



# A Taxonomic and Ultrastructural Study of *Trachelomonas* spp. (Euglenophyta) from Agricultural Area Pond, Lamphun Province



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## Abstract

A taxonomic and ultrastructure studies of *Trachelomonas* spp. from agricultural area pond in Thailand are presented. Forty-nine taxa are briefly described, among them thirty eight are recorded for the first time from Thailand and nine are reported as rare worldwide. Light and scanning electron microscope were used to show a complete structure for identification of *Trachelomonas* taxa. The physico-chemical parameters of water in sampling sites are given.

## Background

*Trachelomonas* Ehrenberg is a genus in Euglenophyta division which is often abundant in polluted environments. They are characterized as free-swimming *Euglena*-like cells, phototrophic and completely enclosed in a spherical to ovoid mineralized envelope (lorica). The lorica has small, apical opening, usually with an abrupt collar. Lorica tends to be porous and variously ornamented with papilla or spines. The genus *Trachelomonas* was first described by Ehrenberg and studied worldwide. The present database includes 306 species that have been recorded as currently accepted taxonomically using light (LM) and scanning electron (SEM) microscope. Information about *Trachelomonas* in Thailand is still scarce, so this study was focused on a taxonomy, ultrastructure and biodiversity of *Trachelomonas* spp. from agricultural area pond as natural environment for this species.

## Results

Forty-nine taxa were found and shown in Table 1. The illustration is shown in Figs. 1, 2

Table 1. List species of *Trachelomonas* in agricultural area pond, Lamphun province. Key: "+" = present, "-" = absent

Species	25/2/2010	4/4/2010	Species	25/2/2010	4/4/2010
<i>T. armata</i>	-	+	<i>T. lefevrei</i> *	-	+
<i>T. armata</i> var. <i>steinii</i>	-	+	<i>T. lotharingiae</i> *	-	+
<i>T. arnoldiana</i> *	-	+	<i>T. mirabilis</i> var. <i>obesa</i> *	-	+
<i>T. atrata</i> *	+	+	<i>T. mirabilis</i> var. <i>helvetica</i> *	-	+
<i>T. atrata</i> var. <i>pustulosa</i> *	-	-	<i>T. nexilis</i> *	-	+
<i>T. australica</i> var. <i>rectangularis</i> *	+	-	<i>T. nigra</i> *	+	+
<i>T. bacillifera</i> var. <i>minima</i> *	+	+	<i>T. oblonga</i> *	+	+
<i>T. bacillifera</i> f. <i>sparsispina</i> *	+	+	<i>T. oviformis</i> var. <i>duplex</i> *	+	+
<i>T. bulla</i> *	+	+	<i>T. pavlovskoensis</i> *	+	+
<i>T. cervicula</i> *	+	+	<i>T. planctonica</i> *	+	+
<i>T. cingeri</i> *	+	+	<i>T. planktonica</i> f. <i>oblonga</i>	+	+
<i>T. compacta</i> *	+	+	<i>T. pulchella</i> *	+	+
<i>T. curta</i> *	+	+	<i>T. radiosa</i> *	-	+
<i>T. curta</i> var. <i>castrensis</i> *	+	+	<i>T. robusta</i> *	-	+
<i>T. cylindrica</i>	+	-	<i>T. rotunda</i> *	-	+
<i>T. felix</i> *	+	-	<i>T. rogulosa</i> var. <i>minima</i> *	+	+
<i>T. grandis</i> *	+	+	<i>T. similis</i> *	+	+
<i>T. hirta</i> var. <i>duplex</i> *	+	0	<i>T. similis</i> var. <i>hyalina</i> *	+	+
<i>T. hispida</i>	+	+	<i>T. spirillifera</i> *	+	+
<i>T. hispida</i> var. <i>crenulatoollis</i> *	+	+	<i>T. superba</i>	-	+
<i>T. hispida</i> var. <i>spinulosa</i> *	+	+	<i>T. sydneyensis</i> var. <i>grandicollis</i> *	-	+
<i>T. hispida</i> var. <i>volucensis</i> *	+	+	<i>T. volvocina</i>	+	+
<i>T. intermedia</i> f. <i>papillifera</i> *	+	+	<i>T. volvocina</i> var. <i>derephora</i> *	+	+
			<i>T. volvocinopsis</i> *	+	+
			<i>T. volzii</i> var. <i>cylindracea</i> *	+	-

