

STANISŁAWA DUSZYŃSKA

FORAMINIFERS FROM THE MIDDLE DEVONIAN OF THE HOLY  
CROSS MOUNTAINS

*Abstract.* — Description is given of three species of Devonian (Givetian) foraminifers, never before collected in Poland. These specimens represent forms with a wide geographical and stratigraphic range. Identical or similar forms have been yielded by rocks from the Middle and Upper Devonian of Europe and from the Upper Devonian of North America.

## INTRODUCTION

This paper describes and illustrates some Middle Devonian foraminifers not previously described from Poland. The studied specimens come from the locality Skały in the Holy Cross Mountains. They have been collected by F. Adamczak while searching for ostracods and were turned over to the writer for investigation. This was carried out under the guidance and with the help of prof. R. Kozłowski and prof. W. Pożaryski, to whom special words of thanks are due.

Devonian foraminifers have thus far been but rarely described and no more than some scores of them are known today from North America, Germany, U.S.S.R. and Czechoslovakia. The foraminiferous fauna from the Devonian of all these regions is very much alike.

In 1933, Miller and Carmer described *Semitextularia thomasi* and *Lituotuba dubia*, two Upper Devonian species from the state of Iowa.

In 1943, the same forms were described by Cushman and Stainbrook, also from the state of Iowa, together with *Textularia? proboscidea* and *Endothyra gallowayi*.

Forms here described from the Holy Cross Mountains in Poland constitute an assemblage approaching that encountered in North America. *Semitextularia thomasi* and *Textularia? proboscidea* are forms common to both areas, while the American *Lituotuba dubia* seems to come very close to the European *Moravamina segmentata*.

In 1937, Bartenstein described forms similar to *Moravamina* from the Middle Devonian of the Eifel Mts., referring them to genus *Lituotuba*.

In 1952, Bykova described foraminiferous assemblages from the Middle and Upper Devonian of the European provinces of Russia. Many new species of genus *Semitextularia* have been established by her on specimens from those assemblages. For one of the Russian forms, identified with the American species *Textularia? proboscidea* Cushman & Stainbrook, that author has introduced the new generic name of *Cremsia* Bykova.

Specimens of foraminifers described in this paper have been produced by „brachiopod shales“ from the Upper Givetian Skaly formation. These shale rocks belong to a complex of deposits with highly differentiated lithological and faunistical facies, resting on a thick dolomitic series and overlaid by Upper Givetian greywacke shales. In the brachiopod shales foraminifers occur but sporadically among a rich fauna consisting mainly of brachiopods, ostracods and corals<sup>1</sup>.

#### DESCRIPTIONS

##### *Moravammina segmentata* Pokorný, 1951

(pl. II, figs. 4-5)

1937. *Lituotuba* sp. Bartenstein; H. Bartenstein, Neue Foraminiferen-Funde im Mitteldevon der Eifel, p. 334-338.  
 1951. *Moravammina segmentata* Pokorný; V. Pokorný, The Middle Devonian Foraminifera of Čelechovice, p. 8-10, fig. 7.

*Material.* — 12 complete specimens.

Dimensions of three specimens (in mm):

	1	2	3
diameter of coil	0.16	0.2	0.3
diameter of rectilinear part	0.06	0.08	0.1

*Description.* — Test composed of a coiled and a rectilinear part. The early portion attached to a foreign particle round which one coil curves spirally so as to form a closed ring. Farther the test becomes tubular. Wall of very fine calcareous grains with calcareous cement. Cross section of the coiled part of tube mostly triangular. The attached part flattened, periphery provided with a sharp keel. As seen in some specimens, standing out clear against the lighter tube wall the interior of the proximal end of tube is divided by inner septa. Outside the septa are seen as dark brown lines. They are equidistant, arranged perpendicularly to the axis of tube. Aperture terminal, sub-circular.

<sup>1</sup> A detailed stratigraphic description of this series has been published by Z. Kielan (1954).

*Discussion.* — *Moravamina segmentata* is referred to in literature under various names. From the Middle Devonian of the Eifel Mts. Barstenstein (1937) has described forms approaching *Moravamina* under the name of *Lituotuba* sp. In his drawing he figures the attachment of the proximal end. He does not, however, mention this character in his description of *Lituotuba* sp. From the Devonian of Iowa, Miller and Carmer (1933) have described a markedly similar form under the name of *Lituotuba dubia* Miller & Carmer. This form differs, however, from *M. segmentata* in that its proximal end develops two coils instead of but one closed round the foreign particle, while septa have an uneven, oblique arrangement.

