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GENUS AMMONICRINUS (CRINOIDEA) FROM THE MIDDLE DEVONIAN OF THE HOLY CROSS MTS (POLAND)

Abstract.—Crinoid genus *Ammonicrinus* is represented by two species, *A. sulcatus* Kongiel and *A. kongieli* sp.n., in the Grzegorzowice—Skały and Świętomarz—Sniadka profiles of the Middle Devonian in the Holy Cross Mts. The presence of barrel-like columnals of a limited mobility in distal part of stems and the development of wide tuberculated external cover indicate that both species represent sessile benthos. In *A. sulcatus* stem was connected with crown through modified columnarium. The crown was equipped with short arms which could take food in a space limited to the interior of coiled part of the stem. The food was supplied by current parallel to the bottom. The structure of crown and stem suggests that all *Ammonicrinus* species represent the same evolutionary stage.

INTRODUCTION

In the years 1968—1975 the author gathered about 800 cups and a few thousands of fragments of various crinoids in the Middle Devonian of the

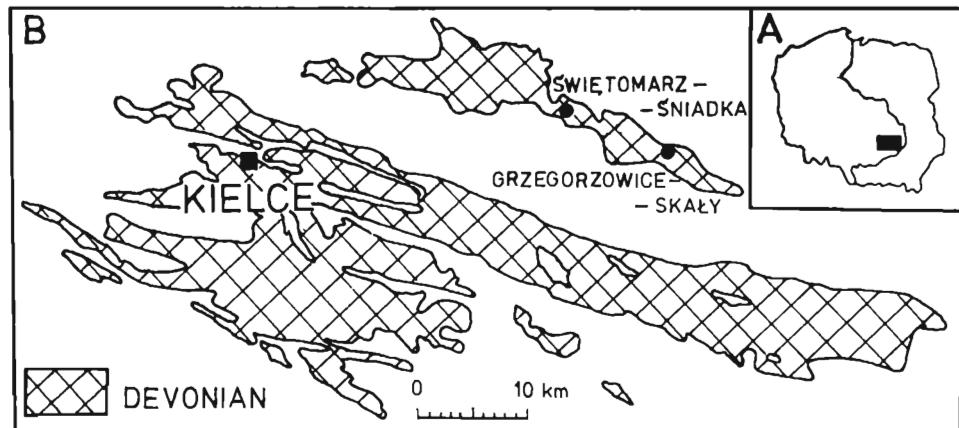


Fig. 1. Map of Poland (A) and location of the Grzegorzowice—Skały and Świętomarz—Sniadka profiles versus geological map of the Holy Cross Mts (B) (after Pajchlowa & Stasińska, 1965, simplified).

Holy Cross Mts. The bulk of material was derived from the Givetian deposits of so-called Skalska series (see Pajchlowa 1957) displayed by the Grzegorzowice — Skały and Świętomarz — Śniadka profiles (fig. 1). From this area crinoids were not described except for *Ammonicrinus sulcatus* Kongiel (Kongiel 1958). Moreover, several authors reported the occurrence of crinoids accompanying other fossils (e.g. Zeuschner 1869, Gürich 1869, Sobolev 1909, Stasińska 1958, Kiepura 1973). In the Grzegorzowice — Skaly profile the genus *Ammonicrinus* occurs in upper part of so-called brachiopod shales assigned to the Givetian (Pajchlowa 1957: member XIV). These are clay shales with thin marly intercalations exposed in an old excavation no. 73 (Pajchlowa *l.c.*). The rich crinoid fauna found there contains: numerous columnals of *Ammonicrinus sulcatus* Kongiel, *Myelodactylus canaliculatus* (Goldfuss) and *Taxocrinus macrodactylus* Phillips, crown plates of *Halysiocrinus* sp., dissociated crown plates and 10 morphological types of columnals of other crinoids. The associated fauna is exceptionally rich and comprises brachiopods, ostracods, corals, trilobites, pelcypods, foraminifers, gastropods and worms as well as occasional bryozoans, cornulites, tentaculites and receptaculites.

In the Świętomarz-Śniadka profile the specimens of *Ammonicrinus* were found in the Błonie valley in the central part of which shales and limestones rich in fossils are exposed (Bednarczyk 1955). Crinoids are fairly common here, being represented by about 10 taxa including *Haplocrinites stellaris* (Roemer), *Platycrinites* sp., *Hexacrinites* sp., *Halysiocrinus* sp., *Myelodactylus* sp., *Ammonicrinus kongieli* sp.n. and *Taxocrinus macrodactylus* Phillips. The very rich associated fauna of brachiopods, ostracods, corals, trilobites, gastropods, pelcypods, bryozoans, nautiloids and conodonts is indicative of the Givetian age.

