

ACTA UNIVERSITATIS STOCKHOLMIENSIS
STOCKHOLM CONTRIBUTIONS
IN GEOLOGY

VOL. II:6

ON LIASSIC AMMONITES
FROM SKÅNE,
SOUTHERN SWEDEN

By *R. A. Reymont*

Distributor ALMQVIST & WIKSELL *Gamla Brogat. 26, Stockholm*

6. On Liassic ammonites from Skåne, southern Sweden

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Abstract. Ammonites of Sinemurian to Toarcian age from southern Sweden are described and figured. The material comes from the north-western and southeastern Lias occurrences of the area. One new species, *Euagassicerias lundgreni* sp. nov., is described.

ACKNOWLEDGEMENTS

The author wishes to acknowledge his indebtedness to Professor G. REGNÉLL of Lund for making the greater part of the collection studied available. Dr. D. DONOVAN, Bristol, kindly gave much helpful advice on Jurassic ammonite taxonomy both in correspondence and during his visit in Stockholm in April, 1958; the author also wishes to thank Dr. DONOVAN for reading and criticizing the manuscript. Professor H. HÖLDER answered many questions during the author's visit to Tübingen in June, 1958 and guided him through the QUENSTEDT collection. In this connexion thanks are due to Professor O. SCHINDEWOLF, Tübingen, for making available

the facilities of his institute and to Mr. J. WIEDMANN for assistance in various ways. Dr. K. HOFFMANN, Hannover, was of great help in supplying information on the occurrence of certain of the species treated in the lower Lias in northern Germany and also in permitting the writer access to unpublished work of his. Dr. E. BÖLAU, Hälsingborg, kindly initiated the author into certain aspects of his work on the tectonics of north-western Skåne and Dr. H. GRY, Copenhagen, made him acquainted with the results of his investigations into the Lias of Bornholm, during a visit there in August in 1958. Dr. E. MOHRÉN, Stockholm, also supplied information. Special thanks are due to Professor I. HESSLAND, Stockholm, for first interesting the writer in the Lias ammonites of southern Sweden.

Most of the photographs were taken by Mr. L. KUTNAR and the maps were redrawn by Miss M. ASKLIN, both of the Geological Institute; technical assistance was rendered by Mr. B. STEEN. Part of the cost of the investigation and publication was defrayed by grants from The Swedish Natural Science Research Council. Financial assistance towards the cost of the field work was received from "THOMAS NORDSTRÖM's testamentsfond" and the Department of Geology, University of Stockholm.

REPOSITORIES

The repositories of the specimens treated are Paleontologiska institutet, University of Lund (L.), Geologiska institutet, University of Stockholm (G. I.), Sveriges Geologiska Undersökning (S. G. U.) and Paläontologisches Institut und Museum, Tübingen. The letters in brackets denote the abbreviations used in the text.

INTRODUCTORY REMARKS

Lias ammonites were first described from Sweden by LUNDGREN (1881). In this paper a large number of pelecypods were figured but only a few ammonites, the determinations of the latter being based on a small number of specimens. MOBERG (1888) in describing pelecypods from the Lias deposits of southeastern Skåne, exposed in the Fyle valley, also treated an ammonite species. The comprehensive account of the Jurassic stratigraphy of Skåne published by TROEDSSON (1951) also included reference to a few ammonites, of which one fragment was figured. The last author to be concerned with Swedish Jurassic ammonites was NILSSON (1953) who figured the largest Jurassic ammonite yet found in Sweden in a popular account of the paleontology of the Höganäs area.