In 1951 these forms were given a thorough revision by W. Pokorný. Thus far species grouped by him under the name of *Moravamina*, were assigned to genus *Lituotuba* Rhumbler of the family Ammodiscidae. The genotype of *Lituotuba lituiformis* (Brady), however, is a recent form whose proximal end is coiled in closely adhering coils. In this character it differs distinctly from genus *Moravamina*, whose proximal end forms a single closed spiral round the substratum. Upon detachment of the substratum the inside of the spiral remains empty. These are, after Cushman (1943), characters of differentiation between the Ammodiscidae and Hyperamminidae. It was also on these differences that Pokorný referred *Moravamina* to the latter family.

*Occurrence.* — Specimens described by the writer are from upper Givetian brachiopod shales at the locality Skała. Pokorný has described this species from the Givetian of Čelechowice where it is found in red marly coral limestones.

*Semitextularia thomasi* Miller & Carmer, 1933

(pl. I, figs. 1-9)

1933. *Semitextularia thomasi* Miller & Carmer; A. K. Miller & A. M. Carmer, Devonian Foraminifera from Iowa, p. 423-431, pl. 50, fig. 10 a-e.

*Material.* — About 400 well preserved specimens with chambers usually filled up with iron oxides.

Dimensions of three specimens (in mm):

	1	2	3
length	0.18	0.30	0.66
width	0.12	0.28	0.44
thickness	0.04	0.05	0.06

*Description.* — Test of a fan-like shape, flattened, spreading out towards the aperture. The first chambers are biserial, the later uniserial. Biserial chambers are short, the uniserial transversely elongate, various-

