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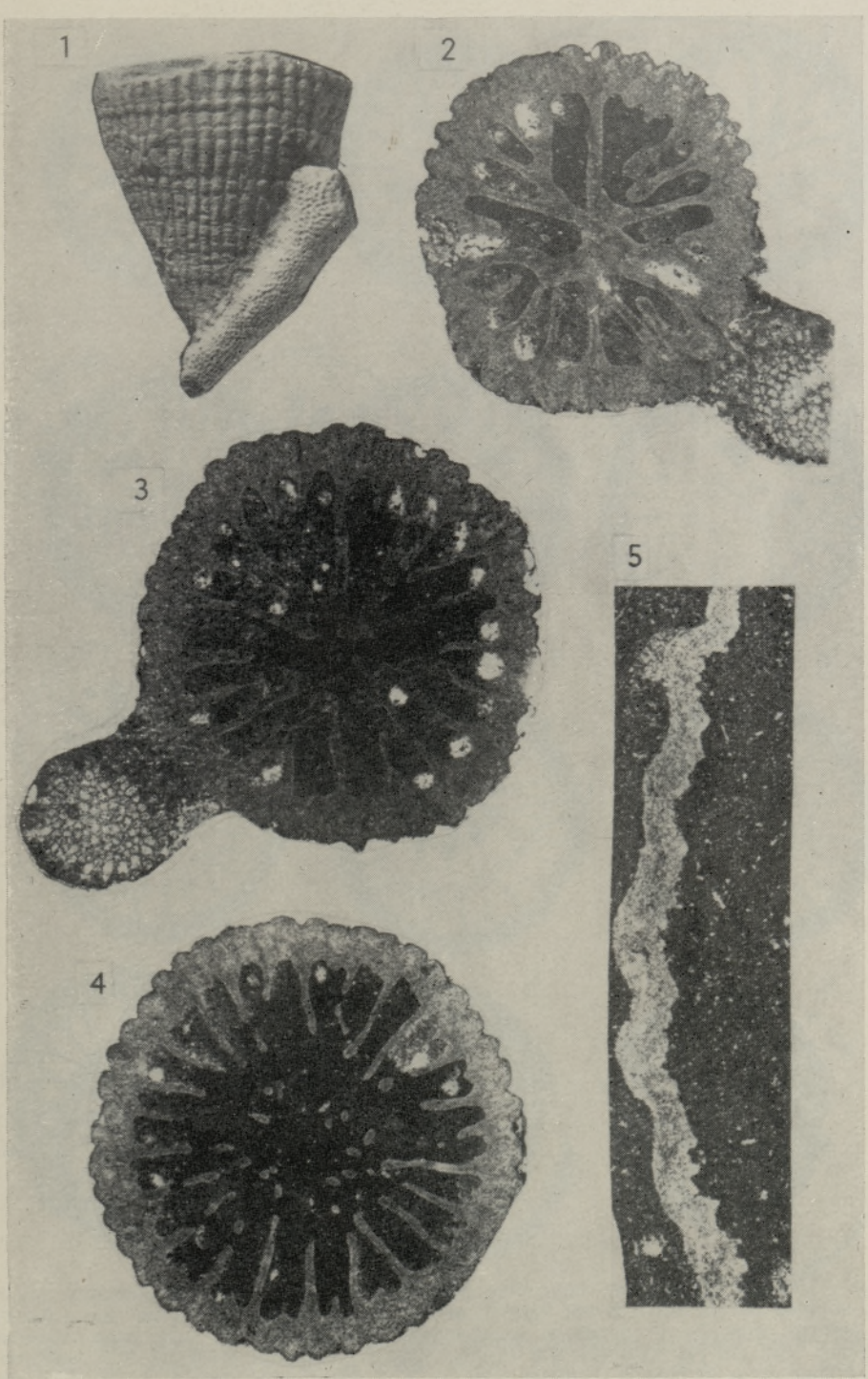
LAMBELASMA NARVAENSE, A NEW RUGOSE CORAL FROM THE MIDDLE ORDOVICIAN OF ESTONIA

