

Orthoamphisiella stramenticola nov. gen., nov. spec., a New Hypotrichous Ciliate (Ciliophora: Hypotrichida) Occurring in Walnut Leaf Litter

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Summary. A new hypotrichous ciliate, *Orthoamphisiella stramenticola* nov. spec., was discovered in fresh walnut leaf litter in Austria. The description is based on live observations, protargol impregnation and morphometric techniques. *Orthoamphisiella stramenticola* is 80-140 $\times$ 30-45 μ m in size and has 4 macronuclear segments, 20 adoral membranelles, 5 buccal cirri and 10 fronto-ventral cirri in 2-3 short rows on average. Transverse and caudal cirri are lacking. This and the short rows of fronto-ventral cirri left to the amphisiellid long ventral row are considered to be diagnostic characters of a new genus, *Orthoamphisiella* nov. gen., which is placed in the family *Amphisiellidae* Jankowski, 1979.

Key words. *Orthoamphisiella*, *Hypotrichida*, systematics.

INTRODUCTION

Hypotrichous ciliates are very common in soil. Many new genera and species have been discovered during the last decade (Foissner 1987a). The new species described in this paper was found during the investigation of ciliates inhabiting fresh leaf litter.

MATERIALS AND METHODS

Orthoamphisiella stramenticola occurred on fallen leaves of a walnut tree (*Juglans*) in the village of Schrötten, Styria, Austria next to an old farmhouse with the number 22. The meadow under the tree is mowed twice a year and is rich in flora.

The top leaf of at least 3 layers of dry walnut leaves was taken. Several such leaves were put in a petri dish and a raw culture

according to Foissner (1987a) was set up. A clone was established in Volvic-yeast medium and maintained at 14-22°C. Protargol silver impregnation was used to reveal the infraciliature (Foissner 1982). Methyl green-pyronin was applied to differentiate certain cell organelles (Foissner 1979). Body shapes of living specimens were drawn from slides without cover glasses. Details were studied on slightly to heavily squeezed individuals using the oil immersion objective, bright field and phase contrast microscopy. Drawings were made with the help of a camera lucida. All counts and measurements were undertaken at a magnification of 945 $\times$ (1 unit of ocular micrometer = 1.25 μ m).

All statistical procedures follow methods described in Sokal and Rohlf (1981).

RESULTS AND DISCUSSION

Orthoamphisiella nov. gen.

D i a g n o s i s: *Amphisiellidae* with 1 row of buccal cirri and 2-3 short rows of fronto-ventral cirri left of the long ventral row.

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Type species: *Orthoamphisiella stramenticola* nov. spec.

Derivatio nominis: Composite of "Orthos" (Greek.; straight; because of the straight rows of cirri in the frontal field) and "Amphisiella". Feminine gender.

Comparison with related genera: The conspicuous buccal and fronto-ventral rows and the lack of transverse and caudal cirri separate *Ort-*

hoamphisiella from *Amphisiella* Gourret et Roeser, 1888 (*Amphisiellidae* with more than 1 cirrus left of ventral row in frontal field. Transverse cirri present; Fig. 2); from *Amphisiellides* Foissner, 1988 (*Amphisiellidae* with more than 1 cirrus left of ventral row in frontal field. Transverse cirri and caudal cirri present; Fig. 3); from *Paramphisiella* Foissner, 1988 (*Amp-hisiellidae* with 1 cirrus left of ventral row in frontal field. Caudal cirri present; Fig. 4); and from *Hemiam-*

