Phytotaxa 449 (3): 295–298
https://www.mapress.com/j/pt/

Correspondence

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

https://doi.org/10.11646/phytotaxa.449.3.8

Taxonomy and nomenclature of the recently published chlamydomonad genera *Ostravamonas* and *Paludistella* (Volvocales, Chlorophyceae)

TAKASHI NAKADA[1,2,5] & HANI SUSANTI[3,4,6]*
[1] *Graduate School of Environment and Information Science, Yokohama National University, Tokiwadai 79-7, Hodagaya, Yokohama, 240-8501, Japan.*
[2] *Institute for Advanced Biosciences, Keio University, Tsuruoka, Yamagata, 997-0052, Japan.*
[3] *Life Science Innovation, School of Integrative and Global Major, University of Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki, 305-8577, Japan.*
[4] *Research Center for Biotechnology, Indonesian Institute of Sciences (LIPI), Jl. Raya Bogor KM 46 Cibinong, West Java, 16911, Indonesia.*
[5] *nakada-takashi-jk@ynu.ac.jp; https://orcid.org/0000-0003-3404-5277*
[6] *hani008@lipi.go.id; https://orcid.org/0000-0003-0431-2573*
**Author for correspondence*

A recently published chlamydomonad green algal genus, *Paludistella* H. Susanti, Mas. Yoshida, Tak. Nakayama, Nakada & M.M. Watanabe (2020: 72), was found to be superfluous as it originally included the type of *Ostravamonas* Barcytë & Hodač in Barcytë *et al.* (2020: 214). Here, the taxonomic and nomenclatural status under these generic names were examined based on morphological, phylogenetic, and ITS-2 secondary structure analyses, proposing two new combinations for *P. asymmetrica* H. Susanti, Mas. Yoshida, Tak. Nakayama, Nakada & M.M. Watanabe (2020: 76) and *P. trianguloculus* H. Susanti, Mas. Yoshida, Tak. Nakayama, Nakada & M.M. Watanabe (2020: 76) under *Ostravamonas*.

Traditionally, *Chlamydomonas* Ehrenberg (1834: 288) (Volvocales, Chlorophyceae) includes hundreds of flagellate green microalgae (e.g., Ettl 1983), but recent molecular phylogenetic studies have revealed its polyphyly, urging its division into monophyletic genera (e.g., Pröschold *et al.* 2001, Demchenko *et al.* 2012, Nakada *et al.* 2016). In the course of the taxonomic revisions, *Ostravamonas* and *Paludistella* have been published.

Ostravamonas was first validly published online on 11 December 2019 in the *European Journal of Phycology*, and included three species, *O. chlorostellata* (E.A. Flint & H. Ettl 1966: 420) Barcytë & Hodač in Barcytë *et al.* (2020: 215) (type), *O. meslinii* (Bourrelly 1951: 258) Barcytë & Hodač in Barcytë *et al.* (2020: 217), and *O. tenuiincisa* Barcytë & Hodač in Barcytë *et al.* (2020: 217). On the same day, a manuscript proposing *Paludistella* was accepted by *Phytotaxa*, and it was published online on 5 February 2020 (Susanti *et al.* 2020). Because *Paludistella* includes *P. chlorostellata* (E.A. Flint & H. Ettl) H. Susanti, Mas. Yoshida, Tak. Nakayama, Nakada & M.M. Watanabe (2020: 75), which was the type of *Ostravamonas*, *Paludistella* is an illegitimate superfluous name under Art. 52 of the *Shenzhen Code*. Susanti *et al.* (2020) also proposed two new species, *P. asymmetrica* and *P. trianguloculus*. While these new species were discriminated from *O. chlorostellata* (≡ *P. chlorostellata*) and *O. meslinii* (≡ *P. meslinii*), they were not compared with *O. tenuiincisa*, newly described in Barcytë *et al.* (2020). Here, genera and species published by Barcytë *et al.* (2020) and Susanti *et al.* (2020) were compared based on descriptions, 18S *r*DNA, and ITS-2 secondary structures, and the correct names under *Ostravamonas* are clarified.

