Hemodynamic changes in normal and medullectomized rats during irreversible hypovolemic shock (for group references see text)

Group	No. of cases	Mean body weight (g)	Blood volume ml/100 g body wt.	Cardiac output ml/min per 100 g	Mean arterial blood pressure mm Hg	Total peripheral resistance $\frac{\text{dyn/sec/cm}^{-5}/10^{-4}}{100\text{ g body wt.}}$
A	10	259	6.8 ± 0.3	35.5 ± 4.0	110.7 ± 5.0	24.9 ± 4.0
B	10	246	3.8 ± 0.3	7.9 ± 1.4	20.3 ± 2.9	20.6 ± 0.7
C	12	182	7.2 ± 0.3	33.2 ± 2.5	101.2 ± 3.1	25.6 ± 1.8
D	10	251	3.2 ± 0.2	3.1 ± 0.2	36.7 ± 4.0	98.0 ± 13.0

Mean $\pm$ S.E.

(group D); total peripheral resistance remained unchanged in group B, and in group D increased significatively ($p < 0.001$). Comparison between group B (sham adrenal medullectomy plus hypovolemic shock) and group D (adrenal medullectomy plus hypovolemic shock) showed a significant difference in cardiac output ($p < 0.01$) which was higher in group B, and in mean arterial blood pressure ($p < 0.01$) which was higher in group D; consequently total peripheral resistance was higher in medullectomized rats than in rats with adrenal medulla, during hypovolemic shock ($p < 0.001$).

Discussion. After the original description of HOUSSAY and LEWIS[9] on the survival of dogs without adrenal medulla. LASCANO GONZALEZ[10] observed that rats with total adrenalectomy, if kept with saline solution in their drinking water, not only survived but developed new cortical tissue. This new cortical tissue was fully developed in 4 weeks, and these animals were considered as animals without adrenal medulla, with normal function of adrenal cortex[2]. There are no observations on the hemodynamic pattern of rats without adrenal medulla, except a report of BRODY[11] who did not find changes in basal heart rate and arterial blood pressure in rats after immunological sympathectomy.

In medullectomized dogs, a decrease has been observed in basal cardiac output, heart rate, stroke volume and arterial blood pressure with an increase in total peripheral resistance[12–14]; if sympathectomy is added the same pattern is present, but there are no changes in total peripheral resistance[15]. In rabbits KORNER and WHITE[16] did not observe any changes in cardiac output, arterial blood pressure and heart rate after medullectomy, either at basal condition or during hypoxia.

As postulated by FOLKOW[4] and CELANDER[3], the adrenal medulla is the main source of epinephrine in mammals while nerve endings liberate mainly norepinephrine. It can be deduced from their studies that medullectomized animals have a very scarce output of epinephrine, and HARRISON and SEATON[17] observed in medullectomized dogs that the tissue storage of epinephrine is almost depleted.

From the results reported in this paper and those previously reported[2] it can be stated that medullectomized rats submitted to irreversible hypovolemic shock have a longer survival time, a lower cardiac output and a higher blood pressure than control rats during shock; these differences can be attributed to a decreased output of epinephrine, since the administration of epinephrine to normal rats undergoing shock induced a shorter survival. Since a more prolonged survival time in this shock model can be obtained not only with adrenal medullectomy but also with continuous injection of norepinephrine[2], it seems that survival time may be related to the ratio norepinephrine/epinephrine available, instead of being related to the available amounts of each cathecolamine separately. However there is not enough experimental evidence to support this hypothesis and more work should be done to clarify this point.

Resumen. La extirpacion de la medula suprarrênal no provoca alteraciones de la hemodinamia en ratas estudiadas en condiciones basales, mientras que durante el shock hipovolemico las ratas meduloprivas presentan un volumen minuto cardiaco menor, y un aumento de la presion arterial media y de la resistencia periferica total, en relacion a los testigos normales sometidos al mismo tipo de shock.

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Demonstration of Post-Hypophysectomy Changes in the Neurosecretory System of a Fish with in situ Staining Technique

There are few instances where bulk staining techniques were adopted to study the topographic pattern of the hypothalamo-neurohypophysial (HN) complex in vertebrates[1–8]. However, experimental studies using in situ staining techniques are wanted. In this study wild-caught Indian freshwater catfish *Rita rita* (Ham) is used. Brains were fixed in Bouin's fluid and stained in Gabe's aldehyde fuchsin (AF) with modifications. The normal HN complex has a paired stainable nucleus preopticus (*npo*) situated on either side of the third ventricle. The *npo* gives rise to the left and the right main tracts. Several pairs of lateral tracts separate off from the main

