

MYSIDACEA (CRUSTACEA) AS ECOLOGICAL AND BIOGEOGRAPHICAL MARKERS IN MEDITERRANEAN BRACKISH ENVIRONMENTS

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Abstract

The brackish water mysid faunas (especially *Diamysis*) are well differentiated between the eastern and the western basins of the Mediterranean. Unlike the more species-rich meta- to polyhaline waters, the meso- and oligohaline waters frequently show only a single mysid species, that is *D. mesohalobia* in the eastern and the vicariant *Mesopodopsis slabberi* in the western Mediterranean. Paleogeographical and paleoecological considerations suggest that certain mysids with low-salinity affinities may have colonized the Mediterranean from the East (brackish Paratethys) while other "brackish" species may have immigrated from the West, i.e. from the Atlantic, at the end of the Messinian salinity crisis.

Keywords: *Mysidae*, faunas, lagoons, salinity, paleoecology

Until recently, only relatively few species of the family Mysidae were cited from the Mediterranean brackish ponds, lagoons, and estuaries. However, recent extensive faunistic investigations led to a revision of the genus *Diamysis* Czerniavsky, and to new ideas about the colonization of the Mediterranean brackish environments by mysids (1).

Main information could be obtained from *Diamysis* species, previously lumped together under the name *D. bahirensis* (G. O. Sars). As a consequence of its emendation, this species now appears to be restricted almost entirely to the SW Mediterranean basin. *D. bahirensis* lives in poly- to metahaline waters, with salinity (S) ranging from 25 (drain near Mazara del Vallo, Sicily, previously unknown locality) to 40 (Stagnone di Marsala, Sicily).

A similar ecology, but a different geographical distribution, is reported for *D. lagunaris* Ariani & Wittmann. It inhabits the NW Mediterranean (where a new population has been discovered in 2003 on Menorca Island, Balears) and also shows one Atlantic population in Portugal, possibly due to passive transport (Cunha, cited in 1) from the Mediterranean.

Two *Diamysis* species, this is *D. hebraica* Almeida Prado-Por and *D. sirbonica* Almeida Prado-Por, and the species complex *D. mesohalobia* Ariani & Wittmann inhabit the eastern Mediterranean. The first two taxa, both from the Levantine basin, are known only from one oligohaline stream or one metahaline lagoon, respectively. The nominal form of *D. mesohalobia* is present with very dense populations in mesohaline karstic springs of the Adriatic basin, whereas the subspecies *gracilipes* and *heterandra* mostly prefer more saline waters in the Adriatic and Ionian basins. Lastly, a stygophilic species closely allied to *D. m. mesohalobia*, i.e. *D. camassai* Ariani & Wittmann (2), is endemic of mesohaline dolinas near the Ionian coast of southern Italy.

Owing to the mineral composition (CaCO₃ instead of fluorite) and certain morphological features, the statoliths of all Mediterranean species of *Diamysis* remind the statoliths of Mysidae from Miocene deposits of the brackish Paratethys. This gives further evidence (1, 3) to Bacescu's hypothesis (4) of a brackish water, Paratethyan origin of these forms. Therefore, the *Diamysis* ecology and distribution pattern in the Mediterranean may be understood in relation to a colonization of this basin starting from the East (Paratethyan drainage during the salinity crisis), with adaptation to near-marine salinity upon expansion towards the West. In line with this context, laboratory experiments showed (1) that survival of brood pouch larvae in *D. lagunaris* and *D. m. gracilipes* is higher at mesohaline compared with euhaline conditions, though the test populations originated from marine or mixoeuhaline natural waters. It is also most remarkable that inspections of many meso- or hypohaline waters in the western Mediterranean yielded no *Diamysis* population, but occasionally *Mesopodopsis slabberi* (van Beneden) as the only mysid species (Étang de Berre, S = 15, and Étang de Mauguio, S = 12; Golfe du Lion). The Mediterranean forms (5) of the genus *Mesopodopsis* Czerniavsky may be considered, therefore, as vicariants of *Diamysis* in low salinity waters of the W Mediterranean, although co-occurring with *Diamysis* in the E Mediterranean.

The oligo- to mesohaline waters of the Mediterranean are usually inhabited by only one mysid species (belonging to *Diamysis* or *Mesopodopsis*), as *D. hebraica* at Nahal Taninim in Israel (S = 0.7-1.8), *D. m. gracilipes* with its "anomalous" population in the Fiume Chidro

(southern Italy, S = 4), *D. m. mesohalobia* with all populations in southern Italy (S = 10-16), *Mesopodopsis slabberi* with the above cited populations.

On the contrary, the poly- to metahaline waters are usually inhabited by more than one mysid species; if only one, this is again a *Diamysis* (*D. lagunaris* in the Étang de La Palme, Golfe du Lion; S = 23) or a *Mesopodopsis* (mouth of Lao river, Tyrrhenian coast of Calabria, S = 38). With the exception of *Paramysis helleri* (G. O. Sars), showing calcareous statoliths and belonging to a typical Ponto-Caspian genus (5), all remaining mysids (including *Mesopodopsis*) associated with *Diamysis* and/or *Mesopodopsis* have fluorite statoliths and may be considered of Atlantic origin. They belong to the genera *Siriella* Dana, and *Leptomysis* G. O. Sars.

The *Siriella* species most frequently encountered are *S. armata* (M.-Edwards) and *S. jaltensis* Czerniavsky, which share brackish affinities with *S. clausii* G. O. Sars. *Leptomysis* is a typically Mediterranean marine genus (6), but one species, *Leptomysis truncata* (Heller) is also found in brackish environments: in the Golfe du Lion together with *Diamysis*, *Paramysis* and *Siriella* (Étang de Thau, Étang de Leucate) or with *Diamysis* and *Siriella*, exclusively (mouth of the Rhône in Port St. Louis). The atlantic genus *Neomysis* has been reported as *N. integer* (Leach) from only one Mediterranean brackish locality: the Arles canal near Fos (7) in the Golfe du Lion. However, recent investigations (7) in this locality as well as in the near Étang de l'Estomac did not confirm previous data.

In conclusion, mysids may be considered suitable study objects in order to reconstruct the colonization of the Mediterranean brackish environments (mainly the less saline ones) in relation to paleogeographical and paleoecological situations.

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