

What Ever Happened to Sex Inducer?

Patrick J. Ferris¹, Erik R. Hanschen¹ and Richard E. Michod¹

1. Ecology and Evolutionary Biology, University of Arizona, Tucson, AZ, USA

Abstract:

While unicellular *Chlamydomonas reinhardtii* and many of the smaller volvocine colonials are sexually induced by nitrogen deficiency, many *Volvox* species become sexual after exposure to a pheromone called sex inducer. The diffusible pheromone is released (usually) by male sperm packets, and acts on vegetative gonidia to induce differentiation of sexual female colonies and sometimes additional sexual males. Inducer was first described by Darden in 1966 [1] in *V. aureus*, and has since been described in *V. rousseletii*, *V. dissipatrix*, *V. gigas*, *V. obversus* and, of course, *V. carteri*. All three *Volvox* clades are represented; however, only in *V. carteri* has the inducer glycoprotein been characterized both biochemically and by gene sequencing.[2] The *V. carteri* inducer protein is comprised of a single phosphorin domain and presumably evolved from this family of ECM proteins. Whether the inducers from the other *Volvox* species are orthologous proteins is unknown.

V. carteri is an obvious choice for investigating sex inducer evolution as incipient speciation leads to reproductive isolation. All *V. carteri* strains are divided into three parts/forma/subspecies called f. *nagariensis*, f. *kawasakiensis* and f. *weismannia*. The f. *weismannia* isolates come from three different locations: North America, Australia and India. Data (sometimes inconsistent) show that the inducers from some of these strains can cross induce others. Unfortunately, less information is available about the ability of the subspecies to cross-fertilize and produce viable zygotes. The reproductive isolation between f. *kawasakiensis* and f. *nagariensis* has been best described.[3]

Since sex inducer has only been sequenced from the Eve strain, a simple place to start is to clone and sequence inducers from the other strains. Screening genomic libraries is preferable, because the inducer genes are generally multi-copy which could lead to complications using gPCR. Inducer from *V. obversus* and *V. carteri* f. *weismannia* Nebraska were cloned using cosmids. Due to time pressure, cloning from f. *kawasakiensis*, f. *weismannia* Australia and f. *weismannia* India are being attempted with gPCR. The current state of our endeavours will be described.

References: (optional)

[1] Darden, W.H. 1966. J. Protozool. **13**:239-255.

[2] Mages, H.-W., Tschochner, H. and Sumper, M. 1988. FEBS Lett. **234**:407-410.

[3] Nozaki, H. 1988. Phycologia **27**:209-220.