

TABLE 1. Dialyzation results.*

Fish species	Sample	Original extract		Dialysate		Residue	
		Deaths no. inj.	Av. death time	Deaths no. inj.	Av. death time	Deaths no. inj.	Av. death time
<i>Fugu rubripes chinensis</i>	(1)	4/4	24 min	8/14	41 min	0/6	+
<i>Fugu rubripes chinensis</i>	(2)	4/4	3 min	30/32	4.7 min	19/34	15 hr
<i>Gymnothorax</i> sp. indet.	(1)	4/4	16 min	1/4	16 hr	0/4	+
<i>Gymnothorax</i> sp. indet.	(2)	4/4	24 hr	0/8	+++	4/8	24 hr
<i>Lutjanus vaigiensis</i>	(1)	21/43	24 hr	0/54	+	9/56	28 hr
<i>Lutjanus vaigiensis</i>	(2)	1/4	24 hr	0/12	++	0/12	+
<i>Caranx melampygus</i>		4/8	30 min	0/28	++	0/28	+

* Sublethal response recorded as: + occasional symptoms; ++ mild to acute symptoms in most mice; +++ entire group extremely distressed.

liver, and extract No. 2 from viscera (pooled liver, intestines, and gonads). *Gymnothorax* extracts Nos. 1 and 2 were from separate batches of muscle. *Lutjanus* extracts Nos. 1 and 2 were prepared from viscera. No. 1 was stored in the frozen state until tested; No. 2 was tested immediately on preparation. The *Caranx* extract was a sample of liver and gonads. Two milliliters of distilled water were used for each gram of tissue. The material was then homogenized in a Waring Blendor and centrifuged at 2000 rpm for 25 min. Aliquots of these extracts were dialyzed against distilled water that had been sterilized by autoclaving. Dialysis was conducted in the cold (38–42° F) for a minimum of 24 hr. The dialyzate was concentrated by distillation under low pressure and the volume adjusted to be equal to that of the original aliquot. The original, the concentrated dialyzate, and the residue were all injected intraperitoneally in 1.0-ml volumes into three separate groups of weanling mice of the California Caviary Strain No. 1, weight 15–23 g. Symptoms were observed for a minimum of 36 hr.

The data show that the dialyzate under the conditions of these experiments has a measurable toxicity. When it is considered that the dose-response curve for these toxins shows a large increment in response for a small increment in dosage, with a very small dose range between ED₁ and ED₁₀₀ (10), it is obvious that a considerable fraction of the toxin has penetrated the membrane,³ and it is therefore a fair inference that the toxin is a small molecular species.

There is an apparent difference in percentage distribution of the toxin between dialyzate and residue in the four species tested. This could be explained as either a function of concentration gradients, or actual differences in molecular species. Our present data do not resolve this question, but indicate that the toxin from each of the four species is a small water-soluble molecule.

References

1. KHELENTZOS, C. T. *Am. J. Trop. Med.* **30**, 785 (1950).
2. LEE, R. K. C., and PANG, H. Q. *Ibid.* **25**, 281 (1945).
3. LARSEN, N. P. *Queen's Hosp. Bull.* **2**, 1 (1925).
4. WATANABE, M. *Spec. Sci. Rept.: Fish.* No. 25, Fish and Wildlife Service, 209 (1950).
5. YUDKIN, W. H. *Bull. Bingham Oceanogr. Coll.* **9**, 1 (1944).

* Cellophane dialyzing tubing, Braun Corp., No. 25 225, 3/4-in. width.

6. PHISALIX, M., *Animaux Venimeux et Venins*, Vol. I, p. 487. Paris: Masson, 1922.
7. PAWLOWSKY, E. N. *Gifftiere und ihre Giftigkeit*, p. 406. Jena: Verlag von Gustav Fischer, 1927.
8. HALSTEAD, B. W. *Med. Arts and Sci.* **5**, 1 (1951).
9. ———. *Copeia* **1**, 31 (1953).
10. HALSTEAD, B. W., and RALLS, R. J. Unpublished data.

Manuscript received November 9, 1953.

Movement of Yolk Cells in the Silkworm (*Bombyx mori* L.)

Takeo Takami

Physiology Department,
Sericultural Experiment Station, Tokyo, Japan

In the silkworm, *Bombyx mori* L., the egg, as in many other insects, contains a large quantity of yolk which is nonliving and is used for nutrition of the embryo. Covered with this huge amount of yolk, the activity of the yolk cells themselves, which contain the yolk and provide for the embryo, is often overlooked.

The behavior of the living yolk cells in hanging drops has been studied and it has been found that the yolk cells show active movement *in vitro*. This is a fact that has not yet been reported about *Bombyx mori* or presumably the other insects, and seems worth describing.

A drop of 0.9% NaCl solution was spread on the underside of a cover slip. The yolk was added to it, and the cover-slip was sealed to a depression slide with petroleum jelly.

