

NEW SPECIES OF CRINOIDS BASED ON THEIR COLUMNALS AND STEM FRAGMENTS (COL.), FROM THE LOWER DEVONIAN ZLÍCHOV LIMESTONE (BARRANDIAN AREA, THE CZECH REPUBLIC)

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Abstract. The washings from the weathered biosparitic limestones of the “Chapel Horizon” at the base of Zlíčov Limestone (Lower Emsian) in the Barrandian area yielded among others a bulk of isolated skeletal remains of crinoids. These remains consisted of columnals and stem fragments of genera and species to date unknown in the Lower Devonian of Bohemia. Four new taxa from the remains are described in the present study: *Pentacauliscus stellatus* sp. n. (col.), *Floripila formosa* sp. n. (col.), *Salairocrinus apertus* sp. n. (col.) and *Mediocrinus stukalinae* sp. n. (col.). The columnals and stem fragments of species very similar to the species here described were also obtained from the washings of weathered sparitic bioclastic Koněprusy Limestone of Pragian age which is exposed both in the “Čertovy schody – West” Quarry near Koněprusy and “Čertovy schody – East” Quarry near Suchomasty.

■ Crinoidea, columnals and stem fragments, *Pentacauliscus*, *Floripila*, *Salairocrinus*, *Mediocrinus*, new species (col.), systematics, Lower Devonian, Pragian, Koněprusy Limestone, Lower Emsian, Zlíčovian, Zlíčov Limestone, Barrandian Area.

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Introduction

Thousands of isolated skeletal remains of crinoids, the majority being columnals and pluricolumnals were collected from the washings of weathered yellowish biosparitic limestone from the “Chapel Horizon” which is developed at the base of the Zlíčov Limestone (Lower Devonian, Lower Emsian). Four new species: *Pentacauliscus stellatus* sp. n. (col.), *Floripila formosa* sp. n. (col.), *Salairocrinus apertus* sp. n. (col.), and *Mediocrinus stukalinae* sp. n. (col.), are described in the present study. They come from Praha-Zlíčov “U kapličky” Quarry and Praha-Lochkov, “Hvíždalka” Quarry.

Very similar columnals and stem fragments of crinoids of the genera described here were also obtained in the washings from weathered sparitic bioclastic Koněprusy Limestone of Pragian age which is exposed in the classical locality “Císařský lom”, “Čertovy schody – West”, “Čertovy schody – East” and “Na Plešivci” Quarries. These coarse bioclastic limestones represents a similar environment to the “Chapel Horizon” of Zlíčov Limestone, i. e. reef flank deposits.

Systematic Palaeontology

Subclass and order incertae sedis

Group: **Pentameri MOORE et JEFFORDS, 1968 (col.)**

Family: **Pentacauliscidae MOORE et JEFFORDS, 1968 (col.)**

Pentacauliscus MOORE et JEFFORDS, 1968 (col.)

Type species: *Pentacauliscus nodosus* MOORE et JEFFORDS, 1968 (col.), Lower Devonian, Helderbergian, Tennessee, the USA.

Pentacauliscus stellatus sp. n. (col.)

Pl. 1, figs 1-6

1987 *Pentacauliscus stellatus* sp. n. (col): Slámová MS; p. 71, pl. VIII, figs 9-15.

H o l o t y p e : Isolated columnal NMP L 26627 figured by Slámová, 1987, pl. VIII, fig 10 and herein on Pl. 1, fig. 2.

T y p e h o r i z o n : “Chapel Horizon” at the base of the Zlíčov Limestone, Lower Devonian, Zlíčovian (= Lower Emsian).

T y p e l o c a l i t y : Abandoned quarry “U kapličky”, Praha-Zlíčov.

M a t e r i a l : In addition to the holotype and figured paratypes, there are more than 300 isolated columnals and stem fragments from weathered biosparitic limestones exposed at the type locality. A few specimens have been recently obtained from washings in the same “Chapel Horizon” exposed by an open cut into the active “Hvíždalka” Quarry near Praha-Lochkov and also from the biomictic Zlíčov Limestones with chert nodules exposed about one meter

above the “Chapel Horizon” in the eastern part of “Červený lom” Quarry in Praha-Klukovice.

Description: Stem heteromorphic, broadly pentastellate to pentagonal in outline, very variable in appearance. Noditaxis composed of relatively massive nodal (N) and three or four extremely thin internodals (1-4 IN). Nodals with narrow epifacet tapering interradially into bulky, pointed asymmetric extremities, internodals without epifacet. Facet plain, crenularium with fine crenellae, areola pentalobate to pentastellate, often reaching up to the facet margin. Lumen minute, pentalobate, cyclic spatium clearly visible.

