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Status of *Exosphaeroma inornata* Dow and *E. media* George and Stromberg (Isopoda: Sphaeromatidae) with Ecological Notes

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The sphaeromatid isopod *Exosphaeroma media* George and Stromberg 1968 from San Juan Island, Puget Sound, is synonymized with *E. inornata* Dow 1958 from California. Differences between the original descriptions of both species are attributed to author errors or variations in the phenotype. Variation in the relative position of the rostrum and clypeus, crenulation of the uropod rami, pleotelson shape, coxal plate suture lines, and body ratio (width/length) are discussed. *Exosphaeroma inornata* is reported to be a wide-ranging intertidal species which is commonly found in crevices, sand, and associated with various algae. Although the distribution is reported to be from San Diego, Calif., north to San Juan Island, Puget Sound, a large distribution gap exists between Humboldt Bay and Puget Sound.

Key words: isopod synonymy, anatomical variations, distribution, habitat

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L'auteur démontre que l'isopode sphaeromatide *Exosphaeroma media* George et Stromberg 1968 en provenance de l'île San Juan, Puget Sound, est synonyme de *E. inornata* Dow 1958 provenant de la Californie. Il attribue à des erreurs de la part des auteurs ou à des variations de phénotypes les différences dans les descriptions originelles des deux espèces. Il analyse la variation de la position relative du rostre et du clypeus, la crénulation des rami de l'uropode, la forme du pléotelson, les lignes de suture des plaques coxales et le rapport corporel (largeur/longueur). *Exosphaeroma inornata* est une espèce intertidale dont l'aire de distribution est étendue et qui se rencontre ordinairement dans les crevasses, le sable, et associée à diverses algues. Bien qu'on ait mentionné l'aire de distribution comme s'étendant de San Diego, Californie, à l'île San Juan, Puget Sound, au nord, il existe un vide important entre la baie Humboldt et le Puget Sound.

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THE sphaeromatid isopod *Exosphaeroma media* George and Stromberg 1968 was described from the upper intertidal zone of San Juan Island, San Juan Archipelago, Puget Sound. However, due to an unfortunate error in figure 8A of their description, *E. media* appears to differ from all other genera of Sphaeromatidae. They figure the fourth pleonite as being free, not medially fused to the two anterior pleonites. If George and Stromberg's interpretation of the fourth pleonite structure is disregarded, *E. media* then shows a close resemblance to *E. inornata* Dow 1958, known from central and southern California.

The general resemblance between *E. media* and *E. inornata*, the apparent discrepancy in the description of the pleon in the former species, and the occurrence of both species in similar habitats in Puget Sound, Washington (see below) suggested that these species might be synonymous. A comparison of the type material confirmed this suspicion.

Materials examined — The supplemental descriptive notes given below are based on the paratypes of *E. media* (USNM 119837) and the type series of *E. inornata* (Holotype, Los Angeles County Museum 1113; Allotype, LACM 1114; and 232 paratypes) plus a large series of males, females, and juvenile stages from six California populations (Point Fermin, Los Angeles County; Carpinteria State Beach, Santa Barbara County; Half Moon Bay, San Mateo County; San Francisco Bay, San Francisco County; Bodega Head, Marin County; and Humboldt Bay, Humboldt County) and one population from Puget Sound, Washington (Smith Cove, Seattle). Additional distributional records were obtained from materials deposited in the California Academy of Sciences collections (CAS), and specimens collected by the University of California, Irvine, for the Bureau of Land Management (BLM).

Supplemental descriptive notes — The original descriptions by Dow (1958) and George and Stromberg (1968) give several characters that might serve to separate *E. inornata* from *E. media*. However, re-examination of the characters showed that these differences were due to either author errors or to variations

in the phenotype. Except where refigured here, the drawings given by Dow (1968) are considered to adequately represent *E. inornata* and are not duplicated.

George and Stromberg's figure 8A incorrectly shows the pleon with the fourth pleonite entirely free, not medially fused with the anterior two segments. In the text they describe the pleon as "Anterior segment with two suture lines; half as long as telson." In the genus *Exosphaeroma*, the first pleonite lies under the seventh pereonite, obscuring it from dorsal view except near the articulation of the seventh pereonite and its coxal plate (Fig. 1). The second, third, and fourth pleonites fuse medially into the second pleonal division, forming the dorsally visible part of the pleon. The fifth and sixth pleonites fuse with the telson forming a pleotelson. A reexamination of George and Stromberg's paratypes clearly showed the fourth pleonite is medially fused to the two anterior pleonites.

