Stop 16: Ohesaare cliff

Tiiu Märss

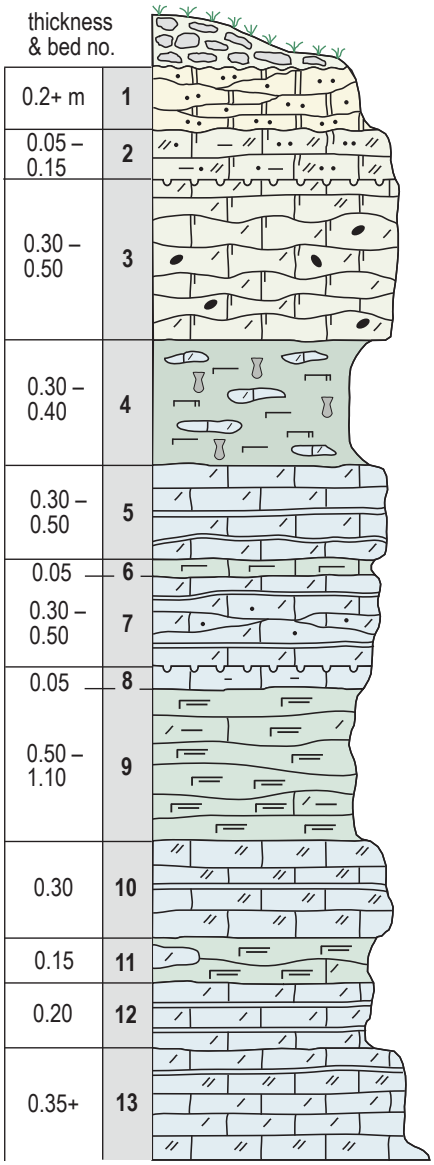
Location: Latitude 58°0´2˝N, longitude 22°1´10˝E; Sõrve Peninsula, Saare County, Estonia.
Stratigraphy: Přidoli, Ohesaare Fm, Ohesaare RS.
Status: Cliff is under protection; no hammering, but loose material may be collected.
More information: https://geoloogia.info/en/locality/12270

The following text is modified after Märss and Nestor (2014).

The Ohesaare (or Ohessaare) cliff is located on the western coast of the Sõrve Peninsula near Ohesaare village, 2.5 km southwest of Jämaja church. Carbonate rocks of two facies belts, the high-energy shoal belt and open shelf belt, which formed in the regressive succession, can be seen in this outcrop.

The lower beds of the Ohesaare RS, the highest stage in the Silurian of Estonia, are exposed here. This outcrop serves as a stratotype of the Ohesaare RS and is one of the best-known Silurian localities in Estonia. Being a famous fish locality, it has been known already since the pioneering work by C. Pander in 1856. It also has attracted attention as the outcrop with the youngest Silurian sedimentary rocks exposed in the entire Baltic area. The rocks in the section correspond to the *Monograptus transgrediens* graptolite biozone, indicating a late Pridoli age (Hints 2008) and contain a rich association of different fossils, including fishes, brachiopods, molluscs, trilobites, trace fossils, ostracods, conodonts, etc.

The Ohesaare cliff is over 600 m long and up to 4 m high. The total thickness of the exposed bedrock is 3.5 m, whereas the thicknesses of individual beds vary considerably throughout the extent of the outcrop.



Description of the section

The section is characterised by the intercalation of thin-bedded limestones and marlstones. The intervals containing relatively few thin marlstone interlayers form three protruding ledges in the cliff section: I – beds 2–3, II – beds 5–7, III – beds 10–13. Limestones are mostly with a biomicritic texture (skeletal packstone) in the middle part of the section but biosparitic (skeletal grainstone) in its upper part (bed 2) and especially in the lower parts (beds 10 and 13). A few lens-shaped intercalations of cross-bedded, fine-grained, pelletal-skeletal grainstones are also found in the middle part of the section, in beds 7 and 9.

Marlstone interlayers may have very high clay content – in some instances, plastic carbonate clays can be observed. The rocks in the upper beds of the outcrop (1–4) are somewhat dolomitized.

Some distinct interlayers are found in this rather monotonous section. The lower part of the section reveals a layer of coarse-grained skeletal grainstone to coquinoid rudstone (bed 10) with a 3–5 cm thick interbed of argillaceous marlstone in the middle. A 2–5 cm thick interlayer of fine-grained limestone (bed 8), pierced by thin vertical burrows filled with light green marl, occurs 0.5–1.0 m higher. Still 0.3–0.5 m higher, there is a thin (5 cm) interlayer (bed 6) of light green calcareous marlstone containing vertical cracks with brownish granular infilling.

