CURRENT PROBLEMS IN PLANT MORPHOLOGY (II.).

THE INFLUENCE OF SPRAY AND RAIN ON THE FORMS OF LEAVES.

THE interesting work of Stahl*—based upon observations made at the Buitenzorg gardens, and thus indicating tropical conditions and recording tropical results—served to direct attention towards those adaptive form-modifications which leaves take when subjected to excessive rainfall. That the points and serrations of the leaves were in such cases usually prolonged and slender; that the leaves frequently adopted a vertically suspended position; that the nerves in many cases were sunken in gullies, thus making channels from which the superfluous water easily escaped; that the arrangement of hairs on leaves and stems contributed to the ready dispersion of water, were among the facts made clear in this contribution. Previous students, as, for example, Lundström† and Wille,‡ had already brought out some of these, but Stahl's work is noteworthy from its novel points of view as well as for its solid additions to the knowledge of the subject. Of particular interest is his summing up of the ecologic importance of rain specializations in tropical leaves. That it is necessary to disburden the leaves of their weight of moisture; that this superfluous water must be conducted to the roots and not intercepted by the crown; that the upper sides of the leaves must be freed from attached epiphytic algæ, fungi and lichens; that the transpiration stream, passing with difficulty from a leaf the surface of which is wet, must be promoted by the rapid drying off of the surface, are some of the reasons brought forward to account for the morphological peculiarities of the rain leaves.

The most peculiar single form-character of the rain leaf is the elongated point or '*Träufelspitze*,' and this has been shown to be characteristic not only of tropical plants subjected to a rainy season, but of strand plants subjected to the ocean spray, of high mountain and plateau plants subjected to heavy dews and of temperate zone plants where the rainfall is excessive.

Jungner,* whose earlier researches have contributed to the subject,† brings out a valuable paper in which considerable direct experimental work is recorded and several new observations are described. The most novel part of the work is the discussion of the influence of cataract spray upon the plants growing in the gorge beneath or beside the waterfall. '*Träufelspitzen*' are shown to characterize plants in such locations, and several figures showing the difference between normal habitat and spray habitat leaf forms are given. In such an habitat, too, the customary hairiness of the leaf is reduced, hairs having a tendency to retain the water too long, and peculiar groupings of the leaves on the stem, significant as arrangements for rapid draining off of water, were observed. The glazing by wax of the upper surface of the leaf in some cases served to reduce its 'wetableness.'

The most valuable part of the work, however, is the experimental portion in which it is shown how form-modifications may be produced in the greenhouse by subjecting leaves to regular dropping of water or to spray. The characteristic rain forms and spray forms were thus developed in a

(*) Regenfall und Blattgestalt. Leiden, 1893.

† Die Anpassungen der Pflanzen an Regen und Thaue, Upsala, 1884.

‡ Kritische Studien über die Anpassungen der Pflanzen an Regen und Thaue. Cohn's Beitr. Biol. Pflanz. 4: hft. 3.

* Wie wirkt träufelndes und fliessendes Wasser auf die Gestaltung des Blattes? Bibliotheca Botan. 32. Stuttgart. 1895.

† Om regnblad, daggblad och snöblad. Bot. Notiser No. 3, 1893, No. 3, 1894, *and* Klima und Blatt in der Regio alpina. Flora. 1894.

number of plants. Jungner properly distinguishes between ontogenetic rain leaves and phylogenetic. It is clear, however, that it is not necessary in every case to attribute the special form to any deeper effective cause than the direct influence of the environment. This whole line of experiments, recorded by Jungner, is a notable contribution to the modern literature of adaptation phenomena—a literature which on the whole is as richly and as sanely developed in the field of plant morphology as anywhere.

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SCIENTIFIC NOTES AND NEWS.

The next International Congress of Zoölogists will be held in England in 1898 under the presidency of Sir William H. Flower. The International Congress of Physiologists will also hold its next meeting in England, having accepted the invitation to Cambridge given by Prof. Michael Foster.

Four American men of science were elected corresponding members at the recent meeting of the British Association: Professor John S. Billings, University of Pennsylvania; Professor D. H. Campbell, University of California; Professor H. F. Osborn, Columbia College, and General F. A. Walker, Boston.

At the suggestion of Dr. H. Carrington Bolton the Smithsonian Institution is now corresponding with American universities for the purpose of making a collection of all printed Dissertations published by candidates for higher degress.

M. Pierre Fauvel reported to the Paris Academy on September 9th that the severe cold of last winter was very destructive to the marine fauna of France, the mortality extending even to a depth at which the temperature could not have had any direct effect. Nearly the entire contents of the dragnets, both of the marine laboratory and of the fishermen, consisted of animals dead and decomposed. Thus eighty per cent. of the scallops (*Pecten maximus*) were decomposed and the others were in such condition that they could not be sold. In the spring rare species and some new to the fauna of the coast were present in great abundance.

Captain Lenox-Conyngham is in charge of a mission sent out by the British government for the purpose of determining the difference of longitude between Greenwich and Madras. After having finished operations at Odessa the mission will proceed to Batum and then on to Baku, Resht and Teheran. Facilities have been promised to this mission by the Russian and Persian governments.

Since the report on indexing chemical (see p. 478) was presented before the A. A. A. S., Mr. W. D. Bigelow's 'Index to Methods for the Detection and Estimation of Fusel Oil in Distilled Liquors' has been accepted for publication by the Journal of the American Chemical Society.

Prometheus, the German scientific journal, in Nos. 300–302, publishes an article, '*Der thierische Körper als Kraftsmaschinen*,' translated from Science by Dr. Reuleaux, the Director of the Polytechnicum at Charlottenburg and author of '*Briefe aus Philadelphie*'; the latter famous for their frankness in revealing the defects of German manufactures and especially for their prompt effect in stimulating improvement. Professor Reuleaux prefaces Dr. Thurston's paper by an appreciative introduction, and supplements it by an interesting statement of his own ideas on the subject.

The next meeting of the German Association of Naturalists and Physicians will be held at Frankfort.

A telegram to the London *Times* states that Professor Anderson Stuart, of the Uni-