## PL. I

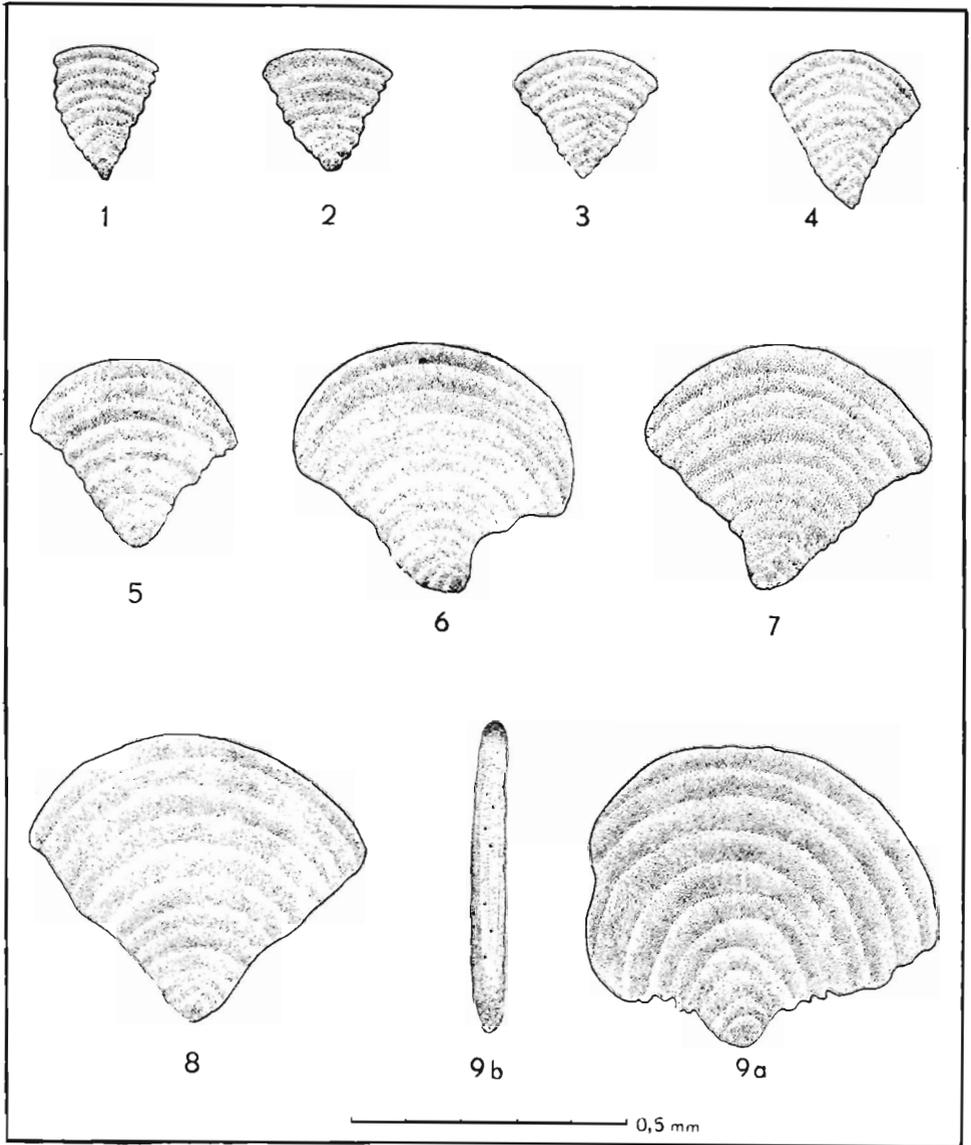


Fig. 1-9. *Semitextularia thomasi* Miller & Carner,  $\times 74$ ; specimens illustrating variability of shape, 9b apertural face of specimen 9.

