

Late Oligocene and Early Miocene Paleoenvironmental Analysis of the Mesohellenic Basin (Grevena area, NW Greece)

D. Thivaïou^{1*}, E. Koskeridou¹, M. Harzhauser¹, H. Drinia¹, Th. Tsourou¹, D. Mantzouka¹

(1) National and Kapodistrian University of Athens, University Campus, 157 84, Zografou, Greece, dthivaïou@geol.uoa.gr

(2) Naturhistorisches Museum Wien, Burgring 7, 1010 Wien, Austria

The Mesohellenic Basin (MHB) is a synorogenic molasse-type basin of NW Greece active from the late-Eocene (late Lutetian) through the mid-Miocene (Langhian). The MHB has been studied since the late 19th century with few mentions of its fossil content (Wielandt-Schuster et al., 2004); in the 1950's Brunn (1956) presented a synthetic work that analyzed all the characteristics of the basin.

In the present study, a multidisciplinary paleoenvironmental approach, based on sedimentological and paleontological analyses, is attempted in newly studied sections. Particularly, the material comes from two new sections and one new locality of the greater Grevena area in NW Greece. One section and locality are of late Oligocene age (Chattian), and one section is of the early Miocene age (Aquitanian). The sections belong to Eptachori and Pentalofo formations (Zelilidis et al. 2002), and are mainly composed of fine marls, marly sands to conglomerating sands. Most of the fossiliferous beds are fine-grained, with only one coquina bed found during our investigation in the known Dotsiko section (Wielandt-Schuster et al., 2004).

Fossil content in the region include mollusks, benthic foraminifers, ostracods and wood fragments. The detailed sedimentary facies analysis together with the taxonomic analysis of mollusks, benthic foraminifers and ostracods has yielded two different environments, one of brackish-mudflat character, and one where shallow marine conditions prevailed.

For mollusks, new occurrences of 17 species are noted in the Aquitanian, as well as 5 new species (Thivaïou et al. in press). For the Oligocene, three species of bivalves are reported for the first time from Dotsiko section of Wielandt-Schuster et al. (2004), as well as two species of micromorphic gastropods. The gastropod species *Bellatara lozoueti* Harzhauser, 2004 is found in shallow marine assemblages of three Oligocene locations of the studied area, in addition to the original location of Dotsiko village (Harzhauser, 2004). Species of *Terebralia* Swainson, 1840 infer proximity to mangrove environments and (Houbrick, 1991; Raw et al., 2017; Reid et al., 2008). In the study area, two occurrences are noted, one in the Chattian and one in the Aquitanian.

Benthic foraminifers and ostracods provide stronger support of differences between the brackish-mudflat assemblage and the shallow marine assemblage, as their taxonomic diversity and relative numbers vary. They also are reflecting well the fluctuating environments especially for the Aquitanian section. Interestingly, the ostracod assemblages also point towards the presence of mangrove environments in the same section. The combined results, help retrace the sea level fluctuations and add information to the evolution of the MHB, for example the details of the subsidence curve of (Ferrière et al., 2004). Lastly, the analysis of fossil wood fragments has shown transportation and strong boring from *Teredo* Linnaeus, 1758 for specimens collected in the Oligocene. Samples from the early Miocene found within the brackish-mudflat assemblage correspond to an “evergreen *Quercus* type” wood (Fagaceae), inferring such nearby forests.

In summary, the present study has brought new information relative to sea-level changes that occurred in the MHB, with changing environments between shallow marine and brackish-coastal mudflats.

References

- Brunn, J., 1956. Contribution à l'étude du Pinde septentrional et d'une partie de la Macédoine occidentale. *Ann. Géologiques du Pays Helléniques*, 7: 1-358.
- Ferrière, J., Reynaud, J.-Y., Pavlopoulos, A., Bonneau, M., Migiros, G., Chanier, F., Proust, J.-N., Gardin, S., 2004. Geologic evolution and geodynamic controls of the Tertiary intramontane piggyback Meso-Hellenic basin, Greece. *Bull. la Soc. Géologique Fr.* 175, 361–381. <https://doi.org/10.2113/175.4.361>
- Harzhauser, M., 2004. Oligocene gastropod faunas of the eastern Mediterranean (Mesohellenic Trough/Greece and Esfahan-Sirjan Basin/Central Iran). *CFS Cour. Forschungsinstitut Senckenb.*
- Houbrick, R.S., 1991. Systematic review and functional morphology of the mangrove snails *Terebralia* and *Telescopium* (Potamididae; Prosobranchia). *Malacologia* 33, 289–338.
- Raw, J.L., Perissinotto, R., Miranda, N.A.F., Peer, N., Raw, J.L., Perissinotto, R., Miranda, N.A.F., Peer, N., 2017. Feeding dynamics of *Terebralia palustris* (Gastropoda : Potamididae) from a subtropical mangrove ecosystem Feeding dynamics of *Terebralia palustris* (Gastropoda : Potamididae) from a subtropical mangrove ecosystem. *Molluscan Res.* 37, 258–267. <https://doi.org/10.1080/13235818.2017.1323370>
- Reid, D.G., Dyal, P., Lozouet, P., Glaubrecht, M., Williams, S.T., 2008. Mudwhelks and mangroves: The evolutionary history of an ecological association (Gastropoda: Potamididae). *Mol. Phylogenet. Evol.* 47, 680–699. <https://doi.org/10.1016/j.ympev.2008.01.003>
- Thivaïou D., Harzhauser, M. and Koskeridou, E. (in press). Early Miocene gastropods from the Felli section (Proto-Mediterranean Sea, NW Greece). *Geodiversitas*.
- Wielandt-Schuster, U., Schuster, F., Harzhauser, M., Mandic, O., Kroh, A., Rögl, F., Reisinger, J., Liebtrau, V., Steininger, F.F., Piller, W.E., 2004. Stratigraphy and palaeoecology of Oligocene and Early Miocene sedimentary sequences of the Mesohellenic Basin (NW Greece). *CFS Cour. Forschungsinstitut Senckenb.*
- Zelilidis, A., Piper, D.J.W., Kontopoulos, N., 2002. Sedimentation and basin evolution of the Oligocene-Miocene Mesohellenic basin, Greece. *Am. Assoc. Pet. Geol. Bull.* 86, 161–182. <https://doi.org/10.1306/61eeda6c-173e-11d7-8645000102c1865d>