A layer of greenish-grey marlstone (bed 4), containing abundant shells of *Grammysia obliqua* buried in a living position, forms a distinct recession in the upper half of the cliff. The section ends with an up to 20 cm thick layer (bed 1) of fissile, wavy- to cross-bedded laminated calcareous siltstone preserved only in the southern end of the cliff section. It is underlain by a 5–15 cm thick interbed (bed 2) of light grey silty skeletal grainstone, the upper surface of which bears large ripple marks, and the lower boundary displays a hardground.

Fig. 16.1. Ohesaare cliff after Märss & Nestor (2014).

Fig. 16.2. Southernmost part of the Ohesaare cliff. Photo: Olle Hints, 2024.

The hardground is encrusted by microconchids and bryozoans (Vinn & Wilson 2010); also, *Trypanites sozialis* borings are abundant (Knaust et al. 2023)

Fossils

The Ohesaare cliff is characterised by rich and diverse shelly fauna (Vinn et al. 2024). The most abundant macrofossils are brachiopods represented by *Collarothyris collaris* (Rubel), *Delthyris magna* Kozłowski, *D. elevata* Dalman, *Homoeospira baylei* (Davidson), *Levenea canaliculata* (Lindström), *Microsphaeridiorhynchus nucula* (Sowerby), *Morinorhynchus orbignyi* (Davidson), *Morinorhynchus rubeli* Musteikis & Cocks, *Protochonetes piltenensis* Rybnikova, *Protochonetes striatellus* (Dalman), *Salopina conservatrix* (McLearn), *Salopina submedia* (McLearn) and *Stegerhynchus pseudobidentatus* (Rybnikova). High abundance of bryozoans compared to other eastern Baltic Silurian sections is noteworthy. The bryozoan fauna was described in detail by Pushkin et al. (1990), who identified sixteen species from the Ohesaare cliff, including the most common *Fistulipora przhidolensis* Kopajevich. Many bryozoans show intergrowth with rugosans, cornulitids, hederelloids and hydroids (Vinn et al. 2021a, 2021b, 2022; Zapalski et al. 2022). Molluscs are represented by the most common bivalve *Grammysia obliqua* (McCoy); *Pteronitella retroflexa* (Wahlberg), *Palaeopecten danbyi* (McCoy), and *Modiolopsis complanata* Sowerby are also recorded. Cephalopods, bivalves and gastropods are represented by several genera and species (Sinitsyna & Mironova 1978; Kiselev et al. 1990). The fossils of trilobites are also common; the most numerous are calymeniids and proetiids (Männil 1983, 1987). Corals occur at certain levels in the middle part of the section. Corals are mainly represented by several species of *Favosites* and rugose corals by *Entelophyllum* and *Tryplasma* (Mõtus & Hints 2007). The middle part of the section (beds 5–10) has also yielded the cornulitids *Cornulites baranovi* Vinn & Toom (Vinn & Toom 2020) and the tentaculitids *Tentaculites scalaris* Schlotheim and *Lonchidium inaequale* Eichwald (Vinn et al. 2023). The association of microfossils, particularly ostracods, is very diverse (Sarv 1970).

Macroscopic vertebrate fossils are rare, *e.g.* shields of the heterostracan *Tolypelepis undulata* Pander, plates of the osteichthyan *Lophosteus superbus* Pander and jaw bones of acanthodians. Vertebrate microremains, on the contrary, are common and form bonebeds in several levels of the section.

The content of terrigenous material is high in the Ohesaare section, probably due to the intense influx of fine siliciclastic material into the basin at the final stage of its development. The input of the siliciclastic material contributed to the preservation of trace fossils such as *Chondrites, Cruziana, Helicodormites, Lockeia, Palaeophycus, Protovirgularia, Skolithos, Rusophycus* and *Zoophycos* (Toom 2019).