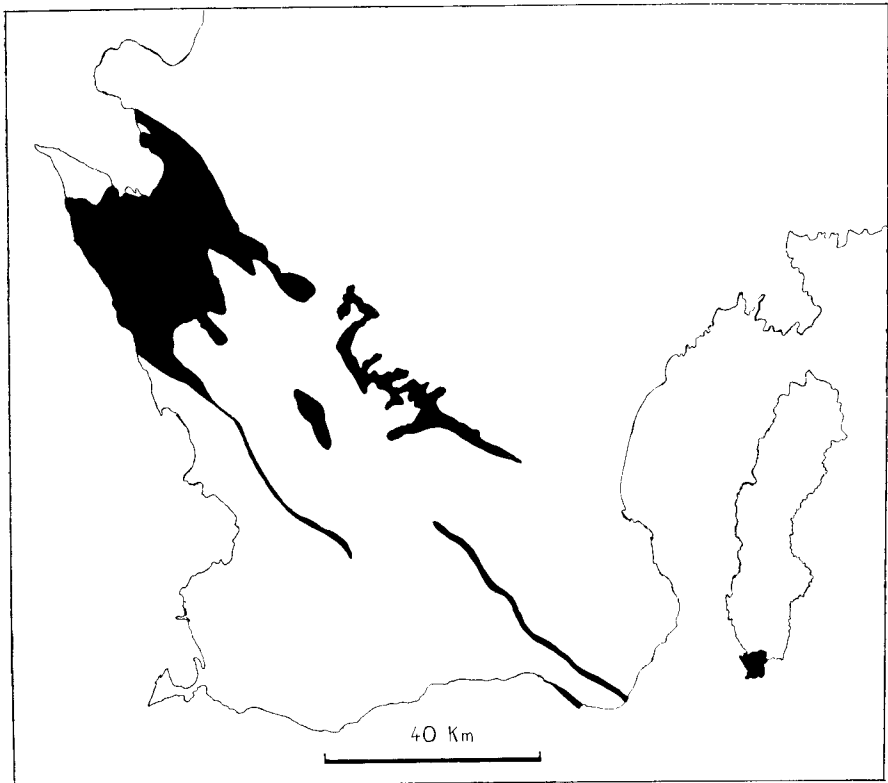
In the period of time since LUNDGREN recorded some 8 specimens a fairly large amount of material has been brought together, most of it in Lund, but also a few specimens in Stockholm. Considering the im-

portance of ammonites in Mesozoic stratigraphy and the now outmoded determinations of LUNDGREN, in which all species were referred to the "genus *Ammonites*", it was decided that an evaluation of the material already at hand was called for. Ammonites are far from rare in certain sequences of the area under consideration, as proved by cored boreholes, but owing to the intensive cultivation and the scarcity of natural exposures, the field collector is seldom rewarded. Up to about 70 years ago it was the custom to obtain fertilizer by digging so-called "marl pits" (*märgelgravar*) in clays with generally some calcareous content. More than half of the specimens treated in the present paper were collected by H. SJÖGREN, a student of LUNDGREN's, from such excavations. This method is no longer employed as better fertilizer is more conveniently obtainable from other sources. Although no definite chronologic information is available it would seem that the bulk of the material brought to Lund by SJÖGREN was collected after the preparation of LUNDGREN's monograph, as no mention is made therein of further material of the species treated and the SJÖGREN collection embraces many more forms, in better preservation, than those figured by LUNDGREN.

The present author had three opportunities of becoming acquainted with the area, first a few days in August, 1956, on a geological excursion under the leadership of Professor I. HESSLAND, and later in the summers of 1957 and 1958. The valuable borehole material from Nya Vilhelmsfält and Oregården, already commented on by TROEDSSON (1938, 1951), was studied by the writer at Lund in 1957 and more intensely in 1958, thanks to the courtesy of Professor G. REGNELL. Particularly Oregården proved to be richly ammonitiferous but also the Vilhelmsfält cores yielded ammonites of very great interest.

The present study makes no claims whatsoever to being a comprehensive monograph of the Lias ammonites of Sweden. It does cover the collections such as they are to date (apart from some of the Vilhelmsfält species being treated by Dr. K. HOFFMANN in a forthcoming separate account), but every new borehole will without doubt bring up hitherto unrecorded forms. As will become apparent from the following pages, ammonites occur in sufficient numbers throughout the Swedish Lias to permit accurate correlation with the standard zonal sequence and fortunately, therefore, the pessimistic picture once painted by TROEDSSON (1955, p. 605) is exaggerated.

The present research has resulted in several essential deviations from the stratigraphic framework envisaged by the late Professor TROEDSSON (1951, 1954); for example, the Kattslösa formation is proved to belong to the Lias β and not Lias γ and uppermost Lias (Lias ϵ) is demonstrated to occur, whereas TROEDSSON believed the youngest possible division to be Lias δ (TROEDSSON, 1955, p. 606). It should nevertheless be borne in mind that TROEDSSON's pioneer work on the Swedish Jurassic laid the grounds to all future work on the subject.



