the serum and pleural fluid were absorbed 4 times by RIgG or human IgG coated tubes to remove immunoglobulins possessing RF activity. Total IgE levels before and after the absorptions were measured by ELISA using the solid phase sandwich technique[2] with a slight modification. HRPO labelled antiIgE Fab was used instead of HRPO-antiIgE whole antibody, and BSA was used in place of rabbit serum. Total IgE concentration in the serum and pleural fluid decreased markedly after the first 3 absorptions and was not changed by the 4th absorption. The results indicated that 330 ng/ml (66%) of IgE in the serum and 650 ng/ml (78%) of IgE in the pleural fluid had RF activity, whereas the total IgE concentration in the serum from a asthmatic patient did not change after the absorption by RIgG coated tube.

The patient with RA was treated with prednisolone and arthritis and the pleural effusion subsided. However, the effusion accumulated again with a decrease in the dose of prednisolone. Sera were obtained from the patient at various intervals and the levels of IgE-, IgG-, IgM-RF were measured. It was observed that the serum levels of IgE RF were more parallel with the disease activities than those of IgM and IgG RF. Therefore we think that IgE RF might have played some role in this patient.

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Penetration of regenerated neurosecretory fibres into the saccus vasculosus following hypophysectomy in the catfish, *Heteropneustes fossilis* (Bloch)

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Summary. Regenerating neurosecretory fibres were traced in 150-day post-hypophysectomized catfish, *Heteropneustes fossilis*. The regenerated neurosecretory fibres reorganised into a neurohypophysis-like structure, as well as extending several neurosecretory fibres into the epithelium of the saccus vasculosus, and a few into its lumen. This circumventricular organ may serve as a cellular bridge between the cerebrospinal fluid and the vascular system.

Studies on the hypothalamo-neurohypophysial complex of fishes following hypophysectomy are few[2-9], and have generally described changes in the neurons of the nucleus preopticus and neurosecretory material. The fate of neurosecretory fibres other than those that terminate in the neurohypophysis-like structure has not been described. Neurosecretory fibres are shown here as they regenerated in the catfish, *Heteropneustes fossilis*, 150 days after hypophysectomy.

Material and methods. 25 catfish were hypophysectomized and 25 were sham-operated after acclimatisation to laboratory conditions. Sexes were not separated since preliminary investigations indicated no sexual distinctions in the hypothalamo-hypophysial system. Each fish was anesthetized by immersing in 0.034% aqueous solution of methane tricaine sulphonate, and the parasphenoid bone at the level of the pituitary was drilled with the help of a fine burr. The exposed pituitary was sucked out using a glass pipette. Sham-hypophysectomy was performed in the same way, but the pituitary was not disturbed. 8 hypophysectomized and an equal number of sham-operated and unoperated controls were sacrificed 150 days after operation, following the conclusion of other studies. Brains were fixed in Bouin's fluid, and 4–6-μm-thick sections were cut in the sagittal and transverse planes. They were stained with alcian blue, aldehyde fuchsin and chrome alumhematoxylin-phloxin.

Results. In unoperated controls and sham-operated fish the axons of the aldehyde fuchsin-positive neurons of the preoptic region extend ventrolaterally, curve posteriorly, unite ventromedially and enter the stalk of the pituitary gland (figure 1). Neither the basal hypothalamus posterior to the stalk nor the saccus vasculosus show any aldehyde fuchsin-positive fibres.

In the hypophysectomized fish neurosecretory fibres severed at the stalk regenerated and reorganised to form a neurohypophysis-like structure (figures 2 and 3). Some of the neurosecretory fibres penetrate the ependyma and project into the 3rd ventricle. Several fibre bundles extendn posterior to the stalk and ventral to the 3rd ventricle as a thick aldehyde fuchsin-positive fibre tract. The axons contain deeply stained neurosecretory granules. The main bundle of regenerated peptidergic fibres extends to the saccus vasculosus; then it ramifies and the branches enter its wall. In the anteroventral region of the saccus vasculosus neurosecretory fibres enter and encircle small lobules of epithelial cells. Some fibres terminate around the capillaries in the epithelium of the saccus vasculosus. Neurosecretory fibres also penetrate the epithelial wall and project into the central lumen of this circumventricular organ.

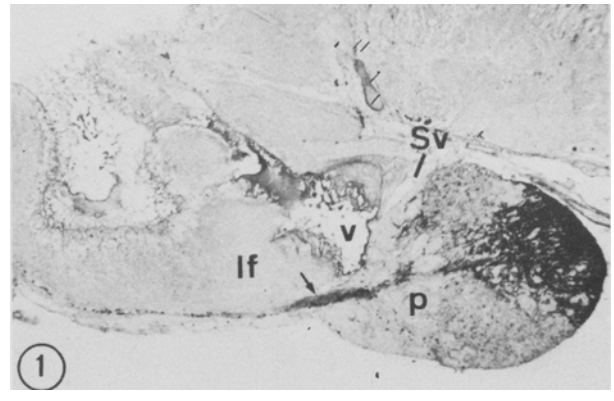

Fig. 1. Sagittal section of the brain of sham-operated catfish, *Heteropneustes fossilis* showing the pituitary gland (p) and saccus vasculosus (Sv). Arrow shows the neurosecretory fibre tract which enters the hypophysis through the pituitary stalk. Also note the absence of neurosecretory fibres posterior to the stalk. If, Infundibulum; v, 3rd ventricle. × 128.

