amino acid constituents of resilin. Further, resilin, which has the property of autofluorescence may play important optical role in the transparent cuticle over the compound eyes[7].

The authors are grateful to Prof. R. G. Michael for laboratory facilities. SD is thankful to the authorities of N.E.H.U. for the award of a research fellowship.

15 April 1983; Revised 12 December 1983

1. Weis-Fogh, T., *Adv. Insect. Physiol*, 1960, **2**, 1.
2. Sannasi, A., *Experientia*, 1970, **26**, 154.
3. Raghuvarman, A., *Experientia*, 1980, **36**, 564.
4. Raven, D. J., Earland, C. and Little, M., *Biochem. Biophys. Acta*, 1971, **151**, 96–99.
5. Bailey, K. and Weiss-Fogh, T., *Biochem. Biophys. Acta*, 1961, **48**, 452.
6. Locke, M., *Tissue Cell*, 1969, **1**, 555.
7. Anderson, S. O., *Comprehensive biochemistry*, (ed. M. Florkin, and E. H. Stotz), 1971, **C26**, 633.

EFFECT OF SOME CHEMICALS ON NEUROSECRETORY ACTIVITY OF *OCTOCHAETOIDES SUDERSHENSIS*

M. S. KODARKAR, G. N. VANKHEDE* and K. M. KULKARNI
Department of Zoology, Vivek Vardhini College, Hyderabad 500 001, India.
**Department of Zoology, Brijlal Biyani Science College, Amravati 444 602, India.*

SCHMID has studied the influence of novocaine and the hydrochloride of epinephrine on the activity of neurosecretary cells (NSC) in *Lumbricus terrestris*[1]. He observed that 1% novocaine induced a significant increase in the number of cerebral NSC. A similar result was observed when 1% epinephrine hydrochloride was administered. No efforts have been made in testing the effect of chemicals or drugs on the neuroendocrine system of earthworm.

Mature clitellate *Octochaetoides sudershensis* were

Table 1. *Cytomorphological changes in A and B type neurosecretory cells from brain and the subpharyngeal ganglion.*

Injections	A cells: Changes in diameter of perikarya (μ)	A cells: Changes in nuclear diameter (μ)	A cells: Effect on NSM	B cells: Changes in diameter of perikarya (μ)	B cells: Changes in nuclear diameter (μ)	B cells: Effect on NSM	Remarks
a. Insulin (4 I.U./ worm)	10.7–23.0	7.5–8.5	+	7.5–20.5	5–6.5	+ +	Marked accumulation of NSM at axonal terminals of B cells from sub. ph. gang.
b. Allaxon (1 ml of 0.05%/worm	11.0–23.0	7.5–8.0	–	–	–	–	Effect prominently observed only on B cells from the sub. ph. gang. Intercellular spaces observed between A cells
c. Acetylcholine (0.1 ml of 0.00001%/ worm)	11.5–23.0	7.5–8.0	+	8.0–20.5	5–7	+	Distribution of NSM characteristic *i.e.* along ant. end of perikarya and the axon tip.
d. Adrenaline (0.1 ml of 0.00001%/ worm)	11.5–23.0	8.5–9.0	+	7.5–20.5	5–7	+	Enlarged nuclei of A cells from sub. ph.gang.
e. 5-HT (0.1 ml of 0.00001%/ worm)	10.5–23.5	7.0–7.5	–	7.5–19.5	4.5–6.5	–	Scanty NSM along axon hillock in A cells from brain and along periphery of A cells of the sub. ph. gang. Intense vacuolization in B cells from sub. ph. ganglion.

collected and acclimated for a week in the laboratory in glass troughs filled with moist soil. For each group of 10 unanaesthetized worms, insulin (conc. 40 I.U./ml), acetylcholine, adrenaline, allaxon and 5-hydroxytryptamine were injected separately using an aqueous vehicle. Each worm of the particular test group thus received an injection of 0.1 ml of either 4 I.U. insulin or 0.00001 % (w/v) acetylcholine and adrenaline or 0.05 % (w/v) of allaxon or 0.00001 % (w/v) of 5-HT into the preclitellar region. The animals were fixed in aqueous Bouin's *in toto* 90 min after the injections. Mallory's triple stain was used in histological studies.