Remarks: *Pentacauliscus stellatus* sp. n. (col.) differs from the type species in the shape of the facet, bulky, pointed extremities and mostly pentastellate cross section of the stem. It is very similar to the species *P. vervourensis* LE MENN 1985 from the Lower Devonian of France. The difference is only in the shape of the areola, prominent narrow epifacet on the radial ray and bulky extremities. From the species *P. armoricanus* LE MENN 1970 and *P. montguyonensis* LE MENN 1976 it differs in size and form of the extremities and in the shape of the areola.

	columnal height	columnal diameter	lumen diameter
L 26626:			
nodal	0.7	5.7	1.1
internodal 3	0.3	4.8	
internodal 4	0.2	4.7	
L 26627 (holotype):	0.6	5.9	0.9

Dimensions in mm.

Floripila MOORE et JEFFORDS, 1968 (col.)

Type species: *Floripila florealis* MOORE et JEFFORDS, 1968 (col.), Middle Devonian, New York, the USA.

Floripila formosa sp. n. (col.)

Pl. 1, figs 7-10, text-fig. 1

1987 *Floripila formosa* sp. n. (col.): Slámová MS; p. 76-77, pl. IX, figs 7-10, text-fig. 21.

Holotype: Isolated pluricolumnal NMP L 26642 figured by Slámová 1987, pl. IX, fig 10, text-fig. 21 and herein on Pl. 1, fig.8.

Type horizon: “Chapel Horizon” at the base of the Zlíchov Limestone, Lower Devonian, Zlíchovian (= Lower Emsian).

Type locality: Abandoned quarry “U kapličky”, Praha-Zlíchov.

Material: In addition to the holotype and paratypes, 17 isolated columnals and 6 stem fragments from weathered biosparitic limestones exposed at the type locality. The species is also recorded from Praha-Lochkov, “Hvízdalka” Quarry.

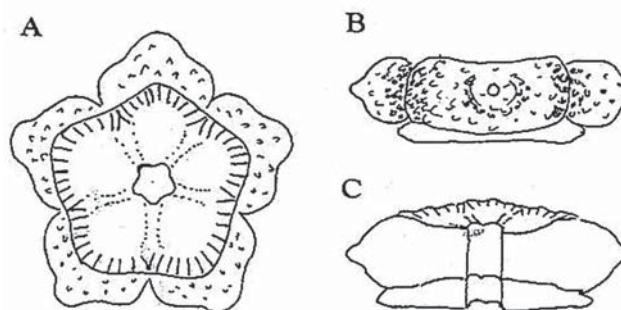
Description: Stem heteromorphic, broadly pentagonal in outline, noditaxis composed of relatively tall nodals (N) and two rows of internodals (1-2 IN). Latera vaulted, with five distinctive grooves running parallelly with axial canal throughout the length of the stem. Nodals massive, five-lobed, its latera and epifacet densely granulated.

Internodals pentagonal, 1 IN short, 2 IN extremely thin, epifacet narrow or missing. Articular facet flat, subpentagonal to broadly pentalobate, crenularium composed of straight, mid-fine crenellae (cca 60 culmins). Symplexy articulation. Areola broadly pentalobate, extended up to latera.

Remarks: *Floripila formosa* sp. n. differs from the type-species in the complicated tips of its epifacet, in the columnal’s latera having a densely granulate surface and in the morphology of the articulum. Further more, it differs from *Floripila florealis* in the shape of the crenularium which does not reach the lumen.

	columnal height	columnal diameter	lumen diameter
NMP L 26641: NMP L 26642 (holotype):	1.5	5.8	1.2
nodal	1.1	5.4	1.4
internodal	0.4	4.3	

Dimensions in mm.



Text-fig. 1. *Floripila formosa* sp. n. (col.). A – nodal in facet view. B – nodal with internodal in lateral view. C – cross section of nodal and internodal. Drawing by Radana Slámová.

Group: Cyclici MOORE et JEFFORDS, 1968

Family: Salairocrinidae DUBATOLOVA, 1971 (col.)

Salairocrinus DUBATOLOVA, 1971 (col.)

Type species: *Pentagonocyclicus textus* DUBATOLOVA, 1964 (col.). Lower Devonian, Kuzbass, Russia.

Salairocrinus apertus sp. n.

Pl. 1, figs 11, 12, text-fig. 2

1987 *Salairocrinus apertus* sp. n. (col.): Slámová MS; p. 83-84, pl. XI, figs 12-13, text-fig. 23.

