

## AN ASTONISHING CELL EXPANSION DURING AUXOSPORULATION IN THE ARAPHID PENNATE DIATOM *PSEUDOSTAUROSIRA TRAINORII*

Shinya Sato<sup>1,2</sup> & David G. Mann<sup>1</sup>

<sup>1</sup>Royal Botanic Garden

<sup>2</sup>Cardiff University

We observed auxospore expansion and perizonium structure of an araphid pennate diatom *Pseudostaurosira trainorii*, in which we recently demonstrated control of sexualization via pheromones. This species is heterothallic, with clear differentiation into female and male clones; auxosporulation does not require contact between female and male gametangia. Immediately after the fertilization of a sessile egg by a motile male gamete, the zygote secretes mucilaginous substances and during auxospore (zygote) development, the mucilage envelope expands as the auxospore elongates, until the length of the auxospore exceeds c. 5 times that of the mother cell. Then the auxospore expands further, extending beyond the mucilage envelope at both ends. The degree of expansion is astonishingly high, the auxospore finally being more than c. 20 times longer than the mother cell. Because of the cell length, the chain-like colonies formed by post-auxospore cells of *P. trainorii* look superficially like *Fragilaria*, although ultrastructurally they differ, e.g. in the type of pore field, and in the presence (*Fragilaria*) or absence (*P. trainorii*) of labiate processes. Because of this similarity at the LM level, it would not be surprising if large-celled populations of *P. trainorii* have sometimes been misidentified or described as species of *Fragilaria* by previous taxonomists.

The perizonium of *P. trainorii* is delicate but is of the most common type, i.e. comprising aligned open transverse bands, with the widest one at the centre, and longitudinal bands lying underneath the suture of the transverse ones. No incunabular structures, e.g. strips, scales or caps, were detected, even after thorough observation.