

ON THE GRAVITATION STIMULUS IN RELATION TO POSITION.—When an apogeotropic organ is placed on the intermittent klinostat¹ it is subjected to alternate stimuli tending to make it curve in opposite directions. If the organ is fixed say at an angle of 45° to the horizontal axis of rotation, the organ will, during half the time, point obliquely upwards, and during the other half it will point obliquely downwards. Are the gravitation stimuli equal in these two positions? If so, no curvature will occur, but if Czapek² is right in believing that 45° below the horizon gives a stronger stimulus than 45° above, it is clear that the organ must gradually curve towards the horizontal.

Thirty-four experiments were made with grass-haulms (principally those of *Lolium perenne*) fixed at angles varying between 35° and 55° to the horizontal axis of the intermittent klinostat. In four cases no bending occurred, in twenty-seven cases the haulms bent from 2° to 19° towards the horizontal, while in three instances they bent in the opposite direction or laterally. There can therefore be no doubt that grass-haulms obey Czapek's Law in being more strongly stimulated at angles of about 45° below the horizontal than at corresponding angles when the free end points obliquely upwards³.

The above observations were made some time ago in ignorance of the fact that Czapek⁴ has used the same method in a cognate experiment.

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SOME OBSERVATIONS BEARING ON THE FUNCTION OF LATEX⁵.—The author has lately returned from a year's sojourn in Ceylon, where he has been acting as scientific assistant to Mr. Willis, the Director of the Royal Botanic Gardens. During his

¹ For a description of the instrument see F. Darwin and D. F. M. Pertz in *Annals of Botany*, 1892, p. 245.

² Pringsheim's *Jahrbücher*, XXVII.

³ The facts also agree, broadly speaking, with Elfving's results, *Acta Soc. Sci. Fennica*, 1880.

⁴ Sitzb. K. Akad. Wien, Bd. civ, 1895.

⁵ Abstract of paper read before the Botanical Section of the British Association, Dover, Sept. 1899.

time there he has been principally engaged in investigations on caoutchouc-yielding trees, chiefly *Hevea brasiliensis* (Para Rubber), and *Castilloa elastica* var. (a Central American Rubber-tree). The results of this research are contained in a recently-published circular of the Royal Botanic Gardens, Ceylon, entitled 'Caoutchouc or Indiarubber,' intended primarily for those interested in rubber cultivation.

The purpose of this paper is to draw attention to some of the observations and experiments recorded in the Circular, which, besides their practical value, have a general botanical interest, and also to make public other observations which may throw light on the functions of laticiferous tissue. It is arranged in six sections. The main features of these are here briefly given.

Section I is occupied chiefly with the coagulation of the latex of *Hevea*. Coagulation is now known to be brought about by the proteid contained in the latex passing from a soluble to an insoluble state. The latex of *Hevea* is not coagulable by heat or slight additions of alkalies, but is coagulable in the cold, by small quantities of acids. The approximate weight of acid required to clot completely 100 c.c. of latex has been worked out for sulphuric, hydrochloric, nitric, acetic, oxalic, tartaric, and citric acids. Experimental evidence points to the proteid in question being alkali-albumen rather than ordinary albumen. It has previously been called albumen.

The behaviour of the latex towards certain saline solutions has also been investigated. Mercuric chloride is shown to be a powerful coagulator.

Section II contains observations and remarks relating to the carbohydrates of latex.

Sugar in variable proportions is of frequent occurrence in latex. The little contained in the trunk-latex of *Hevea* seems invariably to be cane-sugar.

It is suggested that the sugar may arise, in part at least, from the surrounding injured tissues, and may not be always originally present in the latex.

The starch-rods so characteristic of the laticiferous tubes of *Euphorbia* and allied genera have been found still present in the turned and fallen leaves of the following species examined: *Euphorbia pulcherrima*, *E. Bojeri*, *E. rothiana*, *Pedilanthus tithymaloides*, *Hura crepitans*, *Excaecaria bicolor*, and *Sapium biglandulosum*. This fact

is somewhat opposed to the view of these tubes functioning as conductors of starch from the leaf.

In Section III reasons are given for thinking that in some caoutchouc trees the latex of the young stems and leaves differs in the composition of its globules in suspension from that of the trunk and main branches. While the latter yield rubber free of stickiness, the former give a somewhat viscous substance with feeble elasticity. Such is the case with *Hevea*, *Castilloa*, *Landolphia Kirkii*, *Ficus elastica*, and *Urceola esculenta*.

Section IV treats of an important fact connected with the tapping of *Hevea* trees, viz., that wounding the bark causes a greater flow of latex from subsequent injuries, a point first indicated in the experiments of Mr. Willis, who found that the weight of rubber obtained from the second tapping was about double that from the first. The author has followed this up with some instructive results.

In Section V a peculiarity in the exudation of latex from the severed base of the petiole of *Hevea brasiliensis* and *Plumiera acutifolia* is described and discussed.

In Section VI a special laticiferous system developed in the immature seed of *Hevea brasiliensis* is brought to notice.

The paper concludes with general remarks and suggestions on the origin and functions of laticiferous tissue.

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INTUMESCENCES OF *HIBISCUS VITIFOLIUS* (L.)¹.

I. *Anatomical Part.*

The plants on which the following observations were made, were grown, directly or indirectly, from seed from Somaliland. The intumescences, which vary in size and shape, occur on the leaves, stems, green parts of the flower, and on the young fruit. Some are entirely colourless; others are green at the base. Those on (1) the leaf differ from those on (2) the stem.

1. *On the leaf* the intumescences are of two types.

(a) Purely epidermal.

(β) Partly sub-epidermal.

¹ Abstract of paper read before the Botanical Section of the British Association, Dover, Sept. 1899.



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Annals of botany 13, 620–622.

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