

Some taxonomical and nomenclatural changes  
in the genus *Trachelomonas* EHRENB. emend. DEFL.  
(Euglenophyta)

By ALAIN COUTÉ<sup>1</sup> and GUILLERMO TELL<sup>2</sup>

<sup>1</sup> M.N.H.N., Dépt. Régulation, Développement et Diversité Moléculaire, USM 505  
Écosystèmes et Interactions Toxiques, Paris, France

<sup>2</sup> UBA, Dept. Ecología, Genética y Evolución, Facultad Cs. Exactas y Naturales  
Buenos Aires, Argentina

With 12 figures in the text

**Abstract:** This paper deals with the taxonomic and nomenclatural revision of some species and infraspecific taxa of the genus *Trachelomonas* (Euglenophyceae). Twelve changes are suggested. Among them, we propose new synonyms for the following four taxa: *Trachelomonas acanthophora* var. *minor* BALECH et DASTUGUE, *T. acanthophora* var. *speciosa* (DEFL.) BALECH, *T. hispida* (PERTY) STEIN emend. DEFL. and *T. superba* var. *swirenkiana* DEFL.; the identification of an unnamed but previously illustrated and described individual: *T. amphoriformis* var. *granulosa* COUTÉ et ILTIS; a new variety: *T. megalacantha* DA CUNHA var. *paucispina* COUTÉ et TELL, and five new status and new combinations: *T. crateriphora* (CONFORTI et RUIZ) COUTÉ et TELL, *T. duplex* (DEFL.) COUTÉ et TELL, *T. rugulosa* var. *paralella* fo. *paralella* (TELL et ZALOCAR) COUTÉ et TELL and *T. rugulosa* var. *paralella* fo. *minima* (CONFORTI et RUIZ) COUTÉ et TELL.

**Key words:** *Trachelomonas*, taxonomy, Euglenophyta.

### Introduction

The genus *Trachelomonas* EHRENB. emend. DEFL. was defined by DEFLANDRE (1926) in the paper “Monographie du genre *Trachelomonas* EHRENB.” Species of *Trachelomonas* have been recorded from all over the world in numerous papers dealing with phytoplankton taxonomy and ecology. Some species are endemic, and others are cosmopolitan or restricted to cold, temperate or warm regions. Certain species and infraspecific taxa of the genus present doubts in their taxonomy. This taxonomical uncertainty promotes an erroneous understanding of the taxonomy and of the geographical distribution of species. On the basis of biblio-

graphic material we suggest some changes on the taxonomy of twelve species and infraspecific taxa of the genus. Among them, we propose new synonyms for the following four taxa: *Trachelomonas acanthophora* var. *minor* BALECH et DASTUGUE, *T. acanthophora* var. *speciosa* (DEFL.) BALECH, *T. hispida* (PERTY) STEIN emend. DEFL. and *T. superba* var. *swirenkiana* DEFL.; the identification of an unnamed but previously illustrated and described individual: *T. amphoriformis* var. *granulosa* COUTÉ et ILTIS; a new variety: *T. megalacantha* DA CUNHA var. *paucispina* COUTÉ et TELL, and five new status and new combinations: *T. crate-riphora* (CONFORTI et RUIZ) COUTÉ et TELL, *T. duplex* (DEFL.) COUTÉ et TELL, *T. rugulosa* var. *paralella* fo. *paralella* (TELL et ZALOCAR) COUTÉ et TELL and *T. rugulosa* var. *paralella* fo. *minima* (CONFORTI et RUIZ) COUTÉ et TELL.

Besides our results on morphological features, the *Trachelomonas*' taxonomy researches should consider also the morphological plasticity of some species and molecular analyses (MARIN et al. 2003).

## Material and methods

In order to analyse the features of the species and infraspecific taxa of *Trachelomonas* we performed an extensive survey of the bibliographic material. The original descriptions and illustrations were evaluated and compared from the universal literature.