Rugosa of the family Lambelasmatidae dominate in Baltoscandian coral faunas of the Middle Ordovician and are widely distributed from Norway (Oslo district) and Sweden (Siljan district, Östergötland, Öland) to Estonia, Leningrad Region and Podolia; additionally they occur in Pleistocene erratic boulders throughout the northern German-Polish lowlands. Perforate laminar septa built of incompletely fused coarse long trabecular spines (monacanths) are the most important feature characterizing this ancient group (suborder Calostylina). Among Rugosan phylogeny, it represents one of the primary radiations, well flourishing and highly diversified already during Viruan times with the first coralla having invented axial bosses (*Coelostylis*), dissepiments (*Neotryplasma*), and everted calices (*Calostylis*). Lambelasmatidae continue into Harjuan times, but as a minor constituent of solitary Rugosa faunas, which then become predominated by Streptelasmatidae.

About 15 Ordovician species have been recorded from Baltoscandia. This number may be doubled from evidence of undescribed collections at the author's disposal. Most interesting are several new taxa of *Lambelasma* Weyer, 1973, a possible junior synonym of *Lambeophyllum* Okulitch, 1938; that genus offers good Caradocian index fossils (from Jõhvi to Nabala Stages). *Lambelasma narvaense* sp. n. to be proposed here was found both in Estonia (Rakvere Stage) and in the German Democratic Republic (Baltic Sea limestone of same age, Pleistocene drift).

The following list of Estonian Lambelasmatidae includes all previously erected species and some nomina nuda (descriptions in press). Two somewhat doubtful specimens are omitted: «*Lambeophyllum* (aff. *Streptelasma compactum* Hill, 1953)» (Кальо, 1956, p. 69) = «*Lambeophyllum compactum* (Hill, 1953)» (Ивановский, 1965, p. 10) from Idavere and Jõhvi Stages, «*Primitophyllum primum* Kaljo, 1956» (revised in Weyer, 1980, paratype No. Co1333 similar to Lambelasmatidae, not conspecific with holotype of unknown systematic position) from Jõhvi Stage. Morphological revisions of selected species have been published by D. Weyer (1980, 1982, 1984). Remarkable gaps within the coral sequence during Keila, Nabala, and Pirgu Stages will be due to present imperfect knowledge. Unstudied faunas can be expected, especially those from Keila and Oandu Stages perhaps yielding *Coelostylis* Lindström, 1880 (Neuman, 1967), curiously missing up to now in Estonia. Existence of Lambelasmatids in strata corresponding to Nabala Stage is proved by German erratic Pleistocene drift materials (small collection from aphanitic limestone facies).



Plates I—III. *Lambelasma narvaense* sp. n., holotype No. Co1340 (Institute of Geology, Tallinn), Rakvere Stage, Skaryatina Gora near Narva River.
Fig. 1. Lateral view of corallum, ×2.5. *Figs 2—4.* Cross-sections of middle calicular regions, ×8 (2—3) and ×7 (4); drawings see Pl. II, Fig. 12, and Pl. III, Figs 2, 6. *Fig. 5.* Multitrabecular septa of top calicular margin (detail from cross-section of Pl. III, Fig. 12), ×20.

