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ABOUT THE STRATIGRAPHY OF PALEOZOIC FROM SNAKE ISLAND (THE BLACK SEA BASIN)

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Abstract: The Snake Island represents one Paleozoic witness on the Scytic Platform, situated in the Black Sea Basin, at the north of Sf. Gheorghe fault and at the west of Odessa dislocation.
Lithologically, the Paleozoic formations are represented by a succession of breccious conglomerates with sandstone and aleurite shale intercalations, down to the depth of 56m (drilling F1). Towards the depth of 509m (the drilling sole), the lithological composition is represented by a succession of calcareous dolomites, black limestones, marls and grey-blackish argillites.
Biostratigraphically, to the depth of 56m, the species of ostracods, corrals and brachiopods are characteristic for Geddinian age. Between 56m and 300m in depth, the faunistic remains are characteristic for the Silurian-Devonian age, and under the depth of 300m, towards the drilling sole (509m), all of the faunistic remains are characteristic for Upper Silurian.
The palynological investigations represent the novelty for this study, the first one for this island, offering interesting assemblages of chitinozoans, acritarchs and spores, included in the samples from the depths of 93-95m and 199-202m.
The results of the palynological investigations have ascertained a Silurian-Devonian age for the analysed stratigraphical segment and have offered the possibility for biostratigraphical correlations between faunistic and palynological data and the developing area to the adjacent zones and regions.

Key words: Snake Island, Black Sea, Palynology, Silurian, Devonian.

INTRODUCTION

The Snake Island is the biggest island in the Black Sea, being situated in straight way of Sulina branch of the Danube River at a distance of almost 45 km from Sulina town. The island has an area of 170.000 m^2 (17 ha) with an irregular quadrilateral shape and 1973m in length; from North to South the island has 440m in length and from East to West 414m. The island shores are high, with a maximum of 21m in height in the South and East, and about 12m in the North. The island maximum altitude is registered in central area at 40m (Cucu, Vlăsceanu, 1991). Being isolated from the mainland, the Snake Island has been poorly studied. As follows, we are going to present some preliminary data about geological and biostratigraphical aspects of Palaeozoic formations from Snake Island.

GEOLOGICAL, LITHOLOGICAL, STRUCTURAL AND FAUNISTIC GENERAL DATA

The geological situation of Snake Island, in North of Sf. Gheorghe fault, makes us to conclude that the basement of this island is the same with the Scytic Platform one.

The island geological composition, in outcropped data, can be studied by observing and measuring cleaves.

In the geological section (Figure 2), in the northern slope of island, on the W-E direction, there is a wavy monocline structure, consisting in breccious conglomerates with intercalations with quartzitic rocks and aleuritic-pelitic shales; their inclination measures 8-45° towards E-NE. This monocline, representing an extended anticline fold, is fractured by an invert fault that allows the appearance of one lense of aleuritic - pelitic shales. The age of these rocks is Lower Devonian. In depth, the geological composition is better known in data obtained from the lithostratigraphical column of F1 drilling, located near the light-house, in the south part of the island (Figure 2).

The drilling location altitude is about 20m and the drilling sole is situated at 509m in depth.

Following the lithostratigraphical column analysis, the geological structure data in the F1 drilling area and the faunistic content of the analysed samples may be synthesized as follows:

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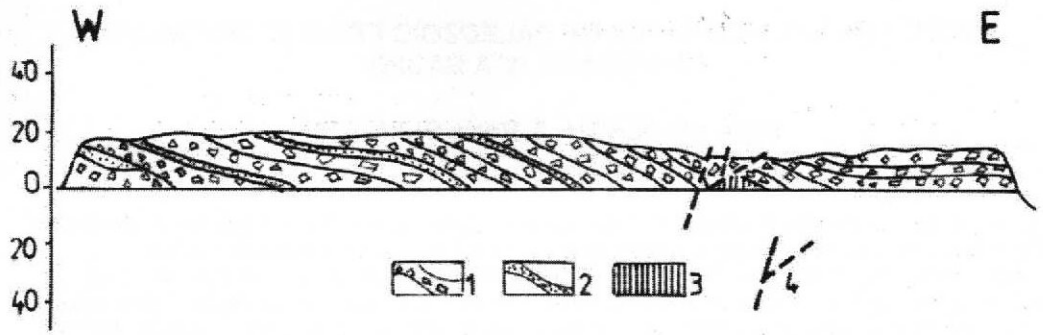

Figure 1. Geological section through the fractured monocline from Lower Devonian on the northern slope of Snake Island (Sulimov et al., 1975).
1. Breccious conglomerates; 2. Quartzitic rocks; 3. Aleuritic-pelitic shales; 4. Vertical faults.