The list of crinoids recorded in the profiles studied
(supplemented with the data from Zeuschner 1869, Gürich 1869,
Sobolev 1909 and Kongiel 1958)

* — species recorded by the author

	Grzegorzowice- Skały	Świętomarz- Śniadka
Camerata		
<i>Rhipidocrinus crenatus</i> Goldfuss	+	
? <i>Rhodocrinites</i> sp.		+
* <i>Hexacrinites</i> sp.	+	+
* <i>Platycrinites</i> sp.	+	+
Inadunata		
* <i>Haplocrinites stellaris</i> (Roemer)	+	+

<i>Cupressocrinites</i> aff. <i>schlotheimi</i>		
(Steininger)	+	
<i>Cupressocrinites schlotheimi</i>		
(Steininger)	+	
* <i>Cupressocrinites</i> sp.	+	+
* <i>Aviadocrinus</i> sp.	+	
* <i>Bactrocrinus tenuis</i> Jaekel	+	
* <i>Myelodactylus canaliculatus</i>		
(Goldfuss)	+	
* <i>Myelodactylus</i> sp.		+
* <i>Halysiocrinus</i> sp.	+	+
<i>Flexibilia</i>		
* <i>Ammonicrinus sulcatus</i> Kongiel	+	
* <i>Ammonicrinus kongieli</i> sp.n.		+
* <i>Taxocrinus macrodactylus</i> Phillips	+	+

Crinoids described here are housed in the Museum of Evolution, Polish Academy of Sciences in Warsaw (abbr. ME). The studies also covered specimens gathered by R. Kongiel and housed in the Museum of Earth, Polish Academy of Sciences in Warsaw (abbr. MZ).

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THE BIOLOGY OF THE GENUS AMMONICRINUS

Life position

Ammonicrinus sulcatus and *A. kongieli* presumably represent the same type of adaptation as *A. doliformis*. The crinoids are characterized by distal part of stem formed of cylindrical columnals with circular, smooth and slightly depressed joint surfaces. Such structure of crenularium indicates limited possibilities of inter-columnal movement. In *A. doliformis* the last distal columnal was attached to the substrate (Wolburg 1937: pl. 17:1; pl. 18:8). According to Springer (1926, *fide* Wolburg 1937), Krause (1927), Wolburg (1937) and Ubaghs (1952) in *A. wanneri* a distal part of stem was lacking, and the stem ended with the last segment of external cover. The photos of Springer's specimens given by Wolburg (1937: pl. 18:9-10) show that smaller specimen (pl. 18:9) had complete external cover with distal plates clearly diminishing towards the last columnal member and that the larger specimen (pl. 18:10) had stem ending with a wide columnal plate from the medial part of external cover. The distal part of external cover was also lacking in specimens studied by Krause (1927) and Ubaghs (1952). In *Ammonicrinus sulcatus*, *A. kongieli* and

A. doliformis central part of stem strongly narrows distally and passes into plates entirely different in morphology. The appearance of the last plate of external cover of *A. wanneri* was not equivocally defined in the papers cited above and thus the existence of distal part of stem in smaller specimen described by Springer (see Wolburg 1937: pl. 19:9) cannot be excluded. The data concerning lithology of deposits yielding *Ammonicrinus wanneri* and *A. doliformis* (Ubags 1952) indicate that these species similarly as *A. sulcatus* and *A. kongieli* lived on muddy sea floor. All the species of *Ammonicrinus* display very similar central stem part consisting of widened plates surrounding crown. This feature similarly as the mode of development of distal stem part is of decisive importance for reconstructing the adaptation of these crinoids. It may be assumed that the specialization was aimed at providing a firm support in soft bottom (fig. 2)

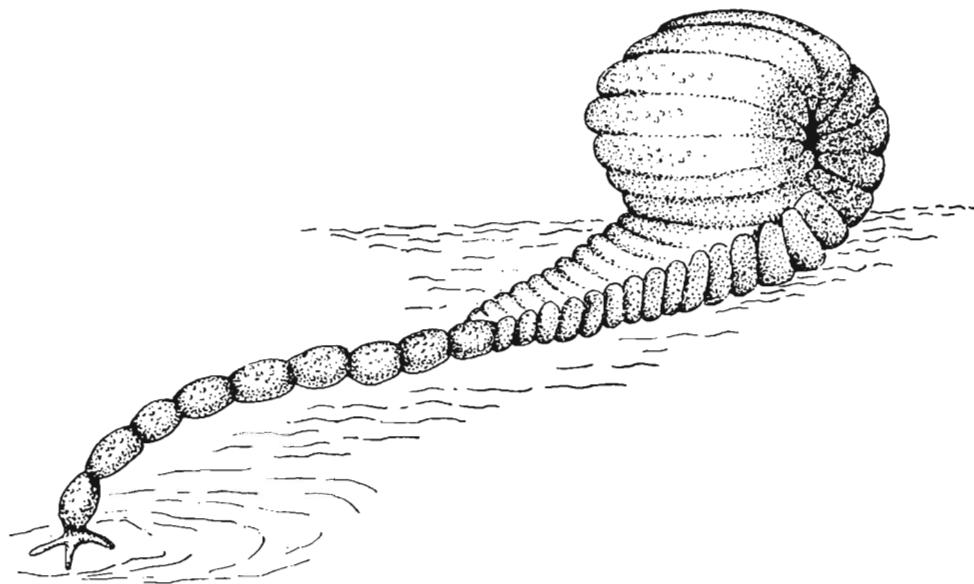


Fig. 2. Reconstruction of life position of *Ammonicrinus sulcatus* Kongiel; approx. $\times 4$.

and protection from pollution with sediment carried by water. Plates of external cover of all the species are heavily ornamented (for example, spines are developed on some juvenile individuals of *Ammonicrinus kongieli* — see pl. 18:2, 3). The relief increased surface of central part of stem and thus it presumably facilitated the crinoid to keep above the surface of muddy deposit. *Ammonicrinus* was compared with other crinoids characterized by adaptation to life on sea floor. In two of them, *Myelodactylus* (Inadunata) and *Camptocrinus* (Camerata) the crown was completely enveloped by a part of trailing stem. All the genera characterized by such crown enveloped by stem were placed in an artificial group "Nebenfor-

men" of Ehrenberg (1930) or "eingerollte Crinoiden" of Wolburg (1938). According to Ubaghs (1952) the convergency of external morphology may result in apparent similarity of forms of entirely different ethology.

