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Dedicated to Dr. Wilfried Schönborn, protozoologist, Jena, on the occasion of his 70th birthday

The genus *Microcorycia* Cockerell, 1911 (Testacealobosia, Rhizopoda, Protozoa). A critical monograph of the genus including a first description of a new species: *Microcorycia scutella n. sp.*

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With 24 figures and 3 tables

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The genus *Microcorycia* now comprises 13 species including the first description of *M. scutella* done in this paper. A general review of these species with additional morphological data is given, and their status is critically assessed. 10 species of the genus may be considered secure: *M. aculeata*, *flava*, *husvikensis*, *penardi*, *physalis*, *radiata*, *spiculata*, *suctorifera tessellata* and the new species *scutellata*; the state of *M. bartosi* and *spinosa* is questionable, *M. bryophila* will be withdrawn. Five of the 12 species formerly described have not been rediscovered since their first description.

1 Introduction

The genus *Microcorycia* was established by Cockerell in 1911. It is, however, little known even to experts in the field of testate amoebae (Testacea). This is presumably the reason why *Microcorycia* species are often overlooked. In addition, there is only little work on species of this genus and publications are widely scattered, which stands in the way of a wider knowledge of this genus. The nomenclature is somewhat confused. A monograph of the genus had not been published before. Only Chardez (1984) published a short survey on the genus including a description of three species. I will therefore make an attempt at critically summarizing thinly spread knowledge in a monograph of the genus and to point out its gaps.

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2 Diagnose of the genus

The genus *Microcorycia* is characterised by the following features: The test is flexible and comprises two parts, upper test part and lower test part. The upper test part is dome-shaped with most species, its wall is thicker and less flexible than the lower test part. On the other hand, the lower test part consists of a thin, transparent skin, which shows no structure in the light microscope, can be folded up and is open downwards for extruding pseudopodia. The skin only loosely covers the cell body and can be contracted like a sack. There is a zone of gradual transition from the upper test part to the lower test part.

The species ("morphospecies") of the genus *Microcorycia* are distinguishable by size, shape, colour, and characteristic structures of the upper test part. Their size ranges between 23 μm and 160 μm.

Our knowledge of the cell body's functional morphology is quite incomprehensive. Several original descriptions covered only the test, but not the cell body; thus, generalisations are bound to remain fragmentary.

The cell body does not fill up the test. It can be fixed to the test wall by means of epipodia, which can be observed only infrequently, though. They have been observed with *M. flava* (Penard 1902), but only with "young" individuals, with *M. husvikensis* (Chardez 1999), with *M. radiata* (Penard 1917) and *M. tessellata*. The pseudopodia are endolobopodia. They are extended through the opening in the lower test part. Digitiform lobopodia are extended only rarely. Archer (quoted according to Penard 1902) observed them with *M. flava*, Penard (1917) with *M. physalis* and *M. radiata*. Penard (1917) watched the crawling motion carried out by means of digitiform lobopodia with *M. physalis* and showed it in a drawing (Penard Pl. 11.Fig. 25). Mostly, only one widely rotund, flat pseudopodium is formed. This is substantiated by numerous findings on *Microcorycia flava*, *M. penardi*, *.M. radiata* and *M. tessellata*. There are no observations concerning the function of this pseudopodium. It is assumed to serve for the intake of food particles, possibly detritus, that stick to it by chance.

Cytoplasm is divided into ectoplasm and endoplasm. Ectoplasm is hyaline and less viscous than endoplasm. Endoplasm contains numerous granules, food particles (detritus?) and excreta as well as a variable number of contractile vacuoles.

Cells are mononuclear. Binuclear cells have also been found with *M. flava* and *M. aculeata* (Penard 1902). Nuclei mostly have one central nucleolus, only those of *M. flava* contain a number of irregularly shaped nucleoli.

3 Systematics

Amoebae with single-chambered tests and lobose pseudopodia, which include also those of *Microcorycia*, were united in the taxon Testacealobosia by de Saedeleer in 1934. The genus *Microcorycia* is classified in the system of the subclass Testacealobosia as follows:
Order: Arcellinida Kent, 1880
Suborder: Arcellina Haeckel, 1894
Family: Microcoryciidae de Saedeleer, 1934
The family Microcoryciidae also comprises the genera *Amphizonella* Greeff, 1866, *Diplochlamys* Greeff, 1888, *Parmulina* Penard, 1902, *Penardochlamys* Deflandre, 1953 and *Zonomyxa* Nüsslin, 1882. According to older literature, the genus *Microchlamys* Cockerell, 1911, of which two species have been described, had also been assigned to this family. However, Ogden (1985) established a new family for this genus: the family Microchlamyidae.

4 Genus nomenclature

Corycia is the synonym of the generic name *Microcorycia*. This designation caused some nomenclatural errors in the past, which still result in a somewhat confused impression of the nomenclature of the genus *Microcorycia*.

The name *Corycie* (derived from kórykos [Greek] = small leather bag) is introduced by Dujardin (1852) into the nomenclature of Rhizopoda. However, the diagnosis of the genus *Corycie* had not been definitely formulated such that it was differently interpreted by some later authors. Different interpretations of the genus diagnosis *Corycie* were favoured because this publication of only two printed pages did not contain any illustration. Gagliardi (1871) changed the genus name *Corycie* into *Corycia* and introduced the name "*Corycia Dujardini*" for the species described by Dujardin. He identified the species *Corycia dujardini* with *Amoeba terricola* Greeff (valid name: *Thecamoeba terricola* (Greeff, 1866) Lepşi, 1960). He also combined the diagnosis of the species *Corycia dujardini* with Greeff's *Amphizonella flava* when he wrote: "As to his A. flava, I am rather inclined to consider it as another form of *Corycia*, scarcely differing from *C. Dujardini*." Maggi (1876) interpreted Gagliardi's somewhat vague publication, which also contained no illustration, in such a way that he indicated both species, *Corycia dujardini* and *Amphizonella flava*, stating *Amoeba terricola* Greeff as a synonym under *C. dujardini*. Penard (1902) then formed the new combination *Corycia flava* according to the rules of nomenclature for a new description of *Amphizonella flava* Greeff. A new species and a new variety were also described under this generic name. Later (Penard 1909) he recognized, however, that the *Corycie* of Dujardin is not identical with *Amphizonella*

flava Greeff, but very probably with *Amoeba terricola* Greeff 1866, which consequently would have to be named "*Corycia terricola* Dujardin". But he pronounced himself in favour of keeping the then established name *Corycia*. However, Cockerell (1911) suggested using the new name *Microcorycia* for the genus as the name *Corycia* was preoccupied and not identical with the genus that is based on *Amphizonella flava*. Nevertheless, some of the Rhizopoda specialists continued to ignore this suggestion for a long time.

Vejdovsky (1880 and 1882) made further mistakes in using the terms *Corycia mutabilis* and *C. stercorea* (see below), which can be evidently attributed to Leidy (1879) who identified the generic name "*Corycie*" with *Pamphagus*.

5 Biology

5.1 Reproduction

There is hardly anything known on the reproduction of *Microcorycia*. As is common among the "naked" and testate amoebae, it certainly takes place by cell division, being the most general form of asexual reproduction. Division may take place in longitudinal or transverse form. In case of longitudinal division, the division plane is located in the longitudinal test axis, the test of the mother cell is included in the division. This form of division evidently does not take place with *Microcorycia*. In case of transverse division, the division plane runs at right angles to the longitudinal test axis; the test of the mother cell is maintained in this process and is reused by one of the two daughter cells. The other one of the two daughter cells comes out of the opening of the old test as a plasmatic bud and precipitates a new test. The new test largely corresponds to the old one regarding size and shape, but test colour and structures may acquire their final expression only in the course of ageing. So, an increase in colour intensity of the daughter test after division (= "young individual") has been observed with other Testacea (e.g. with *Arcella*). In literature, there are two references to the fact that division takes place in transverse form. Penard (1917) made a drawing of pairs of tests for *Microcorycia physalis* and *M. radiata*, which he interpreted as a dividing stage (Penard Pl. 11.Fig. 29, and 13.13). However, Penard (1902) and also Heinis (1911) speak of "small and young" individuals, which in the true sense should not exist.

5.2 Encystment

Hallas (1975) described the encystment of *Microcorycia* using the example of *Microcorycia radiata*. The cell body of this species encysts outside the test; exocysts are formed (see under *M. radiata*). With *M. husvikensis*, Chardez (1999) ob-

served cysts that had formed in the test (see under *M. husvikensis*); consequently this species forms endocysts.

The cell body of *Microcorycia* is relatively often in the state of pre-encystment. In this state, the protoplasmic body contains less water and has contracted into a spherical mass, with cytoplasm being opaque. Nucleus and other organelles are masked. The cell body membrane is rough.

5.3 Ecology and geographical distribution

Our knowledge of the ecology and geographical distribution of the genus *Microcorycia* is quite fragmentary. This is evident from the fact that as many as six of the 12 species described so far have not been rediscovered since their first description. Another two species that had been missing for 85 years were rediscovered only recently (Badewitz 2003). Of another species, only single findings are known such that a major number of localities are indicated only for one third of the known species, from which ecological demands on their living space and geographical distribution can be derived.

