

THE SYNTYPES OF *CARNEITHYRIS INCISA* (BUCH, 1835)

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The six complete specimens and a pedicle valve of *Carneithyrus incisa* (Buch, 1835) in the type-series from Schlotheim's collection in the Humboldt University, Berlin, are figured for the first time. They do not originate from Fakse quarry as stated on the original label, but from Herfølge quarry (Upper Danian, Denmark) as can be deduced from the lithology and microfauna of the sediment within the valves.

Terebratula incisa was erected by Buch in 1835. His material comprised six two-valved specimens, a brachial valve and a pedicle valve from Schlotheim's large collection which, after Schlotheim's death in 1832, was purchased by the Humboldt University in Berlin. Buch did not figure the species and only described its external features.

According to Schlotheim's catalogue and original label the specimens were collected from Fakse quarry (*i.e.* *Tylocidaris bruennichi* Zone, Middle Danian, Denmark).

The writer visited the Humboldt University in 1965 and studied Schlotheim's collection. She later had the opportunity to borrow the specimens of *Carneithyrus incisa*.

A cursory inspection of the brachiopods and the sediment adhering to them and within the valves was sufficient to indicate that the specimens could not have originated from Fakse quarry. The sediment was neither coral limestone nor bryozoan limestone, but a calcarenite of a type characteristic of the uppermost layers in Herfølge quarry (*Tylocidaris vexillifera* Zone, Upper Danian, Denmark).

A study of the literature (Bredsdorff, 1824; Nielsen, 1909) and a closer examination of the sediment and its microfauna within the pedicle valve of one of the type specimens clearly indicated that the provenance of the Schlotheim material was Herfølge quarry and not Fakse.

The syntypes

(pl. 1; pl. 2, figs 1 and 2)

In Quenstedt's catalogue p. 762 these have received the numbers 5.1.2. (two specimens), 5.2.1, 5.2.2, 5.2.4, 5.2.5 and 5.2.6 (No. 5.2.3 of the original series is the brachial valve of a "*Terebratula*" *haddingi* Nielsen, 1921.)

The following abbreviations are used: lp: length of pedicle valve; lb:

length of brachial valve; w: width, t: thickness. Measurements are in mm.

No. 5.1.2. (pl. 1, fig. 1) lp 31.8, lb 28.8, w 26.8, t 15.7.

No. 5.1.2. (pl. 1, fig. 2) lp 31.5, lb 28.5, w 28.7, t 13.0.

No. 5.2.1. (pl. 1, fig. 3) The specimen is somewhat crushed. Original lp about 41. On the pedicle valve Schlotheim's no. 2.b.

No. 5.2.2. (pl. 1, fig. 4) lp about 26, lb about 23, w 22.1, t about 14. The specimen has slightly gaping valves. There is a predatory gastropod boring in the brachial valve.

No. 5.2.4. (pl. 1, fig. 5) lp 32.2, lb 29.4, w about 27.5, t about 17.5. The sediment in this specimen is very fine-grained.

No. 5.2.5. (pl. 2, fig. 1) lp 40.5, lb 36.5, w 29.8, t 23.1. There is a predatory gastropod boring in the pedicle valve.

No. 5.2.6. (pl. 2, fig. 2) lp about 36.5. This pedicle valve was filled with calcarenite which was used for study of the microfauna. The valve bears Schlotheim's no. 2.b.

The original label

(pl. 2, fig. 3)

The orange label with Schlotheim's handwriting provides several interesting lines of information.

1. Schlotheim has himself altered the trivial name of "*Terebrat. ventricosa*" to *carnea* and added a reference to Sowerby's illustration. Sowerby erected *T. carnea* in 1812. When Schlotheim published his *Petrefactenkunde* in 1820 he did not know any of Sowerby's works, so the correction must have been made after 1820. None of the type specimens bears Schlotheim's no. 1, which may be because the number is included in Quenstedt's 5.1.2. This conjecture is supported by the fact that the "1" in the specimen figured in pl. 1, fig. 2 is written in a more brownish ink and in another style than the rest. Furthermore both the specimens numbered 5.1.2 are of a rather flat type which apart from the sulcate frontal commissure bear some resemblance to *Carneithyrus carnea*.