Feeding and water circulation in *Ammonicrinus* body

Feeding position. — Up to the present little is known about the structure of crowns except for that of *A. wanneri* (fig. 5A), *A. doliformis* — (Ubaghs 1952) and, partly, *A. sulcatus* (fig. 5B). The structure is similar in all the forms, being characterized by a development of short arms always remaining inside of external cover as well as radial symmetry disturbed by hypertrophy of left anterior radiale, which leads to certain contortion of crown in relation to symmetry plane of stem. The crown was screened by external cover so that the food could be supplied into it by current parallel to the bottom only. The water carrying food was introduced into the central part of stem through a furrow formed by distal parts of external cover and the outflow proceeded through umbilical openings. During feeding the arms were presumably resting on stem plates (fig. 3). The contortion of crown in relation to symmetry plane of

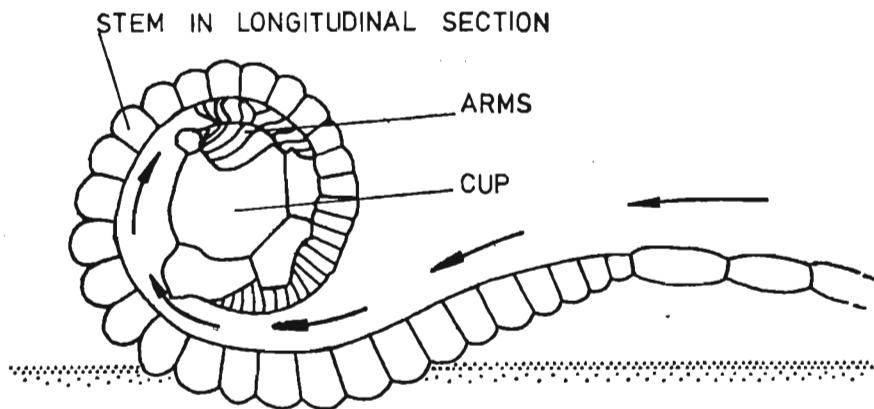


Fig. 3. Arrangement of crown of *Ammonicrinus* during taking food. (Structure of crown after Ubaghs 1952).

stem could facilitate water circulation inside the external cover as water current was directed by contorted crown to umbilical opening. *Ammonicrinus sulcatus* and *A. kongieli* are accompanied by crinoids with trailing stem, assigned to the genus *Halysiocrinus* (Calceocrinidae). The reconstructions of life position of the latter (Jaekel 1918, and Kesling & Singer 1969) show that they were adapted to filter food out of the horizontal water current. Similar adaptation occurs in recent case-worms of caddis-flies (Trichoptera) which attach their tubular "houses" with outlet directed towards the current supplying food (Pavlovskij & Lepneva 1948).

"Resting position".—It was connected with tightening of stem plates around the crown. Lateral projections joining one another were completely screening umbilical surfaces of external cover. All the specimens of *Ammonicrinus* with preserved central parts of stem were found in that position.

The analysis of relations existing in that group (Kongiel 1958), has shown the evolutionary trends leading from sessile forms (*A. doliiformis*) through crinoids detached from the bottom (*A. wanneri*) to forms actively moving (*A. sulcatus*). However, the present study and some new data from the literature make it possible to assume that the majority of crinoids assigned to this group represent the same evolutionary stage characterized by highly similar morphology of crown and a small differentiation in structure of stem, mainly connected with stronger (*A. sulcatus*, *A. kongieli*) or weaker (*A. wanneri*?, *A. doliiformis*) development of joint surfaces of plates forming central stem parts.

S Y S T E M A T I C P A R T

Subclass **Flexibilia** Zittel, 1879

Order **Sagenocrinida** Springer, 1913

Family **Lecanocrinidae** Springer, 1913

Genus **Ammonicrinus** Springer, 1926

Type species: *Ammonicrinus wanneri* Springer.

Revised diagnosis.—Calyx dicyclical, consisting of 2 infrabasal plates (IB), 3 somewhat smaller basal plates (B) and 5 radialia (R) of different size; left and right anterior radialia are best developed. Two radial plates (RA) and anal plate (X) supporting anal tube consist of two series of plates. Five short isotomically branching arms of unequal length. Crown spherical, with disturbed symmetry. Stem tuberculated, enveloping calyx with its proximal and central parts. Proximal part of stem formed of small, narrow, semicrescent plates, the last of which is hidden in depression in both infrabasal plates (IB). Central stem part (external cover)—the widest, formed of larger and more massive plates than those of the proximal stem part, and with prominent lateral projections. Plates forming distal section of central part of stem with partly or complemently reduced lateral projections, joint surfaces triangular in outline and markedly increased in height. Distal part of stem may be formed of massive cylindrical columns.

Species assigned: *Ammonicrinus wanneri* Springer, *Ammonicrinus doliiformis* Wolburg, *Ammonicrinus sulcatus* Kongiel, *Ammonicrinus kongieli* sp.n.. *Ammonicrinus* ? *nordicus* Jakovlev & Ivanov.