Tab. 1: *Microcorycia*. Survey on ecological distribution, m = mosses, sph = sphagna, s = soils, sw = swamps, fw = fresh water, se = sediment, pe = periphyton, pi = plankton (according to Meisterfeld 2002)

Species	m	sph	s	sw	fw	se	pe	pi
M. aculeata	X	X	X	X	X			X
M. bartosi	X							
M. bryophila	X							
M. flava	X	X	X	X	X	X	X	X
M. husvikensis	X				X			
M. penardi	X	X	X		X	X		
M. physalis	X							
M. radiata	X	X						
M. spiculata	X							
M. spinosa	X							
M. suctorifera	X							
M. tessellata	X							

The ecological distribution of *Microcorycia* species is shown in table 1. Two facts are conspicuous there. First: All species were found in mosses. Their degree of humidity can vary widely and range between submerged and xeric. It should be stressed that some of the *Microcorycia* species find appropriate living conditions even in highly desiccative mosses of rocks, roofs and walls (Bartoš

1940, 1963a, 1963b; Badewitz 2003). S e c o n d : *Microcorycia flava* colonizes the highest number of habitats, although it has to be considered that it is also the species that is found most frequently. Besides mosses, it also populates sphagna, soils, swamps and limnetic habitats such as sediment and periphyton. It has been found even in plankton. *Microcorycia aculeata* and *M. penardi*, which also have been found commonly, also populate a greater number of habitats. A fourth species, *M. radiata*, of which several localities are known that are, however, outnumbered by far by the three previously mentioned species, has been found only in moss and *sphagnum* species. Badewitz (2003) found this species on several localities in Germany in dry epilithic mosses.

Tab. 2: *Microcorycia*. Survey on geographical distribution, E = Europe, Af = Africa, Am = America, As = Asia, Au = Australia/Oceania, Aa = Antarctica (according to Meisterfeld 2002)

Species	E	Af	Am	As	Au	Aa
M. aculeata	X	X	X		X	
M. bartosi	X					
M. bryophila	X					X
M. flava	X	X	X	X	X	X
M. husvikensis						X
M. penardi	X	X	X		X	X
M. physalis	X					
M. radiata	X		X			
M. spiculata				X		
M. spinosa			X			
M. suctorifera				X		
M. tessellata	X					

A survey of the geographic distribution of the genus *Microcorycia* is given in table 2. It becomes evident from the table that only one species, *Microcorycia flava*, has been found on all six continents, which confirms its cosmopolitic distribution. *Microcorycia penardi* has been found only on five continents, *Microcorycia aculeata* on four continents. This makes their cosmopolitic distribution very probable. A number of localities on two continents is also known for *Microcorycia radiata*. The geographical distribution of all other species is unknown. Concerning the six species that have not been rediscovered since their first description, only their respective localities are known. This concerns *Microcorycia bartosi* and *M. bryophila*, which were found in Europe, *Microcorycia husvikensis*, which was described only in 1995 and the locality of which is on the subantarctic island of South Georgia, *Microcorycia spinosa* and *M. suctorifera* which were described as occurring in China as well as *Microcorycia spinosa* with

a locality in Mexico. Of the two species *Microcorycia physalis* and *M. tessellate* that were rediscovered only recently (Badewitz 2003) and which Penard had described from Switzerland in 1917, only few localities in Switzerland and Germany are known. (The only new find of *M. bryophila* in the Antarctic (Sudzuki, 1979) is questionable.)

6 Description of species

The following abbreviations are used for sizing:
n.d. = no data, D = diameter, H = height.

Microcorycia aculeata (Greeff, 1888) Cockerell, 1911 (Fig. 1)

Pseudochlamys aculeata Greeff, 1888: p. 104 (first description)
Corycia coronata Penard, 1902: pp. 178-180 (synonym)
Corycia aculeata (Greeff) Awerintzew, 1906: p. 142 (new combination)
Microcorycia aculeata (Greeff) Cockerell, 1911: p. 137 (new combination)
Microcorycia corona mistake by Godeanu (1977) instead of *M. coronata* (Penard, 1917) (synonym)

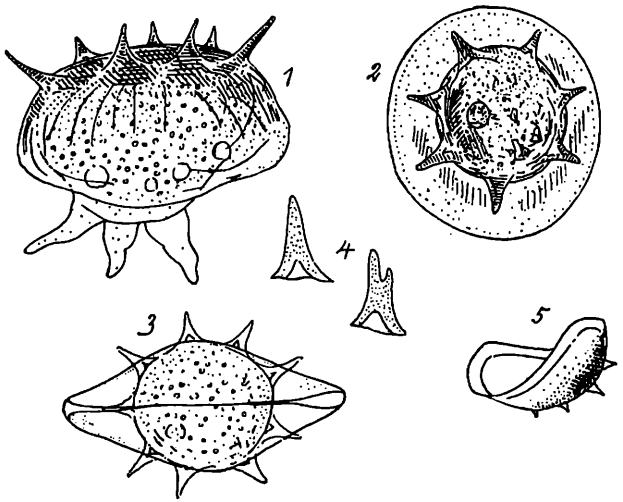
Description: Upper test part rigid, dome-shaped with a crown-like corona of 6 to 15 strong, big thorns and a wide base. The thorns are brown, hard, smooth and mostly apiculate, but in some cases biacuminate, according to Bartoš (1940) differently big and high as well as often multiply acuminate and hollow at the base.

Size (D): Greef (1888): n.d., Penard (1902): 140 μm, Bartoš (1954): 100-160 μm.

Greeff (1888) gave no substantial information on the cell body. Penard (1902) referred to the fact that this species does not differ in the constituency of cytoplasm, pseudopodia as well in its entire physiology from *M. flava*. However, the nucleus has a centrally located nucleolus.

Similar species: *Microcorycia bartosi, Microcorycia spinosa* (see below and Tab. 3).

Habitat: *M. aculeata* populates predominantly moss, also *sphagnum*. Other biotopes or habitats have been stated less frequently. Penard (1902) indicates swamp. Varga (1962) found it in forest litter (L layer), Todorov (1998) in soil, and Balik (1986) in rendzina soil. It has also been found in limnetic biotopes. Lansac-Tôha & al (2001) state generally inland bodies of water besides moss and *sphagnum*. It also occurs in plankton (Godeanu & Ionescu 1973, Godeanu 1977) and on reed (Godeanu 1977).



Corycia coronata. — 1. L'animal vu de côté. — 2. Enveloppe, vue d'en haut. — 3. Animal replié sur lui-même. — 4. Deux des dents. — 5. Partie rigide de l'enveloppe, vue de trois quarts.

Fig. 1: *Microcorycia aculeata*. 1. = lateral view, 2. = dorsal view, 3. = individual internally folded, 4. = horns, 5. = upper test part in perspective view. (From Penard 1902)

Tab. 3: Comparison of three *Microcorycia* species having a crown of thorns: *M. aculeata, M. bartosi* and *M. spinosa*

Feature	M. aculeata	M. bartosi	M. spinosa
Upper test part			
-Diameter	100-160 µm	90-100 µm	86-124 µm
-Coverage with xenosomes	uncovered	covered inside the crown of thorns	upper test part more or less covered
Thorns			
-Number	6-15	10-12	7-14
-Shape	big, with a wide base, hollow only at the base	long, slender, tapered, hollow, bloated in a belly-like way at the base	long, relatively slender, hollow, internally structured
-Length		27-30 µm	25-40 µm
Status of species	secure	questionable	questionable

Geographical distribution: cosmopolitan?

Europe: Belgium (Beeli 1931), Bulgaria (Todorov 1998), Germany (Greeff 1888), Yugoslavia (Varga 1962), Romania (Godeanu & al. 1973, Godeanu 1977), Switzerland (Penard 1902, 1905, Heinis 1909, Bourquin-Lindt 1919), Czechoslovakia (Bartoš 1937, 1940, 1946, 1954), Hungary (Varga 1956)
Africa: Algeria (Balik 1986)
South America: Brazil (Wailes 1913, Pinto 1925, Lansac-Tôha et al 2001).
Australia and Oceania: Pacific Islands (Penard 1911)
(Source of data on geographic distribution: Meisterfeld 2002)

Microcorycia bartosi (Bartoš, 1940) Decloitre, 1950 (Fig. 2)

Corycia spinosa Bartoš 1940 (nec *Corycia spinosa* Heinis 1911): pp. 145-146 (first description, homonym)
Microcorycia bartosi (Bartoš, 1940) Decloitre, 1950: p. 41 (new combination)

State of species questionable.

Description: Upper test part dome-shaped, covered with mineral particles in the centre. At the border of covered and uncovered parts, there is a corona of 10-12 slender, hollow thorns that are bulbously bloated at the base. Length of thorns 27-30 μm. Uncovered part of upper test part delicately punctuate. Test colour light brown.

Size (D): 90-100 μm (Bartoš 1940).

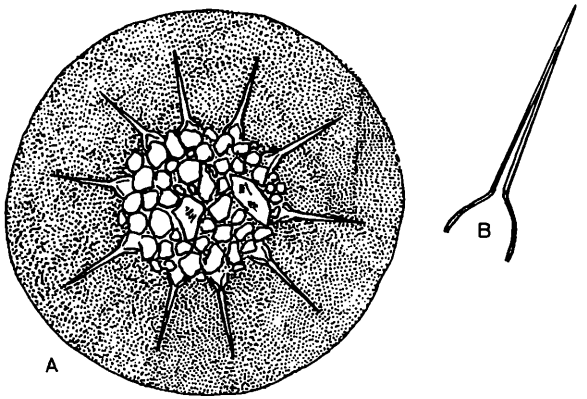


Fig. 2: *Microcorycia bartosi*. A = dorsal view, B = a magnified thorn of this species. (From Bartoš 1940)

Remark: Bartoš (1940) initially considered this form to be *M. aculeata*, but then decided to describe it as a new species. *M. bartosi* differs from *M. aculeata* in a smaller size and in the length and basal shape of thorns. Very probably it is only a test variety of *M. aculeata*.

Habitat: Xerophile moss (Bartoš 1940, 1954).

Geographic distribution:
Europe: Czechoslovakia (Bartoš 1940, 1954).

Microcorycia bryophila Decloitre, 1974 (Fig. 3)

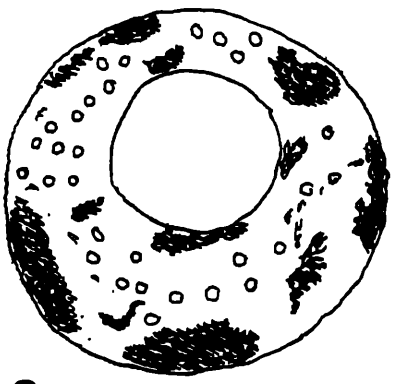
Microcorycia bryophila Decloitre, 1974: p. 14 (first description).

