

Some Information on Testate Amoebae from Spitsbergen

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Opravilová, V., 1989. Some Information on Testate Amoebae from Spitsbergen. *Fauna norv. Ser. A 10*: 33—37.

In 8 samples taken in periodic puddles and brooks flowing from snow fields, altogether 29 taxa were found. A probably new species in the genus *Diffugia* is described as well as a new form of *Arcella discoides* f. *compressa* n. forma. The occurrence of a recently described species, *Centropyxis pontigulasiformis* Beyens & Chardez 1986, at further stations of the Spitsbergen Archipelago was confirmed. Of the taxa found by me 11 had not been described from Spitsbergen. A mass occurrence (more than 2,000 individuals) was noticed in the species *Plagiopyxis labiata* (Sample 4b). The index of species diversity was highest in algal periphyton (Sample 3: $H' = 2.746$); the highest equitability index was found in detritus (Sample 5a: $E = 1.146$) and in algal periphyton (Sample 3: $E = 1.145$).

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INTRODUCTION

The material originates from the collections obtained by the Czechoslovak expedition Svalbard 1985 to the western part of Spitsbergen. The expedition was organized by the Czechoslovak Bioclimatological Society and sponsored by the Czechoslovak Television — Studio Bratislava. From the collections the family Chironomidae (Diptera) has been processed and the results published (Losos & Kubíček 1988).

The Testate Amoebae from Spitsbergen were paid attention to as early as in the last century: the first paper was published by Ehrenberg (1869 — vide Scourfield 1897), and an extensive report was given by Scourfield (1897) who at the same time specified and corrected the original findings of Ehrenberg. At the beginning of this century Penard (1903) published a voluminous study of the Rhizopoda of Spitsbergen, in which he described 32 species of Testate Amoebae. Awierintzew (1907) published his findings from Bear Island which is a part of Spitsbergen. All hitherto mentioned findings originated from mosses. Sandon (1924) processed — besides mosses — also soil samples. Bonnet (1965) made an analysis of the community of Testate Amoebae which populate different types of soils, at the same time he compared the com-

munities from the Arctic region to those of the temperate zone. Schönborn (1966a) followed the ecology of Testate Amoebae in that region, and at the same time described new taxa. Beyens, Chardez & Landtsheer (1986) processed populations of Testate Amoebae from mosses and lichens of the Arctic region, i.e. Greenland, Jan Mayen and Northwest Spitsbergen. In a further paper Beyens & Chardez (1986) recorded some new and rarely occurring taxa of Testate Amoebae from Greenland and Spitsbergen. Chardez & Beyens 1987 described a new species of the genus *Arcella* — *A. ovaliformis*, found on Edgeøya (South East Svalbard).

MATERIAL AND METHODS

Samples for the study of Testate Amoebae were handed over to me for processing by a participant in the expedition, Asst. Prof. F. Kubíček (J. E. Purkyne University, Brno). They were samples of detritus, algae and moss from periodic puddles and rivulets flowing from snow fields. The samples were taken between 6th and 28th July, 1985.

Samples of detritus were taken after disturbing the bottom with a plankton net with 80 μm mesh. Algal periphyton was scraped from the substrate, a part of the moss cluster

Table 1. List of the taxa

The scale of relative density: 1: 1—10; 2: 11—50; 3: 51—100; 4: 101—500; 5: mass occurrence; + new taxa for Spitsbergen