Remarks.—The species assigned to this genus differ in structure of distal part of stem. In *A. doliiformis* Wolburg it was formed of cylindrical columnals without lateral projections and served for attachment to the substrate (Wolburg 1937, Ubaghs 1952). *Ammonicrinus sulcatus* Kongiel represented similar structural type whilst *A. kongieli* sp.n. was characterized by distal stem part built of plates shorter than in the above mentioned species and with lateral projections. Plates serving for

attachment to the substrate were not found in the *A. wanneri* (see Krause 1927, Wolburg 1937, Ubaghs 1952).

Stratigraphic and geographic distribution. — Eifelian — Lower Givetian of the Federal Republic of Germany, Givetian of Poland (Holy Cross Mts.), ?Carboniferous of the USSR (Donetz Basin).

Ammonicrinus sulcatus Kongiel, 1958

(pl. 17:1-5; pl. 18:4-8, 10)

1958. *Ammonicrinus sulcatus* n.sp.; Kongiel: pl. 1:1-10.

Supplemented diagnosis. — Ornamentation consisting of tubercles of different size randomly arranged in central part of external surface of stem plates. Strongly developed joint surface of external cover consisting of 2 planes separated by crenularium. Distal stem part built of barrel-like columnals without lateral projections.

Material. — About 17 complete columnals, 39 fragments of various parts of stems and the Kongiel's (1958) collection. Dimensions of plates of *Ammonicrinus sulcatus* (fig. 4) are given in Table 1.

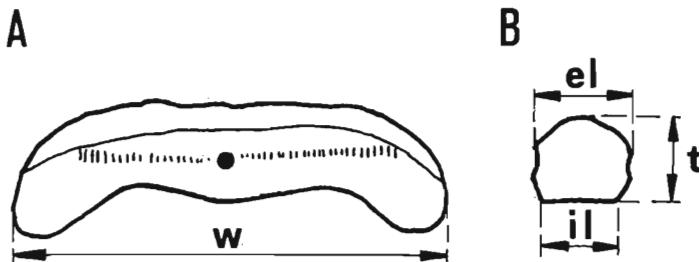


Fig. 4. Joint surface (A) and longitudinal section through stem plate (B) of *Ammonicrinus sulcatus* Kongiel.

w width, t thickness, el external length, il internal length.

Description. — Crown spherical, formed of plates with external surface displaying neither traces of any relief nor imprints of stem plates. Stem (fig. 6) connected with crown by a characteristically modified proximal columnal equipped with 2 projections entering depressions from both infrabasal plates (pl. 18:5a, b). Columnals of the most proximal parts of stem are small and narrow, with poorly developed lateral projections (pl. 18:4). Their external surfaces display ornamentation typical of the species, consisting of densely spaced tubercles of different size but generally smaller than those from external cover plates. Subsequent part of stem is formed of plates with sharp, long lateral tubercles and well-developed crenularium (pl. 18:6, 7). Central part of stem (external cover) fig. (6) is formed of wide, semicrescent plates with prominent lateral projections and crenularium. External surface of plates is tuberculated (pl. 19:10). Lateral projections disappear and columnals increase in size in distal parts of central part of stem. The reduction of lateral projections parts of plates results in formation of flat columnals with joint surfaces triangular in outline (pl. 17:2a, b) which subsequently achieve the shape of a truncated cone with subcircular joint surfaces (pl. 17:3). Distal part of stem (fig. 6) is formed of high cylindrical plates with characteristic tuberculation. It covers the whole surface in smaller forms and is limited to central parts in larger forms (pl. 17:1a, 4, 5). Joint surfaces of each columnal are circular (pl. 17:1b). The most distal columnal was not found.

Table 1

Dimensions of plates of *Ammonicrinus sulcatus* Kongiel (in mm)

No. of plate	Part of stem	Width w	Thickness t	External length el	Internal length il
ME 14/19	1 st plate from the proximal part of stem	—	2.3	length 1.9	
ME 14/7	Plate from the proximal part of stem	11.0	2.2	2.1	1.8
ME 14/8	—, —	8.0	2.2	1.4	1.3
ME 14/14	—, —	7.1	2.2	1.6	1.2
ME 14/15	—, —	12.3	3.0	2.4	1.9
ME 14/1	external cover	17.5	3.6	3.3	3.2
ME 14/2	—, —	17.3	3.3	2.6	2.6
ME 14/3	—, —	16.0	3.3	3.1	3.3
ME 14/4	—, —	12.2	3.2	1.9	1.5
ME 14/5	—, —	17.7	3.2	2.8	2.6
ME 14/16	—, —	16.9	3.2	3.3	2.8
ME 14/6	Plate from the distal part of external cover	12.1	4.4	2.5	1.9
ME 14/9	—, —	8.7	3.9	2.1	2.3
ME 14/17	—, —	6.9	5.8	length 6.8	
ME 14/10	—, —	5.5	14.8	—	—
ME 14/11	—, —	5.7	13.4	—	—
ME 14/12	—, —	4.8	9.7	—	—

