Pesticides have been shown to cause a sharp and substantial increase in the rate of oxygen consumption in insects[4], Fishes[9], etc. The increased rate of oxygen consumption after an exposure to pesticide might be due to excessive muscular activity due to the action of the pesticide *via* nervous system[8].

Thus, in the present study, the increased rate of oxygen consumption after exposure to γ-BHC, in the morning could be ascribed to its effect on the nervous system which in turn increases muscular activity. The evening rise in oxygen consumption in untreated animals is a reflection of diurnal rhythm in oxygen consumption and locomotor activity which are higher in the evening than in the morning[5]. At that time, the animal was highly active and the respiration was more, because of a diurnal rhythm, the fixed concentration of the pesticide (25 ppm) and duration of exposure (half an hour) had practically no effect on oxygen consumption, though it had effected an increase in the rate of oxygen consumption when exposed at 10·00 hr. Perhaps a higher dose of Lindane is required to elicit a change in the rate of oxygen consumption at 17·00 hr.

Thus, it may be suggested that the environmentalists should note the time of the day while doing the bioassay studies of pesticide, since, the concentrations standardised for one particular time of the day may not hold for another time of the day.

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1. Halberg, F., *Cold Spring Harb. Symp. Quant. Biol.*, 1960, **25**, 289.
2. —, *Hospital Practice*, 1977, **12**, 139.
3. Reinberg, A., In *Biological Aspects of Circadian Rhythms*, J. N. Mills, ed., Plenum Press, London, New York, 1973, p. 121.
4. Mills, J. N. ed., *Biological Aspects of Circadian Rhythms*, Plenum Press, London, New York, 1973.
5. Ralph, C. L., *Physiol. Zool.*, 1957, **30**, 41.
6. Bennet, M. F. and Guilford, C. B., *J. Comp. Physiol.*, 1971, **74**, 32.
7. Hanumante, M. M., *Comp. Physiol. Ecol.*, 1978, **3**, 117.
8. O'Brien, R. D. (ed.), *Insecticides—Action and Metabolism*, A.P., New York, London, 1967.
9. Holden, A. V., In *Environmental Pollution by Pesticides*, Edwards C. A., Ed., Plenum Press, London, 1973, p. 213.

A NOTE ON HYPOPHYSATION OF TAWES, *PUNTIUS JAVANICUS* (BLKR.) IN INDIA

GRASS carp (*Ctenopharyngodon idella*) has proved to be very effective in controlling aquatic vegetation besides being capable of very good growth in Composite Fish Culture ponds of India[1]. Tawes, *Puntius javanicus*, is also known as an effective browser of aquatic vegetation in freshwaters. To assess the possibilities of introducing the species in India, and to determine its efficacy for weed eradication of the cultivated waters, and to see its performance with regards to its growth in Indian conditions, a consignment of 5,000 fry (10–20 mm) of the species was procured in September, 1972 from Indonesia. A part of the consignment was kept at Kalyani Fish Farm in the ponds of West Bengal centre of the Co-ordinated Research Project on Composite Fish Culture and Fish Seed Production. The species was successfully acclimatised and thrived well in the new environment.

Tawes can breed in ponds only if appropriate measures are taken. For breeding tawes in ponds in Indonesia, the home country of the species, riverine conditions are simulated[2,3]. The method is almost similar to that of dry bundh breeding of Indian major carps practised in India. In Indonesia, larvae and fry of the species are collected for culture from the Bengawan Solo River during monsoon[2], as Indian major carp seed is collected from Indian rivers.

The induced breeding of the species was attempted for the first time in India at Kalyani centre to raise fingerling stock for stocking. On July 28, 1977, one mature female, weighing 600 g, and four oozing males, weighing 250 g each, were selected out of the stock. Female was given two injections of pituitary extract (heterogenous) @ 4 mg and .8 mg/kg body weight (weight of the pituitary gland after preservation in absolute alcohol) at an interval of six hours. Males were given only one injection, @ 5 mg/kg body weight, at the time of second injection to the female. The water temperature during the period of injection and breeding ranged between 26–27° C. Though it remained cloudy throughout the night it didn't rain. The brooders were kept in one breeding hapa in a stagnant pond.

Breeding was observed about three hours after the second injection. About one lakh eggs were obtained and hatched in double walled hatching hapa. Fertilization was observed to be 90%. Hatching started about 11 hours after spawning and was completed by about 14 hours. The water temperature during the period of hatching ranged between 28–30° C. Altogether 65,000 hatchlings were obtained. They have been reared in nursery pond and in about two months time have grown to about 70–100 mm in size (Figs. 1 and 2).

This method of induced breeding tawes, successfully attempted for the first time, opens up a simple process of breeding this fsh. This is simpler than the method followed for its breeding in its home country. Such a success is a concrete step forward towards the propogation of the species for biological control of aquatic weeds, besides augmenting fish production.