Taxon	Sample No.	1	2	3	4a	4b	5a	5b	6
<i>Arcella discoides f. compressa</i> f.n. +		1	—	—	1	—	—	—	1
<i>Assulina muscorum</i> Greeff		—	—	—	—	3	—	—	—
<i>Centropyxis aculeata v. oblonga</i> Deflandre +		1	1	1	—	—	1	2	—
<i>Centropyxis aerophila v. sphagnicola</i> Deflandre		—	—	1	—	1	1	—	—
<i>Centropyxis platystoma</i> (Penard) Deflandre		1	—	1	—	—	—	1	—
<i>Centropyxis pontigulasiformis</i> Beyens & Chardez		1	—	—	—	—	—	2	—
<i>Centropyxis sylvatica</i> (Defl.) Thomas		2	2	2	1	1	2	2	—
<i>Corythion dubium v. terricola</i> Schönborn +		—	—	—	—	1	—	—	—
<i>Diffugia bryophila</i> (Penard) Jung		—	1	1	—	—	—	1	—
<i>Diffugia compressa v. minima</i> Schönborn +		1	—	—	—	—	—	—	—
<i>Diffugia elegans</i> Penard +		—	1	—	—	—	—	—	—
<i>Diffugia elegans v. parva</i> Chardez +		—	—	—	—	—	—	1	—
<i>Diffugia penardi</i> (Penard) Hopkinson		1	1	1	—	—	—	1	—
<i>Diffugia pyriformis</i> Perty		—	—	—	—	—	—	1	—
<i>Diffugia spec.</i>		1	—	—	—	—	1	—	—
<i>Euglypha laevis</i> (Ehrenberg) Perty		—	—	1	—	1	—	1	—
<i>Euglypha strigosa v. glabra</i> Wailes		—	—	—	—	4	—	1	—
<i>Nadinella tenella</i> Penard +		—	—	1	—	—	—	—	—
<i>Nebela collaris</i> (Ehrenberg) Leidy		—	—	—	—	—	—	1	—
<i>Nebela lageniformis</i> Penard		—	—	—	—	—	1	—	—
<i>Phryganella acropodia</i> (Hertwig & Lesser) Hopkinson		1	1	—	—	—	—	—	—
<i>Plagiopyxis callida v. grandis</i> Thomas +		—	—	—	1	—	—	—	—
<i>Plagiopyxis labiata</i> Penard +		—	—	—	2	5	—	—	—
<i>Pseudodiffugia globulosa</i> Stepánek +		—	—	—	—	1	—	1	—
<i>Pseudodiffugia gracilis</i> Schlumberger		1	1	1	—	—	—	—	—
<i>Pseudodiffugia gracilis v. terricola</i> Bonnet & Thomas		—	—	—	1	4	1	—	—
<i>Pseudodiffugia senartensis</i> Couteaux +		2	—	2	—	—	1	2	—
<i>Tracheleuglypha dentata</i> (Vejdovský) Deflandre		—	—	1	—	—	—	—	—
<i>Trinema lineare</i>		—	—	—	—	—	1	—	—

was taken with tweezers and transferred into a test tube. The material was fixed on the spot with 4% formaldehyde. Temperature and pH were measured by means of the water quality checker Horiba U-7.

In each sample the diversity index (according to Shannon & Weaver) and the equitability index (according to Sheldon) were calculated.

List of stations and samples taken

Altogether 8 samples were taken. They were collected in the surroundings of the town of Barentsburg, in the mouth of the river Grøndalselva, in the surroundings of Lake Kongress and in the river (Vassdalselva) in the valley of Vassdalen. There were two types of stations: running water — rivulets flowing from snow fields (Station 1) and stagnant waters — periodic puddles (sensu Summerhayes & Elton 1923) (Stations 2—6).

Station 1

Date of sampling: July 6, 1985. Algal periphyton: *Nostoc* sp., *Cosmarium* sp., *Zygnema* sp., Bacillariophyceae — *Tabellaria* spp. div., *Achnanthes* spp. div. etc.

Rivulets flowing from the snow field and emptying into Lake Linné. Water temperature: 5.5°C.

Station 2

Date of sampling: July 6, 1985. Detritus.

A small lake behind Cape Starostina; depth 0.4—0.5 m; pH: 8.0; water temperature: 9.2°C; stony bottom, partly covered with moss.

Station 3

Date of sampling: July 13, 1985.

Algal periphyton: *Oedogonium* sp., rarely Bacillariophyceae. Shallow puddle in the

Table 2. Indices of Species Diversity H' and Equitability E

Habitat		H'	E
Periphyton	(Sample 3)	2.746	1.145
Periphyton	(Sample 1)	2.550	1.063
Detritus	(Sample 5b)	2.435	0.949
Detritus	(Sample 5a)	2.384	1.146
Detritus	(Sample 2)	1.729	0.888
Moss	(Sample 4b)	1.147	0.522
Detritus	(Sample 4a)	0.655	0.406

delta of the river Grøndalselva. Water temperature: 10.5°C.

Station 4

Date of sampling: July 14, 1985.

A puddle on the coast opposite Barentsburg (mouth of a brook from Lake Kongress into the fjord); area: 5 m²; pH: 3.5; water temperature: 11.7°C.

Sample: 4a - detritus, 4b - moss (*Scapania* cf. *irrigua* (Nees) Dum.).

Station 5

Date of sampling: July 20, 1985.

A puddle without plants and moss — Vassdalen; area: 10 m².

Sample: 5a - depth 0.1 m; 5b - depth 0.3 m.

Station 6

Date of sampling: July 12, 1985.

Algal periphyton: filamentous blue-green algae of the genus *Oscillatoria*.

Swamp about 100 m behind the cowshed at the pasture near the town of Barentsburg.

