

Final conclusions

1° The fine-grained Lower Visean (?) sediments of Ciechanowice contain locally abundant volcanic materials including both altered glass and the so-called "crystal phase" (quartz, biotite);

2° Most likely, their parent volcanic material was a vitrophyric acid (rhyolitic (?) lava;

3° The material under consideration is very similar to that already found within the Upper Tournaisian (?) sediments of the Intrasudetic Basin, i.e. the Kulm of Ciechanowice [15, 16] and the Kulm of Sady Górne [8, 14, 17];

4° During the Lower Visean (?) time, a little ash was available; it might thus have been concentrated but only under conditions of calm and slow sedimentation, which existed over a relatively long period, merely in the area of Ciechanowice;

5° The material had undergone considerable alteration under conditions of water-logged fine sediments interstratified with pit accumulations. It is clear that alteration followed deposition.

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Ammonites of the Genus *Phlycticeras* Hyatt from the Callovian of the Cracow Upland

by

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Some observations of several ammonite specimens of the genus *Phlycticeras* Hyatt are presented, which may contribute to the better knowledge of them. One species has been distinguished in this genus, namely the *Phlycticeras pustulatum* (Reinecke). The ammonites of this species seldom occur in the Callovian deposits of Europe, and so far, they have never been described from the Polish territory. It was first found in the Cracow Upland by Koroniewicz (cf. [8]), and was then cited by Wójcik [10] and Różycki [8]. Unfortunately, all these specimens were lost during World War II. The specimens here presented were collected from the Balin Oolite (Callovian) of the vicinity of Czerna and Czatkowice.

Because of the considerable variability of characters of the specimens classified to *Phlycticeras pustulatum* (Reinecke) and the infrequent and fragmentary character of finds, serious controversies exist in the literature concerning its taxonomy. Quenstedt [6, 7] distinguished several varieties within this species, namely: *A. pustulatus nodosus*, *A. pustulatus laevigatus*, *A. pustulatus suevicus*, *A. pustulatus giganteus*, *A. pustulatus franconicus*. Parona and Bonarelli (cf. [9]), thinking that the varieties established by Quenstedt in the *Ammonites pustulatus* species are different species of the genus *Lophoceras* distinguished by them, gave the rank of species to the new forms distinguishing: *Lophoceras polygonium*, *L. cristagalli*, *L. lachati*, *L. pustulatum*. Scheurlen [9] was of the opinion that all the above-mentioned forms belong to the same *Phlycticeras pustulatum* (Reinecke) species, and that they are particular ontogenic stages described as separate species. Despite of that, some differences were explained by Scheurlen [9] as geographic varieties. He also pointed out that Zieten's specimens come from the Schwäbisch Jura, and those of Quenstedt — from the Franconian Jura. Kuhn [3] was of the opinion that the forms treated as evolutionary stages of *Phlycticeras pustulatum* (Reinecke) occur in various stratigraphic horizons.

The classification of the genus *Phlycticeras* (Hyatt, 1900) to a definite family is not clear either. Lóczy [4] classified it to the *Amaltheidae* family, and Scheurlen [9] referred it, tentatively, to the *Strigoceratidae* family. Jeannet [2] places this genus within the "incertae sedis" group. Arkell [1] included the genus *Phlycticeras* into the *Oppeliidae* family.

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Scheurlen [9], when describing the particular specimens classified to *Phlycticeras pustulatum* species (Reinecke) as its ontogenic stages, did not take into account the fact that those specimens, of similar diameters, differ from one another in sculpture and dimensions. These differences may be easily observed both in Quenstedt's specimens [7] (Pl. 86, Figs. 13 and 17), in those of Scheurlen [9] (Pl. 3, Figs. 15—16 and 19), and also in the specimens derived from the Callovian of the Cracow Upland (Pl. 1, Figs. 1—1a, 2—2a and 3—3a). Such a differentiation among the individuals of this species is caused by the variability between specimens, which is so frequent among ammonites, and possibly also by sexual dimorphism (cf. [5]).

It is extremely difficult to establish whether the occurrence of the above-mentioned ammonites is connected with definite Callovian zones as it was assumed by Kuhn [3], as they derive from the Balin Oolite which is a bed of reduced thickness. Otherwise, it would be possible to follow up their variability in the stratigraphic column. According to Quenstedt [6, 7], the "giganteus" stage was the earliest one and came from the Lower Callovian, and the "franconicus" stage occurred higher up. Thus it would have been a change from the forms in the sculpture of which ribs and nodes prevail, to those with the domination of nodes only. The same may be observed among the investigated specimens, in which also forms with prevalence of ribs over nodes occur (Pl. 1, Figs. 3, 3a, 4, 4a) as well as those where the nodes dominate (Pl. 1, Figs. 1, 2 and 5). Besides, stronger nodality may be seen in the inner whorls of the specimens in question than in the outer ones, which clearly points to evolutionary changes of the genus that took place during the protogenesis.