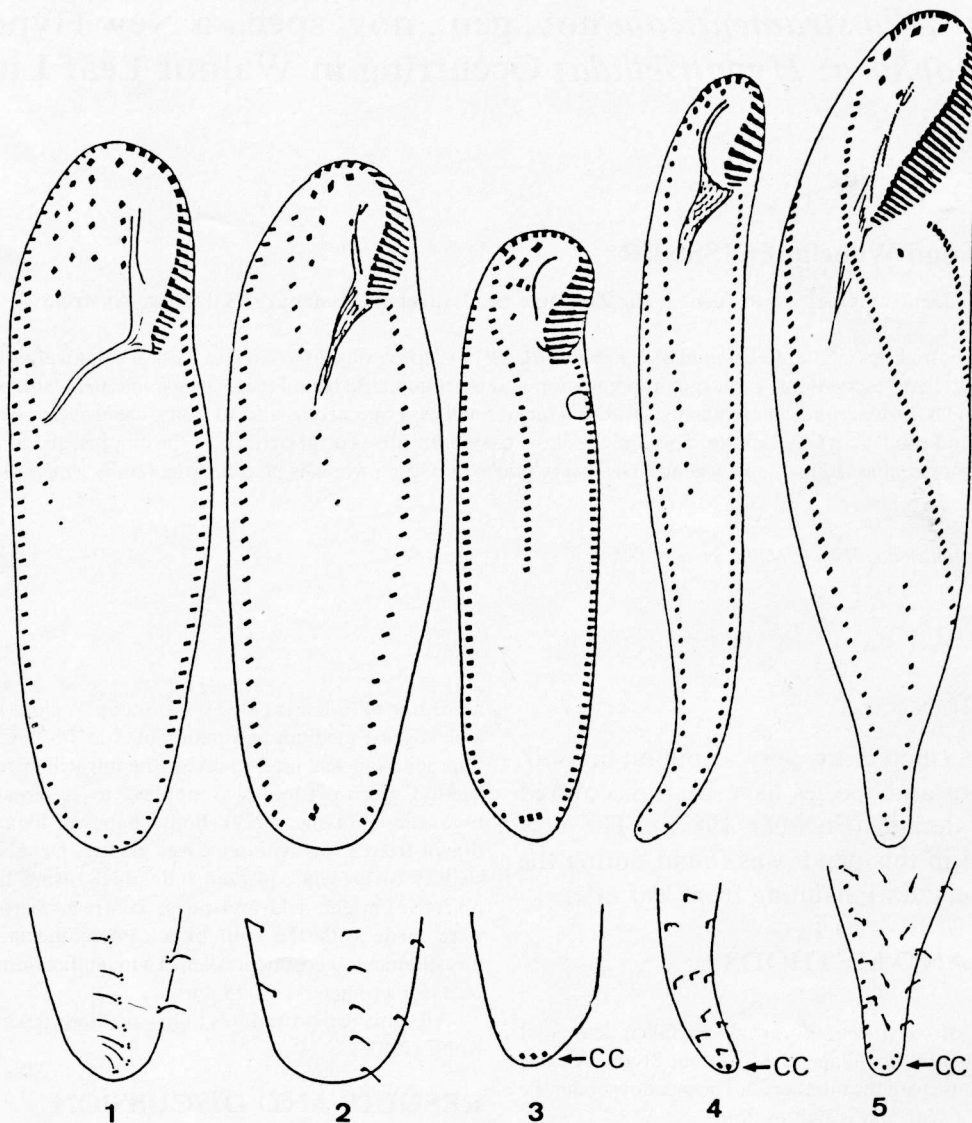


Fig. 1-5. Comparison of the 5 genera of the family Amphisiellidae. The upper series of figures shows the ventral infraciliature, the lower series shows the dorsal infraciliature in the posterior part. 1 - *Orthoamphisiella* (original). 2 - *Amphisiella* (from Foissner 1987b). 3 - *Amphisiellides* (from Hemberger 1985). 4 - *Paramphisiella* (from Foissner 1982). 5 - *Hemiamphisiella* (from Foissner 1988). CC - caudal cirri.

Table 1

Morphometric characterization of *Orthoamphisiella stramenticola*

Character ¹⁾	$\bar{x}$	M	SD	SE	CV	Min	Max	n
Body, length	93.8	92.5	6.5	1.2	6.9	78.7	105.0	29
Body, width	28.8	27.5	6.6	1.2	22.9	18.7	50.0	29
AZM, length	27.5	27.5	4.6	0.8	16.7	22.5	37.5	29
VR, length	46.2	48.7	8.9	1.7	19.2	41.2	83.7	27
Ma, length ²⁾	10.9	11.3	1.7	0.4	15.2	6.8	13.8	22
Ma, width ²⁾	5.9	6.3	0.9	0.2	15.2	3.8	7.5	22
Ma, length ³⁾	11.9	12.5	3.0	0.6	25.2	5.0	17.5	28
Ma, width ³⁾	5.3	5.0	0.9	0.2	16.9	3.7	7.5	29
Ma, No.	4.3	4.0	0.6	0.1	13.9	4.0	6.0	30
Mi, No.	5.1	5.0	1.3	0.2	25.4	3.0	7.0	28
AM, No.	20.4	20.0	2.7	0.6	13.2	18.0	30.0	23
RMR, No. cirri	40.7	41.0	2.1	0.5	5.1	36.0	44.0	19
LMR, No. cirri	33.5	34.0	2.3	0.5	6.9	30.0	38.0	21
BC, No. cirri	4.7	5.0	1.0	0.2	21.2	4.0	7.0	22
FVR 1 No. cirri	3.7	4.0	0.7	0.1	18.9	3.0	5.0	22
FVR 2 No. cirri	4.0	4.0	0.6	0.1	15.0	3.0	5.0	23
FVR 3 No. cirri	2.8	3.0	1.0	0.2	35.7	1.0	5.0	15
VR, No. cirri	22.8	23.0	2.4	0.5	10.5	19.0	30.0	20