## PL. II

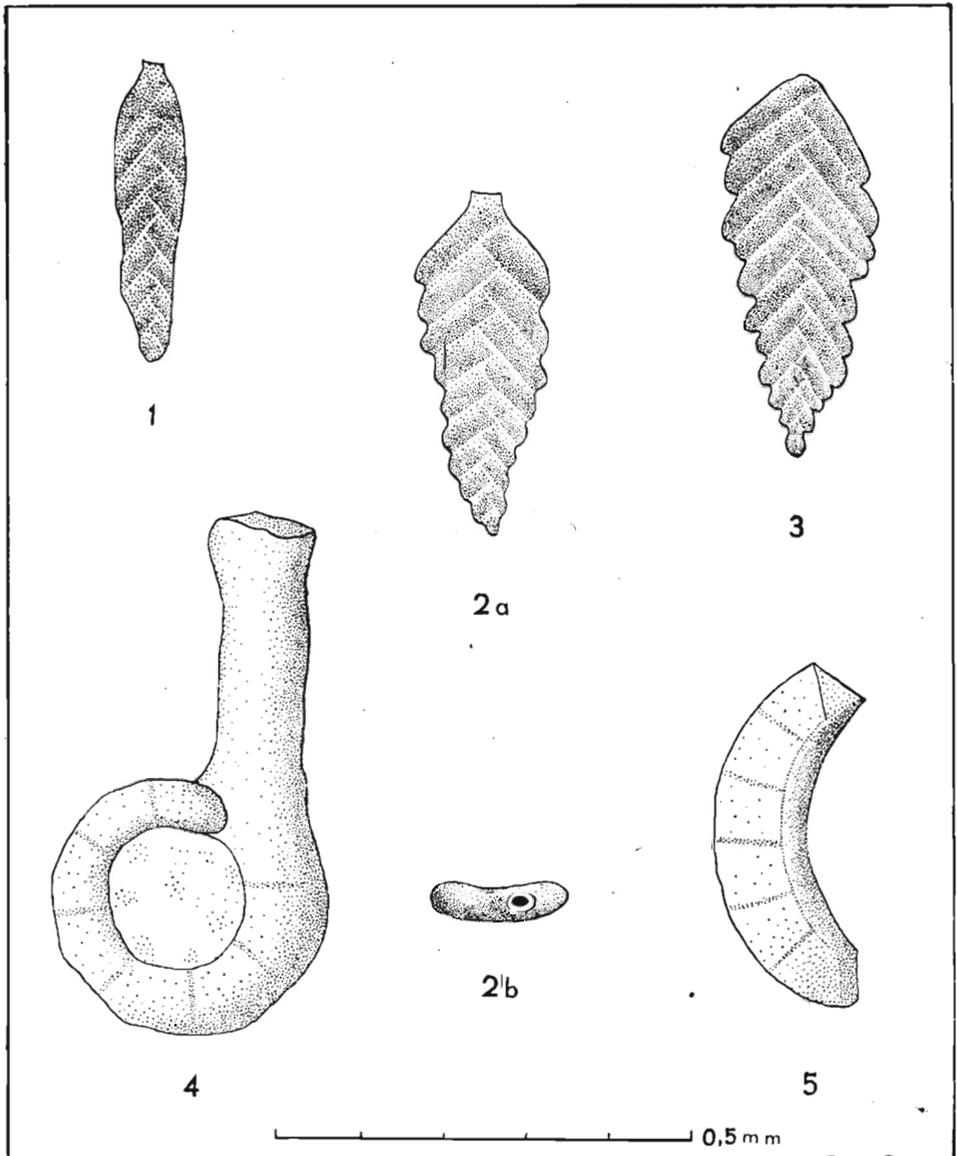


Fig. 1-3. *Textularia? proboscidea* Cushman & Stainbrook,  $\times 110$ ; three specimens of different width, 2b apertural face of specimen 2.

Fig. 4-5. *Moravammina segmentata* Pokorný,  $\times 120$ ; 4 whole specimen, 5 fragment of coiled portion.

ly shaped, rectilinear or sub-arched. Margins of test undulating, frequently serrate. In well preserved specimens a small spinose process terminates every chamber. Wall of very fine calcareous grains with calcareous cement. Sutures gently depressed more or less flush due to granular texture of test, more distinct in uniserial parts, hardly discernible in the initial biserial area. Some slides reveal that uniserial and biserial chambers are divided by septa into chamberlets perpendicularly arranged to the alignment of the chambers. Their width almost equals thickness of septum separating two adjacent chamberlets. There are about eight of them to 0.1 mm (fig. 1). Owing to irregular penetration of specimens by limonite only some marginal chamberlets are clearly distinct, the most being confused. The multiple aperture consists of two rows of minute openings in a symmetrical arrangement on both sides of the apertural area.

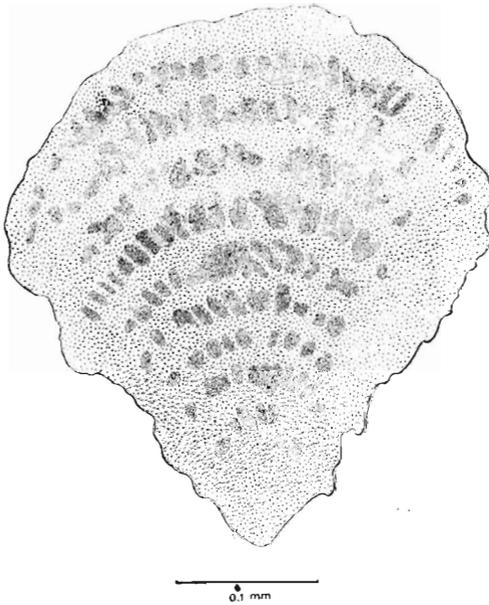


Fig. 1. — *Semitextularia thomasi* Miller & Carner. Section of a specimen showing chambers divided into chamberlets,  $\times 370$ .

*Variations.* — Abundant material has enabled the writer to study individual variations. These are of great range bearing on number of chambers, as well as on outline of sides and shape of test. Number of uniserial and biserial chambers varies. In some specimens biserial chambers are in a distinct majority as compared to the uniserial. To say, there may be 8 biserial chambers with only 5 uniserial. In others it is the reverse, for example there may be 10 uniserial chambers and but 3 biserial. Specimens occur with uniserial chambers only. Margin of test is serrate and gently undulatory or smooth. Outline of test varies considerably according to elongation and curvature of uniserial

chambers, particularly of those last formed. Some specimens are with nearly rectilinear outline of latest chamber, but a sub-arched outline predominates. Two specimens are with uniserial chambers so strongly curved that they almost converge at the base imparting a horse-shoe shape to the test. The differentiated appearance of the tests is due also to the

various ontogenic stages of the investigated specimens. Adult specimens provided with a greater number of uniserial chambers are broader than juvenile specimens with few uniserial chambers. Fig. 3 is a diagrammatic illustration showing range of variation as based on 200 measured specimens. In this diagram is considered the ratio of entire test length ( $a$ ) to the distance from the apex to the maximum width line of test ( $b$ ) (fig. 2). The plotted values include 10 classes. One of the variants' class is not represented in the studied collection, but could probably be fitted in,

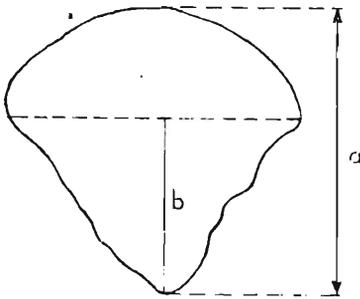


Fig. 2. — *Semitextularia thomasi* Miller & Carmer. Outline figure of test illustrating the measurements  
 $a$  total length,  $b$  distance from apex to maximum width line.

should a still greater number of specimens be measured. The diagram shows one apex whence it may be inferred that the considered specimens are conspecific.

