

CONTRIBUTION TO THE KNOWLEDGE OF THE MACROBENTHIC BIODIVERSITY OF VOULIAGMENI LAGOON (ATTICA, GREECE)

C.C. Chintiroglou, C. Antoniadou, P. Damianidis * and A. Diapoulis
Aristotle University of Thessaloniki, School of Biology, Dept. of Zoology, Thessaloniki, Greece

Abstract

This study deals with the macrobenthic biodiversity of the tectonic lagoon Vouliagmeni in Attica, Greece, where 12 flora and 24 fauna species are put on record for the first time. The macrobenthic diversity is similar to other Mediterranean lagoons, with some exceptions, most probably new species. The relevant literature is reviewed and the taxonomic status of certain species is discussed and revised. With its atypical geomorphology and the presence of endemic species, the Vouliagmeni Lagoon is of great interest in studies of lagoonal ecosystems.

Keywords: Macrobenthos, Biodiversity, Lagoons

Introduction

Vouliagmeni Lagoon has been the subject of geological research since the end of the 19th century [1]. However, the study of the biotic and abiotic environment of the Lagoon has not started until recently. The Vouliagmeni Lagoon (=VL) was created when the roof of a large underground cave collapsed as powerful earthquakes stroke the region about 2000 years ago [1]. Similar observations were made in studies of a rocky island in the Adriatic Sea [2]. These facts indicate that VL is of tectonic origin (=Tectonic laguna), according to the classification of lagoonal ecosystems [3].

The information about the living world of VL is limited. The biological research started after Doumenc *et al.* [4] had described *Paranemonia vouliagmeniensis*, a new species of sea anemone, endemic in the lagoon. Chintiroglou *et al.* [5] were the first to study the population dynamics and feeding habits of this anemone. This study gives some preliminary results on the faunal and floral macrobiodiversity of the lagoon.

Materials and Methods

Common techniques of qualitative, semiquantitative and quantitative sampling were employed to evaluate the macrobenthic biodiversity [6] [7]. The physico-chemical factors were also measured.

Results and Discussion

The physico-chemical parameters show minimal annual fluctuation. Temperature never drops below 18°C, whereas it reaches 29°C in summer. Salinity varies around 17‰ and pH around 7.

Flora

Two phanerogames were collected and identified [*Scyrpus maritimus* Linnaeus and *Ruppia cirrhosa* (Petagna) Grande] and ten algae: six Rhodophyceae [*Chroodactylon ornatum* (C. Agardh) Basson, *Gelidium* sp., *Lophosiphonia scopulorum* (Harvey) Wormsley, *Lophosiphonia cristata* Falkenberg, *Polysiphonia tenella* (C. Agardh) Ambrom and *Griffithsia* sp.] and four Chlorophyceae (*Chaetomorpha* sp1, *Chaetomorpha* sp2, *Olothrix* sp., *Rhizoclonium* sp). These species are typical in brackish and fresh water with wide geographical distribution [2] [8]. *Olothrix* and *Chaetomorpha* are reported to live in fresh water and they frequently form green masses in spring and autumn.

Fauna

Porifera: Two *Cliona* species were found (*Cliona* sp1 and *Cliona* sp2). The first was found on limestone substrate, at 3 m depth. The second, found in small quantities, covered small algal parts. Sponges are generally absent from the relevant literature.

Cnidaria: The only species found in great abundance [9] was *Paranemonia vouliagmeniensis* Doumenc, England & Chintiroglou 1987.

Annelida: Four polychaetes were found, *Hediste diversicolor* (O.F. Muller, 1776), *Spio* sp., *Capitella capitata* (Fabricius, 1780) and *Manayunkia* sp. and one oligochaete *Limnodrilus* sp., all very common in brackish waters [8] [10]. *Manayunkia* sp. is relative to *Manayunkia estuarina* (Bourne 1883), a brackish waters species. However, the *Manayunkia* sp. specimens showed morphological dissimilarities from the typical *Manayunkia estuarina*, therefore their taxonomic status is still unclear.

Mollusca: Three gastropods and two bivalves were found. *Acteum* sp. and *Caecum* sp. were few and not properly identified. The gastropod *Hydrobia acuta* (Draparnaud, 1805) and the bivalves *Cerastoderma glaucum* (Poiret, 1789) and *Abra ovata* (Philippi, 1836) are common of brackish water assemblages [8] [10] [11].