¹⁾ All data are based on protargol impregnated specimens from a raw culture. All measurements in μm . AM – adoral membranelles; AZM – adoral zone of membranelles; BC – buccal row; LMR – left marginal row; Ma – macronuclear segment; Mi – micronuclei; RMR – right marginal row; VR – ventral row; FVR 1,2,3 – 1st, 2nd, 3rd fronto-ventral row; $\bar{x}$ – arithmetic mean; M – median; SD – standard deviation; SE – standard error of arithmetic mean; CV – coefficient of variation in %; Min – minimum value; Max – maximum value; n – sample size. ²⁾ anterior segment. ³⁾ second anterior segment.

phisiella Foissner, 1988 (*Amphisiellidae* with 1 cirrus left of ventral row in the frontal field. Underneath oral apparatus 1 isolated cirrus between ventral row and left marginal row. Caudal cirri present. Usually a second much shorter ventral row in posterior half of body; Fig. 5).

***Orthoamphisiella stramenticola* nov. spec.**
(Tab. 1, Fig. 6-13)

Diagnosis: Size in vivo 80-140 $\times$ 30-45 μm . Body shape almost rectangular. 4 macronuclear segments, 20 adoral membranelles, 5 buccal cirri and 10 fronto-ventral cirri in 2-3 rows on average.

Derivatio nominis: "Stramenticola" (lat.) due to its living in litter.

Type location: Walnut leaf litter in village Schrötten, Styria, Austria (Long. 15°49', Lat. 46°47', Alt. 320 m).

Type specimens: A holotype and a paratype of *O. stramenticola* as 2 slides of protargol impregnated cells have been deposited in the collection of microscope slides of the Oberösterreichischen Landesmuseums in Linz.

Description: Shape rectangular, right body margin straight to slightly convex, left slightly indented beneath adoral zone of membranelles. Both ends broadly rounded. Sometimes anterior end narrowed head-like, posterior pointed (Fig. 9). Dorso-ventrally flattened about 2:1. Under coverslip pressure slightly contractile. Usually 4 macronuclear segments, three of them ellipsoid, lie slightly left of median, anteriormost segment almost spherical, located slightly right of median at level of cytopharynx. Chromatin bodies spherical. Usually 5 spherical micronuclei near macronuclear segments. Contractile vacuole on left border in mid-body, without collecting canals. Some colourless subpellicular granules irregularly and lo-

osely arranged, do not stain with methyl green-pyronin (Fig. 9). Cytoplasm filled with crystals and greasily shining globules. Food vacuoles 3-7 μm in diameter, containing colpodid ciliates and possibly bacteria. Cytopyge at posterior end of body. Movement fast, changes direction frequently.

Adoral zone of membranelles 30% of body length. Cilia of adoral zone of membranelles in vivo 13-17 μm . All cirri 8-12 μm long. Right marginal row commences at level of 3rd-4th cirrus of ventral row. Ventral row commences next to distal end of adoral zone of membranelles, usually terminates near centre of ventral surface. Marginal rows almost closed posteriorly. Bases of the 3 frontal cirri slightly enlarged. Undulating membranes almost straight, lie side by side. Buccal

row in line with middle (second) frontal cirrus. First buccal cirrus lies at a level with 2nd cirrus of 1st fronto-ventral row. First fronto-ventral row in line with right frontal cirrus. Last cirri of fronto-ventral rows sometimes out of line. A 3rd fronto-ventral row exists in 64% of cells (including cells which have only 1 cirrus for the 3rd fronto-ventral row). Two dorsal kineties commence at anterior end of body, right kinety courses along right margin of body and ends slightly subterminally. Left kinety courses almost straight to posterior end of body, its last 3 cilia curved to left. Caudal and transverse cirri absent.

