

recovery period of the hemogramme reveals obvious signs of a functional stimulation: the intense proliferation of the highly polymorphous reticular cells and the great increase in maturing blood cell clusters results in a marked hypertrophy of this tissue which invades large portions of the pericardial sinus, and even, to a lesser extent, penetrates into the perivisceral sinus.

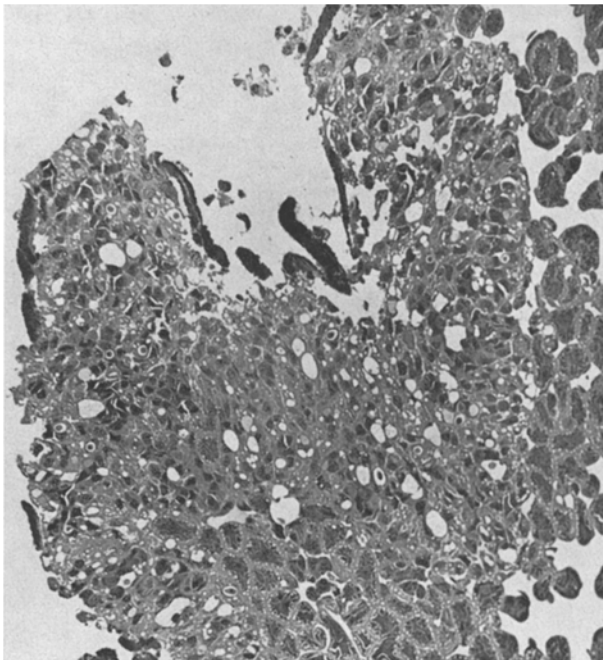


Fig. 3. Intensely proliferating hemocytopoietic tissue of a male adult of *Locusta migratoria*, 5 days after selective X-irradiation (time of recovery of the hemogramme). Glutaraldehyde-osmium tetroxide fixation; araldite embedding medium, 1 μ m thick section. $\times 160$.

It appears now that there exist in Orthopteran insects reticular cells showing both macrophagic and hemocytopoietic potentialities. These cells are grouped together either in diffuse tissues or more closely integrated in far more complex organs (*Gryllus*, see³). The normal functioning of these tissues and the reactivity in abnormal and experimental conditions are both remarkably close to those of the Vertebrate hemopoietic organs. While their importance in the continuous production of mature hemocytes is essential, the macrophagic capacity of these tissues enables them to play an important role in eliminating worn-out hemocytes and various debris, and especially in contributing to the defense reactions and to resistance to bacterial infection. What is more, selective X-ray-provoked lesions of this tissue affect the normal evolution of the proteinemia, or the humoral determinant of moulting⁷ and ovarian maturation⁸ as recent results have shown in *Locusta*. These different functional aspects are at present under investigation.

Résumé. Des cellules sanguines différenciées sont produites tout au long de la vie larvaire et imaginaire des Insectes Orthoptères par des tissus hématopoïétiques spécialisés. Nos études morphologiques et expérimentales soulignent l'analogie que présentent ces tissus avec les organes hématopoïétiques des Vertébrés, à la fois sur le plan structural et sur le plan fonctionnel.

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Thermo-regulatory Responses to Hypothalamic Heating in Dehydrated Rabbits

Thermal panting and sweating are known to be reduced in hot environment in dehydrated steers^{1,2} and desert animals³⁻⁵. Similarly, the rate of sweating is diminished in men during thermal or exercise dehydration⁶⁻⁸.

One of the reasons for the above phenomena may be a decreased reactivity of the hypothalamic thermoregulatory system. In order to check this possibility, thermoregulatory responses to a direct heating of the heat loss center were investigated in water-deprived and in normally hydrated rabbits.

Material and methods. A thermode and a copper-constantan thermocouple were inserted stereotactically under hexobarbital anesthesia into the preoptic anterior hypothalamic area (POA) of 12 male rabbits. The thermode consisted of a miniature carbon resistor heated electrically by passing a direct current. The temperature sensor was placed at a distance of 1.5 mm from the heater.

The experiments started not earlier than 14 days following surgery. The animals were placed in a 45 \times 15 \times 15 cm cage and were not restrained. Hypothalamic and rectal temperatures as well as the temperature of the outer surface of the ear pinna were taken by means of copper-constantan sensors and displayed on a Motor-Kom-

pensator 2 mV type EKN (VEB Messgerätewerk E. Weinert, Magdeburg). The accuracy of measurements was within the range of 0.2°C. Respiratory movements were transformed to voltage oscillations using a resistance transducer fastened around the animal's chest and, after amplification, were recorded continuously on a polygraph. Ambient air temperature was 23 \pm 3°C.

Under control conditions the rabbits were fed with dry pellets and obtained water ad libitum. Dehydration was achieved by depriving the animals of water for 3 days, with no restriction of food intake.

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Results and discussion. The Figure shows a gradual decrease of respiratory rate with developing dehydration. The panting produced by a local POA heating (from 39.2 ± 0.1 to $40.6 \pm 0.1^\circ\text{C}$) also diminished until it was completely blocked after 3 days. After rehydration of the animals by allowing them a free access to water for 2 h, the respiratory rate increased and the panting response to a central thermal stimulation was restored.