The following abbreviations are utilized: c.d.: collar diameter; c.h.: collar height; d.: lorica diameter without spines; d.w.sp.: lorica diameter with spines; L.: lorica length without spines; L.w.sp.: lorica length with spines; sp.: spines; t.p.: tail-piece; w: width.

## Results

*Trachelomonas acanthophora* var. *minor* BALECH et DASTUGUE in BALECH 1944, Anales del Mus. Arg. de Cs. Nats. Bernardino Rivadavia, Bs. As. 41: 291, Fig. 130, 132–137, 234.

Syn.: *Trachelomonas acanthophora* var. *speciosa* fo. *minor* CONFORTI 1989, Crypt. Algol. 10: 75, fig. 11. (Fig. 1a–f)

The organism attributed by CONFORTI (1989) to *T. acanthophora* var. *speciosa* fo. *minor* coincides with the description of *T. acanthophora* var. *minor* BALECH et DASTUGUE. Moreover, both taxa were found in the same region (Buenos Aires province, Argentina). BALECH (1944) illustrated five individuals showing the variability of the spine distribution (Fig. 1a–e). CONFORTI's (Fig. 1f) individual shows a very similar pattern of spines distribution to those of *T. acanthophora* var. *minor*. Dimensions in both taxa are very similar, *T. acanthophora* var. *minor*: L.: 35–39  $\mu\text{m}$ , d.: 17–22  $\mu\text{m}$ , c.h.: 4–5.5  $\mu\text{m}$ , t.p. 5–6  $\mu\text{m}$ ; *T. acanthophora* var. *speciosa* fo. *minor*: L.: 35–36  $\mu\text{m}$ , d.: 17–17.5  $\mu\text{m}$ , c.h.: 1.5  $\mu\text{m}$ , c.d.: 4–5.5  $\mu\text{m}$ , t.p.: 4.5  $\mu\text{m}$ , sp.: 3.5–5. Due to the similarity of the individuals of both taxa we consider the infraspecific taxa erected by CONFORTI (1989) as a synonym of *T. acanthophora* var. *minor*.

The variety is only known from Buenos Aires province, Argentina.



*Trachelomonas acanthophora* var. *speciosa* (DEFL.) BALECH 1944, Anales del Mus. Arg. de Cs. Nats. Bernardino Rivadavia, Bs. As. 41: 290, Figs. 128, 232.

Basionym et holotypus: *Trachelomonas speciosa* DEFL. 1926, Monographie du genre *Trachelomonas* EHRENB. : p.122, Figs. 637, 638, 639.

Syn. : *Trachelomonas speciosa* var. *spinosa* PRESCOTT 1955, The Ohio Journal of Science 55 (2): 117, pl. 1, fig. 17. (Fig. 2a–d)

The euglenoid named by PRESCOTT (1955) *T. speciosa* var. *spinosa* (Fig. 2d) agrees with the description of *T. acanthophora* var. *speciosa* (DEFL.) BALECH, the shape and size of the lorica coincide in both taxa. Moreover, PRESCOTT's individual shows the same pattern of spines distribution as DEFLANDRE's drawings (Fig. 2a–c). Dimensions of *T. acanthophora* var. *speciosa* are: L.: 40–58  $\mu\text{m}$ , d.: 21–26  $\mu\text{m}$ , c.h.: 3–5  $\mu\text{m}$ , c.d.: 4–5  $\mu\text{m}$ , t.p.: 5–8  $\mu\text{m}$ , sp.: 3–7  $\mu\text{m}$ ; and for *T. speciosa* var. *spinosa*: L.: 51  $\mu\text{m}$ , d.: 23.8  $\mu\text{m}$ .

The coincidences between PRESCOTT's and DEFLANDRE's description lead us to propose the synonymy of both taxa.

The variety is known from hot and temperate Central and South America: Panama Canal (Chagres river), Venezuela and NW Argentina.

*Trachelomonas amphoriformis* var. *granulosa* COUTÉ et ILTIS 1981, Rev. Hydrobiol. Trop. 14 (2) :117, pl. IV, Fig. 4–8 ; pl V, Fig. 1, 2; pl. XIII, fig. A.

