

A



B



C

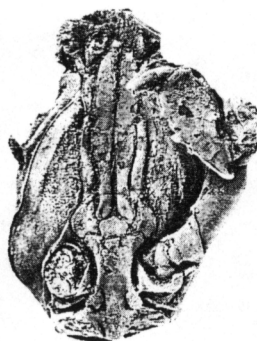
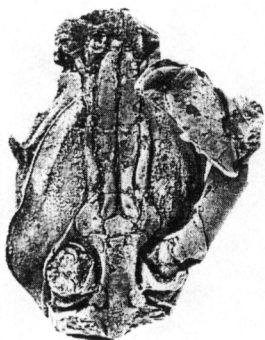


Fig. 10. *Hemioon eysunesensis* sp. nov. from the Upper Campanian at Ikorfat. A: holotype, MGUH 21.592, dorsal view of carapace, $\times 1.5$; B: paratype, MGUH 21.593, dorsal view, $\times 1$; C: paratype, MGUH 21.594, ventral view showing details of maxillipeds and sternum, $\times 1.5$.

Material. 82 more or less complete carapaces, many preserving details of the ventral surface and limbs. Holotype, a carapace (MGUH 21.592) from an Upper Campanian concretion in black shale at Ikorfat, 550 m above sea level on the north coast of Nūgssuaq. Additional specimens, 79 carapaces in concretions from the steeply inclined strata of black shales in the profile at Brudkløft between 550 m and 625 m altitude, and 2 from the same strata immediately east of Brudkløft at 700 m and 885 m altitude. The age of the shale was determined by Rosenkrantz (1970) as Upper Campanian.

Description. The carapace is almost elliptical in outline, the width a little more than half the length, widest just behind the lateral spines about one third distant from the front; moderately rounded in transverse section, in longitudinal section it reaches its greatest height in the anterior third then curves gently to the posterior margin. The triangular spines forming the bifid rostrum are separated by a deep acutely V-shaped cleft extending onto the dorsal surface as a brief median furrow: the rostrum projects a little beyond the outer orbital spines and its sides form a regular curve with the upper orbital margin in which are two fissures separated by a broad, flatly rounded tooth. The slightly incurved outer orbital spine immediately alongside the outer fissure is rather long and slender. The orbits are narrowly ovate and a short, curved obtuse eyestalk is seen in three specimens. The anterolateral margins are deeply scalloped to a short triangular spine about midlength and again to the slender, curved, sharply pointed, forwardly and outwardly directed lateral spine, which has a length of about one sixth the carapace width. Behind the spines the margins are slightly convex to sub-parallel to the posterior third then, becoming concave, converge to the weakly excavated posterior margin. There is a sharp posterolateral marginal ridge gradually becoming obsolete towards the midlength of the carapace.

The cardiac furrows and impression of the epimeral adductor muscle scars are faint, but generally distinct; in front of these, two oblique, slightly cratered gastric muscle pits are represented as low tubercles in internal casts.

The dorsal ornament consists of small, well separated pits or pores, more closely placed in the anterior and lateral regions.

The granulated subhepatic regions have two deep furrows, one below the marginal spines, the other along the inner edge. The pterygostomial region is narrow, curved, almost rhomboidal and strongly tumid, with a granulated surface; a ridge running parallel to the pleural suture becomes obsolete shortly behind the lateral

spine and a smooth rim bounds the buccal margin. The first-third sternites projecting between the third maxillipeds, are fused and onion-shaped; the anterior edge of the fourth sternites is straight and inclines very little forwards from short incisions near the midline, its sides long and slightly excavated between the first pair of legs, the posterior angles are much rounded and deeply incised either side of the midline before the adjoining fifth sternites which are about as long as the fourth, almost as wide and similarly excavated laterally.

The third maxillipeds fill the buccal cavity. The large coxopodites are closely articulated medially with the lateral part of the first-third sternites and basally with the lateral head of the fourth sternites; its outer margin is strongly convex. The subtriangular basiopodite is divided by a curved groove which reaches the distal margin between the exopodite and the ischiognath. The ischiognath expands a little distally and its outer margin is sinuous, that of the merognath is convex; broadest in its proximal third the merognath is about as long as the ischiognath. The exopodite is sinuous, about half the width of, and a little longer than the ischiognath.

The first abdominal somite is short, rather narrow, but increasing in width posteriorly; each outer angle overlaps some of the margin of the succeeding somite; the long spatulate sixth somite reaches the basis of the second pair of limbs. The telson is not preserved. In section the first somite is flat, the second-fifth are rounded and a median elevation on the third gives way to a prominent tubercle on the fourth somite. There is scattering of fine pits over the surface similar to those on the dorsal surface.