PLATE II

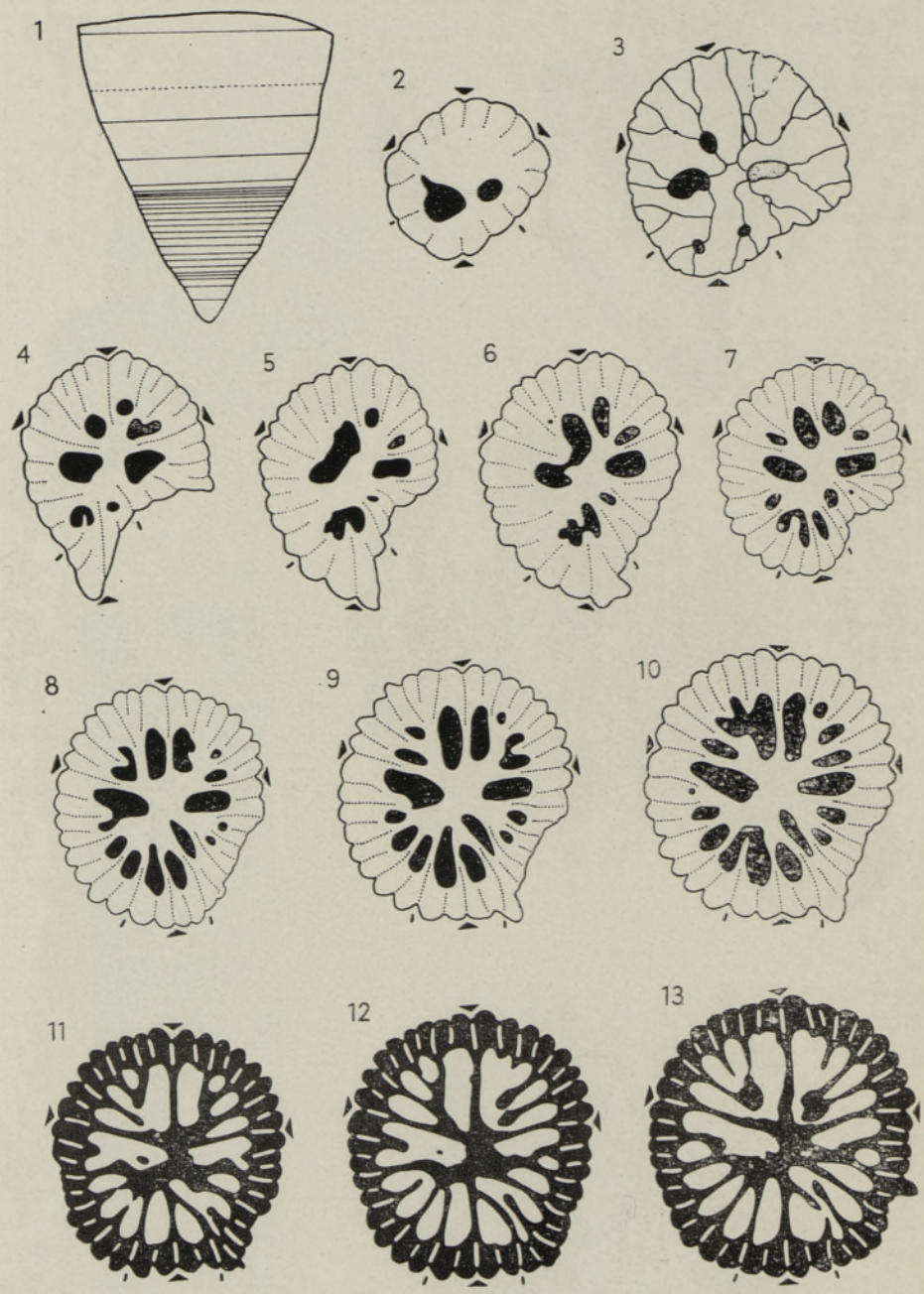
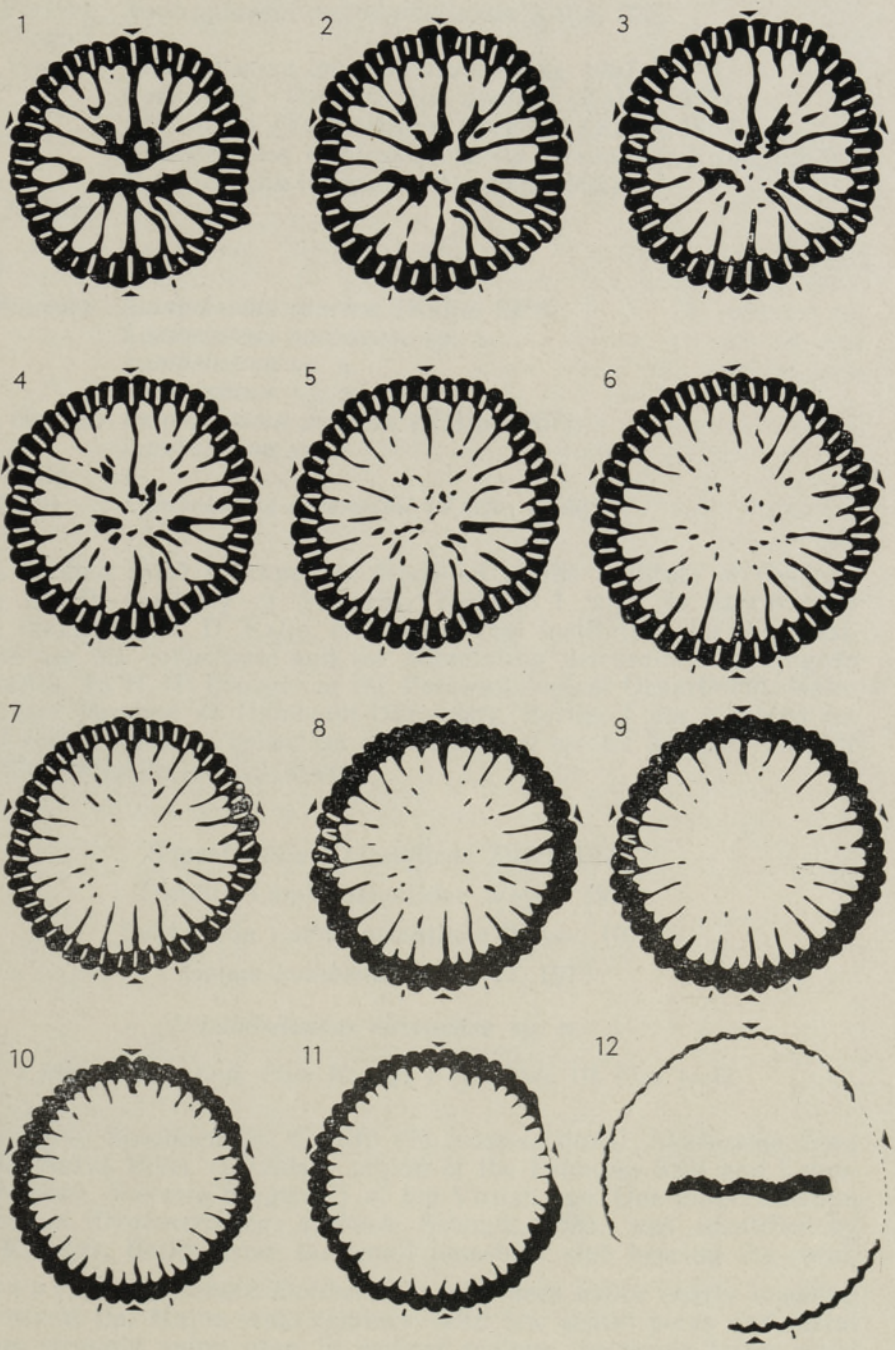