= *Trachelomonas* sp.2 LING & TYLER 1986, Research Report 3, p. 63, pl. 42, Fig. 22. (Fig. 3a, b)

COUTÉ & ILTIS (1981) described the new variety *T. amphoriformis* var. *granulata* (Fig. 3a) from Côte d'Ivoire pointing out that "Cette nouvelle variété se distingue de l'espèce-type décrite par OSORIO-TAFALL (1942) par la présence de granules coniques ... disposés, sans ordre, à la partie antérieure de la logette, autour du col et de sa base ..., et à la partie postérieure, autour de la base de la queue... Le pore flagellaire ... est bordé d'une couronne ... de petites épines". Later, LING & TYLER (1986) described *Trachelomonas* sp. 2 (Fig. 3b) as follows: "Lorica reddish-brown with a ring of spines around the aperture and a few spines scattered round the neck; surface lorica granulate, caudus has a blunt end". The descriptions and illustrations of *T. amphoriformis* var. *granulata* and *Trachelomonas* sp. 2 regarding the shapes and sizes of the loricae and shapes and sizes of spines and granules are the same for both organisms. Dimensions of *T. amphoriformis* var. *granulosa*: L.: 60–70  $\mu\text{m}$ , d.: 13–16  $\mu\text{m}$ , c.d.: 4  $\mu\text{m}$ , sp.: 1  $\mu\text{m}$ , and of *Trachelomonas* sp. 2 : L.: 64–65  $\mu\text{m}$ , d.: 16–17  $\mu\text{m}$ .

The incorporation of *Trachelomonas* sp. 2 to *T. amphoriformis* var. *granulata* enlarges its geographical distribution. The variety is known from Africa, Argentina and Australia.

***Trachelomonas crateriphora* (CONFORTI et RUIZ) COUTÉ et TELL stat. nov.**

Basionym et holotypus: *Trachelomonas perlata* var. *crateriphora* CONFORTI et RUIZ, 2001, Arch. Hydrobiol./Algological Studies 102 : 132, Figs 59–61. (Fig. 4a, b)

According to CONFORTI & RUIZ (2001) *T. perlata* var. *crateriphora* (Fig. 4a, b) differs from *T. perlata* due to the annular thickening surrounding the pore located

in the bottom of a circular depression. Taking into account that no infraspecific-taxon of the genus *Trachelomonas* shows such a type of depression at the top, we consider that this character is strong enough for establishing a new species. CONFORTI & RUIZ (2001) pointed out that *T. perlata* var. *crateriphora* resembles *T. curta* fo. *crassatifer* SAFON., but SAFONOVA's (1962, p. 27. Figs 1–4) description and illustrations do not show any depression located at the anterior end. The wall ornamentation of the new species shows little obtuse protuberances regularly distributed on the lorica up to the external edge of the depression whose surface is smooth. This ornamentation is similar to those of *T. perlata* DEFL. (1926, p. 65, Fig. 106). Dimensions: L.: 8–9 µm, d.: 9–10 µm.

The species is only known from South Korea.

***Trachelomonas duplex* (DEFL.) COUTÉ et TELL stat. et comb. nova**

Basionym et holotypus: *Trachelomonas hispida* var. *duplex* DEFL. 1926, Monographie du genre *Trachelomonas* EHRENB. :79, figs. 224–226. (Fig. 5a–d)  
Syn.: *Trachelomonas pulchra* var. *elongata* SWIRENKO 1927, Arch. Russ. Protistol. 6 (1–4): 205, Fig. 10.

*Trachelomonas hispida* var. *duplex* was mentioned by DEFLANDRE (1926) from France for the first time. The variety was differentiated from the type because spines are distributed only in the poles. Later, SWIRENKO (1927) erected *T. pulchra* var. *elongata* (Fig. 5d) based on Russian material. According to SWIRENKO's description and illustration this taxon only differs from *T. hispida* var. *duplex* due to small size differences. Dimensions of *T. hispida* var. *duplex*: L.: 30–33 µm, d.: 23–25 µm, and of *T. pulchra* var. *elongata*: L.: 35–39 µm, w.: 26–30 µm. We consider that both taxa are similar and that the presence of spines distributed only in the poles is a strong character for defining DEFLANDRE's taxon as a new species.