2. The specimens numbered 2 (probably now hidden under Quenstedt's 5.2.2, 5.2.4 and 5.2.5) are named "*Terebrat. incisa* Münsteri." This fact combined with Schlotheim's (1820, p. xxx) thanking bishop Münster of Copenhagen for sending him material, gives the impression that Schlotheim is speaking here of his own species *T. incisa*, of which, however, he never published a description. Boll (1854, p. 45) mentions *T. lens* var. *incisa* with Schlotheim as author; he no doubt had seen Schlotheim's specimens and label. Buch (1835, p. 115) attributed the species to Münster. On p. 81 of this paper he used Schlotheim's expression "Münsteri" as a species name for a *Terebratulina* also from Schlotheim's collection and said to originate from Fakse. As a matter of interest it may be added that the learned bishop Münster seems to have sunken into oblivion by 1885 when Buch's complete works were re-edited, and in the two cases mentioned Münster's name has been substituted by that of the illustrious Graf von Münster.

3. The two specimens marked 2.b. still bear the original Schlotheim number, possibly because it has been too complicated to hide beneath a new system of numbering and Quenstedt's new number is written elsewhere on the specimens.

4. The locality given is Faxøe (the early 19th century spelling of Fakse). The possible origin of this error is discussed below.

The sediment within the valves and its microfauna

The sediment removed from the pedicle valve no. 5.2.6 and seen inside no. 5.2.1, 5.2.2 and 5.2.3 outwardly resembles the well-sorted calcarenite of Herfølge (cf. Larsen, 1961) but for a higher proportion of finer material presumably due to the quieter depositional environment within the valves. The sediment inside no. 5.2.4 is fine-grained. Two smears of this were examined by Dr. K. Perch-Nielsen but were found to contain no coccoliths; the only nannoplankton present consisted of fragments of *Thoracosphaera* sp. which in Denmark is found throughout the Danian.

Of the sediment removed from no. 5.2.6 the fractions between 100 μ and 500 μ were examined by Mrs. I. Bang. She had earlier examined the sediment contents of borings in spines of the type specimens of *Tylocidaris vexillifera* Schlüter, 1892 and found an Upper Danian foraminifera fauna (Rosenkrantz, 1965; Bang, 1967). The spines were labelled "Stevns Klint. Schreibkreide" (i.e. white chalk, Upper Maastrichtian, Denmark) but undoubtedly originated from Herfølge, where bored spines are common (Grönwall, 1900).

According to Mrs. Bang (personal communication, 1969) the sediment from no. 5.2.6 contained foraminifera characteristic of the Danian Foraminifera Zone III (Bang, 1967 and 1969). According to the microfauna the provenance of the specimen is therefore an Upper Danian locality.

The mistaken locality

Among the manuscript names of Schlotheim later published by Buch there are two more Danian species: "*Rhynchonella*" *flustracea* (Buch, 1835) and "*Rhynchonella*" *incurva* (Buch, 1835). They too are labelled "Faxøe" and in the case of "*R.*" *flustracea* this is correct. In the case of "*R.*" *incurva*, however, it is wrong. There is a very fine illustration of this large, smooth rhynchonelloid in Buch, 1835 (pl. 2, fig. 40). This form is not known from Fakse, since it only occurs in the Upper Danian, but it is common at Herfølge (Nielsen, 1909 p. 157; 1914 pp. 294-295).

Nielsen (1909, p. 158) discusses the occurrence in old collections in the Mineralogical Museum, Copenhagen, of *Rhynchonella incurva* and *Terebratula lens* (i.e. *Carneithyris incisa*) labelled "Limsten" (i.e. bryozoan limestone) "Stevns Klint" (Lower Danian). None of the species occurs in the Lower Danian and the adhering sediment shows that they must have originated from Herfølge. Nielsen explains the confusion in the old col-

lections as originating in the popular misconception started by Bredsdorff (1824) and adopted by Forchhammer (1825; 1835) that the coral limestone of Fakse was a correlative of the sediments at Herfølge and Stevns Klint.

Forchhammer (1825) erected the name "Ceritkalksten" (*Cerithium*-limestone) for the Lower Danian limestone found in Stevns Klint above the Fish Clay and below the bryozoan limestone (*i.e.* for the hardground now known to also include indurated Maastrichtian chalk, see Rosenkrantz & Rasmussen, 1960). He mentions it (pp. 21–22) from Herfølge and on p. 25 he writes that Fakse quarry's limestone may be considered as a local development of the *Cerithium*-limestone from Stevns Klint.

In 1835 Forchhammer also calls the above mentioned layer "Faxøekalken" or "Faxøelaget" (adopted by Lyell, 1835, as the Faxøe-layer).