\*, new record of Thailand

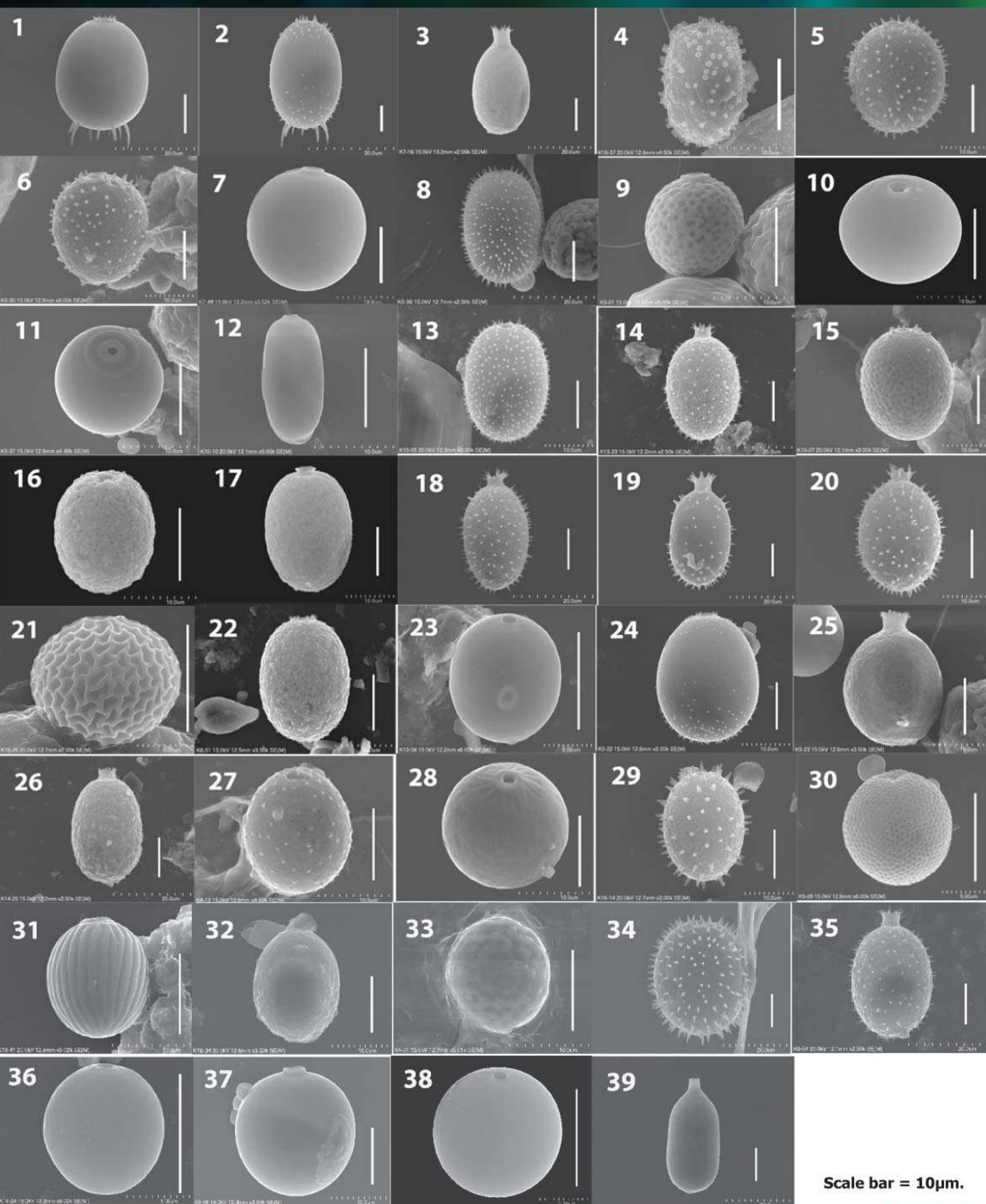


Figure 1. SEMs of *Trachelomonas* spp. 1. *T. armata*, 2. *T. armata* var. *steinii*, 3. *T. arnoldiana*\*, 4. *T. australica* var. *rectangularis*\*, 5. *T. bacillifera* var. *minima*\*, 6. *T. bacillifera* f. *sparsispina*\*, 7. *T. cervicula*\*, 8. *T. cingeri*\*, 9. *T. compacta*\*, 10. *T. curta*\*, 11. *T. curta* var. *castrensis*\*, 12. *T. cylindrica*, 13. *T. hispida*, 14. *T. hispida* var. *crenulatoollis*\*, 15. *T. intermedia* f. *papillifera*\*, 16. *T. irregularis*\*, 17. *T. lefevrei*\*, 18. *T. lotharingiae*\*, 19. *T. mirabilis* var. *helvetica*\*, 20. *T. mirabilis* var. *obesa*\*, 21. *T. nexilis*\*, 22. *T. nigra*\*, 23. *T. oblonga*\*, 24. *T. oviformis* var. *duplex*\*, 25. *T. pavlovskoensis*\*, 26. *T. planktonica* f. *oblonga*, 27. *T. pulchella*\*, 28. *T. radiosa*\*, 29. *T. robusta*\*, 30. *T. rotunda*\*, 31. *T. rogulosa* var. *minima*\*, 32. *T. similis*\*, 33. *T. spirillifera*\*, 34. *T. superba*, 35. *T. sydneyensis* var. *grandicollis*\*, 36. *T. volvocina*, 37. *T. volvocina* var. *derephora*\*, 38. *T. volvocinopsis*\*, 39. *T. volzii* var. *cylindracea*\*, \* = new record of Thailand.