Between 0-56m, there is a terrigenous formation, consisting in psephites, psammites, siltstones, and pelites, with granulometric variable rocks with a similar petrographical composition. The rolling degree of components as well as the detritic material cementation widely varies. This drilled formation might be conventionally divided in some lithostratigraphical units:

- 0-24m. This unit consists in breccious conglomerates, gravel sandstones, quartzitic rocks with siltstone and shale argillite intercalations, with a grey-whitish colour, marked by sporadic ferruginous spots.

In the outcrops from north of this island (Figure 1), there is an irregular alternation of rocks, with gradual or sudden limits. The breccious conglomerates have a "pudding" aspect.

- 24-38m. The breccious conglomerates and the unsorted siltic -argillitic sandstones continue to appear, but their colour becomes yellow - grey with some reddish or brownish shades. The rock structure is mostly untidy.

- 38-56m. This unit is characterised by an alternation of argillites, silts, sandstones and variegated conglomerates, but the pelites prevail. The psephitic - psammitic intercalations form some thin layers of conglomerates, coarse sandstones, argillaceous gravels, with 50 cm in thickness. The rock cement is very weakly, usually argillaceous, impregnated with iron oxides and hydroxides. The argillites from the basement part of this subzone (52-56m) present an alteration crust with a "terra rossa" aspect. The texture of this drilled lithological formation has parallel subhorizontal (± 2-3°) stratification, with a inclination of 5-10° to 15-25° towards East.

In between this pack of terrigenous rocks and the subjacent limestones there is an angular unconformity about 40° (Figure 2).

Abushik (1966) (oral information) described the faunistic content for the first time.

In some outcropped siltstone layers, there are fossil remains and prints of molluscs, foraminifers, spongiers, crinoids and placoderm fishes, such as *Irregulareaspis* sp., which stands for Lower Devonian (Geddinian) age, specific for the entire drilled terrigenous rock pack.

In the argillite intercalations of the lower section (the interval of 37-53m), there have been found ostracod shells and prints of *Leperditia tyraica* Schmidt, *Poloniella* sp., *Cytherellina* sp., *Pseudozygobolbina* sp., *Eridoconcha ivanica* (Kraud.), characteristic for the Upper Geddinian. Also, there has been cited the presence of some foraminifer species such as: *Hyperammina* sp., *Blustammina* sp., and *Rhabdamina* sp. In an argillite sample from this interval (Abushik, 1966), there has been identified a shell which belongs to *Leperditiida* order (*Leperditiae* family), and another shell which belongs to *Palaeocopida* order, and conventionally may be attributed to *Zygobeirichia* species. The final conclusion is that the analysed rocks belong to Silurian-Devonian age.

In between 56-113m, there stands a pack of variegated, bioamorphous and bioclastic organogenous limestones, brownish, brown-reddish, or grey, with yellow and red spots, strongly altered, brecciated, fissured with cavern processes, and calcite veins. The rock consists in entire bodies or fragments of corrals, brachiopods, trilobites, ostracods, crinoids, and so on.

In the upper part for the interval of 86-90m, there are mainly reef limestones, with corrals and brachiopods, with clay lenses in caverns as well as thin crusts on the friction surfaces.

The organogenous material is partially or entirely recrystalized included in calcitic -