*T. duplex* shows a large worldwide distribution with a very constant pattern of spines disposition on the lorica.

*Trachelomonas hispida* (PERTY) STEIN emend. DEFL. 1926, Monographie du genre *Trachelomonas* EHRENB. :77, Figs 202, 203, 207, 208, 227.

Syn.: *Trachelomonas joysagarensis* PHILIPOSE et RADHAKRISHNAN, in PHILIPOSE 1988, Proc. Indian. Acad. Sci. (Plant Sci.) 98 (5): 346, Fig. 20. (fig. 6a–f).

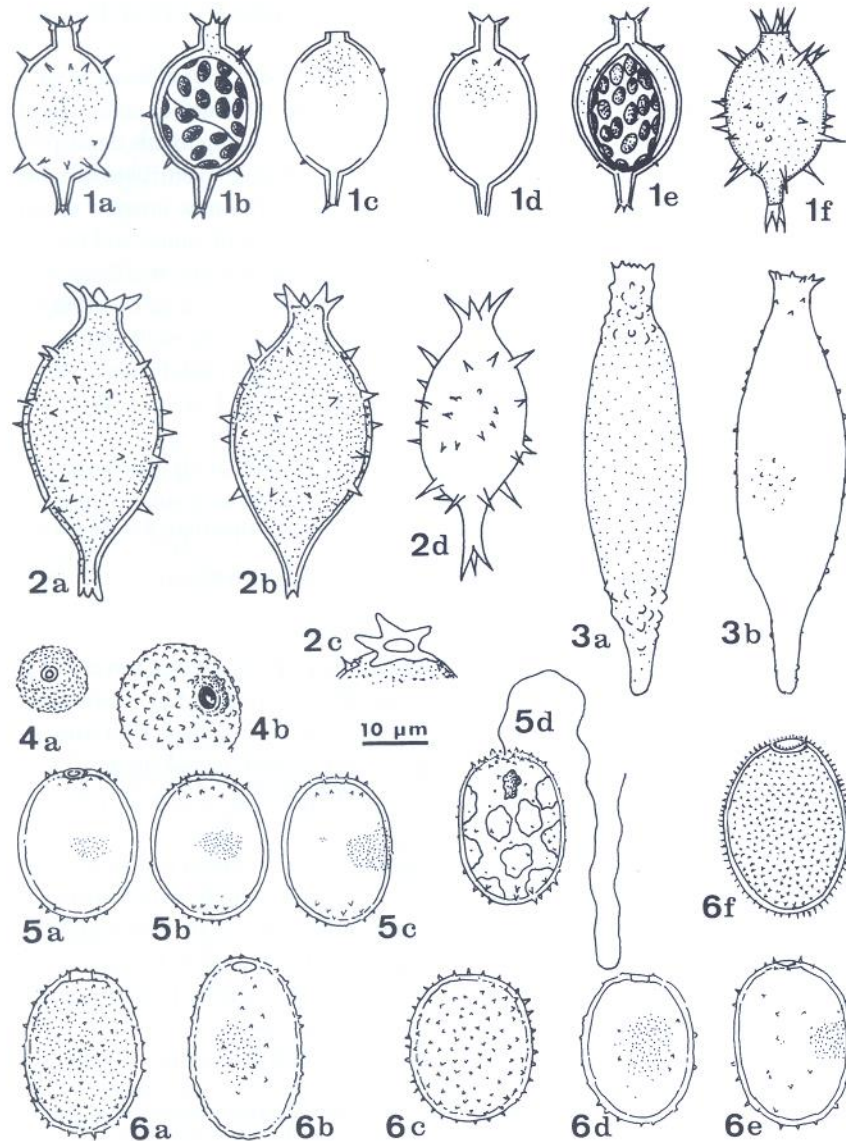
The organism named *T. joysagarensis* (Fig. 6f) by PHILIPOSE & RADHAKRISHNAN (in PHILIPOSE 1988) agrees with the description of *T. hispida* (PERTY) STEIN emend. DEFL. (Fig. 6a–e). The shape and size of the lorica, and the spines distribution pattern are similar in both taxa. Thus, we consider PHILIPOSE & RADHAKRISHNAN's species as a synonym of *T. hispida*. Dimensions of *T. hispida*: L.: 26–32 µm, d.: 19–23 µm, and of *T. joysagarensis*: L.: 26.5 µm, d.: 20.2 µm, c.d.: 4.7 µm.

