

Stop 12: Suuriku cliff

Tõnu Meidla and Oive Tinn

Location: Coordinates of the terminal points: west: 58°30′32.65″N, 21°59′24.14″E; east: 58°30′22.61″N and 22°0′15.91″E; Saare County, Estonia.

Stratigraphy: Sheinwoodian, Jaani Fm (Mustjala and Ninase Mbs), Jaani and Jaagarahu RSs.

Status: Cliff is under protection; no hammering, but loose material may be collected.

More information: <https://geoloogia.info/en/locality/12227>

The following text is modified from Meidla & Tinn (2015).

The Suuriku cliff (Fig. 12.1), the second highest on Saaremaa Island, is located in north-western Saaremaa. It comprises about 950 m long escarpment along the northern coast of the Tagamõisa Peninsula. The maximum height of the Suuriku cliff reaches 8 m. It is actively abraded and rather unstable, with heaps of limestone

debris and blocks below the escarpment pointing at recent collapses.

The description of the section is largely based on the section at the coordinates 58°30′28.48″N and 22°0′1.76″E (Fig. 12.2). Six subunits are distinguished in the succession. The thicknesses of the subunits vary in different parts of the cliff (see Fig. 12.3).

Description (from the top):

- 1) 0.4–1.3 m – grainstone beds (5–12 cm) intercalating with calcareous marl (up to 3 cm);
- 2) 1.7–3.0 m – thick-bedded oncoidal grainstone, grading into argillaceous wackestone to packstone rich in brachiopods;
- 3) 0.5–2.2 m – crinoidal grainstone, slowly grading into argillaceous wackestone rich in isolated valves and complete shells of brachiopods; the lower boundary of the

unit represents a distinct, slightly undulating surface;

- 4) 0.2–0.3 m – calcareous marl with limestone pebbles, with crinoidal grainstone lenses (up to 2 cm in thickness) in the lower part and bioclastic packstone lenses and nodules in the upper part;

- 5) 0.4–0.7 m – cross-bedded crinoidal(?) grainstone, with frequent bryozoans; stromatoporoids and (in some places) oncoids are found in the upper part;



Fig. 12.1. View of the Suuriku Cliff. Photo: Tõnu Meidla.

6) 0.6–1.5 m – calcareous marl with interbeds and nodules of argillaceous limestone, unsorted bioclastic material; stromatoporoids and tabulate corals are common in some intervals;

The lowermost unit (6) represents the Mustjala Member that is overlain by the Ninase Member (units 1-5).

Lens-like bryozoan reefs could be observed near the eastern end of the cliff, in the upper part of the escarpment.

Stratigraphy

In terms of conodont zonation, the Mustjala Member and the lower part of the Ninase Member (intervals 3-6) correspond to the Upper *Kockelella ranuliformis* Conodont Zone and the upper part of the Ninase Member (intervals 1-2) comprises the *Ozarkodina sagitta rhenana* Conodont Zone (Männik in Meidla et al. 2014). According to the revised stratigraphy, the appearance of *O. s. rhenana* marks the boundary between the Jaani and Jaagarahu RSs (Männik et al. 2024).

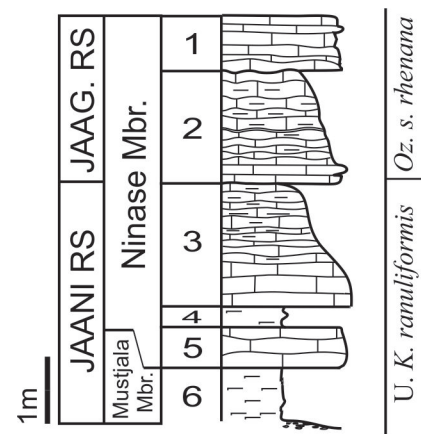


Fig. 12.2. Composite section of the Suuriku Cliff (modified from Meidla et al. 2014). Jaag. RS – Jaagarahu RS.

Environments

The transition from the open shelf mudstones (the Mustjala Member) to shoal fore reef grainstones (the Ninase Member) marks a remarkable shallowing event in the palaeobasin (Nestor and Einasto 1997). The same interval is also exposed in several other sections along the northern coast of Saaremaa. This shallowing marks a distinct stage in the long-term sea level fall throughout

the latest Llandovery and Wenlock, culminating near the Wenlock-Ludlow boundary. During this period, the open shelf clay-rich sediments are continuously shifted towards the subsurface area whilst cyclically but progressively shallowing up limestone and dolostone succession is characteristic of the outcrop belt.

