PAPYROTHECA, A NEW GENUS OF GASTROPODA FROM THE PONTIC STEPPES OF SERVIA.[1]

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(Pl. 11, figs. 1 to 5.)

Preliminary Remarks.

When in the year 1887 I was staying in Belgrad with my friend and colleague, J. M. Zujovic, Professor of Geology and Palæontology in the University there, he encouraged me to examine the Pontic deposits of Ripanj.

Ripanj lies 25 kilometres south of the capital of the Servian kingdom, and the fossiliferous locality lies not far from the railway station. On the spot I have only collected some large specimens of *Melanopsis martiniana*, Fér.; *M. vindobonensis*, Fuchs; *Congeria subglobosa*, Partsch, &c., and have taken away some of the fossiliferous clay. From this material I have, by clearing away the clay, discovered some very interesting new species which I have described and partly figured under the names:—*Neritodonta stanæ*, Brus.; *Caspia vujici*, Brus.; *Melanopsis zujovici*, Brus.; *M. lozanici*, Brus.; *M. nesici*, Brus.; *M. pavlovici*, Brus.; *Orygoceras fistūla*, Brus.; *Planorbis lazici*, Brus.; *Pl. marinkovici*, Brus., &c., in the "*Annales Géologiques de la Péninsule Balkanique*, dirigées par J. Zujovic, Tome iv., Fasc. i., 1892," in one of the parts written in the Servo-Croatic language.

Besides the species just mentioned I have also collected three examples of a very remarkable genus. They were plainly diminutive little specimens, very badly preserved; but each specimen appeared different to the others. For this reason I laid these specimens on one side and made no comment on them in my above-mentioned work.

When my friend Zujovic visited me in the spring in Agram I showed him the specimens in question, and I asked him to procure for me some further clay and sand from Ripanj. I have to thank my friend that I have succeeded in finding in the material sent several, unfortunately more or less incomplete, specimens from which I have been able to obtain a better knowledge of this obscure fossil.

It is already known that the Land and Freshwater-Molluscan fauna, of the so-called Levantine and Pontic steppes of Croatia and

[1] Communicated by the author and translated from the original by Herr A. Schaerer.

other south Slavonic Balkan countries, which thirty years ago was quite unknown to us,[2] has in the space of a generation brought to light a large number of remarkable new types, which call forth universal admiration.

It was not enough that one should discover a very large number of singular species of the genera *Unio*, *Melanopsis*, *Viviparus*, &c., but one now knows to one's gratification the genera *Fossarulus*, Neum., *Prosasthenia*, Neum., *Diana*, Cless., from the Dalmatian—or I might better say from the Fossarulus—Marl. Slavonia has its *Tylopoma*, Brus., *Choerina*, Brus. From the immediate environs of the capital of the Croatian kingdom, Zagreb (German, Agram), I have described the genera *Zagrabica*, Brus., *Boskovicia*, Brus., *Lytostoma*, Brus., *Micromelania*, Brus., and *Baglivia*, Brus. Of the genus *Valenciennesia*, which was first known from South Russia, we know to-day several forms from Croatia, Slavonia and Hungary. Our most remarkable genus *Orygoceras* I first discovered in the Levantine Fossarulus Marl of Dalmatia; afterwards I found other described species in the Pontic strata of the brother-lands Croatia and Servia. Since the publication of my monograph[3] Hungarian geologists have shown that *Orygoceras* is a well distributed genus in Hungary also.[4]

Some of our genera have found universal recognition, while others even at the present time are less known. The reason is chiefly that these novelties are but slightly or not at all represented in collections. Many of our South-slavonic genera are the more interesting, since their position in the system is difficult, or not at all, to be fixed.

The number of these singular types will now be enriched by a very remarkable new one. This new genus, like *Orygoceras*, does not find its like amongst either the extinct or recent genera of mollusca.

In the first place I will endeavour to describe the form of the shell in popular language. One might describe it as having the form of a slipper with a pointed toe; it recalls the former pointed shoes (Rostratishoes) which in the 14th and 15th centuries were called in England "Cracowes," in France "Poulaine," and in Germany "Schnabelschuhe." The best description one can give is that the genus

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[2] Frauenfeld in 1862 described the earliest Slavonic *Paludina*, and in the year 1865 Moritz Hörnes described and figured the first species of *Unio* from Slavonia, in his great work upon the "Fossilen Mollusken des Wiener-Beckens." Immediately afterwards E. Albert Bielz published, unfortunately without figures, the first local fauna from Krajowa in Rumenia.

