sions can be drawn from studies of somatic cells. A medium-sized metacentric chromosome was found exclusively in primary males, probably reflecting a male-specific chromosome. On the basis of the territorial behavior of secondary males it had been assumed that only these males reproduce. However, the persistence of this metacentric chromosome in the population proves that the conclusions drawn from observing the mating behavior were correct.
No observation of any possible offspring, with small acrocentric chromosomes, from secondary males and females could be made. Such animals could not be viable due to genetic inbalance. Through the sex inversion of some of the females into secondary males which produce functioning sperm, the ratio of females to males is substantially increased in the next generation.
A female produces relatively few but large eggs for a pelagic fish. The mechanism of sex development in *Coris julis* L. favoring the females in numbers, i.e. the female gametes, could compensate for the small number of eggs per female and allow the species to survive.

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Hyperglycemic activity of crab and scorpion hormones in grasshopper *(Poecilocerus pictus)*[1]

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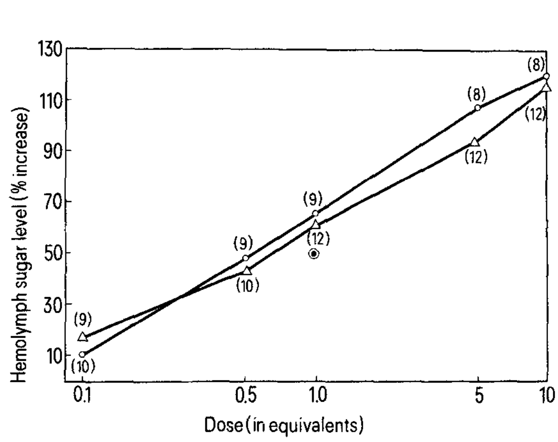
Summary. Hyperglycemic hormones obtained from crab and scorpion both cause significant, dose-dependent elevations of hemolymph sugars in the grasshopper *Poecilocerus pictus*. These results suggest a highly conservative evolution of some mandibulate arthropod neuro-hormones.

Since its discovery by Steele[2] in cockroaches, the hyperglycemic hormone has been throughly investigated in several orders[3-6]. We have shown that hemolymph sugar in the grasshopper *Poecilocerus* is also under the control of a hyperglycemic hormone, which is present in the brain[7]. Earlier research indicated that crustacean eyestalk hormones show glycogenolytic effect in grasshopper[8]. In view of these developments, we decided to examine the effect of hyperglycemic hormones of the crab[9] or the scorpion[10] on the grasshopper. Our results demonstrate that low dosages of hyperglycemic hormones obtained from crab and scorpion are effective in grasshopper and provide strong evidence for a close similarity of crab and scorpion hyperglycemic hormones and a putative grasshopper hyperglycemic hormone.
Materials and methods. The grasshoppers, *Poecilocerus pictus* used in these studies were collected in the wild in Tirupati from late August to mid October, 1980. They were fed *Calotropis* leaves at room temperature (32 °C) every day; feeding was discontinued 24 h prior to use in experiments. Crab, *Oziotelphusa senex senex* hyperglycemic hormone was extracted from eyestalks, and that of the scorpion *Heterometrus fulvipes* from the cephalo-thoracic ganglionic mass (CTGM). The hormones were solubilized and injected, and assays were conducted as previously described for grasshoppers[8]. Hemolymph sugar level was determined using anthrone reagent[11].
Results and discussion. The figure summarizes the effects of hyperglycemic hormones obtained from crab and scorpion in grasshopper. A linear dose-response relationship, at low doses, is evident for both hormones in grasshopper. For comparison, extracts of grasshopper brains, injected at a dose of 1 brain equivalent/animal raised hemolymph sugars in 2 h to 12.04 ± 1.02 μg/ml from 6.09 ± 0.84 μg/ml in 10 grasshoppers (data are mean ± SD). By contrast, distilled water injections resulted in an insignificant change of − 1.3 ± 1.2 μg/ml (n = 9).
The above data demonstrate for the 1st time that 2 similar neurosecretory peptide hormones, isolated from arthropods as distantly related as decapods and arachnids, mimic the effect of a putative neurosecretory hormone[7] of grasshopper. The presence of materials with hyperglycemic hormone-like biological activity in locusts[3], stick insects[4], bees[5]



Effect of crab (○) and scorpion (△) hyperglycemic hormones on hemolymph sugar levels in grasshopper *(Poecilocerus pictus)*. Hormones (crab: eyestalks equivalents; scorpion: CTGM equivalents) injected in 10 μl distilled water; n in parentheses; sugars measured 2 h after injection. Dotted circle (⊙) is 'reference standard' indicating the elevation of glycemia caused by grasshopper brain in its own milieu (for detailed values, see text).

