## *Research Note*

### *COILING OF SPERM CELL TAILS UNDER STRESS*[1]

In many insects, the sperm bundles coil before they leave the testes. Such a coiling is the rule in Coleoptera[2]. The significance of this phenomenon is unknown, although it obviously helps transport out of the testis excessively long spermatozoa. In *Drosophila*, defective sperm cells are eliminated during the coiling process[3].

Various male adults of the Membracid *Umbonia crassicornis* (Amyot and Serville) were collected on January 12 and on May 4, 1976, in Cupey, Río Piedras, Puerto Rico, from a *Pithecolobium dulce* (Roxb.) Benth tree.

Living preparations were made in Gaulden's saline[4], in a modified Belar's saline[5] and in the insect's own haemolymph according to Forer[6], with the difference that Halocarbon oil (batch 102174, Series 10–25, Halocarbon Products Corporation[7, 8] was used instead of Kel-F #10 mineral oil.

Observation and photography were made with Zeiss Photomicroscope II provided with phase control optics and flash. Kodak Plus-X Pan black and white film was used in photography.

In haemolymph and modified Belar's saline, mature testicular sperm bundles of *Umbonia* show a rapid synchronous motion of their tails (fig. 1, A) which is not seen in Coleoptera, for example[2]. The mature bundle has no cap cell. A secondary association of sperm heads occurs when the sperm bundle breaks down. Clusters of fragmented bundles with adhered

[1] Manuscript submitted to Editorial Board May 18, 1976.

[2] Virkki, N., Personal communication, Agric. Exp. Sta., Univ. P.R., Río Piedras, P.R., 1976.

[3] Tokuyasu, K. T., Peacock, W. J., and Hardy, R. W., Dynamics of spermiogenesis in *Drosophila melanogaster*. II. Coiling Process, Z. Zellforsch. 127: 492–525 (1972).

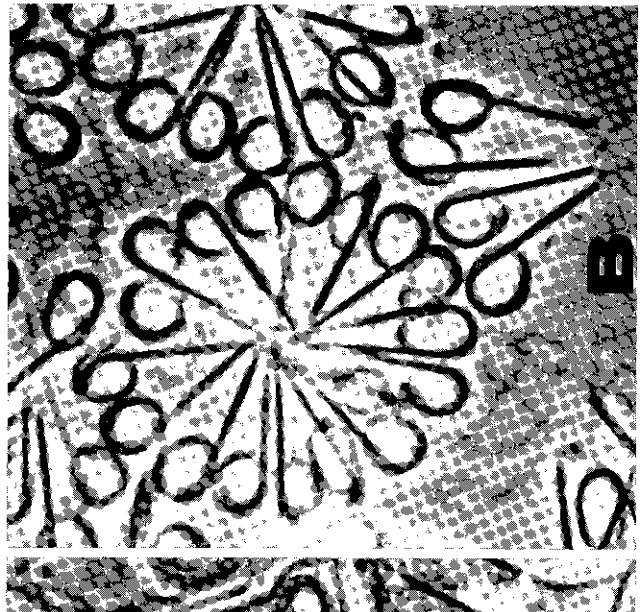
[4] Gaulden, M. E., and Carlson, J. G., Cytological effects of colchicine on the grasshopper neuroblast in vitro with special reference to the origin of the spindle, Exp. Cell Res. 2: 416–33, 1951.

[5] Virkki, N., Spermatogonial budding in fleabeetles, Caryologia 26: 405–23, 1973.

[6] Forer, A., Local reduction of spindle fibre birefringence in living *Nephrotoma suturalis* (Loew) spermatocytes induced by ultraviolet microbeam irradiation, J. Cell Biol. 25: 95–117, 1965.

[7] 82 Burlews Court, Hackensack, N. J.

[8] Trade names are used in this publication solely for the purpose of providing specific information. Mention of a trade name does not constitute a guarantee or warranty of equipment or materials by the Agricultural Experiment Station of the University of Puerto Rico or an endorsement over other equipment or materials not mentioned.


B

acrosomal regions appear (fig. 1, A and B). This is similiar to the secondary association found in orthopteran sperm[9].

In Gaulden's saline, the spermatozoa of *Umbonia* coil. Although the acrosomal association tends to persist, each spermatozoon coils individually. The entire tail becomes coiled and immobile (fig. 1, B). Rapid substitution of Gaulden's saline by modified Belar's saline reverses the process.

Systematic limits of the coiling as a normal phenomenon are unknown. In Diptera, at least, there are species with and without coiling of sperm tails. The normally straight bundle of *Aedes* spp. becomes coiled when exposed to low temperatures[10]. Thus a thermal stress in *Aedes* and a stress caused by an inadequate saline in *Umbonia*, are capable of coiling normally straight sperm bundles. The mechanism of coiling is presumably the same as in cases of normal coiling.

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[9] Cantacuzène, A. M., Recherches morphologiques sur les glandes annexes mâles des orthoptères. III. Modes d'association des spermatozoides d'orthoptères, Z. Zellforsch. 90: 113–26, 1968.

[10] Horsfall, W. R., Heteromorphic development of Aedine mosquitoes reared at abnormal temperatures, Ann. Zool. Fennici 11: 224–36, 1974.