The species is worldwide distributed.

---

Plate 1. **1** – *Trachelomonas acanthophora* var. *minor* BALECH et DASTUGUE (after BALECH 1944 : **1a** = fig. 130 ; **1b** = fig. 132 ; **1c** = fig. 133 ; **1d** = fig. 134 ; **1e** = fig. 136 ; after CONFORTI 1989 : **1f** = fig. 11) ; **2** – *Trachelomonas acanthophora* var. *speciosa* (DEFL.)





BALECH (after DEFLANDRE 1926: **2a** = fig. 637; **2b** = fig. 638; **2c** = fig. 639; after PRESCOTT 1955: **2d**: pl. 1, fig. 17); **3** – *Trachelomonas amphoriformis* var. *granulosa* COUTÉ et ILLIS (after COUTÉ & ILLIS 1981: **3a** = pl. XIII, fig. A; after LING & TYLER 1986: **3b** = pl. 42, fig. 22); **4** – *Trachelomonas crateriphora* (CONFORTI et RUIZ) COUTÉ et TELL stat. nov. (after SEM photographs, CONFORTI & RUIZ 2001: **4a** = fig. 59; **4b** = fig. 61); **5** – *Trachelomonas duplex* (DEFL.) COUTÉ et TELL stat. et comb. nova. (after DEFLANDRE 1926: **5a** = fig. 224; **5b** = fig. 225; **5c** = fig. 226; after SWIRENKO 1927: **5d** = fig. 10); **6** – *Trachelomonas hispida* (PERTY) STEIN emend. DEFL. (after DEFLANDRE 1926: **6a** = fig. 202, **6b** = fig. 203, **6c** = fig. 207, **6d** = fig. 208, **6e** = fig. 227; after PHILIPPOSE et RADHAKRISHNAN, in PHILIPPOSE 1988 : **6f** = fig. 20)

***Trachelomonas megalacantha* DA CUNHA var. *paucispina* COUTÉ et TELL var. *nova***

LING & TYLER (1986) gave the following description of *Trachelomonas* sp. 1: "Lorica oval, with several large spines grouped round the anterior end; varying numbers of small spines scattered over the surface". According to this description and the corresponding illustration (Fig. 7), we were not able to attribute this euglenoid to any previously described species or variety. The new erected variety here proposed differs from the type due to the few number of spines and their irregular disposition on the lorica and the presence of other some small scattered spines. Shape and size of the lorica are similar to those of *T. megalacantha* var. *crenulatocollis* BOURR., but the distribution of the spines on the wall and the absence of a spiny collar differentiate the LING & TYLER's individual from *T. megalacantha* var. *crenulatocollis*. Dimensions: L. : 45–48 µm, L.w.sp. : 70–71 µm, d.: 31 µm, d.w.sp. : 63–65 µm.

The variety is only known from Conjimba and Ja Ja Billabong (Australia).

Diagnosis: ovoidea lorica cum pluribus latis spinis ad anteriorem polum aggregatis; minutae spinae variante numero distributae in tota parietis superficie. L.: 45–48 µm, L.w.sp.: 70–71 µm, d.: 31 µm, d.w.sp.: 63–65 µm.