Miller & Carmer (1933) took note of the specific variations of this form and figured the variable morphology of some specimens, without any comments in their description. These authors have recorded the presence of but one specimen showing planispiral coiled early chambers. No such specimens were recorded among material from the Holy Cross Mts. Neither did Bykova record any such forms among Russian specimens by her referred

to this genus. This is perhaps so because being microspheric forms they are scarce, megalospheric forms with a large proloculum and without planispiral portion being more frequent.

*Discussion.* — After Miller & Carmer (1933) *Semitextularia thomasi* somewhat approaches several genera of the Textulariidae and appears to be related to *Spiroplectamina* and „may have developed out of some member of that genus by the addition of the flattened uniserial chambers” (p. 428). Bykova (1952) in her paper on Devonian foraminifers from the province of Voronez, has described 8 species belonging to

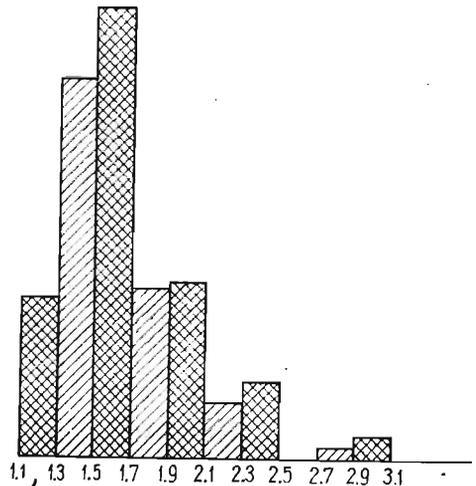


Fig. 3. — *Semitextularia thomasi* Miller & Carmer. Diagram of variation of the  $a$  to  $b$  ratio. Heights of rectangles proportional to number of specimens (1 specimen = 0,5 mm).

genus *Semitextularia*. As specific characters she considered the number of uni- and biserial chambers and mode of curvature of chambers, also assigning great significance to the marginal spinose processes at terminations of chambers. It is the mode of development and the number of these spinose processes and not their mere existence that Bykova regards as specific index characters. The investigation of several hundreds of the Skaly specimens leads the present writer to conclude that the differences on which Bykova has based her determination of so many species should be rather assigned to extensive individual variation. Hence it may be suggested that the number of species determined by that author would be considerably reduced if she had more turned her attention to the problem of individual variation.

In their description of American specimens, Miller & Carmer make no reference whatever to the division of chambers into secondary chamberlets. This may be explained by their apparent omission to prepare any sections of tests. In Polish specimens secondary chambers are very distinct and their presence in Russian specimens has also been confirmed by Bykova.

*Occurrence.* — Holotype of this species has been described from the Upper Devonian of the state of Iowa. The specimens here considered come from brachiopod shales of the Upper Givetian at the locality Skaly. Out of the eight species differentiated by Bykova from the Devonian of the Voronez district, but one is referable to the Givetian, all the others to the Frasnian.

*Textularia? proboscidea* Cushman & Stainbrook, 1945  
(pl. II, figs. 1-3)

1943. *Textularia? proboscidea* Cushman & Stainbrook; J. A. Cushman & A. M. Stainbrook, *Some Foraminifera from the Devonian of Iowa*, p. 73-79, pl. 13

*Material.* — 24 complete specimens.

Dimensions of three specimens (in mm):

	1	2	3
length	0.26	0.32	0.5
width	0.10	0.14	0.22
thickness	0.05	0.05	0.09

Size of proloculum 0.04 mm.

*Description.* — Test elongate, consisting of chambers arranged in biserial series along the whole course. Initial end of test sub-acute. Chambers increase from proloculum towards the apertural end, disposed at acute angles forming a zig-zag suture in midline of test. Margins

serrate. Sutures made distinct by slight depressions. Aperture rounded, terminal, on apex of last chamber, usually on a short neck. Wall of fine calcareous grains with calcareous cement.

