successfully used on a commercial scale to terminate diapause in the silkworm. This method is simple, safe and economical and only requires precise maintenance of water temperature and duration of treatment.

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ELECTRON MICROSCOPIC STUDIES ON THE EFFECT OF DEHYDRATION–HYDRATION ON THE CORPORA ALLATA OF THE COCONUT PALM BEETLE *ORYCTES RHINOCEROS* (COLEOPTERA:SCARABAEIDAE)

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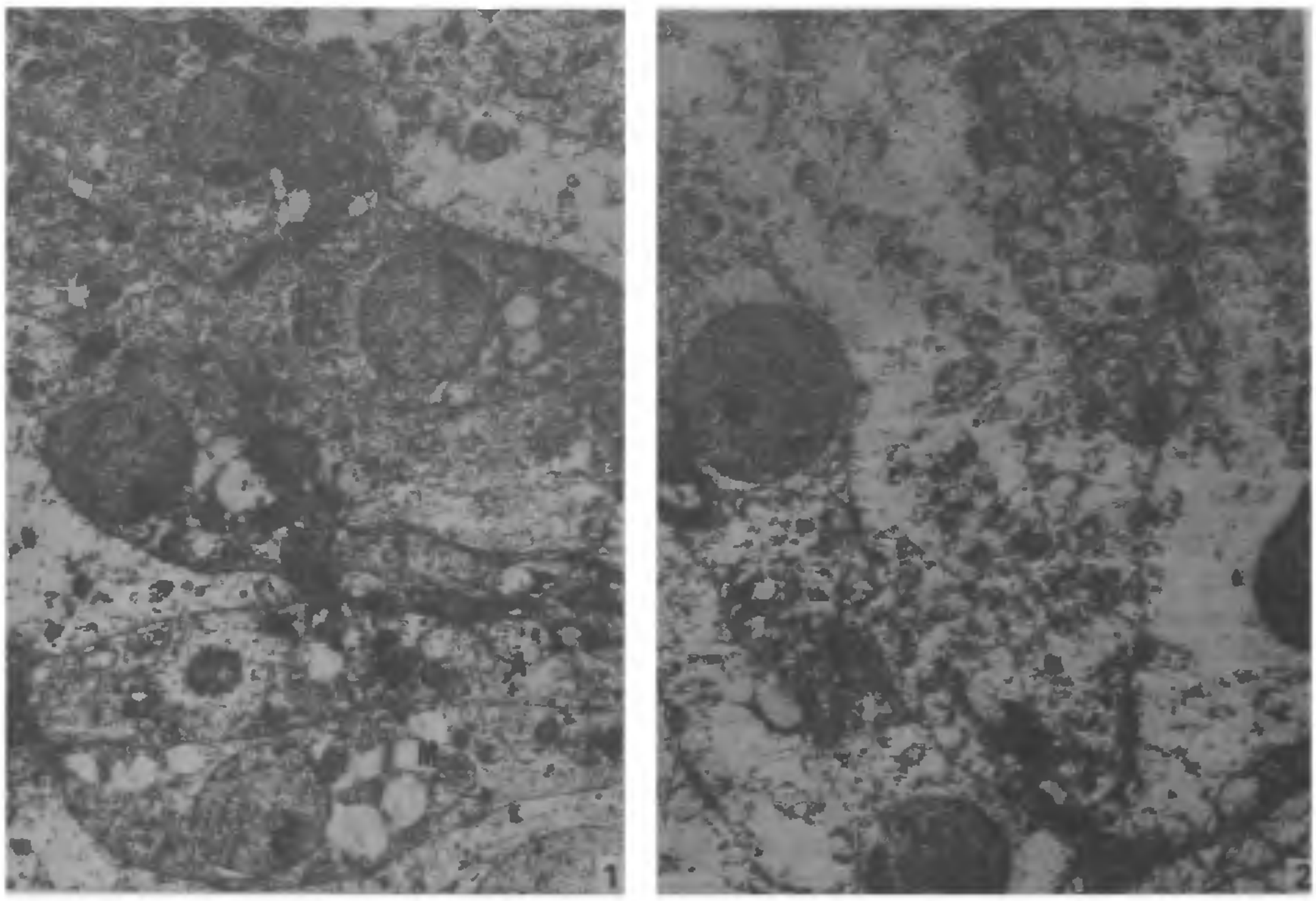
THE median neurosecretory cells of the larval brain of *Oryctes rhinoceros* secrete a diuretic principle in response to hydration stress[1,2]. It has also been reported that the 'A' type neurosecretory cells of the ventral nerve cord of this insect are involved in the secretion of an antidiuretic hormone in response to dehydration stress[3]. The effects of dehydration–hydration stresses on the corpora allata (CA) of *O. rhinoceros* were studied at the ultrastructural level and the results are reported here.

