ing the rabbits become nervous and fidgety. This is frequently associated with soft feces and an increase in the volume of urine.

No attempt has been made to determine what rôle the hormones of the posterior pituitary and chromaffin tissue may play in the production and maintenance of the exophthalmos. There is, however, some hypertrophy and great hyperemia of the medulla of the suprarenals in these animals.

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Survival Period of Bilaterally Adrenalectomized Rats.

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Wide discrepancies exist in the literature as to the life-span of adrenalectomized rats. Most of the work between 1900 and 1930 indicated that approximately 50% of these mammals survived adrenal ablation for a month or indefinitely. This survival was attributed to the presence of accessory cortical tissue. Recently, however, Pencharz, Olmsted and Giragossintz[1, 2] reported that the rat is no exception to the rule that adrenalectomy is fatal in mammals. Freed, Brownfield and Evans[3] stated definitely that adrenalectomy was uniformly fatal in rats if one-quarter inch of the pedicle was removed with the gland. Kutz[4] stated that out of 57 animals of his strain operated at 4 weeks age, 56 were dead by the tenth day. While these results were being reported other workers have been reporting a high percentage survival. The present study was undertaken in an attempt to give some explanation to this chaos of evidence.

A series of 156 adrenalectomies were done to investigate the effects of different types of operation in animals of different ages and different strains. Rats from 35 days to 10 months age were used from 5 different colonies. To demonstrate that the animals

* This study was suggested by Professor W. W. Swingle and his advice and assistance have been generously given.

[1] Pencharz, R. I., Olmsted, J. M. D., and Giragossintz, G., *Science*, 1930, **73**, 175.

[2] Pencharz, R. I., Olmsted, J. M. D., and Giragossintz, G., *Phys. Zool.*, 1931, **4**, 501.

[3] Freed, S. C., Brownfield, B., and Evans, H. M., PROC. SOC. EXP. BIOL. AND MED., 1931, **29**, 1.

[4] Kutz, R. L., PROC. SOC. EXP. BIOL. AND MED., 1931, **29**, 91.

were really dying of adrenal insufficiency a series from all colonies were revived from their terminal coma with the cortical hormone, kindly supplied by Drs. W. W. Swingle and J. J. Pfiffner. Also to check the effect of surgical trauma a series of control operations were done. Rigid asepsis was maintained in the operations. A balanced diet containing all necessary food factors was used. No animal was used unless in apparent perfect condition of health.

Results. The results indicate that different strains or colonies of rats obtained from various sources over the country differ remarkably in their post-adrenalectomy survival; and this difference is of sufficient magnitude to account for many of the previous divergent reports. Animals from 4 of the 5 colonies gave essentially similar results, an almost uniform fatality, essentially like that reported by Pencharz, Olmsted and Giragossintz. Rats from these colonies nearly all died by or before the fifteenth day with a survival for a month or longer of but 5%. The average life-span of this group was 7 days; and 60% of the deaths fell between 4½ and 10 days.

The fifth or "T-Colony" showed an entirely different picture. To date it has been possible to get only 26 of these animals for operation, but of that number exactly half or 13 of them are still surviving at more than 30 days after adrenalectomy, and most are apparently in excellent condition. Of the 13 which have died, the average life-span was 14.2 days, twice that of the other colonies. The survival period varied between 5 and 27 days. These results compare favorably with many earlier reports on long survival after adrenalectomy. It should be emphasized that exactly the same operative technique and post-operative care was employed for all animals.

The operation used by Freed *et al.*, Pencharz *et al.*, in which the surrounding fat, connective tissue and pedicle were removed along with the adrenals proper was employed in approximately half of the cases of all colonies. No significant difference has been demonstrated in the results following this operation and that involving merely removal of the adrenals.

Young animals are apparently somewhat more susceptible to adrenalectomy than older ones. Sex makes no apparent difference. Accessory cortical tissue has been observed in only a few animals. It can generally be found in those living over a month in the few cases in which necropsy has been performed (most of these animals are still living). Rarely, however, is it seen, even after histological examination of any suspicious-looking tissue, in animals living less than one month. No other feasible explanation exists, however, to

explain the extended survival of part of the animals than to presume the presence of minute amounts of accessory tissue; because rats kept on cortical extract show a quick sensitivity either to the presence or absence of that hormone.

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A New Roentgenologic Technic in the Study of Phonetics.

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Numerous theories have been advanced and investigations made to account for differences in voice quality based upon a study of speech sound after it leaves the mouth. Such studies have been in many instances unreliable because formerly it was almost impossible to make an accurate study of the intra-oral, pharyngeal, and laryngeal mechanisms, which are among the important structures used to produce speech and singing.

About 20 years ago it was appreciated that the X-ray, by outlining the forms and sizes of speech and singing cavities, could be the means of uncovering many of the hidden secrets of phonation. Myers[1] demonstrated a certain technic by which these structures were visualized on an X-ray plate. Later, Stephen Jones[2] devised the chain technic, which consisted of the passing of a small chain through the nostril of a subject who was instructed to swallow the loose end. An X-ray plate was then made to show the position of the chain in relation to the soft tissues. Russell[3] used a fine thread which apparently was impregnated with some substance opaque to the X-ray. The subject was made to swallow the loose end of the thread, which was supposed to remain by capillary attraction on the middle portion of the tongue. We are unable to find mention by any of the numerous investigators that the palate was satisfactorily outlined by any marker except the normal bone as shown on the X-ray film.

It must be appreciated that a mechanical means employed in outlining the forms and sizes of speech and singing cavities, such as the chain technic, gold foil, or the thread technic, could interfere

[1] Russell, G. Oscar, Speech and Voice, The Macmillan Co., New York, 1931, 7.

[2] Russell, G. Oscar, Speech and Voice, The Macmillan Co., New York, 1931, 7.

[3] Russell, G. Oscar, Speech and Voice, The Macmillan Co., New York, 1931, 10.