It seems appropriate to give a specific rank to some of the subspecies of *Phlycticeras pustulatum* (Reinecke), as some highly differentiated individuals are included in this species. Such a differentiation cannot be explained merely by the existence of ontogenic stages. The present author is unable to carry out an exhaustive investigation because of a too small number of available specimens.

Genus *Phlycticeras* Hyatt, 1900

Phlycticeras pustulatum franconicum (Quenstedt, 1886) (Pl. 1, Figs. 1, 1a, 2 and 2a)

1886. *Ammonites pustulatus* (Reinecke) *franconicus*; Quenstedt, p. 756, Pl. 86, Figs. 14, 15;

1928. *Phlycticeras pustulatum* (Rein.) var. *franconica* Quen.; Scheurlen, p. 29, Pl. 4, Figs. 13, 14, 19, 24—25.

1951. *Phlycticeras pustulatum* (Rein.) sp. var. *franconica* Quen.; Jeannet, p. 105, Pl. 4, Fig. 6

Dimensions (mm):

First specimen (Pl. 1, Figs. 2, 2a)		Second specimen (Pl. 1, Figs. 1, 1a)	
$D = 17.0$	$H/D = 0.5$	$D = 18.3$	$H/D = 0.65$
$H = 11.0$	$E/H = 1.5$	$H = 11.8$	$E/H = 1.08$
$E = 15.0$	$E/D = 0.83$	$E = 12.8$	$E/D = 0.69$
$O = 2.2$	$O/D = 0.12$	$O = 2.3$	$O/D = 0.12$

D — whorl diameter H — height of the last whorl
 O — umbilical width E — width of the last whorl

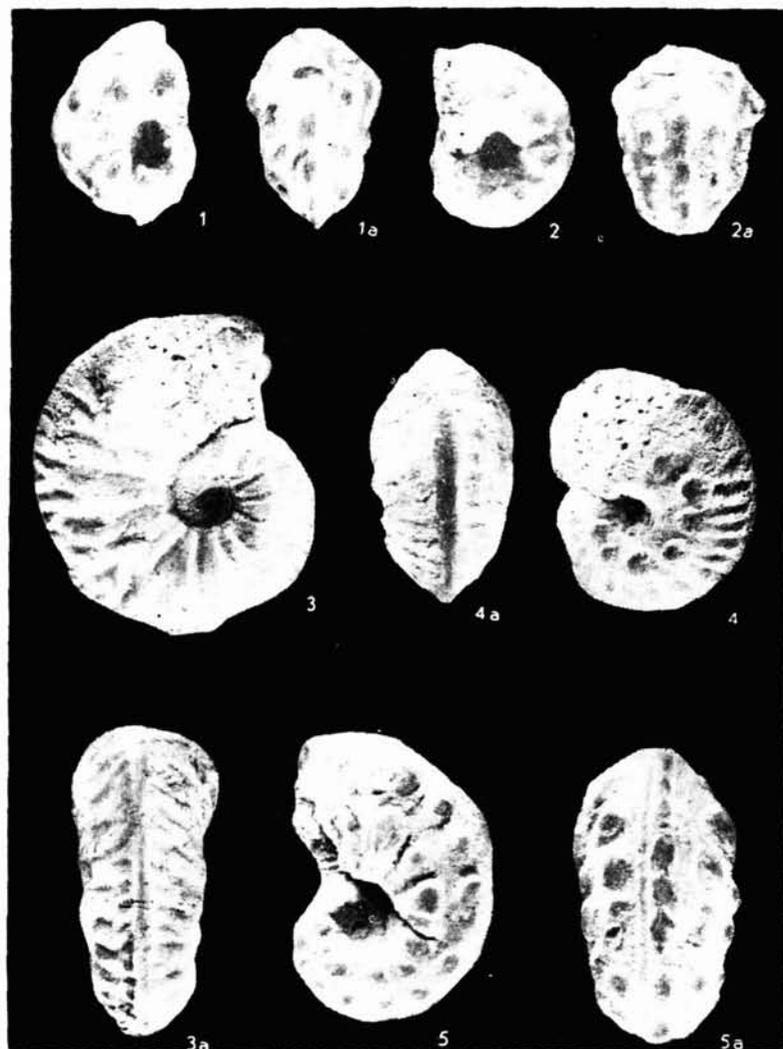


Fig. 1—1a, 2—2a — *Phlycticeras pustulatum franconicum* (Quenstedt). Czerna. 1.5

Fig. 3—3a — *Phlycticeras* aff. *pustulatum suevicum* (Quenstedt). Czerna. 1.5

Fig. 4—4a — *Phlycticeras* sp.; Czatkowice. 1.5

Fig. 5—5a — *Phlycticeras* cf. *pustulatum franconicum* (Quenstedt). Czerna. 1.5

Remarks. The investigated specimens are in good agreement with Quenstedt's figures [7], but one specimen (Pl. 1, Figs. 2, 2a) shows smaller height of the last whorl than those of Quenstedt. The author's specimens are identical with those of Scheurlen.

