ON THE STRUCTURE OF MACROZOOPLANKTON AND ITS CONTRIBUTION TO THE ACTIVE TRANSPORT OF ORGANIC MATTER THROUGH THE UPPER PART OF THE WATER COLUMN IN THE DEEP LEVANTINE SEA

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Macrozooplankton (arbitrarily defined as >0.5 cm on the basis of total length) was studied from 0.333 mm mesh size samples and discriminated into 0.5 cm size classes. The material was collected in January 1987 SE of Crete (34°20'N, 26°00'E) with the use of a $1m^2$ Mocness by oblique stratified tows which commenced at 4000 m, i.e. about 200 m from the bottom.

Overall, the composition of macrozooplankton differed markedly from that of mesozooplankton by its taxonomical and trophical nature. Copepods accounted for 90% of the total standing crop of mesozooplankton (WEIKERT and KOPPELMANN, 1993), forming a mainly omnivorous life style of this compartment by groups which are both filter and raptory feeders. Among the macrozooplankton copepods were only a minor fraction of the standing crop, constituting 0.6% and 2.8% of the smallest size class by numbers and wet weight (ww), respectively. Like in the larger fractions, carnivorous groups of swallowers such as chaetognaths, siphonophores and fishes were overwhelmingly abundant.

In the day profiles, a conspicuous change was observed for the taxonomical and trophical structure at 750 to 900 m. Chaetognaths and siphonophores, which abounded in the shallower layers, were markedly outnumbered and outweighed by crustaceans and fishes. This faunal assemblage was characterized by omnivorous feeders, mainly due to the mass occurrence of euphausiids (*Euphausia* spp.) und decapods (*Gennadas elegans*). The trophical change at depth to a more generalized omnivorous/detritivorous life style co-occurred with a change in the proportion of the standing crops of mesozooplankton and macrozooplankton. In the upper 750 m, the latter accounted for 2.2 g/m^2, i.e. 43% of the mesozooplankton, but at greater depths the macrozooplankton (1.6 g/m^2) outweighed mesozooplankton by a factor of two. Below 2250 m no macrozooplankton was caught (WEIKERT, 1990).

Nocturnal vertical migrations into the 100 m surface layer were observed for crustaceans, especially euphausiids, and large (≥1.0 cm) chaetognaths. Small chaetognaths and siphonophores showed a reversed migration pattern. For other major macrozooplankton groups no synchronous diel vertical migrations into the top 100 m could be detected.

No day/night differences were found for the biota of the 0.5-1.0 cm size class. Therefore (and in accordance to literature), this fraction was added to the mesozooplankton to estimate fluxes into the upper 100 m. The summed migrant biomasses of the macrozooplankton taxa ≥1.0 cm in size amounted to 643 mg/m^2 as compared to 194 mg/m^2 which is the day/night difference of the total macrozooplankton. The respective share of migrants to the total standing crop (704 mg/m^2) was 71% as compared to 29% in the second case, and they outweighed the migrant mesozooplankton (506 mg/m^2, day/night difference of the total mesozooplankton). Altogether, migrants comprised 42% of the combined ww of meso-/macrozooplankton in the top 100 m (2846 mg/m^2). The calculated excretion rate of nitrogen in this layer by the migrant macrozooplankton is 0.21 $mgN/m^2.d$ [0.06 $mgN/m^2.d$ when calculated from the day/night difference of total macrozooplankton], that of migrant mesozooplankton is 0.16 $mgN/m^2.d$ [using the transformations by ANGEL (1989) who assumed that dry weight [dw] = 0.13 ww, N excretion = 0.005 mg/mg.dw, residence of migrators in the top 100 m 12 hrs]. The release rate of excretory nitrogen of the non-migrant metazoans is 1.08 $mgN/m^2.d$, assuming that they stayed 24 hours in the top 100 m.

The tentative estimates of recycled nitrogen compare well with those reported by ANGEL (1989) for the zooplankton and micronekton from sites in the subtropical N-Atlantic. He suggests that totals between 1 and 2 $mgN/m^2.d$ provide for one third of the N, which is needed to support the productivity of the local deep chlorophyll-a maximum. Though the excretion rates calculated for both areas are very speculative (see ANGEL, 1989 for discussion), they indicate the non-trivial role of vertically migrating macrozooplankton in the oligotrophic Levantine Sea in January 1987. The macrozooplankton seems to redistribute similar amounts of N into the euphotic zone as compared with the mesozooplankton, while the recycling of N in this zone is mainly supported by the non-migrant mesozooplankton (0.91 $mgN/m^2.d$). Macrozooplankton probably played a principal role in the active downward transport of organic material due to the long gut retention times of large organisms. For better estimates, the assess of fluxes in the course of periodic synchronous vertical migrations should be based on the composite fluxes of the community.

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