

SBORNÍK NÁRODNÍHO MUZEA V PRAZE

ACTA MUSEI NATIONALIS PRAGUE

XLII B (1986); No. 3—4

REDAKTOR: JIŘÍ ČEJKA

RUDOLF J. PROKOP – VÁCLAV PETR

National Museum in Prague, Praha

Geological Library, Faculty of Science, Charles University, Praha

REVISION OF SUPERFAMILY MELOCRINITACEA D'ORBIGNY, 1852 (CRINOIDEA, CAMERATA) IN SILURIAN AND DEVONIAN OF BOHEMIA

INTRODUCTION

In the present paper a comprehensive revision of all so far known Bohemian members of the crinoid superfamily Melocrinitacea d'Orbigny, 1852 is carried out. These crinoids occur only in the Siluro-Devonian boundary formations of the Barrandian area (uppermost Silurian: Upper Pridolian to lowermost Devonian: Lower Lochkovian) which are characterized by a complete sequence in the carbonate facies and typically by a conformity without any impressive breaks and facies changes. In this work all of the hitherto described Bohemian species are discussed and revalued. A description of 3 species of the family *Scyphocrinitidae* Jaekel, 1918 (Upper Pridolian and Lower Lochkovian) and 1 species of the family *Melocrinitidae* d'Orbigny, 1852 (Upper Pridolian) is presented. The species *Scyphocrinites elegans* Zenker, 1833 occurs only in Bohemia. Because we can not study Springer's type material, we should like only to notice the American colleagues to the fact that the American crinoid described by SPRINGER (1917) from Lower Devonian rocks of

Cape Girardeau (Missouri) differs from the Bohemian *Scyphocrinites elegans* Zenker, 1833 very conspicuously in number of secundibrachs and so it is not identical with the latter but a new species of the genus *Scyphocrinites*.

On the basis of this study the superfamily *Melocrinitacea* d'Orbigny, 1852 is made up of the following Bohemian species:

1. family *Scyphocrinitidae* Jaekel, 1918:

Scyphocrinites elegans Zenker, 1833

Scyphocrinites subornatus Waagen et Jahn, 1899

Carolicrinus barrandei Waagen et Jahn, 1899

2. family *Melocrinitidae* d'Orbigny, 1852

Zenkericrinus melocrinoides Waagen et Jahn, 1899

The original material comes from Barrande's and Waagen and Jahn's collections which are deposited in the National Museum in Prague. The good stratificated specimens from new findings are at disposal partly in collections of the National Museum in Prague (below abbreviated as NM) and partly in the District Museum of Beroun (below abbreviated as DMB).

Outside Barrandian the fragments of crinoids of the genus *Scyphocrinites* were ascertained in Upper Pridolian limestones of East Bohemia (Železné hory Mts., quarries near Vápenný Podol). Further in Moravia (Drahanská vysočina Mts., spoil bank of the abandoned gallery near Stínava), where fragments of stems and isolated columnals of supposed scyphocrinitids were found, together with a graptolite pelagic community in the micritic limestone intercalations within weakly metamorphosed bituminous shales. The discovery of scyphocrinitid remains supports the opinion about the Pridolian age of the mentioned sequence.

The authors are indebted especially to Dr. I. Chlupáč (Geological Survey, Praha) for his valuable comments and thank all who made photographs in this work: Dr. V. Turek (National Museum, Praha), Dr. H. Jaeger (Museum of Natural History, Humboldt University, Berlin, GDR), and Mr. Z. Žůna (Beroun).

DESCRIPTIVE PART

Subclass *Camerata* Wachsmuth et Springer, 1885

Order *Monobathrida* Moore et Laudon, 1943

Suborder *Glyptocrinina* Moore, 1952

Superfamily *Melocrinitacea* d'Orbigny, 1852

1. Family *Scyphocrinitidae* Jaekel, 1918

nom. correct. UBAGHS, 1953, p. 741 (pro *Scyphocrinidae* Jaekel, 1918, p. 31)

(= *Camarocystidae* Zittel, 1895, p. 154

Camarocystida Haeckel, 1896, p. 168)

Diagnosis: (After UBAGHS, 1978 in Treatise..., modified)

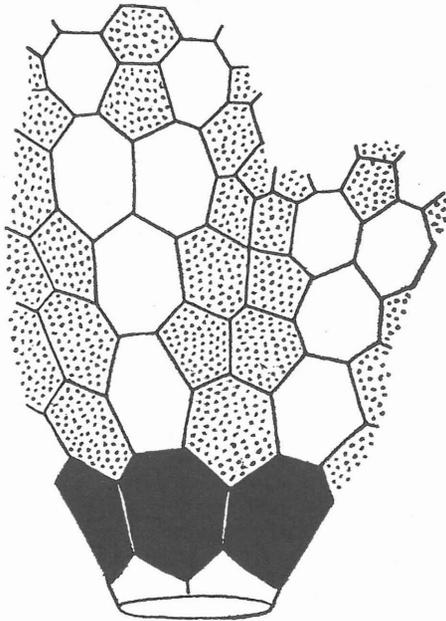
Secundibrachs numerous, incorporated in calyx. Interbranchials separat-

ed from tegmen by fixed pinnulars; posterior side slightly or not differentiated in calyx. Proximal tertibrachs incorporated in calyx. Intertertibrachs present or absent. Rami two in each ray, isotomously branching. Stem very long, with pentalobate to pentastellate axial canal. Modified holdfast (lobolith) serving as a float.

Stratigraphic and geographic distribution: ? Lower Silurian, Upper Silurian to Lower Devonian. Europe, Asia, North Africa, North America.

Remarks on genera: At the present state of knowledge 4 genera of the family *Scyphocrinitidae* Jaekel, 1918 are known:

Scyphocrinites Zenker, 1833 (? Lower Silurian, Upper Silurian-Lower Devonian of Europe, Asia and North America), *Liomolgocrinus* Strimple, 1963 (Lower Devonian of Oklahoma), *Marhoumacrinus* Prokop et Petr (in print) (Upper Silurian-Lowermost Devonian of North Africa) and *Carolicrinus* Waagen et Jahn, 1899 (Upper Silurian of Bohemia). Except *Liomolgocrinus* Strimple, 1963, a poorly known genus, the genera are distinguishable as given in the Tab. 1.



1. *Scyphocrinites elegans* ZENKER, 1832; AB interray view, see also pl. I. fig. 2, NM L 13250 [Waagen et Jahn, Pl. 46, fig. 3]. Karlštejn, x1.7.

Tab. 1.

Genus <hr/> Character	Scyphocrinites Zenker, 1833	Marhoumacrinus Prokop et Petr (in print)	Carolicrinus Waagen et Jahn, 1899
distal fixed SBrBr	uniserial	uniserial (rarely phylogenetically immature biserial)	biserial (only in one specimen uniserial)
proximal fixed TBrBr and distal free TBrBr	uniserial	phylogenetically immature biserial to mature biserial	biserial (only in one trunk of one specimen partly uniserial)
intertertibrachs	absent	present	present
brachials of free arms	transitional between uniserial and immature biserial	transitional between uniserial and immature biserial	biserial
floor plates covering the inner surface of distal fixed SBrBr, proximal fixed TBrBr, and fixed pinnulars	absent	very probably present	present
tegminal plates	about half of tegm. plates flat and half ball-like	all ball-like	almost all flat, only a reduced number of ball-like plates in outer radial directed elevations
type of the float (modified holdfast)	cirrus-lobolith and possibly plate-lobolith too	only plate-lobolith	probably only plate-lobolith

Scyphocrinites Zenker, 1833

(= *Scyphocrinus* Geinitz, 1846, p. 549 (nom. van. pro *Scyphocrinites*)
(non *Scyphocrinus* Hall, 1847)

Scyphocrinites Roemer in BRONN, 1855, p. 255 (nom. null.)

Siphocrinus Krejčí, 1860, p. 751 (nom. null.)

Lobolithus Barrande in BIGSBY, 1868, p. 192 (nom. nud.)

