activity, no less than solubility, is very sensibly augmented....just as a rise of temperature would do, and will sometime make effective a reaction which would otherwise be in abeyance..... A shearing stress by altering the atomic configuration of a crystal, changes also its chemical property". The chemical process takes place inside the crystal, so that atomistic transformation releases the stress without necessarily forming new nuclei of crystals (Ramberg, 1952).

Hydrogen ions of considerable amount are added to the chlorite-schist for the formation of hydroxyl group of minerals like chlorite, epidote, etc. It is impossible to visualise this metasomatic process unless some amount of water is present during this process. Harker (1932) points to an atmospheric source, but whatever be the source, we are sure that an aqueous phase existed in the dyke, and with this as an intermediary, the introduction of material and the displacement of elements were much more rapid than by solid reaction. The aqueous phase encouraged recrystallization of minerals and crystallization of new minerals; and the prevailing conditions, then, enormously lowered the resistance of the dolerite to the deformational forces.

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Department of Civil Engineering,
Sri Venkateswara University,
Tirupati, *September* 20, 1971.

K. ANJANAPPA.

1. Barth, T. F. W., *Jour. Geology*, 1949, **56**, 56.
2. Harker, A., *Metamorphism*, Methuen and Co. Ltd., London, 1932.
3. Ramberg, H., *The Origin of Metamorphic and Metasomatic Rocks*, University of Chicago Press, Chicago, 1952.

NATURE OF THE HORMONE FROM A NEMATODE *PHOCANEMA DEPRESSUM* BAYLIS

It is known that nematode worms moult periodically by laying down a new cuticle and shedding the old one[1]. An important event in moulting is the secretion of an exsheathing fluid, containing leucine aminopeptidase into the space between the new and old cuticles, by the excretory glands[2]. If the exsheathing fluid is not secreted, the worms fail to ecdyse[3]. By following the activity of the neurosecretory cells in the dorsal and ventral nerve ganglia and by observing that the excretory glands started elaborating leucine aminopeptidase on incubation with the extracts of the anterior end of the worm which contains dorsal and ventral nerve ganglia, Davey and Kan[3,4] suggested that the process of moulting in nematodes is under the control of a hormone secreted by the neurosecretory cells. The hormone involved in moulting in arthropods has been isolated and it is found to be steroid in nature[5]. But no attempt has so far been made to isolate and study the nature of the hormone in question in nematodes. Hence we have extracted the hormone from a nematode and characterized it chemically.

Nematodes of the species *Phocanema depressum* Baylis were the materials used. These nematodes occur as last stage larvae in the muscles of the common shrew *Suncus caeruleus* and moult once to the adult stage in the digestive tract of vultures *Vultur monachus*[6]. The last stage larvae were obtained by dissecting the shrew inactivated by exposure to chloroform for 5 minutes. A culture of the larvae thus collected was maintained in the laboratory following the method outlined by Townsley *et al.*[7]. In the culture, the neurosecretory cells in the dorsal and ventral nerve ganglia stain intensely on the first and second days with Gomori's chromehaematoxylin—Phloxin and paraldehyde fuchsin according to the modification of Halmi and Dawson[8], suggesting the presence of hormonal substance in them. After the second day the neurosecretory cells fail to stain with these stains. Correspondingly the leucine aminopeptidase activity was obvious in the excretory glands on the first and second days as indicated by positive reaction to Rosenblatt *et al.* test[9]. Therefore the activation of excretory glands to synthesize leucine aminopeptidase was used as a marker for the presence of the hormone in question, as suggested by Davey and Kan[3].

5 mm long regions from the anterior end of 2,000 last stage larvae from 2 days old culture were separated, freeze-dried and homogenized immediately at -10° C. This homogenized material was used for all further studies. The incubation experiments were carried out according to Davey and Kan[3]. Thin layer chromatography was done following Thompson *et al.*[10]. Mass and ultraviolet spectroscopic

analyses were made as suggested by Kaplanis *et al.*[11].