Holotypus: *Trachelomonas* sp.1 LING & TYLER 1986, Research Report 3, p. 63, pl. 42, Fig. 24. (Fig. 7).

***Trachelomonas rotundospinosa* (BALECH) COUTÉ et TELL species nova**

Lorica widely ovoid, slightly longer than wide. Pore surrounded by a cylindrical collar the distal end of which is ornamented by 6–8 short spines. Posterior end finishing in a short, conical, truncate tail-piece ornamented by 3–4 small spines at the top. Dimensions: L.w.sp.: 36–37 µm, d.: 22–23 µm, d.w.sp.: 26–27 µm, c.h.: 3 µm, c.d.: 5–6 µm, t.p.: 3 µm.

According to BALECH (1944), *T. acanthophora* var. *rotunda* is differentiated from the other varieties of *T. acanthophora* due to its widely ovoid lorica (L.: 45–58 µm, d.: 21–24 µm), the shorter and numerous spines at the collar and their smaller size. We think that all these characters are strong enough to separate this taxon from *T. acanthophora* and its varieties and consider the former as a new species which we propose to name *T. rotundospinosa*.

*T. rotundospinosa* is only known from temperate and hot regions of Argentina. Diagnosis: lorica ample ovoidea; porus cum cylindrico collo circumdatus; colli apicalis ora cum 6–8 brevibus spinis ornamenta. Apicalis posterior pars in brevi, conica, truncata cauda terminata et cum apice ornamento cum 3–4 brevibus spinis. L.w.sp.: 36–37 µm, d.: 22–23 µm, d.w.sp.: 26–27 µm, c.h.: 3 µm, c.d.: 5–6 µm, t.p.: 3 µm. Basionym et holotypus: *Trachelomonas acanthophora* var. *rotunda* BALECH 1944, Anales del Mus. Arg. de Cs. Nats. Bernardino Rivadavia, Bs. As. 41: p.291, Figs. 129, 233. (Fig. 8).

***Trachelomonas rugulosa* var. *paralella* (TELL et ZALOCAR) COUTÉ et TELL stat.nov.**

Basionym et iconotypus: *Trachelomonas rugulosa* var. *rugulosa* fo. *paralella*, TELL & ZALOCAR 1985, Nova Hedwigia 41: 369, pl. VIII, Fig. 19–a–c, pl. XIV, figs 6–7. (Fig. 10).



