NOTES.

ON LEPTOMIN.—About forty years ago, Schönbein¹ discovered that various parts of plants contain substances which give certain reactions with tincture of guaiacum : (1) substances (or a substance) which cause the guaiacum to turn blue immediately on contact ; (2) substances (or a substance) which only cause the guaiacum to turn blue in the presence of hydrogen peroxide. The substances of the first class are those which are now generally known as *oxydases* : but it is not with these, but with those of the second class that I am now concerned.

Schönbein enumerates a number of vegetable substances which give the blue reaction with tincture of guaiacum to which hydrogen peroxide has been added : such are gluten (from wheat-flour), diastase, emulsin, myrosin, yeast, watery extracts of various seeds (barley, oats, millet, poppy, cress) and of various roots (Dandelion, Lettuce), as also of potatoes.

Although attention was drawn to this subject by Jamieson² in 1878, it was not until the recent publication of Raciborski's observations that it came prominently into notice. Raciborski³ has proved the presence of a substance giving this reaction, not only in vegetable liquids, such as coco-nut milk and latex, but also in various tissues, such as the endodermal passage-cells in the aerial roots of Orchids, the lenticels, the spongy parenchyma of aquatic Phanerogams, and more especially the sieve-tubes of a number of plants. It is, in fact, to emphasize the occurrence of this substance in the phloem that he has given to it the name *leptomin* ; a designation which seems to be misleading, inasmuch as it suggests that the substance in question is in some special way associated with the sieve-tissue, whereas his own researches prove that it is widely distributed in the tissues and fluids of plants.

Raciborski's suggestion as to the probable physiological significance of 'leptomin' is perhaps even less justifiable than his nomenclature.

¹ Katalytische Wirksamkeit organischer Materien und deren Verbreitung in der Pflanzen- und Thierwelt : Journ. f. prakt. Chemie, 89, 1863.

² Nature, vol. xviii, 1878.

³ Ber. d. deutsch. bot. Gesellschaft, xvi, 1898 : Flora, 85, 1898.

Since the time of Schönbein it has been known that blood, or more particularly haemoglobin, has the property of causing guaiacum to turn blue in the presence of hydrogen peroxide. On the strength of their similarity in this respect, Raciborski goes so far as to state that 'leptomin performs, in vascular plants, a function analogous to that of haemoglobin in the higher, and haemocyanin in the lower, animals, in that it is a vehicle charged with oxygen maintaining internal respiration, that is, a supply of oxygen from the phloem and the laticiferous system to the adjacent tissues.'

Now it is well known that haemoglobin possesses in a high degree the property of combining with free oxygen and of readily parting with it: but it is not clear that this property is expressed by, or indeed stands in any relation with, its power of decomposing hydrogen peroxide. For many tissues of the animal body, as also freshly prepared blood-fibrin, have been found to decompose hydrogen peroxide, without there being any suggestion that they are, like haemoglobin, of physiological importance as oxygen-carriers. This is precisely the position of the matter as regards leptomin. Because it decomposes hydrogen peroxide, it does not follow that it is an oxygen-carrier like haemoglobin; there is no evidence whatever to show that it shares in any degree the property of combining with oxygen which is so characteristic of haemoglobin. Nor is there any ground for distinguishing physiologically, as Raciborski apparently does, between the 'leptomin' of the phloem and the laticiferous tissue, and the 'leptomin' of coco-nut milk or of potato pulp.

The analogy which Raciborski seeks to establish between 'leptomin' and haemoglobin, attractive as it is, would seem to be premature, to say the least. The fact that there exist, in the body of both animals and plants, substances which can decompose hydrogen peroxide, still awaits, I believe, its physiological interpretation; and its significance is rendered all the more problematical by the great improbability of the occurrence of hydrogen peroxide in the living organism. It is, however, possible to conceive that unstable, highly oxidized, organic substances may be formed and distributed within the organism, and that their loosely combined oxygen can only be made available in the tissues on decomposition by the substances which we now only know by their action on hydrogen peroxide; it is not inconceivable, for instance, that the decomposition of oxy-haemoglobin may be effected in this way.

To facilitate repetition of the experiments, I give a few details as to the application of the guaiacum test. The tincture is prepared by dissolving the resin in absolute alcohol, to a deep brown solution: fresh tincture should be made from time to time, as it is liable to lose with age its property of turning blue when oxidized, especially if it be exposed to light. When the test is about to be applied, a small quantity of hydrogen peroxide, not enough to cause a permanent precipitate, should be added to some of the guaiacum tincture. A few drops of the mixture are then poured on to some of the liquid to be tested, either in a test-tube or on a piece of white porcelain. Boiling destroys the activity of all vegetable liquids. With regard to testing for 'leptomin' in the tissues, the tissue must first of all be freed from oxydases, as Raciborski points out, either by heating to 60° C., or by keeping it for a time in absolute alcohol: but the stay in alcohol must not be too long, otherwise the property of decomposing hydrogen peroxide will also be destroyed. The tissue is then to be treated with the mixture of guaiacum tincture and hydrogen peroxide, when a blue colour will appear in the tissues containing 'leptomin.'

I may add, in conclusion, a few further observations of my own as to the distribution of 'leptomin,' or bodies of that class, in plants. I find that pine-apple juice gives a strong reaction, whilst the juice of oranges, lemons, and apples gives no reaction: the pulp of the apple, and still more its rind, gives a slight reaction. Non-drying oils, such as olive, almond, colza, and rape, give the reaction, but not the drying oils, such as linseed, walnut, and poppy. The behaviour of different kinds of wheat-meal is striking: bran gives a good reaction when a little is sprinkled on a few drops of the mixture of guaiacum and hydrogen peroxide; 'toppings' and 'middlings' give a strong reaction, whereas the pure flour gives little or no reaction.

S. H. VINES.

OXFORD.

ON THE ANATOMY OF THE STEM OF DALBERGIA PANICULATA, ROXB.—For some time it has been known that the stem of *Dalbergia paniculata*, Roxb. exhibits certain anomalies as to its structure. Brandis¹ writes thus concerning this plant:—'A

¹ Brandis, Sir Dietrich, The Forest Flora of North-west and Central India: London, 1874, p. 151. See also Gamble, J. S., A Manual of Indian Timbers: Calcutta, 1881.

Vines, Sydney Howard. 1901. "On leptomin." *Annals of botany* 15, 181–183.
<https://doi.org/10.1093/oxfordjournals.aob.a088810>.

View This Item Online: <https://www.biodiversitylibrary.org/item/236929>

DOI: <https://doi.org/10.1093/oxfordjournals.aob.a088810>

Permalink: <https://www.biodiversitylibrary.org/partpdf/318617>

Holding Institution

Smithsonian Libraries

Sponsored by

Biodiversity Heritage Library

Copyright & Reuse

Copyright Status: Not in copyright. The BHL knows of no copyright restrictions on this item.

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.