Camarocrinus Hall, 1879, p. 205 (type species *C. stellatus*)

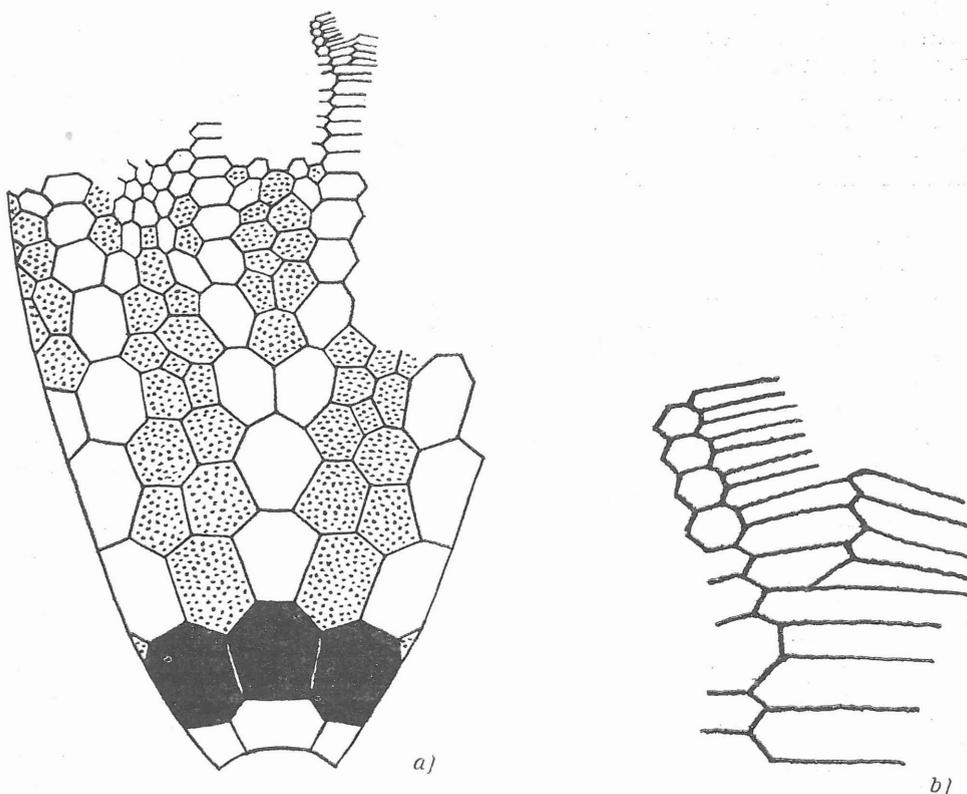
Camarocrinus Miller, 1899, p. 230

Camerocrinus Frič, 1904, p. 277 (nom. van. pro *Camarocrinus*)

Type species: *Scyphocrinites elegans* Zenker, 1833; Upper Pridolian to Lower Lochkovian, Bohemia.

Diagnosis: (After UBAGHS, 1978 in Treatise..., modified)

Calyx generally large, expanding or contracting toward arm bases. Interradial areas depressed or protuberant; distal interbrachials formed of fixed pinnulars. Fixed SBrBr 10 to 20. First pinnule borne by SBr 2 (outer), second one by SBr 4 (inner). Intertertibrachs absent. Distal fixed brachials uniserial. Anal tube subcentral on tegmen. Free arms composed



2. *Scyphocrinites elegans* ZENKER, 1833; a — A ray view see also Pl. II., b — detail of distal SBrBr and proximal TBrBr, NM L 22785. Karlštejn, natural size (a), x4 (b).

of very short brachials the inner sides (opposite the pinnule facet) of which show distinct resorption of distal and proximal brachial faces (transitional state between uniserial and phylogenetically immature biserial brachials). Stem ends distally in a lobolith (typically cirrus-lobolith and probably in some plate-lobolith).

D i s c u s s i o n : From the morphological point of view, all differences from the remaining two good known genera of the family are given in the Tab. 1. From the phylogenetical point of view almost nothing is known about the origin of the discussed genus. SPRINGER (1917) shows the relation to the glyptocrinitid species *Pycnocrinus dyeri* (Meek, 1872) because of the identical sequence of fixed pinnules. *Scyphocrinites* differs from the latter in increase of number of fixed secundibrachs, fixed pinnules, and incorporation of proximal tertibrachs into the calyx. Further in change of number of basals from 5 to 4, and in evolution of isotomous branching of rami. The reduction of number of basals may have increased the mechanical strength of the calyx and protection of the chambered organ. Evolution of isotomous branching of rami provided the crinoids with a larger and more complex food gathering system which drained greater amount of water. However, the scyphocrinitid lobolith which is the only known special organ for buoyancy among crinoids, has its evolutionary beginning in the radicular-cirri-bearing type of crinoid holdfast. The latter is absent in the North American, Ordovician *Pycnocrinus*, and, therefore, as stated BROWER (1973), *Scyphocrinites* is a derivative (but not direct) of the melocrinitid species *Alisocrinus ? heterodactylus* Brower, 1973 from Upper Ordovician Girardeau Limestone of North America, in which "rootlets" are present. The latter may have descended from the above mentioned species of the genus *Pycnocrinus* or from a related glyptocrinitid species. After HAUDE (1972) the *Scyphocrinites*-float had two evolutionary steps: older cirrus-type, and the more specialized plate-lobolith. HAUDE (1972) ascribes the two lobolith-types to two species-groups of the genus *Scyphocrinites* given by SPRINGER (1917). However, present authors do not agree with any grouping of scyphocrinitid species based on presence or absence of sculpture, and on shape of the calyx. The shape of the calyx is strongly dependent on the position of the dead individual in sediment, and both the characters are dependent on the stage of ontogeny (e.g. strong changes of ornamentation and convexity of calyx plates in late ontogeny in the Bohemian species *Scyphocrinites elegans* Zenker, 1833). There is no evidence that a certain lobolith-type belongs to a certain species of the genus *Scyphocrinites*, at least in Bohemia. However, it is evident that plate-types belong to the scyphocrinitid species *Marhoumacrinus legrandi* Prokop et Petr (in print) which is the direct ancestor of the scyphocrinitid species *Carolicrinus barrandei* Waagen et Jahn, 1899. SPRINGER (1917) ascribes some large plate-loboliths (*Camarcrinus ulrichi* Schuchert, 1904) to a single calyx from Lower Devonian of Oklahoma, which is the type-specimen of the scyphocrinitid species *Liomolgocrinus dissutus* Strimple, 1963. Unfortunately, at present, we can only speculate on the pertinence of loboliths to the several genera and species of the family *Scyphocrinitidae*. Moreover, no com-

parison between all the plate-lobolith types from the several regions of the world was given (see HAUDE, 1972). Also the hitherto described species of the genus *Scyphocrinites* from North America and U.S.S.R. need a revision e.g., the species *Scyphocrinites pyburnensis* Springer, 1917 from Lower Devonian of Tennessee may be a member of the genus *Marhoumacrinus* Prokop et Petr (in print) known from Upper Silurian and Lowermost Devonian of Morocco and Algeria, North Africa.

Stratigraphic and geographic distribution: Lower Silurian?, Upper Silurian to Lower Devonian; Europe, Asia, North America.

Scyphocrinites elegans Zenker, 1833

(Pl. I, Fig. 1—3; Pl. II; Pl. III, Figs. 1—2; Pl. IV; Pl. V, Fig. 4)