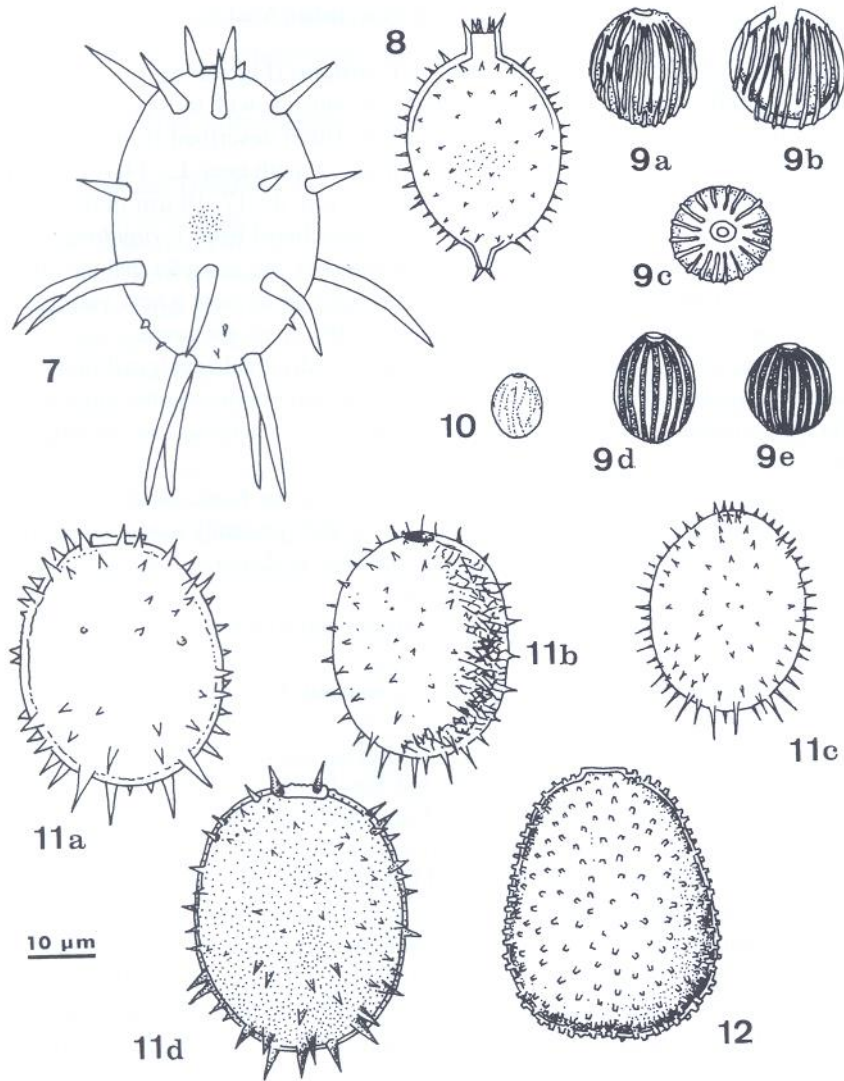


Plate 2. **7** – *Trachelomonas megalacantha* var. *paucispina* COUTÉ et TELL var. nova. (after LYNG & TYLER 1986 : **7** = pl. 42 , fig. 24); **8** – *Trachelomonas rotundospinosa* (BALECH) COUTÉ et TELL species nova (after BALECH 1944: **8** = fig. 129); **9** – *Trachelomonas rugulosa* var. *paralella* (TELL et ZALOCAR) COUTÉ et TELL stat. nov. (after TELL & ZALOCAR 1985: **9a** = fig. 19a, **9b** = fig. 19b, **9c** = fig. 19c; after PHILIPSE 1988: **9d** = fig. 69a, **9e** = fig. 69b); **10** – *Trachelomonas rugulosa* var. *paralella* fo. *minima* (CONFORTI et RUIZ) COUTÉ et TELL stat. et comb. nov. (after CONFORTI & RUIZ 2001: **10** = fig. 10); **11** – *Trachelomonas superba* var. *swirenkiana* DEFL. (after DEFLANDRE 1926: **11a** = fig. 271, **11b** = fig. 272; after PRESCOTT 1944: **11c** = pl. 4, fig. 13; after TRACANNA 1985: **11d** = pl. 17, fig. 3); **12** – *Trachelomonas victoriae* (TELL et ZALOCAR) COUTÉ et TELL stat. nov. (after TELL & ZALOCAR 1985: **12** = pl. IX, fig. 24)

Syn. *Trachelomonas costatus* PHILIPOSE 1988, Proc. Indian Acad. Sci. (Plant Sci.) 98 (5): 331, Fig. 6 a,b. (Fig. 9a–e).

PHILIPOSE (1988) erected the new species *T. costatus* (Fig. 9d–e) based on material from India. The description and illustration coincide with those of *T. rugulosa* var. *rugulosa* fo. *paralella* TELL et ZALOCAR (1985) described from Argentina (Fig. 9a–c). Moreover, the sizes are very similar in both taxa: L.: 14.1–17.6 µm, d.: 12.8–15.8 µm in the former and L.: 18–19 µm, d.: 17–18 µm in the latter. *T. rugulosa* var. *rugulosa* fo. *paralella* was differentiated from *T. rugulosa* due to the possession of parallel ribs instead of oblique ones. We consider that the difference in the disposition of the ribs is a good character to erect a new variety but not strong enough for creating a new species as PHILIPOSE proposed.

BOURRELLY & COUTÉ's (1978, pl. 1, Fig. 5) individuals designed under the name *T. rugulosa* show some variations (parallel and oblique) in the direction of the ribs, whereas some of them probably belong to *T. rugulosa* var. *rugulosa* fo. *paralella*.