## Materials & Methods

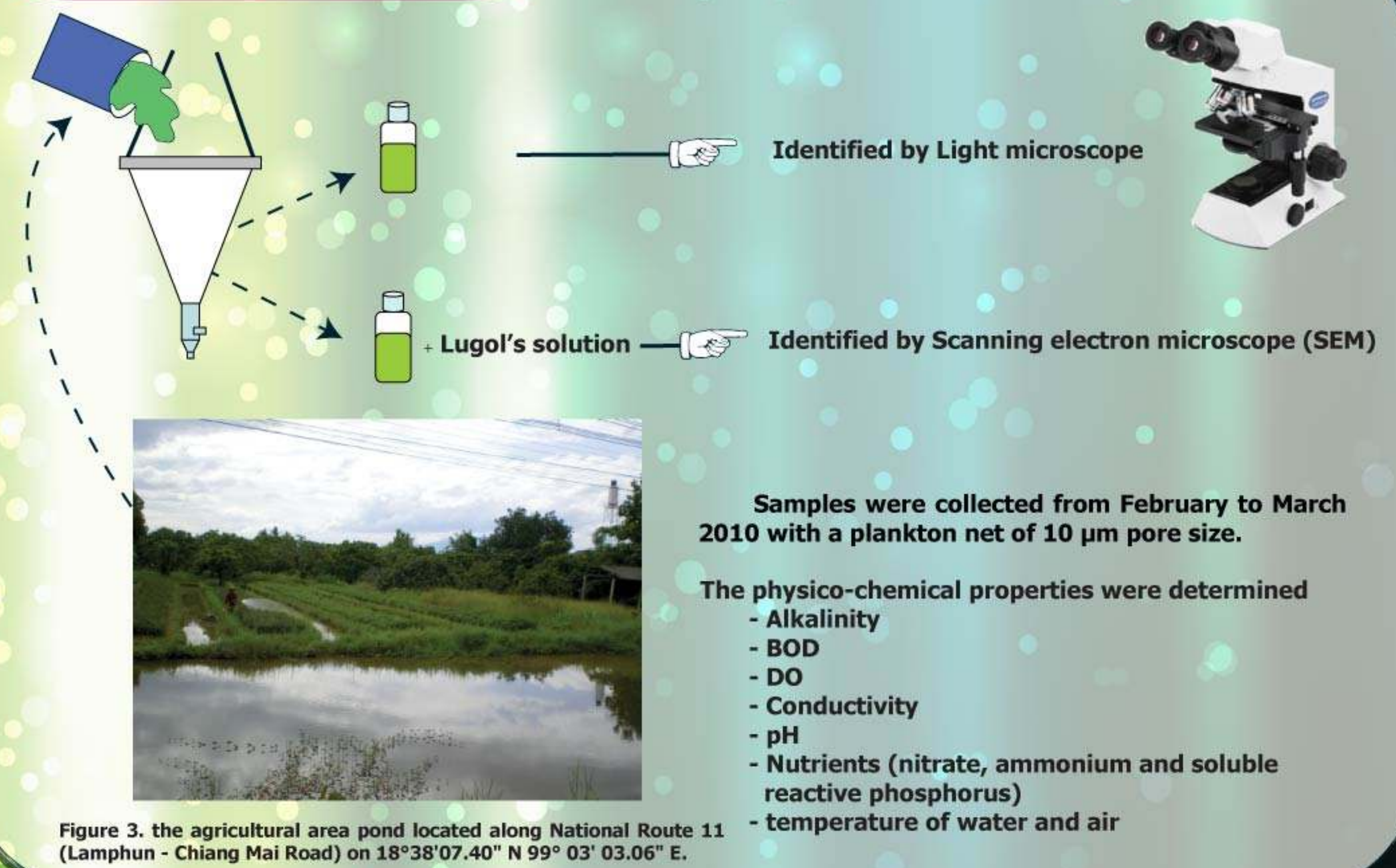


Figure 3. the agricultural area pond located along National Route 11 (Lamphun - Chiang Mai Road) on 18°38'07.40" N 99° 03' 03.06" E.

The physico-chemical properties of water in agricultural area pond are shown (Table 2.) and water quality was mesotrophic status or moderate water quality.

Table 2 The physico-chemical properties of water in agricultural area pond, Lamphun province.

Date	25/2/2010	4/4/2010
Air temperature (°C)	33.0	41.0
Water temperature (°C)	25.6	30.1
pH	7.4-7.6	7.3-7.5
Conductivity (µs/cm)	294-296.0	290.0-294.0
Alkalinity (mg/l as CaCO <sub>3</sub> )	147.0-150.0	94.0-96.0
DO (mg/L)	5.0-5.2	3.6-4.0
BOD (mg/L)	2.8-3.0	3.2-3.4
NH <sub>4</sub> -N (mg/L)	0.0	0.0
NO <sub>3</sub> -N (mg/L)	0.7-0.8	0.3-0.4
SRP (mg/L)	0.0	0.1



Figure 2. LMs of lorica of *Trachelomonas* spp. 1. *T. atrata*\*, 2. *T. atrata* var. *pustulosa*\*, 3. *T. bulla*\*, 4. *T. felix*\*, 5. *T. grandis*\*, 6. *T. hirta* var. *duplex*\*, 7. *T. hispida* var. *spinulosa*\*, 8. *T. hispida* var. *volucensis*\*, 9. *T. planctonica*\*, 10. *T. similis* var. *hyalina*. \* = new record of Thailand.

## Conclusions

All together 49 taxa of *Trachelomonas* were found which dominated among other euglenoids genera. Especially *T. armata* (Ehrenberg) Stein, *T. cervicula* Stokes, *T. hispida* (Perty) Stein, *T. oblonga* Lemmermann, *T. planctonica* Swirenko and *T. volvocinopsis* Swirenko occurred frequently. All of those taxa are well known all over the world and usually can be found in polluted water. Earlier similar reports were published from e.g. Europe: Wołowski (1998,2002), Safonova (1965); Asia: Yamagishi(2010); North America: Dillard (2000), Wołowski (2007); Australia: Playfair (1915). Some data about *Trachelomonas* from Thailand were elaborated by Lewmanomont et al. (1995) who included information about 13 taxa. Recently detailed information was published by Yamagishi (2010). He reported data about 31 *Trachelomonas* species occurring in different ponds of Thailand. He included well elaborated LM documentation for all studied taxa. Our study gives information about 38 new taxa for Thailand. The high efficiency equipment as LM and SEM provided more information, helped with identification and increased the opportunity to discover more species. However, this study includes only Lamphun province, expanding the investigation to wider area could provide more information about the species that will sustain the biodiversity database of Thailand.

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