

indicate the occurrence of variation in the turgidity of the plant body even at short intervals. The author is inclined to believe that probably a similar variation in the turgidity might account for the fluctuation in the rate of elongation of the coleoptile.

A detailed paper dealing with this activity in *Cicer*, *Dolichos*, *Phaseolus*, *Pisum* and *Zea Mays* will be published later on.

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<sup>1</sup> Friesner, R. C., *Amer. Jour. Bot.*, 1920, 7, 380-406.

<sup>2</sup> Krishna Iyengar, C. V., *Jour. Mys. Univ.*, 1942 a. 3, 23-38.

<sup>3</sup> Bose, J. C., *Plant Autographs and Their Revelation*, London, 1927.

<sup>4</sup> —, *Physiology of the Ascent of Sap*, London, 1923.

#### MANUFACTURE OF GLANDULAR PRODUCTS IN INDIA: PREPARATION OF ADRENALINE FROM SUPRARENAL GLANDS

THE number of publications from different laboratories and institutions in the country, which have recently been appearing in your columns on this subject, affords ample evidence of the keen interest which has been aroused in the public in the subject. I am, therefore, tempted now to publish this short note on the commercial preparation of Adrenaline from glands, if only to correct some misconceptions which appear to prevail in certain quarters. One of the criticisms levelled against the proposal for investigating the possibilities of manufacturing natural Adrenaline in the country that has come to my notice, appears to be that Adrenaline isolated from natural sources is never pure, whereas with the synthetic product one can always be certain of its purity. This criticism is really quite unfounded. The gland extracts undoubtedly contain many foreign substances—some of them still of unknown composition—but the experiments carried out in my laboratories during the past few months

have shown definitely that, by the careful handling of these extracts, products can be obtained, which, even in the crude stage, analyse to more than 80 per cent. of purity. These products, moreover, lend themselves readily to further purification, the purest product having the correct melting point (212° C.) and optical rotation (−52°). The yields, too, of the pure product are quite satisfactory. The synthesis of Adrenaline can perhaps be a commercial proposition in India, only in times of peace, when the intermediate chemicals, which are essential for this synthesis, such as Catechol, Chloracetyl Chloride, etc., can be imported at cheap rates. At the present moment, however, we have no option but to fall back on the resources available in the country. I may perhaps point out that even in Europe and America the synthetic product has not been able to replace entirely the natural product. On the other hand, there are good reasons to believe that the Adrenaline manufactured from the products of the organised packing houses of Chicago and other cities in the U.S.A. is definitely cheaper than the synthetic compound. I may further mention that the information, which has been supplied to me, through the kind help of the Board of Scientific and Industrial Research of the Government of India, appears to show that the mobilisation of the raw material from the slaughter houses of, say, 10 of our large cities in India, might lead to the production of sufficient Adrenaline, not only for the civilian consumption, but also for the present military emergencies. Our efforts should, therefore, be all in the direction of organising and pooling our resources, and, I believe that if we succeed in doing it effectively, India can not only be self-sufficient as regards her requirements of this important drug, but may even have a surplus for export to less favoured countries like China and others.

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