external genitalia were yellow in colour. There was loss of appetite, weakness, emaciation and debility. Constipation was marked. Microscopic examination of faeces by sedimentation method revealed the eggs of *Fasciola gigantica* (162–163 μm by 97–98 μm). The urine was dark yellow in colour and was highly positive for bile pigments by Gmelin test[2]. The animals were then treated with hexachloroethane with a single oral dose of 10–15 g and the treatment was repeated on the fourth day. Mifex (M & B) (300 ml) was injected subcutaneously for two consecutive days. Vibelan (Glaxo) injection (10 ml) was given intramuscularly for six days. Animals became gradually normal and passed normal urine and faeces. Fifteen days after the first treatment, urine and faeces were examined and it was found that the urine was free from bile pigment and faeces from the egg of *F. gigantica*. Olsen[3] demonstrated the value of hexachloroethane for liver-fluke infection in cattle. Fasciolosis with jaundice seems to be common in West Bengal and if not properly diagnosed and treated the result could be fatal.

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PROBABLE ANTIDIURETIC FUNCTION OF CERTAIN NEUROSECRETORY CELLS IN THE VENTRAL NERVE CORD IN *ORYCTES RHINOCEROS* (COLEOPTERA: SCARABAEIDAE)

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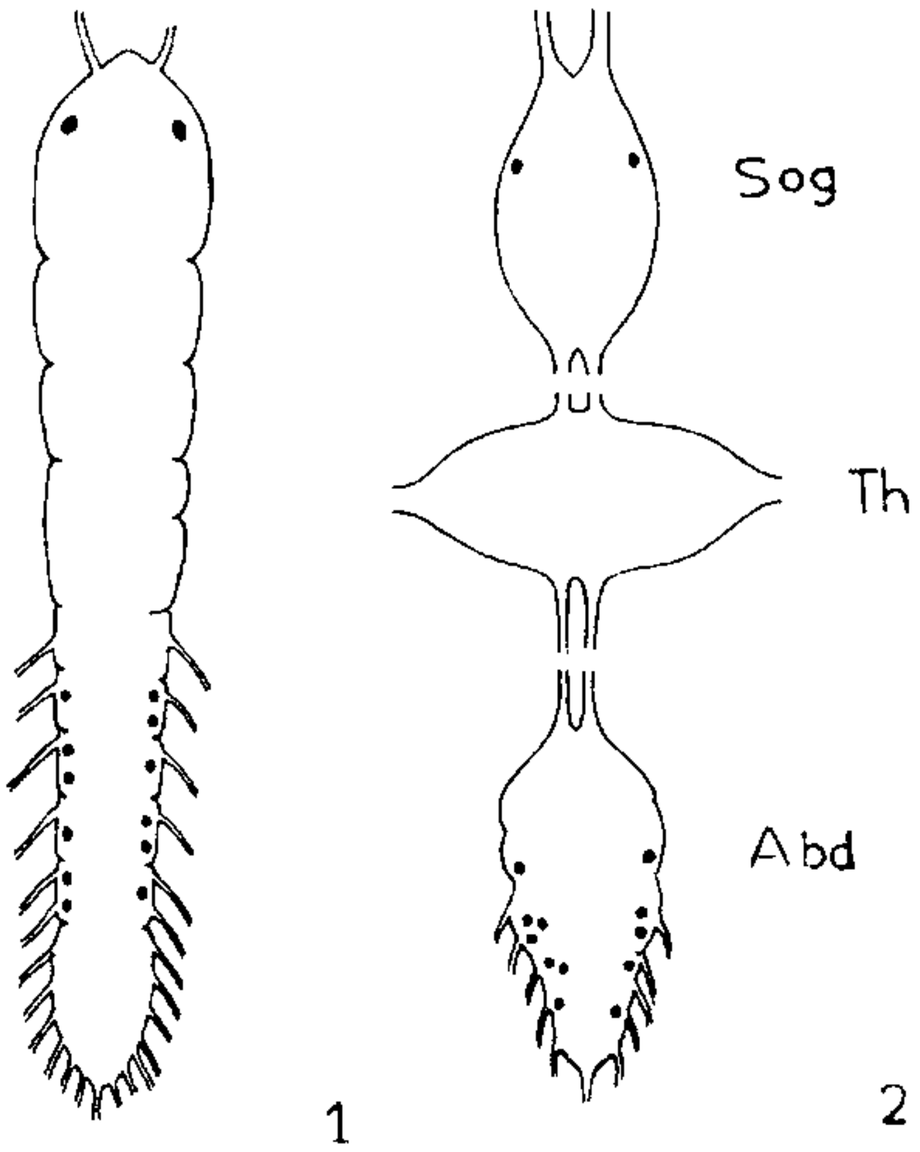
IT has been reported that most of the A-type neurosecretory cells in the brain (except one pair) and their axonal endings in the corpus cardiacum in the coconut beetle *Oryctes rhinoceros* (Coleoptera: Scarabaeidae) appear to contain a diuretic principle, as these cells are devoid of colloids under conditions of hydration, and charged with colloids under condition of dehydration[1]. The single pair of neurosecretory cells among the rest of the pars-intercerebralis A-cells however are supposed to have an antidiuretic function as these alone are fully loaded under conditions of water loading and indistinguishable under dehydration conditions. The present observations suggest that in addition to the single pair of the above neurosecretory cells in the Pars intercerebralis in *O. rhinoceros*, the A cells in the ventral ganglia also have an antidiuretic function.

