et al. 2007). The first three pairs are particularly locomotory (e.g. for swimming), while the posterior two pairs are strictly respiratory (Alexander 1988; Alexander et al. 1995).

Uropods: Ventral, not visible dorsally, and forming opercular doors or valves covering pleopods (Valvifera).

Pleotelson: Large, elongated and shield-like with posterior border bearing concave margin, keels (Fig. 1).

Sexual Dimorphism: Conspicuous sexual dimorphism is rare among isopods. Mature females bear a thoracic marsupium and males have modified first pleopods, called gonopods (Sadro 2001; Boyko and Wolff 2014).

Possible Misidentifications

The order Isopoda contains 10,000 species, 1/2 of which are marine and comprise 10 suborders, with eight present from central California to Oregon (see Brusca et al. 2007). Among isopods with elongated

telsons (with anuses and uropods that are subterminal), there are several families including Flabellifera, Anthuridea, Gnathiidea, Epicaridea and Valvifera. The Valvifera are characterized by hinged doors or valves covering the pleopods, well-developed coxal plates, the absence of mandibular palps, occasionally fused pleonites and males with modified sexual appendages arising from the first pleonite, rather than the thorax. This suborder includes three local families and 34 species: the Chaetiliidae (see *Mesidotea entomon*, this guide), the Arturidae and the Idoteidae. The Arturidae is composed of species with narrow but cylindrical bodies, with the anterior four pleopods larger and less setose than the posterior three. Characteristics of the Idoteidae include a dorso-ventrally compressed body, similar pereopods, and seven free pereonites and is composed of 22 species, locally (Brusca et al. 2007).

Most local species in the Idoteidae are within the genus *Idotea* (12 species), which includes those with a pleon composed of two complete and one incomplete pleonite(s), a maxillipedal palp with five articles and one coupling seta, eyes that are not elongated transversely and a large shield-like pleotelson (Brusca et al. 2007). *Idotea sensu* Poore and Ton 1993 refers only to individuals with free pleonites, anterior spiniform pereopod setae and free penes, while many northeastern Pacific species have fused pleonites, partially fused penes and reduced coxae (Poore and Ton 1993). Based on these characters, authors differentiate *Idotea* from *Pentidotea* (see **Taxonomy**). *Idotea resecata* is the only member of the genus to have a concave pleotelson. Thus it is easy to distinguish it from other light green idoteids, such as *I. aculeata* and *I. montereyensis*.

Among the *Idotea*, *I. urotoma*, *I. rufescens*, and *I. ochotensis* have a maxilliped palp with four articles (rather than five in the

remaining eight *Idotea* species) a character that previously defined two sub-genera, *Idotea Idotea* (with four articles) and *Idotea Pentidotea* (with five articles) (Menzies 1950; Miller and Lee 1970).

Of the *Idotea* species with five maxilliped palp articles (*Idotea Pentidotea*, Menzies 1950), *I. aculeata*, a reddish idoteid, has a long projection on its narrowing pleo-telson. It has oval eyes (not reniform), long antennae and blunt lateral borders on the first pleonite. *Idotea montereyensis* is slender and small (up to 16 mm), red, green-brown, or black and white and is found on *Phyllospadix* species and red algae. It has a rounded telson and with a short projection. *Idotea stenops* is olive-green to brown, found on brown algae and with narrow eyes, a slender pointed telson, and 2–3 coupling hooks on its maxillipeds, not one. *Idotea schmitti* has pleonite one with acute lateral borders and an anterior margin of pereonite one that does not encompass the cephalon. *Idotea kirchanskii* is bright green and found on *Phyllospadix* species. It has a rounded telson (lacking a medial projection), oval eyes and the epimera of pereonal somites are visible dorsally only on segments 5–7.

Ecological Information

Range: Type locality is Strait of Juan de Fuca (Menzies 1950). Known range is from Alaska to Baja, California (Ricketts and Calvin 1952; Iverson 1974; Welton and Miller 1980). *Idotea* as a genus is cosmopolitan (see Fig. 9, Brusca 1984).

Local Distribution: Coos Bay distribution northwest of the Charleston Bridge in South Slough.

Habitat: Frequently found on or clinging to eelgrass *Zostera* or *Macrocystis* (Ricketts and Calvin 1952; Miller 1975), even on drifting kelp rafts (Hobday 2000). Preferable substrate is mud, but individuals also occur

under rocks, in crevices and cracks, within empty shells and worm tubes (Brusca et al. 2007).

Salinity: Can survive one hour in fresh water (Welton and Miller 1980).

Temperature: Scarce where surface temperatures exceed 18°C (Welton and Miller 1980). North Pacific *Idotea* species exhibit a wide temperature tolerance as their ranges extend across several zoogeographic provinces that are associated with temperature barriers for other invertebrates (Wallerstein and Brusca 1982).

Tidal Level: Intertidal, near + 0.15 meters (South Slough of Coos Bay), ranging from surface to 6.4 meters (Richardson 1905).

Associates: Gastropods and hermit crabs in the genera *Littorina* and *Pagurus*, as well as amphipods.

