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Mesopodopsis slabberi (Crustacea: Mysidacea): can it be used in toxicity tests?

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Abstract

Mesopodopsis slabberi is a euryhaline and suprabenthic mysid with a wide geographic distribution and one of the most important mysid species in coastal shallow waters. Nevertheless, no references were found to its uses in ecotoxicological experiments (TOXNET, AQUIRE, ISI Web of Knowledge). This work is part of an ecotoxicological study, representing the first step in establishing a description of this species' tolerance to chemical pollutants typical of estuarine environments. It is possible to assert that acclimation was achieved, for it occurred during a period of time, with a low mortality. Due to the short life cycle of *M. slabberi* it is strongly believed that 12 days of acclimation is a far too long time, when experiments are to be made after this period. This species is suitable for acclimation in the laboratory, tolerant, and easy of handling. Logistics and materials used to maintain the acclimation system as described are simple and not costly and could easily be used in other laboratories.

Keywords: *Mesopodopsis slabberi*; Test species; Acclimation; Toxicity tests

1. Introduction

Characteristics examined in the selection of a test organism include number of organisms available, simplicity of sampling and handling, tolerance to physicochemical variations, sensitivity to toxics, and ecological relevance, among others (Luoma and Ho, 1993).

Mysids are logical candidates for estuarine toxicity tests (Nimmo et al., 1977). They are important members of the food web, amenable to laboratory rearing, and sensitive to many toxic materials (Lussier et al., 1985). Mysids are useful species for toxicity testing because they are relatively small (adults ca. 1–2 cm), easily cultured (with a life cycle of 3–4 weeks), and form ecologically important representatives of the estuarine ecosystem (Widdows, 1998). The available toxicity data suggest that mysids sensu lato are very sensitive to toxic chemicals and have many attributes suitable for laboratory use (Roast et al., 1998). While there is a relatively large amount of published information on the sensitivity of *Americamysis* species to toxicants (e.g., Nimmo et al., 1978), there is relatively limited toxicity data for other mysid species (Roast et al., 1999).

Mesopodopsis slabberi is a member of a group of species within the genus *Mesopodopsis* (Order Mysidacea, Family Mysidae). The taxonomy of the genus *Mesopodopsis* Czerniavsky, and of the species *slabberi* in particular, has been a matter of controversy. In 1861, van Beneden described the first species as *Podopsis slabberi* and erroneously assigned it to a decapod genus. Two years later Goës correctly transferred it to the genus *Mysis* Latreille (Wittmann, 1992). This mysid is easily distinguished: it presents a slender transparent body and its eyes are of an uncommon length—twice longer than the diameter of the carapace in the gastric region. In a sample it stands out, because it actively swims and it looks like a small wand, ending in stalked black eyes (Gomoiu, 1978). The small body chromatophores may expand at most to small gray stripes or a pair of russet spots at sympods of uropods, respectively. Eggs are transparent to yellowish opaque or rarely green (Wittmann, 1992).

It has a wide geographic distribution (Greenwood et al., 1989) and, according to Gomoiu (1978), is one of

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the most important mysid species in coastal shallow waters. It frequently occurs in estuarine systems (Macquart-Moulin, 1965) where it is usually the most abundant mysid (Webb and Wooldridge, 1987; Greenwood et al., 1989). *M. slabberi* is abundant in estuarine and marine waters, such as northeast Atlantic, western Baltic, and the entire Mediterranean, Marmara, Black, and Azov Seas, 30–59°N, 10°W–41°E (Wittmann, 1992).

M. slabberi (van Beneden, 1861) is a euryhaline (Greenwood et al., 1989) and suprabenthic mysid, exhibiting tidal and diel vertical and tidal and seasonal horizontal migrations (Webb and Wooldridge, 1990). Under conditions of low illumination, for example in turbid waters or at night, the animals are planktonic, often dispersed between bottom and surface. Several authors emphasized substrate independence, stronger than usual in hyperbenthic Mysidae, as the species may be found over practically every type of substrate in coastal waters of less than 50 m depth. It is present in waters in the salinity range of 1.3–43 PSU (Wittmann, 1992) and its main food is seston but it also feeds on small animals (Wittmann, 1992). Some studies indicate that it is one of the favorite fish preys, occurring in 30–40% of the analyzed fish stomachs (Hostens and Mees, 1999).

There are no published studies on laboratory culture and acclimation techniques or acute toxicity testing methods for *M. slabberi* (TOXNET, AQUIRE, ISI Web of Knowledge). This paper describes laboratory acclimation methods and how acute toxicity test might be made using this species and is part of an ecotoxicological study, representing the first step in establishing a description of this mysid's tolerance to chemical pollutants typical of estuarine environments.

2. Material and methods

2.1. Sampling

Mysids were collected at Ria de Aveiro (NW Portugal), where depths vary from 5 to 7 m, with a salinity of 35 PSU, about 2 h after high tide. All samples were collected during the day, when suprabenthic mysids are known to be near the bottom (Mees et al., 1993). Sampling was made using a suprabenthic sledge with collecting cup, both with 500-μm-mesh net, operated from a small boat, with 3- to 4-min drags. The content of the collecting cup was placed in 20-L buckets, to keep the organisms alive until reaching the laboratory.

2.2. Acclimation

Fifteen *M. slabberi* specimens, of the same size category, were placed in a glass bottle with 500 mL of artificial seawater, prepared by dilution of marine salt Sera Premium in distilled water, with 25 PSU salinity (Greenwood et al., 1989) and without sediment. This solution was aerated prior to and during acclimation. Acclimation took place during 12 days and, on a daily basis, mortality, temperature, pH, salinity, and oxygen level were monitored and 250 mL of water was renewed (semistatic system). Four replicates produced a total of 60 specimens. A very-narrow-mesh net was carefully placed inside the bottles to prevent the removal of the specimens, while the 250 mL of water was removed. The fresh water was dripped in the bottles, with the aid of a glass rod. Bottles were placed in a room with controlled photoperiod and air temperature (14 h light and 20°C). During mysid culture, *Artemia* nauplii were used as food (Domingues et al., 2000). *Artemia* cysts were hatched for 24 h under intense light, at temperatures of 25°C, average salinity of 27 PSU, and permanent and vigorous aeration. Organisms were fed daily with 24-h-old *Artemia* nauplii, ad libitum, because cannibalism has been observed when not enough food is provided (Domingues et al., 2000). When necessary, excess food that accumulated in the bottom was removed.

2.3. Statistical analysis

A repeated-measures ANOVA was used to assess fluctuations of physical–chemical parameters in containers with time. A repeated-measures ANOVA using physical and chemical parameters as covariates was used to compare mortality differences between containers with time (Zar, 1996). The statistical analysis was carried out using the General Linear Model (GLM) of Minitab 13.

3. Results

The acclimation conditions for *M. slabberi* are summarized in Table 1. Some conditions can be slightly changed: number of organisms per bottle, quantity of water per bottle, and quantity of changed water. Conditions such as feeding frequency, water change frequency, aeration, and air temperature should be followed according to the protocol and maintained as constant as possible.

Physical–chemical parameters were kept stable during the acclimation period as shown by the mean variation of parameters (Figs. 1–4). Standard errors were very low, which indicates that it was possible to maintain the same physicochemical characteristics in all four replicates. Salinity ranged from 24.5 to 27.6 PSU, while water temperature varied from 20.1°C to 21.7°C. Minimum and maximum oxygen levels were 61.9% and 85.0%, respectively, and pH values ranged from 7.8 to 8.1. Oxygen level suffered a visible decrease from the