- 1820 *Pentacrinites excavatus* Schlotheim; SCHLOTHEIM, p. 329.
 1833 *Scyphocrinites elegans* Zenker; ZENKER, p. 26, Pl. 4, figs. A—F, non fig. AA.
 1899 *Scyphocrinus excavatus* Schlotheim sp. p., var. *Schlotheimi* Waagen et Jahn; WAAGEN et JAHN, p. 82—83, Pl. 44, fig. 1, Pl. 45, figs. 1, 2, Pl. 46, fig. 2, Pl. 47, figs. 1, 5—6, Pl. 49, figs. 2, 3, Pl. 51, figs. 9—10, Pl. 53, figs. 1—3, Pl. 54, figs. 1—6, 9, Pl. 57, figs. 1—3, 6.
 1899 *Scyphocrinus excavatus* Schlotheim sp. p., var. *typ.* Waagen et Jahn; WAAGEN et JAHN, p. 84—85, Pl. 42, figs. 1—3, Pl. 44, fig. 2, Pl. 45, figs. 4—5, Pl. 48, figs. 2—3, Pl. 49, fig. 1, Pl. 50, figs. 6—10 (immature individual NM L 19926), Pl. 51, figs. 11—15, Pl. 52, figs. 1—3, Pl. 53, figs. 4—5, Pl. 54, figs. 7—8, 10—11, ?Pl. 55, figs. 1—3.
 1899 *Scyphocrinus excavatus* Schlotheim sp. p., var. *Schröteri* Waagen et Jahn; WAAGEN et JAHN, p. 85—88, Pl. 40, fig. 6, Pl. 43, figs. 2—6, Pl. 46, figs. 3—4, Pl. 48, figs. 4—5, Pl. 50, figs. 1—5 (immature individual), Pl. 51, figs. 1—8, non Pl. 58, fig. 10 [poor specimen of *Carolicrinus barrandei* Waagen et Jahn, 1988].
 1899 *Scyphocrinus excavatus* Schlotheim sp. p., var. *Zenonis* Waagen et Jahn; WAAGEN et JAHN, p. 80—82, ?Pl. 40, fig. 7 = Pl. 41, figs. 6—7 (very problematic specimen), Pl. 43, fig. 1.
 1899 *Scyphocrinus excavatus* Schlotheim sp. p., cf. var. *Zenonis* Waagen et Jahn; WAAGEN et JAHN, p. 82, Pl. 45, fig. 3.
 1899 *Scyphocrinus* sp. ind. Waagen et Jahn; WAAGEN et JAHN, p. 92—97, Pl. 40, fig. 5, 8—9, Pl. 41, figs. 4—5, 8—18, Pl. 46, fig. 1, Pl. 47, figs. 7—9, ?Pl. 48, fig. 1, Pl. 52, figs. 4—10, ?Pl. 62, figs. 9—10, Pl. 65, figs. 1—2 (immature individual).
 1899 *Scyphocrinus decoratus* Waagen et Jahn; WAAGEN et JAHN, p. 88—91, Pl. 40, figs. 3—4, Pl. 41, figs. 1—3, Pl. 47, figs. 2—4.
 1899 *Scyphocrinus cf. decoratus* Waagen et Jahn; WAAGEN et JAHN, p. 91—92, Pl. 41, figs. 19—20.
 1899 *Scyphocrinites elegans?* Zenker, Barr. MS.; WAAGEN et JAHN, p. 125—131, very probably all plates and figures, non Pl. 67, figs. 5—6 belonging to *Carolicrinus barrandei* Waagen et Jahn, 1899.
 1917 *Scyphocrinus elegans* Zenker [*excavatus* Waagen et Jahn pars]; SPRINGER, p. 23—24.
 1917 *Scyphocrinus decoratus* Waagen et Jahn; SPRINGER, p. 24.
 1917 *Scyphocrinus zenonis* Waagen et Jahn; SPRINGER, p. 24.
 non 1917 *Scyphocrinus elegans* Zenker; SPRINGER, p. 30—39, all plates and figure.
 non 1968 *Scyphocrinites elegans?* Zenker; YELTSISHEVA, p. 34—35, Pl. 2, fig. 1.
 non 1968 *Scyphocrinites excavatus schlothermi* Waagen et Jahn; YELTSISHEVA, p. 35—36, Pl. 1, figs. 1—2, 4—9, 13, Pl. 2, fig. 2.
 non 1968 *Scyphocrinites decoratus* Waagen et Jahn; YELTSISHEVA, p. 36—37, Pl. 5, fig. 2.
 non 1978 *Scyphocrinites elegans* Zenker; UBAGHS in Treatise..., p. T489, Pl. 292, fig. 1.

Neotype (here stated): With regard to evident loss of the original type material of ZENKER (1833) it is now inevitable to select a neotype from the Barrande's original material compiled by Waagen et Jahn (1899). The present authors pick out the specimen figured by WAAGEN et JAHN (1899) on Pl. 48, figs. 2, 3 and deposited at National Museum, Praha under inv. number L 13252. The chosen neotype was collected at about the same time as the Zenker's types, very probably from the same locality, i.e. Karlštejn, which is the only known finding place of Bohemian scyphocrinitids at that time. The Zenker's locality specified (1833) as "wahrscheinlich aus der Umgebung von Teschen" is mistaken. So-called "Teschen" (at present time Těšnov near Česká Lípa) is situated in Northern Bohemian region, which is completely out of the Central Bohemian Lower Paleozoic area of the Barrandian. Here figured on Pl. I., fig. 3.

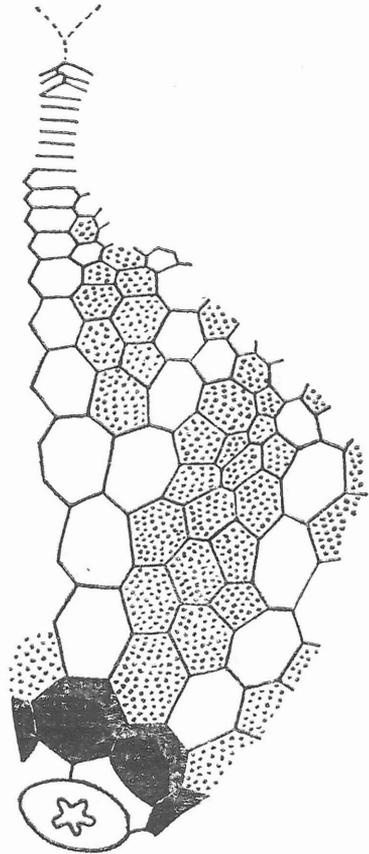
Locus typicus: Karlštejn

Stratum typicum: Upper Silurian (Upper Pridolian)

Material: In addition to extremely rich Waagen and Jahn's original material several tens of calyces, stems, cirrus-loboliths and some crowns in collections of National Museum, Praha and District Museum of Beroun.

Description: Calyx of medium size to very large, generally expanding from proximal end of basals to the arm bases. In some cases the calyx expands rapidly from the top of basals, however, this is evidently only in specimens which were laid down after death with their tegmens directly on the sea floor and then compressed. In some cases, the calyces expand only to about the level of SBr 2 or so, which shape is probably due of individual variability. Anterior basal plate and anterior radial plate typically hexagonal, other basals and other radials typically septagonal, and rarely, their shape is moderately changed. Radials of immature individuals the largest plates in calyx, but in adults, the primi-brachs and first interbrachials about as large as radials. Calyx plates generally low-convex in proximal part of calyx, but in old adults may be distinctly convex. In proximal part of the calyx of normal adult specimens there is more or less distinct sculpture of narrow ribs radiating from the centres of the plates, crossing the sutures, and connecting from plate to plate, forming a variable complicated network of ornamentation. In some largest individuals this sculpture is changed into radiating rows of separate granules (upon which Waagen et Jahn proposed the species *Scyphocrinus decoratus*). In some old adults the sculpture is removed, and their proximal calyx plates are conspicuously convex (upon this type Waagen and Jahn proposed the variety *Zenonis*). Interbrachials to the range of SBrBr 2 and intersecundibrachs to the range of SBrBr 4 formed of true interbrachials, but distally of complicated, variously sculptured pavement of fixed pinnulars (and partly interpinnulars). Secundibrachs and proximal tertibrachs incorporated in calyx, uniserial. Intersecundibrachs numerous, typically with 2 plates in the second range. Intertertibrachs absent. Secundibrachs typically 15 and 14 (never more) in the two half-rays of the same ray of an adult. Proximal tertibrachs of the same half-ray united laterally. First fixed pinnule borne

3. *Scyphocrinites elegans* ZENKER, 1833 AB interray view, DMB P 09. See also Pl. IV. Karlštejn, x0.8.



by SBr 2 (outer), second one by SBr 4 (inner), third one probably by SBr 5 (outer), fourth by SBr 6 (inner), and so on, but possibly not so regularly in every case. Secundibrachs from the level SBr 4—SBr 5 symplectially united, becoming much wider than long, smooth or with more or less distinct sculpture of transverse ribs or transverse rows of separate granules. Sometimes the distal secundibrachs and tertibrachs with sharp transverse ridges (typical for Waagen and Jahn's varieties *Zenonis* and *Schlotheimi*). The five interradian areas of calyx do not differ conspicuously from one another. The posterior interradius not distinctly wider than the others. Proximal interbrachials of young individuals arranged in the first five ranges 1—2—2—2—2. With the increase of body size some additional plates are incorporated in calyx from about the third range. In old adults sometimes 3 plates in the second row may be present. The interbrachials are good recognized to about six ranges (about the level of SBr 3). From about the level of SBr 4 the interradian areas begin to be depressed (between the distinct median ridges of fixed brachials), formed of variably sculptured pavement of fixed pinnulars (Waagen and Jahn proposed upon the pinnular orna-

mentation their varieties *Schlotheimi*, *typicus*, and *Schröteri*). The sculpture within the fixed pinnulars may be formed of broad, rounded ridges connecting from one plate to the other in about horizontal directions, resembling irregularly interrupted chains (this type of sculpture is represented by two varieties of Waagen and Jahn: *Schlotheimi* and *Zenonis*). Or the sculpture may be reticulate (Waagen and Jahn's variety *typicus*) or stellate (variety *Schröteri*). However, the type of sculpture has no specific value and may be even combined in one specimen. Calyx more or less distinctly lobed between arm bases. Tegmen more or less distinctly convex; in the outer interambulacral areas more or less distinctly depressed. Tegminal plates numerous, small, polygonal, arranged irregularly. About half of the tegminal plates flat and about half ball-like. Anal tube was subcentral on tegmen, but in every case is broken away.

