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## NEW FINDS OF *TOKOPHYRA WENZELI* (CILIOPHORA, SUCTOREA), A COMMENSAL OF WATER MITES (ACARI, HYDRACHNIDIA), AND THE REDESCRIPTION OF THE SPECIES

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**New Finds of *Tokophrya wenzeli* (Ciliophora, Suctorea) a Commensal of Water Mites (Acari, Hydracarina) and Redescription of a Species.** Dovgal I. V., Zawal A., Pešić V. — The article deals with investigations of suctorian species *Tokophrya wenzeli* Matthes et Stiebler, 1970 which was observed in waterbodies of Ukraine, Poland and Macedonia. New observations permit to precise the morphology of tentacles and show the variability of such sufficient characters of the species as morphology of basal plate, stalk and actinophores. The redescription of the species is also presented.

**Key words:** suctorian, *Tokophrya wenzeli*, commensal, host, water mite.

**Новые находки *Tokophrya wenzeli* (Ciliophora, Suctorea) — комменсала водных клещей (Acari, Hydracarina) и переописания вида.** Довгаль И. В., Заваль А., Пешич В. — Статья посвящена изучению суктории *Tokophrya wenzeli* Matthes et Stiebler, 1970, обнаруженной в водоемах Украины, Польши и Македонии. Новые данные позволили уточнить детали строения щупалец цилиаты, также оказалось, что важные для диагностики вида признаки, как строение базального диска, стебелька и актинофоров достаточно изменчивы. Приводится переписание вида.

**Ключевые слова:** суктория, *Tokophrya wenzeli*, комменсал, хозяин, водный клещ.

### Introduction

The first finds of suctorians as commensals of arachnids have occurred from twenties to thirties of 20th century, when two species of these ciliates were described from marine halacarid mites (Dovgal et al., 2008).

Almost at the same time the suctorians occurring on the freshwater hydracarine mite were first found. C. Motas (1928) observed the mass colonization of mites by suctorians in ponds in the vicinity of Dombes just north of Lyon and in ponds at the river Rhone between Aoste and Sant-Didier, southeast of France. Suctorian ciliates were observed by the author on *Hydryphantes dispar* (Schaub, 1888), *Limnesia fulgida* Koch, 1836, *L. maculata* (O. F. Müller, 1776), *L. undulata* (O. F. Müller, 1776), *Piona pusilla* (Neuman, 1875), *P. obturbans* (Piersig, 1896), *Pionopsis lutescens* (Hermann, 1804) and *Hydrochoreutes krameri* Piersig, 1895.

C. Motas made the figures of suctorians (fig. 1. 1) but did not identify the species and provided no descriptions.

The species observed by C. Motas was described (Matthes, Stiebler, 1970) from water bodies of Germany as *Tokophrya wenzeli* Matthes et Stiebler, 1970 (fig. 1. 2). German authors found the species on pedipalps and legs of mites *Limnesia undulate* (O. F. Müller, 1776), *L. maculata* (O. F. Müller, 1776), *Piona conglobata* (Koch, 1836), *P. variabilis* (Koch, 1842), *Arrenurus globator* (O. F. Müller, 1776), and *A. stecki* Koenike, 1894.

Later C. R. Curds (1985) gave short diagnosis of *T. wenzeli* in his taxonomic revision of tokophryin suctorians. However, after the report of Matthes and Stiebler the species was found only in Ukrainian water bodies. Thus I. V. Dovgal (1987) observed *T. wenzeli* in Lake Staraja Desna near Makoshino, Chernigiv oblast on

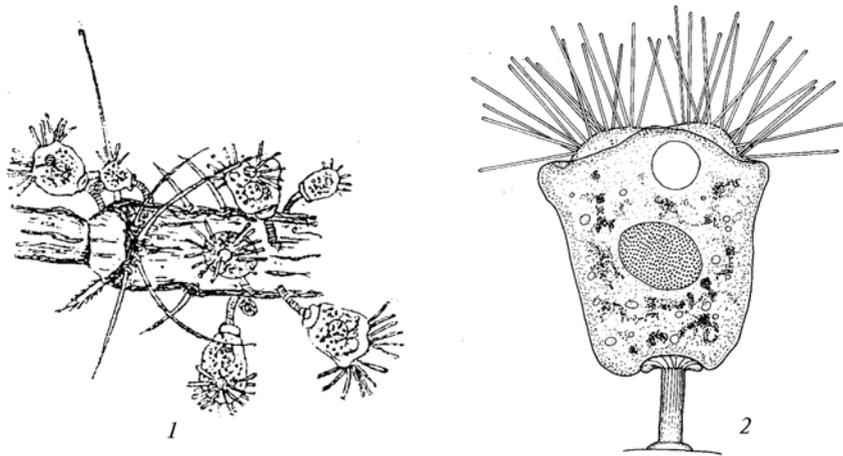


Fig. 1. *Tokophrya wenzeli*: 1 — after Motas (1928); 2 — after Matthes and Stiebler, 1970.