Third (final) instar larvae of *O. rhinoceros* were employed in the study. The methods used for inducing dehydration and hydration in the animals have been described earlier[1]. The CA were dissected out in insect saline three days after dehydration or hydration treatments. The tissue was fixed in 3% glutaraldehyde in 0.1 M cacodylate buffer, pH 7.2, and postfixed in 1% osmium tetroxide. Fixed tissues were dehydrated in acetone series and embedded in Araldite 502 resin. Ultrathin sections were stained in uranyl acetate and lead citrate and observed in a Hitachi transmission electron microscope.

Light microscopic studies revealed that in hydrated animals, the volume of both gland and cell



Figures 1 and 2. **1.** Electron micrograph of CA of dehydrated animal showing prominent nuclei and dense cytoplasm containing plenty of mitochondria. Bar = 3 μm. **2.** Electron micrograph of CA of hydrated animal showing cells in a state of disintegration. Bar = 3 μm. N, Nucleus; G, Golgi body; M, Mitochondria; A, Axon of neurosecretory cell.

nuclei was less than in that dehydrated animals, while the cytoplasm of the neurosecretory cells in hydrated animals also showed a state of degeneration (unpublished results). Electron microscopic studies showed cells of CA of dehydrated animals with prominent nucleus and dense cytoplasm containing plenty of mitochondria and a few golgi bodies; Endoplasmic reticulum was not observed; Cell boundaries were distinct and nuclei contained one or two large nucleoli (figure 1). Ultrastructural studies of CA of hydrated animals revealed indications of disintegration such as insignificant cytoplasm, large intracellular space and degenerating cell organelles; cell boundaries were not distinct but nuclei were intact (figure 2). In both dehydrated and hydrated conditions the CA contained neurosecretory axons with plenty of granules.

Taking gland volume, cell appearance and nuclear size as criteria for determining the activity status of CA[4] in *O. rhinoceros*, it appears that the CA of the dehydrated animal remains in an active state while in the hydrated animal, CA becomes degenerate and inactive. In insects such as *Leucophaea maderae*[5], *Locusta migratoria*[6] and in *Eurygaster integriceps*[7] active and inactive states of CA have been described on the basis of similar characteristics. In *Schistocerca gregaria* allatectomy induces water accumulation in the body[8]. However, it is difficult to state at present whether the CA has any role in water balance. It is probable that the effect is indirect or secondary and due to changes in activity of other endocrines in response to dehydration or hydration stress[1-3].

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MECHANOSENSORY REGULATION OF PREDATOR EVASION BEHAVIOUR IN THE COCKROACH, *PERIPLANETA AMERICANA*

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Evasive responses to mechanical stimuli provide for escape from predators in thysanuran[1] and orthopteroid insects[2]. Air movements or sound vibrations caused by the approaching predator are the effective stimuli in the crickets and cockroaches in which the mechanoreceptive hairs on the abdominal cerci supply sensory input to a set of giant interneurons in the terminal abdominal ganglion[2]. Giant interneuron activity elicits rapid running or a jump that serves to evade an approaching predator[1,2].

Our objective was to examine the role of the abdominal cerci of the cockroach, *Periplaneta americana*, in predator evasion and to understand whether the processing of sensory input in the neural circuitry of the escape system of cockroach is rhythmic.

Natural predators of both nocturnal (scorpion, *Heterometrus fulvipes*[3], and toad, *Bufo malanosticus*) and diurnal (lizard, *Calotes nemoricola*[4]) nature were used. The scorpions were maintained in man-made burrows in a terrarium and the lizards, toads and cockroaches were maintained in cages. Predator animals were starved for 24 h before experimentation. Cercectomy (unilateral and bilateral) was performed on cockroaches one day prior to experimentation. Cockroaches were allowed to move near the entrance of the scorpion burrow and the toad cages with the door opened at 20 h of the day, while the lizards were allowed to feed on the cockroaches at 08 h of the day. A predator animal was discarded after the first successful attempt.

The number of escapes from attacks of the nocturnal predators, scorpion and toad, was more in cockroaches with intact cerci (control) than in cercectomised (unilateral or bilateral) cockroaches (table 1). Among the cercectomised animals, those with no cerci (bilateral cercectomy) were more susceptible to capture by predators. The highly reduced escape efficiency in cercectomised animals suggests the involvement of mechanoreceptive cercal filiform hairs in eliciting evasion behaviour. The toads were found to be more efficient predators on cockroaches than the scorpions. In contrast to the nocturnal predators, the diurnal predator,