Bishop F. Münter (1761–1830) was known as a keen amateur archaeologist but he also took an interest in geology and visited several localities (Garboe, 1959).

Bredsdorff (1824, pp. 170–171) mentions as some of the more common fossils from Herfølge quarry two "Terebratuloids" and an echinoid. On p. 171 he adds a footnote which reads in translation: "We could expect detailed information on these petrefactions in Baron von Schlotheim's work on The Petrefactions, since The Right Rev. Bishop Münter has sent him specimens thereof."

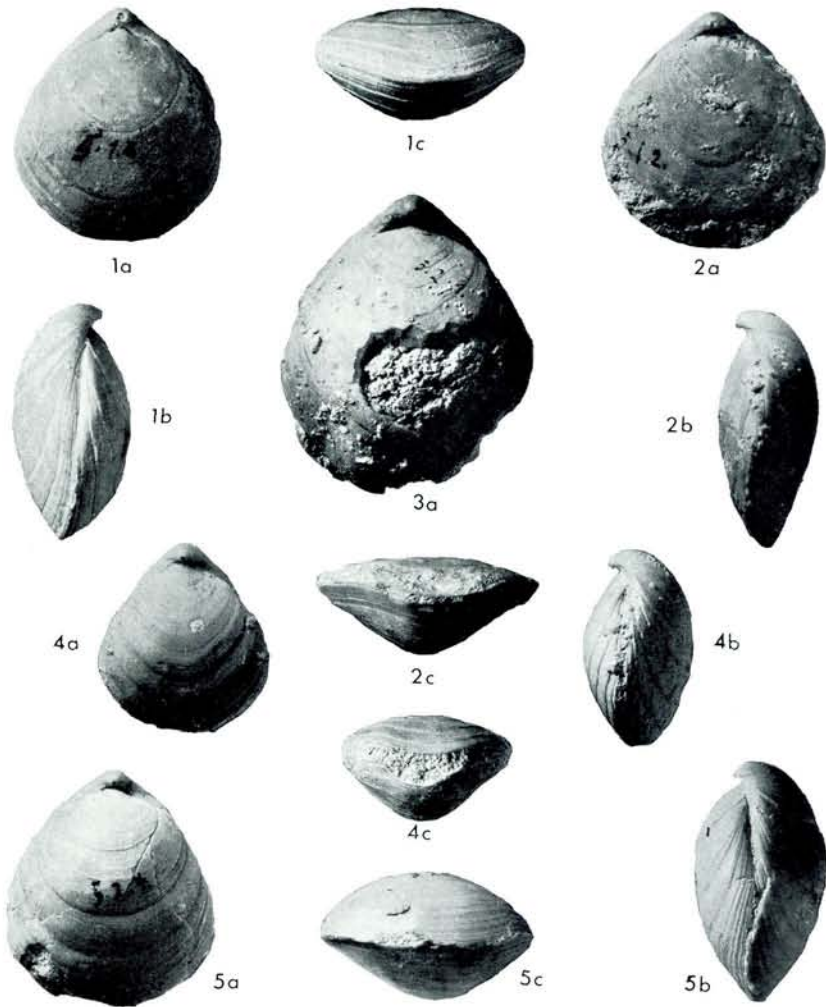
There is therefore no doubt that Schlotheim received specimens of the most common fossils (*e.g.* *Carneithyris incisa* and "*Rhynchonella incurva*") from Herfølge quarry from bishop Münter. But the manner in which they were labelled remains unknown. One can only assume that they might have been labelled "Faxøekalk, Herfølge" or simply "Faxøekalk" and so confused with fossils from Fakse quarry.

Herfølge quarry is situated north of Herfølge church about 5 km south west of Køge, Sjælland, Denmark. It is not known when the quarry was first opened. When Forchhammer visited Herfølge in 1825 the pit was abandoned and he was not able to see the lower part of the section described by Bredsdorff (1824). The quarry was abandoned until 1895 (Milthers, 1908). Since then it has been worked rather sporadically. In 1951 the geology students' club re-exposed a section in the overgrown pit (*cf.* Berthelsen, 1962, pp. 32–35 and fig. 21). The quarry is now incorporated in the cemetery. During most of the history of Herfølge quarry only the calcarenite in the upper part of the section remained exposed, with talus obscuring the underlying bryozoan limestone. Consequently most museum material originates from the calcarenite.

The generic affinities

The writer places "*Terebratula incisa*" in the genus *Carneithyris* Sahni, 1925.