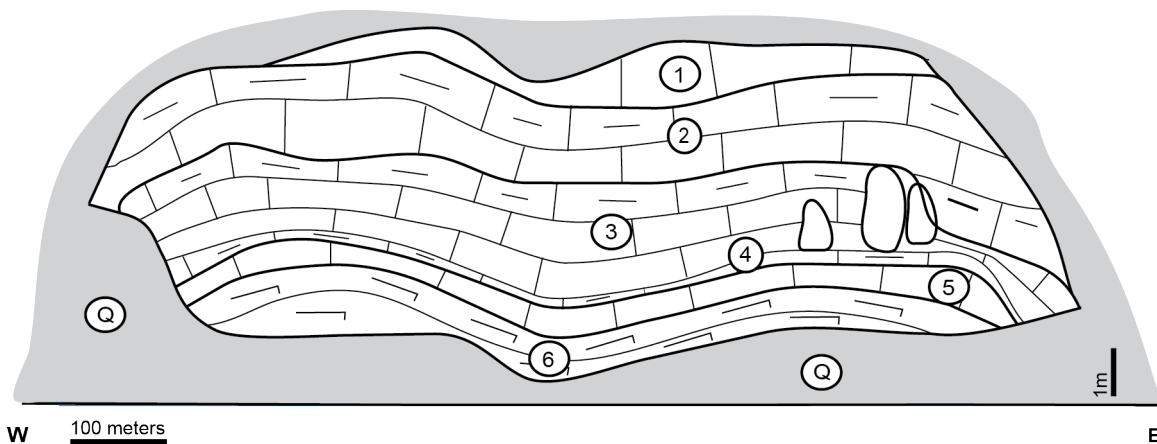


Fig. 12.3. Profile of the Suuriku cliff (Meidla et al. 2014). The principal units distinguished in the succession are shown in the Fig. 12.2 and described in the text.

Fauna

Conodonts. The Upper *Kockelella ranuliformis* and *Ozarkodina sagitta rhenana* conodont zones are recognised in the Suuriku section. Samples from the Upper *K. ranuliformis* Zone are dominated by *Panderodus equicostatus* (Rhodes) and *Wurmiella excavata* (Branson & Mehl), whilst *Ozarkodina sagitta rhenana* (Walliser) is strongly dominated in the upper part of the section (Meidla et al. 2014).

Trilobites. *Encrinurus punctatus* (Wahlenberg) has been recorded (Männil 1978).

Brachiopods. 34 species of brachiopods are identified in this section (Rubel et al. 1991). *Eoplectodonta* (*Eoplectodonta*) *duvalii* (Davidson) and *Visbyella visbyensis* (Lindström) are common in the lowermost part of the section (the marls of Mustjala Member), whilst *Rhynchotrete cuneata* (Dalman) and unidentified species of the genera *Whitfieldella*, *Craniops*, *Isorthis* and *Dolerorthis* range also into the lower Ninase Member (intervals 2-4), being accompanied by *Atrypa reticularis* (Linnaeus) that makes its first appearance in this interval. The diversity of brachiopods decreases upwards in the section. *Dolerorthis*