Prior to encystment in a clone 2 cells unite along their oral surfaces and the posterior body half attenuates. Pairs stop swimming and round up, still

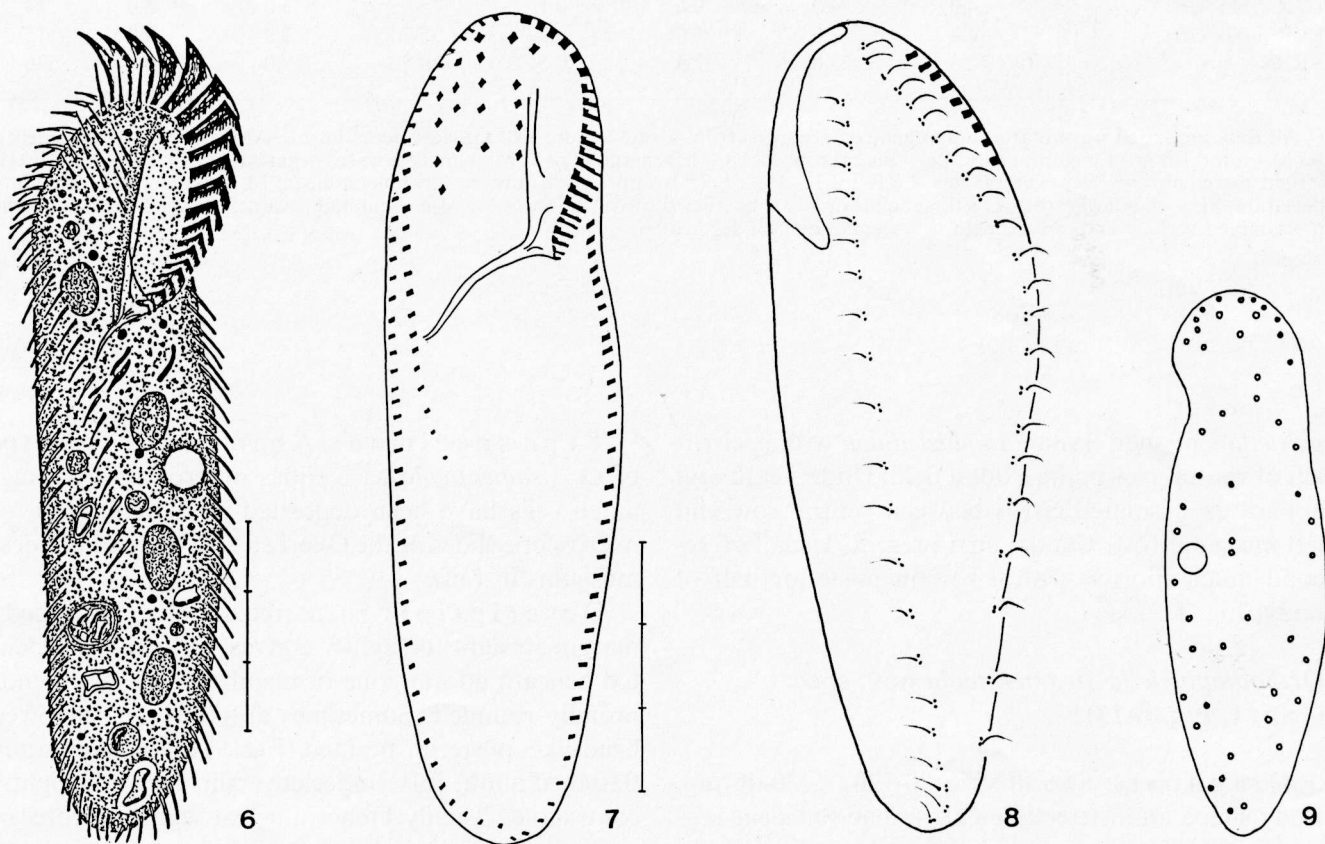


Fig. 6-9. *Orthoamphisiella stramenticola* from life (Fig. 6) and after protargol impregnation (Fig. 7, 8). 6, 7 - Ventral views. 8 - Dorsal view, 9 - Dorsal view of shape variant. Note loosely arranged subpellicular granules. Scale bar division = 10 μm .