Holotype: Isolated columnal NMP L 26667 figured by Slámová 1987, on pl. XI, fig. 13 and herein on Pl. 1, fig. 12.

Type horizon: “Chapel Horizon” at the base of Zlíchov Limestone, Lower Devonian, Zlíchovian (= Lower Emsian).

Type locality: Abandoned quarry “U kapličky”, Praha-Zlíchov.

Material: In addition to the holotype and paratypes, 52 isolated columnals and 19 pluricolumnals were obtained from washings from the type locality. The species is also recorded from Praha-Lochkov, “Hvíždalka” Quarry.

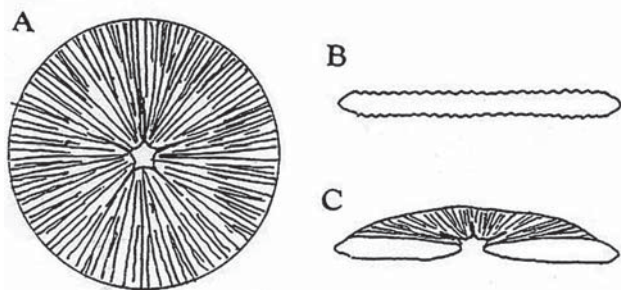
Description: Stem homeomorphic, circular in outline, composed of thin columnals with flat articular facets and weakly convex latera. Symplexy articulation, crenularium consisting of fine, straight, dichotomic crenellae, which extend up to the latera. Areola is absent, lumen pentagonal to broadly pentastellate with rounded tops from which extend prominent grooves, up to 1/3 of the width of the facet.

Comparison: *Salaiocrinus apertus* sp. n. (col.) differs from the other species of the genus *Salaiocrinus* in the prominent grooves extending from the lumen corners. From the species *Salaiocrinus carinatus* LE MENN, 1980 (col.) it differs in addition by the considerably shorter columnals. Pluricolumnals of *Salaiocrinus kerovenonsis* LE MENN, 1985 are heteromorphic and their taller columnals have a coarse crenularium.

Occurrence: Lower and Middle Devonian of Russia (North Ural Mts.), Eifelian of Kazakhstan and Turkestan (South Tian-Shan Mts), France (Siegenian, Givetian) and the Czech Republic (Pragian, Zlíchovian = Lower Emsian).

	nodal height	nodal diameter	lumen diameter
NMP L 26667 (holotype):	1.1	9.6	0.6
NMP L 26666:	0.9	10.2	0.5

Dimensions in mm.



Text-fig. 2. *Salaiocrinus apertus* sp. n. (col.). A – columnal in facetal view. B – columnal in lateral view. C – cross section of columnal. Drawing by Radana Slámová.

Family: Mediocrinidae STUKALINA, 1964 (col.)

***Mediocrinus* STUKALINA, 1965 (col.)**

Type species: *Pentagonocyclicus medius* ELTYSHEVA in STUKALINA, 1965 (col.). Upper Silurian, Central Kazakhstan.

***Mediocrinus stukalinae* sp. n. (col.)**

Pl. 1, figs 13-17, text-fig. 3

1987 *Mediocrinus* sp. (col.): Slámová MS, p. 82-83, pl. XI, figs 7-11, text-fig 22.

Holotype: Isolated pluricolumnal NMP L 26662, figured by Slámová 1987, pl. XI, figs 8 and 10, and herein on pl. 1, figs 13-14.

Type horizon: “Chapel Horizon” at the base of the Zlíchov Limestone, Lower Devonian, Zlíchovian (= Lower Emsian).

Type locality: Abandoned quarry “U kapličky”, Praha-Zlíchov.

Derivatio nominis: In honour of the outstanding Russian specialist in crinoid palaeontology, Dr. Galina A. Stukalina.

Material: In addition to the holotype, the isolated columnals and stem remains figured by Slámová 1987, (MS), 230 columnals and 49 pluricolumnals. The species is also recorded from Praha-Lochkov, “Hvíždalka” Quarry.

Description: Stem heteromorphic, circular in outline, composed of 2–3 rows of relatively short columnals. Articular facet flat, cyclic, crenularium consisting of fine, straight, dichotomic crenellae and narrow, rounded latera. Symplexial articulation. Areola small, featureless or absent. Lumen medium size, pentalobate.