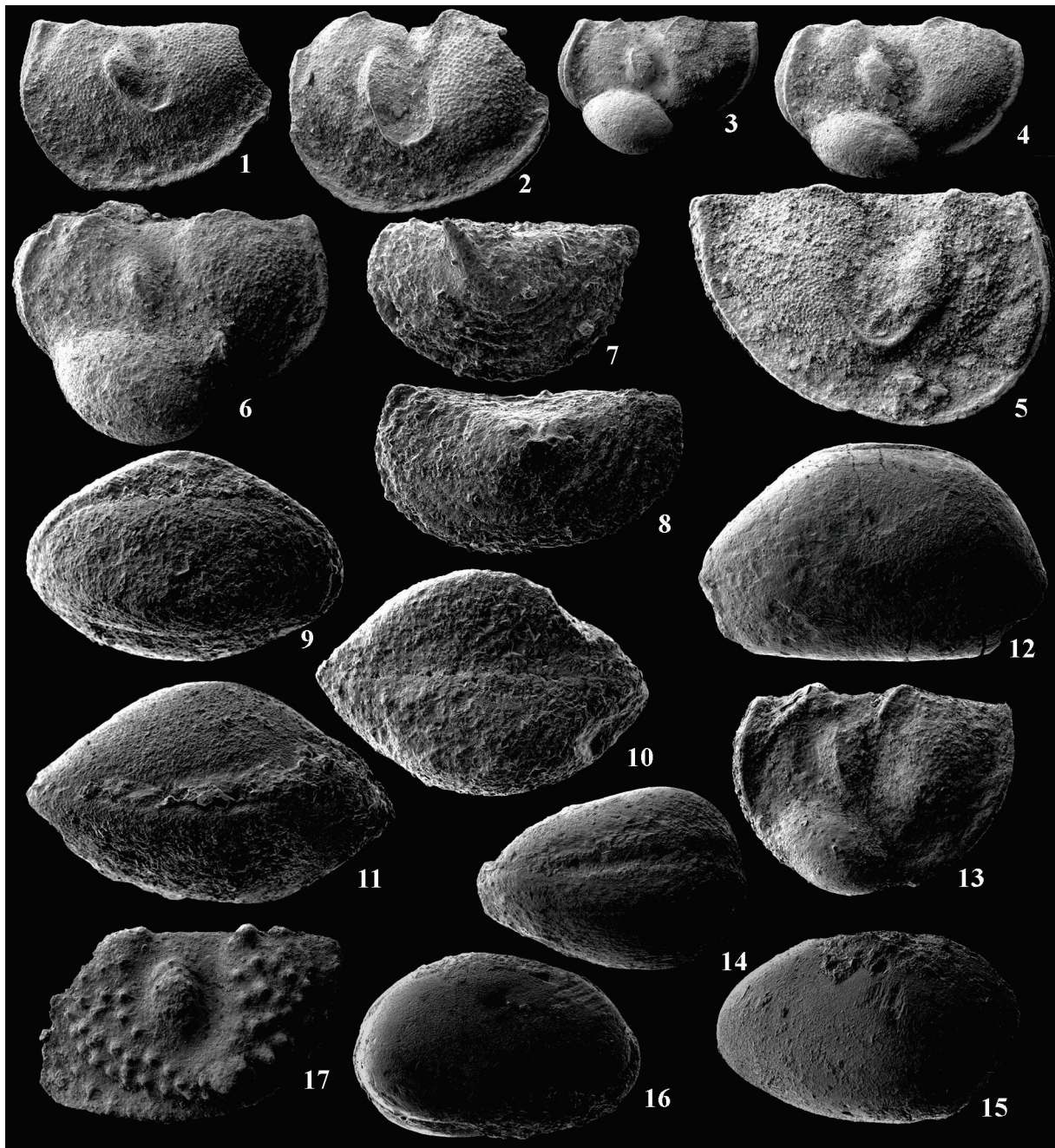


Fig. 12.4. Selected ostracod species from the Suuriku Cliff section. **1** – *Craspedobolbina (Craspedobolbina) ornulata* (Martinsson), incomplete left tecomorphic valve, x30; **2** – *Craspedobolbina (Craspedobolbina) mucronulata* Martinsson, incomplete left tecomorphic valve, x31; **3** – *Craspedobolbina (Craspedobolbina) mucronulata* Martinsson, left heteromorphic valve, x21; **4** – *Craspedobolbina (Mitrobeyrichia) unculifera* Martinsson, slightly incomplete left heteromorphic valve, x21; **5** – *Craspedobolbina (Mitrobeyrichia) unculifera* Martinsson, right tecomorphic valve, x31; **6** – *Craspedobolbina (Craspedobolbina) ornulata* (Martinsson), left heteromorphic valve, x31; **7** – *Schaefericoncha theatri* Schallreuter, right valve, x63; **8** – *Schaefericoncha theatri* Schallreuter, left valve, x53; **9** – *Daleiella ianica* Neckaja, carapace, right view, x62; **10** – *Daleiella ianica* Neckaja, carapace, ventral view, x52; **11** – *Daleiella ianica* Neckaja, juvenile carapace, dorsal view, x101; **12** – *Silenis* aff. *subtriangulatus* Neckaja, slightly incomplete carapace, left view, x42; **13** – *Craspedobolbina (Mitrobeyrichia) unculifera* Martinsson, left tecomorphic valve, x31; **14** – *Microcheilinella variolaris?* (Neckaja), carapace, dorsal view, x41; **15** – *Microcheilinella variolaris?* (Neckaja), juvenile carapace, left view, x54; **16** – *Microcheilinella variolaris?* Neckaja, carapace, right view, x44; **17** – *Beyrichia (Beyrichia) suurikuensis* Sarv, left, slightly incomplete tecomorphic valve, x31.