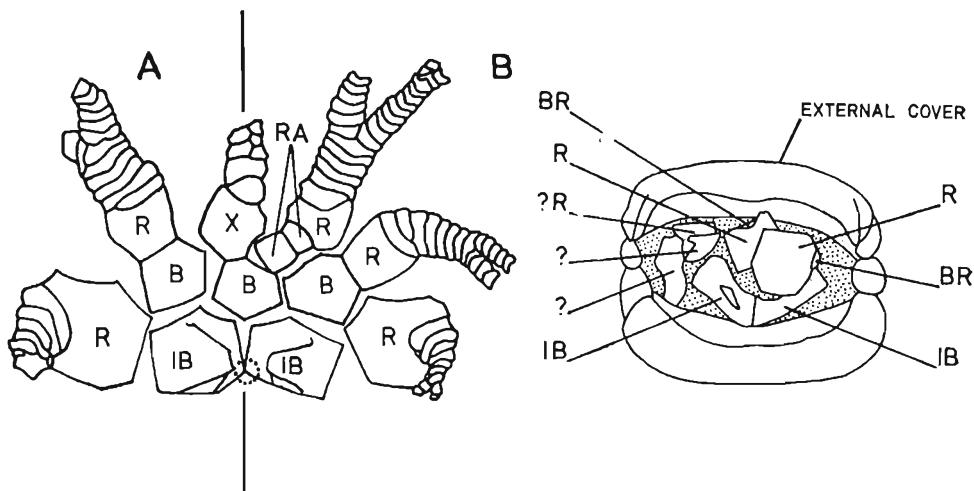


Fig. 5. A Structure of *Ammonicrinus* crown (after Ubags 1952). B Arrangement of crown plates in the holotype of *A. sulcatus* Kongiel.
IB infrabasal plates, B basal plates, R radial plates, X anal plates, RA radianal plates.

The structure of articulum in different parts of stem. The surfaces of articulum of plates from proximal and central parts of stem are very similar in structure. A ridge on which crenulae are marked continues throughout a plate, separating two

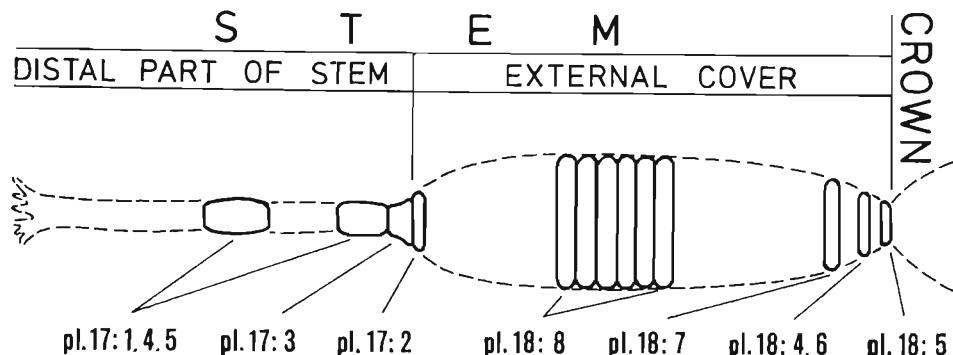


Fig. 6. Structure of stem of *Ammonicrinus sulcatus* Kongiel.

planes set oblique one to another. The number of crenulae is variable, depending on size of plate; the degree of their development is less advanced in columnals from proximal part of stem. Lumen situated in the center of plate is pentagonal, with sharply ended jugula. Such shape of lumen is typical of all the stem plates (pl. 17: 1c, 2c). Crenularium gradually disappears on plates at the transition from central to distal parts of stem and its role is presumably fulfilled by tubercles developed on margins of articulum (pl. 17:2b). Articulum of plates from distal stem part is circular, with lumen situated in the center (pl. 17:1b, 5b).

Remarks. — A plate uniting stem and crown was partially exposed inside the holotype. Table 3 presents the comparison with other species of that genus.

Occurrence. — Givetian, Skały beds (member XIV, brachiopod shales) of the Grzegorzowice — Skały profiles, Poland.

Ammonicrinus kongieli sp.n.

(pl. 18:1-3, 9; pl. 18:1-9)

Holotype: A four-plate section of central part of stem (external cover) — Me 15/19.

Type horizon: Givetian, Skały beds.

Type locality: Błonie valley, Świętomarz — Sniadka profile, Holy Cross Mts, Poland.

Derivation of the name: In honour of the late Polish paleontologist, Roman Kongiel, who was first to find the genus *Ammonicrinus* in the Devonian of Poland.

Diagnosis. — Tubercles fine, uniform in size, very densely and irregularly spaced and distributed throughout the external surface of plates. Distal part of stem formed of barrel-like columns with lateral projections.

Material. — Two fragments of external cover, one consisting of 4 columnals (the holotype) and another of 2 complete and one damaged plate, 95 separate plates and their fragments representing various parts of stem.

