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**SILICA-SCALED FLAGELLATES (SYNUROPHYCEAE) OF THE
“MESTECĂNIȘU DE LA RECI”, COVASNA COUNTY, TRANSYLVANIA,
ROMANIA**

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Abstract: Silica-scaled flagellates (*Synurophyceae*) of the „Mestecănișu de la Reci” Covasna County, Transylvania, Romania. The „Mestecănișu de la Reci” („Rétyi Nyír”) is an extended sandy area situated in the Brașov Depression, southeast of Transylvania, between the city of Sf. Gheorghe and Covasna town, near the village of Reci (Réty). The peculiar landscape of the region is due to the eolian sand dunes that had been formed at the beginning of Holocene after the Râu Negru („Feketeügy”) river emptied the ancient Quaternary lake basin. Later, due to the raising of ground water level, small pools and bogs have been formed in the hundreds of small depressions formed among the dunes. The present paper deals with the silica-scaled chrysophytes collected during the spring and autumn of 1996 and 1997, from such small pools and bogs, situated mostly in the protected area (Nature Reserve) of the „Mestecănișu de la Reci”. There have been identified 23 taxa: 17 *Mallomonas* and 6 *Synura* species. The following taxa have not yet been recorded in the „Mestecănișu de la Reci”: *Mallomonas acaroides*, *M. annulata*, *M. lelymene* and *Synura lapponica*.

Introduction

The “Mestecănișul de la Reci” („Rétyi Nyír”) is the remnant of an ancient eolian sand dune district of diluvial origin situated in the southeast of Transylvania between the city of Sf. Gheorghe and Covasna town. The formation of this unique landscape had started during the last interglacial of the Quaternary period, upper Pleistocene (Riss – Würm), by the formation of an ancient lake in the so called „Trei Scaune” Depression (Râu Negru compartment of the Brașov Depression).

When the sandy lake deposits left after the river called “Râu Negru” („Feketeügy”) emptied the basin dried out, most probably during the last glacial period (Würm) – dry and cold – as well as at the beginning of Holocene, had started the genesis of the eolian sand dunes. Soon, due to the raising of ground water, small pools and bogs have been formed in the depressions created among the sand dunes lined by alder belts („Country of hundred pools”). Willow and birch formed the tree layer of these tiny wetland formations. Rich and extended birch

populations inhabited the higher and dry sandy places among the aquatic habitats. Palynological evidences attest the ancient and permanent occurrence of birch in the region (Lupșa, 1976-1977). According to Pop (1960) „Mestecănișul de la Reci” is a Preboreal relict, its ancient landscape has been changed rather little during the Holocene. The small pools and bogs are in various silting stages, the oldest ones have rather deep peat deposits. Various sedges or more recently peat moss (*Sphagnum*) layers partly or entirely overgrew some of them.

The high diversity of aquatic habitats sheltered unique and rare plants like *Caldesia parnassifolia*, *Aldrovanda vesiculosa*, *Menyanthes trifoliata*, *Hottonia palustris*, *Stratiotes aloides*, *Utricularia neglecta*, *U. breinii*, *Heleocharis carniolica*, *H. acicularis* and even glacial relicts like *Lysimachia thyrsiflora*, *Comarum palustre* and *Dryopteris cristata*.

This ancient natural landscape became markedly altered with the start of intense human activities (cuttings, clearings, farming, gracing etc.). Towards the end of last century a pine belt was planted, the sand dunes became more or less consolidated, the birch populations were mostly cleared and large areas are cultivated for crops.

It was almost too late when the central area of the “Mestecănișu de la Reci” was declared (1962) Nature Reserve, because some elements of its ancient flora and fauna had presumably disappeared.

The algal flora of the area has been investigated (especially desmids) from the beginning of this century and became relatively well known (Péterfi Ș., 1960, 1964; Péterfi L. Ș. and Momeu, 1988). During the last 30 years the investigations were focused mainly on silica-scaled flagellates; many of the recorded taxa being new, rare or otherwise interesting (Momeu and Péterfi L. Ș., 1983, 1987; Péterfi L. Ș. and Momeu, 1976 a-c, 1977, 1981, 1988).

Material and methods

Samples were collected during spring and autumn 1996 and 1997 from natural and artificial ponds and bogs, with or without *Sphagnum* layer, situated in the central area of “Mestecănișul de la Reci” or on its periphery, using plankton net (mesh size 25 μm). Samples preserved in 4% formaldehyde solutions were investigated by light microscopy in dry preparations for the presence of silica-scaled chrysophytes. Positive samples repeatedly rinsed with distilled water were used for transmission electron microscope (TEM) observations by dropping on parlodion-coated EM grids by means of a pipette. After drying, the grids were inspected under a TESLA BS-500 transmission electron microscope at the “Babeș-Bolyai” University, Cluj-Napoca.

Results and discussion

The present finding revealed the occurrence of 23 silica-scaled chrysophytes, namely 17 *Mallomonas* and 6 *Synura* species. Only *Mallomonas acaroides*, *M. annulata*, *M. lelymene* and *Synura lapponica* have not yet been

recorded in the investigated area (“Mestecănișul de la Reci”) one of them being quite remarkable – *Synura lapponica*.