This species is withdrawn.

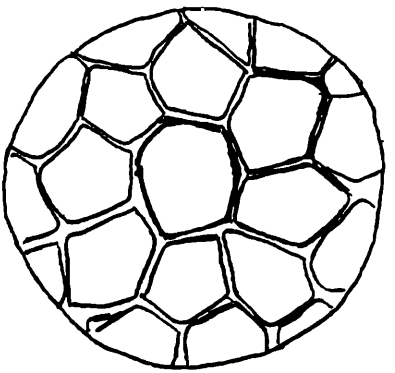
The original description of this species reads: "Cette nouvelle espèce rappelle quelque peu *Microcorycia tessellata* Penard. Les différences sont les suivantes: dans *tessellata* le fond de la thèque est muni de cinq plaques à côtés inégaux, droits ou courbes. Dans *bryophila*, le fond de la thèque est formé de plusieurs plaques vaguement pentagonales. Vue par dessus, la thèque de *bryophila* présente un pseudostome bien ouvert, un peu excentrique et une partie supérieure de la thèque avec quelques taches très irrégulières sombres qui apparaissent comme des détritus étrangers collés sur la thèque, avec parsemés quelques petits cercles bordés d'une ligne un peu sombre. D'autre part, dans *bryophila* la thèque est circulaire."

[This new species bears a slight remembrance to *Microcorycia tessellata* Penard. The differences are as follows: With *tessellata*, the base of the theca is provided with five plates having unequal sides, straight or curved. With *bryophila*, the base of the theca is constituted by several almost pentagonal plates. When seen from above, the theca of *bryophila* shows a well opened pseudostoma, slightly eccentrically located, and an upper part of the theca has some irregular dark spots that look like strange foreign particles stuck onto the theca, covered with some small circles that are defined by a slightly dark line. On the other hand, the theca of *bryophila* is circular.]

Size (Decloitre 1974): D = 40 μm, H = 30 μm, D of pseudostoma = 12-15 μm



a Fig. 1 vue par dessus



b Fig. 2 vue par dessous

Fig. 3: *Microcorycia bryophila*. a = ventral view, b = dorsal view. (From Decloitre 1974)

Remarks: The genus description becomes more intelligible in connection with Decloitre's drawing (Fig. 3) if the adverbial phrases "from above" [French dessus] and "from below" [French dessous] are interpreted as the opposites. Then Fig. 3a (Decloitre Fig. 1) shows the ventral view, Fig. 3b (Decloitre Fig. 2) shows the dorsal view.

In dorsal view, the upper test part of *M. bryophila* shows evidently stiffening ribs as a characteristic in reticular arrangement. Thus *M. bryophila* is within the range of variation of *M. tessellata* (see below). The second feature Decloitre stated, the covering of the lower test part with "dark spots" and "some small circles" is in my opinion no specific characteristic; presumably this is a random feature. The only rediscovery so far, which Sudzuki (1979) reported from the Antarctic, is marked as questionable in a species list. His added microphotographs did not dispel doubts. *M. bryophila* is therefore withdrawn.

Habitat: Aerophilous mosses (Decloitre 1974), Antarctic moss(?) (Sudzuki 1979).

Geographic distribution:
Europe: France (Decloitre 1974), the Antarctic(?) (Sudzuki 1979).

Microcorycia flava (Greeff, 1866) Cockerell, 1911 (Figs. 4, 5, 21-24)

Amphizonella flava Greeff, 1866: pp. 329-330 (first description)
Corycia flava (Greeff) Penard, 1902: pp. 173-177 (new combination)
Microcorycia flava (Greeff) Cockerell, 1911: p. 137 (new combination)

Microcorycia flava is the species most commonly observed.
Description: Upper test part rigid, dome-shaped, mostly covered more or less by xenosomes (mineral particles and detritus) (see REM photographs Figs. 21, 22). Individuals without xenosomes also occur. The upper test part is yellow to yellowish brown, the lower test part light yellow to hyaline. Xenosome-free portions of the upper test part appear darkly punctuate in the light microscope. As the REM photograph Fig. 24 shows, the dots are irregularly distributed alveolae.

Size (D): Bartoš (1963 c): 90-100 μm, Penard (1902): 80-100 μm, according my own measurements: $\bar{x}$ = 103.8 (78-130) μm, n = 18.

Cytoplasm does not fill up the test; it is granulate and contains numerous food particles, excreta as well as contractile vacuoles, 3-12 or more being located near the upper periphery according to Penard (1902). Digitiform lobopodia are obviously not formed or only by way of exception. Only Archer is reported to have observed them (quoted from Penard 1902). However, it can be

observed with many individuals where the cell is in a vital state that a widely rotund pseudopodium is outside the test. Penard (1902) observed the formation

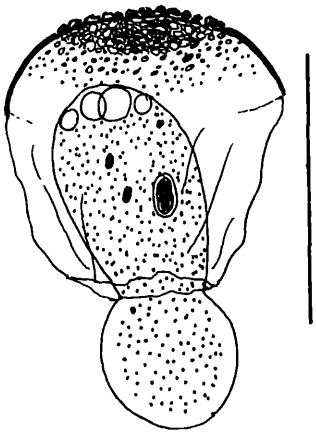
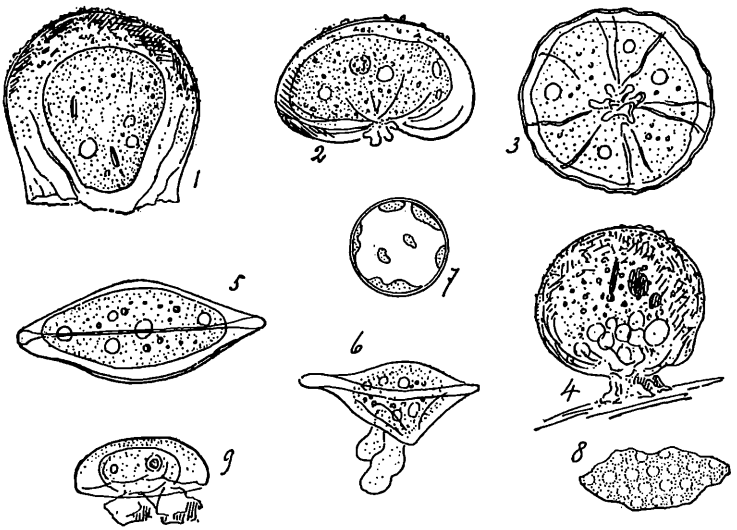


Fig. 4: *Microcorycia flava* with extruded pseudopodium



Corycia flava. — 1. Individu vu de côté, avec membrane pendante. — 2. Un autre, à membrane fermée. — 3. Le même, vu par dessous. — 4. Un autre, sphérique, de côté. — 5. Individu replié en fuseau. — 6. Individu jeune. — 7. Noyau. — 8. Détails de la surface de l'enveloppe, sur un exemplaire jeune. — 9. Très jeune individu, agglutiné à des pierres.

Fig. 5: *Microcorycia flava*. 1. = lateral view, lower test part open, 2 = closed lower test part, 3. = the same in ventral view, 4. = individual spherical in lateral view, 5. = individual folded up into a wedge, 6. = "young" individual (D 62 µm), 7. = nucleus, 8. = detail of an upper test part of a "young" individual, 9. = "very young" individual (D 19 µm). (From Penard 1902)

of this type of pseudopodium: The extrusion of the ectoplasmic pseudopodium occurred in an eruptive way, seemed to grow stiff on the surface and was slowly retracted back into the cell body. According to my own observations, pseudopodia of this type are mainly lasting. Only one is formed per individual, which spreads on a flat surface. No observations exist on the function of these pseudopodia, uptake of food and locomotion. Penard (1902) has seen epipodia that fix the protoplast in the test only with "young" individuals.

The cell is mononuclear. Penard (1902) reported also on binuclear cells. Nuclei are spherical or ovular and contain a number of nucleoli of irregular shape. Penard (1902) ascertained the diameter of four nuclei of four individuals to be 19 µm. According to my own measurements, nuclei are sized between 13 µm and 18 µm. Nuclei are always difficult to recognize in the living cell; they are masked by cell inclusions and under the test. Penard (1902) therefore recommended to crush the organisms.

Habitat: *Microcorycia flava* populates terrestrial and limnetic habitats. Terrestrial habitats mainly include mosses and soils. Based on their locality, mosses comprise both soil mosses and epiphytic as well as epilithic mosses. The moisture degree of mosses ranges from submersed mosses (Penard 1902, 1913) to moist mosses (Müller 1918) to xerophile mosses at extreme locations such as rocks, walls and roofs (Badewitz 2003, Bartoš 1940, 1950b, 1954, 1963a, 1963b, Thomas 1953). Varga (1960) found this species in the moss of an eaves gutter. It was also found in *Sphagnum* (Wailes 1912, Bourquin-Lindt 1919, Harnisch 1929, Thomas 1954, Varga 1956). What is also remarkable is Heinis' (1920) discovery of *M. flava* in alpine cushion plants. Several authors state "soil" as a terrestrial habitat (Francé 1921, Bonnet 1978, and others). Some authors are more precise about soil: humus on a lava slope (Grospietsch 1971), forest litter (L-horizon) (Varga 1961a, 1961b), forest soil (Schröter 2001), lithomorphic soils, rendzina soil (Bunescu 1977, Balik 1986), calcareous soil, truffle soil (Bonnet 1974), beach soil on the Mediterranean (Bonnet & Comoy 1977) and raw humus from a spruce forest (Krupp 1999, quoted from Meisterfeld 2002). Several authors also state swamp which probably is to mean permanently wet soils (Decloitre 1953, Ghilarov 1955, Godeanu 1977). Heinis (1937) found this species in the Alps also under the special conditions of small snow-bound valleys. Limnetic biotopes and habitats are as varied as are terrestrial ones. Those stated include: fresh water in general, lakes, ponds and moors. Limnetic habitats of

this type are: sediment (Penard 1902, Wailes 1912, Müller 1918, Štěpánek 1967, and others) and aquatic plants (Wailes 1912, 1931, 1932). It should be stressed that is was also found to be a planktonic organism (Müller 1918, Wailes 1931, 1932, 1939, Godeanu 1977, Beyens & al. 1986).