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Fig. 16.3. Selected fossils from the Ohesaare cliff, Ohesaare Regional Stage. **A–E, I** brachiopods; **A** – *Delthyris (Delthyris) magna* Kozlowski, GIT 130-221; **B** – *Delthyris (Delthyris) elevata* Dalman, GIT 130-217; **C** – *Collarothyris collaris* (Rubel), GIT 130-194; **D** – *Homoeospira baylei* (Davidson), GIT 130-155; **E** – *Stegerhynchus pseudobidentatus* (Rybnikova), GIT 173-53; **I** – *Protochonetes piltenensis* Rybnikova, GIT 554-2309. **F** – bivalve *Grammysia obliqua* (McCoy), GIT 403-158. **G** – crinoid *Cicerocrinus osiliensis* (Jaekel), GIT 405-242. **H** – trilobite *Calymene conspicua* Schmidt, GIT 187-41. **J** – cornulitid *Cornulites baranovi* Vinn & Toom, GIT 412-4. **K, M** tentaculitids; **K** – *Tentaculites scalaris* Schlotheim, GIT 403-751-2; **M** – *Anticalyptraea calyptrata* Eichwald, GIT 403-123-1. **L** – rugose coral *Entelophyllum articulatum* (Wahlenberg), GIT 403-5. **N** – hydrozoans on the bryozoan *Fistulipora przhidolensis* Kopajevich. **O–P** tabulate corals; **O** – *Favosites forbesi* Milne-Edwards & Haime, GIT 90-36; **P** – *Aulopora amica* Klaamann, GIT 403-136-2. Scale bars: L – 5 cm; F, H, 0, P – 1 cm; A, B, E, G, I, J, M – 5 mm; C, D, K, N – 1 mm.

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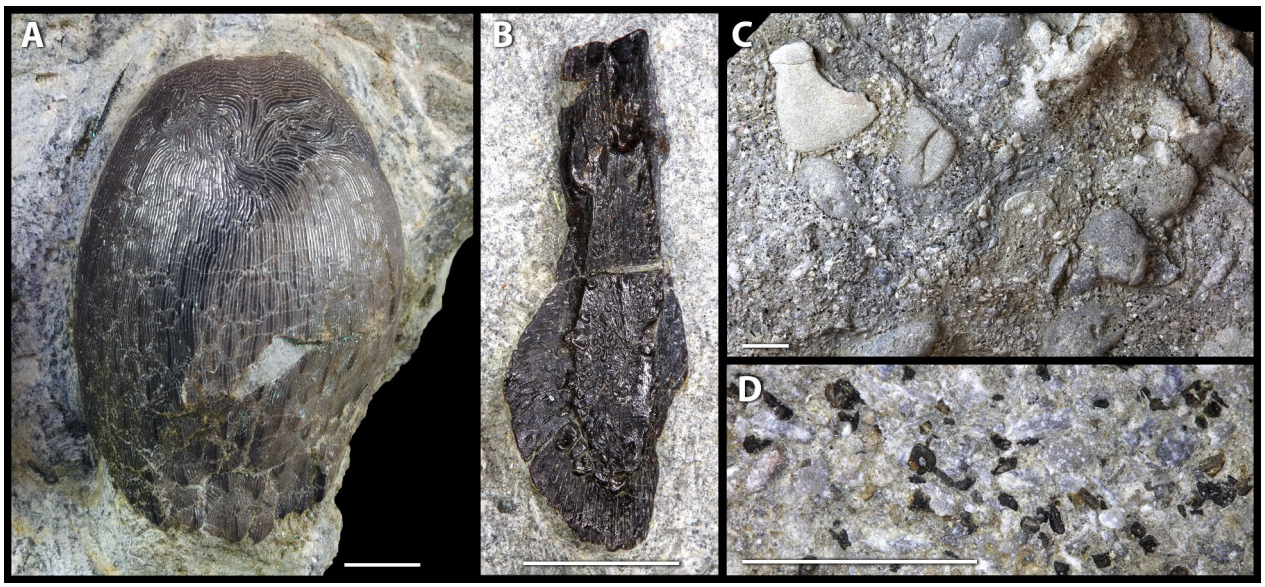

Fig. 16.4. Vertebrate fossils of the Ohesaare cliff, Ohesaare Regional Stage. Scale bars C – 1 cm; A, B, D – 5 mm. **A** – *Tolypelepis undulata* Pander, TUG 68-1; **B** – *Gomphonchus sandelensis* (Pander), GIT 232-255; **C, D** – conglomerate with microremains of vertebrates, D close-up, GIT 403-1.