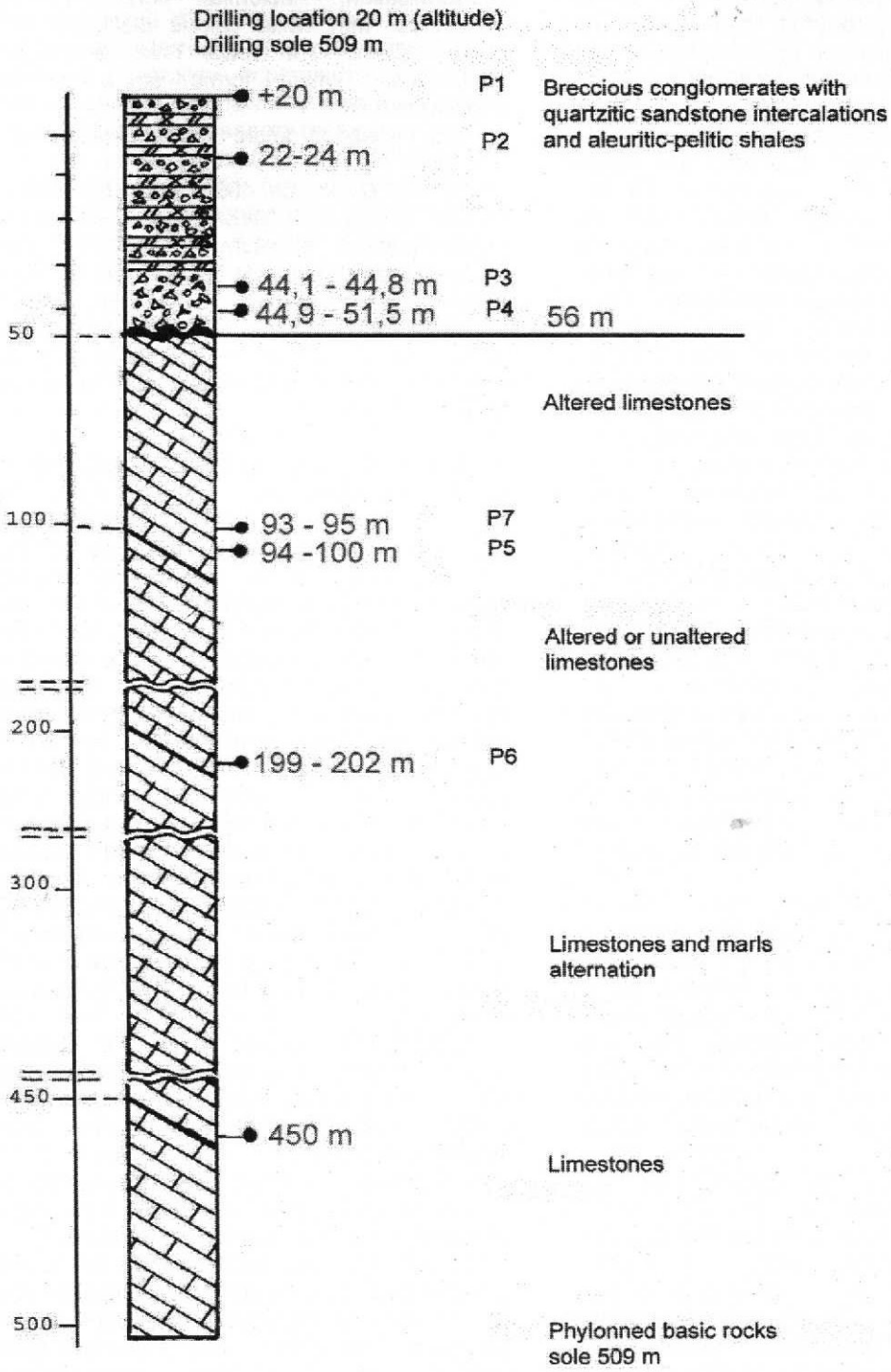

Figure 2. Lithological column of F1 drilling from Snake Island (Scale 1:2000).

micritic cement with an extra argillaceous material. The angular inclination of the separation surface and the breaking surfaces is successively changing upward downward, from 45° to 20°.

In between 56-150m, a rich fauna had been determinated, represented by:
Ostracods: *Pararhealdia* aff. *qaesita* (Roth.), *Ponderodictya mirabilis* Abush, *Diziyggopheura* sp., *Bairdiocypris transversus* (Roth.), *Healdionella*

sp., *Eucraterellina* sp., *Cytherellina* sp., *Opistophax* sp., Corrals (Gritchenco, 1975): *Linstrőmia* sp., *Zelophyllum subdendroideum podolica* Syt., *Aulopora* sp., *Cladopora* sp., *Parastriatodomicroplasma nečlavica* Syt., Brachiopods: *Amphyistrophia podolica* (Siem.), *Strophochonetes proliferus* Kozl., *Atrypa tajnensis* Kozl., *Eospirifer turjenensis* Tschern., *Howellella angustiplicata* Kozl., *Liinguopugnoides carens* (Barr.), he up-mentioned species of brachiopods are characteristic for Geddinian and had been ascertained by Teghelniuc (1974-1975).

In between 113-300m, there had been drilled some black argillitic and pelitic (calcitic-micritic) limestones, which pass into marls, in alternation with organogenous and granular crystalline limestones. They have the same structural and textural characteristics as the subjacent rocks, but the stratification occasionally turns to be perfect. Sometimes, it might be noticed some parallel separation faces, laminar and lenticular textures. The thickness of the strata varies from mm to a few metres. The inclination angle decreases upward (20-30°) downward (10-20°). The limestones are inhomogeneous recrystalized, weakly dolomited; they have a slight aspect of breccia or a nodular structure; they are included in an argillitic-calcitic mass. The limestones contain faunistic fragments or entire skeletons of brachiopods, corrals, ostracods, and graptolites. These limestones are ascertained as Geddinian.