The anterior margin of the cephalon as described by George and Stromberg is correct. In addition, the supraantennal line is poorly developed, and weakly trilobate. The relative position of the rostrum to the clypeus is variable. In some individuals the rostrum clearly touches the clypeus, while in others the rostrum and clypeus are widely separated. Typically the rostrum and clypeus are nearly touching (Fig. 2).

The incisor process of the mandible ends in four rounded cusps. Dow incorrectly describes and figures the lacina mobilis terminating in two instead of three cusps. George and Stromberg's figure 8J incorrectly shows the paired peni as medially fused over the proximal fourth of its length. The peni are clearly separated at the proximal margin (Fig. 3). George and Stromberg's figure 8I incorrectly shows the appendix masculina of the male second pleopod as biarticulate. The appendix masculina actually is unsegmented, attaching to the medial proximal margin of the endopod.

George and Stromberg correctly stated that the border of the uropodal rami have slight emarginations which give them a crenulated appearance (Fig. 4). Some variation was observed in this character by George and Stromberg (1968). In this study, several

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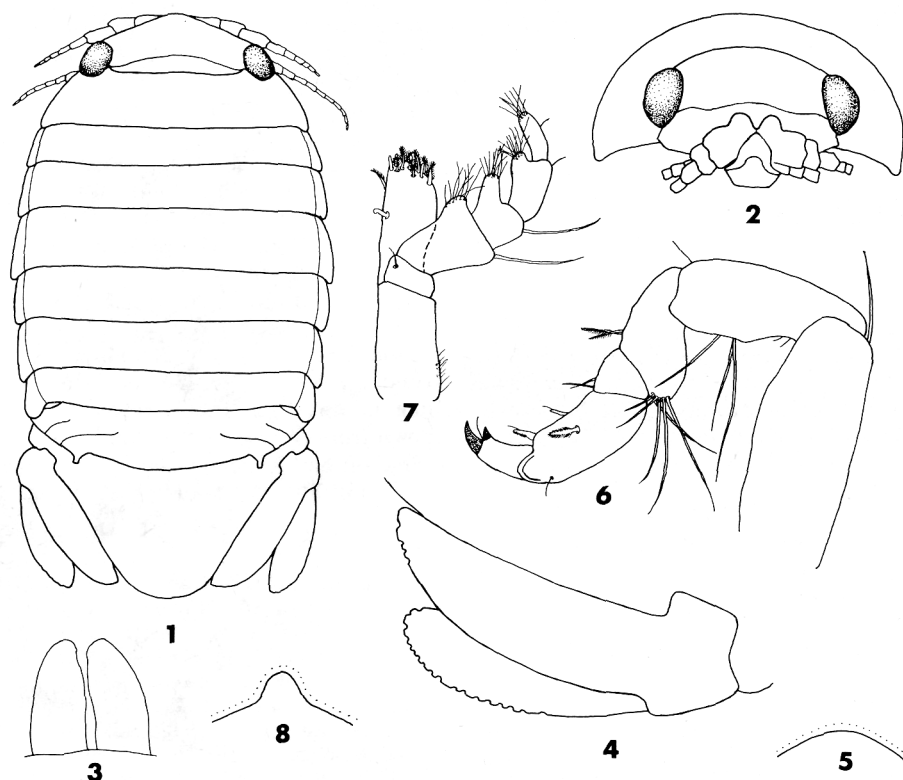
FIGURES 1-8. *Exosphaeroma inornata*

Fig. 1. Adult female. Fig. 2. Cephalon. Fig. 3. Male, peni. Fig. 4. Uropod. Fig. 5. Juvenile, posterosagittal view of pleotelson apex. Fig. 6. Female, pereopod one. Fig. 7. Maxilliped. *E. amplicauda*. Fig. 8. Juvenile, posterosagittal view of pleotelson apex.

individuals that completely lacked crenulations on both rami were found (agreeing with Dow's description), while in extreme cases the distal and lateral margins of both the exopod and the endopod are crenulated. Typically only the distolateral margin of the exopod is crenulated. The shape of the pleotelson varies slightly with age and sex. Females and immature males have a broadly rounded posterior margin which becomes increasingly truncate in large adult males. Suture lines of coxal plates two to seven with their respective pereonites are distinguishable (best seen in lateral view) on females and juvenile males. Coxa and pereonites appear completely fused in adult males.