Food intake in the course of dehydration was considerably decreased. For this reason an additional series of experiments was made in which during 3 days of a free access to water, the daily supply of food was reduced to amounts consumed by the animals during the water-

deprivation period. No changes of respiratory activity were observed in this group of rabbits.

The ear temperature (mean \pm SE) increased in response to a local POA heating from 34.8 ± 0.4 to $36.2 \pm 0.2^\circ\text{C}$ ($p < 0.001$) in controls and from 33.4 ± 1.0 to $35.8 \pm 0.6^\circ\text{C}$ ($p < 0.01$) in dehydrated animals.

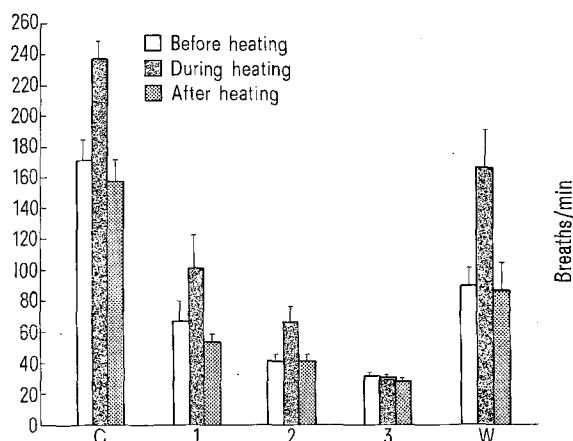
At the end of 10-min heating the rectal temperature decreased from 39.0 ± 0.1 to $38.8 \pm 0.1^\circ\text{C}$ ($p < 0.001$) in normally hydrated rabbits and from 39.2 ± 0.1 to $39.0 \pm 0.1^\circ\text{C}$ ($p < 0.01$) in water-deprived animals.

It should be stressed that respiratory movements in dehydrated rabbits were always well coordinated and the breathing rate increased in response to arousing stimuli (e.g. a sudden noise). It seems therefore that it was not impaired function of the respiratory system but rather a reduced sensitivity of the heat loss center to a thermal stimulation and/or a blocking of conduction of impulses from POA to the respiratory centres which were responsible for the inhibition of panting in dehydrated rabbits. This conclusion agrees with the opinion of EKBLOM *et al.*⁶ that a decreased rate of sweating in dehydrated humans is due to a reduced central influence upon sweat glands rather than to a primarily impaired secretory function of the latter.

Résumé. Chez les lapins déshydratés par privation d'eau pendant 3 jours, on constate la disparition de la polypnée produite par la stimulation thermique de l'hypothalamus antérieur, tandis que la réaction vasodilatatrice cutanée est conservée.

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Mean respiratory rates (\pm SE). C, control; 1, 2, 3, days of water deprivation; W, after 2 h of free access to water.

The Effect of Unilateral and Bilateral Lesions in the Locus coeruleus on the Levels of 3-Methoxy-4-Hydroxyphenylglycol (MHPG) in Neocortex

Studies with the histochemical technique of FALCK *et al.*¹ indicate that fibres arising from catecholamine-containing cell bodies in the brainstem have a widespread distribution in the mammalian central nervous system^{2,3}. Ungerstedt has presented evidence⁴ that the noradrenaline-containing terminals in the neocortex originate from cell bodies in the ipsilateral locus coeruleus, a small nucleus in the floor of the fourth ventricle (A6 cell body group of DAHLSTRÖM and FUXE²). We have recently modified⁵ the gas chromatography method of BOND⁶ to detect 3-methoxy-4-hydroxyphenylglycol (MHPG), the major metabolite of noradrenaline in rat brain^{7,8}, and developed a stereotaxic method for locating electrodes in the region of the locus coeruleus⁹. In this preliminary communication, we report the effects of unilateral and bilateral lesions of the locus coeruleus on the neocortical levels of MHPG which we take to represent an index of the turnover of noradrenaline (NA) in that region.

Methods. Eighteen female albino rats were anaesthetised with halothane and immobilized in a Kopf stereotaxic apparatus. A unipolar varnished steel electrode was located in the region of the locus coeruleus in 12 rats according to the technique of Crow, *et al.*⁹. An electrolytic lesion was made by passing a charge of 40 m Coul through the electrode tip to an anal cathode. In 6 animals the lesion was made on the left side, and in 6 bilaterally. In

6 further animals (controls) burr holes were drilled in the skull bilaterally and the dura removed but no electrode was inserted. 3 weeks after operation the brains were removed, the brainstems sectioned and stained by the Kluver-Barrera technique, and the neocortical portion of the prosencephalon prepared for assay of MHPG.

Results. Two rats in the group with bilateral lesions died shortly after recovery from anaesthesia. In the remaining animals, the electrolytic lesion had ablated the nucleus locus coeruleus on the appropriate side. The results of the neocortical assay for total MHPG (Table)

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