In between 300-450m, there is an alternation of limestones, marls and calcareous clays, with textures similar to the subjacent and suprajacent rocks. The strata thickness varies between 1-2m. The marls, the calcitic micrits and the clays have a grey-blackish colour with passing into black (argillites) due to pyrite presence and carbonified organic substance. The apparent inclination of the strata is about 20°.

In these rocks, the following faunistic content was determinated:
Ostracods: *Ocheoscapha* sp., *Bairdiocypris* aff. *subsilinculus* Krand., Corrals:
Strombodes sp., *Cladopora* sp., *Squameofavosites incredibilis* Chekhovich, *Triplasma* sp., *Weissermelia definita* Syt. Graptolites: *Monograptus* cf. *similis* Prib. All these species are characteristic for Upper Silurian (Ludlowian) (Skala Strata from Volâno - Podolia).

In between 450-509m, the pelitomorphous and argillaceous grey-black limestones, with some dolomite processes, alternated with calcareous marls and argillites. The strata thickness varies from mm to 5m. The rocks have not been uniformly affected by recrystalisation, dolomite and breccia processes, with white calcitic diaclases and slicken slides. The rocks have a parallel stratification, which forms strata without separation faces.

The inclination angle varies between 15° and 20°.

At the depth of 496-498m, the drilling pierced a grey-pink lamprophyre dyke with a cryptocrystalline structure. The drilling was stopped (with the sole at 509m) in some grey-green basic rocks with a medium grained structure. At the upper part of this interval (484-450m), the rocks include faunistic remains of ostracods and corrals. Their age is Upper Silurian (Ludlowian).

BIOSTRATIGRAPHICAL DATA FROM THE ANALYSED SAMPLES

The lithological column was not entirely analysed, many of the outcropped samples being lost. We managed to select 7 samples (P1-P7), the deepest one being taken from 199-202m. The second author took the samples from the drilling lithological column they had been preserved at the Natural History Museum from Chişinău, Republic of Moldavia. In order to ascertain the faunistic content, we received the support of Mrs. Dr. Magdalena Iordan (The Romanian Geological Institute, Bucharest). Also, we used the results of some Ukraine researchers from Odessa and Lvov: Abushik, Tkacenko, Paziuk, Samsonov (1969); Sulimov, Gurevici, Anastasieva (1975); Sulimov, Anastasieva, Blagodarov (1979); Gorak (1984); Gorak, Bercenko, Blagodarov (1984); Sulimov (1984).

Sample P1, yielded from the surface (+20m), consists in breccious conglomerates, sandstones, quartzites with siltstones and grey-whitish shaled argillites interbeddings, with ferruginous spots.
The siltstones and argillites include some bivalve castings, difficult to identify. Also, there are some remains of thin and friable shells.

Sample P2 was yielded from the same rocks between 22-24m. The prevailing quartzitic breccia contains fragments of hard fine white-greyish sandstone, in an amorphous quartzitic cement, which includes small quartz grains (0,2-1 mm), some rounded, some spherical. No faunistic rests are included.

Sample P3, yielded from 44,1 - 44,8m, consists in kaolin white argillites, with chaotic agglomerations of grey-blackish tiny fragments, spherical quartz grains and plate translucid fragments, probably from fossils. There are not enough data in order to specify the age.

Sample P4 was yielded from 44,9 - 51,5m. It is similar to sample P3, with argillites and siltstones, which came from a sandstone and conglomerate alternation. The rock cement has oxide and hydroxide impregnations. In the analysed sample no macrofaunistic rests have been found in order to specify the age.

If we make appeal at the Abushik' s mentioned data (1966) (oral information), it comes out that, for the interval of 38-56m, there is noticed a rich fauna of molluscs, foraminifers, spongiers, crinoids and placoderm fishes, such as *Irregulareaspis* sp. Also, there have been found ostracod prints of *Leperditia tyraica* Schmidt, *Poloniella* sp., *Cytherellina* sp, *Pseudozygobolbina* sp., *Eridochoncha ivanica* (Krand.). All these species are characteristic for the upper part of the Geddinian. Among foraminifers, come out species such as: *Hyperammina* sp., *Rhabdammina* sp., *Blastammina* sp. Also, using some other rests of ostracods, the up-mentioned author conclude that the age of the lithological interval would belong to the stratigraphical interval of Silurian – Devonian, more exactly to the upper part of the Geddinian.