The 18S *r*DNA sequences of *O. chlorostellata* strain SAG 12.72 (MK912143) and *O. meslinii* strain SAG 75.81 (MK912144) published by Barcytë *et al.* (2020) were identical to those published by Susanti *et al.* (2020) (MK696129 and MK696131, respectively). Therefore, these sequences were used for further analyses. The 18S *r*DNA sequences of *O. tenuiincisa* (FR865525) was appended to the 18S *r*DNA alignment generated by Susanti *et al.* (2020), manually aligned (provided in Supplemental Material), and used for phylogenetic analyses according to the methods of Susanti *et al.* (2020). The morphological descriptions of *Ostravamonas* and *Paludistella* were generally consistent with each other. In the 18S *r*DNA phylogenetic tree (Fig. 1), all species belonging to *Ostravamonas* and *Paludistella* formed a robust clade (posterior probability [PP] = 1.00, bootstrap proportion [BP] in maximum likelihood analysis = 100%) within the clade *Chloromonadinia* (sensu Nakada *et al.* 2008).

Three species described in Barcytë *et al.* (2020) and Susanti *et al.* (2020) were morphologically compared based on their original descriptions. The morphological characteristics of three species, *O. tenuiincisa*, *P. asymmetrica*, and *P. trianguloculus*, were similar, with some differences. Young cells of *P. asymmetrica* were frequently asymmetrical, while no such cells were reported for *O. tenuiincisa* and *P. trianguloculus*. The stigma was string-like in *O. tenuiincisa*, oblong to

Accepted by Thomas Pröschold: 10 Jun. 2020; published: 23 Jun. 2020

small elliptical in *P. asymmetrica*, and triangular to elliptical in *P. trianguloculus*. Zoosporangia including eight zoospores were reported for *O. tenuiincisa* but not for *P. asymmetrica* or *P. trianguloculus*. Similarly, akinetes were reported only for *P. asymmetrica*. However, these characters related to asexual reproduction can be affected by culture conditions, and their importance in species taxonomy requires further studies.

In the 18S *r*DNA phylogenetic tree (Fig. 1), *P. asymmetrica* and *O. chlorostellata* were sister to each other (PP = 1.00, BP = 98%), and they formed a clade with *P. trianguloculus* (PP = 1.00, BP = 100%) but were distantly related to *O. tenuiincisa*. The predicted secondary structure of nuclear *r*DNA ITS-2 of *O. tenuiincisa* (Barcytë *et al.* 2020) was compared with models for *P. asymmetrica* and *P. trianguloculus* (Susanti *et al.* 2020). The four helices of ITS-2 were comparable among the new species, and five compensatory and six or seven hemi-compensatory base changes, respectively, were recognized between *O. tenuiincisa* and *P. asymmetrica* or *P. trianguloculus* (Fig. 2).