According to the original diagnoses, the only important difference between *Carneithyris* and *Chatwinothyris* Sahni, 1925 lies in the form of the cardinalia (Sahni, 1929, p. 40). In *Carneithyris* these are unfused and the



The syntypes of *Carneithyrus incisa* (Buch, 1835). The types are in the Humboldt University, Berlin.

All figures $\times 1$.

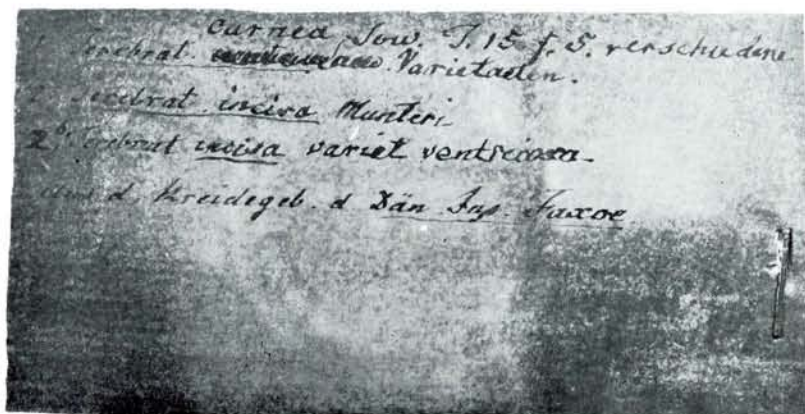
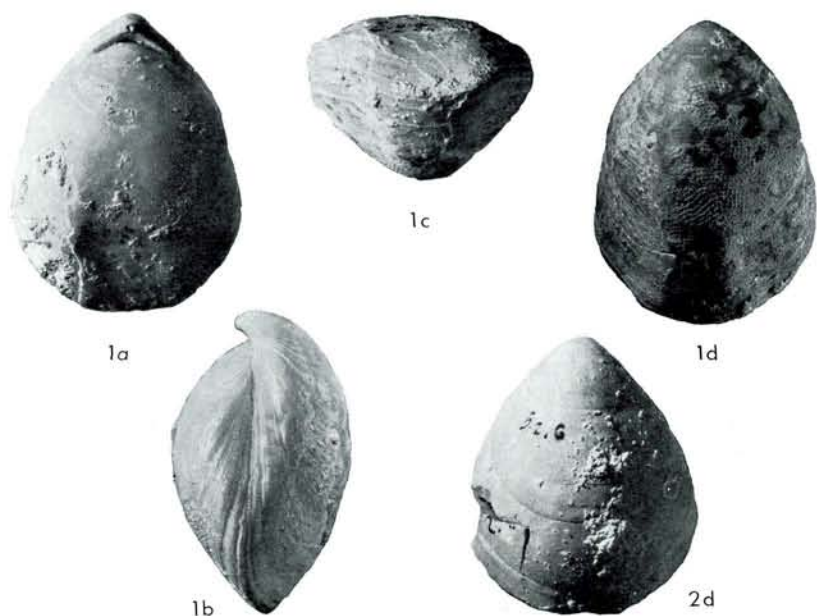
a: dorsal view; b: lateral view; c: anterior view; d: ventral view.

Fig. 1. No. 5.1.2. The specimen is very flat and only shows an incipient sulcation of the frontal commissure.

Fig. 2. No. 5.1.2. (The wider specimen.) The »1« in the number is in a different style from that in figs 1 and 3 (See p. 362).

Fig. 3. No. 5.2.1. The specimen bears Schlotheim's no. 2.b. on the pedicle valve. Fig. 4. No. 5.2.2. A small specimen with distinct sulcate frontal commissure. a shows a gastropod boring.

Fig. 5. No. 5.2.4. The specimen has a fine-grained sediment within the valves. Note the inflexion of the lateral commissure.



3

The syntypes of *Carneithyrus incisa* (Buch, 1835)

a: dorsal view; b: lateral view; c: anterior view; d: ventral view.

Fig. 1. No. 5.2.5. This large specimen clearly shows the inflexion of the lateral commissure so characteristic of the species. However, it was not this »incision« which gave rise to the species-name but the »incision« formed by the symphytium and the overhanging beak (Buch, 1835 p. 115). $\times 1$.

Fig. 2. No. 5.2.6. The sediment which filled this valve was used for the study of the microfauna. Schlotheim's no. 2.b. can be seen at the bottom left. $\times 1$.