Sample P5 comes from 94-100m and consists in yellow-greyish dolomitic limestones with plenty of corrals and a few fragments of brachiopod shells. Analysing this sample, no specific or generic determination came out for the corral and brachiopod rests. On the other hand, in the analyses presented by Abushik (1966), for the interval of 56-113m, where our sample belongs to, there is mentioned a rich fauna of corrals and brachiopods, represented by the following genera and species:
Corrals (Gritchenko, 1975): *Lindströmia* sp., *Zelophyllum subdendroideum podolica* Syt., *Aulopora* sp., *Cladopora* sp., *Parastriatodomicroplasma nečlavica* Syt. Brachiopods: *Amphyistrophia podolica* (Siem.), *Strophochonetes proliferus* Kozl., *Atrypa tajnensis* Kozl., *Eospirifer turjenensis* Tschern., *Howellella angustiplicata* Kozl., *Linguopugnoides carens* (Barr.)

The up-mentioned brachiopod species are characteristic for Geddinian.

Sample P7, yielded from 93-95m in depth, is represented by marl-limestones with a rich fauna of corrals and rare brachiopods. In all this rich content, only a few exemplars of *Isorthis* sp. were separated. The estimated age of the sample is Upper Silurian - Lower Devonian (in accordance with data confirmed by Magdalena Iordan).

Sample P6, comes from 199-202m in depth, being represented by black argillites, weakly calcareous. In this sample the *Isorthis (Protocorthezorthis) vinniensis* Melon was ascertained, synonym to *Orthis (Dalmanella) canaliculata* Aindstr. Also, *Laptaena nassichuki* Smith was ascertained as a specific form for the base of the Lochkowian. The Silurian – Devonian age was proved, proceeding from the up mentioned species and *Laptaena* sp., characteristic for this interval. Also, another trilobite was recognised, but it remained unidentified.

If we return to the previous data, the lithological interval analysed by other authors includes a rich fauna of ostracods, corrals, brachiopods specific for the lower section of Borshchov Formation, corresponding to Lower Geddinian age (Early Lochowian), following data presented by Magdalena Iordan.

Also, samples P7 and P6 have been analysed, from palynological point of view, the synthesised data being included in Table n°1.

The palynological study distinguished a rich microfloristic content of chitinozoans, acritarchs and spores.

Among chitinozoans (Sample P7), species such as *Ancyrochitina ancyrea*, *A. moldavica* and *Angochitina longicollis* have the same stratigraphical spreading (Silurian – Geddinian). These forms have a large spreading, starting in Llandoverian and ending in Geddinian, up to the Early Siegenian. These forms were found in the North of France, in Cotentin Peninsula, in May-sur-Orne syncline, Pas-de-Calais region, the eastern side of the Baltic Sea, and Moldavian and Moesic Platforms (Romania). Some other two species of *Conochitina emmastensis* and *C. cribrosa* are characteristic for a shorter stratigraphical interval (Llandoverian – Wenlockian), with a larger spreading from Prague Basin to the eastern side of the Baltic Sea; they are presented in sample P7 from Snake Island. *Cyathochitina campanulaeformis* has a spreading all along the Silurian interval (Llandoverian – Pridolian); also, it is quite frequent in the analysed sample.

The acritarchs have offered a richer assemblage than the chitinozoans, one; they appear in both analysed samples (P6 and P7). Firstly, we mention some species strictly characteristic for Llandoverian. E.g.: *Dactylofusa estilis*, *Tunisphaeridium* sp., *Baltisphaeridium multipilosum*, *Orygmatosphaeridium ruminatum*, *Lophosphaeridium papillatum*, *Baltisphaeridium microspinosum*. These species have a very large spreading in Belgium, France (May-sur-Orne syncline), Aquitanie and Cotentin Peninsula.

Some other species of acritarchs are characteristic for other Silurian stages. E.g.: *Navifusa scrutila (Wenlockian)* and *N. striata* (Ludlowian – Pridolian). *N. striata* ends its evolution

Table 1. Stratigraphical range chart showing the distribution of microflora in geological formations of the Snake Island