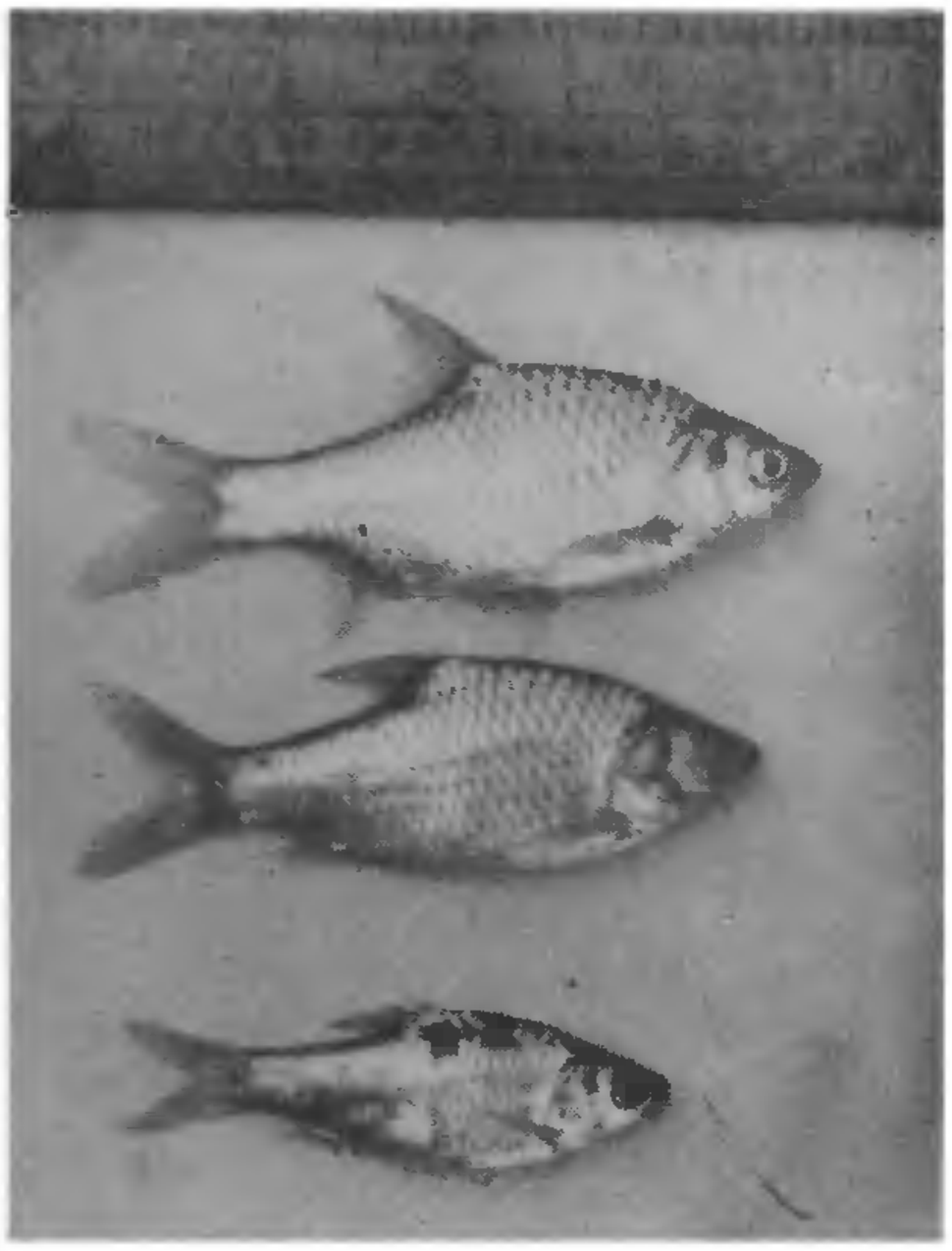

FIG. 1. 2 months old fngerlings of *Puntius javanicus*.

FIG. 2. 2 months old fingerlings of P. *javanicus* in a plastic bag.

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1. Sinha, V. R. P. and Vijaya Gupta, M., *Aquaculture*, 1975, 5, 283.
2. Hora, S. L. and Pillay, T. V. R., *Hand-book of Fish Culture in the Indo-Pacific Region*, FB/T 14, FAO Publication, 1962.
3. Bardach, J. E., Ryther, J. H. and Mclarney, W. C., *Aquaculture*, Wiley Interscience, New York, 1972.

PRESENCE OF CILIA IN SCHWANN CELLS AND IN SATELLITE CELLS OF FROG SKELETAL MUSCLE IN DENERVATED CONDITIONS

AN unexpected presence of cilia in different cell systems such as smooth muscle[1], renal epithelium[2] and parenchymal cells of adenohypophysis[3] has already been reported. In addition to that, there are reports of cilium being present in the sympathetic ganglion of frog, axolatal and lizard[4] and in the autonomic nervous system of rat[5]. In the present report, we have shown an incidental finding of incomplete cilium in the Schwann cells of neuromuscular junctions and satellite cells in denervated skeletal muscle.

The muscles *rectus internus major* and *sartorius* from frogs *Rana esculenta* and *Rana temporaria* were used for the present study. The methods are given in our previous publication[6].

It has already been reported that after denervation the Schwann cell takes the place of nerve terminal and is present in front of the post-synaptic membrane[6,7]. Quite often, we observed the presence of an incomplete cilium in the Schwann cell present in front of the post-synaptic membrane. It is lying mostly in the transversal position to the longitudinal axis of the muscle fibre. It has a double membrane structure containing 8 or 9 double fibrils, the central fibrils are mostly absent (Fig. 1).

Satellite cells are known to increase after denervation[8] and cilia are frequently found in these satellite cells. Fig. 2 shows one such example where an incom-