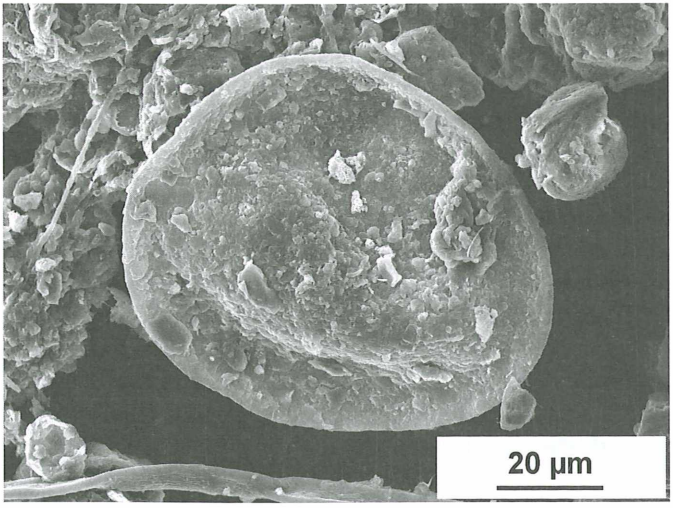


Fig. 21: *Microcorycia flava*. SEM-micrograph. Upper test part in dorsal view, covered with xenosomes

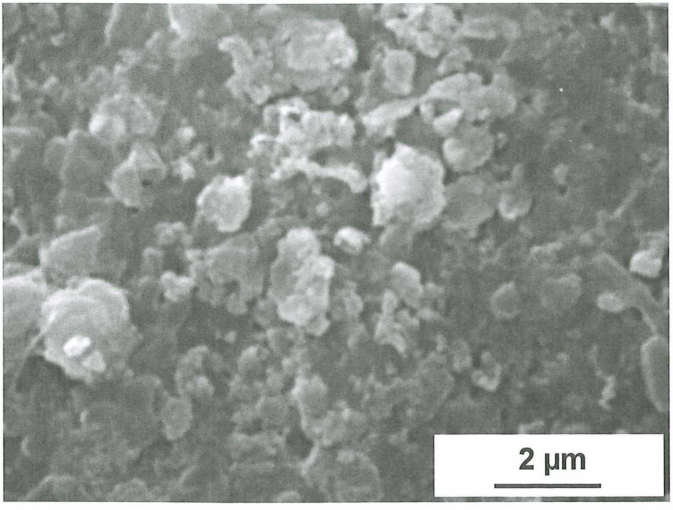


Fig. 22: *Microcorycia flava*. SEM-micrograph. Detail of the upper test part, covered with xenosomes

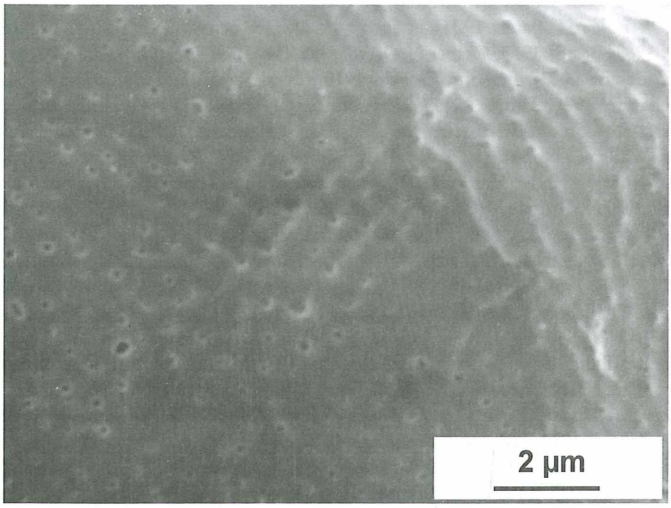


Fig. 23: *Microcorycia flava*. SEM-micrograph. Portion of an upper test part without any xenosomes

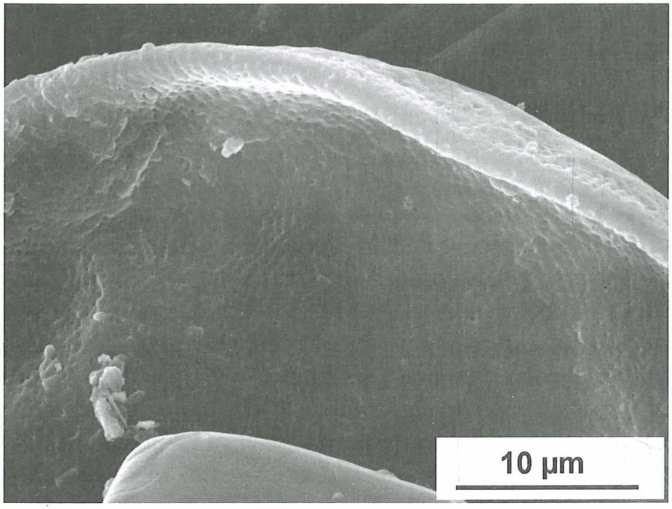


Fig. 24: *Microcorycia flava*. SEM-micrograph. Detail of the uncovered upper test part

Geographic distribution: cosmopolitan
Europe: Abkhazia/Georgia (Bartoš 1963), Belgium (Beeli 1931, Chardez 1987, Chardez & al. 1987, Krupp 1999), Bulgaria (Pateff 1924, Todorov 1998), Germany (Greeff 1866, Jung & Spatz 1938, Schönborn 1962, Bartoš 1963, Casper [ed.] 1985, Jax 1985, Schröter 1995, 2001, Richter 1995, Maassen 1996, Badewitz 2003), England (Brown 1910, Cash, Wailes & Hopkinson 1919, Wailes 1939), France (Deflandre 1927, Thomas 1953, 1954, Bonnet & Thomas 1955, Decloitre 1973, Bonnet 1974, 1978, Bonnet & Comoy 1977, Schröter 2001), Greece (Bonnet 1967), Ireland (Wailes & Penard 1911, Cash, Wailes & Hopkinson 1919), Italy (Grandori 1934, Rampi 1950), Yugoslavia (Golemansky 1966), Canary Islands (Heinis 1908), Netherlands (de Graaf 1956, Siemensma 1982), Poland (Golemansky 1973), Rumania (Godeanu & al. 1973, Bunescu 1977, 1979, Bunescu & Matic 1977, Godeanu 1977, Bunescu & al. 1985), Russia [then East Prussia/Germany] (Steinecke 1913), Sweden (Schröter 2001), Switzerland (Penard 1902, 1905, Heinis 1909, Müller 1918, Bourquin-Lindt 1919, Heinis 1920, 1937, 1959, Bartoš 1950), Hungary (Varga 1933, 1954, 1956, 1960, 1961, Szabo & al. 1964, Török 1993), Spitsbergen (Penard 1903, Sandon 1924, Beyens & al. 1986), Czechoslovakia (Bartoš 1937, 1940, 1946, 1949, 1950, 1951, 1954, Štěpánek 1967, Balik 1994).
Africa: Algeria (Balik 1986), Ivory Coast (Bonnet 1978), Marion Island/South Africa (Grospietsch 1971), West Africa (Decloitre 1948, 1949), Senegal, Mali (Decloitre 1954), Togo (Decloitre 1954).
North America: Canada (Penard 1911, Wailes 1931, 1932, 1933, Chardez & al. 1988, Beyens & al. 1991), USA (Wailes 1912, Lousier & Bamforth 1990, Beyens & Chardez 1995).
Central America: Costa Rica (Ruiz 1961), Mexico (Golemansky 1967).
South America: Bolivia (Murray & Wailes 1913), Brazil (Wailes 1913, Pinto 1925, Lansac-Tôha & al. 2001), Chile (Bonnet 1966), Colombia (Heinis 1914).
Asia: China (Bartoš 1963, Balik & Song 2000), Java/Indonesia (Bartoš 1963), Thailand (Golemansky & Todorov 2000).
Australia and Oceania: Australia (Penard 1911), Pacific Islands (Penard 1911). Antarctica (Richters 1908, Penard 1911, Penard 1913, Smith 1992, Todorov & Golemansky 1996, 1999).
(Source of data on distribution: Meisterfeld 2002)

Microcorycia husvikensis Beyens & Chardez, 1997 (Fig. 6)

Microcorycia husvikensis Beyens & Chardez, 1997: pp. 138 + 141 (first description)

Description: It mainly follows the subsequent description by Chardez (1999), which is more precise and detailed than the original description:
The upper test part is dome-shaped and has a yellowish tinting. A very delicate punctuation is visible at high magnification. The margin of the upper test part is divided into an external part and an internal part. The internal margin changes into a flexible, hyaline membrane, which spreads towards the periphery and forms a border around the upper test part. This membrane can fold up towards the centre as to reduce the diameter of pseudostoma. The upper test part of young individuals is hyaline and more pliable than with older ones.

Size: D of upper test part; 32-35 μm, H 16-20 μm, D including the spread lower test part: 39-43 μm.

The cell body is located as a spherical or oval mass in the test and is connected to the upper test part through fine ectoplasmatic epipodia of varying number (two or three). Pseudopodia are lobate. Cytoplasm is finely granulate. It contains numerous inclusions (excreta and glycogen granules) and a contrac-

tile vacuole. The cell is mononuclear. The nucleus contains a central nucleolus. The nucleus has a diameter of 2.4-3,0 µm.

