Phylogenetic analysis of the "*Nannochloris*-like" algae and diagnoses of *Picochlorum oklahomensis* gen. et sp. nov. (Trebouxiophyceae, Chlorophyta)

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A broadly halotolerant new isolate of a small asexual coccoid chlorophyte and six new, related freshwater isolates provided the impetus for a phylogenetic analysis of the so-called "*Nannochloris*-like" algae within the Trebouxiophyceae. Previous taxonomic disagreements concerning this group had not been rigorously tested with molecular phylogenetic analyses. We show with 18S rDNA sequence phylogeny that nineteen of twenty-two isolaets previously assigned to either *Nannochloris* or *Nanochlorum* fall within a diverse sister clade to a clade including the four "true" *Chlorella* species *senus lato*. In addition, *Marvania geminata, Gloeotila contorta, Chlorella* sp. Yanaqocha RA1, *Koliella spiculiformis*, "*Chlorella minutissima*" C-1.1.9, and new *Koliella*, *Gloeotila* and *Marvania* isolates were included in the "*Nannochloris*-like" clade. Distinct freshwater and marine/saline lineages comprise at least three major subclades, generally corresponding to cell division pattern. Seven of fourteen marine/saline isolates are known (and others presumed) to divide by autosporulation. Eight freshwater isolates divide by binary fission, including two *Koliella*, two *Gloeotila, N. bacillaris, Chlorella* sp. Yanaqocha RA1, and two new unassigned isolates. Four freshwater isolates divide by budding or autosporulation (three *Marvania*, including CCAP 251/1b, previously assigned to N. coccoides). The autosporic taxa *N. eucaryotum* UTEX 2502 (marine) and "*C. minutissima*" C-1.1.9 (freshwater), which have nearly identical 18S rDNA sequences, are deeper-branching than the freshwater and marine/saline lineage. We propose including the thirteen marine/saline, autosporic taxa (excluding *N. eucaryotum* UTEX 2502) in the genus *Picochlorum* until distinctive morphological or biochemical characters are identified that would indicate multiple genera corresponding to subclades. Such characters exist in the freshwater lineages, supporting retention of *Koliella, Gloeotila, Marvania*, and *Nannochloris* as distinct genera, although each is currently represented by few isolates. *Nannochloris* at this time may be restricted to *N. bacillaris* and *C.* sp. Yanaqocha RA1. We also describe halotolerant *Picochlorum oklahomensis* Hironaka *sp. nov*. Based on 18S rDNA sequence and lack of chlorophyll *b.*, *N.* sp. UTEX 2379 should be reassigned to the Eustigmatophyceae.

In press, *Phycologia*