Free arms composed of very short symplectially united brachials. Rami two in each ray, isotomously braching from about 3 to 5 times and sometimes possibly more. Brachials wedge-shaped, each brachial bears one free pinnule. The outer (pinnule-bearing) sides of brachials alternate. The inner (opposite the pinnule-facet) sides of brachials generally show a distinct resorption of the distal and proximal brachial faces, which character can be interpreted as transitional between uniserial and phylogenetically immature biserial brachials. Proximal part of the stem subcylindrical, composed of short symplectially united columnals. Axial canal of proximal part of the stem quinquelobate; articulum formed of quinquelobate lumen and of crenularium bearing numerous radiating crenulae. Latera of columnals possibly variously ornamented. There seems to be a possibility that there is a xenomorphic type of crinoid stem in this species, however, it is impossible to ascertain what type of mesistele, dististele, and even of loboliths can be ascribe to *Scyphocrinites elegans*.

The authors can only calculate (see below discussion) that stem ends distally in cirrus-lobolith (see HAUDE, 1972) divided into numerous closed chambers of varying sizes. Walls of the chambers are composed of complicated network of radicular cirri with cirral segments much longer than wide.

Dimensions:

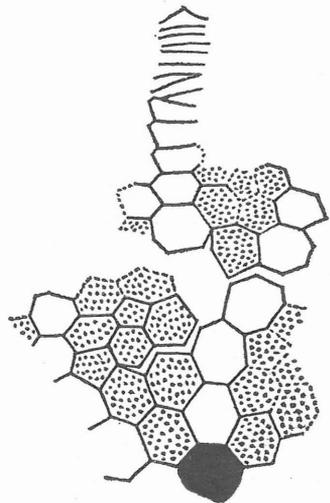
	Height of the cup (in cm.)
Neotype	8,0
Orig. WAAGEN et JAHN, 1899	
Pl. 46, fig. 3 (= NM L 13250)	7,5
specimen NM L 22785	9,5
specimen DMB P 09	11,5

Discussion: *Scyphocrinites elegans* Zenker, 1833 differs from the second Bohemian species *Scyphocrinites subornatus* Waagen et Jahn, 1899 in number of secundibrachs (15 and 14 in the first, whereas in the latter about 12). Further, *Scyphocrinites subornatus* shows absence of sculpture on calyx plates and has a characteristic broad crenulation on the margins of many of the calyx plates. We know nothing about types of loboliths in both the species, however, possibly the cirrus-lobolith may be ascribe to *Scyphocrinites elegans* because of situation at the loca-

lity "lobolith hillside" near Praha-Řeporyje. At this locality *Scyphocrinites subornatus* is absent, and only two scyphocrinitid species occur in the weathered layers of Upper Pridolian age of that finding place: *Scyphocrinites elegans* and *Carolicrinus barrandei*. The latter species is much more abundant than the first, and plate-loboliths are much more abundant than cirrus-loboliths. And also, it seems better to ascribe the plate-types to the genus *Carolicrinus* which is evidently direct derivative of the genus *Marhoumacrinus* (see PROKOP et PETR, in print). Nevertheless, this is an uncertain opinion because of tendency of loboliths to be transported by surface or subsurface currents after dead calyces and stems laid down, as seen from some monotonous accumulations of these floats at several localities in Barrandian area (e.g., the great accumulation of isolated large plate-loboliths in about half-meter thick layer of uppermost Pridolian age at the locality Koukolova hora near Beroun).

SPRINGER (1917) described from Lower Devonian of Cape Girardeau (Missouri) a similar species as *Scyphocrinites elegans* Zenker, 1833. Our examinations indicate that it is not synonymous with *S. elegans*. With regard to the types in National Museum, Praha, and on the basis of study of further rich material the difference is evident. The American crinoid differs from *Scyphocrinites elegans* Zenker, 1833 in having 18 to 20 secundibrachs while the utmost number of secundibrachs in the Bohemian species is only 15, never more. The inaccurate Springer's designation (retained by UBAGHS, 1978 in Treatise...) was due to indistinct figures of Waagen and Jahn's work (see SPRINGER, 1917, p. 31). Consequently, the poorly known, small species from Borscov Horizon (Lower Lochkovian, U.S.S.R.) described by YELTISHEVA (1968) as *Scyphocrinites elegans*? Zenker, *Scyphocrinites excavatus schlothermi* Waagen et Jahn, and *Scyphocrinites decoratus* Waagen et Jahn also

4. *Scyphocrinites subornatus*
WAAGEN et JAHN, 1899; scheme of the calyx plates showing complete sequence of fixed SBrBr in an adult specimen. SBrBr in the distal part of calyx are partly disarticulated but their number is clearly 12. The designation of the ray figured is uncertain because of poorly preserved proximal margin of its radial plate and because of absence of basals. The anterior basal of Waagen and Jahn's Pl. 40, fig. 1 is not present in the specimen. Almost all Waagen and Jahn's drawings of *Scyphocrinites subornatus* are partly incorrect and partly invented (and not only of *S. subornatus*). NM L 13237. See also Pl. V, fig. 1. — lectotype. Karlštejn, natural size.



with certainty is not synonymous with *Scyphocrinites elegans* Zenker, 1833. Also the North African scyphocrinitid crinoids, presented by several previous authors as *Scyphocrinites elegans* are not synonymous with the Bohemian species, and, even, represent a new genus (see PROKOP et PETR, in print). So, *Scyphocrinites elegans* Zenker, 1833 occurs only in Bohemia, and in general, there must be noticed a surprising fact, that although scyphocrinitids were provided with float to survive in epipelagic conditions, the particular species were, however, restricted to limited regions.

Occurrence: The Upper Silurian (Upper Pridolian) specimens come from Praha-Dvorce, Řeporyje (lobolith hillside) and Karlštejn. The Lower Devonian (Lower Lochkovian) ones are to be found in Karlštejn, Lochkov, and Velká Chuchle. The "hash" of disarticulated skeletal elements, especially columnals, occurs at almost all Upper Pridolian and Lower Lochkovian outcrops of Barrandian.

Scyphocrinites subornatus Waagen et Jahn, 1899

(Pl. III, Fig. 3—4; Pl. V, Fig. 1—2; Pl. VI)

- 1899 *Scyphocrinus subornatus* Barrande (MS); WAAGEN et JAHN, p. 78—80, Pl. 40, figs. 1—2, Pl. 44, fig. 3, Pl. 58, figs. 8—9, Pl. 60 I, figs. 1—3, Pl. 62, figs. 1—8.
? 1899 *Scyphocrinus excavatus* Schlotheim sp. p., var. *Schlotheimi* Waagen et Jahn; WAAGEN et JAHN, Pl. 45, figs. 1—2.
1917 *Scyphocrinus subornatus* Barrande (MS); SPRINGER, p. 24.

Lectotype (here stated): WAAGEN et JAHN (1899), Pl. 40, fig. 1 (= Pl. 62, figs. 1—2) deposited in the National Museum, Praha under inv. no. L 13237. Here figured on Pl. V., fig. 1.

Locus typicus: Karlštejn.

Stratum typicum: Upper Silurian (Upper Pridolian).

Material: Originals of Waagen and Jahn are deposited in National Museum, Praha, except the paralectotype WAAGEN and JANH, Pl. 44, fig. 3, which is deposited in Museum of Natural History of Humboldt University, Berlin, GDR. Several specimens (incomplete calyces) from uppermost Pridolian of Praha-Dvorce and Karlštejn are deposited in NM and one very good stratificated specimen from lowermost Lochkovian layers of Klonek near Suchomasty is deposited in the Geological Survey, Praha (coll. I. Chlupáč).

Description: Calyx typically of medium size, rarely very large, probably sac-shaped. Proximal calyx plates low-convex, but the most proximal sometimes distinctly convex and typically smooth (only in one case there are some inconspicuous infrequent granules on the surface of the plates). Except basals and proximal end of radials, margins of all calyx plates distinctly crenulated by very low, very broad, rounded corrugations. Secundibrachs 12 (seen only in lectotype), smooth. Tertibrachs (known only in two specimens) typically smooth or with a shallow, broad transverse furrow. Proximal part of tertibrachs incorporated in calyx. No intertertibrachs visible. Distal calyx plates practically flat, except the above mentioned crenulation. Interbranchials numerous. A poorly known species. Tegmen, free arms, stem, and lobolith-type unknown.