rustica (J. de C. Sowerby), *Microsphaeridiorhynchus nucula* (J. de C. Sowerby) and *Whitfieldella nitida* (Hall) are the most common species in the upper part of the section, above the reefs (beds 5-6).

Corals. Eight tabulate species of the genera *Palaeofavosites*, *Mesofavosites*, *Syringolites*, *Thamnapora?*, *Subal-*

veolites, *Halysites*, *Heliolites* and *Propora* are identified in this section by Klaamann (1961).

Stromatoporoids. Stromatoporoids are common in this section. Nestor (1966) has identified five species: *Clathrodictyon affabile* Nestor, *Densastroma pexisum* (Yavorsky), *Eostromatopora impexa* (Nestor), *Petridio-*

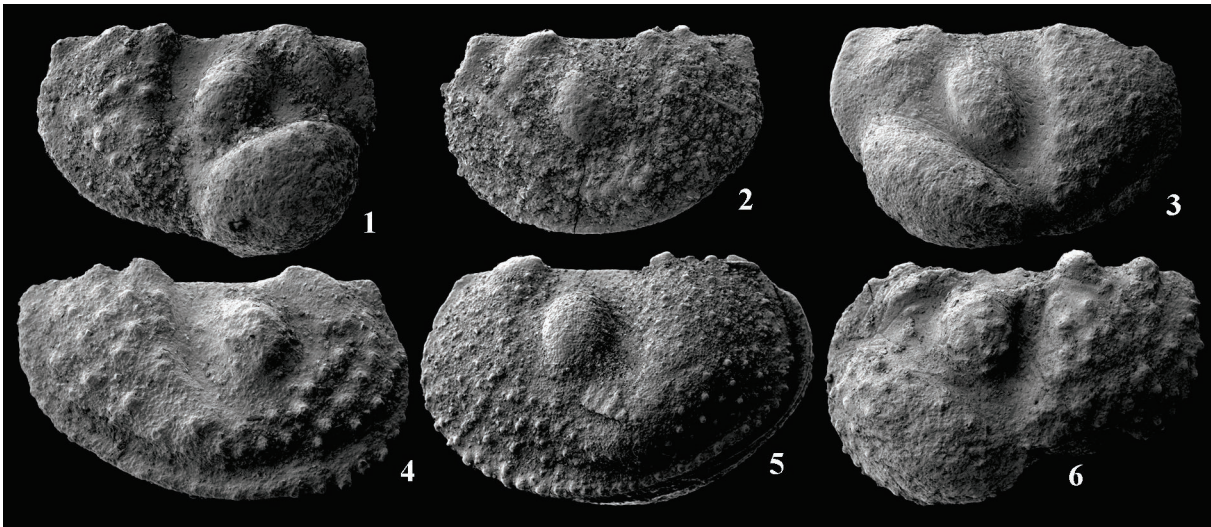


Fig. 12.5. Selected bryrichiids from the Suuriku Cliff section. **1** – *Beyrichia (Beyrichia) bicuspis* (Kiesow), right heteromorphic valve, x26; **2** – *Beyrichia (Beyrichia) bicuspis* (Kiesow), left tecomorphic valve, x26; **3** – *Beyrichia (Beyrichia) suurikuensis* Sarv, left, slightly incomplete heteromorphic valve, x27; **4** – *Beyrichia (Beyrichia) suurikuensis* Sarv, right tecomorphic valve, x30; **5** – *Beyrichia (Beyrichia) halliana* Martinsson, tecomorphic carapace, left view, x21; **6** – *Beyrichia (Beyrichia) halliana* Martinsson, left heteromorphic valve, x21.

stroma simplex (Nestor) and *Simplxodictyon simplex* Nestor.