*Variations.* — In adult specimens the maximum number of chambers does not exceed ten pairs. In younger specimens it ranges from 5 to 7 pairs. Margin of test is serrate or undulating, sometimes almost rectilinear. In some specimens a neck is developed in the last-formed chamber, its absence in other specimens may be due to total undevelopment.

*Discussion.* — Cushman & Stainbrook (1943) when describing *Textularia? proboscidea* were well aware that the assignment of this species to genus *Textularia* is doubtful. Among their abundant material they failed to discover a single specimen with a spirally coiled early portion, a character of *Textularia*. The adult stage of these forms comes very close to *Textularia*, the aperture excepted. In the typical form of *Textularia* this is slit-like and occurs on the interior margin of the last chamber, while in *T.? proboscidea* it is sub-circular and opens at apex of chamber or even at apex of neck.

On evidence of the general shape of test, the biserial chambers and their features, the course of sutures and the terminal aperture, the writer has allocated the Polish specimens to the species of Cushman and Stainbrook. Since no forms with spirally coiled initial chambers have here been recorded, a definite generic determination is rather difficult.

From the Upper Devonian (Frasnian) of the Russian Platform Bykova (1952) has described a form similar to that from America, identifying it with the species established by Cushman and Stainbrook. After that author the species here considered cannot be referred to genus *Textularia* to which it was tentatively assigned by the American writers, since in *Textularia* the aperture is in the form of an arched slit at the interior margin of the last chamber, while in the studied Devonian form the aperture occurs on a neck and is multiple. The new genus *Cremsia* has, therefore, been established by Bykova for this form on the genotype of *Textularia? proboscidea* Cushman & Stainbrook. But the American authors have described their specimens as not having a multiple but a single aperture and this has been confirmed on Polish specimens. Thence, they cannot be identified with those investigated by Bykova, as they are said by her to be provided with a multiple aperture. Thus neither can the species *Textularia? proboscidea* Cushman & Stainbrook be used as the genotype of genus *Cremsia* since Bykova, in her diagnosis states that the aperture is multiple. On the other hand, in having their aperture at the apex of the chamber, all these forms undoubtedly differ

from *Textularia*. The problem involved in the Devonian forms here considered is most likely to be clarified only by direct comparison of specimens from different regions.

*Occurrence.* — This species is found in the Givetian of Poland and in the Upper Devonian of North America. The two Russian species described by Bykova also belong to the Upper Devonian (Frasnian).

#### CONCLUSIONS

The very limited knowledge on foraminifers from the Devonian of Europe and America is a hindrance in the way of farreaching conclusions as to faunistical relationships. The foraminiferal fauna today known from the Middle and Upper Devonian of Europe recurs also in the Upper Devonian of North America. This might indicate that the Middle Devonian foraminifers of Europe have originated here and have penetrated into America at some later time. But a great deal more research studies on Devonian Foraminifera of both continents is needed for a confirmation of such hypothesis. Nevertheless the vast range of geographical and stratigraphic distribution of undoubtedly similar forms during the Devonian time is distinctly significant.

*Paleozoological Laboratory  
of the Polish Academy of Sciences  
Warszawa, October 1955*

#### REFERENCES

- BARTENSTEIN R. 1937. Neue Foraminiferen-Funde im Mitteldevon der Eifel. *Senckenberg.*, **19**, 334-338. Frankfurt a/M.
- BYKOVA E. V. 1952. Foraminifery devona Russkoj platformy i Priuralia. *Trudy „VNIGRI“*, nov. ser., **60**, 5-64. Moskva-Leningrad.
- CUSHMAN J. A. & STAINBROOK A. M. 1943. Some Foraminifera from the Devonian of Iowa. *Cushm. Labor. Foram. Res.*, **19**, 73-79. Sharon, Mass.
- KIELAN Z. 1954. Les Trilobites mésodévoniens des Monts de Sainte-Croix (Trylobity środkowo-dewońskie z Gór Świętokrzyskich). *Palaeont. Pol.*, **6**, I-VI + 1-50. Warszawa.
- MILLER A. K. & CARMER A. M. 1933. Devonian Foraminifera from Iowa. *Journ. Palaeont.*, **7**, No. 4, 423-431. Menasha, Wisc.
- POKORNÝ V. 1951. The Middle Devonian of Čelechovice, Czechoslovakia. *Vestn. Král. České Spol. Nauk, Třída Mat.-Přir.*, 1-27. Praha.