Dimensions (in cm.):

	Original W. et J. Pl. 58, fig. 8, 9	specimen NM L 23486	specimen NM L 23485	specimen NM L 23484
height of the base	0,3	0,3	0,5	—
width of stem facet	0,8	0,8	1,3	? 1,0
width of calyx at distal end of BB	2,0	2,0	—	—
height of calyx to distal end of PBr ax	—	—	—	2,6
	[Klukovice]	[Dvorce]	[Karlštejn]	[Dvorce]

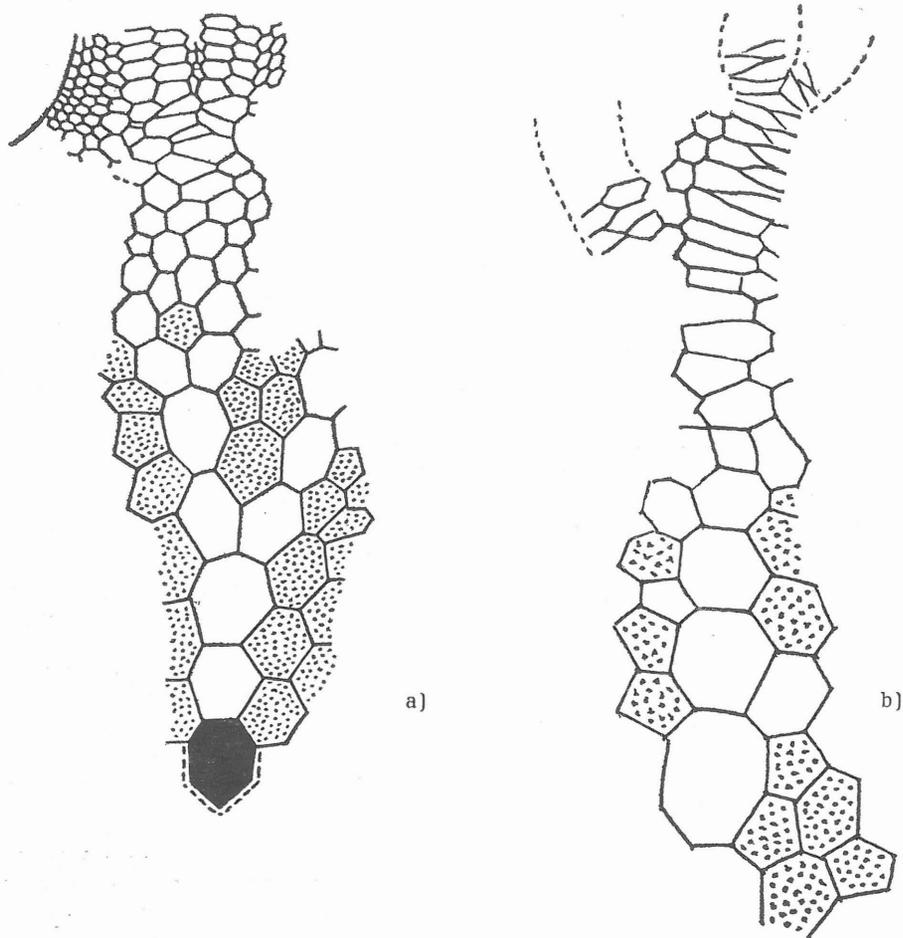
Discussion: The morphological differences between *Scyphocrinites subornatus* and *Scyphocrinites elegans* were given in the discussion on the first Bohemian species. *Scyphocrinites subornatus*, in contrast to the first species, is poorly known, very rare, and morphologically not so variable species, which is possibly closely related to one species from U.S.S.R. and one species from U.S.A., however, possibly not identical with them. First of those species comes from Lower Devonian (Lower Lochkovian) Borscov Horizon of U.S.S.R. which was incorrectly determined by YELTISHEVA (1968) as *Scyphocrinites excavatus schlothermi* Waagen et Jahn. That crinoid is a new species with dense sharp crenulation at the margins of the calyx plates, but the specimen figured by Yeltisheva on Pl. 1, fig. 7 is partly similar to Bohemian *Scyphocrinites subornatus*. Second of those species comes from Lower Devonian (Helderbergian) of Tennessee and was described by SPRINGER (1917) as *Scyphocrinites mutabilis*. That is also a new species, but the specimen figured by Springer on Pl. 8, fig. 5 is similar to the Bohemian *Scyphocrinites subornatus*. Unfortunately, the present authors can not study Yeltisheva's and Springer's type material.

Occurrence: The types come after the original Barrande's designation (MS) assumed by WAAGEN and JAHN (1899, p. 80) from Karlštejn, Klukovice, and Malá Chuchle. Specimens from Karlštejn are of Upper Pridolian age but the stratigraphic position of the two latter is uncertain. Except types, several calyces (NM) come from Upper Pridolian (uppermost Silurian) of Praha-Dvorce and Karlštejn. One good stratified calyx (Geological Survey, Praha, coll. I. Chlupáč) was derived from the hillside Klonk near Suchomasty from Lower Devonian (Lower Lochkovian) limestone.

Carolicrinus Waagen et Jahn, 1899

Type species: *Carolicrinus barrandei* Waagen et Jahn, 1899; Upper Silurian (Upper Pridolian) of Bohemia.

Diagnosis: Calyx large, sac-shaped. Proximal part of calyx same as in all scyphocrinitids. Distal secundibrachs and fixed tertibrachs typically biserial. Intertertibrachs present. First fixed pinnule borne by SBr 2 (outer), second probably by SBr 3 (inner) (seen only in two specimens). Inner skeletal surface of fixed pinnulars, distal fixed secundibrachs and proximal fixed tertibrachs covered by small, generally hexa-



5. *Carolicrinus barrandei* WAAGEN et JAHN, 1899; a) Array view, NM L 13272 [Waagen et Jahn, P. 58, fig. 1] see also Pl. VII., fig. 1 — lectotype. Karlštejn, natural size b) specimen showing sequence of SBrBr, NM L 24624, x2.

gonal floor plates. Tegmen convex, with depressed outer interambulacral areas. Tegminal plates generally flat, but at outer ambulacral elevations some ball-like. Anal tube subcentral on tegmen, but unknown. Free arms compactly biserial, isotomously branching; brachials of free arms without floor plates. Stem unknown, distally possibly ending in a plate-lobolith.

Discussion: The differences between *Carolicrinus* and the other two good known scyphocrinitid genera *Marhoumacrinus* and *Scyphocrinites* were given above in the Tab. 1. *Carolicrinus* Waagen et Jahn, 1899 is a direct derivative of the genus *Marhoumacrinus* Prokop et Petr

(in print) from which it differs only in development of biserial-arrangement of distal fixed brachials and free arms, and in slightly different type of tegmen. Present authors ascribe to *Carolicrinus* the plate-loboliths on the basis of calculation with the direct ancestor of it. *Marhoumacrinus* was certainly provided with a plate-lobolith, and so we believe that the descending genus was provided with plate-loboliths, too.

Stratigraphic and geographic distribution: Upper Silurian (Upper Pridolian) of Bohemia.

Carolicrinus barrandei Waagen et Jahn, 1899

(Pl. V, Fig. 3; Pl. VII, Figs. 1—3)

1899 *Carolicrinus barrandei* Waagen et Jahn; WAAGEN et JAHN, p. 22—28, Pl. 58, figs. 1—7, Pl. 66, figs. 1—4.

1899 *Scyphocrinus excavatus* Schlotheim sp. p., var. *Schröteri* Waagen et Jahn; WAAGEN et JAHN, Pl. 58, fig. 10.

1899 *Scyphocrinites elegans?* Zenker; WAAGEN et JAHN, Pl. 67, figs. 5—6.

1900 *Abacocrinus barrandei* (Waagen et Jahn); BATHER, p. 107—108.

1978 ?*Carolicrinus barrandei* Waagen et Jahn; UBAGHS in Treatise..., p. T491, Pl. 292, fig. 2.