The results of the histological observations are given in table 1, which shows that insulin injection presumably induced an increase in the rate of axonal transport and decline in the release of NSM of B cells of subpharyngeal ganglion. As a result, neurosecretory granules are found aggregated in the axonal endings. Again there is no change in the nuclear dimensions of B cells which indicates no enhancement in the rate of synthesis as compared to the normal.

Allaxon is a drug that selectively destroys pancreatic B cells, which are the source of insulin in fishes[2] and higher vertebrates[3]. The atrophy of B cells of subpharyngeal ganglion following the administration of allaxon suggests that these cells are the source of insulin like hypoglycemic endocrine principals.

Amines like dopamine, nor-adrenaline and 5-hydroxytryptamine play a role in neurosecretion in polychaetes and oligochaetes[4]. In Octochaetoides, injected acetylcholine probably interferes with the axonal transport of NSM thereby ensuring the recorded pile-up of neurosecretory granules in the perikarya and anterior half and distal tips of the axons of A cells of lateral group from the brain.

After the administration of adrenaline there was a drastic reduction in neurosecretion from perikarya and axons of A cells of lateral cell group from subpharyngeal ganglion, which may mean adrenaline accelerates synthesis, transport and release of neurosecretory granules in these NSC. Increased nuclear dimensions of nuclei of A cells, present an additional evidence for this assumption. Interestingly enough, 5-HT exerts similar influence on the B cells of subpharyngeal ganglion. The action of 5-HT on A cells (both from brain and subpharyngeal ganglion) probably shuts off or slows down the axonal transport and release but not the synthesis of NSM as their nuclear dimensions were enhanced and NSM was restricted within perikarya.

13 September 1983

1. Schmid, L. A., *J. Exp. Zool.*, 1947, **104**, 365.
2. Chavin, W. and Young, J. E., *Gen. Comp. Endocrinol*, 1970, **14**, 438.
3. Gorbman, A. and Bern, H. A., *A Text Book of Comparative Endocrinology*, Wiley Eastern Private Ltd. New Delhi, 1974.
4. Herlant-Meewis, H., *Bull. Cl. Sci. Acad.*, R. Belg SE Ser, 1977, **63**, 240.

PRELIMINARY OBSERVATIONS ON THE USE OF WATER HYACINTH (*EICHHORNIA CRASSIPES*) LEAF MEAL AS PROTEIN SOURCE IN FISH FEED

R. NIAMAT and A. K. JAFRI
Department of Zoology, Aligarh Muslim University, Aligarh 202 001, India.

EFFORTS have been made by several workers in the past to utilize proteins of plant origin, in various forms, in fish feeds[1–5]. A review of the literature indicates that, although the nutritive value of water hyacinth (*Eichhornia crassipes*) and its use as an ingredient for farm animals has been extensively investigated, the utilization of this weed as fish feed ingredient is much less explored[6].

The present communication reports results of some preliminary observations on the use of water hyacinth leaf meal as a protein source in formulated fish feed. Such a study incorporating low-cost plant protein source in fish feed is significant in view of the rapidly increasing cost of animal protein components.

For the preparation of the leaf meal, fresh water hyacinth, obtained from a sewage-fed pond, was washed, the leaves air-dried and powdered. The leaf meal was assessed for its proximate composition using standard techniques[7]. The meal in dried form at 8 % moisture level contained 25 % crude protein and 14693 J/g gross energy.

Soft pellets, containing water hyacinth leaf meal (50 %), low-quality minced meat (37 %) and commercial fish oil (3 %), were prepared by extrusion using a 3 mm die. Carboxymethyl cellulose was used as a binder. The efficacy of the formulated feed was tested through a short-term feeding trial on a siluroid, *Heteropneustes fossilis*. No supplementation with minerals or vitamins was made in the feed. The fish (average weight 10.5 g and average total length 88 mm) were acclimatized to