The left and right chelipeds are similar in size and form. The coxa is short, wide and curved distally. The ischium is strongly curved outwards and subdivided by furrows into five lobes. The merus is almost cylindrical and generally has a granulated dorsal ridge in the proximal and median part. The proximal articulation forms an angle of about 45° with the axis. The carpus is subquadrate, its curved upper margin terminating in a stout spine; the articulation with the propodus is broadly excavate. The somewhat flattened propodus has sharp upper and lower margins; the upper margin is boldly convex distally, its almost straight proximal half laying against the merus terminates in a rounded attenuation with the slanting portion of the lower margin. On the distal part of the lower margin two or three spines increase in size distally and project in the same plane as the robust fixed finger. A spine or node near the upper margin marks the articulation of the dactylus which is gently curved and has a sharp upper and somewhat ridged outer margin. The opposing margins are serrate. The surface of the merus, carpus and propodus is rugose

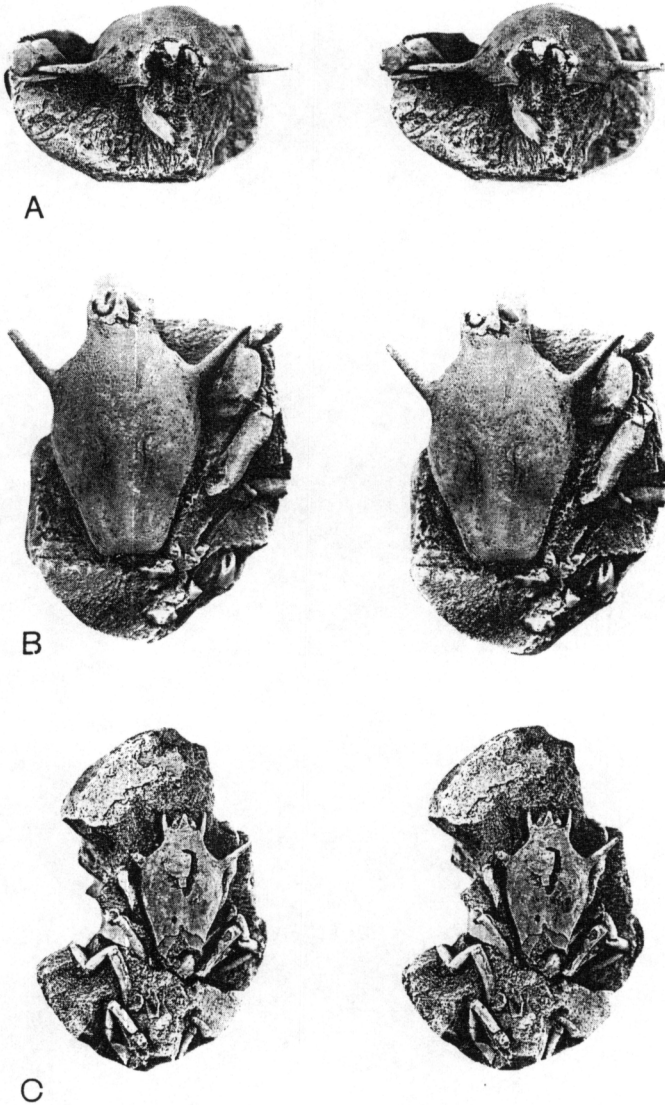


Fig. 11. *Lyreidus succedanus* sp. nov. from the Campanian–Maastrichtian at Turrillakløft. A–B: holotype, MGUH 21.595, A: frontal view; B: dorsal view, $\times 1.5$; C: paratype, MGUH 21.596, showing limbs associated with detached sternites, $\times 1$.

with short irregular transverse rows of pits for setae on the outer margin and a granulation on the upper side of the merus and carpus. There is a row of pits along the margins of the fixed finger and dactylus.

The second to fourth pairs of legs are rather similar in form and size. The coxa and basi-ischium are short, the merus long and slender, elliptical in section; the carpus is shorter, distally wide, almost wedge-shaped and flat; the propodus and dactylus are paddle-shaped. The fifth pair of legs are more dorsally placed, smaller, less flattened and have only a small paddle-like dactylus.

A lateral swelling typical of *Bopyrus* infestation occurs on the right side of one specimen.

Measurements. The carapace length, including rostrum, ranges from 10.5 mm to 33.5 mm, most specimens,

however, are between 15 and 30 mm in length. The greatest width is 0.55% to 0.60% of the length. The front occupies from 0.55% to 0.60% of the width while the posterior margin is distinctly less than a half, although not clearly indicated due to the rounded angles. The lateral spine occurs some 0.25% to 0.30% distant from the front and its median length varies from less than 1 mm in small specimens to more than 3 mm in the largest.