Description. — Crown not found. Columnals of proximal part of stem not found. Central stem part (external cover), consisting of small semicrescent plates with

Table 2

Dimensions of plates of *Ammonicrinus kongieli* sp.n. (in mm)

No. of plate	Part of stem	Width w	Thickness t	External length el	Internal length il
ME 15/1	external cover	14.3	3.0	2.1	1.5
ME 15/4	external cover juvenile specimen	9.1	3.9	1.9	1.7
ME 15/2	distal part of central section of stem	11.0	5.5	2.7	2.6
ME 15/3	—, —	9.0	5.4	2.4	2.2
ME 15/8	—, —	14.3	3.0	2.1	1.5
ME 15/5	distal part of stem	7.8	3.9	length 4.9	
ME 15/6	—, —	—	—	length 3.2	
ME 15/7	—, —	—	—	length 3.2	
ME 15/9	external cover, holotype	about 16.0	—	—	
ME 15/10	external cover 3 plates	about 15.8	—	—	

Table 3

Differences between the species of the genus *Ammonicrinus*

Species	Structure of distal part of stem	Ornamentation and shape of external side of plates and central stem part	Joint surfaces of plates of central and proximal parts of stem
<i>Ammonicrinus sulcatus</i> Kongiel	Cylindrical columnals, presumably attached to the substrate	Culmina of different size, irregularly, densely spaced, external side strongly convex	Consisting of 2 planes separated by crenularium
<i>Ammonicrinus doliformis</i> Wanner	Cylindrical columnals, attached to the substrate	Small, loosely spaced tubercles, external side weakly convex	flat
<i>Ammonicrinus wanneri</i> Springer	Distal part of stem not found	Tubercles small, uniform in size, densely spaced, external side weakly convex	flat
<i>Ammonicrinus kongieli</i> sp.n.	Barrel-like columnals with lateral projections, presumably attached to the substrate	Tubercles small, very densely spaced, external side weakly convex	Consisting of 2 planes sperated by crenularium

lateral projections (pl. 19:4b, 5), ornamented with fine, crowded tubercles (pl. 18:9) or spines in the case of some, presumably juvenile individuals (pl. 18:2, 3). Articulum represented by two oblique planes separated by crenularium formed of culmina arranged in its center and becoming ridge-like towards the margins. The number of culmina approaches 50 on largest plates. External surface of plates is flatter than in the above described species. The transition to distal stem part is marked by decrease in plate width and, to a some degree, in size of lateral projections (pl. 19:3, 8). Plates increase in thickness and show the relief of the type of randomly distributed culmina in internal parts of the plates (pl. 18:1a). Some modifications of articulum are connected with attaining of subcircular shape. All the modifications lead to origin of barrel-like columnals still having lateral projections (pl. 19:1, 2). The sculpture of their external surface is close to tuberculation of plates of external cover whilst their internal parts are ornamented similarly as columns of transitional section of stem. Articula of these plates are circular in outline and completely devoid of crenularium. Lumen of all the stem plates is pentagonal.

Remarks. — Stem of this species is similar to that of *Ammonicrinus doliformis* Wolburg (Wolburg 1937, Ubaghs 1952) and *A. sulcatus* Kongiel (fig. 6) in general structural plan. The external cover of *A. kongieli* sp.n. is built of plates somewhat smaller than those of *A. sulcatus* Kongiel. Table 3 shows similarities and differences in respect to other species of that genus.

Occurrence. — Givetian, Skaly beds of the Świętomarz—Śniadka profile, Błonie valley, Poland.

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REFERENCES

- BEDNARCZYK, W. 1955. Stratygrafia dewonu w profilu Świętomarz-Śniadka i zdjęcia geologiczne okolic. — MS, Arch. Inst. Geol. U. W.
- GÜRICH, G. 1869. Das Paleozoikum im polnischen Mittelgebierge. — *Inst. S. Pet. Min. Ob. T.*, 32, 1—539.
- JAEKEL, O. 1918. Phylogenie und System Pelmatozoen. — *Palaeont. Ztschr.*, 3, 1, 1—128.
- JAKOVLEV, N. N. & IVANOV, A. P. 1956. (ЯКОВЛЕВ, Н. Н. & ИВАНОВ, А. П.) Морские лилии и бластоиды каменноугольных и пермских отложений СССР. — *Труды ВСЕГЕИ*, 2, 1—142.
- KESLING, R. V. & SIGLER, J. P. 1969. *Cunctocrinus* a new Middle Devonian calceocrinid crinoid from the Silica Shale of Ohio. — *Contr. Mus. Paleont. Univ. Michigan*, 22, 24, 339—360.
- KIEPURA, M. 1965. Devonian bryozoans of the Holy Cross Mts., Poland. Part I Ctenostomata. — *Acta Palaeont. Pol.*, 10, 10, 11—47.
- KONGIEL, R. 1958. Nowy gatunek *Ammonicrinus* i jego występowanie w Polsce. — *Prace Muz. Ziemi*, 2, 31—40.

- KRAUSE, P. G. 1927. Über *Ammonicrinus* in dem Mitteldevon der Eifel. — *Ztschr. deutsch. geol. Ges.*, **79**, 448—456.
- PAJCHLOWA, M. & STASIŃSKA, A. 1965. Formations recifales du Devonien des Monts de Sainte-Croix (Pologne). — *Acta Palaeont. Pol.*, **10**, 249—260.
- 1957. Dewon w profilu Grzegorzwice — Skały. — *Biul. Inst. Geol.*, **122**, 2, 145—254.
- PAVLOVSKIJ, E. N. & LEPNEVA, G. G. 1948. (ПАВЛОВСКИЙ, Е. Н. & ЛЕПНЕВА, Г. Г.) Очерки из жизни пресноводных животных. — Советская Наука, 1—458.
- SOBOLEV, D. 1909. (СОБОЛЕВ, Д.) Средний девон Келецко-Сандомирского Края. — *Mat. Geol. Ros.*, **24**, 41—536.
- STASIŃSKA, A. 1958. Tabulata, Heliolitida et Chaetetida du Devonien moyen des Monts de Sainte-Croix. — *Acta Palaeont. Pol.*, **3**, 3—4.
- UBAGHS, G. 1952. *Ammonicrinus* Springer, Crinoidea Flexibilia du Devonien moyen d'Allemagne. — *Senckenbergiana*, **33**, 203—220.
- WOLBURG, J. 1937. Bau und Biologie von *Ammonicrinus doliformis* n.sp. — *Jb. Preuss. Geol. Landes.*, **58**, 30—241.
- ZEUSCHNER, L. 1869. Geognostische Beschreibung der mittleren devonischen Schichten zwischen Grzegorzwice und Skały — Zagaje, bei Nowa Słupia. — *Ztschr. deutsch. geol. Ges.*, **21**, 263—274.