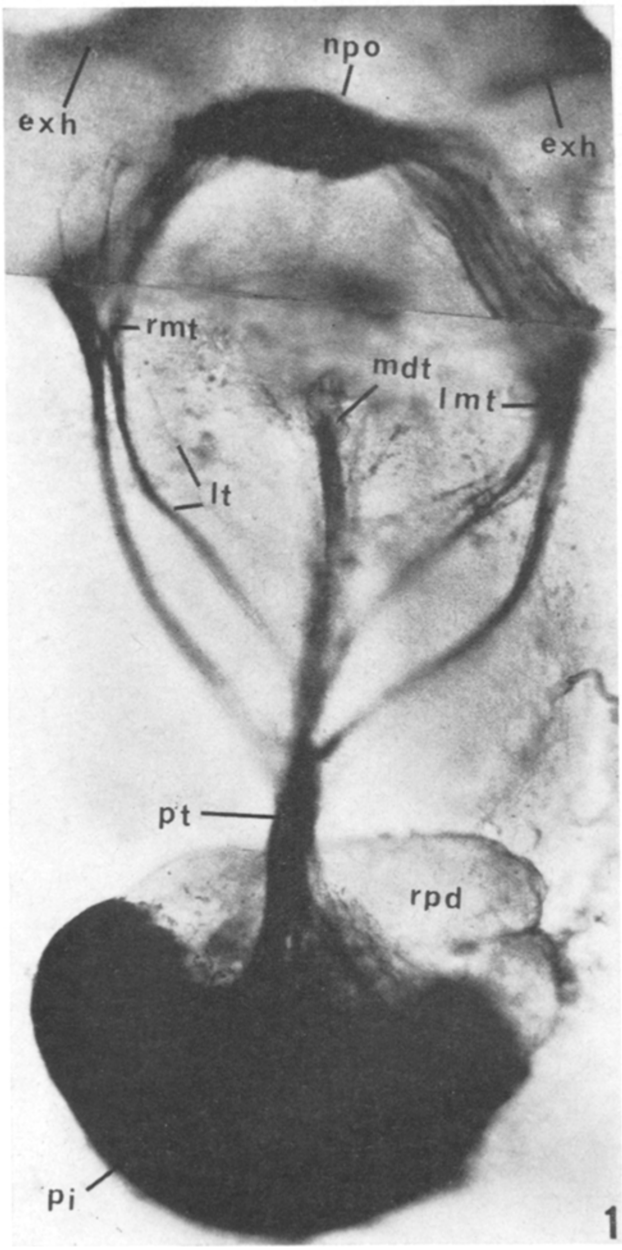

Fig. 1. Ventral view of the in situ stained preparation of HN complex of *R. rita*. × 60. exh, extra-hypophysial tract; lmt, left main tract; lt, lateral tract; mdt, median tract; npo, nucleus preopticus; pt, pituitary stalk; pi, pars intermedia; rpd, rostral pars distalis; rmt, right main tract.

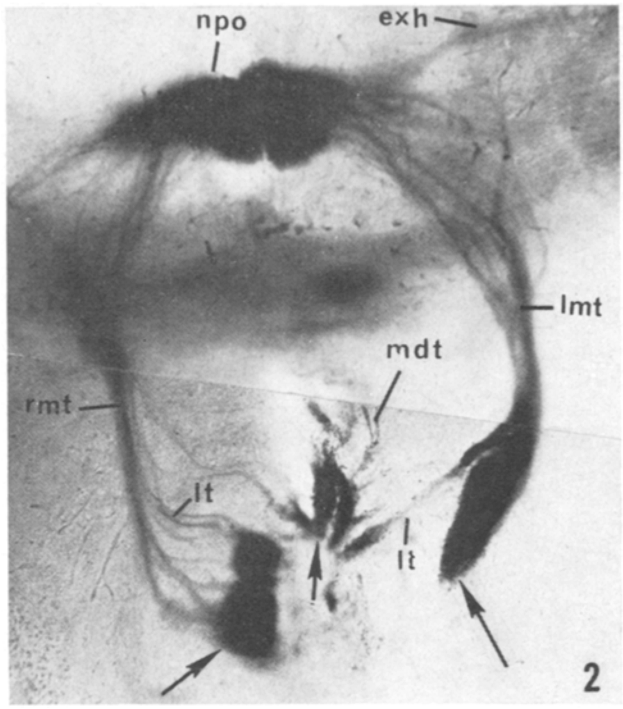

Fig. 2. In situ preparation of the HN complex of hypophysectomized *R. rita* where the posterior $^1/_3$ of the HN complex was removed along with the pituitary. Arrows show the neurohypophysis-like formations at the proximal cut ends of the tracts. × 60.

tracts and join in the middle to form the paired median tracts. The main and the median tracts approximate together and enter the pars intermedia (Figure 1). In hypophysectomized animals, where the pituitary is removed along with the posterior $^1/_3$ of the HN complex, rounded AF-positive bodies were noticed at the proximal cut ends of the main, lateral and the median tracts the fourth day after the operation (Figure 2). These bodies seen in the bulk preparations are comparable to the neurohypophysis-like formations described in tissue sections of the hypophysectomized *Porichthys notatus*[9]. Bulk staining procedures can be profitably used to study the experimentally produced variations in the quantity of the neurosecretory material along the entire HN complex. Also it can be employed as an effective new approach in experimental studies involving ablation, electrophysiological and implantation techniques to learn more about the hypothalamo-hypophysial interrelationships in teleosts, about which very little is known[10].

Zusammenfassung. Bei einer Fischart, *Rita rita* (Ham), wird nachgewiesen, dass sich nach Entfernung der Hypophyse im Gebiet proximal davon Substanzen nachweisen lassen, die von einer vermehrten Sekretion aus dem Gebiet des Hypothalamus stammen müssen.

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