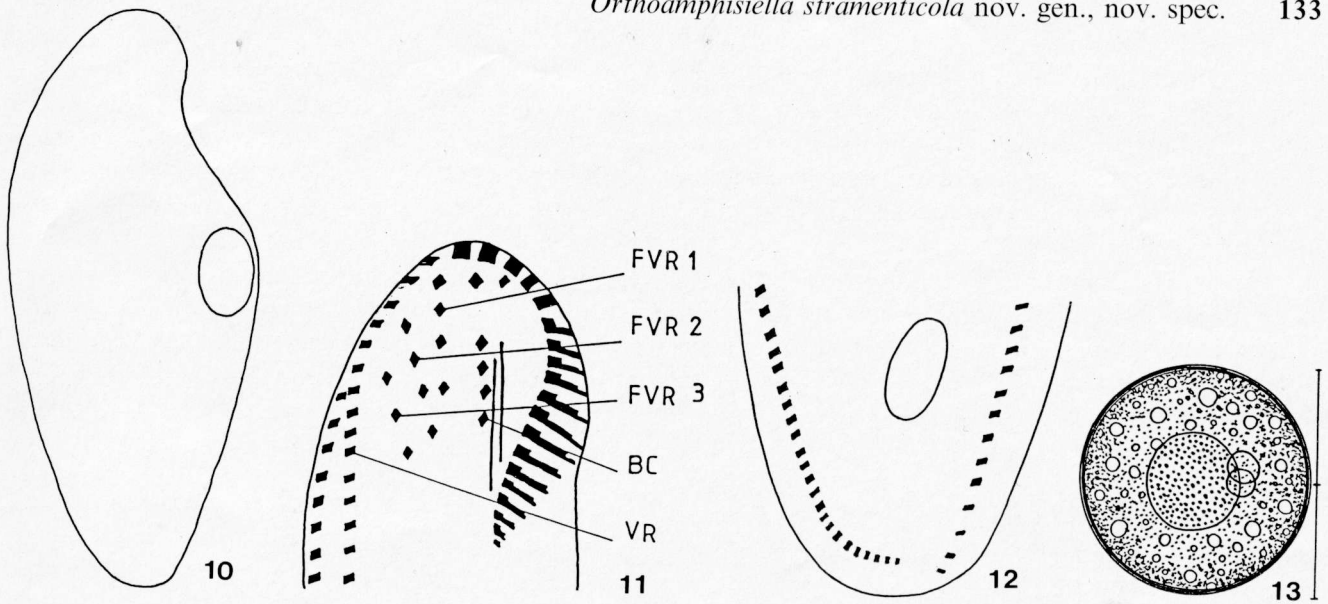


Fig. 10-13. *Orthoamphisiella stramenticola* from life (Fig. 10, 13) and after protargol impregnation (Fig. 11, 12). 10 – Body shape of a middle morphogenetic stage. 11, 12 – Anterior and posterior portion of ventral side higher magnified. 13 – Resting cyst. BC – buccal row; FVR 1, 2, 3, – 1st, 2nd, 3rd fronto-ventral row; VR – ventral row. Scale bar divisions = 10 μ m.

united along their oral surfaces. They then separate by slow movement of their cirri which eventually disappear. Resting cysts usually lie by pairs, filled with greasily shining globules, 15-42 μ m ($\bar{x}$ = 38 μ m, n = 30) in diameter. Shape spherical to slightly ellipsoid, wall c. 1 μ m thick (Fig. 13).

Comparison with related species: No other species is known to us with the characters of *Orthoamphisiella stramenticola*. Some, however, appear rather similar when superficially observed, e. g., *Hemiamphisiella quadrinucleata* (Foissner, 1984) Foissner, 1988 (caudal cirri present, 4 dorsal kineties, no fronto-ventral rows), *Amphisiella quadrinucleata* Berge et Foissner, 1989 (transverse cirri present, only 1 fronto-ventral row left of ventral row), *Amphisiella vitiphila* (Foissner, 1987) Foissner, 1988 (transverse cirri present, 3 dorsal kineties, usually only 3 ventral cirri behind the 3 frontal cirri).

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