Discussion. Although the rostrum of *Hemioon* has not before been described in any detail, its bifid character was made known by Wienberg Rasmussen in correspondence with Wright & Collins who incorporated (1972) this information in their reconstruction of *H. elongatum* (A. Milne-Edwards) and *H. circumviator*

Wright & Collins, 1972 on the evidence, in the former species of. "the insignificant base [of the rostrum] is deeply grooved, so that it may have been bifid".

The superior preservation of the present species not only provides a clearer definition of the sternum, but also a concise knowledge of the limbs and the generic diagnosis of Wright & Collins (1972) should be modified to include these characters.

H. eysunesensis has affinities to both *H. elongatum* and *H. circumviator*; the former has a more slender carapace with narrower frontal and posterior margins, while in *H. circumviator* the less robust anterolateral spine is further from the front. *Symnista bidentata* Rathbun, 1935 was described from a single incomplete carapace from the Sucarnoochee beds of the Danian Midway Group in Alabama; it has similarly placed anterolateral and lateral spines. Both spines are abraded, however, and neither the rostrum nor sternum is known, but it is possible that this species represents a Paleocene member of *Hemioon*.

Genus *Lyreidus* de Haan, 1830

Type species. *Lyreidus tridentatus* de Haan, 1844 by monotypy.

Range. Lower Campanian to Recent.

Remarks. During preparation of this work a carapace from a presumed Danian boulder of flint, found in Quaternary till at Bad Oldesloe, North Germany, was described and figured by Gripp (1969) as *Pseudoraniella* sp. The specimen, refigured by Kummel (1972) obviously belongs to the present genus.

Lyreidus succedanus sp. nov.

Figs 11A-C, 12

1970 *Raninid*, new genus; Wienberg in Rosenkrantz, p. 426.

1972 *Acantharanina* Wienberg; Kummel. *nom. nud.*

Diagnosis. Carapace subcarinate posteriorly, the anterior portions of the branchial regions are nodose and there is a small to obscure node on the anterolateral margins. No spine is developed on the upper margin of the chelae.

Material. Holotype, a carapace MGUH 21.595, from the Cucullaea conglomerate at Turritellakløft, Campanian-Maastrichtian. Additional specimens, 192 carapaces from a series of localities ranging from Lower Campanian to Maastrichtian: Agatdalen, valley side; Agatkløften; Quvnilik, Ilugigsoq and Qilakitsoq on north side of Auvfarssuaq; Agatdalen, western slopes (incl. 'Sonja lens', Rundetårn and Jeepkløft); Qaersutjægerdal, Turritellakløft (incl. *Cucullaea* conglomerate); Breccianæsen and east of Ikorfat, Kangilia, Konglomeratkløft and Niaqornat on north coast of Nûgs-suaq.

Description. The carapace is essentially similar to *Lyreidus rosenkrantzi* sp.nov. It is considerably more rounded in longitudinal section; rising rapidly behind the front it reaches maximum height at the base of the lateral spines then curves smoothly to the posterior margin. At the greatest carapace height the transverse section is steep, barrel-like, but at the base of the mesogastric lobe there develops a broadly rounded median ridge which continues to the posterior margin where it

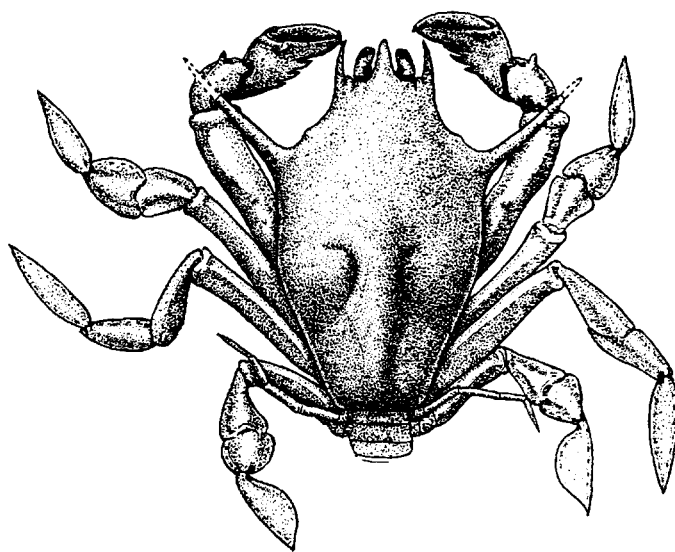


Fig. 12. *Lyreidus succedanus* sp. nov. Diagrammatic reconstruction of carapace and limbs.