Fig. 3. Schlotheim's original label. Dimensions of the label: 91 \times 47 mm.

cardinal process protrudes and tends to become globular while in *Chatwinothyris* the cardinalia are completely fused and strongly swollen.

"*Terebratula*" *incisa* possesses unfused cardinalia with a protruding, swollen cardinal process. Accidentally Sahni (1929, p. 42 and pl. 6, figs 8-9, 20-22; pl. 10, figs 10-11) described and illustrated specimens of *Carneithyris incisa* as *Chatwinothyris lens* (Nilsson, 1827). He states that his specimens originate from the Upper Danian of Saltholm, Denmark (Sahni, 1929, p. 42). In the collection of the British Museum (N.H.) they are labelled: "Chalk. I. of Saltholm, Denmark." One of the specimens, no. B. 52066 (Sahni 1929, pl. 6 figs 8-9) was disarticulated and slightly damaged when the writer examined it in 1962. However, some typical Herfølge calcarenite was still adhering to the interior, posterior part of the valves, and on the exterior of the pedicle valve was inscribed in drawing ink: "Herfølge *T. l.* var L.D."

The name *Terebratula lens* was commonly used in Denmark for all Danian *Carneithyris*, and *Terebratula incisa* was considered a synonym (Posselt, 1894; Nielsen, 1909, 1911, 1914 and 1921). It was first Hadding (1919, p. 4) and later Rosenkrantz (1945, p. 448) who pointed out that *Terebratula lens* Nilsson s. str. only occurs in the uppermost Upper Danian.

Stratigraphical range

Carneithyris incisa occurs in the Middle Danian and lower Upper Danian.

Large numbers of this species have been collected from the *Carneithyris* bed in the "Hvedeland" pit within Fakse quarry (Asgaard, 1968) and the quarry on Saltholm island, both of which are bryozoan limestone, Middle Danian (*Tylocidaris bruennichi* Zone); and the bryozoan limestone and calcarenite of Herfølge quarry, which are Upper Danian (*Tylocidaris vexillifera* Zone).

The syntypes, originating from Herfølge quarry, are of lower Upper Danian age.

By the uppermost Upper Danian *Carneithyris incisa* has developed into *C. lens*.

Acknowledgements. The writer is indebted to Dr. H. Jaeger, Humboldt University, Berlin, for the loan of the syntypes and the original label. The search for nannoplankton by Dr. Katharina Perch-Nielsen, University of Copenhagen; and the examination of the foraminifera by Mrs. Inger Bang, Geological Survey of Denmark, were of invaluable help. Dr. R. G. Bromley kindly corrected the English manuscript and patiently undertook the task of photographing the syntypes.

Dansk sammendrag

Terebratula incisa blev opstillet af Buch i 1835. Typeserien består af 6 næsten komplette eksemplarer og en stilkskal fra Schlotheims samling i Humboldt Universitet, Berlin. Buch afbildede ikke arten og beskrev kun dens ydre karakterer.

Ifølge Schlotheims katalog og etiket skulle eksemplarerne stamme fra Fakse. Imidlertid klæber typisk Herfølge-calcarenit til skallerne og udfylder også det indre af stilkaskallen. En undersøgelse af mikrofaunaen i en prøve af sedimentet fra stilkaskallen og en fodnote hos Bredsdorff (1824, p. 171) angiver, at eksemplarerne, som blev sendt til Schlotheim fra biskop Münter i København, utvivlsomt må stamme fra calcareniten i Herfølge kalkbrud.

Syntyperne er her afbildet for første gang. Forfatteren henfører *Terebratula incisa* til slægten *Carneithyris* Sahni, 1925.