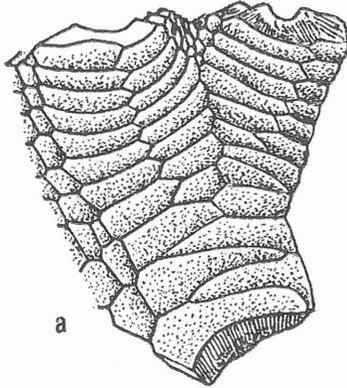
Lectotype (here stated): WAAGEN et JAHN, 1899, Pl. 58, figs. 1—6 (NM L 13 272). Here figured on Pl. VII., fig. 1 and text-fig. 5a.

Locus typicus: Karlštejn

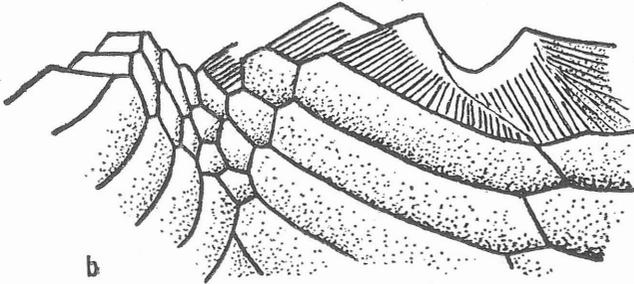
Stratum typicum: Upper Silurian (Upper Pridolian).

Material: Lectotype, paralectotype (WAAGEN et JAHN, 1899, Pl. 58, fig. 7 = NM L 13 273), one complete poorly preserved specimen NM L 22 947, one incomplete specimen NM L 24 624, several other fragments in NM, and rich material (especially isolated fragments) in DMB.

Description: Character of the genus. There must be added only some remarks. Base is unknown, however, the ancestor was provided with four basals, and there seems to be a great possibility that this species was provided with four basals, too. Some isolated basals from washed weathered layers ("white beds") may be ascribed to this species (see text-fig. 8 a—d). Sculpture of calyx plates is variable, sometimes very similar to that of *Scyphocrinites elegans* (see lectotype Pl. VII, Fig. 1) or with dense corrugations on the margins of the plates which meet at irregularly situated points on the surface of the plates (in specimen NM L 24 624, text-fig. 5b). Distal fixed pinnulars are invariably flat to low convex, typically without any ornamentation, and good recognizable. Distal fixed secundibrachs and tertibrachs are sometimes flat to simply low-convex, or they are provided with sharp transverse ridges. In every case the distal fixed secundibrachs and tertibrachs are biserial, only in the specimen MN L 24 624 (see text-fig. 5b) there is a tendency to uniserial arrangement of distal fixed secundibrachs and of part (the trunk not figured) of proximal fixed tertibrachs. However, that anomaly only supports the opinion about the derivation of this species from *Marhoumacrinus* (see Prokop et Petr, in print). Secundibrachs about 10, but without clear evidence. The succession of fixed pinnulars is not good known. In lectotype it is: SBr 2 (outer) and probably SBr 3 (inner), in higher orders unrecognizable. In the specimen NM L 24 624 (see text-fig. 5b) it is: SBr 2 (outer), and probably SBr 3 (inner), SBr 4 (inner), SBr 5

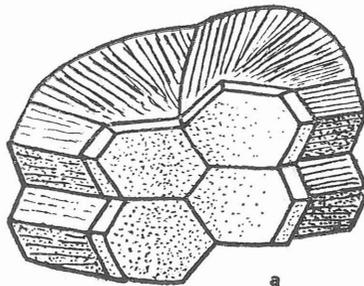


a

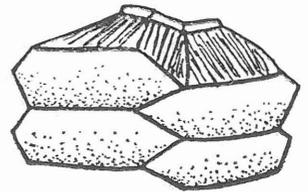


b

6. *Carolicrinus barrandei* WAAGEN et JAHN, 1899; distal SBrBr and proximal TBrBr, a — whole specimen, b — detail of intertertibrachia, DMB P 2237. "Lobolith hillside" near Řeporyje, x3.5 (a), x10 (b).



a



b

7. *Carolicrinus barrandei* WAAGEN et JAHN, 1899; a — internal side of proximal TBrBr covered by hexagonal floor plates, b — external side of the same specimen. Drawing from many specimens of DMB and from DMB P 2238 above all. "Lobolith hillside" near Řeporyje, enlarged.

[may be outer], SBr 6 [impossible to determine], SBr 7 (outer), SBr 8 (inner), and SBr 9 (outer).

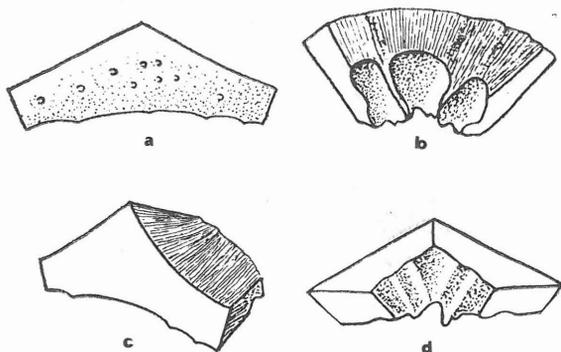
Dimensions

(in cm.):

	height of calyx	width of calyx in PBr ax	width of calyx between arm bases
Lectotype	11,0	4,5	—
specimen NM L 22947	9,0	4,0	9,0

Discussion: For discussion see the discussion on the genus. There must be only added that *Carolicrinus barrandei* is the only known species of the genus.

Occurrence: The greatest part of the material was derived from the so-called "lobolith hillside" near Praha-Řeporyje from washed weathered layers of Upper Silurian (Upper Pridolian) age, partly deposited in NM, partly in DMB. The lectotype and some other specimens come from Upper Pridolian of Karlštejn. One specimen (NM L 24 624) comes from Upper Silurian (Upper Pridolian) of Praha-Dvorce. The paralectotype comes after Barrande's original designation from Lower Devonian (Lower Lochkovian) of Lochkov, but it is incorrect; the paralectotype was with certainty derived from the "white beds" of "lobolith hillside" near Řeporyje, and is of Upper Pridolian age. Further, from Karlštejn two problematic specimens (NM L 23 481 and NM 23 482) were collected showing only the floor plates covering the pavement of fixed pinnulars and having pustulous centres on many of the floor plates. A distal part of dorsoventrally compressed calyx with good preserved tegmen (NM L 21 587, Pl. VII, fig. 3) was found in Upper Silurian (Upper Pridolian) layers of Opatřilka quarry near Holyně. No specimen is known from Lower Devonian (Lower Lochkovian).



8. ? *Carolicrinus barrandei* WAAGEN et JAHN, 1899; isolated posterior basal plate, a — external view, b — stem facet, c — radial facet, d — internal view, DMB 2077a. "Lobolith hillside" near Řeporyje, x3.

2. Family MELOCRINITIDAE d'Orbigny, 1852

nom. correct. BASSLER, 1938, p. 26 (pro *Melocrinidae* d'Orbigny, 1952, p. 141)

(= *Ctenocrinidae* C. F. Roemer, 1855, p. 228)

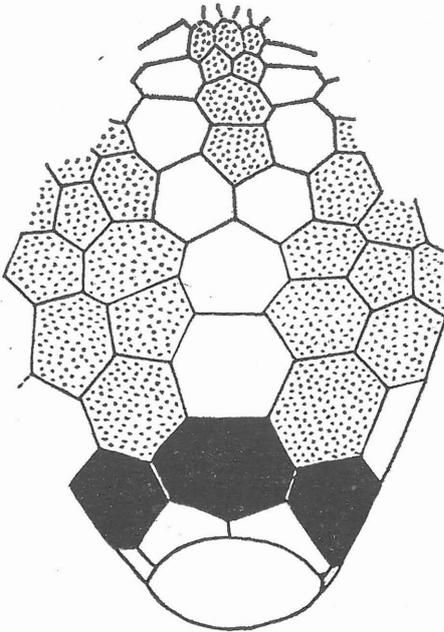
Diagnosis: For diagnosis and stratigraphic and geographic distribution see UBAGHS, 1978 in *Treatise* . . . , p. 492.

Zenkericrinus Waagen et Jahn, 1899

Type species: *Zenkericrinus melocrinoides* Waagen et Jahn, 1899 Upper Silurian (Upper Pridolian) of Bohemia.

Diagnosis: Calyx of medium size, expanding from proximal end of basals to about the level of first fixed secundibrachs. Basals four, very regular arranged. Anterior basal hexagonal, other basals pentagonal. Anterior radial hexagonal, other radials septagonal. Interprimibrachs arranged 1-2-2 in the first three ranges, but in the posterior inter-radius the arrangement is 1-2(3)-3(4). Fixed secundibrachs 4 visible. One fixed pinnule borne by SBR 2 (outer). Tegmen, free arms, stem and holdfast unknown.