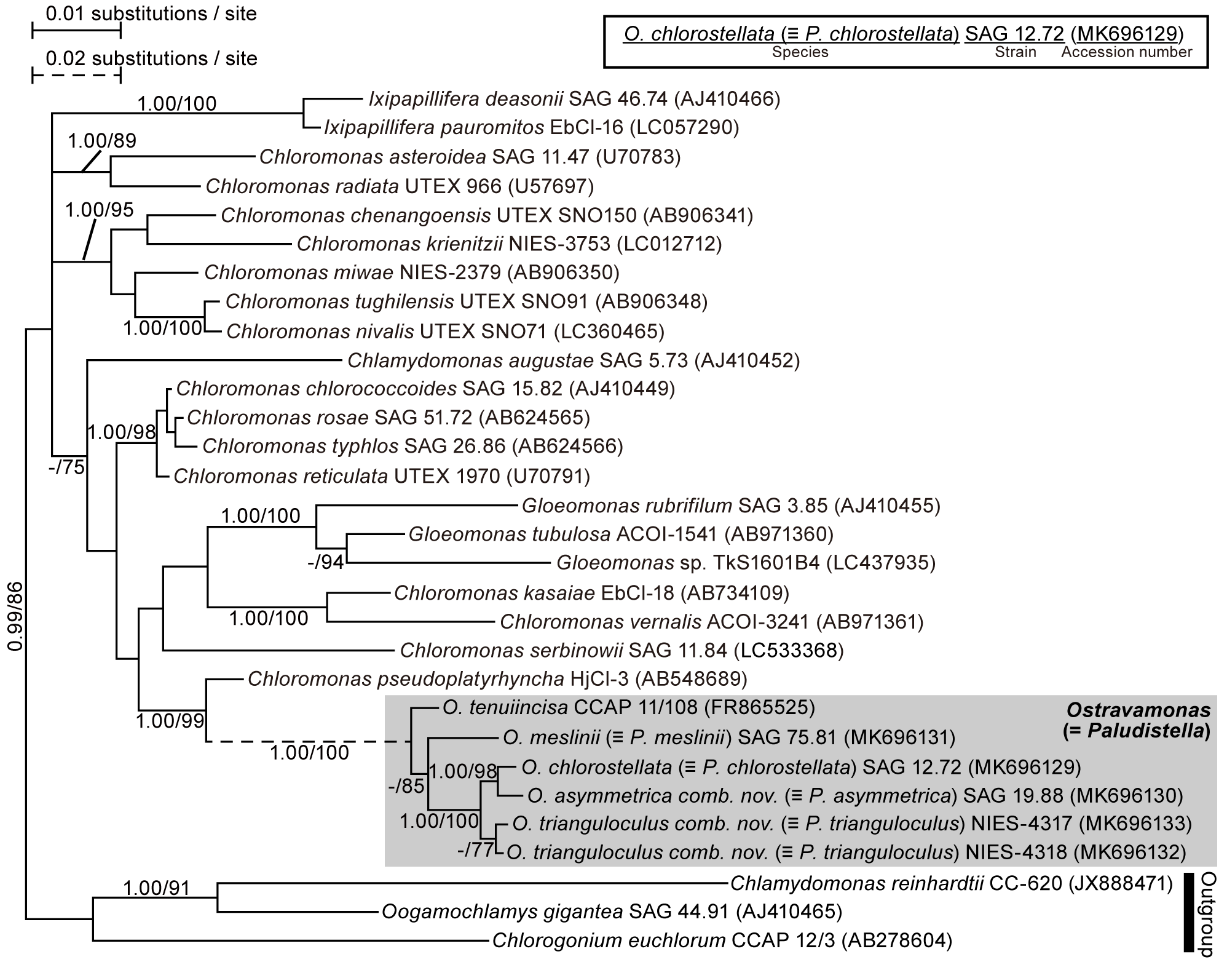

FIGURE 1. Bayesian phylogenetic tree of the clade *Chloromonadinia* based on 18S *r*DNA. Numbers on branches indicate posterior probabilities (≥0.95; left) and bootstrap percentages for the maximum likelihood analysis (≥70%; right).