Fig. 1. Outline of corallum indicating positions of 25 prepared cross-sections, ×2.4; the stippled section No. 2 is not figured; section No. 20 lying only 0.1 mm above No. 21 is omitted. *Figs 2—13.* Series of cross-sections from subtabular and lower calicular regions, ×12 (2—3), ×9.6 (4), ×8 (5—6), ×6.4 (7—10), and ×5.6 (11—13); subtabular lumina occur in Figs 2—7 (black areas of 2, 3, one stippled area of 4—7); distances from the basal section (2) count 0.9 (3), 1.3 (4), 1.5 (5), 1.7 (6), 2.0 (7), 2.4 (8), 2.7 (9), 3.1 (10), 3.5 (11), 3.8 (12), and 4.2 mm (13).



Figs 1—12. Series of cross-sections from middle and upper calicular regions (without subtabular areas), ×4.8 (1—3), ×4.4 (4—6), ×4 (7—9), ×3.2 (10), and ×2.8 (11—12); distances from the basal cross-section of Pl. II, Fig. 2, count 4.5 (1), 4.9 (2), 5.2 (3), 5.4 (4), 5.7 (5), 5.9 (6), 6.0 (7), 6.1 (8), 6.5 (9), 7.9 (10), 10.0 (11), and 14.7 mm (12); septal details within Fig. 12 ×8.