Abundance: Common in Puget Sound.

Life-History Information

Reproduction: Most isopods have separate sexes (i.e. dioecious, Brusca and Iverson 1985) (although protogynous and protandric species are known, Araujo et al. 2004; Boyko and Wolff 2014). Reproduction proceeds by copulation and internal fertilization where eggs are deposited within a few hours after copulation and brooded within the female marsupium (e.g. *I. emarginata*, Naylor 1955; Brusca and Iverson 1985). The biphasic molting of isopods allows for copulation; the posterior portion of the body molts and individuals mate, then the anterior portion, which holds the brood pouch, molts (Sadro 2001). Embryonic development proceeds within the brood chamber is direct and individuals hatch as manca larvae that resemble small adults, with no larval stage (see *I. granulosa* and *I. neglecta* development, Stromberg 1965; Boyko and Wolff 2014). Ovigerous *I. resecata* have been observed in July (central California, Welton and Miller 1980). *Idotea baltica* and *I. chelipes* produce 1–3 broods per year with

brood sizes that range from 60 to 120 eggs per brood (Limfjord, Denmark, Kroer 1989; Baltic, Jormalainen and Tuomi 1989).

Larva: Since most isopods are direct developing, they lack a definite larval stage. Instead this young developmental stage resembles small adults (e.g. Fig. 40.1, Boyko and Wolff 2014). Most isopods develop from embryo to a manca larva, consisting of three stages. Manca larvae are recognizable by lacking the seventh pair of pereopods, but otherwise resemble small adults. They usually hatch from the female marsupium at the second stage and the molt from second to third manca produces the seventh pair of pereopods and sexual characteristics (Boyko and Wolff 2014). Isopod development and larval morphology can vary between groups (e.g. Gnathiidae, Cryptoniscoidea, Bopyroidae, Cymothoidae, Oniscoidea) (see Boyko and Wolff 2014). Parasitic isopods, for example, have larvae that are morphologically dissimilar from adults (Sadro 2001). Isopod larvae are not common members of the plankton, with parasitic larvae most likely to be observed. Occasionally, suspended benthic juveniles or pelagic species are collected in plankton samples, but these can be differentiated from larvae by their larger size (Sadro 2001). The development of the congener *I. emarginata* was described in 1955 by Naylor where, within the brood chamber, three stages were observed over a 30 day period (at 9°C): 1) green eggs 700 µm in diameter encased in a membrane, 2) elongated embryo with rudimentary appendages and 3) hatched individuals, 1.8 mm in length, with fully formed appendages. Following hatching individuals molt every two weeks (British Isles, Naylor 1955).

Juvenile: Juvenile development follows the third manca stage, where males have gonopods (modified first pleopods) and females have plate-like limbs on pereopods 2–5, called oostegites (that, together with the

sternites, form the marsupium) (Boyko and Wolff 2014). Females begin to brood once body length is at least 14 mm (Wallerstein and Brusca 1982).

Longevity: The longevity of the congeners, *Idotea baltica* and *I. chelipes* is 11–12 months and 10–11 months, respectively (Limfjord, Denmark, Kroer 1989).

Growth Rate: Growth among isopods occurs in conjunction with molting where the exoskeleton is shed and replaced. Post-molt individuals will have soft shells as the cuticle gradually hardens. During a molt, arthropods have the ability to regenerate limbs that were previously autonomized (Kuris et al. 2007), however, isopods do not autotomize limbs as readily as other groups (Brusca and Iverson 1985). Compared to other arthropods, isopods exhibit a unique biphasic molting, in which the posterior 1/2 of the body molts before the anterior 1/2 (Brusca et al. 2007).

Food: *Idotea resicata* is an herbivore, primarily eating kelp, eelgrass blades (Welton and Miller 1980), sea grasses (Holbrook et al. 2000; Best and Stachowicz 2012) and their epiphytes (Williams and Ruckelshaus 1993; Houghes et al. 2010). Populations have the ability to destroy entire kelp canopies when predators are lacking (Bernstein and Jung 1979). *Idotea* species produce a phenolic compound that reduces feeding on eelgrass (*Zostera* species) by other grazers (e.g. *Ampithoe valida*, this guide) (Lewis and Boyer 2014). Algal feeding rates in *Idotea* species can range from 0.1–71.3 mg per individual per day (Trowbridge 1993).

Predators: Isopods play a significant role as intermediate food web links, like amphipods (e.g. see *Americorophium salmonis*, this guide), that are consumed by more than 20 species of marine fish (e.g. *Oxyjulis californica*, Bernstein and Jung 1979; Welton and Miller 1980; cabezon, Best and Stachowicz 2012) and whales (Brusca et al. 2007).

Behavior: Always orients on kelp blades, along the same axis as the blade.

Swimming is accomplished by propulsion from the first three pairs of pleopods. In *Idotea resecata* and *I. wosnesenskii*, the power strokes from each pleopod occur in succession, but the recovery strokes occur simultaneously (Alexander 1988).

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