In the silkworm egg, fertilization takes place within 2 hr after deposition. At about the 24th hr the yolk segmentation begins and the yolk mass is divided by thin membranes into many large cells that contain several groups of nuclei surrounded by dense masses of fatty globules and a large quantity of protein globules. These large cells are subdivided into much smaller yolk cells, or so-called "yolk segments," which are mononuclear, as usually seen.

The moving yolk cells observed *in vitro* show a peculiar shape. They have a concave portion and a satellite projection at that portion (Fig. 3), and move toward the direction of the headlike extension. The maximum moving velocity in these experiments was 13.18 μ /m.

Many cells cease movement within about 1 hr or so

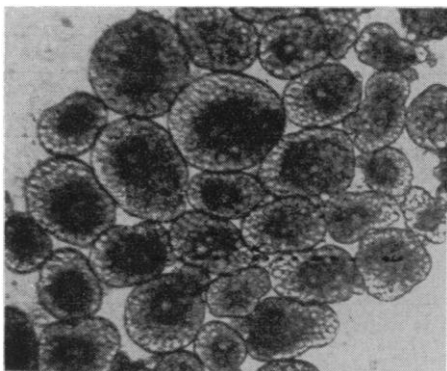


FIG. 1. Resting yolk cells from a hibernating egg at the beginning of incubation. Photographed about 5 min after the explantation (ca. $\times 280$).

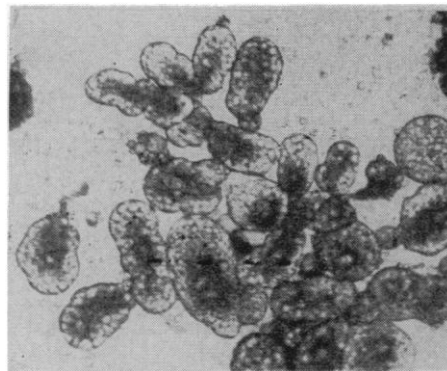


FIG. 2. Yolk cells changing form in the same preparation as shown in Fig. 1. Photographed 30 min later (ca. $\times 280$).

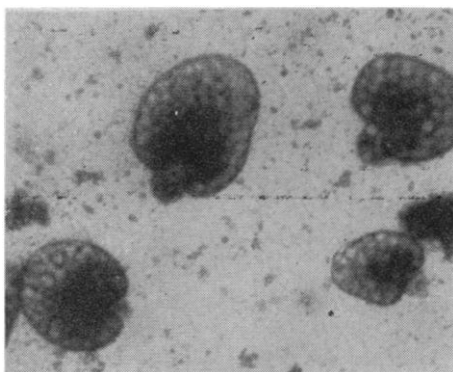


FIG. 3. Moving yolk cells (ca. $\times 400$).

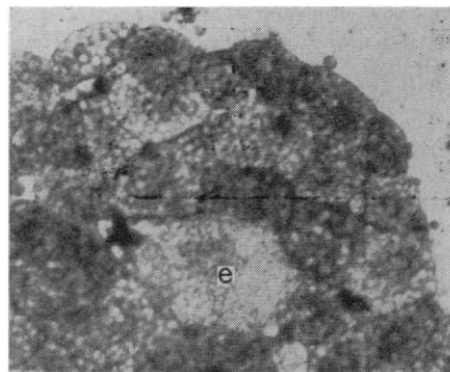


FIG. 4. Tissuelike grouping of yolk cells. e, embryo (ca. $\times 300$).

after the explantation. They recover their round shape, and the neighboring cells come into intimate contact with each other to form tissuelike groups (Fig. 4). But some cells often continue to move for several hours, as seen under the microscope.

In hibernating eggs the active movement period of yolk cells covers about 1 wk or more, beginning about 40 hr after deposition. Then the yolk cells gradually become less active. In the nonhibernating and artificial

nonhibernating eggs this period is very short, and continues only for a day or less. In these nonhibernating eggs the movement of yolk cells is not restored, whereas in the hibernating egg it is restored at the beginning of the next spring and is retained until just before the time of the curvature reversal of embryos.

Manuscript received August 26, 1953.

Communications

Unpopular Science

At a recent meeting of representatives of federal agencies sponsoring biological and medical research, the question of the limitations imposed on scientists in regard to travel and security was discussed. I expressed the belief that both are merely symptoms of a growing distrust of science and scientists. This matter has concerned me for a long time. The problem is indicated by a number of phrases and statements (some only approximate quotations) which have appeared in speeches, articles, and books, particularly during recent months.

"Science is in conflict with society. . . . Science has failed. . . . Science is charged with some, if not most, of the failures, violence, brutalities, suffering and confusion of our times. . . . There is a growing anxiety to minimize and localize science. . . . Science is tolerated only on its best behavior. . . . It has become a passion and a luxury. . . . A sacred cow. . . . A cult of men in white coats. . . . Its revelations have been considered alien to the human spirit. . . . It will destroy civilization. . . . There is a steady hunger for irrationalism—unscientific and antiscientific