[3] S. Brusina—*Orygoceras*, eine neue Gasteropoden gattung der Melanopsiden—Mergel Dalmatiens (Beiträge zur Paläontologie Oesterreich—Ungarns und des Orients, 11 Bd. Wien 1882.)

[4] Dr. J. Pethö. Das Vorkommen der Orygocerasschichten im Tehér-Körös-Thale. Jahresber. der. Kgl. ungar. Geolog. Anstalt. Budapest 1888.

has the form of a diminutive, crushed, and very thin conical paper case[5]; for it has the conical form of the case, the inrolled apex, the wide oblique, very unequal mouth, as also the groove which runs in a straight line from the apex to the mouth. I have therefore called the genus *Papyrotheca* from παπύρος and θήκη. That *Papyrotheca* belongs to the Gasteropoda is shown us by the apex of the shell. We have, as already stated, considered the enormous multitude of extinct and living Gasteropods already collected, but can only find distantly related affinities.

In considering the form we might well find a relationship with the genus *Crepidula*, especially *Spirocrypta*, in so far that these genera and *Papyrotheca* have in common a slipper-shaped form. In particular *Crepidula (Spirocrypta) pileum*, Gabb, from the cretaceous formation of California, appears to show a certain relationship. *Spirocrypta* has also an inrolled apex, the left side of the mouth bends towards the interior and forms a broad lamella or septum, the right side also bends inwards, it reaches and partly covers the just-mentioned interior septum. Although I had no opportunity of comparing *Spirocrypta* with *Papyrotheca* in nature; it is certain that a real relationship is out of the question, for this reason, that *Spirocrypta* was a marine gasteropod, while *Papyrotheca* was an inhabitant of either fresh or brackish water.

The apex of *Papyrotheca* is formed like that of *Calyptræa chinensis* (L.), but in the *Calyptræa* it is crushed flat, as is the shell, whereas in *Papyrotheca* the apex is extended, lengthened, and therefore pointed, microscopic examination only showing that it is not sharp, but blunt, or say digitate. For this same reason, we can better compare the apex of *Papyrotheca* with that of the genus or sub-genus *Acella*, Hald., i.e., with the recent *Limnæa* (*Acella*) *gracilis*, Jay, from North America, or with the fossil *Limnæa* (*Acella*) *acuaria*, Neum., from Slavonia.

We might therefore say that *Papyrotheca* is a *Limnæa*, imitating the form of a *Crepidula*.

Already the recent genus *Lantzia*, Jouss., shows a highly singular habitat amongst the *Limnæa*. Very different are also the fossil genera *Boskovičia*, Brus., *Lytostoma*, Brus., *Corymbina*, Bukowski. *Valenciennesia*, Rouss, is also related to this family, and with the *Limnæidæ*, through *Limnæa* (*Velutinopsis*, Sandb.) *velutina*, Desh. *Papyrotheca* is certainly the most distant from all, and therefore one might perhaps form a separate family of *Papyrothecidæ*, or at least a sub-family *Papyrothecidinæ*.

[5] [The German "papierdüte" really means a paper cornet, such as grocers use to wrap up sugar, &c., in.—TRANSLATOR.]

I have sent a few specimens to the distinguished conchologists M. Cossmann, of Paris, and Dr. O. Boettger, of Frankfurt am Main. The first wrote me: "*Papyrotheca mirabilis* ressemblerait à un Ptéropode, si le sommet n'etant pas tordu comme dans quelques genres de Gasteropodes; c'est tout à fait curieux et vraiment *mirabilis*."

Dr. Boettger wrote very strikingly: "Your *Papyrotheca* is very singular. As it is for certain a freshwater snail any relationship with the *Succinea*, *Omalonyx*, &c., disappears. Considering the thinness of the shell the existence of an operculum is likewise impossible, therefore a comparison with *Navicella* is also out of the question. There remains, consequently, but the *Limnæidæ*, and here the position between *Latia* and *Limnæa*, in my opinion, is acceptable, even though any living or fossil analogues are unknown to me."

Special Part.

Papyrotheca, gen. nov.