Therefore, the electron microscopical investigations (including previous ones) recorded 34 synurophytes in the „Mestecănișul de la Reci” area (Tab. 1): *Mallomonas* 26 and *Synura* 8. From previous phycological investigations (Péterfi, Ș., 1960, 1964); Péterfi L. Ș. and Momeu, 1988) it became evident that the bogs, ponds and oxbow lakes located in the „Mestecănișu de la Reci” area is particularly rich in algae. There have been identified 336 taxa (without diatoms); their distribution among the main algal groups are as follows: Cyanophyta – 19, Rhodophyta – 1, Dinophyta – 16, Euglenophyta – 45, Chlorophyta – Chlorophyceae – 71, Chlorophyta – Zygnematophyceae – 137, Xanthophyta – 8, and Chrysophyta – 39.

The relatively high number of chrysophytes is quite outstanding in this relatively small area (about 24 sq. km) and can be explained by the great variety of habitat conditions. Accordingly, the algal communities exhibit a high diversity. Based on similarity analyses (Péterfi L. Ș. and Momeu, 1988) these communities belong to three main types:

- (1) Communities living in alkaline, highly eutrophic habitats (oxbow lakes near the Râu Negru), dominated by euglenoid flagellates and chlorococcalean algae;
- (2) Communities with very high species diversity of desmids and chrysophytes, occurring in the slightly acidic mesotrophic bogs, and
- (3) Typical sphagnophilous desmid communities inhabiting the depressions of the floating peat moss islets of some bogs (“Ingoványostó”, „Csihányostó” and others).

Most of the silica-scaled flagellates are widely distributed and occur all year round, but others has their occurrence limited mainly to the cool/cold seasons of the year. Species with special distribution pattern are rather rare (*Mallomonas actinoloma* var. *maramuresensis*, *M. insignis*, *Synura lapponica*).

Some of the *Mallomonas* species occurring in the “Mestecănișu de la Reci” are preferentially eutrophic (*Mallomonas acaroides*, *M. areolata*, *M. caudata*, *M. costata*, *M. punctifera*, *M. teilingii*, *M. tonsurata*, *M. trummensis*). They inhabit the eutrophic ponds and oxbow lakes situated near the Râu Negru (river) at the villages Ozun and Bița. Others are presumably mesotrophic or even sphagnophilous and form rich populations in the bogs located in the central part, considered the genuine “Mestecănișul de la Reci” which is partly protected (Nature Reserve). These species are *Mallomonas actinoloma* var. *maramuresensis*, *M. clavus*, *M. heterospina*, *M. intermedia*, *M. leboimei*, *M. multiunca*, *M. transsylvanica* etc. Some of these exhibited waterblooms during spring in the mesotrophic bogs (*M. leboimei*, *M. heterospina*, *M. multiunca*).

Table 1: Silica-scaled chrysophytes of Mestecănișul de la Reci

TAXA	REFERENCES									
	1	2	3	4	5	6	7	8	9	10
* <i>Mallomonas acaroides</i> Perty em. Ivanov										+
<i>Mallomonas actinoloma</i> var. <i>maramuresensis</i> Péterfi et Momeu									+	+
<i>Mallomonas akrokomos</i> Ruttner in Pascher					+				+	+
<i>Mallomonas allorgei</i> (Deflandre) Conrad							+			
* <i>Mallomonas annulata</i> (Bradley) Harris										+
<i>Mallomonas areolata</i> Nygaard						+				
<i>Mallomonas caudata</i> Ivanov em. Krieger					+	+			+	+
<i>Mallomonas clavus</i> Bradley						+	+		+	
<i>Mallomonas costata</i> Dürrschmidt					+				+	+
<i>Mallomonas crassisquama</i> (Asmund) Fott		+				+				+
<i>Mallomonas doignonii</i> Bourrelly em. Asmund et Cronberg							+			
<i>Mallomonas heterospina</i> Lund		+								+
<i>Mallomonas insignis</i> Penard									+	+
<i>Mallomonas intermedia</i> Kisselev em. Péterfi et Momeu		+								+
<i>Mallomonas leboimeii</i> Bourrelly		+							+	
* <i>Mallomonas lelymene</i> Harris et Bradley										+
<i>Mallomonas mangofera</i> Harris et Bradley		+							+	+
<i>Mallomonas matvienkoae</i> (Matvienko) Asmund et Kristiansen		+							+	+
<i>Mallomonas multiunca</i> Asmund		+								+
<i>Mallomonas oviformis</i> Nygaard						+				+
<i>Mallomonas punctifera</i> Korshikov					+	+				
<i>Mallomonas strictopteris</i> Péterfi et Momeu	+	+				+			+	+
<i>Mallomonas teilingii</i> Conrad		+								
<i>Mallomonas tonsurata</i> Teiling									+	
<i>Mallomonas transsylvanica</i> Péterfi et Momeu			+			+			+	+
<i>Mallomonas trummensis</i> Cronberg								+	+	
<i>Synura echinulata</i> Korshikov		+	+	+					+	+
* <i>Synura lapponica</i> Skuja										+
<i>Synura mollispina</i> (Petersen et Hansen) Péterfi et Momeu		+	+	+						
<i>Synura multidentata</i> (Balonov et Kuzmin) Péterfi et Momeu		+	+	+						
<i>Synura petersenii</i> Korshikov		+							+	+
<i>Synura sphagnicola</i> (Koshikov) Korshikov			+	+						+
<i>Synura spinosa</i> Korshikov		+	+	+						+
<i>Synura uvella</i> Ehrenberg em. Stein		+								+