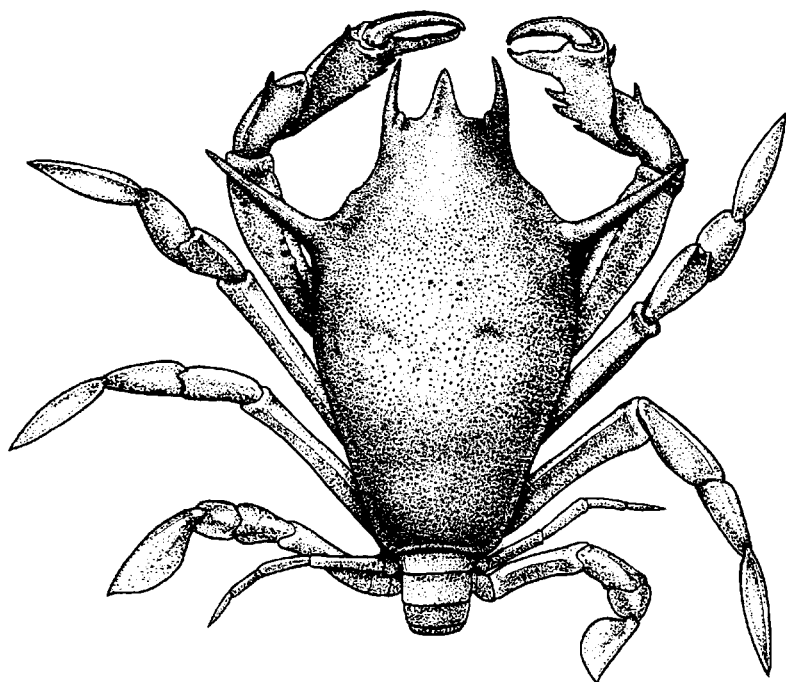


Fig. 13. *Lyreidus rosenkrantzi* sp. nov.
Diagrammatic reconstruction of carapace and limbs.

becomes flattened and broadens towards the posterior angles. Anteriorly the ridge is accentuated by deep cardiac furrows embracing round, inflated areas of the branchiocardiac region. In extreme cases the appearance is almost bopyriform, but actual occurrences of *Bopyrus* have been observed in only a few individuals. The median ridge and tumid areas are particularly noticeable in young carapaces but both features become gradually less prominent, though never entirely obscure, as growth advances. The strong, stout lateral spine occurs a little more than one third distant from the rostral tip; its angle of inclination to the longitudinal axis varies from about 38°–43°. The cervical furrow crosses the midline in a broad V and its extremities are directed towards the base of the spines. The orbital peduncle is almost as long as the outer orbital spine and curved in much the same plane.

The first-third sternites are fused, rounded triangular and about one third maximum width of the sternal plate; the head, or anterior part of the fourth sternites is broadly triangular, it is deeply concave behind for the chelae; the head of the fifth sternites is noticeably wider than that of the fourth sternites, and the portion between the first pereopods is wider than that between the chelipeds and has deeply cleft sides. The sides of the narrow sixth sternites are raised.

The chelipeds are similar to those of *L. rosenkrantzi* but lack the spine on the upper margin of the propodus.

Discussion. This species is discussed with the following species after the description of *L. bispinulatus*.

Lyreidus rosenkrantzi sp. nov.
Figs 13, 14A-C, 15A-B

Derivation of name. In honour of Professor A. Rosenkrantz, leader during 1938–1968, of the Danian expeditions to Nûgssuaq in West Greenland, and promoter of numerous palaeontologic and biostratigraphic studies on the Senonian and Danian in Denmark and Greenland.

Diagnosis. Carapace with a small node on the anterolateral margin and a stout lateral spine forming an angle of about 30° with the carapace midline; dorsal surface evenly arched, smooth, with a fine scattering of pits; chela with distal spine on the upper margin of the propodus.

Material. Holotype, a carapace, MGUH 21.597, from a calcareous concretion of bituminous clay of Maastrichtian age in the 'Oyster-ammonite conglomerate' included in the Lower Danian bituminous shale of the Kangilia Formation, *Thyasira* Member at an altitude of 510 m on the western side of Agatdalen. Additional specimens, 1240 carapaces of which 540 were found between 510 and 530 m altitude at the type locality and

Fig. 14. *Lyreidus rosenkrantzi* sp. nov. from the Maastrichtian at Agatkløft. $\times 1.5$. A: holotype, MGUH 21.597, dorsal view; B: paratype, MGUH 21.598, ventral view showing details of chelipeds; C: paratype, MGUH 21.599, ventral view.