STANISŁAWA DUSZYŃSKA

## OTWORNICE Z DEWONU ŚRODKOWEGO GÓR ŚWIĘTOKRZYSKICH

## Streszczenie

Autorka opisuje trzy gatunki otwornic, znalezione przez mgra F. Adamczaka w miejscowości Skały w Górach Świętokrzyskich. Występują tam one w tzw. łupkach brachiopodowych wieku żyweckiego. Są to następujące gatunki:

*Moravamina segmentata* Pokorný

*Semitextularia thomasi* Miller & Carmer

*Textularia? proboscidea* Cushman & Stainbrook.

Pierwszy z nich znany jest z dewonu środkowego Czechosłowacji, drugi zaś i trzeci występują w dewonie górnym Ameryki Północnej. Poza tym, formy zbliżone do *Semitextularia thomasi* i do *Textularia? proboscidea* opisane zostały przez E. W. Bykową z dewonu środkowego i górnego Platformy Rosyjskiej.

Zbadanie kilkuset okazów *S. thomasi* z Gór Świętokrzyskich dało autorce możliwość stwierdzenia dużej zmienności różnych cech tego gatunku. Na podstawie tych obserwacji stało się wielce prawdopodobne, że formy, opisane przez E. W. Bykową i zaliczone przez nią aż do ośmiu gatunków rodzaju *Semitextularia*, są w rzeczywistości wariantami jednego lub najwyżej paru gatunków.

## OBJASNIENIA DO ILUSTRACJI

## Fig. 1 (p. 28)

*Semitextularia thomasi* Miller & Carmer — szlif okazu o widocznym podziale komór na mniejsze komórki,  $\times 370$ .

## Fig. 2 (p. 29)

*Semitextularia thomasi* Miller & Carmer — schemat objaśniający pomiary; *a* całkowita długość skorupki, *b* odległość między wierzchołkiem a linią największej szerokości.

## Fig. 3 (p. 29)

*Semitextularia thomasi* Miller & Carmer — wykres ilustrujący zmienność kształtu; na osi poziomej stosunek wymiarów  $\frac{a}{b}$  wysokości prostokątów proporcjonalne do liczby osobników (1 okaz = 0,5 mm),

## Pl. I (p. 26)

Fig. 1-9. *Semitextularia thomasi* Miller & Carmer,  $\times 74$  — seria okazów ilustrująca zmienność kształtu; 9b strona ujściowa okazu 9.

## Pl. II (p. 27)

Fig. 1-3. *Textularia? proboscidea* Cushman & Stainbrook,  $\times 110$  — trzy okazy różnej szerokości; 2b strona ujściowa okazu 2.

Fig. 4-5. *Moravamina segmentata* Pokorný,  $\times 120$  — 4 okaz całkowity, 5 fragment części skręconej.

СТАНИСЛАВА ДУШИНЬСКА

## ФОРАМИНИФЕРЫ СРЕДНЕГО ДЕВОНА СВЕНТОКРЖИСКИХ ГОР

## Резюме

Автор описывает три вида фораминифер, найденных магистром Ф. Адамчаком в местности Скалы в Свентокржиских Горах. Они содержатся там в так наз. брахиоподовых сланцах живецкого яруса. Виды эти следующие:

*Moravamina segmentata* Pokorný

*Semitextularia thomasi* Miller & Carmer

*Textularia? proboscidea* Cushman & Stainbrook.

Первый из них известен из среднего девона Чехословакии, второй и третий встречаются в верхнем девоне Северной Америки. Кроме того, формы близкие *Semitextularia thomasi* и *Textularia? proboscidea* были описаны Е. В. Быковой из среднего и верхнего девона Русской Платформы.

Исследование нескольких сот экземпляров *S. thomasi* из Свентокржиских Гор дало возможность автору установить большую изменчивость различных признаков этого вида. На основании этих наблюдений можно считать весьма правдоподобным, что формы описанные Е. В. Быковой и зачисленные ею к восьми видам рода *Semitextularia*, представляют собой в действительности лишь варианты одного или, в крайнем случае, двух-трех видов.

---