Ostracods. A detailed ostracod log has never been compiled for this section. The main part of this section comprises the grainstones of the Ninase Member with a very poor ostracod yield. This is likely due to several reasons: sorting of the coarse-grained sediment, destruction of the fragile shells in the coarse carbonate sand and preparation difficulties. Most of the ostracod data comes from the Mustjala Member, which is the lowermost part of the section. The documentation of ostracods in the Ninase Member in this section is mostly based on the clay-lenses related to the bryozoan reefs.

The ostracod assemblage at Suuriku (Figs 12.4 and 12.5) represents the second successive ostracod fauna in the Silurian of Estonia. The assemblage of bryrichiid ostracods is dominated by *Beyrichia (B.) halliana* Martinsson (Fig. 12.5:5-6), *Beyrichia (B.) suurikuensis* Sarv (Fig. 12.4:17, Fig. 12.5:3-4), *Craspedobolbina (Mitrobeyrichia) unculifera* Martinsson (Fig. 12.4:4-5) and *Clavofabella juvenca* Sarv. *Beyrichia (Beyrichia) bicuspis* Kiesow (Fig. 12.5:1-2) makes its first appearance in the Ninase Formation, as well as *Craspedobolbina (Craspedobolbina) ornulata* Martinsson (Fig. 12.4:1, 12.4:6). *Apatobolbina gutnica* Martinsson and *Craspedobolbina (Craspedobolbina) mucronulata* Martinsson (Fig. 12.4:2-3) are also referred to by Sarv (1968, 1970).

The Mustjala Member was, for a long time, thought to

be the appearance level of the first Silurian primitiopsids. There is a considerable gap between the Ordovician *Baltocyamus primarius* Meidla (Anisocyaminae; Oandu Regional Stage of Estonia, lower Katian; Meidla 1995, 1996) and the first Silurian primitiopsids in the lower Wenlock. *Venzavella germana* Sarv is one of the oldest representatives of this family in the Silurian.

The record of Metacopina is incomplete, being limited to *Eoprimitia? versipella* Neckaja (Thlipsuridae), *Daleiella ianica* (Neckaja) (Fig. 12.4:9-11), *Microcheilinella variolaris* (Neckaja) (Fig. 12.4:14-16) and *Microcheilinella acutafinis* (Neckaja), all listed species being so far recorded in this section from the Mustjala Member only.

Pseudoaparchites gregarius (Neckaja) (Cytherelliformes, Platycopina) has also been recorded in this section, but the level could not be specified.

Other fauna. Lens-like bryozoan reefs near the eastern end of the cliff, in the upper part of the escarpment, are mainly built by the bryozoans *Ceramopora* and *Liolema*, but branching tabulates, stromatoporoids, echinoderms and, less commonly, ostracods and brachiopods are present in the clay lenses between the bryozoan encrustations (Aaloe & Einasto 1970; Rubel et al. 1991). Ausich et al. (2012, 2015) have identified three genera of crinoids from the marlstone interlayers of the Ninase Member: *Enallocrinus*, *Eucalyptocrinites* and *Protaxocrinus*.