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References

- Asgaard, U. 1968: Brachiopod palaeoecology in Middle Danian limestones at Fakse, Denmark. *Lethaia* **1**, 103–121. Oslo.
- Bang, I. 1967: Foraminifer-undersøgelse af kalk fra typeeksemplarerne af *Tylocidaris vexillifera* Schlüter. *Meddr dansk geol. Foren.* **17**, 147. København.
- Bang, I. 1969: Planktonic Foraminifera and biostratigraphy of the type Danian. In *Proc. 1st int. Conf. Planktonic Microfossils Geneva 1967* (Brönnimann, P. & Renz, H. H. editors) **1**, 58–65. Leiden.
- Berthelsen, O. 1962: Cheilostome Bryozoa in the Danian deposits of East Denmark. *Danm. geol. Unders. række* **2**, **83**, 290 p. København.
- Boll, E. 1854: Die Brachiopoden der Kreideformation in Meklenburg. *Arch. Ver. Freunde Naturg. Mecklenb.* **8**, 29–48. Neubrandenburg.
- Bredsdorff, J. H. 1824: Om Kalksteensbrudet ved Herfølge. *Tidsskr. Naturvidensk.* **3**, 168–172. København.
- Buch, L. v. 1835: Ueber Terebrateln. *Abh. K. Akad. Wiss. Berlin, Phys. Kl. (1833)*, 21–144. Berlin.
- Buch, L. v. 1885: Ueber Terebrateln. In *Gesammelte Schriften*. (Ewald, J., Roth, J. & Dames, W. editors) **4**, 167–278. Berlin.
- Forchhammer, G. 1825: Om de geognostiske Forhold i en Deel af Sjælland og Naboøerne. *K. danske Vidensk. Selsk. Skr., math.-naturvidensk. afd. (2)*, 245–280. København.
- Forchhammer, G. 1835: Danmarks geognostiske Forhold. *Kjøbenhavns Univ. Indbydelsesskr. Reformationsfesten 14. November 1835*, 112 p. København.
- Garboe, A. 1959: *Geologiens historie i Danmark I*, 283 p. København (C. A. Reitzel).
- Grönwall, K. A. 1900: Borrade ekinidtaggar från Danmarks Krita. *Meddr dansk geol. Foren.* **1**, (6) 33–36. København.
- Hadding, A. 1919: Kritische Studien über die *Terebratula*-Arten der Schwedischen Kreideformation. *Palaeontographica* **63**, 1–24. Stuttgart.
- Larsen, G. 1961: Kvantitativ petrografisk undersøgelse af nogle sjællandske danielkalksten. *Danm. geol. Unders. række* **4**, **4**, (7) 25 pp. København.
- Lyell, C. 1835: On the Cretaceous and Tertiary Strata of the Danish Islands of Seeland and Möen. *Proc. geol. Soc. London* **2**, 191–192. London.
- Milthers, V. 1908: Beskrivelse til geologisk Kort over Danmark, Kortbladene Faxe og Stevnsklint. *Danm. geol. Unders. række* **1**, **11**, 291 pp. København.
- Nielsen, K. B. 1909: Brachiopoderne i Danmarks Kridtaflejringer. *K. danske Vidensk. Selsk. Skr., math.-naturvidensk. afd. (7)*, **6**, 128–178. København.
- Nielsen, K. B. 1911: Brachiopoderne i Faxe. *Meddr dansk geol. Foren.* **3**, 599–618. København.
- Nielsen, K. B. 1914: Some remarks on the brachiopods of the Chalk in Denmark. *Meddr dansk geol. Foren.* **4**, 287–296. København.

- Nielsen, K. B. 1921: Nogle Bemærkninger om de store Terebratler i Danmarks Kridt- og Danienaflejringer. *Meddr dansk geol. Foren.* 6, (3) 18 p. København.
- Nilsson, S. 1827: *Petrificata Suecana Formationis Cretacea*. 39 pp. Lund.
- Posselt, H. J. 1894: Brachiopoderne i den danske Kridtformation. *Danm. geol. Unders. række 2*, 4, 59 pp. København.
- Rosenkrantz, A. 1945: Slægten *Chatwinothyris* og andre Terebratler fra Danmarks Senon og Danien. Smaaafdrag til Danmarks Geologi no. 4. *Meddr dansk geol. Foren.* 10, 446–452. København.
- Rosenkrantz, A. 1965: Demonstration af originalstykker fra den v. Schlotheimske samling i Berlin repræsenterende gammelkendte arter fra vort danien, samt omtale af Schlüters originaler af *Tylocidaris vexillifera* og *T. baltica* fra Bonn. *Meddr dansk geol. Foren.* 15, 624. København.
- Rosenkrantz, A. & Rasmussen, H. W. 1960: South-Eastern Sjælland and Møn, Denmark. *Int. geol. Congr. 21, Guide to excursions A42 and C37*, 17 pp. København.
- Sahni, M. R. 1929: A monograph of the Terebratulidae of the British Chalk. *Palaeontogr. Soc. London*, 62 pp. London.
- Schlotheim, E. F. von 1820: *Die Petrefactenkunde auf ihrem jetzigen Standpunkte*. LXII + 437 pp. Gotha.