Encystment: Two types of cysts have been found. The resting cyst is formed inside the test. It is completely spherical in shape and has a diameter of 24 µm. Cytoplasm is dense and opaque. It is surrounded by a smooth membrane. Moreover, the cell can change into the state of pre-encystment. In pre-encysted state, the membrane is rough and irregular; it is attached to a test point. Pre-encysted cytoplasm has a diameter of about 28 µm. The lower test part is folded towards the peristome centre. The margin of the upper test part can also be folded inwards for reducing the test opening.

Remark: What is striking with *M. husvikensis* is that the lower test part has only a small height compared with other *Microcorycia* species. Thus it is assumed that the pseudostoma cannot be completely closed. Obviously *M. husvikensis* is a primordial form of *Microcorycia*.

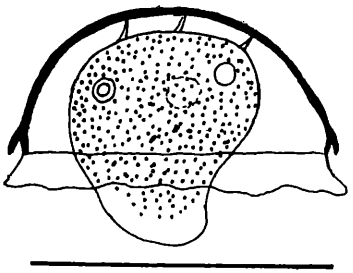


Fig 6: *Microcorycia husvikensis* (according to Chardez 1999; scale 30 µm)

Habitat: Slightly alkaline lakes and ponds, vegetated by moss (Beyens & Chardez 1997), moss (Chardez 1999).

Geographic distribution: So far only known from the subantarctic island of South Georgia.

Microcorycia penardi (Penard, 1902) Cockerell, 1911 (Figs. 7, 8, 9)

Corycia coronata var. simplex Penard, 1902: pp. 178-180 (first description)
Corycia penardi (Penard) Awerintzew, 1906: p. 143 (new combination)
Microcorycia penardi (Penard) Cockerell, 1911: p. 137 (new combination)
Microcorycia simplex (Penard) Deflandre-Rigaud, 1958: p. 28 (new combination)
Microcorycia corona var. simplex: mistake by Balik (1986) instead of *Microcorycia coronata var. simplex* (Penard, 1902) (synonym)

Description: Upper test part rigid, dome-shaped, with a closed annular collar. The centre of the upper test part and the collar are covered more or less by xenosomes (mineral particles), the size and density of which decrease towards the collar. The upper test part is covered with xenosomes also outside the collar region; their size and density decreases even further towards the test margin where the upper test part gradually changes into the hyaline, xenosome-free lower test part. The upper test part outside the ring is covered with xenosomes only slightly, their size and density decreases towards the upper test part margin. With many individuals, the annular collar shows only a weak development or is completely missing. In the latter case, xenosomes are always circularly arranged. No matter how the upper test part is covered with xenosomes inside or outside the ring, the ring of xenosomes can well be made out. Colour of upper test part brownish, also yellowish in the region outside the ring (Penard 1902) and finely punctuate.

Size (D): Penard (1902): 100 µm on average, Chardez (1984): 90-110 µm, according to my own measurements: $\bar{x}$ = 99.3 (78-114) µm, n = 16.

Digitiform lobopodia and epipodia have not been observed. Frequently a widely rotund, lobate pseudopodium is extruded. The cell is mononuclear or binuclear (Penard 1902). The nucleus has got a central nucleolus.

Bartoš (1940) reported on "abweichend gebaute Stücke" [differently structured individuals] of *M. aculeata* that "sehr nahe stehen" [are very similar] to *M. penardi*. With these individuals, the closed collar has regressed to form individual sharp points, the centre of the upper test part is covered with xenosomes (Fig. 9). It is, however, more probable that this was not *M. aculeata*, but atypical specimens of *M. penardi*.

Habitat: Terrestrial and limnetic(?) species. Predominantly moss, also *sphagnum* (Penard 1911, Heinis 1914). The moisture degree of mosses on the locality is usually not detailed. There is only the remark with Bartoš (1940) and Badewitz (2003) that the species was found in aerophilic or xerophile mosses. Sandon (1924) found it also in soil besides mosses, likewise Balik (1986), who indicated the soil as rendzina. Only Schmassmann (1924) found it in a limnetic habitat (sediment).

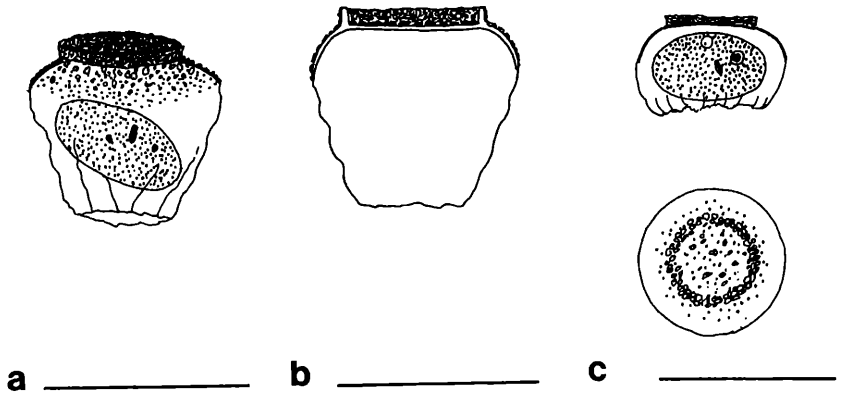
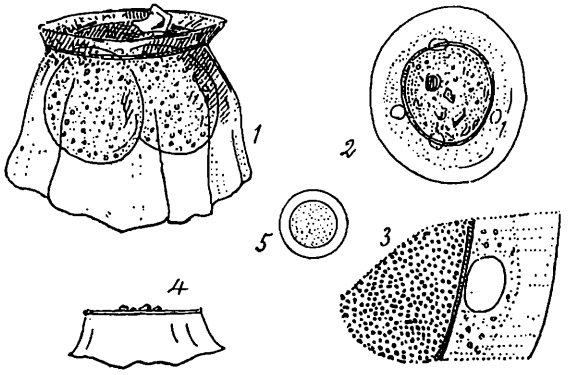


Fig. 7: *Microcorycia penardi.* a = perspective view, b = test in section, c = test with contracted lower test part and upper test part in dorsal view with annularly arranged xenosomes. (Scales 100µm



Corycia coronata, var. *simplex.* — 1. Animal vu de côté, avec plasma rétracté en deux masses sphériques. — 2. Individu jeune, vu d'en haut. — 3. Fragment du même, sur les bords. — 4. Individu jeune, de côté. — 5. Noyau.

Fig. 8: *Microcorycia penardi.* 1. = lateral view of an individual whose plasmatic body is divided into two spherical masses, a state interpreted by Penard as a division stage, 2. = dorsal view, 3. = detail of a test, on the left, the yellowish, delicately punctuate centre of the upper test part, then the collar forming, on the right, the hyaline part of envelope, 4. = "small" individual (D 45 µm) in lateral view, 5. = nucleus with central nucleolus. (From Penard 1902)

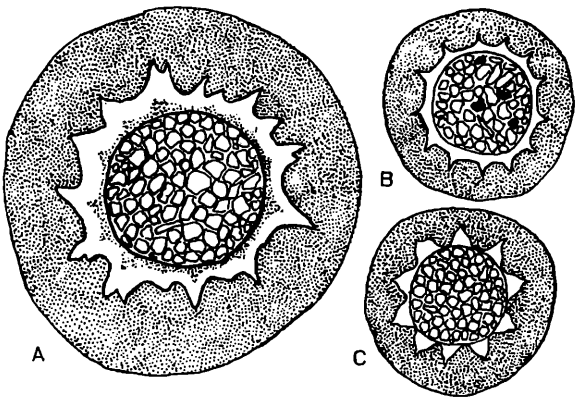


Abb. 4. *Corycia aculeata* GREEFF. Einige abweichend gebaute Stücke dieser Art. A Ein Stück von Smrekovec bei Dolni Kubin. B und C Stücke von Bad Bojnice.

Fig. 9: Atypical form of *Microcorycia penardi*(?). Bartoš stated that this form is very similar to *M. penardi*, but assigned it to *M. aculeata*. However, it tallies to a higher degree with *M. penardi* than with *M. aculeata*. (From Bartoš 1940)

Geographic distribution: cosmopolitan.
Europe: Belgium (Chardez 1984, 1987), Germany (Badewitz 2003), France (Decloitre 1972), Austria (Schmassmann 1924), Switzerland (Penard 1902, Benier 1988), Spitsbergen (Sandon 1924), Czechoslovakia (Bartoš 1937, 1940, 1949, 1950, 1951, 1954).
Africa: Algeria (Balik 1986).
North America: Canada (Penard 1911, Wailes 1925).
South America: Colombia (Heinis 1914).
Australia and Oceania: New Zealand (Penard 1911), Pacific Islands (Penard 1911).
Antarctica (Penard 1911, Decloitre 1960).
(Source of data on distribution: Meisterfeld 2002)

Microcorycia physalis (Penard, 1917) Deflandre, 1927 (Figs. 10, 11)

Corycia physalis Penard, 1917: pp. 18-20 (first description)
Microcorycia physalis (Penard) Deflandre, 1927: p. 501 (new combination)

Description: The upper test part is dome-shaped and has got 5, 6 or 8 radial stiffening ribs. The ribs are differently distinct; they may be slightly intimated to strip-like reinforced. Strip-like reinforced ribs are brown. The upper test part is brown to reddish brown, particularly with older individuals, but grey individuals that are coloured like smoked glass or almost hyaline ones occur, too. The upper test part is covered with tiny regular spots, which become visible only at higher magnification (Penard 1917).

