

corresponding to most of these ammonium salts have also been studied in aqueous solution, and many new Raman lines in addition to those previously recognized<sup>4</sup> have been found. The detailed discussion of these spectra is necessarily somewhat complex and will be presented elsewhere, but one significant point may be reported here. Free primary and secondary amines give one (or two) powerful Raman lines between 3,300 and 3,400  $\text{cm}^{-1}$ , presumably associated with the un-ionized N-H linkage; the corresponding ammonium salts, however, in which the amino group has acquired a proton, show no Raman frequencies above 3,050  $\text{cm}^{-1}$ . Likewise the sodium salts of glycine and alanine show strong lines near 3,330; the isoelectric amino acids show no lines above 3,030. The conclusion follows that the amino group in glycine and alanine must be electrically charged; in other words, that these amino acids exist as dipolar ions at the isoelectric point. This supplements the earlier spectroscopic proof of this structure,<sup>5</sup> based on studies of the ionization of the carboxyl group. Ample evidence for the theory of dipolar ions has been forthcoming from other sources, but the evidence from Raman spectra is valuable for the clarity and directness of the proof it offers for the validity of this structure. This method also should be directly applicable to the determination of structure in new compounds containing these ionizable groups.

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#### RECOVERY OF VIABLE ADRENAL CORTICAL TISSUE<sup>1</sup>

It has been reported by Ingle<sup>2</sup> that autogenous transplants of the adrenal glands to the ovaries in rats consistently become established as functional grafts. On the other hand, direct homoplastic transplants of the adrenal glands of adult rats invariably have degenerated. It was suggested by one of us (Nilson) that acclimatization of transplanted glands may be a function of genetic similarity and that the survival of homoplastic transplants could be used as an index for determining homozygosity in inbreeding experiments.

<sup>4</sup> K. W. F. Kohlrausch, "Der Smekal-Raman Effekt," Berlin, 1931, pp. 311-312. New data on anhydrous liquid amines by Kohlrausch, *Monatsch. Chem.*, 68: 349, 1936.

<sup>5</sup> J. T. Edsall, *Jour. Chem. Physics*, 4: 1, 1936. See also M. Freymann and P. Rumpf, *Jour. Phys. Radium*, 7: 30, 1936.

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<sup>2</sup> D. J. Ingle and R. F. Harris, *Am. Jour. Physiol.*, 114: 657-660, February, 1936.

The following preliminary experiments were carried out with female rats obtained from two inbred strains of pied rats segregated for differences in rate of growth and efficiency of utilization of feed.<sup>3</sup> Cross-strain transplants of the adrenal glands to the ovaries were made in four pairs of rats and all died of adrenal insufficiency within sixty days after operation. The adrenal glands were also exchanged between six pairs of sisters belonging to the high efficiency strain. Functional grafts were established in nine of the twelve animals. Histologic examination of the grafts sixty days after operation disclosed good regeneration of the adrenal cortical tissue. In a third experiment the adrenal glands were exchanged between four pairs of sisters belonging to the low efficiency strain. Functional grafts were established in three of these eight animals, as was demonstrated by histologic examination.

All completely adrenalectomized rats prepared in this laboratory die of adrenal insufficiency when fed a diet high in potassium and low in sodium chloride. Only animals which receive replacement therapy or which have viable adrenal cortical tissue in addition to accessory glands survive for as long as sixty days after operation. Our evidence on survival time in addition to our histologic evidence is proof that some functional grafts were established between siblings of inbred strains of rats. A detailed study of the influence of genetic relationship of the donor and the host on the success of homoplastic transplantation of adult adrenal glands in the rat is being carried out in this laboratory.

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<sup>3</sup> H. P. Morris, L. S. Palmer and Cornelia Kennedy, *Univ. of Minn. Agr. Exp. Sta. Tech. Bull.*, 92: 1-56, 1933.

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