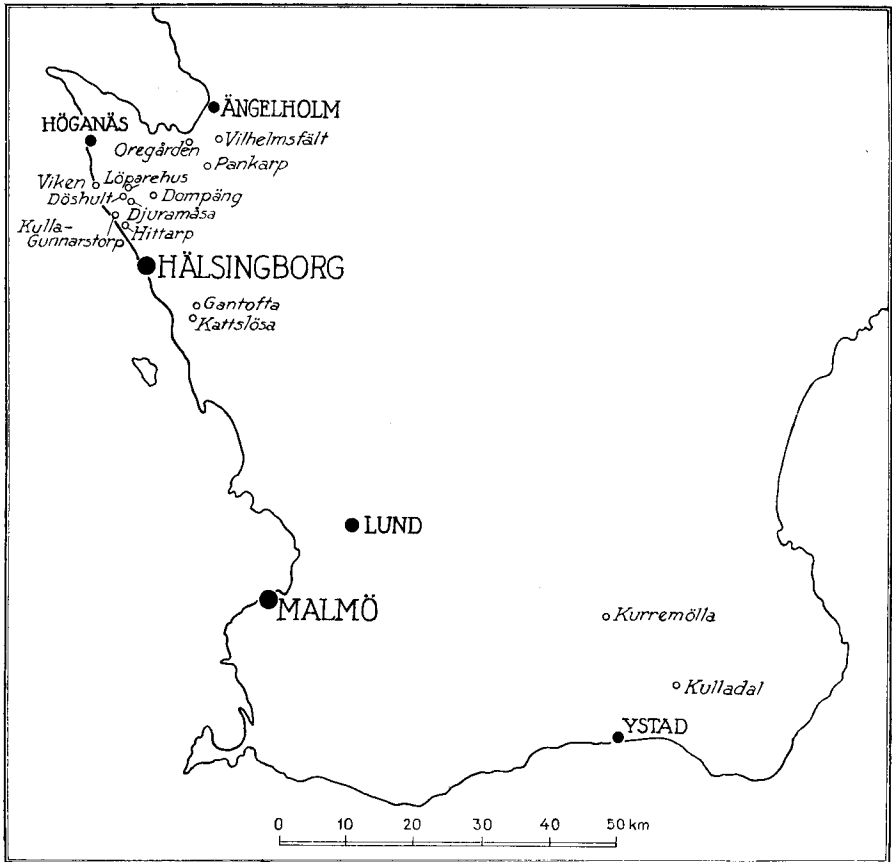
Sketch map showing roughly the distribution of Jurassic and Rhaetic (marked in black) in the province of Skåne, southern Sweden (after EKLUND (1937; Sveriges Geologiska Undersökning, geological map of Skåne), MOHRÉN (1948), and TROEDSSON, 1951). The inset map displays the position of the county of Skåne relative to the rest of Sweden.

PROVENANCE OF THE MATERIAL

As already observed, the rarity of ammonites in surface exposures is no indication of their actual abundance and every borehole through marine strata is likely to yield large numbers of specimens. Over the last 70 years, however, a moderately large collection has accumulated from outcropping beds and most of the material forming the basis of the present paper is derived from the Döshult area. The lists of species from the various localities are given below; the locations of the boreholes, outcrops and wells are given in the accompanying sketch map.

Northwestern Skåne

1. *The Döshult area.* — This area includes the classical localities from which LUNDGREN's material was obtained. The marl pits in the Dompäng, Djuramåsa, Viken, and Döshult vicinities are no longer accessible (cf.



Sketch map showing the location of localities and boreholes in northwestern and southeastern Skåne, mentioned in the text.