RESULTS

Samples were taken from periodic puddles and rivulets flowing from the snow field. They contained moss, detritus, blue-green algae and algae (diatoms, desmids and filamentous algae).

The only moss sample (*Scapania* cf. *irrigua*) was taken at Station 4 (Sample 4b). It was interesting for the mass occurrence of the species *Plagiopyxis labiata* (Fig. 2a), which has not been described from Spitsbergen so far. The sample consisted mainly of empty tests. Another species of the same genus, but from Sample 4a - *Plagiopyxis callida* v. gran-

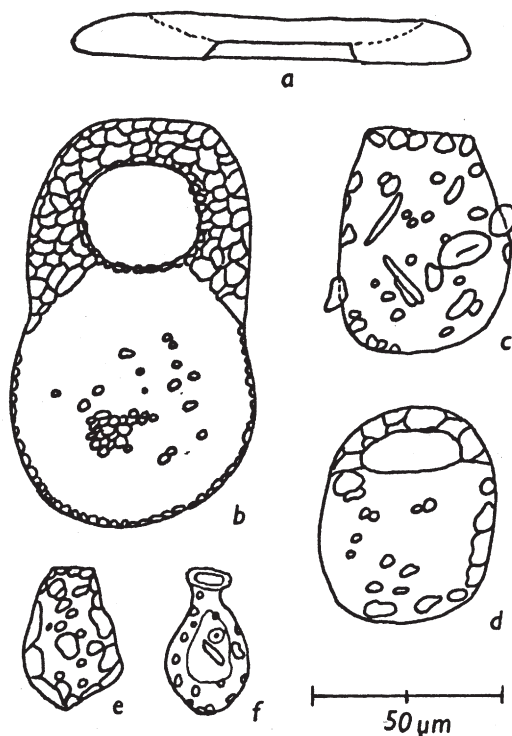


Fig. 1.

- a - *Arcella discoides* f. *compressa* f.n.
- b - *Centropyxis pontigulasiformis* Beyens & Chardez
- c - *Diffflugia* sp. nov.?
- d - *Centropyxis sylvatica* (Defl.) Thomas
- e - *Diffflugia elegans* v. *parva* Chardez
- f - *Nadinella tenella* Penard

dis (Fig. 2c) was represented by only a few individuals which were always encysted. Three more species were represented in high numbers in Sample 4b: *Assulina muscorum*, *Euglypha strigosa* v. *glabra*, and *Pseudodifflugia gracilis* v. *terricola* (Fig. 2b). *Assulina muscorum* and *Corythion dubium* v. *terricola* were not found in any other samples. The taxon *Corythion dubium* v. *terricola* is described from high mountain soils in the Alps by Laminger (1971). In the protoplasm of *Assulina muscorum* and *Euglypha strigosa* v. *glabra* small particles of detritus could be observed. In the species *Pseudodifflugia gracilis* v. *terricola* encysted individuals often occurred. The above composition of the testacoenose points to the fact that the station and/or the clusters of moss were frequently out of the water environment. The composition of the

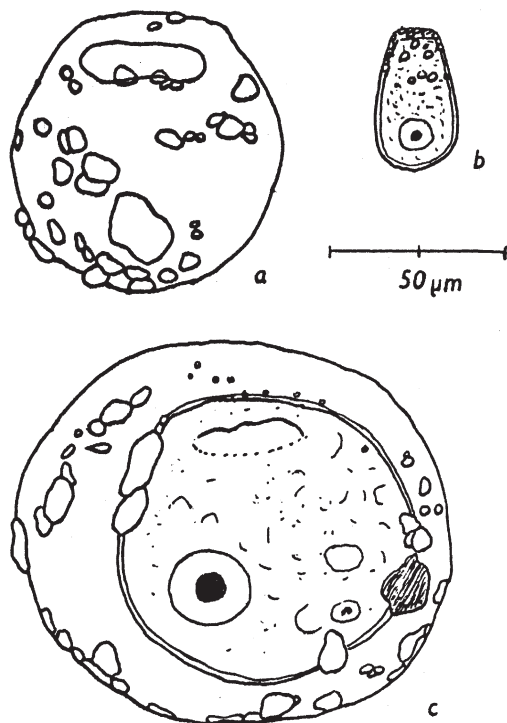


Fig. 2.

a - *Plagiopyxis labiata* Penard

b - *Pseudodifflugia gracilis* v. *terricola* Bonnet & Thomas

c - *Plagiopyxis callida* v. *grandis* Thomas

community corresponds rather to that from edaphon (Laminger 1980). The diversity and equitability indices were low ($H' = 1.147$, $E = 0.522$).

