

Kalana *Lagerstätte*: expansion of stratigraphic ranges and palaeobiological data

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The Kalana *Lagerstätte* in Central Estonia opens a window into the shallow-water setting during the early Silurian (Llandovery, Aeronian, Raikküla Regional Stage) of the Baltic Palaeobasin. The biota is dominated by exceptionally preserved algae, with various uncalcified dasyclade species, such as *Palaeocymopolia silurica* Mastik et Tinn 2015, *Kalania pusilla* Tinn, Mastik, Ainsaar et Meidla, 2015 and several yet unnamed taxa, being particularly prevalent. Dasyclades are unicellular green algae with a specific siphonous radially symmetrical thallus, the length of which can reach up to 20 cm. Their stratigraphic record goes back to the Cambrian, but the bulk of their fossil record consists of highly mineralised taxa, unlike those found in Kalana. Today, the dasyclade flora includes only 11 species, all of which inhabit shallow, tropical marine waters. Due to

their long fossil history and conservative morphological features, dasyclades are often regarded as „living fossils“. One particular species from Kalana, *P. silurica*, being also closely similar to *P. nunavutensis* from the Silurian of Arctic Canada, is morphologically almost identical to a Recent species *Cymopolia barbata*.

What makes Kalana special is the preservation and details of organisms, which are rarely found in the fossil record. The fossils found here include a head shield of an agnathan vertebrate *Kalanaspis delectabilis* Tinn et Märss 2018. *K. delectabilis*, although atypically preserved as a carbonaceous microbial biofilm, shows a combination of characters that are common to osteostracans, along with a few features known also among other early vertebrates. *K. delectabilis*, being about 10 million years older than any previously described member of the class Osteostraci, has been referred to as a member of the stem group osteostracans.

Kalana has also yielded a considerable number of sponge fossils, a group that (apart from stromatoporoids) has been very poorly studied in Estonia. While statistically, according to the Estonian geological collections database (<https://fossilid.info>) the Raikküla Stage shows the highest abundance and variety of sponges in Estonia, all of these are stromatoporoids. Our provisional studies have revealed a considerable taxonomic variety of non-stromatoporoid sponges in Kalana.

Estonian palaeontologists have always taken pride in their eurypterid fossils. Our geological collections hold more than 600 specimens identified as chelicerate arthropods. A large portion of these – either as nearly complete specimens or fragments with varying degrees of completeness – belong to the iconic species *Eurypterus tetragonophthalmus*, which comes from a locality on Saaremaa Island and dates to the Wenlock age (Rootsiküla Regional Stage). However, the oldest chelicerate fossils in Estonia have been collected from the Kalana *Lagerstätte*. This collection contains a diverse range of chelicerates, both in terms of taxonomy and preservation types.

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