The shell is very frail, as if made from a slip of white paper, hardly whorled and not umbilicated, consisting of the apex and one volution. The form is a very peculiar one, and it can only be compared with a depressed *Succinea* that has adapted the form of a lengthened *Crepidula*. The apex is smooth, elongated like *Acella*, and makes but a single turn (Pl. II., fig. 3); which at once widens into a very broad mouth, this latter forming nearly the whole of the shell, and having no lips, the edges being sharp. The spindle-shaped edge which is developed directly under the apex and runs towards the mouth, forms a comparatively large lamella; this forms a rather acute angle with the hinder portion of the mouth. The external edge of the mouth is largely extended below, simple, but above opens into an acute angle, and therefore forms a septum-like lamella. This reaches the already described lamella on the spindle-shaped edge, unites with it, but only partly covers it, often leaving a distinct flat space, not unlike a deepened grove.

The shell has rather the appearance of a mussel, for it shows fine concentric, not quite regular striæ which show more on the back, while the interior of the shell is nearly smooth.

Papyrotheca mirabilis, sp. nov.

(Pl. II, figs. 1-3.)

To the description of the genus, we have only to add that the spindle plate of this species is very narrow, but the external plate—or as I have previously termed it, the septum—is very broad, and its surface is marked with a large number of fine and fairly regular wrinkles. The edge of the septum is crescentric.

The best preserved and nearly complete specimen (fig. 1) has a height of 4·5 millim., a breadth of 1·9 millim., and a thickness of 0·5 millim. The septum is about 2 millim. high. The septum of the largest, but very incomplete specimen (fig. 2) is about 4 millim.; the whole shell must consequently have been about 10 millim. in height. I do not think the species has reached larger dimensions than this or I should have been bound to have found fragments of larger and stronger apices.

This species, of which I discovered a single specimen in 1887 in Ripanj, I consider as the type of the genus. It is a very abundant form, I having this year received over fifty more or less complete examples or fragments.

Papyrotheca pseudogyra, sp. nov.

(Pl. 11, fig. 4.)

This species is very much like the preceding one, and yet so very different, that although I have found only one specimen, I must consider it as a distinct form.

It is considerably smaller than *P. mirabilis*, the septum of the external edge is not crescentric but simply diagonal. I do not, however, wish to put too much weight on these circumstances, as we can probably trace the reason to the fact that this is only a half-grown specimen.

The following important facts, however, have convinced me that it is an absolutely good and separate species.

a The whole shell is more spade-shaped.

b Although the specimen is only very small, the apex if compared with the larger apex of *P. mirabilis* will be found to be much more blunt and puffed up.

c In *P. mirabilis* the apex is turned a little sideways, but in this species the apex is quite straight.

d In the apex of *P. mirabilis* there is a distinct deep wrinkle on the back, whereas in this species it forms a regular surface.

e If the apex is magnified, say about thirty times, there appears on the side of the mouth a thread shaped wrinkle or scarcely deepened spiral, which apparently seems to separate the apex in 2-3 whorls. I say seems, because although I cannot sacrifice the only specimen, I am convinced that the said wrinkle does not correspond to any real interior whorls, but is simply a superficial spiral, which, if one cares to form a hypothesis, morphologically considered, will probably show a tendency to produce rotations.

The small shell is about 2 millim. high, 0·8 millim. broad, and a little less than 0·5 millim. thick.

Papyrotheca contraria, sp. nov.

(Pl. 11, fig. 5.)

This species varies very much from *P. mirabilis*. In the first place the shell is apparently thicker, and therefore its form is not so flattened, but rather semi-cylindrical. The spindle-shaped edge forms a sharp ridge directly under the apex and runs further down, quite different from the condition noticed in the preceding species. The spindle lamella is well developed, and therefore forms a broad septum, which is not crescentic but runs diagonally across the shell as a straight line from the apex. The external edge above runs diagonally and forms a much smaller septum, which curves towards a spindle septum, it covers but little of the opposite large septum of the spindle edge, only uniting itself at the apex. For this same reason, there is absolutely no spindle-groove which can be compared with *P. mirabilis*. The septum of the external edge consequently hardly deserves the name, its edge is, as has already been mentioned, diagonal, but in the opposite direction to the edge of the spindle septum, and reminds one a little of the upper part of the mouth of many *Succinea*. In other words, if one lengthened the lines of the right and left septum, they would cross and form a figure thus X.

The very imperfect specimen (fig. 5) is 3 millim. high, 1·9 millim. broad, and not quite 1 millim. thick; when complete it must certainly have been not less than 5 millim. high.

The first defective specimen, without the apex, I discovered in Ripanj in 1887. I am almost inclined to believe that this species is really scarce, and I am more inclined to believe that I have collected it at that time on another spot. It is well known that at different spots of the same horizon at the distance of a few metres one may find different species.

Explanation of Plate II.