Samples analysed	TAXONOMIC UNITS	SILURIAN				DEVONIAN			OCCURENCES
		Llandov.	Wenlock.	Ludlow.	Pridol.	Gedin.	Emsian.	Couvin.	
	CHITINOZOANS								
P 7	*Ancyrochitina ancyrea* (Eis.)								Silur.-Devon., Pas-de-Calais
P 7	*Cyathochitina campanulaeformis* Eis.								Upper Silur, East Baltic area. Llanvirn-Caradoc, May.-sur-Orne, Llandov. Montagne Noire
P 7	*Ancyrochitina moldavica* Beju&Dăn.								Silur.-Dev. Pas.-de-Calais; Mold. Plt.
P 7	*Conochitina emmastensis* Nestor								Lland.,Prague Bas., East Baltic area
P 7	*Conochitina cribrosa* Nestor								Wenlock. of the East Baltic area.
P 7	*Angochitina longicollis* Eis.								Llandov.- Lower Siegen., Cotentin and May-sur-Orne, East Baltic area
	ACRITARCHS								
P 7	*Dactylofusa estilis* Cramer & Diez								Lower Silur., Belgium; Upper Llandoverian, Kentuky
P 7, P 6	*Navifuasa* cf. *minuta* (Deunf.)								Onondaga Formation, Couvinian, Ontario, Canada
P 7, P 6	*Navifusa striata* (Staplin, Jansonius & Pocock)								Trenton Form, Anticosti Island; Upper CaradocBohemia;Upper Sil.,Argentina
P 7 P 6	*Navifusa scrutila* Gramer & Diez								Waldron Shale, Upper Wenlock. Kentucky
P 7	*Micrhystridium* sp.								Silur.-Devon., Cotentin, Pas-de-Calais
P 7	*Lophosphaeridium* sp.								Silur.-Devon, Cotentin, Pas-de-Calais
P7,P6	*Leiosphaeridia* sp.								Silur.-Devon, Cotentin
P 7	*Tunisphaeridium* sp.								Ludlow.; Cotentin
P 7	*Baltisphaeridium multipilosum* (Eis.)								Llandov: Sondage Caubon, 101 Aquitaine
P 6	*Orygmatosphaeridium ruminatum* Tim.								Llandov: Sondage Caubon, 101 Aquitaine
P 6	*Lophosphaeridium papillatum* (Stapl.) Downie								Llandov.Syncl. May-sur-Orne
P 6	*Baltisphaeridium microspinosum* Eis.)								Llandov.-Sondage Caubon, 101 Aquitaine
	SPORES								
P 7, P 6	*Convolutispora quintitae* Rodrigues								Ludlow.-Ditton. Bioz. I b to IV b San Pedro Form; Late Silur. Turkey
P 7	*Azonomonoletes* cf. *microtuberculatus* Tchib.								Western Slope, South Ural, Inzey River Western Bashkiria
P 7	*Amicosporites splendidus* Cramer								Southeastern Turkey, Late Silur., Wenlock Gedin.,Assambl. A.splendid.
P 7, P 6	*Stenozonotriletes pumilus* (Waltz.) Naum.								Silur-Dev. Pas-de-Calais
P 7	*Acanthotriletes parvispinosum* Naum								Silur-Dev. Pas-de-Calais
P 7	*Archaeozonotriletes chlus* (Gram.) Rich. & Lister								Silur-Dev.Cotentin, Pas-de-Calais
P 7	*Emphanisporites neglectus* Vigr.								Gedinian, Cotentin
P 7	*Streelispora granulata* Rich.&Lister								Ludlow.-Gedin.,St.Germ.-sur-Ay
P 7	*Synorisporites tripapillatus* R.&List.								Gedinian, Cotentin
P 7	*Leiotriletes* sp.								Silur.-Devon-, Cotentin
P 6	*Trachytriletes minor* Naum.								Silur.-Devon., Pas-de-Calais
P 6	*Acanthotriletes parvus* Naum								Silur.-Devon., Pas-de-Calais
P 7	*Ambitisporites* sp.								Silur.-Devon-, Cotentin, Pas-de-Calais

in Upper Silurian from Argentine; also, it is specific for Upper Ordovician from Bohemia and Anticosti Island in Canada. From this group, we mention one species, *N. minuta*, which is characteristic for the Couvinian from Ontario, Canada. Generally, the assemblages of acritarchs and chitinozoans represent the same stratigraphical interval of Silurian – Devonian. The assemblage of spores is the same with the assemblage of acritarchs in the analysed samples (P6 and P7). Many species are specific for Silurian – Lower Devonian, with a large specific spreading, especially in the North of France (Pas-de-Calais, Cotentin) (Table n° 1). Other species characteristic for the Upper Silurian – Geddinian interval are: *Azonomonoletes* cf. *microtuberculatus*, *Convolutispora quintitae*, *Streelispora granulata*. Two species are strictly

characteristic for the Geddinian from Cotentin Peninsula (*Emphanisporites neglectus* and *Synorisporites tripapillatus*).