Harjuan

F_{II}, Porkuni	*Neotryplasma codonophylloides* Kaljo, 1957
F_{Ic}, Pirgu	?
F_{Ib}, Vormsi	*Neotryplasma longiseptatum* Kaljo, 1957
	Coelostylis (*Vormsistylis*) *dentata* (Kaljo, 1957)
	Coelostylis (*Vormsistylis*)? *bekkeri* (Kaljo, 1957)
	Estonielasma hemicymatelasma (Reiman in Kaljo, 1957)
	Estonielasma antiquum (Reiman, 1958)
F_{Ia}, Nabala	?

Viruan

E, Rakvere	*Lambelasma atavum* (Kaljo, 1958)
	Lambelasma narvaense sp. n.
	Lambelasma sp. n.
	Dybowskinia sp. n.
D_{III}, Oandu	*Estonielasma praecox* (Kaljo, 1957)
	Lambelasma sp. n.
D_{II}, Keila	?
D_{I}, Jõhvi	*Lambelasma dybowskii* (Kaljo, 1956)

The studied coral specimen is deposited at the Institute of Geology of the ESSR Academy of Sciences, Tallinn. I wish to express my sincere thanks to Dr. D. Kaljo, director of that institution, for the possibility to see his collections and for stimulating discussions on Rugosa systematics. To H.-H. Krueger of the Palaeontological Department, Natural History Museum of Humboldt-University, Berlin, I am indebted for loan of corals from his collection of Pleistocene erratic boulders and for help with a trilobite identification.

Suprafamilia Calostylicae Zittel, 1879

Familia Lambelasmatidae Weyer, 1973

Subfamilia Lambelasmatinae Weyer, 1973

Genus *Lambelasma* Weyer, 1973

Lambelasma narvaense sp. n.

Plate I, Figs 1—5; Plate II, Figs 1—13; Plate III, Figs 1—12

Holotype. Specimen No. Co1340 (26 cross-sections), Skaryatina Gora near the Narva River (boundary region of the Estonian SSR and Leningrad Region), Rakvere Stage (E) of top Viruan age. One mid-cranidium fragment of *Erratencrinurus seebachi* Schmidt, 1881, was identified by H.-H. Krueger, Berlin, from the small limestone slab bearing the coral.

Diagnosis. A trochoid *Lambelasma* with deep calice nearly reaching the proximal tip. Major septa laminar, with few septal pores and distal margins strongly spiny even in central regions. In levels below axial septal fusion, interseptal spaces are large in proportion to thin major septa.

Description. The excellently preserved monotype is a conical erect corallum of 17 mm in length, attached to a Bryozoan. Diameters of unbroken calicular margin and basal tip measure 14 mm and 0.5 mm. External wall (archaeotheca) with fine growth rugae and coarse longitudinal sculpture. Broad interseptal ribs are flatly to well rounded; deep slender septal furrows show the pinnate arrangement according

to the law of Kunth, with multiplication by splitting of old furrows connected with intercalation of new ribs. There are no additional «third order» furrows of hyposepta. Depth of calice amounts to 80% of corallum length.

The mature septal apparatus consists of 50 septa, 28 of which are major ones. Minor septa remain rather short and are active only in the upper calice; their generally biform reduction (incorporation into the wall) starts in middle calicular parts and is finished in the lower calice. Major septa reach the centre at about half the corallum height and fuse without forming an axial boss. Metasepta demonstrate a remarkable pinnate position in four quadrants. Cardinal septum of same length as other major septa, with an incipient very weak shortening in high calicular regions (Pl. III, Figs 5—8, there surrounded in a somewhat fossula-like manner by neighbouring metasepta). Larger pseudofossulae occur near cardinal and lateral septa.