Schultz (1968) distinguishes in his key between *E. inornata* and *E. media* by the more convex body margins of the latter species. Computation of a body ratio (width/length) from the respective measurements of length and width given by Dow (holotype = 0.27, allotype = 0.26) and George and Stromberg (holotype = 0.50, allotype = 0.50) for their types agrees with Schultz's observations. However, remeasurement of Dow's paratypes revealed the body ratio ranged between 0.46 and 0.53, suggesting that his measurements of the length and width of the holotype and allotype

are in error. Precise measurements can no longer be made from these specimens since they have suffered from decalcification. Freshly collected topotypes of *E. inornata* from Point Fermin, Calif., averaged 0.54. This value falls well within the range of body ratio measurements recorded from 127 individuals (0.44 to 0.59, mean = 0.55).

The setation of the first pereopod (Fig. 6) was found to vary a great deal more than the variation reported by George and Stromberg. The number of setae on the outer margin of the ischnum ranges from 3 to 12 long setae; distally, the meris ranges from 4 to 13 setae; the inner margin of the carpus ranges from one to three short setae; and the inner margin of the propodus ranges from two to five setae. Typically, the inner margin of the propodus has two, two-pointed setae plus a stout plumose setae on the lateral margin, as per George and Stromberg's description, but contra to Dow's figure. Figures given by both Dow and by George and Stromberg of the maxilliped are within the range of variation observed. Figure 7 represents a maxilliped of average proportions.

In most cases juvenile sphaeromatid isopods are difficult to identify because distinguishing characters pres-

ent in the adult are often reduced or absent. Small juvenile specimens of *E. amplicauda* lack the characteristic dorsal sculpturing and angulate pleotelson apex of the adult, thus resembling *E. inornata*. The latter species can be distinguished from the former species by the absence of a groove or channel on the ventral surface of the pleotelson apex, (Fig. 5 and 8). As juvenile *E. amplicauda* mature, the pleotelson apex becomes increasingly more angulate, while in *E. inornata* it remains broadly rounded.

Ecology — George and Stromberg (1968) collected their specimens from several localities on San Juan Island, in the upper intertidal zone from "... clean sand and among stones in slight depressions of the beach, where coarser material accumulates." I collected a large series of *E. inornata* at Smith Cove, Seattle, Washington (about 100 km south of San Juan Island) in August 1973. Here, *E. inornata* occurs in the middle and upper intertidal zones among the stones of a cobble stone beach, associated with the alga *Ulva* sp., and in the empty tests of the barnacle *Balanus glandula* Darwin 1854. In California *E. inornata* is widely distributed in many habitats including the fully exposed rocky outer coast and the fully protected marine regions of bays and harbors. It is not known from the sandy outer coast beaches. At Bodega Head, Calif., *E. inornata* was found in coarse sand, in between individuals of the clone-forming anemone *Anthopleura elegantissima* (Brandt 1835).

Dow (1958) stated that *E. inornata* occurs under the holdfast of the kelp *Macrocystis*. In southern California, the dominant species of *Macrocystis* is *M. pyrifera* (Linnaeus 1771). This kelp forms extensive stands offshore at depths commonly between 6 and 20 m (Abbott and Hollenberg 1976). Dow's statement thus implies that *E. inornata* occurs subtidally between those depths. Dr J. L. Mohr collected the material described by Dow (1958) at Point Fermin, Los Angeles County, Calif., in 1948. Dr Mohr has informed me (personal communication) that in 1948 he did not have any means to reach the offshore kelp stands at Point Fermin. Thus, the material described by Dow probably came from holdfasts that washed up on the beach. Once in the intertidal, the holdfast could easily have been colonized by the isopod. Although numerous

museum records have been examined, as yet no subtidal records are known to me. Thus, *E. inornata* is probably strictly a littoral species.

Distribution — Previous to this report, the known distribution of *E. inornata* was from Point Fermin, Los Angeles County, Calif. (type-locality) north to Humboldt Bay, Humboldt County, Calif. (Iverson 1974). The distribution is now extended north to San Juan Island, Puget Sound (George and Stromberg 1968) and south to San Diego, San Diego County, Calif. (BLM data). Numerous intermediate localities are known within its reported range in California. A large distributional gap exists between Humboldt Bay and Puget Sound, probably reflecting the lack of adequate sampling in this area. In California, *E. inornata* is also known from three offshore islands: South East Farallon Island, off San Francisco Bay (CAS data); San Nicolas Island (BLM data); and San Miguel Island (BLM data).

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