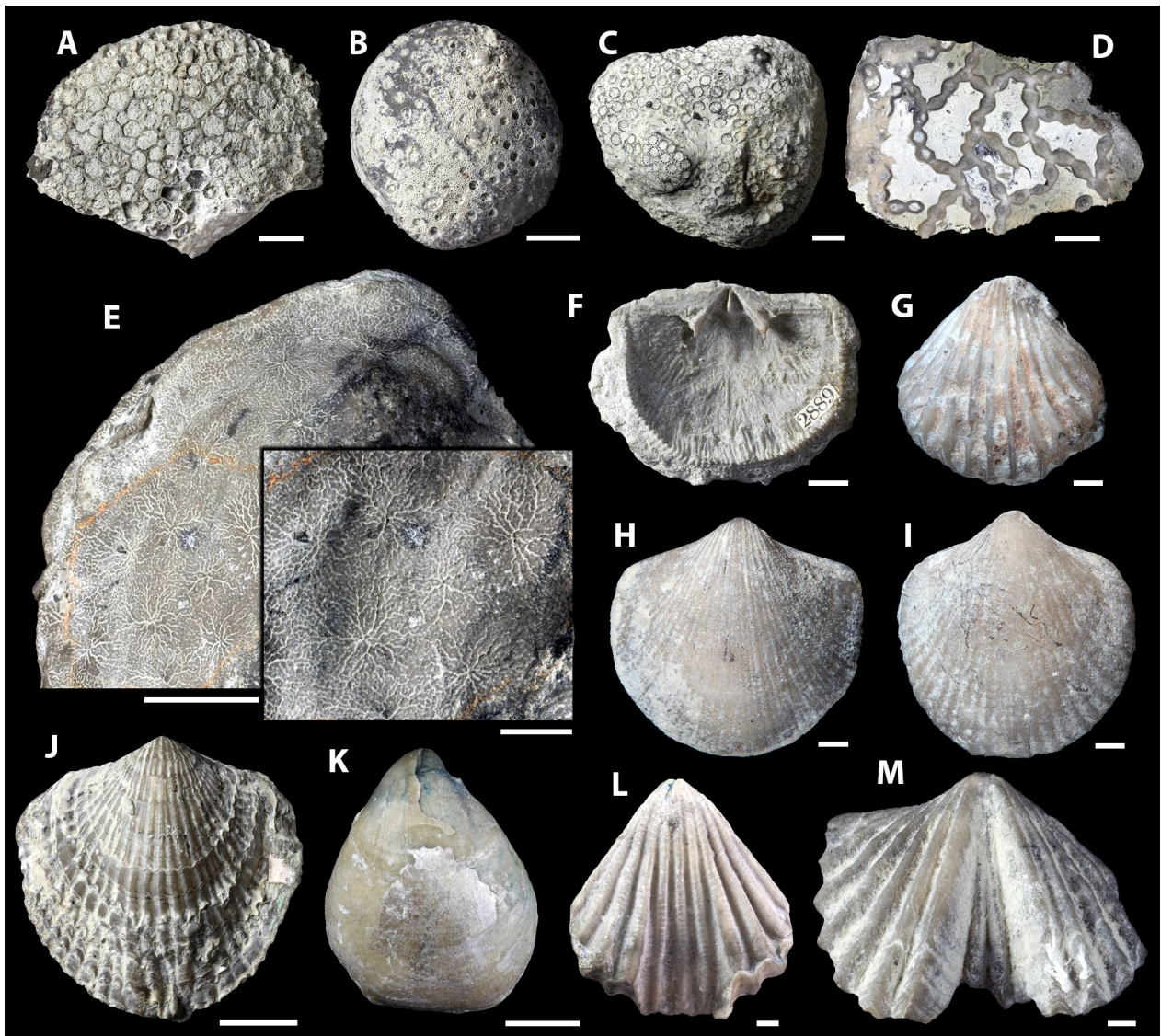


Fig. 12.6. Selected macrofossils of the Suuriku cliff, Jaani Regional Stage. Scale bars E – 1 cm, A–D, E close-up, F, J, K – 5 mm; G–I, L, M – 1 mm. **A–D** tabulate corals; **A** – *Favosites serratus* Sokolov, GIT 180-715; **B** – *Heliolites interstinctus* (Linnaeus), GIT 529-151; **C** – *Propora* sp., GIT 529-149; **D** – *Halysites senior* Klaamann, GIT 180-367. **E** – stromatoporoid *Stromatopora impexa* Nestor and close-up from the upper surface with astrorhizae, GIT 435-44. **F–M** brachiopods; **F** – *Dolerorthis rustica* (J. de C. Sowerby), GIT 128-36; **G** – *Microsphaeridiorhynchus nucula* (J. de C. Sowerby), GIT 853-28; **H** – *Visbyella visbyensis* (Lindström), GIT 128-130; **I** – *Resserella canalis* (J. de C. Sowerby), GIT 128-149; **J** – *Atrypa (Atrypa) reticularis* (Linnaeus), GIT 130-129; **K** – *Whitfieldella nitida* (Hall), GIT 130-188; **L** – *Rhynchotreta cuneata* (Dalman), GIT 173-13; **M** – *Neoplatystrophia jaaniensis* (Rubel), GIT 128-112.

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