Рис. 1. *Tokophrya wenzeli*: 1 — по: S. Motas (1928); 2— по: Matthes, Stiebler, 1970.

*Hydrachna* sp. and also mentioned the finds of the species on *Eylais* sp. and *Limnesia fulgida* in water bodies of the rivers of Western Bug and Pripyat basins (Dovgal, 1991).

Only well after (Dovgal et al., 2007) one more suctorian species, *Acineta persiensis* Dovgal et Pešic, 2007, was described from mites from lotic freshwaters.

This article deals with investigations on suctorian species *T. wenzeli* studied by the authors in water bodies of Ukraine, Poland and Macedonia.

#### Material and methods

The mites were collected by a mesh net or by manual sampling and then sorted on the spot from the living material, fixed and preserved in 70% alcohol or 4% formalin. Through the fine microscopical observation, the suctorian ciliates were recorded and identified, by using several staining techniques, such as haematoxylin.

The photomicrographs were made with the use of digital video camera DC-1200 for microscopy. The interference contrast photos were obtained in the Schmalhausen Institute of Zoology Centre of Shared Service of Unique Equipment using the microscope Zeiss AxioImager M1 and computer program Zeiss Axio Vision v. 4.63. Measurements were made by means of the computer program ScopePhoto 3.0 for processing of digital imaging.

#### Results and discussion

*Tokophrya wenzeli* was found in Ukraine by I. V. Dovgal, as mentioned above. Apart from the find in Chernigiv oblast the species was also observed on *Eylais* sp. from former river-bed of the Goryn' river near Stavok village, Rivne oblast (04.07.1985), on *Limnesia fulgida* from floodplain lake near the Goryn' river near village Zbuzh, Rivne oblast (06.07.1985), and on *E. saratowi* Piersig, 1904 from floodplain lake on the left bank of the Dnieper in Kyiv vicinity (20.07.1986).

Suctorians found in Ukraine had the following measurements (in  $\mu\text{m}$ ): body length 39–50, width 32–35, dimensions of the macronucleus 5–9 x 10–16, length of the stalk 6–14, diameter 5–6, length of the tentacles 8–25.

The species was observed in summer with intensity from 8 to 30 individuals per host.

Noteworthy, the stalk in some individuals of *T. wenzeli* from Ukraine possessed an apical basal plate which was not flattened and submerged into the cell body (as in the specimens from Germany), but in the others this plate was calyciform and longitudinally striated (fig. 2. 1).

In A. Zawal's materials, *T. wenzeli* was found on *Forelia variegator* (Koch, 1837) and *Hygrobatas longipalpis* (Hermann, 1804) from the Lake Binovskie in vicinities of Szczecin, 53°18'41 72"N, 14°38'4. 4"E (Poland).

Measurements (in  $\mu\text{m}$ ): body length 31–42, width 25–41, dimensions of the macronucleus 14–21 x 9–17, length of the stalk 7–22, diameter 3–4, basal plate diameter 6–11, actinophore height 1–18, actinophore width 3–17, length of the tentacles 10–21.