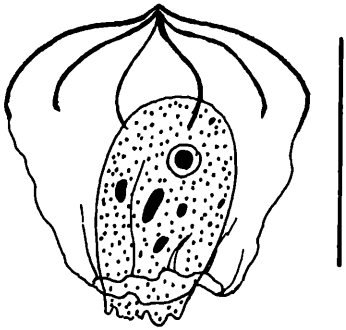


Fig. 10: *Microcorycia physalis.* (Scale 50µm)

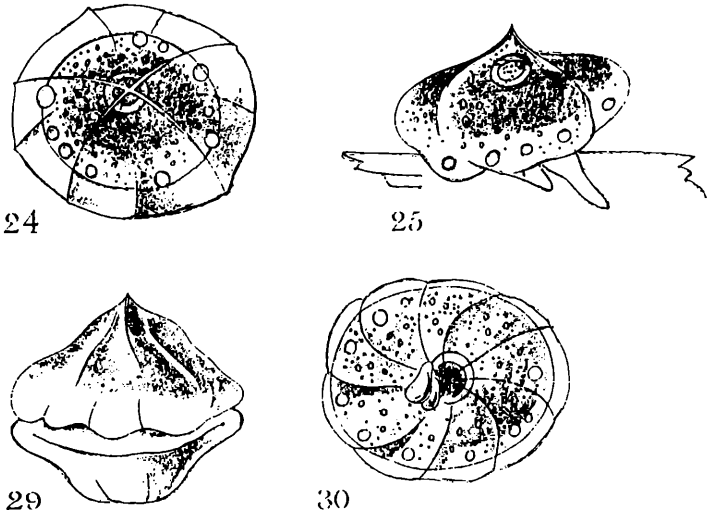


Fig. 11: *Microcorycia physalis*: 24 = typical form in dorsal view, 25 = indivudual in lateral view, creeping over a vegetable fibre, 29 = division, 30 = individual in ventral view, showing folds of skin. Nucleus in centre, small stones right next to it. (From Penard 1917)

According to Penard's drawing, the dome-shaped upper test part is extended to form a tip (Penard Pl. 11.Fig. 25, and 11.29). The centre of the upper test part is only slightly extended when the ribs are reinforced to a higher degree. The characteristics of *M. physalis* are highly variable.

Size (D): Penard (1917): 55-65 μm, according to my own measurements: $\bar{X}$ = 60.8 (49-70) μm, n = 21.

The cytoplasm is greyish and granulate. It contains food particles and excreta as well as contractile vacuoles in varying numbers. Epipodia have not been observed. Digitiform pseudopodia are extruded according to Penard (1917), which also serve for locomotion.

The cell contains a relatively large cell nucleus with a central nucleolus, which is well visible with many individuals. Dimensions: nucleus 13-14 μm, nucleolus 5-7 μm.

Penard (1917) observed division stages. Division is of the transverse type. The test of mother cell can be recognized by its more intensive colouration and distinct costae. The test of daughter cell is, however, hyaline and costae are scarcely visible. Both tests are of the same size.

Habitat: Moss (Penard 1917, Deflandre 1927), xerophile moss (Badewitz 2003).

Geographical distribution:
Europe: Switzerland (Penard 1917), France (Deflandre 1927), Germany (Badewitz 2003).

Microcorycia radiata (Brown, 1912) Hopkinson, 1919 (Figs. 12, 13).

Corycia radiata Brown, 1912: pp. 109-111 (first description)
Microcorycia radiata (Brown) Hopkinson, 1919: p. 27 (new combination)

Description: Upper test part flat, of slightly conical shape (not dome-shaped as with other species) having a somewhat raised centre point, colourless, less frequently slightly yellowish. In dorsal view, round, surrounded by two concentric rings, from the centre of which 5-8 (rarely up to 10) lines irradiate. The external ring of the two concentric rings may also be missing. The lower test part is a flexible, thin, plicate, open at the bottom and colourless membrane, which can be highly contracted. The test is purely organic in composition.

Size (D): Brown (1912): 24-30 μm, according to my own measurements: $\bar{x}$ = 28.1 (23-39) μm, n = 25.

The cell body does not fill up the test. Cytoplasm is greyish and granulate. It contains small food particles as well as several vacuoles. Epipodia and pseudopodia are formed (Penard 1917).

The cell is mononuclear. The nucleus has a diameter of 5-6 μm. It has a variable shape: hemispherical, oblong, compressed or oval and has got a central nucleolus (Penard 1917).

M. radiata can form a lobopodium, which enables it to move. However, locomotion is so slow that it can be detected only by observation over a longer period of time. A widely rotund pseudopodium can also be extruded.

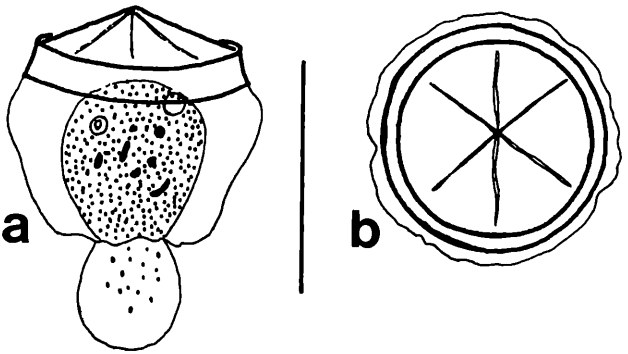


Fig. 12: *Microcorycia radiata*. a = in perspective view with widely rotund pseudopodium, b = test in dorsal view. (Scale 30 µm)

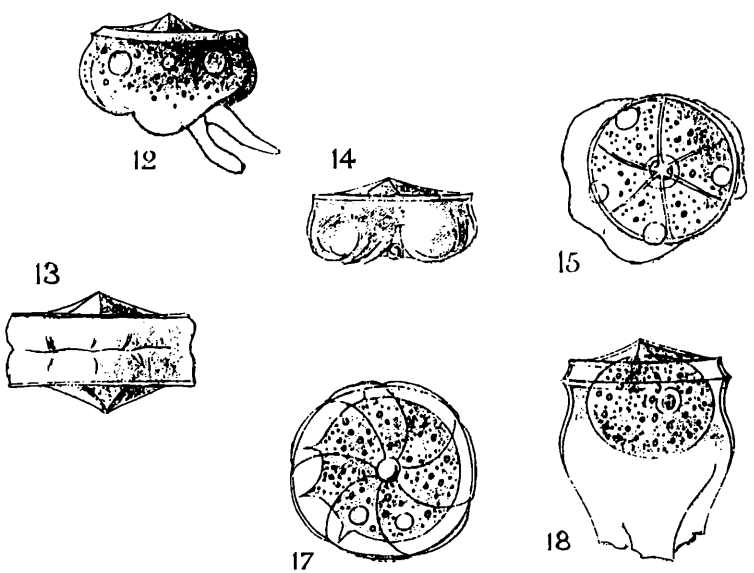


Fig. 13: *Microcorycia radiata*: 12 = individual with extruded digitiform pseudopodia; 13 = division; 14 = individual with contracted lower test part; 15 = individual in dorsal view. (From Penard 1917); 17 = individual in dorsal view showing folds of the lower test part and the pseudostom in centre; 18 = individual in lateral view with pre-encysted cytoplasm (dormancy), lower test is opened widely

Reproduction: Penard (1917) made drawings of individuals in their division stages (Penard Pl. 13.Fig. 13). According to this, division is of the transverse type. Hallas (1975), too, observed division stages. He wrote on this: "The thec of the 'new' animal is apparently produced within the thec of the 'old'. Thereafter it is extruded out with its distal part first – folded like an umbrella." The contradiction in both authors' observations cannot be resolved presently.

Encystment: *M. radiata* forms exocysts. Hallas (1975) described the process of encystment. It starts with the formation of a thin, elastic saccule that is connected with the test through the pseudostoma. Then the amoeba leaves the test and crawls into the saccule. The saccule is enclosed by a capsule made of a highly refringent material. Next a gelatine-like external mantle surrounding the saccule is deposited. The encysted amoeba forms another test. Hallas observed directly the process of the amoeba's move into the saccule with subsequent formation of a capsule. However, the encysted amoeba was squeezed by gentle pressure out of the cyst for proof of the test formed. Hallas pointed out that the test of an amoeba squeezed out of a cyst may lack typical test features.

Habitat: Terrestrial species. Moss, sphagnum (Brown 1912, 1913), moss located at the lower part of tree trunks (Penard 1917), moss (Piskol 1969, Hallas 1975, Török 1993), xerophile moss (Bartoš 1954, Badewitz 2003).

Geographical distribution:
Europe: Scotland (Brown 1912, 1913, Cash, Wailes & Hopkinson 1919) Switzerland (Penard 1917), England (Cash, Wailes & Hopkinson 1919), Belgium (Beeli 1931), Czechoslovakia (Bartoš 1954), Poland (Piskol 1969), Finland (Hallas 1975), Hungary (Török 1993), Germany (Badewitz 2003).
Arctic North America: Greenland (Hallas 1975).
(Source of data on distribution: Meisterfeld 2002)

Microcorycia scutella n. sp. (Fig. 14)

Material: Moss cushions from seven localities. Three epilithic mosses, four mosses from reed and tiled roofs.

Diagnosis: 42-56 µm sized *Microcorycia* with dome- or helmet-shaped upper test part which shows a delicate alveolar structure in the light microscope.

Locus typicus: Loburg, District of Anhalt-Zerbst, Saxony-Anhalt, Germany. Moss from a tiled roof.

Derivation of name: scutella [Latin] = small bowl because of the bowl shape of the upper test part.