Fig. 1. *Papyrotheca mirabilis*, Brus. Nearly complete specimen 4·5 millim. high, 1·9 millim. broad. Front view.

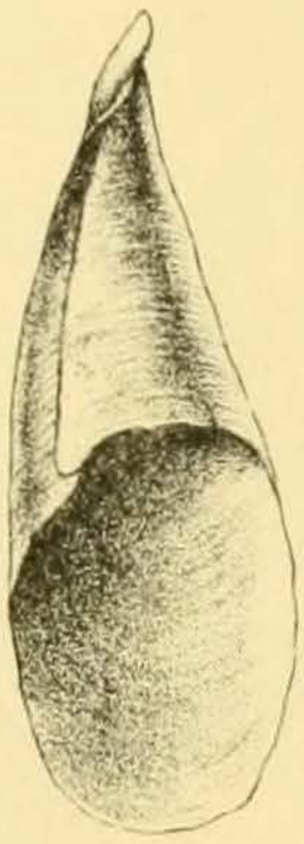
Fig. 2. *Papyrotheca mirabilis*, Brus. The largest specimen, very much damaged and with one groove at the septum, 5·5 millim. high, 2·2 millim. broad. Front view.

Fig. 3. *Papyrotheca mirabilis*, Brus. Fragment, 3·2 millim. high, 1·8 millim. broad. Back view.

Fig. 4. *P. pseudogyra*, Brus. Young specimen, 2 millim. high, 0·8 millim. broad. Front view.

Fig. 5. *P. contraria*, Brus. Fragment, 3·2 millim. high, 1·9 millim. broad. Front view.

All the figures are magnified. The original specimens are in the collection of the National Museum, Agram, Croatia.



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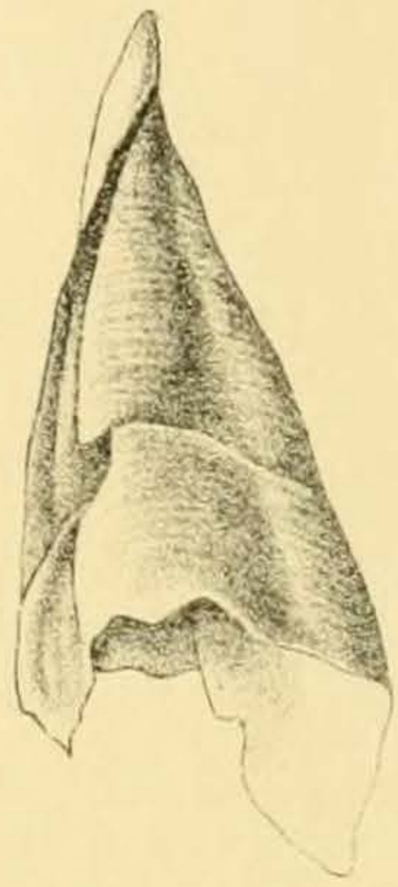

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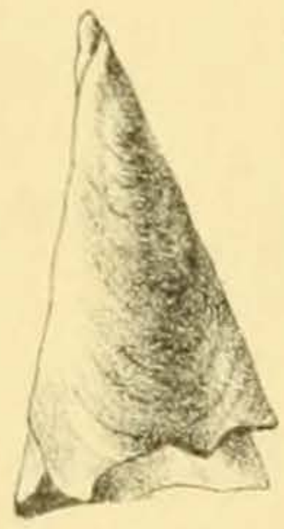

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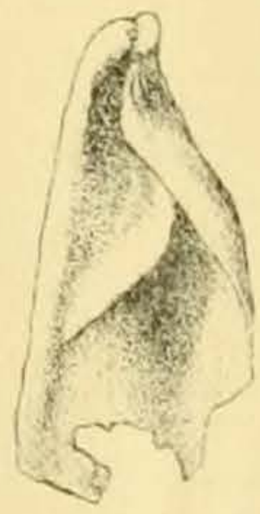

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Fig. 1.	*Papyrotheca mirabilis*,	Brus.	4.5	millim.	high,	1·9	millim.	broad.
Fig. 2.	do.	do.	do.	5·5	,,	,,	2·2	,,	,,
Fig. 3.	do.	do.	do.	3·2	,,	,,	1·8	,,	,,
Fig. 4.	do.	*pseudogyra*,	Brus.	2	millim.	,,	0·8	,,	,,
Fig. 5.	do.	*contraria*,	Brus.	3·2	,,	,,	1·9	,,	,,