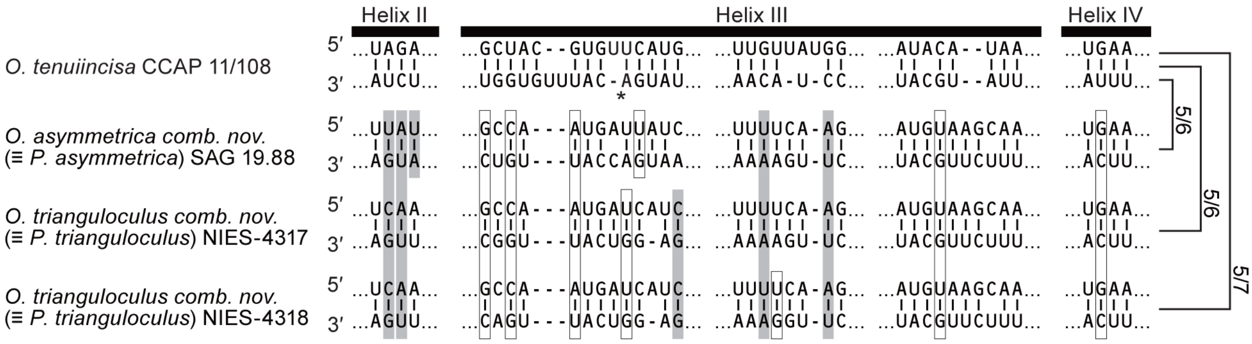

FIGURE 2. Comparisons of ITS-2 secondary structures of *Ostravamonas tenuiincisa* with *O. asymmetrica* and *O. trianguloculus* based on Barcytë *et al.* (2020) and Susanti *et al.* (2020), except where modified (*). Hyphens (-) and ellipses (...) indicate gaps and omitted regions, respectively. The positions marked by gray boxes and empty boxes respectively indicate the presence of compensatory and hemi-compensatory base changes compared to the *O. tenuiincisa* sequence. Numbers are indicated on the right.

All morphological, phylogenetic, and ITS-2-structural analyses supported the synonymy of *Paludistella* with *Ostravamonas* and the independence of *O. tenuiincisa* from *P. asymmetrica* and *P. trianguloculus*. Therefore, the correct generic name for the taxon is *Ostravamonas*. Here, a species list with synonymy and new combinations for *P. asymmetrica* and *P. trianguloculus* under *Ostravamonas* are compiled.

Ostravamonas Barcytë & Hodač in Barcytë *et al.* (2020: 214)

Type: *Ostravamonas chlorostellata* (E.A. Flint & H. Ettl) Barcytë & Hodač in Barcytë *et al.* (2020)

Heterotypic synonym: *Paludistella* H. Susanti, Mas. Yoshida, Tak. Nakayama, Nakada & M.M. Watanabe, (2020: 72), *nom. illeg. superfl.*

Ostravamonas chlorostellata (E.A. Flint & H. Ettl 1966: 420) Barcytë & Hodač (2020: 215)

Type: Flint & Ettl (1966), fig. 2 (holotype); SAG 12.72 (authentic strain; permanently cryopreserved in a metabolically inactive state) (epitype; designated by Barcytë *et al.* 2020)

Homotypic synonyms: *Chlamydomonas chlorostellata* E.A. Flint & H. Ettl (basionym) (excl. var. *gracillima* H. Ettl), *Paludistella chlorostellata* (E.A. Flint & H. Ettl) H. Susanti, Mas. Yoshida, Tak. Nakayama, Nakada & M.M. Watanabe (2020: 75)

Ostravamonas asymmetrica (H. Susanti, Mas. Yoshida, Tak. Nakayama, Nakada & M.M. Watanabe 2020: 76) Nakada & H. Susanti *comb. nov*.

Type: TNS-AL-58967 (specimen prepared from the strain SAG 19.88) (holotype)

Homotypic synonym: *Paludistella asymmetrica* H. Susanti, Mas. Yoshida, Tak. Nakayama, Nakada & M.M. Watanabe 2020: *Phytotaxa* 432: 76 (figs. 3, 6E, F; basionym)

Ostravamonas meslinii (Bourrelly 1951: 258) Barcytë & Hodač in Barcytë *et al.* (2020: 217)

Type: Bourrelly (1951), pl. 3 fig. 52 (holotype); SAG 75.81 (authentic strain; permanently cryopreserved in a metabolically inactive state) (epitype; designated by Barcytë *et al.* 2020)

Homotypic synonyms: *Chlamydomonas meslinii* Bourr. (basionym); *Paludistella meslinii* (Bourr.) H. Susanti, Mas. Yoshida, Tak. Nakayama, Nakada & M.M. Watanabe (2020: 73)

Ostravamonas tenuiincisa Barcytë & Hodač in Barcytë *et al.* (2020: 217)

Type: CCAP 11/108 (permanently cryopreserved in a metabolically inactive state) (holotype)

Ostravamonas trianguloculus (H. Susanti, Mas. Yoshida, Tak. Nakayama, Nakada & M.M. Watanabe 2020: 76) Nakada & H. Susanti *comb. nov*.