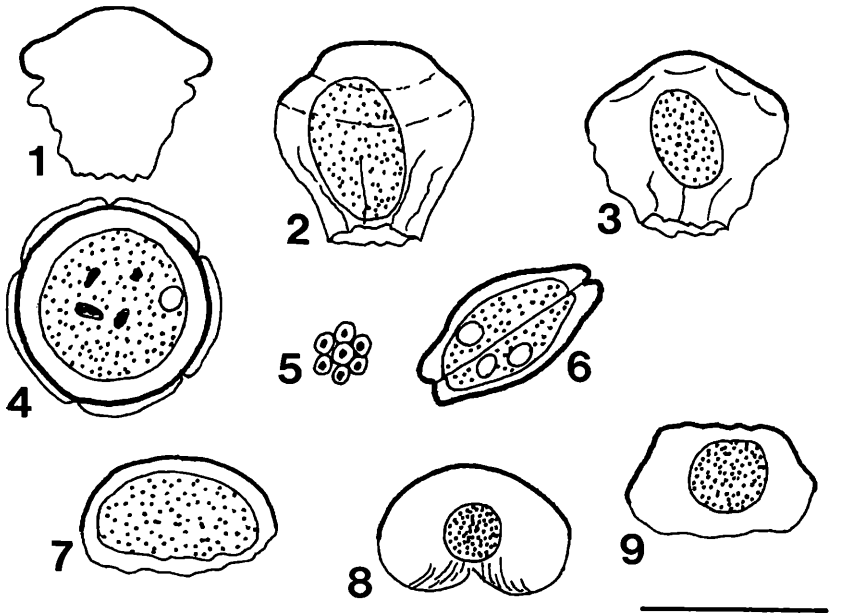


Fig. 14: *Microcorycia scutella* n. sp. 1 = empty test in sectional view, 2 = test with cell body (dormant stage?), 3 = test with cell body, the upper test part is irregularly undulated, 4 = test with cell body in dorsal view, 5 = structure of upper test part, 6 = divisional stage(?), 7–9 = individuals with pre-encysted cytoplasm. (Scale 50µm)

Storage place of type material: Author's collection

Description: Typical test shape of the genus *Microcorycia*. Upper test part dome- or helmet-shaped, sometimes with slight, irregular undulation; rounded in dorsal view; composed of rotund, irregularly arranged elements each with a dark centre (alveoli). Upper test part yellowish-brownish, lower test part hyaline. Dimensions: $\bar{x}$ = 50.8 (36-62) µm, n = 19.

The cell body does not fill up the test. Cytoplasm is greyish and granulate. It contains one or two contractile vacuoles and food vacuoles with food particles (detritus?) and excreta. The cell is mononuclear. Pseudopodia and epipodia have not been observed.

Discussion: This species can be clearly distinguished from all *Microcorycia* species described so far. A delicate alveolar structure is also found with *M. husvikensis* (Beyens & Chardez 1997). However, *M. scutella* can be clearly distinguished from that species as it is bigger than *M. husvikensis* and its upper test part shows no divided margin.

Habitat: Xerophile mosses.

Localities: Mecklenburg-Vorpommern: Ralswiek, District of Rügen; Klaber, District of Güstrow; Saxony-Anhalt: Magdeburg, south cemetery; Gardelegen/Altmark; northeast of Schierke/Harz, District of Wernigerode; Loburg, District of Anhalt-Zerbst.

Microcorycia spiculata Bartoš, 1963 (Fig. 15)

Microcorycia spiculata Bartoš, 1963 b: p. 86 (first description)

Description: The author found only few specimens of this species in one of several moss samples, but not together with *M. suctorifera* described below. Upper test part with shallow curvature and low cuticular collar that extends to form 16 to 20 radially protruding annexes. Annexes are equally long, have the same structure and are equidistant. The upper test part is covered with mineral splinters inside the cuticular collar. Test brown.
Size (D): 81-100 µm (Bartoš 1963 b).

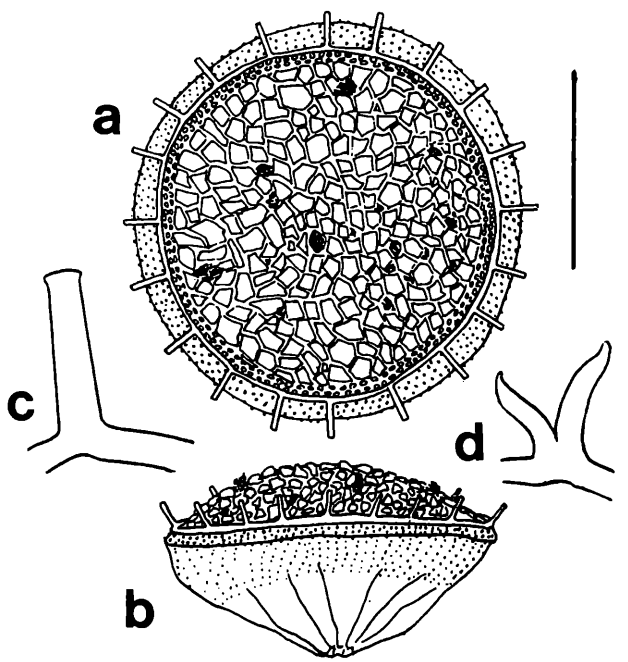


Fig. 15: *Microcorycia spiculata*. a = dorsal view, b = lateral view, c = magnified normal annex to test, d = magnified forked annex to test. (From Bartoš 1963b; scale 50µm)

Habitat: Xerophile moss (Bartoš 1963 b).

Geographic distribution:
China (Bartoš 1963 b).

Microcorycia spinosa (Heinis, 1911) Decloitre, 1950 (Figs. 16, 17)

Corycia spinosa Heinis, 1911: pp. 256-258 (first description)
Microcorycia spinosa (Heinis) Decloitre, 1950: p. 41 (new combination)

State of species questionable.
Description: Upper test part irregularly dome-shaped with regular corona of 7-14 long, relatively slender, tapered thorns that are longer than those of *M. aculeata* (L = 25-40 μm). Thorns hollow and internally structured (Fig. 17b), colour brown. Upper test part covered with xenosomes consisting of soil and gravel particles. Lower test part plicate and at rest contracted. In ventral view, the lower test part shows 3-4 folds that are sometimes regularly arranged (Fig. 17a).

Size (D): 86-110 μm, one individual 124 μm (measures excluding thorns) (Heinis 1911).

Five, six or more contractile vacuoles of different sizes are spread in cytoplasm. Moreover, "...enthält das Plasma noch eine Anzahl kleiner, glänzender Körnchen." [cytoplasm also contains a number of small, shiny granules]. (Heinis 1911). Heinis (1911) wrote on nuclei: "Meist treten kugelige Kerne auf von 10 bis 14 μ Durchmesser." [Spherical nuclei having a diameter of 10 to 14 μm occur in most cases.] "Die Pseudopodien sind wie bei *C. flava* und *C. coronata* etwas breit und farblos. [Pseudopodia are somewhat wide and colourless as with *C. flava* and *C. coronata*.] (Heinis 1911).

Heinis (1911), too, reports on "young animals" The author wrote about them: "Bei jungen Tieren kann man oft die Bildung der Zähne resp. Dornen genau verfolgen. Zuerst hebt sich der Dornenkranz nur wenig aus der Haut in Form von kleinen, spitzen Höckern. Solche Tiere gleichen dann eher der *Corycia coronata* Pen. Junge Exemplare von 50 μ Grösse zeigen noch keinen Anfang in der Bildung der Dornen." [It is often possible to closely observe the formation of teeth or thorns with young animals. First the corona of thorns rises only slightly out of the skin, consisting of small pointed protuberances. Such animals then show resemblance to *Corycia coronata* Pen. Young animals of a size of 50 μm do not show the beginning formation of thorns.]

Remark: This species looks very much like *M. aculeata*. Its status is thus questionable. Differences from *M. aculeata* are: Its thorns are longer, relatively slender, internally hollow and structured. The upper test part is covered with xenosomes.

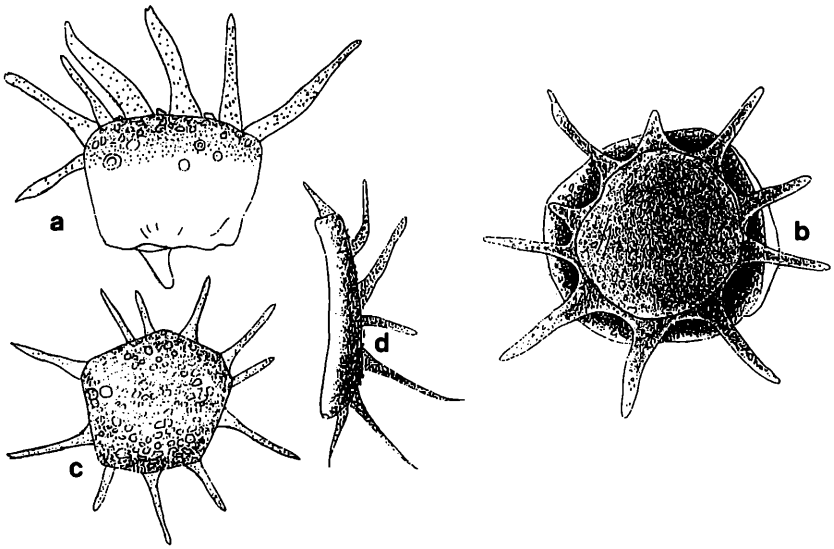


Fig. 16: *Microcorycia spinosa.* a = lateral view, b = ventral view, c = dorsal view, d = lateral view. (From Heinis 1911)

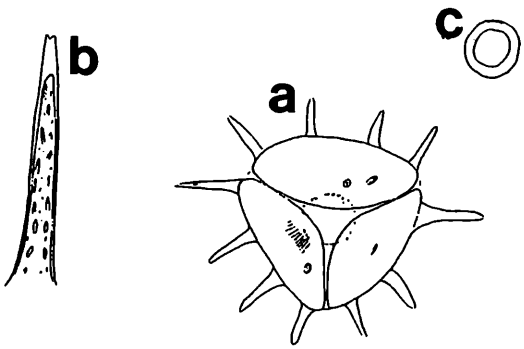


Fig. 17: *Microcorycia spinosa.* a = ventral view, b = thorn, c = nucleus. (Illustration 1 in a text from Heinis 1911)

Habitat: Moss and lichens on trees and rocks (Heinis 1911).

Geographical distribution:
Mexico (Heinis 1911).

Microcorycia suctorifera Bartoš, 1963 (Fig. 18)

Microcorycia suctorifera Bartoš, 1963 b: p. 86 (first description)

The author found several specimens of this species in one of several moss samples, but not together with *M. spiculata*.

