

Lactate dehydrogenase of the horseshoe crab hybrids grown into the first-instar larvae for the first time in 1983*

Hiroaki SUGITA¹⁾ and Koichi SEKIGUCHI²⁾

1) Institute of Biological Sciences, University of Tsukuba, Sakura-mura, Niihari-gun, Ibaraki 305, Japan

2) Business Department, Jobu University, Iseaki-shi, Gunma 372, Japan

The first experimental hybridization among 3 Asian horseshoe crabs (Merostomata: Xiphosura), was carried out in 1977 and in addition to the 3 species, the American species could be obtained in the next year. Therefore, the experimental hybridization among these 4 species of horseshoe crabs has been done since 1978. The hybridization experiments revealed that the fertilization could not be accomplished between American (*Limulus polyphemus*) and Asian species gametes, while 3 Asian horseshoe crabs (*Tachypleus tridentatus*, *T. gigas*, and *Carcinoscorpius rotundicauda*) were cross-fertilizable one another. The interspecific hybrids of *T. tridentatus* ♀ x *T. gigas* ♂, *T. gigas* ♀ x *C. rotundicauda* ♂, and *C. rotundicauda* ♀ x *T. gigas* ♂ stopped their development at blastula stage (Sekiguchi's stage 6) but those of *T. tridentatus* ♀ x *C. rotundicauda* ♂, *C. rotundicauda* ♀ x *T. tridentatus* ♂, and *T. gigas* ♀ x *T. tridentatus* ♂ were always grown into swimming larvae (the first-instar larvae) (Sekiguchi & Sugita, 1980). The lactate dehydrogenase (LDH) from these first-instar larvae of hybrid horseshoe crabs was composed of 3 molecular forms: a maternal homodimer, a paternal homodimer, and a hybrid heterodimer, although each LDH from the larvae of 3 Asian horseshoe crabs showed only one dimeric form with different electrophoretic mobility from one another on a starch gel (Sugita & Sekiguchi, 1983).

In the summer of 1983, however, about 60 normal larvae were hatched from *T. gigas* eggs fertilized by *C. rotundicauda* sperm for the first time. Furthermore, *T. tridentatus* ♀ x *T. gigas* ♂ hybrids were also grown into swimming larvae in the summer of 1983. This is the second case for *T. tridentatus* ♀ x *T. gigas* ♂ eggs. Then LDH of these unusual hybrids showed 3 enzymic bands on the starch gel as well as that of the usual hybrids. In the survival of the unusual hybrids, therefore, the paternal genes for the LDH were expressed together, because the hybrid forms of the enzymes are expressed at the time when both maternal and paternal genes for the enzymes are activated together (Sugita & Sekiguchi, 1983; Wright & Subtelny, 1971).

References

Sekiguchi, K. and H. Sugita (1980) *Evolution*, **34**, 712–718.

Sugita, H. and K. Sekiguchi (1983) *Biol. Bull.*, **165**, 436–443.

Wright, D. A. and S. Subtelny (1971) *Develop. Biol.*, **24**, 119–140.

* Full content of this paper may be seen in the article entitled;

Sugita, H. and Sekiguchi, K. (1984) Lactate dehydrogenase of the horseshoe crabs and their hybrids. *Zool. Sci.*, **1**, 421–426