The excretory glands from the last stage larvae, collected from the shrew, showed intensely positive reaction to Rosenblatt *et al.* test after incubation with an aliquot of the homogenate in saline at 33–35° C for 3 to 4 hours; the controls on the other hand were negative to this test, suggesting the presence of the hormone in question in the homogenate of the anterior region. But after extraction with 75% methanol the homogenate produced no effect on the excretory glands as indicated by the negative reaction given by the excretory glands to the test for leucine aminopeptidase. The dried residue of the methanolic extract dissolved in 20% ethanol in saline, on the other hand, induced the excretory glands to elaborate leucine aminopeptidase. These observations may indicate that the hormonal substance in question may be of the nature of lipid. Therefore the substance extractable with methanol from the homogenate of the anterior end of the worms was studied in detail for its properties.

In thin layer chromatography the methanolic extract formed a single band with R_f value of 0·34. The melting point of the material in question was 230–235° C. Mass spectroscopic analyses indicated that molecular weight of the substance was 466. The wavelength of absorption and molar extinction coefficient of the substance in methanol were 243 and 11,900, respectively, as revealed by ultraviolet spectroscopy.

It is of interest to note that the properties of the hormone from the nematode, described above, recall those of α-ecdysone isolated from insects[5]. If the hormone from the nematode resembles the α-ecdysone from insects, one would expect that the former should cause an insect to moult and the latter should be able to induce leucine aminopeptidase activity in the nematode excretory glands. To test this possibility 5 μg of the methanolic extract from the nematode prepared as mentioned above, dissolved in 1 cc of 20% ethanol in saline was injected into the abdomen of an early pupa of a *Cynthia* moth. This caused the pupa to moult into adult, 8 days after injection. No such effect was seen in the control in which only 20% ethanol in saline was injected. In another set of experiments, the excretory glands from *Phocanema depressum* were incubated in α-ecdysone from insects in 20% ethanol in saline for 6 hours at 35° C. After incubation, the excretory glands gave an intense positive reaction to the test for leucine aminopeptidase but controls were negative to this test.

In the light of the observation reported in the foregoing study it is suggested that the hormone involved in the process of moulting in nematodes is a substance similar to α-ecdysone. The ecdysones which were previously thought to be specific in insects are now being detected in a variety of living systems[11]. Therefore the occurrence of a hormone recalling the α-ecdysone in the nematode is not surprising.

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Dept. of Zoology, Madras University, Madras-5, and Development Biology Centre, Case-Western Reserve University, Cleveland, U.S.A., *September* 13, 1971.

G. Sundara Rajulu.
S. Kulasekarapandian.
N. Krishnan.

1. Rogers, W. P., *The Nature of Parasitism*, Academic Press, London and New York, 1962.
2. —, *Comp. Biochem. Physiol.*, 1965, **14**, 311.
3. Davey, K. G. and Kan, S. P. *Nature*, 1967, **214**, 737.
4. — and —, *Canad. J. Zool.*, 1968, **46**, 893.
5. Karlson, P. and Sekeris, C. E., *Recent Prog. in Hormone Res.*, 1966, **22**, 473.
6. Baylis, H. A., *The Fauna of British India, Including Ceylon and Burma. Nematoda* (*Ascaroidea and Strongyloidea*), Taylor and Francis London, **1**, 1936
7. Townsley, P. M., Wright, G. H., Scott, M. A. and Hughes, M. L., *J. Fish. Res. Board*, Canada, 1963, **20**, 743.
8. Scharrer, E. and Scharrer, B., in *Handbuch der mikroskopischen Anatomie des Menschen*. Ed. Wiehelm von Mollendroff, Berlin : Springer, 1954.
9. Pearse, A. G. E., *Histochemistry, Theoretical and Applied*, J. and A. Churchill, London, 1961.
10. Thompson, M. J., Kaplanis, J. N., Robbins, W. E. and Yamamoto, R. T., *Chem. Commun.*, 1967, **13**, 650.
11. Kaplanis, J. N., Thompson, M. J., Robbins, W. E. and Bryce, B. M., *Science*, 1967, **157**, 1436.

SEXUAL DIMORPHISM IN THE SPINY EEL *MASTACEMBELUS PUNCALUS*

Working on the Urinogenital system of Indian spiny eels Dalela[1] and Kamlaveni[2] have reported the occurrence of urinogenital papilla in both the sexes of *Macrognathus aculeatus* and *Mastacembelus armatus* respectively and have denied that these species show any sexual dimorphism. However, Sterba[3] describing the family Mastacembelidae in general and the species *Mastacembelus puncalus* in particular