Thus, we followed the results for the previous faunistic analyses from Snake Island, the data confirmed by Magdalena Iordan, and the palynological results from the analysed samples of F1 drilling. We think that the brecciated calcareous rocks, the black argillaceous limestones with organogenous limestone interbeddings, from the interval of 94-202m (yielded in the samples P5, P6, P7) might belong to the "Upper Strata with corrals and brachiopods" (Văscăuţanu, 1931). The latest ones were considered to be equivalent for the 2nd Horizon from Bătrâneşti, Moldavian Platform (Iordan, 1975).

CONCLUSIONS

- The Snake Island represents a witness of Palaeozoic, in the Scytic Platform; the island is situated to the North of Sf. Gheorghe fault and West of Odessa dislocation.
- The lithological composition of the island is known from the cliff outcrops and from the samples of F1 drilling, situated in the South of the island.
- Lithologically, the Paleozoic succession is represented by breccious conglomerates with sandstone and aleuritic shales intercalations to the depth of 56m; below this depth to the drilling sole (509m), it follows an alternated succession of organogenous limestones, dolomitic limestones, black limestones, marls and greyish-blackish argillites.
- Between the conglomerates, quartzitic sandstones and limestones, dolomitic limestones and argillites, an unconformity was identified at the depth of 56m.
- Biostratigraphically, from different samples of the drilled intervals, many characteristic species of ostracods, corrals and brachiopods have been analysed and ascertained for the Silurian - Devonian age; if down to 56m the faunistic rests are characteristic for the Geddinian age, below this depth down to 300m, the faunistic rests show a Silurian - Devonian stratigraphical interval, and below 300m to the drilling sole (509m), all the faunistic remains are characteristic for Upper Silurian.
- The palynological analysed samples come from the argillaceous intercalations of the breccious conglomerates (down to 56m) and from pelitic intercalations in the dolomitic limestones down to the depth of 202m.
- The palynological analyses offered assemblages of chitinozoans, acritarchs and spores, from the samples P6 and P7, yielded from the depth of 93-95m (P7) and 199-202m (P6).
- The results of the palynological analyses presented in Table n°1 show the Silurian – Devonian age for the analysed rocks, which confirm the age established by the faunistic rests.
- The corroboration of the faunistic and palynological data allows some ideas of biostratigraphical correlations for the geological analysed formations.

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PLATES

Plate I

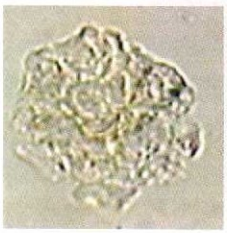
1. *Convolutispora quintitae* Rodrigues - Ludlowian
2. *Phycomicetes sporange* - Silurian-Devonian
3. *Ambitisporites avitus* Hoffman - Silurian-Devonian
4. *Archaeozonotriletes chlus chlus* (Cramer) Rich.& Lister - Silurian-Devonian
5. *Convolutispora quintitae* Rodrigues - Ludlowian
6. *Emphanisporites neglectus* Vigran - Gedinnian
7. *Lophosphaeridium* sp. - Silurian-Devonian
8. *Acanthotriletes parvus* Naumova - Silurian-Devonian
9. *Conochitina* cf. *leptostoma* Laufeld - Wenlockian
10. *Synorisporites tripapillatus* Rich.& Lister - Gedinnian
11. *Trachytriletes minor* Naumova - Silurian-Devonian
12. *Eupoikilofusa camura* (Loeblich) - Wenlockian
13. *Dactylofusa neahgae* Cramer - Lower Llandoverian
14. *Bursachitina lagenomorpha* (Eis.) Taugondeau - Silurian-Devonian
15. *Ancyrochitina moldavica* Beju& Dăneț - Silurian-Devonian
16. *Ancyrochitina ancyrea* Eisenack - Silurian-Devonian
17. *Conochitina cribrosa* Nestor - Wenlockian
18. *Dactylofusa fastidiona* (Cramer) - Siegenioan-Emsian
19. *Angochitina* cf. *longicollis* Eisenack - Llandoverian
20. *Leiofusa striatifera* Cramer - Silurian-Devonian
21. *Ancyrochitina ancyrea* Eisenack - Silurian-Devonian
22. *Eisenackitina bohemica* Eisenack-Lochkovian

