

Combination coccospheres from the eastern Adriatic coast (Mediterranean Sea)

Luka Šupraha

Department of Earth Sciences, Paleobiology Program, Uppsala University, SE-752 36 Uppsala, Sweden; luka.supraha@geo.uu.se

Zrinka Ljubešić

Department of Biology, Faculty of Science, University of Zagreb, 10000, Zagreb, Croatia; zrinka.ljubestic@biol.pmf.hr

Jorijntje Henderiks

Department of Earth Sciences, Paleobiology Program, Uppsala University, SE-752 36 Uppsala, Sweden; CEES, Department of Biosciences, University of Oslo, 0316 Oslo, Norway; jorijntje.henderiks@geo.uu.se

Coccolithophores commonly exhibit a heteromorphic life cycle, alternating between morphologically distinct heterococcolith (diploid) and holococcolith (haploid) phases (Young *et al.*, 2005). Transition between the two phases is occasionally observed in field samples in the form of combination coccospheres containing both heterococcoliths and holococcoliths. Such coccospheres have great taxonomic importance as they link previously unrelated morphospecies to a common life cycle (Cros *et al.*, 2000). Here, we present combination coccospheres that were observed in a survey of coccolithophore distribution and diversity along the Krka River estuary (eastern Adriatic Sea). Samples were collected at six stations along a coastal-to-estuarine transect during winter and summer 2013. Water samples from four to six different depths were obtained, using a series of 5L Niskin water samplers. Seawater was filtered in a pre-determined volume onto a polycarbonate filter (0.8 μm pore size), rinsed with bottled fresh water, and oven dried at 50°C. Samples were sputter-coated with gold and studied under a Zeiss Supra35-VP scanning electron microscope.

Of the 11 combinations that were detected, four were previously described: *Coronosphaera mediterranea** - *Calyptolithina wettsteinii*, *Coronosphaera mediterranea** - *Zygosphaera hellenica*, *Syracosphaera bannockii** -

Corisphaera sp. type A, and *Syracosphaera pulchra** - *Calyptrosphaera oblonga*. Combination coccospheres of *Acanthoica quattrosipina** - *Sphaerocalyptra* sp. 1, *Syracosphaera didyma* - *Homozygosphaera arethusa**, and *Syracosphaera marginaporata** - *Anthosphaera* sp. type B were verified. A new life cycle association was observed between *Syracosphaera hirsuta* and *Corisphaera strigilis**, as well as *Alisphaera unicornis** and a nannolith-producing *Polycrater galapagensis*. A possible association between *Rhabdosphaera xiphos** and an undescribed holococcolithophore needs to be verified in future investigations. Following the taxonomic principle of priority, species names marked with (*) should be used for both the heterococcolith and the holococcolith phase.

References

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