CONFORTI & RUIZ (2001) recorded the variety for Korea under the name *T. rugulosa* var. *paralella* TELL et ZALOCAR, but they probably made a confusion with *T. rugulosa* var. *rugulosa* fo. *paralella* TELL et ZALOCAR because no new combination was proposed by these authors.

The variety is known from Argentina, France and Korea.

***Trachelomonas rugulosa* var. *paralella* fo. *minima* (CONFORTI et RUIZ) COUTÉ et TELL stat. et comb. nov.**

Basionym et iconotypus : *Trachelomonas rugulosa* var. *minima* CONFORTI et RUIZ 2001, Arch. Hydrobiol./Algological Studies 102 : 140, Fig. 10, 45–50. (Fig. 10).

CONFORTI & RUIZ (2001) differentiated *T. rugulosa* var. *minima* from *T. rugulosa* due to the small size of the cell and the parallel ribs. These authors said: “Envelope ..., ornamented by ridges arranged longitudinally (9–10/10 µm), branched or not ...”, and added: “This newly established variety resembles *Trachelomonas costatus* PHILIPOSE ...”. As we pointed out before, *T. costatus* may be considered as a synonym of *T. rugulosa* var. *paralella*. So, in spite of its parallel ribs and small size *T. rugulosa* var. *minima* must be considered as a form of *T. rugulosa* var. *paralella* and not as a variety of *T. rugulosa*. Dimensions: L.: 10–11 µm, d. : 9–10 µm.

The form is only known from South Korea.

*Trachelomonas superba* var. *swirenkiana* DEFL. 1926, Monographie du genre *Trachelomonas* EHRENB. :84, figs. 271–272.

Syn.: *Trachelomonas superba* var. *spinosa* PRESCOTT, 1944, Farlowia 1 (3): 370, pl. 4, Fig. 13; *Trachelomonas hispida* var. *duplex* fo. *multispinosa* TRACANNA 1985, Opera Lilloana 35: 44, pl.17, Fig. 3; *Trachelomonas hispida* var. *multispinosus* (TRACANNA) TELL et CONFORTI, 1986 Bibliotheca Phycologica 75: 134, Fig. 285. (fig. 11a–d).

Sizes and morphologies of *T. superba* var. *swirenkiana* (L.: 42 µm, d.: 32 µm), *T. superba* var. *spinosa* (L.: 39–48 µm, d.: 32,5–36 µm) (Fig. 11c) and *T. hispida* var. *duplex* fo. *multispinosa* (L.: 42–44 µm, d.: 32–33 µm) (Fig. 11d) are alike.



- SAFONOVA, T. (1962): Formae novae et curiosae generis *Trachelomonas* EHR. e regione. – Tomskensi. Komarovii Academiae Scientiarum URSS. **16**: 27–31.
- SWIRENKO, D. (1927) : Sur la systématique des Euglenacées. – Arch. Russ. Protistol. **6** (1–4): 204–207.
- TELL, G. & CONFORTI, V. (1986): Euglenophyta pigmentadas de la Argentina. – Bibliotheca Phycologica **75** : 1–301.
- TELL, G. & ZALOCAR, Y. (1985): Euglenophyta pigmentadas de la provincia del Chaco (Argentina). – Nova Hedwigia **41**: 353– 391.
- TRACANNA, B. (1985): Algas del noroeste argentino (excluyendo las Diatomophyceae). – Opera Lilloana **35**: 1–136.

Manuscript received May 23, 2005, accepted March 20, 2006.

The authors' addresses:

ALAIN COUTÉ  
Muséum National d'Histoire Naturelle  
Département RDDM-USM 505  
57, rue Cuvier-Case 39  
F-75231 Paris Cedex 05, France

GUILLERMO TELL  
Universidad Buenos Aires  
Facultad de Ciencias Exactas y Naturales,  
Dept. Ecología, Genética y Evolución,  
RA-1428 Buenos Aires, Argentina