All figures were increased by 1500 X

Plate II

1. *Dactylofusa estillis* Cramer & Diez. - Upper Llandoverian
2. *Eupokilofusa striata* (Stapl. Jans. & Pocock) - Upper Silurian
3. *Leiofusa* cf. *irroratipellis* Loeblich - Middle Silurian
4. *Phycomicetes sporange* - Silurian-Devonian
5. *Eisenackitina* cf. *dolioliformis* Ummova - Wenlockian
6. *Urnochitina urna* Eisenack - Pridolian
7. *Conochitina emmastensis* Nestor - Llandoverian
8. *Eisenackitina* cf. *dolioliformis* Ummova - Wenlockian
9. *Navifusa scrutila* Cramer& Diez. - Upper Wenlockian
10. *Eupoikilofusa striata* (Stapl. Jans. & Pocock) - Upper Silurian
11. *Dactylofusa* cf. *spinata* (Stapl. Jans. & Pocock) - Upper Silurian
12. *Eupoikilofusa striata* (Stapl. Jans. & Pocock) - Upper Silurian
13. *Streelispora granulata* Rich.& Lister - Ludlowian-Gedinnian
14. *Hoegisphaera lenticularis* Bouché - Silurian-Devonian
15. *Stenozonotriletes pumillus* (Waltz) Naumova - Silurian-Devonian
16. *Trachytriletes minor* Naumova - Silurian-Devonian
17. *Navifusa minuta* (Deunff.) - Couvinian
18. *Dactylofusa* cf. *spinata* (Stapl. Jans. & Pocock) - Upper Silurian
19. *Leiofusa elenae* Cramer - Ludlowian Wenlockian
20. *Lophosphaeridium* sp. - Silurian-Devonian
21. cf. *Omalophyma solida* Golub. - Lower Paleozoic
22. cf. *Omalophyma angusta* Golub. - Lower Paleozoic

All figures were increased by 1500 X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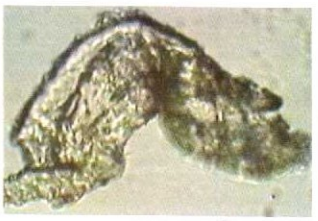
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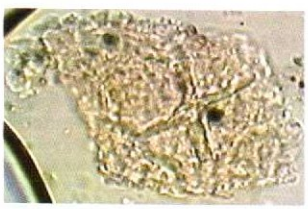
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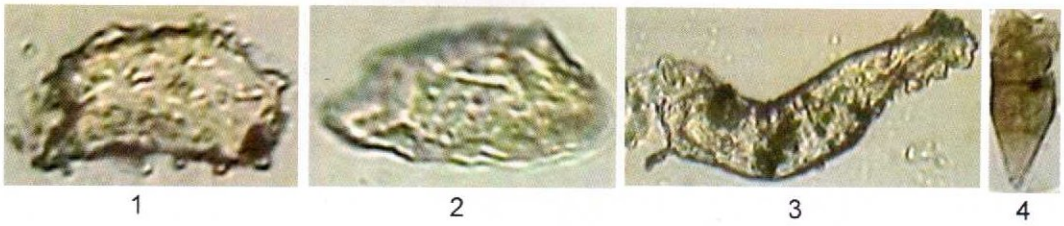

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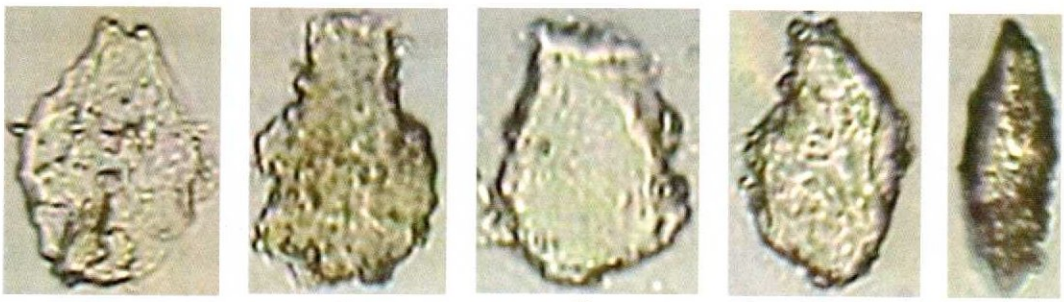

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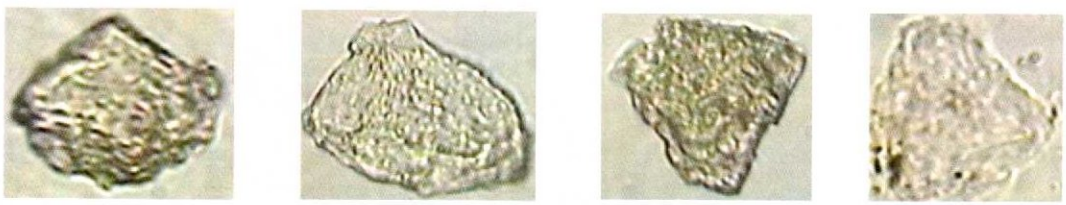

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