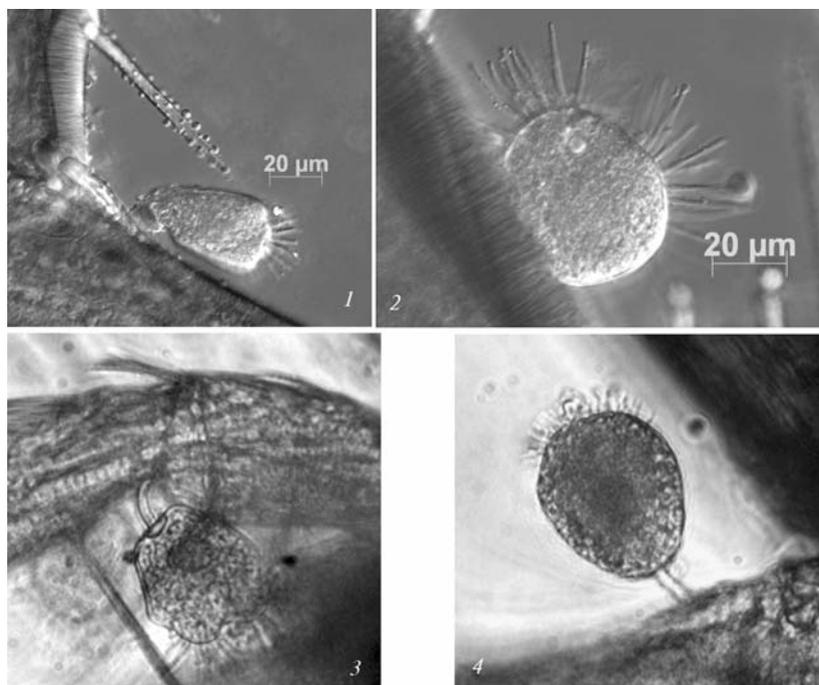


Fig. 2. *Tokophrya wenzeli*: 1–2 — from Ukrainian water bodies (differential interference contrast; 1 — lateral view, 2 — frontal view); 3 — from Poland (x640); 4 — from Lake Ohrid (Macedonia) (x640).

Fig. 2. *Tokophrya wenzeli*: 1–2 — из водоемов Украины (дифференциальный интерференционный контраст; 1 — вид сбоку, 2 — вид спереди); 3 — из водоемов Польши (x640); 4 — из озера Охрид (Македония) (x640).

It should be noted that in the specimens from Poland (fig. 2, 3) the basal plate was well developed, flattened, but without striae.

V. Pešić found *T. wenzeli* on *Hygrobatas diversiporus* (Sokolow, 1927) in the ancient lake Ohrid, in vicinities of Ohrid city (41°07'02"N, 20°48'26"E) in Macedonia.

Suctorians found in lake Ohrid had the following measurements (in  $\mu\text{m}$ ): body length 37–52, width 30–39, dimensions of the macronucleus 13–18 x 9–12, stalk length 9–14, diameter 2–3, basal plate diameter 5–6, actinophore height 5–10, width 13–21, length of the tentacles 4–22.

In contrast to the Matthes' and Stiebler's description of *T. wenzeli* the individuals of the species from Ohrid had the stalk not striated, basal plate poorly developed, dipped into the cell body and often imperceptible (fig. 2, 4). The characteristic for the species actinophores were absent in those individuals.

In accordance with Matthes' and Stiebler's (1970) diagnosis *T. wenzeli* is a suctorian up to 30  $\mu\text{m}$  large, having two bundles of tentacles (from 8 to 28 tentacles in each) situated on dome-shaped actinophores (fig. 1, 2). The apical surface of the cell body bearing the actinophores dips into the body and, as a result, is surrounded by a circular groove. It is Matthes' and Stiebler's opinion that the same actinophore morphology is also characteristic for Baikal suctorian *T. radiata* Gajewskaja, 1933. The width of the body in *T. wenzeli*, as a rule, is larger than the body length. The stalk is striated and bears basal plate 10  $\mu\text{m}$  in diameter. The body easily separates from stalk under mechanical load. There is one large contractile vacuole which is placed subapically near the longitudinal axis of the body. Cytoplasm is hazel, macronucleus is spherical or oval. The duration of the processes of endogemmic budding lasts 4. 5 hours. The tentacles of *T. wenzeli* are rather thin, without visible knobs; however, their distal ends are slightly thickened.

It is pertinent to note that in Matthes' and Stiebler's (1970) and Curds' (1985) diagnoses of *T. wenzeli* the type locality and the type host were not indicated. Besides, our

observations permit to precise the morphology of tentacles and show the variability of such important characters of the species as morphology of the basal plate, stalk and actinophores. In our opinion, these data necessitate to refine the species diagnosis.