Description: Upper test part dome-shaped. The shallow or only slightly curved centre of upper test part is covered with small mineral fragments, here and there also with small detritus particles. The centre is surrounded by an annular, closed cuticular collar; at its side, there are nine tubular annexes with open ends. Annexes have a length of 11 μm and a diameter of 2.7 μm. The test colour is pale grey-yellow.

Size: D 68 μm, H 56 μm (Bartoš 1963 b).

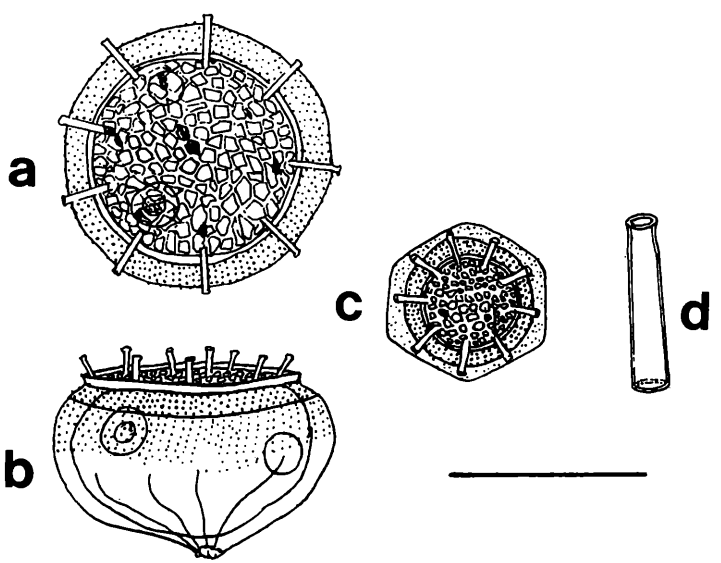


Fig. 18: *Microcorycia suctorifera*. a = dorsal view, b = lateral view, c = dorsal view, d = magnified annex to test. (From Bartoš 1963b; scale 50μm)

Habitat: Xerophile moss (Bartoš 1963 b).

Geographical distribution:
China (Bartoš 1963 b).

Microcorycia tessellata (Penard, 1917) Chardez, 1965 (Figs. 19, 20)

Corycia tessellata Penard, 1917: pp. 17-18 (first description)
Microcorycia tessellata (Penard) Chardez, 1965; p. 310 (new combination)

M. tessellata does not have a uniform appearance.

Description: Upper test part apiculate or more dome-shaped, reinforced by four to six radially arranged costae that divide into two branches after covering a straight distance (Fig. 19a). Costae may also be arranged more or less irregularly and reticularly connected. The upper test part is mostly hyaline, rarely pale brownish, also greenish or yellowish (Penard 1917). Costae may be differently developed. More distinctly developed costae are brownish. At high magnification, it can be recognized that costae are covered with small russet spots (Penard 1917).

Size (D): Penard (1917): 28-35 μm, also up to 40 μm; according to my own measurements of 66 individuals from five specimen series: $\bar{x}$ = 38.8 (29-49) μm.

Cytoplasm is greyish. It contains innumerable granules as well as food particles and excreta. Contractile vacuoles in varying numbers occur at its upper periphery. In rare cases it can be seen that the cytoplasm is attached to the upper test part by means of epipodia (Fig. 19d). A widely rotund pseudopodium spread flat on the ground is extruded now and then (Fig. 19c). The cell is mononuclear (Penard 1917).

Remark: Penard (1917) described the species with radially arranged (in a stellate or rosulate way) and bipartite costae as *Corycia tessellata*. However, he had also found individuals with irregularly running costae for which he did not preclude the status of a species of its own. I have not been able to find discontinuity between features of both forms.

Habitat: Moss (Penard 1917), xerophile moss (Badewitz 2003).

Geographic distribution:
Europe: Switzerland (Penard 1917), Germany (Badewitz 2003).

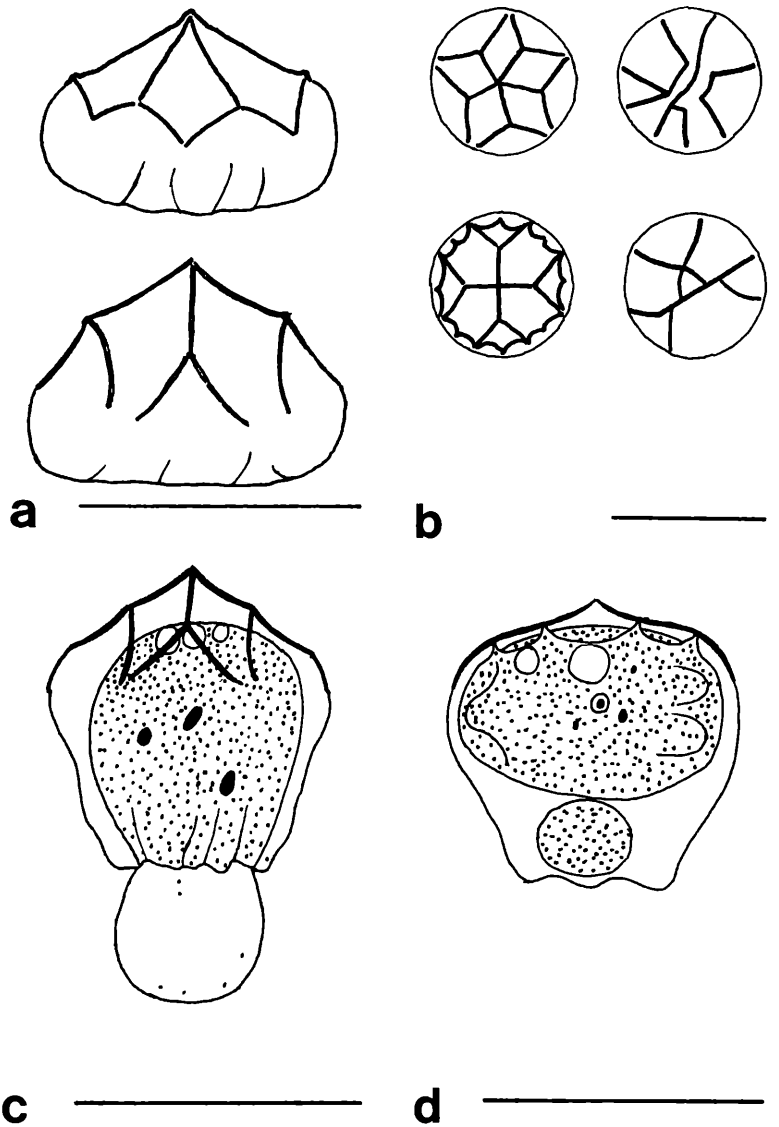


Fig. 19: ***Microcorycia tessellata.*** **a = tests with regularly arranged costae in lateral view, b = tests in dorsal view with both regularly and irregularly arranged costae, c = individual with widely rotund pseudopodium, d = individual whose protoplasm is attached to upper test part by means of epipodia. Cytoplasm showed amoeboid movements. Part of the plasmatic body was separated from the major ellipsoid mass. (Scales 40µm)**

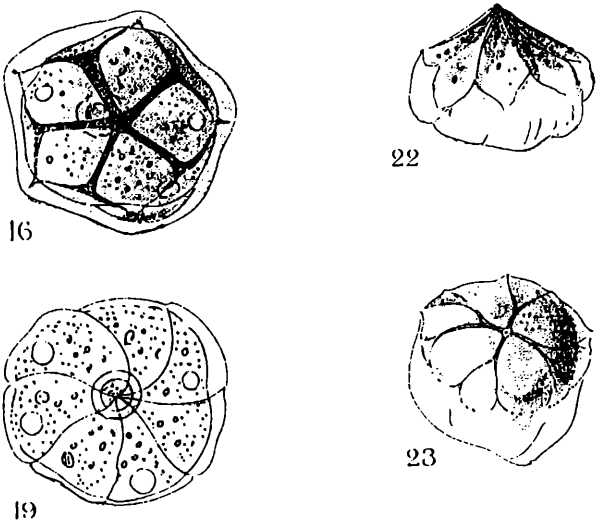


Fig. 20: *Microcorycia tessellata*. 16 = typical form in dorsal view, 19 = ventral view, 22 = lateral view, 23 = empty envelope in perspective view. (From Penard 1917)

7 Species excluded

Corycia dujardini Gagliardi, 1871

This species is, according to Penard (1909), synonymous with *Amoeba terricola* Greeff, 1866 [= *Thecamoeba terricola* (Greeff, 1866) Lepşi 1960]; the term is not synonymous with *M. flava*.

Corycia mutabilis

This term is stated in literature only once by Vejdovsky (1880). This publication is the rendering of a lecture and does not allow conclusions about the species Vejdovsky had in mind. Bailey had described the species *Pamphagus mutabilis* in 1853 and thus established the genus *Pamphagus*. Nowadays *Pamphagus mutabilis* is synonymous with the species *Lecythium mutabilis* (Bailey, 1853) Hertwig & Lesser, 1874, the justification of which is, however, questionable. Leidy identified *Pamphagus mutabilis* with Dujardin's *Corycie* (Penard 1902). Therefore it is quite probable that Vejdovsky referred to *Pamphagus mutabilis* as *Corycia mutabilis*.

Corycia stercorea (Cienkowski, 1876) Vejdovsky, 1882

Vejdovsky (1882) replaced the generic name of the species *Chlamydophrys stercorea* Cienkowski, 1876 with *Corycia* Dujardin, 1852 as he identified the obscure genus diagnosis of *Corycia* (*Corycie*) with *Chlamydophrys* Cienkowski, 1876 and thus wanted to confer "the paramount title" on the older name. Consequently *Corycia stercorea* is synonymous with *Chlamydophrys stercorea* and none of the species of the genus *Microcorycia*.

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