Occurrence. Both specimens of *Phlycticeras pustulatum franconicum* (Quenstedt) derive from the Balin Oolite (Callovian) of Czerna.

Phlycticeras cf. *pustulatum franconicum* (Quenstedt, 1886)
(Pl. 1, Figs. 5, 5a)

Dimensions (mm):

$$\begin{array}{cccc} D - 28.0 & H - 15.2 & E - 14.5 & O - 3.02 \\ H/D - 0.53 & E/H - 0.95 & E/D - 0.50 & O/D - 0.11 \end{array}$$

Remarks. The specimen in question resembles the specimens figured by Quenstedt [7] (Pl. 86, Figs. 14, 15). The latter, however, shows not so broad as the former and exhibit very distinct sulci. A similar specimen was illustrated also by Scheurlen [9] (Pl. 4, Fig. 15) but it is badly preserved and difficult to compare, hence the author's specimen is only tentatively ascribed to this subspecies.

Occurrence. Balin Oolite (Callovian) from Czerna.

Phlycticeras aff. *pustulatum suevicum* (Quenstedt, 1846)
(Pl. 1, Figs. 3, 3a)

Dimensions (mm):

$$\begin{array}{cccc} D - 30.0 & H - 13.5 & E - 12.0 & O - 5.0 \\ H/D - 0.45 & E/H - 0.99 & E/D - 0.40 & O/D - 0.16 \end{array}$$

Remarks. This specimen is similar to those described by Scheurlen [9] (Pl. 3, Figs. 9, 10) but has very irregular ribs and a narrower umbilicus. The specimens of Quenstedt [7] (Pl. 86, Figs. 10, 11, 12) also differ from it by a more regular rib pattern and narrower umbilicus. Because of large differences in the character of ornamentation and dimensions between the specimens of Quenstedt and Scheurlen and those under investigation, it was tentatively classified to *Phlycticeras pustulatum suevicum* (Quenstedt). It is not out of question that we deal here with a quite new species of the *Phlycticeras* genus but this cannot be established on the basis of a single specimen.

Occurrence. Balin Oolite (Callovian) of Czerna.

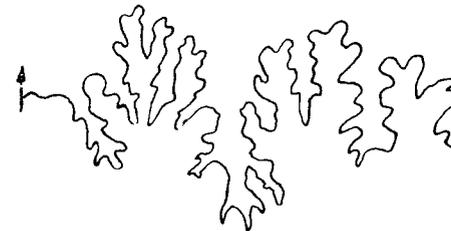
Phlycticeras sp.
(Pl. 1, Figs. 4, 4a)

Dimensions (mm):

$$\begin{array}{cccc} D - 22.0 & H - 13.0 & E - 13.0 & O - 4.0 \\ H/D - 0.59 & E/H - 1.0 & E/D - 0.59 & O/D - 0.18 \end{array}$$

Description. Specimen involute, whorls triangular in section. Maximal width of whorl, taken at 1/4th of its height. Umbilical slope rounded and smooth. Umbilicus

narrow and not very deep. On the ventral side, a ledge-shaped, smooth keel is visible, which broadens anteriorly. The sculpture of this specimen consists of bifurcate ribs, which run from places situated slightly above the umbilical slope, bend forward and terminate with small swells near the keel (18 swells per one whorl). A row of small nodes, 9 per whorl, occurs near the perumbilical area, below which the ribs bifurcate. Delicate spiral striae are observable on whorl sides in between the ribs. The suture is typical for the genus *Phlycticeras* (cf. the Figure).



The suture of *Phlycticeras* sp. of the specimen presented in Pl. 1, Figs. 4 and 4a; diameter 18 mm. Mag. $\times 7$

Remarks. The specimen here described is similar to that of Quenstedt [7] (Pl. 86, Fig. 17) and to that of Scheurlen [9] (Pl. 4, Fig. 3). It differs, however, from the latter in the broad, distinct keel and the character of sculpture. It is possible that this is a new species of the genus *Phlycticeras*.

Occurrence. Balin Oolite (Callovian) of Czatkowice.

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