The central level just above axial septal fusion (Pl. III, Figs 5—6) is characterized by many closely arranged septal spines, some of which may be slightly thickened (rhopaloid) centripetally at their axial ends before fusing with next septa. Both axial stereozone and major septa (including their comparatively small massive areas of pinnately fused interior parts in four quadrants) of lower calice have little thickening by stereoplasm, thus leaving rather large interseptal lumina nearly to the calicular base.

The basal apparatus is weakly developed. There are some few convex and thick tabulae near the proximal tip, in addition to the predominating slight stereoplasmatic thickening of basal calicular skeletal elements.

Septal microstructure changes from a multitrabecular type of immediate calicular margin (Pl. III, Fig. 12) to thick and hyperlong monacanths. Fusion of single trabecular spines proceeds rather well, but with some remaining pores located in central as well as in peripheral septal parts, sometimes not closed even in the lowest calice (antiseptum of Figs 5—6, Pl. II). The following formulae indicate septal ontogeny (n = number of major septa, N = number of all septa, D = diameter):

	$\frac{1}{2}\|\frac{1}{2}$	$\frac{2}{3}\|\frac{2}{3}$	$\frac{3}{4}\|\frac{3}{4}$	$\frac{3}{5}\|\frac{4}{5}$	$\frac{4}{5}\|\frac{4}{5}$	$\frac{4}{6}\|\frac{4}{6}$
n	10	14	18	21	22	24
N	15	22	28	34—35	36—38	41
D (mm)	1.9	2.5	2.6—3.4	3.8—4.9	5.2—5.9	6.4—6.8
pl./fig.	II/2	II/3	II/4—6	II/7—9	II/10—12	II/13, III/1

	$\frac{4}{6}\|\frac{5}{6}$	$\frac{5}{6}\|\frac{5}{6}$	$\frac{5}{7}\|\frac{5}{6}$	$\frac{5}{7}\|\frac{5}{7}$
n	25	26	27	28
N	43—44	46	47	48—50
D (mm)	7.1—8.1	8.5	8.9—9.0	10.2—13.6
pl./fig.	III/2—5	III/6—7	III/8—9	III/10—12

Discussion

Lambelasma lambei Weyer, 1973 from the German Pleistocene drift *Macrourus* limestone (of Baltic Sea origin, stratigraphically corresponding to the Estonian Oandu Stage) is the closest of known species, with similar configuration of major septa (definite pinnate arrangement, well developed pseudofossula with slightly shortened cardinal septum), but differs in having much less spinous septal margins in central parts

above axial fusion, and in building compact axial stereozone (at least two times wider) in lower calice, where interseptal chambers grow distinctly smaller due to stronger thickening of septa. *Lambelasma dybowskii* and *Lambelasma atavum* may be distinguished by their strongly porous, more spinous and less laminar septa, which are much thicker and bear coarser spines at distal margins (see Кальо, 1956, 1958). Additional separating features are hyposepta in *Lambelasma dybowskii*.

One specimen of *Lambelasma narvaense* has been collected from an aphanitic Baltic Sea (or «Wesenberg») limestone boulder in the Pleistocene drift of the German Democratic Republic (Weyer, 1984). Age determination based on accompanying fossils is either Rakvere or Nabala Stage.

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LAMBELASMA NARVAENSE, UUS RUGOOS EESTI KESKORDOVIITSIUMIST

On kirjeldatud uut liiki perekonnast *Lambelasma* Weyer, 1973 (? võib-olla noorem sünonüüm perekonnale *Lambeophyllum* Okulitch, 1938). Materjal on leitud Rakvere lademest, kus domineerivad rugooside hulgas selle perekonna ja teised lambelasmatiidide esindajad.

Д. ВЕЙЕР

LAMBELASMA NARVAENSE, НОВЫЙ ВИД РУГОЗ ИЗ СРЕДНЕГО ОРДОВИКА ЭСТОНИИ

Описан вид из рода *Lambelasma* Weyer, 1973 (? возможно, младший синоним родового названия *Lambeophyllum* Okulitch, 1938). Материал происходит из раквереского горизонта, в котором среди ругоз доминируют представители названного рода и другие ламбелазматиды.