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**RODZAJ AMMONICRINUS (CRINOIDEA) ZE ŚRODKOWEGO DEWONU
GÓR ŚWIĘTOKRZYSKICH (POLSKA)**

Streszczenie

Liliowce z rodzaju *Ammonicrinus* w łupkach śródutowego dewonu Grzegorzwice — Skały i Świętomarz — Śniadka reprezentowane są przez dwa gatunki, *A. sulcatus* Kongiel i *A. kongieli* sp.n. Obecność w dystalnej części łodyg obu liliowców beczułkowatych kolumnali (pl. 17:1, 4, 5, pl. 19:1, 3) o ograniczonej możliwości ruchu oraz wykształcenie szerokiej pokrytej guzkami „powłoki zewnętrznej” (pl. 18:8, pl. 19:6, 7) wskazuje, że oba gatunki należą do bentosu osiadłego. U *A. sulcatus* łodyga łączyła się z koroną przez przekształcone kolumnalium (pl. 18:5). Korona posiadała krótkie ramiona (fig. 3, fig. 5) pozwalające na pobieranie pokarmu jedynie z przestrzeni zawartej wewnętrznej części łodygi. Pokarm był dostarczany przez równoległy do dna strumień wody. Budowa korony (fig. 5) i łodygi (fig. 6) świadczy, że liliowce z rodzaju *Ammonicrinus* reprezentują jedno stadium ewolucyjne.

АНДЖЕЙ ПИОТРОВСКИ

**РОД AMMONICRINUS (CRINOIDEA) СРЕДНЕГО ДЕВОНА
СВЕНТОКРЖИСКИХ ГОР (ПОЛЬША)**

Резюме

Морские лилии рода *Ammonicrinus* (фиг. 2) в сланцах среднего девона Гже-гожовице — Скалы и Свентомаж — Снядка (фиг. 1) относятся к двум видам: *A. sulcatus Kongiel* и *A. kongieli* sp. n. Наличие в дистальной части стеблей обеих лилий цилиндрических пластинок (табл. 17: 1, 4, 5; табл. 19: 1, 8) с ограниченной возможностью передвижения, а также форма широкой, покрытой бугорками внешней оболочки (табл. 18: 8; табл. 19: 6, 7) указывают на то, что оба вида принадлежат к прикреплённому бентосу. У *A. sulcatus* стебель был связан с кроной при помощи преобразованных пластинок (табл. 18: 5). От кроны отходили короткие руки (фиг. 3, фиг. 5), которые позволяли извлекать пищу только с пространства, находящегося внутри внешней части стебля. Пища поступала с током воды, который был параллельный дну. Строение кроны (фиг. 5) и стебля (фиг. 6) указывают на то, что морские лилии рода *Ammonicrinus* являются представителями одного и того же эволюционного этапа.

EXPLANATION OF THE PLATES

Plate 17

Ammonicrinus sulcatus Kongiel, 1958

Middle Devonian (Givetian), Skaly beds of the Grzegorzowice — Skaly profile

1. Plate from distal section of stem, ME 14/12, *a* side view, $\times 4$, *b* crenularium, $\times 10$, *c* lumen, $\times 25$.
2. Plate from transitional section, between distal stem part and external cover, ME 14/9, *a* $\times 4$, *b* crenularium, $\times 10$, *c* lumen, $\times 25$.
3. Plate from stem section transitional between distal part and external cover, ME 14/17, $\times 4$.
4. Plate from distal section of stem, ME 14/10, $\times 4$.
5. Plate from distal section of stem, ME 14/11, *a* side view, $\times 4$, *b* crenularium, $\times 10$.

Plate 18

Ammonicrinus kongieli sp.n.

Middle Devonian (Givetian), Skały beds of the Świętomarz — Sniadka profile

1. Plate from stem section transitional between distal part and external cover, ME 15/3, a, b views from crenularium side, $\times 4$, c external surface, $\times 4$.
2. Plate of external cover of juvenile specimen seen from the side of crenularium, ME 15/4, $\times 4$.
3. Plate from external cover of juvenile specimen seen from the side of crenularium, ME 15/13, $\times 4$.
9. Plate from external cover, external surface, ME 15/14, $\times 10$.