Taxa noted with * are new records for Mestecănișul de la Reci

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The *Synura* species are very widely distributed in almost all habitat types growing in all seasons. Most of them are preferentially eutrophic (*M. echinulata*, *M. petersenii*, *M. spinosa*, *M. uvella*) and usually form rich populations (blooms), except *S. lapponica* and *S. sphagnicola* which have peculiar distribution pattern, inhabiting only the peat bogs.

Therefore, the diversity of silica-scaled chrysophytes of the area is quite remarkable and unique in Romania. A somewhat similar silica-scaled chrysophyte flora has been reported for the so called „Baláta-tó”, southwest of Hungary (Péterfi L. Ş., Padisák, Momeu, Borics, 1998). This resemblance possibly roots in the similarity between the origin (wetland areas among Pleistocene diluvial sand dunes) and the postglacial evolution of both aquatic and terrestrial vegetation in these remote localities. In this context, such silica-scaled chrysophyte floras are of general interest.

Conclusions

The pools, bogs and oxbow lakes located in the Mestecănișu de la Recî area shelter a silica-scaled chrysophyte flora of worldwide interest. Therefore, „Mestecănișul de la Recî” should be considered as a gene pool reserve or refuge not only for chrysophytes, but desmids and other algae too. The preservation of this algal sanctuary is the duty of the present generation. The first step would be to stop further alteration of landscape and habitats, followed by the restoration of the original ecosystems as far as possible.

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**FLAGELATE CU SCVAME SILICIOASE (SYNUROPHYCEAE) DIN
„MESTECĂNIȘUL DE LA RECI”, JUDEȚUL COVASNA, TRANSILVANIA,
ROMÂNIA**

(Rezumat)

„Mestecănișul de la Reci” este o curiozitate peisajistică situată în curbura internă a arcului carpatic, în Depresiunea Brașovului - compartimentul Râul Negru, între municipiul Sf. Gheorghe și orașul Covasna. Această formațiune geomorfologică și hidrologică cu totul particulară prezintă un complex de dune de nisip continentale, orientate paralel cu vântul dominant Nemira (SV-NE). Dunele s-au format prin modelare eoliană din aluviunile cuaternare ale fostului lac dacian ce ocupa Depresiunea Brașovului. Cu timpul, în depresiunile care s-au format între dune, prin ridicarea nivelului apei freatice și cu aportul precipitațiilor atmosferice, s-au infiripat mici formațiuni umede – bălți și mlaștini, în prezent aflate în diferite faze de colmatare. Ele sunt flancate cu arini care cresc în mod natural, iar dunele, în cea mai mare parte consolidate, sunt acoperite fie cu mesteceni fie cu fânețe și diverse culturi agricole. Unele dintre aceste mlaștini se caracterizează prin acumulare de turbă, iar în câteva s-au format plauri pe care s-au instalat diferite specii de *Sphagnum*. Vegetația acvatică și palustră luxuriantă a mlaștinilor adăpostește numeroase rarități floristice – inclusiv relice glaciare (*Lysimachia thyrsiflora*, *Comarum palustre* și *Dryopteris cristata*).

Flora algală, deosebit de bogată și interesantă, a fost cercetată mai ales de la jumătatea secolului 20. Până în prezent au fost semnalate 336 specii algale, mai ales alge verzi (desmidiacee, chlorococcale) și flagelate euglenoide. Flagelatele cu înveliș format din scvame și sete silicioase (Synurophyceae) au fost investigate în ultimile trei decenii cu ajutorul microscopului electronic.

Lucrarea de față se referă la speciile de Synurophyceae identificate în eșantioanele colectate în primăvara și toamna anilor 1996 și 1997. Sunt semnalate 23 de taxoni (17 de *Mallomonas* și 6 de *Synura*) din care *Mallomonas acaroides*, *M. annulata*, *M. lelymene* și *Synura lapponica* sunt semnalate pentru prima dată din „Mestecănișul de la Reci” (Tabel 1). Investigațiile efectuate cu microscopul electronic (inclusiv cele anterioare) au relevat în „Mestecănișul de la Reci” prezența unei diversități remarcabile de Synurophyceae (34 taxoni) dintre care unele rare sau foarte rare. Diversitatea algelor, inclusiv a celor care au constituit obiectul prezentei lucrări justifică pe deplin propunerea autorilor pentru conservarea în continuare a unei părți din „Mestecănișului de la Reci” ca un refugiu de interes mondial pentru numeroase specii de cormofite, briofite și alge.