***Tokophrya wenzeli* Matthes et Stiebler, 1970, emended description**

Suctorian with the cell body in the shape of inverted pyramid, slightly flattened laterally. The tentacles are clavate, contractile, and very thin, thus their knobles are poorly distinguishable (fig. 2, 2). The tentacles are evenly distributed over the surfaces of two hemispherical actinophores, the bases of which are somewhat offset from borders of flattened apical body surface. In some cases the actinophores may be poorly developed. The macronucleus is relatively large, spherical or oviform. There is single subapical contractile vacuole. The stalk is thick, somewhat striated, provided with basal plate which is usually concave upward and gently dips into base of the cell body. Stalk is clamped to substrate by the adhesive disc. Asexual reproduction is by endogenous budding; as a result, the single disc-like swarmer with convex dorsal and flattened ventral surfaces is generated (Matthes et Stiebler, 1970).

**Dimensions** (in  $\mu\text{m}$ ): body length 31–52 (22–55, after Matthes and Stiebler), width 25–41 (25–48), length of the tentacles 4–25 (16–23), height of the actinophore 1–18, width of the actinophore base 3–21, stalk length 6–22 (8–28), diameter 2–6 (4), width of the basal plate 5–11, macronucleus dimensions 5–21 x 9–17.

**Hosts:** *Hydryphantas dispar*, *Limnesia fulgida*, *L. maculata*, *L. undulata* (type host), *Piona pusilla*, *P. obturbans*, *P. conglobata*, *P. variabilis*, *Pionopsis lutescens*, *Hydrochoreutes krameri*, *Arrenurus globator*, *A. stecki*, *Eylais* sp., *E. saratovi*, *Forelia variegator*, *Hygrobatas longipalpis*, and *H. diversiporus*. Localization — pedipalps and legs of the host.

**Localities:** Ponds in the vicinity of Dombes just north of Lyon and in ponds near the river Rhone between Aoste and Sant-Didier, southeast of France, German water bodies (type locality), Lake Staraja Desna near Makoshino, Chernigiv oblast, former riverbed of the Goryn' river near village Stavok, Rivne oblast, floodplain lake near the Goryn' river near village Zbuzh, Rivne oblast, floodplain lake on the left bank of the Dnieper in Kiev vicinity (Ukraine), Lake Binovskie in vicinity of Szczecin (Poland), lake Okhrid (Macedonia).

We emphasize that *T. wenzeli* was not observed on the hydrachnid mites from lotic water bodies. It seems likely that the species is a characteristic commensal of freshwater mites from stagnant water reservoirs.

- Curds C. R.* A revision of Suctorina (Ciliophora, Kinetofragminofora) 3. *Tokophrya* and its morphological relatives // Bulletin of the British Museum (Natural History). Zoology ser. — 1985. — **49**, 2. — P. 167–193.
- Dovgal I. V.* Ciliophora (Suctorina) of the Eastern part of Ukrainian Polesje area // Vestnik zoologii — 1987. **21**, N 4. — P. 3–8. — Russian: *Довгаль И. В.* Щупальцевые инфузории (Ciliophora, Suctorina) восточной части Украинского Полесья.
- Dovgal I. V.* Peculiarities of Ciliophora Suctorina biocoenotic distribution in water bodies of the right-bank Ukrainian Polesje area // Vestnik zoologii.— 1991. — **28**, N 4. — P. 54–57. — Russian: *Довгаль И. В.* Особенности биоценотического распределения щупальцевых инфузорий в водоемах правобережного Полесья Украины.
- Dovgal I. V.* Keys for identification of tentaculous infusoria (Ciliophora, Suctorina) of the Ukrainian fauna // Vestnik zoologii. — 1996. Suppl. N 2. — 42 p. — Russian: *Довгаль И. В.* Определитель щупальцевых инфузорий (Ciliophora, Suctorina) фауны Украины.
- Dovgal I. V., Pešić V.* *Acineta persiensis* sp. n. (Ciliophora, Suctorea) — a new freshwater suctorian species from the water mites of genus *Protzia* (Acari, Hydrachnidia) // Vestnik zoologii. — 2007. — **41**, N 2. — C. 165–167.
- Dovgal I., Chatterjee T., Ingole B.* An overview of suctorian ciliates (Ciliophora, Suctorea) as epibionts of halacarid mites (Acari, Halacaridae) // Zootaxa. — 2008. — N 1810. — P. 60–68.
- Matthes D., Stiebler G.* Susswassersuktorien auf Arachnidien // Arch. Protistenkd. — 1970. — **112**, 1–2. — S. 65–70.
- Motas C.* Contribution a la connaissance des Hydracariens francais particulierement du Sud-Est de la France // Trav. Lab. Hydrobiol. Piscic. Univ. Grenoble. — 1928. — **20**. — P. 49–164.