Discussion: *Zenkericrinus* Waagen et Jahn, 1899 is known only from three incomplete specimens from Bohemian Upper Silurian. It is not a typical representant of the family because of having relatively large calyx, 4 or probably more than 4 secundibrachs and a pinnule



9. *Zenkericrinus melocrinoides* WAAGEN et JAHN, 1899; D ray view, NM L 19923 [Waagen et Jahn, Pl. 42, fig. 4] — holotype by monotypy. See also Pl. VIII., fig. 1. Praha-Dvorce, x2.

borne by SBr 2. Lack of free arms makes the correlation with a foreign genera of the family *Melocrinitidae* very difficult. With regard to this fact the preservation of the name *Zenkericrinus* is in opportunity, but not definite.

Stratigraphic and geographic distribution: Upper Silurian (Upper Pridolian) of Bohemia.

Zenkericrinus melocrinoides Waagen et Jahn, 1899

(Pl. VIII, Figs. 1—4)

1899 *Zenkericrinus melocrinoides* Waagen et Jahn; WAAGEN et JAHN, p. 106, Pl. 42, figs. 4—5.

1900 *Mariacrinus melocrinoides* (Waagen et Jahn); BATHER, p. 111.

1978 ?*Promelocrinus melocrinoides* (Waagen et Jahn); UBAGHS in Treatise . . . , p. T492.

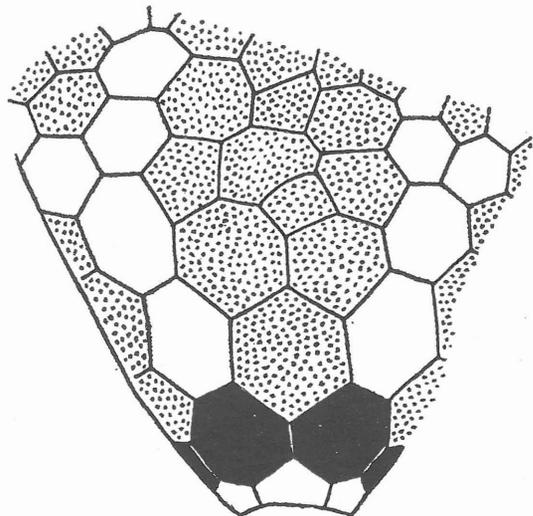
Holotype (by monotypy): WAAGEN et JAHN, 1899, Pl. 42, figs. 4—5, (NM L 19 923). Here figured on Pl. VIII., fig. 1.

Locus typicus: Praha-Dvorce.

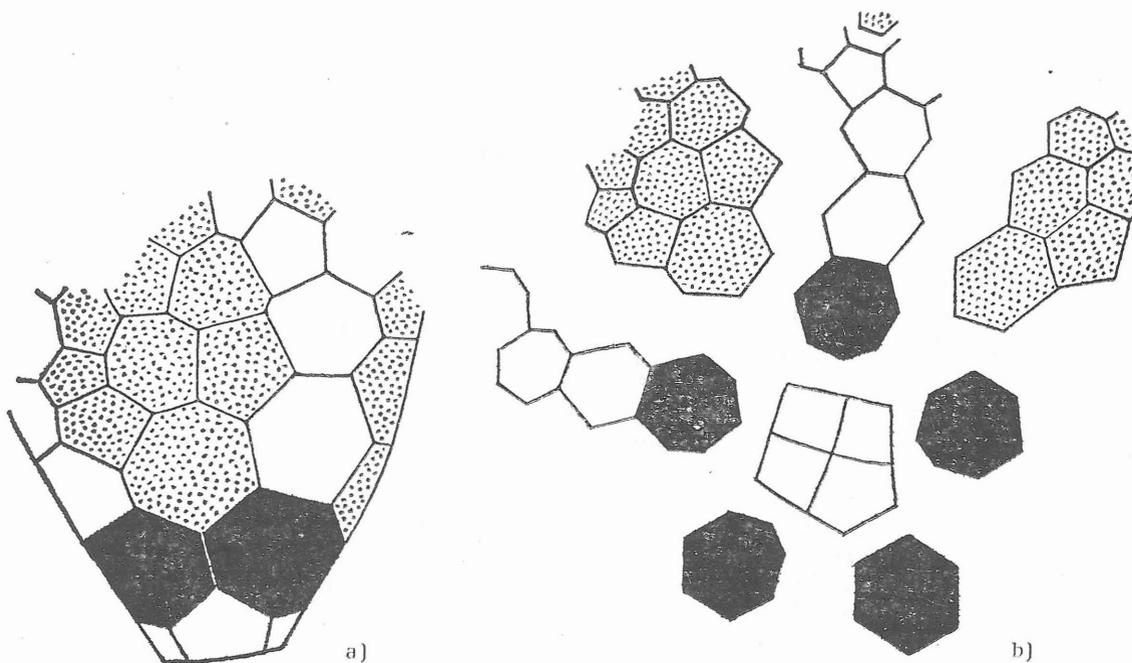
Stratum typicum: Upper Silurian (Upper Pridolian).

Material: Except holotype two incomplete cups: one from new good stratificated findings of uppermost Pridolian of Dlouhá hora near Beroun (DMB P 2294), second one from old collections NM L 19 473 (Upper Pridolian layers of Karlštejn).

Description: Character of the genus. In holotype there is a sculpture on BB, RR, PBrBr and SBr 1 formed of dense radial striae which is good preserved only at the margins of the plates, and on SBrBr 2—4 formed of distinct subparallel striae. In the specimen NM L 19 473 the ornamentation is formed of radiating rows of separated



10. *Zenkericrinus melocrinoides*
WAAGEN et JAHN, 1899; CD
interray view, NM L 19473. See
also Pl. VIII., fig. 3—4. Karlš-
tejn, x1.8.



11. *Zenkericrinus melocrinoides* WAAGEN et JAHN, 1899; a — CD interray view, b — plate diagram of the same specimen, DMB P 2294. See also Pl. VIII., fig. 2. Dlouhá hora near Beroun, x1.5 (a), x1.4 (b).

tiny granules. In the specimen DMB P 2294 the sculpture is not preserved because of weathered surface of the plates.

Dimensions:

(in cm.)

	height of the cup	height of the cup to the distal end of PBr ax	width of the stem facet
Holotype:	5,0	2,5	0,9
NM L 19473	—	2,5	0,6
DMB P 2294	—	3,0	0,8

Discussion: *Zenkericrinus melocrinoides* is the only member of the genus. Relations to other species of the family are unknown because of insufficiency of the Bohemian material. However, because of presence of 4 or very probably of more than 4 fixed secundibrachs, and because of presence of a pinnule borne by SBr 2, there seems to be a possibility that this species is a descendant of an unknown melocrinitid of the evolutionary lineage *Alisocrinus* ? *heterodactylus* Brower, 1973 to the genus *Scyphocrinites* Zenker, 1833.

Occurrence: Only in Upper Silurian (Upper Pridolian) layers of Praha-Dvorce, Karlštejn and Dlouhá hora near Beroun.

REFERENCES

- BATHER, F. A. (1900): The Lower Paleozoic Crinoids of Bohemia. *Ann. and Mag. of Nat. Hist.*, **6**, (7), 102—121. London.
- BROWER, J. C. (1973): Crinoids from the Girardeau Limestone (Ordovician). *Palaeontogr. Amer.*, **7**, (46), 261—499.
- HAUDE, R. (1972): Bau und Funktion der Scyphocrinites-Lobolithen. *Lethaia*, **5**, (1), 95—125. Oslo.
- PETR, V. (1983): Uppermost Silurian echinoderm fauna of the "lobolith hillside" near Řeporyje, Central Bohemia (Summary of the Czech text). *Český kras*, **8**, 51—55. Beroun.
- PROKOP, R. J. — PETR, V. (in print): *Marhoumacrinus legrandi*, gen. et sp. nov., (Crinoidea, Camerata) from Upper Silurian — Lowermost Devonian of Algeria. *Sborník Nár. muz., ř. B. Praha*.
- SPRINGER, F. (1917): On the crinoid genus *Scyphocrinus* and its bulbous root *Camarcrinus*. *Smithsonian Inst.*, 2440, 1—74. Washington D. C.
- STRIMPLE, H. L. (1963): Crinoids of the Hunton Group (Devonian-Silurian) of Oklahoma. *Oklahoma Geol. Surv. Bull.*, **100**, 1—169. Norman.
- UBAGHS, G. (1953): Classe des Crinoïdes: in *Traité de Paléontologie*, J. Piveteau (ed.), **3**, p. 658—773. Paris.
- UBAGHS, G. (1978): Superfamily Melocrinitacea d'Orbigny, 1852. in: *Treatise on Inv. Paleont.*, R. C. Moore (ed.), T. 2, p. 487—494. Geol. Soc. America § Kansas Univ. Press.
- WAAGEN, W. — JAHN, J. (1899): *Système Silurien du centre de la Bohême*, 7. Classe des Echinodermes, Famille des Crinoïdes. 1—215. Praha.
- YELTSISHEVA, R. S. (1968): Krinoidei skalskogo i borscovskogo gorizontov Pololii. in: *Silurijsko-devonskaja fauna Podolii*, p. 30—50. *Izd. Leningradskogo Universiteta*.
- ZENKER, J. C. (1833): *Organische Reste (Petrefacten) aus der Altenburger Braunkohlen-Formation, dem Blankerburger Quadersandstein, jenaischen bunten Sandstein und böhmischen Übergangsgebirge. Beiträge zur Naturgeschichte der Urwelt*, 1—67. Friedrich Mauke, Jena.