Crustacea: Five crustaceans were identified: 3 amphipods (a) *Corophium acutum* Chevreux, 1908, (b) *Microdeotopus anomalus*

(Rathke, 1843) (c) *Gammarus aequicauda* (Martynov, 1931), the isopod *Lekanesphaera hookeri* (Leach, 1814) and one cirriped, *Balanus amphitrite* Darwin, 1854. They are all very common in brackish waters and show a wide geographical distribution [8] [10].

Pisces: Three species were found: *Zebrus* sp. (Gobiidae), *Mollienisia* sp. and *Mugil* sp. (possibly *M. cephalus*, one individual). The first, which is very common in brackish waters [12], lives on the bottom (4 m depth) in small or bigger schools, depending on the season and the reproductive needs. The presence of *Mollienisia* sp. in VL is quite untypical, since this is a S. American aquarium fish [13]. This species was obviously transferred to the lagoon, for unknown reasons, but has settled well, as big schools of juveniles were frequently observed, following the older down to 5 m depth.

Some of the species were previously reported with different names [4] [5], apparently due to mistaken identification. Here, the accurate names are restored in brackets: *Pusillina radiata* (= *Hydrobia acuta*), *Parvicardium ovale* and *Cerastoderma edule* (= *Cerastoderma glaucum*), *Sphaeroma serratum* (= *Lekanesphaera hookeri*), *Corophium orientale* (= *Corophium acutum*) and *Zostera noltii* (= *Ruppia cirrhosa*).

The fauna and flora of VL are similar as in other Mediterranean lagoons. However, certain facts such as the endemism of some species, the unvaried abiotic factors and the special geomorphology of the area, make this lagoon a unique monument of nature, which stimulates great interest in research and management studies.

References

- 1 - Papapetrou-Zamanis A., 1969. Le Lac de Vouliagmeni (Attiki). *Annls geol. Pays Hell.*, 21 : 210-216.
- 2 - Grubelic I, Boris A., and Span A., 1998. Benthic flora and fauna in a submarine cave in the central Adriatic Sea. *Rapp. Comm. int. Mer Médit.*, 35 (2): 446-447.
- 3 - Guerloget O., and Perthuisot J.P., 1992. Paralic ecosystems biological organization and functioning. *Vie Millieu*, 42: 215-251.
- 4 - Doumenc D., England K., and Chintiroglou C., 1987. A new species of sea anemone in the genus *Paranemonia* Calgren (Anthozoa, Actiniaria) from the Aegean Sea. *Zoologica Scripta* 4: 271-275.
- 5 - Chintiroglou C., Valkouma Th., and Culley M., 1996. Biological studies in Athens Lake Vouliagmeni: I. The allometry of feeding and body size in a population of the sea anemone *Paranemonia vouliagmeniensis* Doumenc *et al.* 1987 (Actiniaria:Anthozoa). *J. Mar. Biol. Ass. UK*, 76: 603-616.
- 6 - Stirn J., 1981. Manual of methods in aquatic environment research. Part 8: Ecological assessment of pollution effects (Guidelines for the F.A.O. (GFCM)/UNEP joint Coordinated Project on Pollution in Mediterranean). *F.A.O Fisheries Technical Paper*, 209: 1-190.
- 7 - Chintiroglou C., and Koukouras A., 1992. A population of the sea anemone *Anemonia viridis* (Forsk. *et al.*, 1775) and its associated flora and fauna in North Aegean Sea. *Int Rev. ges. Hydrobiol.* 77(3): 483-495.
- 8 - Barnes R.S.K., 1980. Coastal lagoons. The natural history of a neglected habitat. Cambridge Studies in modern biology. 1. Cambridge University Press, Cambridge, 105 p.
- 9 - Chintiroglou C., Antoniadou C., and Damianidis P., 2000. Spatial dispersion and density of the *Paranemonia vouliagmeniensis* population in Vouliagmeni Lagoon. *J. Mar. Biol. Ass. UK*, 80, 941-942.
- 10 - Reisopoulou S., Thessalou-Legaki M., and Nikolaidou A., 1996. Assessment of disturbance in Mediterranean lagoons: an evaluation of methods. *Mar. Biol.* 125:189-197.
- 11 - Gontikaki E., Antoniadou C., and Chintiroglou C., 2003. Population structure of *Cerastoderma glaucum* and *Abra ovata* in Vouliagmeni Lagoon (Attiki) *J. Mar. Biol. Ass. UK*, 80, 1095-1097.
- 12 - Bauchot M.L., and Pras A., 1980. Poissons marins d'Europe. Delachaux & Niestle, pp. 427.
- 13 - Vogel Z., Brazda V., and Brazda P., 1965. Poissons d'aquarium. Atlas illustré. Gründ, Paris, pp. 215.