Within this epithelial wall neurosecretory granules are accompanied by large 'Herring bodies' in the neurosecretory fibres.

Discussion. The accumulation of neurosecretory material at the proximal cut end of the stalk seen by earlier investigators[5,7–9] was observed here, together with the invasion of the saccus vasculosus by regenerating neurosecretory fibres. A definite neurohypophysis-like structure was observed at the site of hypophysectomy unlike the shapeless regeneration reported elsewhere for this[9] and other species[6,8]. Absence of a well-defined structure in other studies may be a function of their shorter time-frame (i.e., 4 days as opposed to 150 days) or the position of the cut at hypophysectomy[10]. The pronounced swelling of the proximal stump and apparent transformation into a neural lobe has been reported in other vertebrates approximately 3 weeks after hypophysectomy[11].

No aldehyde fuchsin-positive fibres were observed in the saccus vasculosus of unoperated or sham-operated *H. fossilis*. The only previous report of such fibres from the nucleus preopticus penetrating the epithelium of the saccus vasculosus was made before methods to demonstrate the neurosecretory material were available[12]. A recent study using electron microscopy and describing dense-core vesicles of 1400 Å indicated the presence of peptidergic neurosecretory fibres in the saccus vasculosus[13]. Since aldehyde fuchsin-negative neurons of hypothalamic nuclei of some birds show elementary granules (dense-core vesicles) of comparable size[14] those described may not be neurosecretory.

Regenerated aldehyde fuchsin-positive fibres in these fish not only penetrated the epithelium of the saccus vasculosus but protruded into its lumen suggesting the discharge of neurosecretory material. The protrusion of neurosecretory fibres into the 3rd ventricle has been observed in normal[15] and hypophysectomized[16] fishes as well as after hypophysectomy in this study. Thyrotropic releasing hormone has also been described in the cerebrospinal fluid[17]. Neurosecretory fibres also terminated adjacent to the blood capillaries in the epithelium of the saccus vasculosus of hypophysectomized *H. fossilis*.

Just as various specialized areas of the ependyma in the wall of the 3rd ventricle form a cellular bridge between the cerebrospinal fluid and blood vascular system[18], the epithelium of the saccus vasculosus supports both a secretory and absorptive function for this circumventricular organ[13].

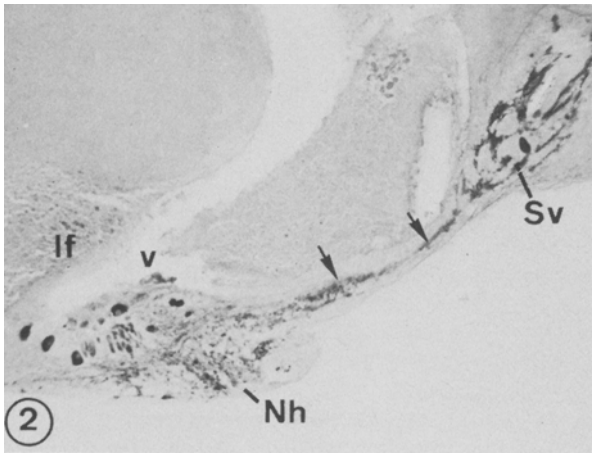

Fig. 2. Sagittal section of brain of *Heteropneustes fossilis*, 150 days after hypophysectomy. At the severed stalk the regenerated neurosecretory fibres form the neurohypophysis-like structure (Nh). Arrows show the neurosecretory fibre tract which extends behind the pituitary stalk and runs posterodorsally to enter the saccus vasculosus (Sv). If, Infundibulum; v, 3rd ventricle. × 315.

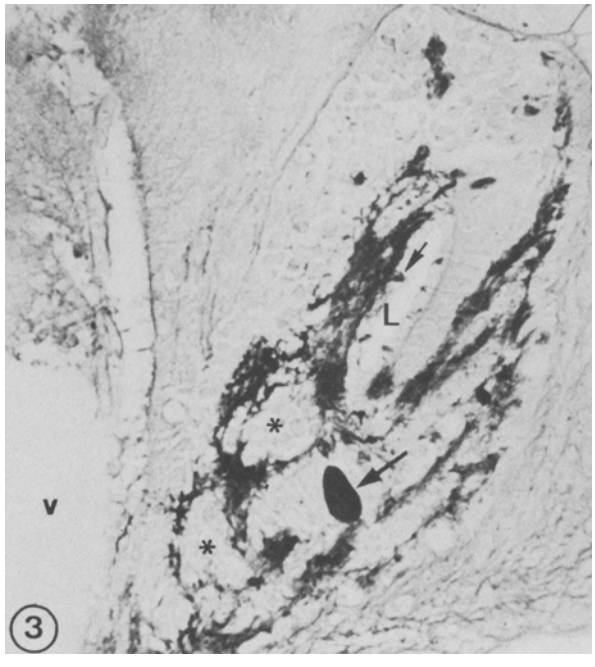

Fig. 3. Magnified view of the saccus vasculosus (Sv) shown in figure 2. Note the neurosecretory fibres (dark) which encircle the follicular lumina (*) of the saccus vasculosus and penetrate its epithelium. Small arrow shows the neurosecretory fibres which protrude into the lumen of the saccus vasculosus. Also note a large 'Herring body' (large arrow) in its epithelium. v, 3rd ventricle. × 900.

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