Ammonicrinus sulcatus Kongiel, 1958

Middle Devonien (Givetian), Skały beds from the Grzegorzowice — Skały profile

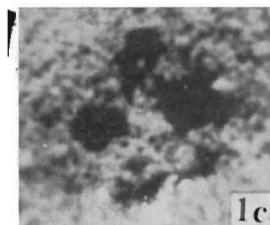
4. Plate from proximal part of stem, seen from the side of crenularium, ME 14/14, $\times 4$.
5. Proximal stem part, ME 14/10, a, b, $\times 4$.
6. Plate from proximal part of stem seen from the side of crenularium, ME 14/18, $\times 4$.
7. Plate from proximal part of stem seen from the side of crenularium, ME 14/4, $\times 4$.
8. Holotype of *Ammonicrinus sulcatus* Kongiel, a fragment of central part of external cover comprising disarticulated crown plates, MZ, $\times 3$.
10. Plate from external cover, external surface, ME 14/20, $\times 10$.

Plate 19

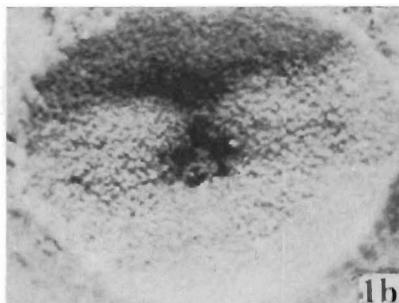
Ammonicrinus kongieli sp.n.

Middle Devonian (Givetian), Skały beds from the Świętomarz — Sniadka profile

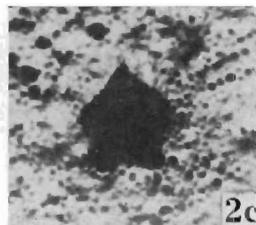
1. Plate from distal part of stem seen from the side of crenularium, ME 15/6, $\times 4$.
2. Plate from distal part of stem, ME 15/5, a external surface, $\times 4$, b from the side of crenularium, $\times 4$.
3. Plate from distal part of external cover seen from the side of crenularium, ME 15/8, $\times 3$.
4. Plate from external cover of juvenile specimen, ME 15/11, a external surface, $\times 4$, b from the side of crenularium, $\times 4$.
5. Plate from external cover of juvenile specimen seen from the side of crenularium, ME 15/1, $\times 4$.
6. Fragment from central part of external cover, formed of two complete plates and a part of third plate, ME 15/10, a external surface, $\times 3$, b side view, $\times 3$.
7. Holotype of *Ammonicrinus kongieli* sp.n.; fragment of external cover composed of 4 stem plates, ME 15/9, a external surface, $\times 3$, b side view, $\times 3$.
8. Plate from distal part of external cover seen from the side of crenularium, ME 15/15, $\times 4$.
9. Plate from distal part of external cover, ME 15/2, a from the side of crenularium, $\times 4$, b external surface, $\times 4$.
10. Plate from distal part of external cover seen from the side of crenularium, ME 15/12, $\times 4$.



1c



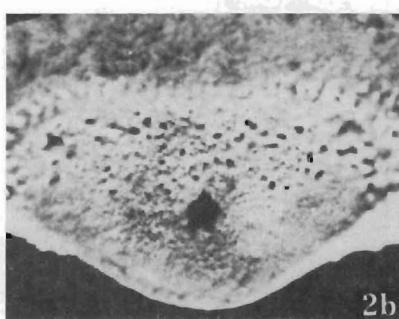
1b



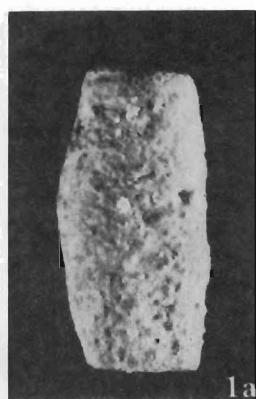
2c



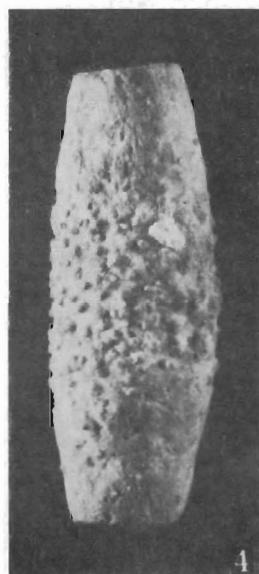
3



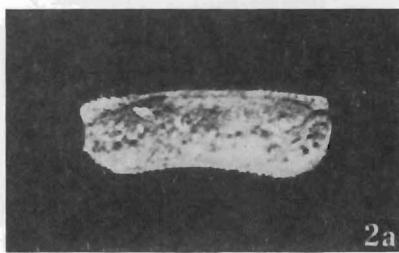
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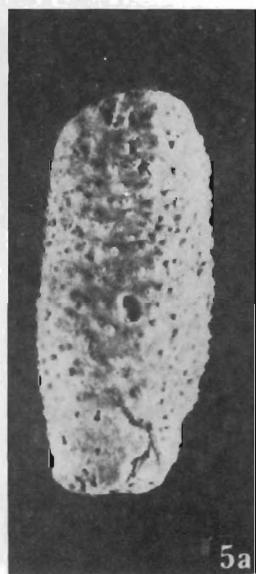
1a



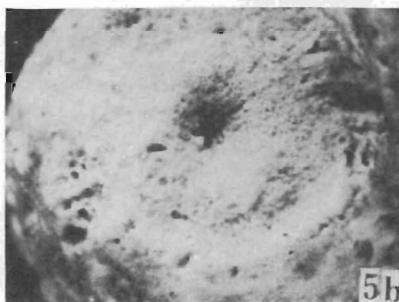
4



2a



5a



5b