TROEDSSON, 1951, p. 41). During a visit in 1957 the writer was able to collect a few fragmentary specimens from a temporary excavation at Dompäng. The following species have been found:

- Paracoriceras charlesi* DONOVAN
- Paracoriceras crossi* (WRIGHT)
- Megarietites meridionalis* (REYNÈS)
- Agassiceras scipionianum* (D'ORBIGNY)
- Agassiceras nodulatum* (BUCKMAN)
- Enagassiceras lundgreni* sp. nov.
- Enagassiceras resupinatum* (SIMPSON)
- Cymbites striaries* (QUENSTEDT)
- Enagassiceras spinaries* (QUENSTEDT)
- Arnioceras falcaries* (QUENSTEDT)?
- Coroniceras (Primarietites) reynesi* (SPATH)

2. *Hittarp*. — In a coarse, ferruginous grit, very rich in plant material, and which may be a lateral continuation of TROEDSSON's Döshult formation a single ammonite was found by the writer in 1957. This specimen could only be determined as to the genus as *Arnioceras* sp. indet.

3. *Nya Vilhelmsfält borehole*. — This cored hole was drilled in 1917 to a depth of 426.24 m (cf. TROEDSSON, 1938, pp. 516, 517; 1951, p. 30). TROEDSSON mentioned the presence of ammonites at depths of around 180 and 240 m and announced his intention of working through the core. This was never completed owing to TROEDSSON's demise. In 1954 E. BÖLAW of the Höganäs—Billesholm Co. made a preliminary investigation of the remains of the core and took out all the ammonites at the two levels mentioned by TROEDSSON. The fossils were later sent to K. HOFFMANN, Hannover, and it is to these two workers credit is due for first recognizing the presence of Upper Lias in northwestern Skåne. This was also confirmed by ammonites recovered from the cored hole drilled by the Höganäs—Billesholm Co. at Pankarp nearby. In 1958 the present writer spent two days in going through what was left of the material from Nya Vilhelmsfält, preserved in the borehole archive at the University of Lund. At 170 m several well preserved fragments of *Dactylioceras* cf. *tenuicostatum* (Y. & B.) were found. The ammonites from Pankarp, Nya Vilhelmsfält 240, 180 m, and a borehole at Kattslösa are preserved in the collection of the Amt für Bodenforschung, Hannover.

4. *Oregården borehole*. — At depths of 53 and 63 m ammonites were encountered. The following species occur:

Euagassicerias resupinatum (SIMPSON)

Agassicerias spp.

Cymbites striaries (QUENSTEDT)

Arnioceras sp.

5. *The sequence at Kattslösa*. — This sequence between Kattslösa and Gantofta has yielded ammonite fragments of the genera *Eparietites* and *Promicroceras* in its lower parts, which indicate the presence of middle Upper Sinemurian. Unfortunately, the fragment referred by TROEDSSON to *Uptonia* could not be located so conclusive evidence for Pliensbachian is lacking, although it is quite possible that the upper part of the sequence in question may belong to that stage.

S o u t h e a s t e r n S k å n e

Ammonites are less frequently found in this area than in the aforementioned. The following forms have been found in the Fyle Valley, particularly at Kurremölla:

Uptonia jamesoni (SOWERBY)

Uptonia angusta (QUENSTEDT)

Uptonia sp. juv.

Polymorphites sp. indet.

At Kulladal numerous badly preserved fragments of *Oxynoticeras*? sp. indet. have been collected, thus indicating the possible presence of Upper Sinemurian. No Lower Sinemurian has yet been recorded from south-eastern Skåne.

DESCRIPTIVE SECTION

Preliminary observations

The material occurs in two preservations; all specimens from surface exposures are ferruginized, often with calcitic cameral fillings, but generally consisting of ironstone. Specimens from borehole cores are unaltered, so that the original aragonitic shell material is preserved. Core specimens are seldom mature and mostly crushed; it is of interest to record that all ammonites obtained from the cores at Oregården and Nya Vilhelmsfält were found in shale, often rich in plant debris; the ammonites derived from surface exposures come either from ironstone or clay. Considering the fact that much of the material is well preserved it is strange that sutures are uncommonly found.

The systematic subdivisions employed in the following are those proposed by ARKELL (1957).

FAMILY ARIETITIDAE HYATT, 1874

SUBFAMILY ARIETITINAE, HYATT, 1874

Genus *Coroniceras* HYATT, 1867

Subgenus *Primarietites* BUCKMAN, 1926

TYPE SPECIES. — *Primarietites reynesi* (SPATH).

Coroniceras (Primarietites) reynesi (SPATH)

Plate I, fig. 1

1879 *Ammonites multicostatus* SOWERBY, REYNÈS, pl. 24, figs. 18, 19.