Animals employed for the study and the methods were the same as in our earlier study for brain neurosecretory cells[1]. For hydration studies 3rd instar (last instar) larvae of *O. rhinoceros* were provided with cowdung with liberal sprinkling of water, or the larvae as well as the adults were given distilled water injections (1 cc/animal). For dehydration studies either the larvae were withheld from water or the larvae as well as the adults were injected saline (1 cc of 1% saline/animal). In either case the ventral nerve cord was dissected 3 days after treatment. Routine



Figures 1 and 2. 1. Composite ventral ganglion of 3rd instar larva of *Oryctes rhinoceros*. **2.** Ventral ganglia (SOG-Suboesophageal, Th-Thoracic, Abd-abdominal ganglionic fusions) of the adult, showing distribution of neurosecretory cells. These cells are antidiuretic.

paraffin sections of Bouin-fixed ganglion were stained in Gomori's chrome alum haematoxylin phloxin[2] or in aldehyde fuschsin[3].

In the third (final) instar larva of *O. rhinoceros* (figure 1) all the ganglia in the ventral nerve cord are fused into a single mass, but in the adult (figure 2) there are three ventral ganglionic masses; the suboesophageal ganglionic mass, the thoracic ganglionic masses and the abdominal ganglionic mass. It was found that the single ventral ganglionic mass in the larvae and all the three ventral ganglionic masses of the adult in the water-logged condition contained dense colloids whereas those of animals from which water was withheld or saline was injected contained little of the secretory material. In the larvae, there are 14 such A cells in all, in the single ventral ganglionic mass; in the adult, there are two A-cells in the suboesophageal ganglia, none in the thoracic ganglion and 12 in the abdominal ganglion. It appears that the neurosecretory A cells of the ventral ganglionic mass are apparently antidiuretic in function, as in *Clitumnus extradentatus*[4], *Leucophaea maderae*[5] and in *Schistocerca gregaria*[6]. In this respect they are comparable to the single pair of A cells of the brain in this animal described earlier[1]. These cells also have an antidiuretic function as opposed to the rest of the brain neurosecretory cells having a diuretic function. Thus the ventral ganglionic mass neurosecretory cells supplement the single pair brain neurosecretory cells in the discharge of their antidiuretic function, but are antagonistic in their activity to the majority of the A cells of the brain which are diuretic in function. This confirms our earlier suggestions that (i) water metabolism in *O. rhinoceros* is controlled by two sets of neurosecretory cells, one elaborating diuretic principle and the other elaborating antidiuretic principle, and that (ii) the single pair of cells elaborating antidiuretic principle in the brain might be supplemented by some other organ, which has turned out to be in this case the neurosecretory cells of the ventral ganglionic mass. It may be noted that such a well-developed and segregated antagonistic neurosecretory system controlling water metabolism or osmoregulation is rather rare in insects as far as is reported[4].

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PRODUCTION OF SUPERNUMERARY LARVA BY THE JUVENILE HORMONE ANALOGUE-FED IMAGINES OF *TRIBOLIUM CASTANEUM* H

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JUVENILE hormone analogues (JHA) are primarily utilized to affect the developmental stages of the insect pest. Application of these compounds during sensitive periods of insect development, produces morphological abnormalities which in many species lead to death or formation of intermediates which are unable to reproduce. One of the main physiological functions of JHA is the formation of supernumerary and intermediate forms among insects belonging to different orders. Such a formation of supernumerary or extra larval stages has been demonstrated in *Dysdercus cingulatus*[1], *Graphosoma italicus*[2] and *Triatoma infestens*[2]. Thus the supernumerary larval or pupal instars and all types of adultoids have already been induced in many orders of exopterygota and endopterygota. It is also evident from the literature that in many species of Diptera, Hymenoptera and Coleoptera application of any amount of JHA during the last larval instars is never followed by a supernumerary larval moult[2]. The usual effect of JHAs on last larval instars of these insects was characterized by a delay of pupation. However not much is known on the effect of the JHA when administered during the stages of development other than the last larval instar. In the present studies Kinoprene a JHA (ZR 777) was administered to the adult beetle through food (oral application) and observations were made on the subsequent generations for a considerable period which revealed formation of a supernumerary larva.

Randomly selected *Tribolium castaneum* (H), adult insects were released in July 1984 into wheat flour treated with Kinoprene (ZR 777) at the dose of 80