and diptera[6] is well established; similarly, ongoing attempts to characterize chemically such materials from the tobacco horn worm *Manduca* currently indicate substantial chemical similarity between the active substances from these species and the glucagon of vertebrates with intra-specific biologic activity[12]. We therefore believe that a family of peptide hormones, closely resembling the hyperglycemic hormones of crab and scorpion, may be generally operative as hormones in many insects. It will thus be of considerable interest to characterize such molecules from a great variety of arthropods, and to examine the effects of currently available materials in additional species.

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Electrophysiological evidence for the existence of crossed nigrostriatal fibers

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Summary. A small number of neurones with electrophysiological properties of dopaminergic neurones and which were located in the pars compacta of the substantia nigra were antidromically activated by stimulation of the contralateral striatum. The characteristics of this response resembled closely those observed in other compacta neurones following ipsilateral striatal stimulation. These data indicate the presence of some crossed nigrostriatal fibers.

The dopaminergic nigrostriatal pathway is well documented anatomically, neurochemically and electrophysiologically and has received considerable interest regarding its possible dysfunction in extrapyramidal disorders such as Parkinsons's disease[3]. This pathway is generally regarded as being ipsilateral although some anatomical studies have suggested the presence of a small crossed constituent[4,5]. The present study was therefore undertaken to investigate whether any neurones located in the pars compacta of the substantia nigra could be antidromically activated by stimulation of the contralateral striatum.

Experiments were performed on male and female albino rats weighing approximately 200 g, anesthetized with urethane (1.2-1.4 g/kg^{-1} i.p.) or halothane (0.5-1.0% in oxygen). Extracellular recordings were obtained from nigral neurones using glass microelectrodes filled with 4 M NaCl or 0.5 M Na acetate and 2% pontamine sky blue dye, as described in detail previously[6,7]. The central cores of the ipsilateral and contralateral striata were stimulated (0.3 msec pulses, 0.05-3.0 mA delivered at 0.5-500 Hz) using stainless steel bipolar electrodes[6]. All electrode placements were confirmed histologically[6].

Recordings were obtained from 65 neurones in 18 rats which had the electrophysiological properties of dopaminergic nigrostriatal neurones[7,8] and which were predominantly located in the ventral pars compacta of the substantia nigra. Of these, 34 cells were antidromically activated following ipsilateral striatal stimulation, in the manner described previously[7]. None of these 34 cells were antidromically invaded by contralateral striatal stimulation. Of particular interest, however, was the finding that 2 of the cells, recorded in separate rats, that could not be antidromically activated by ipsilateral stimulation did respond antidromically to contralateral stimulation (fig.). The nature of this antidromic response was very similar to that seen with the ipsilateral projection in this and other studies[7-10]. Thus, these 2 cells had long latency antidromic spikes (13-19.5 msec) which were highly fractionated and there were frequent failures of the full antidromic action potential. In 1 cell there were considerable variations in the antidromic latency in response to both constant (fig. H) and altered stimulus strengths. This feature was often seen with the ipsilateral projection[9], presumably due to the axons being unmyelinated and highly branched. With both cells, the antidromic spike followed frequencies of stimulation of 250 Hz or more (fig. B), and invariably showed cancellation following collision with an appropriately timed spontaneous action potential (fig. D and F).

These results provide electrophysiological evidence that a small proportion of presumed-dopaminergic neurones located in the pars compacta of the substantia nigra project to the contralateral striatum. Anatomical studies have also suggested the existence of a minor crossed nigrostriatal projection[4,5,11], since in cat and rat a few neurones have been labeled in the pars compacta following injection of horseradish peroxidase or Evans blue into the contralateral striatum. Furthermore, labeling was not observed following injection of tracer into the overlying cortex, indicating that the pathway terminates in the striatum rather than just projects through it[5]. Although the 2 cells could only be antidromically activated by contralateral striatal stimulation it is possible that they projected to both striata and that the ipsilateral stimulating electrode was positioned in regions not innervated by that cell. Alternatively the projections of these neurones may be exclusively contralateral. The extent to which contralaterally projecting neurones also project to the ipsilateral striatum could probably best be resolved using double-label tracing techniques.

The existence of crossed dopaminergic nigrostriatal fibers has implications in studies in which unilateral manipulations of the substantia nigra have been employed in, for example, studies of extrapyramidal motor function[12]. They