Type: NIES-4318 (permanently cryopreserved in a metabolically inactive state) (holotype); NIES-4317 (permanently cryopreserved in a metabolically inactive state) (paratype); TNS-AL-58966 (specimen prepared from the strain NIES-4318) (paratype); TNS-AL-58965 (specimen prepared from the strain NIES-4317) (paratype)

Homotypic synonym: *Paludistella trianguloculus* H. Susanti, Mas. Yoshida, Tak. Nakayama, Nakada & M.M. Watanabe 2020: *Phytotaxa* 432: 76 (figs. 4, 5, 6C, D; basionym)

Note: In Susanti *et al*. (2020), TNS-AL-58966 was erroneously referred as an isotype.

Acknowledgments

The authors thank Dr. Ryo Matsuzaki for his kind advice on the study. We are also grateful to Dr. Thomas Pröschold for directing our attention to the publication of *Ostravamonas*. We thank Prof. Makoto M. Watanabe, Dr. Takeshi Nakayama, and Dr. Masaki Yoshida for invaluable support.

References

Barcytë, D., Hodač, L. & Nedbalová, L. (2020) Overlooked diversity with terrestrial lifestyle in the predominantly freshwater and snow phylogroup *Chloromonadinia* (Volvocales, Chlorophyceae). *European Journal of Phycology* 55: 207–222. https://doi.org/10.1080/09670262.2019.1681519

Bourrelly, P. (1951) Volvocales rares ou nouvelles. *Hydrobiologia* 3: 251–274. https://doi.org/10.1007/BF00043717

Demchenko, E., Mikhailyuk, T., Coleman, A.W. & Pröschold, T. (2012) Generic and species concepts in *Microglena* (previously the *Chlamydomonas monadina* group) revised using an integrative approach. *European Journal of Phycology* 47: 264–290. https://doi.org/10.1080/09670262.2012.678388

Ehrenberg, C.G. (1834) Dritter Beitrag zur Erkenntniss Grosser Organisation in der Richtung des kleinsten Raumes. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin* 1833 (Physikalishce Klasse): 145–336.

Ettl, H. (1983) Chlorophyta I. Phytomonadina. *In*: Ettl, H., Gerloff, J., Heynig, H. & Mollenhauer, D. (Eds.) *Süßwasserflora von Mitteleuropa.* 9. Gustav Fischer, Jena, pp. 1–807.

Flint, E.A. & Ettl, H. (1966) Some new and uncommon *Chlamydomonas* species from New Zealand. *New Zealand Journal of Botany* 4: 418–433. https://doi.org/10.1080/0028825X.1966.10429059

Nakada, T., Misawa, K. & Nozaki, H. (2008) Molecular systematics of *Volvocales* (Chlorophyceae, Chlorophyta) based on exhaustive 18S *r*RNA phylogenetic analyses. *Molecular Phylogenetics and Evolution* 48: 281–291. https://doi.org/10.1016/j.ympev.2008.03.016

Nakada, T., Tomita, M., Wu, J.-T. & Nozaki, H. (2016) Taxonomic revision of *Chlamydomonas* subg. *Amphichloris* (Volvocales, Chlorophyceae), with resurrection of the genus *Dangeardinia* and description of *Ixipapillifera* gen. nov. and *Rhysamphichloris* gen. nov. *Journal of Phycology* 52: 283–304. https://doi.org/10.1111/jpy.12397

Pröschold, T., Marin, B., Schlösser, U.G. & Melkonian, M. (2001) Molecular phylogeny and taxonomic revision of *Chlamydomonas* (Chlorophyta). I. Emendation of *Chlamydomonas* Ehrenberg and *Chloromonas* Gobi, and description of *Oogamochlamys* gen. nov. and *Lobochlamys* gen. nov. *Protist* 152: 265–300. https://doi.org/10.1078/1434-4610-00068

Susanti, H., Yoshida, M., Nakayama, T., Nakada, T. & Watanabe, M.M. (2020) A taxonomic reassessment of *Chlamydomonas meslinii* (Volvocales, Chlorophyceae) with a description of *Paludistella* gen. nov. *Phytotaxa* 432: 65–80. https://doi.org/10.11646/phytotaxa.432.1.6

Supplemental Material. Multiple sequence alignment of nuclear 18S *r*DNA in FASTA format.