1879 *Ammonites multicostatus* SOWERBY, var. *spinaries* QUENSTEDT, pl. 24, figs. 25—28.

1923 *Agassiceras reynesi* SPATH, p. 73.

1926 *Primarietites primitivus* BUCKMAN, pl. 678.

1952 *Coroniceras (Primarietites) reynesi* (SPATH), DONOVAN, p. 737, pl. 29, fig. 1; text-fig. 14.

1955 *Coroniceras (Primarietites) reynesi* SPATH, DONOVAN, pp. 29, 30.

1957 *Primarietites primitivus* (= *Agassiceras reynesi* SPATH, 1923), ARKELL, p. L 239, fig. 262, 2.

REPOSITORY. — Lund, LO 3904.

PROVENANCE. — "Ammonitbanken", Döshult, N. W. Skåne.

COLLECTOR. — H. SJÖGREN.

AGE. — Lower Sinemurian; according to DONOVAN (1955, p. 29) *C. reynesi* has its typical development in the *gmüendense* subzone of the *semicostatum* zone.

DESCRIPTION. — A single large specimen is referred here. The body chamber occupies at least two-thirds of the last whorl. The ribs are simple; they are slightly bowed to straight on the flanks. At the ventrolateral shoulder they flare somewhat to form an elongated subtubercle; on the venter they swing sharply forwards and vanish rapidly short of the keel. The ribs begin slightly above the umbilicolateral margin and the last preserved rib is twice as strong as the preceding rib. There are no side furrows to the strong keel and the venter is arched. The last half whorl possesses 12 ribs and the second last whorl has 24 ribs. The presence of much altered shell on the inner whorls obscures the sutures.

DIMENSIONS. —

diameter	= 211 mm (= 1.00)	(of the partially preserved outer whorl)
thickness	= 38 » (= 0.18)	
umbilicus	= 115 » (= 0.55)	
height of last whorl	= 51 » (= 0.24)	

REMARKS. — The Swedish specimen agrees well with the figures given by BUCKMAN (1926, pl. 678); both have about the same number of ribs on the last half whorl. On first sight the agreement is less satisfactory with REYNÈS figures (1879, pl. 24, figs. 18, 19, 25—28) as these are more densely costate and the ventrolateral tubercles are more distinct. The inner whorls of our specimen indicate, however, that the ribbing gradually becomes more spaced with growth; at a diameter of 60 mm there are approximately 36 ribs, which agrees well with the 32—36 ribs of REYNÈS specimens. The English and Swedish specimens would seem to be of approximately the same size and much larger than the others.

DONOVAN (1952, p. 738) observed that BUCKMAN'S specimen from Radstock is atypical of the species in the rather low rib-frequency, but indicated that this feature is not outside the range of variation observed by him in the assemblage from Bristol. The Swedish specimen would seem to lie near BUCKMAN'S.

Genus *Megarietites* SPATH, 1922

TYPE SPECIES. — *Ammonites meridionalis* REYNÈS.

REMARKS. — This genus was regarded by DONOVAN (1955, p. 15) and ARKELL (1957, p. 238) as synonymous with *Pararnioceras*, the latter being regarded as invalid. In a personal communication Dr. DONOVAN pointed out to the writer that the name *Pararnioceras* was published in January, 1922, as against April, 1922, for *Megarietites*. If the two forms then are synonymous, *Pararnioceras* must have priority. The author desists at this

stage from expressing an opinion on the question as he feels access to the type material to be essential before a decision may be made.

Megarietites meridionalis (REYNÈS)

Pl. II, figs. 1, a—b; pl. III, figs. 1, a—b; fig. 1

1879 *Ammonites meridionalis* REYNÈS, pl. 22, figs. 1, 2, 3.

1924 *Megarietites meridionale* REYNÈS sp., BUCKMAN, pl. dxviii.

1927 *Megarietites meridionalis* REYNÈS sp., BUCKMAN, pls. dxviii A, B.

1952 *Megarietites meridionalis* (REYNÈS), DONOVAN, p. 741.

1955 *Pararnioceras meridionale* (REYNÈS), DONOVAN, p. 14.

