
Dinobryon stokesii var. *neustonicum* in Loch Flemington, Scotland: a rarely observed variety of golden alga new to UK freshwaters

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Dinobryon stokesii var. *neustonicum* Petersen & Hansen is an unusual variety of chrysophyte ('golden') alga (Lang *et al.*, 2011; Lang & Krokowski, 2014), first identified from the surface water or 'neuston' (from which is derived its name) of a pool, near Selde, in Denmark (Petersen & Hansen, 1960). The lorica enveloping its protoplast is described as being thin-walled, almost faint, and characteristically cylindrical, between 25.0 – 31.0 µm long and 4.8 – 6.0 µm wide, before rounding at the base (Petersen & Hansen, 1960; Starmach, 1985) (Fig. 1a, b). Currently this solitary alga is not listed amongst the other *Dinobryon* taxa of the British freshwater flora (Kristiansen & Preisig, 2011) and is rarely mentioned in the wider context, apparently unseen elsewhere other than at its original locality in northern Europe, until now.

Loch Flemington is a shallow, freshwater loch situated in Nairnshire, Scotland (NGR: NH 81026 52040). Its water quality characteristics have been described elsewhere (Lang *et al.*, 2014). In March 2010, the lanthanum-modified bentonite clay, known commercially as Phoslock[®], was applied in an effort to manage the loch's susceptibility to phosphorus-driven, cyanobacteria (blue-green algae) blooms and to this day, through engaging local citizen scientists, the loch remains closely monitored by the Scottish Environment Protection Agency in collaboration with the Centre of Ecology & Hydrology (Lang *et al.*, 2014). In the course of

analysing monthly phytoplankton samples consistently collected, as part of SEPA's ongoing assessment of the ecological status of Loch Flemington (Lang *et al.*, 2014), low numbers of *Dinobryon stokesii* var. *neustonicum* occurred (e.g., 1 – 2 cells per 100 ml sub-sample) intermittently during December 2013 and January 2014. This observation of *D. stokesii* var. *neustonicum* is a new record for UK freshwaters (D. John, pers. comm.) and interestingly, comprises the second of our recent algal discoveries from Loch Flemington (Lang *et al.*, 2014).



Fig. 1. *Dinobryon stokesii* var. *neustonicum*. (a) Photomicrograph of *D. stokesii* var. *neustonicum* preserved in Lugol's iodine. Scalebar, 10 µm. (b) Line drawing of *D. stokesii* var. *neustonicum*. Scalebar, 10 µm.

Little comment can be made on the ecology of *Dinobryon stokesii* var. *neustonicum*. Knowledge is scant as no habitat information or indication of sample timing was given by the original authors. Neither have any subsequent records of the chrysophyte been lodged in the official database holding information on algal distribution (www.algaebase.org). Furthermore, it is difficult to ascertain at this stage if environmental conditions in Loch Flemington have changed favourably towards *D. stokesii* var. *neustonicum* in response to ecosystem-scale geo-engineering, or whether we are dealing with a chance encounter during the temperate winter months. Being charged with careful examination of Scotland's algal communities for water quality assessment means that when exceptional organisms such as this present themselves, we are usually amongst the first to observe them. By documenting these rare finds, we make a significant contribution to accurately recording the UK's freshwater algal biodiversity. Our future work will endeavour to elucidate why

Loch Flemington has seemingly become a haven for the microscopic world.

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