after the initiation of regenerative processes. We had previously found a similar effect in regenerating tadpoles treated with nitrogen mustard[2], and Lüscher described an increase in mitotic activity on the third to the sixth day after amputation of the tail of *Xenopus laevis* tadpoles[3].

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Adrenaline and Noradrenaline in Adrenal Autografts

Both cortical and medullary cells survive in adrenal grafts months after transplantation into the anterior chamber of the eye[1]. It is, however, not known whether the two medullary hormones, adrenaline and noradrenaline, are present in the grafts. Moreover, all previous work has been without regard to the fact that there are two different types of cells in the adrenal medulla[2]. A substantial body of evidence is now available indicating that one of these cell types contains and secretes adrenaline, and the other noradrenaline[3,4]. It seemed therefore to be of interest to investigate adrenal grafts by chemical and histochemical methods which differentiate between adrenaline and noradrenaline.

Adult Wistar rats were used. The left adrenal of each animal was removed, and a piece of the medulla was inserted into the anterior chamber of the left eye. Five months later the animals were killed and the grafts removed.

The adrenaline and noradrenaline contents of some grafts were estimated chemically after separation of these amines by ascending paper chromatography, using a mixture of phenol and 0·1 *N* hydrochloric acid[4]. Both adrenaline and noradrenaline were detected in the grafts (Fig. 1). The adrenaline content was 5–10 times the noradrenaline content.

Other grafts were plunged into a 3·5 per cent solution of potassium dichromate to produce the chromaffin reaction, or into a saturated solution of potassium iodate to demonstrate the noradrenaline-containing cells[3]. These grafts were afterwards fixed in formalin and cut with a freezing microtome at 50μ. Some sections were mounted unstained in glycerol, others were stained with hæmatoxylin and sudan red to facilitate the detection of adrenocortical cells.

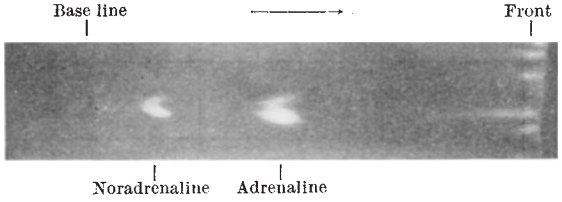

Fig. 1. Chromatogram of an adrenomedullary autograft smeared directly on the base line of the paper (Whatman No. 1). Phenol and hydrochloric acid were used for development, and the strip was sprayed with potassium ferricyanide to develop fluorescence in the adrenaline and noradrenaline spots. Fluorescence photograph

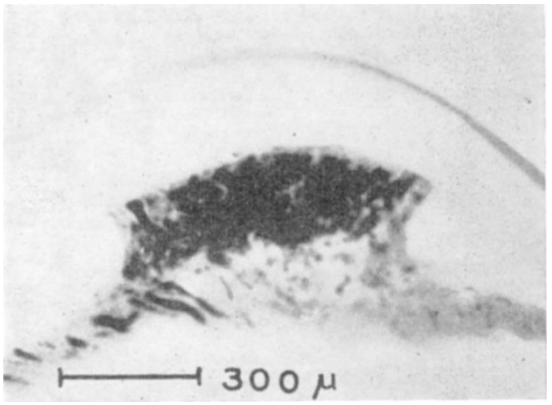

Fig. 2. Unstained frozen section of an adrenomedullary autograft in the anterior chamber of the eye. The graft is attached to the cornea (above) and the iris (below). Chromaffin cells are brown after dichromate fixation. Red blood cells in the vessels of the iris (lower left corner) are also brown

Fig. 2 shows a typical graft, mainly composed of strongly chromaffin cells, and attached to both the cornea and the iris. The chromaffin cells were closely packed together in the grafts. However, regular cell acini, such as can be always seen in the normal adrenal medulla, were replaced by irregular groups of cells. This may be indicative of cellular migration within the graft.

The iodate reaction, which stains the noradrenaline-containing cells brown[3,4], was positive in some graft cells, which were usually solitary and randomly distributed in the graft. The majority of graft cells, although chromaffin, remained colourless after iodate treatment. This is in good agreement with the chemical observations made, and suggests that the grafted adrenomedullary cells have retained their ability to make and secrete the same catechol amine which they were making and secreting in the adrenal before grafting.

Although efforts had been made to include only medullary tissue in the grafts, typical sudan-positive cortical cells were detected in all grafts which were examined histologically. The cortical cells were fewer than the medullary ones and usually apart from these. It is therefore most likely that cortical hormones were equally available to both the iodate-positive, noradrenaline-secreting cells and the adrenaline-secreting cells of the graft, in which the two types of cells were present in proportions similar to those in the normal rat's adrenal medulla. If cortical hormones really have a specific influence on the quality of the secretory products of the adrenomedullary cells, as has been claimed[5], such an influence could not be observed in the present study.

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