1957 *Megarietites meridionalis* (REYNÈS), ARKELL, p. L238, fig. 263, 1, a—d.

MATERIAL. — 7 fragments.

REPOSITORY. — Lund, LO 3905—LO 3909 B.

PROVENANCE. — Döshult.

COLLECTOR. — Unknown.

AGE. — Lower Sinemurian; according to DONOVAN (1955, p. 14) *M. meridionalis* has its typical development in the *gmuendense* subzone of the *semicostatatum* zone; it is also known in the upper *bucklandi* zone (ARKELL, 1956, p. 67).

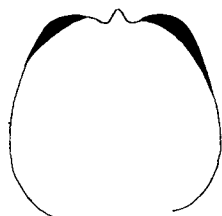
DESCRIPTION. — The collection contains only large fragments of the species. Specimen LO 3906 (pl. III, figs. 1, a—b) is strongly tricarinate on the inner preserved whorl but on the last preserved portion the side keels are very weak; the three keels are equally strong on the inner whorls. The ribs are slightly bent and culminate on the last part in feeble tubercles. The strength of the median keel varies considerably on adult whorls and in specimens LO 3905 and LO 3908 it is relatively high and sharp; on LO 3907, however, it is feeble. Specimen LO 3905 (pl. II, figs. 1, a—b; fig. 1) has straighter ribs than the other specimens that are straight and sharp on the inner preserved whorl.

The whorl section of the Swedish specimens is subquadrate with a tendency for the flanks to slope towards the venter.

The furrows beside the median keel may virtually disappear (LO 3907). One specimen (LO 3908) is relatively strongly ornamented with a sharp, parallel-sided keel and moderately strong tubercles.

REMARKS. — The specimens agree well with REYNÈS' (1879, pl. 22, figs. 1, 2) original drawings, although the slope of the ventrolateral shoulders of his fig. 1 seems to be more angular and steeper; specimen LO 3907 is, however, closely comparable in this respect. DONOVAN (1952, p. 741) noted that the degree of slope of the ventrolateral shoulders of the type specimen as figured is exaggerated. A crushed fragment (LO 3909) seems

Fig. 1. *Megarietites meridionalis* (REYNÈS). Whorl section of specimen LO 3905. ($\times 0.5$).



to display the type of ornament on the ribs and intercostal areas mentioned by BUCKMAN (1927, pl. dxviii A). Specimen LO 3907 A in ventral aspect is very close to BUCKMAN's figure (1927, pl. dxviii B) as regards the remnants of the side keels uniting the ventral terminations of the ribs.

The Swedish specimens differ from the two representatives figured by BUCKMAN (1924, 1927) in having generally weaker side keels on mature whorls.

Genus *Paracoronicer* SPATH, 1922

TYPE SPECIES. — *Ammonites gmündensis* OPPEL (= *Paracoronicer charlesi* DONOVAN).

Paracoronicer charlesi DONOVAN

Pl. I, figs. 2, a—b; fig. 2

1879 *Ammonites Gmundensis* OPPEL, REYNÈS, pl. 16, figs. 1, 2.

1881 *Ammonites bisulcatus* BRUG., LUNDGREN, p. 51.

1951 *Coronicer bisulcatum* BRUG., TROEDSSON, p. 240.

1955 *Coronicer (Paracoronicer) charlesi* DONOVAN, p. 12.

MATERIAL. — A single fragmentary specimen.

REPOSITORY. — Lund, LO 3910 (original to LUNDGREN, 1881, p. 51).

PROVENANCE. — Djuramåsa.

COLLECTOR. — H. SJÖGREN.

AGE. — Lower Sinemurian; *P. charlesi* is an early form in the *semicostatum* zone and occurs in the *gmündense* subzone thereof.

DESCRIPTION. — The specimen is a fragment about 50 mm in length. The maximum whorl height is 22 mm and there are 9 ribs present. The maximum whorl width, measured over the intercostal area, is 14 mm and this occurs at the umbilical margin. The venter is bisulcate and strongly tricarinate. The ribs are relatively high and sharp and curve slightly with

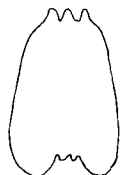


Fig. 2. *Paracoronicer charlesi* DONOVAN. Whorl section of specimen LO 3910. ($\times 0.5$).