Three samples (Stations 3, 1 and 6) contained algal periphyton. In the first two samples the genus *Difflugia* was to a greater extent represented: *D. bryophila*, *D. penardi* (Station 3) and *Difflugia* sp.- (Station 1), Fig. 1c. Further, new taxa for Spitsbergen were found in these samples: *Nadinella tenella* (Station 3), Fig. 1f — and *Difflugia compressa* v. *minima* (Station 1). Diversity and equitability indices reached the highest values here: $H = 2.746$, $E = 1.145$ (Station 3); $H' = 2.550$, $E = 1.063$ (Station 1). The sample from Station 6 (puddle on the pasture) contained only one test of the species *Arcella discoides* f. *compressa* (Fig. 1a).

The remaining samples contained detritus from the bottom of periodic puddles. Most

taxa (13) were found in Sample 5b, where *Centropyxis aculeata* v. *oblonga* was frequently represented, as well as *Centropyxis pontigulasiformis* (Fig. 1b), *Centropyxis sylvatica* (Fig. 1d) and *Pseudodifflugia senar-tensis*. At this station only one specimen of *Difflugia elegans* v. *parva* was found (Fig. 1e). This variety was described by Chardez (1969) from Iceland and so far has not been described from Spitsbergen. In *Centropyxis aculeata* v. *oblonga* almost all tests contained protoplasm and numerous individuals were found at the stage of division. The lowest diversity and equitability from this group of samples were found in Sample 4a: $H' = 0.655$, $E = 0.406$.

Among further microfauna components Nematoda occurred in high amounts (tens of individuals) in Samples 1 and 3, Rotatoria — Bdelloidea — in Samples 1 and 4a, and *Kerattella* sp. in Sample 6. Tardigrada occurred in great numbers in sample 5a.

Notes on some taxa

Test dimensions are given in μm . The given indices mean: L = length of the test, W = width of the test, H = height of the test, D = diameter of the test, A = diameter of the aperture, Lt = length of the oral tube.

Difflugia sp., probable new species, (Fig. 1c). The test is broadly oviform, not compressed, with a large circular aperture. The cover consists of fine flat xenosomata of different shape which are sparsely dispersed about the test surface.

L = 58—69; W = 47—58; A = 25—33. Stations: 1, 5a.

Arcella discoides Ehrenberg f. *compressa* f. nov. (Fig. 1a). Light yellow test whose apex was pressed inside in all the specimens. Test edges were thickened. The same form in the species *Arcella arenaria*, i.e. *A. arenaria compressa* is reported by Chardez (1969) from a sample of *Sphagnum* from Iceland.

D = 98—109; A = 36—40; H = 33; Lt = 18. Stations: 1, 4a, 6.

Centropyxis pontigulasiformis Beyens & Chardez, 1986. (Fig. 1b). This species was described from Spitsbergen (Edgeøya) from terrestrial moist to wet mosses and from mosses growing directly in puddles. In the test two parts may be distinguished: the rear spherical brown coloured part which is covered with fine xenosomata embedded in the matrix and the front flat part with a circular

aperture. The front part is covered with large xenosomata which project from the surface of the test. In our individuals, unlike the original description, the aperture was larger. Stations: 1,5b.

Schönborn (1966b) describes two forms which differed conspicuously in the species *Centropyxis platystoma* from Swedish Lapland. The larger form might, according to the description, be ranked to the above species. The comparison of the dimensions is given in Table 3.

Table 3

Beyens & Chardez, 1986	Schönborn, 1966b			Opravilová
L = 82—90	100.2	100.8	102.0	91—102
W = 58—62	75.4	75.8	80.2	58—62
A = 8—10	—	—	—	36

Diffflugia elegans v. *parva* Chardez, 1969, (Fig. 1e).

The test is shortly pear-shaped, not compressed. The rear part of the test is pointed. The cover consists of xenosomata of different size which mostly do not touch each other. The aperture is circular. This form was described by Chardez (1969) from Iceland from a peat puddle. Comparison of dimensions in Table 4.

Table 4

Chardez, 1969 Station: 5b.	Opravilová
L = 45—60	58
W = 30—35	29
A = —	18

ACKNOWLEDGEMENTS

I would like to thank above all Asst. Prof. RNDr. F. Kubicek, a participant of the Czechoslovak expedition Svalbard 1985, for granting me the material including the essential data about the stations, RNDr. J. Helán for determining the algae and RNDr. J. Unar for determining the moss.

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Received: 20 March 1989