REVIZE NADĀELEDI MELOCRINITACEA D'ORBIGNY, 1852 (CRINOIDEA, CAMERATA)
V SILURU A DEVONU ĀECH

V předložené práci je podána revize všech dosud známých krinoidů stratigraficky významné nadčeledi *Melocrinitacea* d'Orbigny, 1852 z českého staršího paleozoika. Celkem jsou zde revidovány a nově vymezeny 4 druhy z toho 3 druhy patřící do čeledi *Scyphocrinitidae* Jaekel, 1918 (svrchní silur — spodní devon) a 1 druh čeledi *Melocrinitidae* d'Orbigny, 1852 (pouze svrchní silur). Jsou to: *Scyphocrinites elegans* Zenker, 1833, *Scyphocrinites subornatus* Waagen et Jahn, 1899 a *Carolicrinus barrandei* Waagen et Jahn, 1899 z čeledi *Scyphocrinitidae* a *Zenkericrinus melocrinoides* Waagen et Jahn, 1899 z čeledi *Melocrinitidae*. Tito krinoidi se vyskytují pouze v barrandienském nejvyšším siluru (přídolu) a v nejnižším devonu (spodní lochkov), jsou však velmi hojní a nezřídka tvoří zbytky jejich koster výraznou horninotvornou složku vápenců.

Obecná část práce je věnována otázkám fylogenetickým, geografickému rozšíření a vztahům českých a mimočeských zástupců nadčeledi *Melocrinitacea* (zejména z evropské části SSSR, USA a ze Severní Afriky) a stratigrafickému významu těchto krinoidů.

V práci jsou rovněž stanoveny typy pro jednotlivé české druhy. Pro *Scyphocrinites elegans* Zenker, 1833 bylo nutno vybrat neotyp, protože původní Zenkerův materiál uložený v Lipsku byl zničen. Veškerý typový materiál pochází ze sbírky J. Barranda a J. Jahna a je uložen v Národním muzeu v Praze. Bezpečně stratifikované exempláře z nových, kontrolních sběrů jsou zčásti rovněž ve sbírkách Národního muzea v Praze, zčásti ve sbírkách Okresního muzea v Berouně.

EXPLANATIONS OF PLATES

PLATE I.

Fig. 1. *Scyphocrinites elegans* Zenker, 1833; young specimen. Upper Pridolian, Karlštejn. NM L 23100, x1,8.

Fig. 2. *Scyphocrinites elegans* Zenker, 1833; Waagen et Jahn's Pl. 46, figs. 3—4 (*Scyphocrinus excavatus* var. *Schröteri*). Upper Pridolian, Karlštejn. NM L 13250, x1.

Fig. 3. *Scyphocrinites elegans* Zenker, 1833; neotype, Waagen et Jahn's Pl. 48, figs. 2—3 (*Scyphocrinus excavatus* var. *typ.*). Upper Pridolian, Karlštejn, NM L 13252, x1,1.

PLATE II.

Scyphocrinites elegans Zenker, 1833; adult specimen (see also text-fig. 2a,b) preserved together with the lower part of shell of symbiotic gastropod *Platy-ceras* (*Orthonychia*) *elegans*. Upper Pridolian, Karlštejn. NM L 22785, x1,1.

PLATE III.

- Fig. 1. *Scyphocrinites elegans* Zenker, 1833; Waagen et Jahn's Pl. 43, fig. 1 (*Scyphocrinus excavatus* var. *Zenonis*). Upper Pridolian, Karlštejn. NM L 13243, x0,8.
Fig. 2. Undeterminable specimen (may be *Scyphocrinites elegans* or *Carolicrinus barrandei*). Waagen et Jahn's Pl. 40, fig. 7 = Pl. 41, figs. 6—7 (*Scyphocrinus excavatus* var. *Zenonis*). Upper Pridolian, Praha-Dvorce. NM L 19921, x1.
Fig. 3, 4. *Scyphocrinites subornatus* Waagen et Jahn, 1899; calyx in basal and lateral view (Waagen et Jahn's Pl. 58, figs. 8—9). Upper Pridolian, Klukovice. NM L 13275, x1,4.

PLATE IV.

Scyphocrinites elegans Zenker, 1833; old adult specimen (only known complete calyx of Waagen et Jahn's var. *Zenonis* with good preserved stem facet (see also text-fig. 3)). Upper Pridolian, Karlštejn. DMB P 0,9, x1,1.

PLATE V.

- Fig. 1. *Scyphocrinites subornatus* Waagen et Jahn, 1899; lectotype (Waagen et Jahn's Pl. 40, fig. 1). Upper Pridolian, Karlštejn. NM L 13237, x1,2.
Fig. 2. *Scyphocrinites subornatus* Waagen et Jahn, 1899; SBrBr and TBrBr. Upper Pridolian, Praha-Podolí. NM L 23483, x1,4.
Fig. 3. ? *Carolicrinus barrandei* Waagen et Jahn, 1899; pustulous floor plates covering the pavement of fixed pinnulars. Upper Pridolian, Karlštejn. NM L 23481, x1,2.
Fig. 4. *Scyphocrinites elegans* Zenker, 1833; tegmen. Upper Pridolian, Karlštejn. NM L 23099, x0,8.

PLATE VI.

Scyphocrinites subornatus Waagen et Jahn, 1899; paralectotype (Waagen et Jahn's Pl. 44, fig. 3). Upper Pridolian, Malá Chuchle. Museum für Naturkunde der Humboldt-Universität zu Berlin, GDR, x2,8.

PLATE VII.

- Fig. 1. *Carolicrinus barrandei* Waagen et Jahn, 1899; lectotype (Waagen et Jahn's Pl. 58, figs. 1—6). Upper Pridolian, Karlštejn. NM L 13272, x0,8.
Fig. 2. *Carolicrinus barrandei* Waagen et Jahn, 1899; paralectotype (Waagen et Jahn's Pl. 58, fig. 7). Upper Pridolian, Řeporyje. NM L 13273, x1,8.
Fig. 3. *Carolicrinus barrandei* Waagen et Jahn, 1899; tegmen of the dorsoventrally compressed specimen. Upper Pridolian. Opatřilka quarry near Holyně. NM L 21587, x0,7.

PLATE VIII.

- Fig. 1. *Zenkericrinus melocrinoides* Waagen et Jahn, 1899; holotype by monotypy (Waagen et Jahn's Pl. 42, figs. 4—5). Upper Pridolian, Praha-Dvorce. NM L 19923, x1,2.
Fig. 2. *Zenkericrinus melocrinoides* Waagen et Jahn, 1899; posteriorly. Uppermost Pridolian, Dlouhá hora near Beroun. DMB P 2294, x1,4.
Fig. 3, 4. *Zenkericrinus melocrinoides* Waagen et Jahn, 1899; calyx posterior and basal view. Upper Pridolian Karlštejn NM L 19473, x1,2.
Photos V. Turek except Pl. IV and Pl. VIII/2 (Z. Žůna, DM Beroun) and Pl. VI (Dr. H. Jäger, Berlin). Whitened by ammoniumchloride.

SBORNÍK NÁRODNÍHO MUZEA V PRAZE — ACTA MUSEI NATIONALIS PRAGAE

Volumen XLII B (1986), No. 3—4

Redaktor Jiří Čejka, CSc.

Cena tohoto dvojčísla 12 Kčs