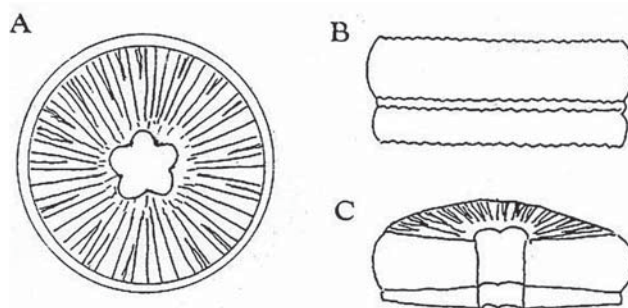
Remarks: *Mediocrinus stukalinae* sp. n., differs from the type-species *Mediocrinus medius* (ELTYSHEVA in STUKALINA, 1965) by its narrower lumen, clearly visible epifacet, broad crenularium and heteromorphic stem. *Mediocrinus squiffiecensis* LE MENN, 1985 from the Givetian of France has a homeomorphic stem, narrower lumen and taller columnals.

Occurrence: *Mediocrinus stukalinae* sp. n. occurs abundantly in the biosparite limestones exposed at the type horizon both in the type locality and in the “Hvíždalka” Quarry near Praha-Lochkov.

The species rarely occurs in the washings from the well bedded micritic Zlíchov Limestone with chert nodules developed cca one meter above the “Chapel Horizon” which is exposed in the eastern part of the “Červený lom” Quarry near Praha-Klukovice.

	columnal height	columnal diameter	lumen diameter
NMP L 26642 (holotype):			
nodal	1.1	6.1	1.8
internodal 1	0.6	6.1	1.8
internodal 2	0.3	5.9	1.7
internodal 3	0.2	5.4	1.7

Dimensions in mm.



Text-fig. 3. *Mediocrinus stukalinae* sp. n. (col.). A – nodal in facetal view. B – pluricolumnal in lateral view. C – cross section of pluricolumnal. Drawing by Radana Slámová.

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Explanation to the plate

Photos 4, 5, 6 by J. Sklenář, others by V. Turek.

PLATE 1

***Pentacauliscus stellatus* sp. n. (col.)**, Lower Devonian, Zlíchovian, “Chapel Horizon” at the base of the Zlíchov Limestone. Praha – Zlíchov, “U kapličky” Quarry.

1. Articulum of isolated pluricolumnal composed of N and 3IN, NMP L 26626, × 5.
2. Holotype, isolated pluricolumnal composed of N and 3 or 4IN, NMP L 26627, × 5.
3. Nodal articulum of isolated columnal, NMP L 26628, × 5.
4. Lateral view of isolated pluricolumnal with pentastellate articulum and epifacets interrally terminated by prominent overhanging projections, NMP L 26630, × 3.5.
5. Lateral view of isolated pluricolumnal with pentagonal articulum. Extremely thin 3 and 4 internodals, NMP L 26632, × 3.
6. Isolated pluricolumnal with pentastellate articulum, lateral view, NMP L 26629, × 3.5.

***Floripila formosa* sp. n. (col.)**, Lower Devonian, Zlíchovian, “Chapel Horizon” at the base of the Zlíchov Limestone. Praha – Zlíchov, “U kapličky” Quarry.

7. Articulum of the isolated nodal columnal, NMP L 26641, × 4.
8. Holotype, a pluricolumnal composed from N and 2IN. Internodal articulum, NMP L 26642, × 4.
9. Isolated pluricolumnal, lateral view, NMP L 26639, × 5.
10. Isolated pluricolumnal, lateral view, NMP L 26640, × 4.

***Salairocinus apertus* sp. n. (col.)**, Lower Devonian, Zlíchovian, “Chapel Horizon” at the base of the Zlíchov Limestone. Praha – Zlíchov, “U kapličky” Quarry.

11. Isolated pluricolumnal, lateral view, NMP L 26666, × 2.
12. Holotype, articulum, NMP L 26667, × 4.5.

***Mediocrinus stukalinae* sp. n. (col.)**, Lower Devonian, Zlíchovian, “Chapel Horizon” at the base of the Zlíchov Limestone. Praha – Zlíchov, “U kapličky” Quarry.

13. Holotype, isolated pluricolumnal, lateral view, NMP L 26662, × 4.
14. Holotype, articulum, NMP L 26662, × 4.5.
15. Pluricolumnal, lateral view, NMP L 26661, × 3.5.
16. Articulum of 2IN or 3IN, NMP L 26665, × 4.5.
17. Articulum of N, NMP L 26663, × 4.5.

All specimens are deposited in the collections of the Palaeontological Department of the National Museum, Prague (abbrev. NMP, catalogue L).