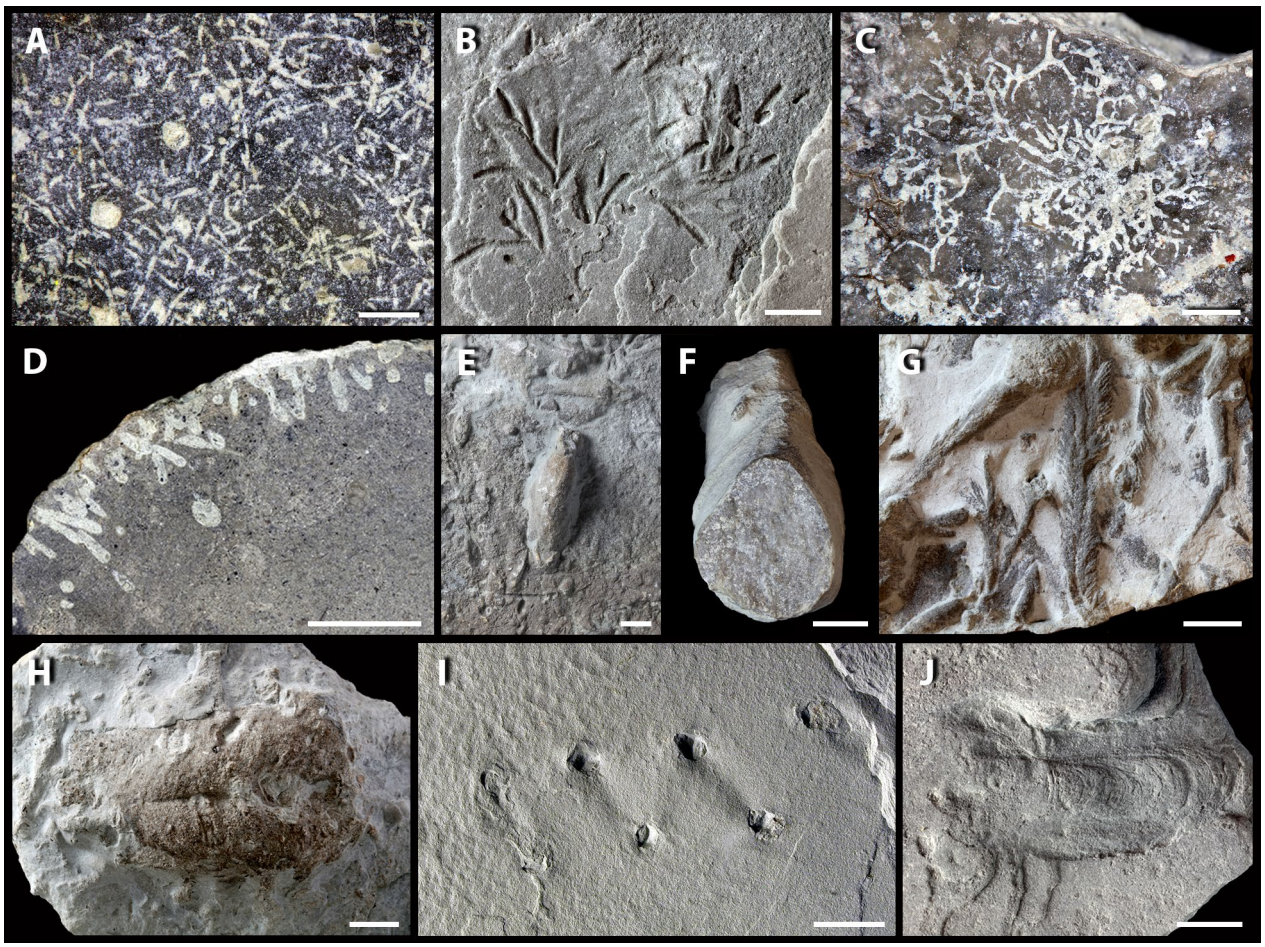

Fig. 16.5. Selected trace fossils from the Ohesaare cliff, Ohesaare Regional Stage. Scale bars D, E, G–J – 1 cm; B, F – 5mm; A, C – 1mm. **A**, **C, D** bioerosional trace fossils on the hardground**; A** – abundant bryozoans borings, GIT 403-604-1; **C** – dendritic bioerosional traces GIT 403-634-2; **D** –dense *Trypanites socialis* Eisenack borings in cross-section, GIT 362-783. **B** – *Chondrites* isp. GIT 403-602. **E**, **F, G** bivalve traces; **E** – *Lockeia siliquaria* James, GIT 362-772; **F** – *Oravaichnium carinatum* Stachacz, Knaust & Matysik, GIT 363-955; **G** – *Protovirgularia pennata* (Eichwald), GIT 156-996-1. **H** – trilobite trace *Rusophycus* isp., GIT 362-682. **I**, **J** polychaete traces in bedding-plane view; **I** – corkscrew-shaped trace *Helicodromites* isp., GIT 362-11; **J** – *Rhizocorallium* isp., GIT 403-613.

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