

ful." Every object must be accompanied by an explanation setting forth its most interesting characteristics, and addressed, not to the unlettered, but to the man of education, who is not a specialist. "Exhibition without explanation is vain and profitless, and causes a justifiable feeling of irritation in every serious intelligent visitor." The colonial museum is another institution which may form a suitable annexe to the regional museum, and should be the result of, and an incentive to, the carrying out of the principle that "exploration should precede exploitation," and, as the author aptly remarks, "the more thoroughly and scientifically the former is done the more profitable will be the latter."

The relations, which should exist between the metropolitan museum and local museums are thus defined. "Certain species represented by only one specimen should be sent to the central museum, in view of the paramount necessity of centralisation. The central museum should, however, only receive these on deposit, and should carefully indicate that they are the property of the local museum. Furthermore, a cast or reproduction of such specimens should be placed in the latter with the label, 'The original is deposited in the national museum.'"



Royal Belgian Museum of Natural History, Brussels. The portion to the right is the old building; to the left is the new south wing; a north wing parallel to it was contemplated, as well as a new central connecting member parallel with the old building on the side remote from the spectator.

The regional museum must of necessity be a State institution, but the relations of the museum with the administrative departments of the State should be as simple and restricted as possible. The actual work of the museum should be controlled by an individual not a committee. "Under the autonomy of a personal head the institution utilises the powers of its direction to the full. If mistakes are made they are temporary; the error is in the personality which is short-lived. On the other hand, under the rule of a committee the work, impersonal in its nature, will be mediocre and sluggish, and the institution will vegetate exposed to the gravest perils; the error is perpetual because it is inherent in the system."

The remainder of the volume is devoted to an account of the Royal Belgian Museum of Natural History at Brussels, its origin, present condition, and future. Its history has been one not unusual in the case of similar institutions: progress impeded by official ignorance, coupled with apathy or opposition; the situation improved on the advent of a strong and enlightened personality who knew how to secure more generous treatment. At present the building consists of an old centre and a new south wing. It was proposed to add a similar north wing and a frontage

parallel with the old building, but in present circumstances there does not seem much likelihood of these additions being carried out in the near future.

There are numerous well-printed illustrations, which represent a great variety of specimens and all departments of museum work, and it is a singular fact that, though they bear very directly on the text, they are scarcely ever referred to in it.

BACTERIAL DISEASES OF PLANTS.¹

THE third volume of Dr. E. F. Smith's work on "Bacteria in Relation to Plant Diseases" deals exclusively with "vascular diseases"—that is, those in which the causal organism advances along the vascular tissues of the plant, completely blocking up the zylem vessels. When compared with the account by Russell under the same title, written in 1892, the present work shows markedly the immense progress made since that date in this branch of botanical study. It is a compilation representing indefatigable labour, and forms, with the preceding volumes, a comprehensive summary of all that is known under the head of bacterial diseases of plants. A feature of the work is the care taken to collect a complete bibliography, and

the author's extraordinarily wide knowledge of the subject and the extent of his own observations and research render his critical review of all investigations bearing upon the etiology of the disease of extreme value to other workers in this field. Moreover, the full abstracting of original papers, which are brought quite up to date, and lengthy excerpts concerning methods, technique, and results, fulfil the purpose of enabling the reader to form his own conclusions and emphasise the essential character of the publication as a book of reference.

Each disease described is treated in an exhaustive manner, the same plan having been followed throughout the series. The geographical distribution, history, signs of disease, the etiology and morbid anatomy are all fully considered, as well as the morphological and cultural characters of the parasite, to which great attention is given as a means of identification of the specific organism. A discussion of treatment is usefully included, and a general computation of pecuniary losses is attempted.

The present volume deals almost entirely with

¹ "Bacteria in Relation to Plant Diseases." By Dr. E. F. Smith. Vol. iii., Vascular Diseases (continued). (Carnegie Institution of Washington, 1914)

diseases affecting tropical or subtropical plants, such as the sugar-cane, banana, sweet-corn, etc., which are of no economic importance in this country. If, however, the cultivation of tobacco is to have any great development in Great Britain, a reference to these pages is indispensable as a guide to the destructive

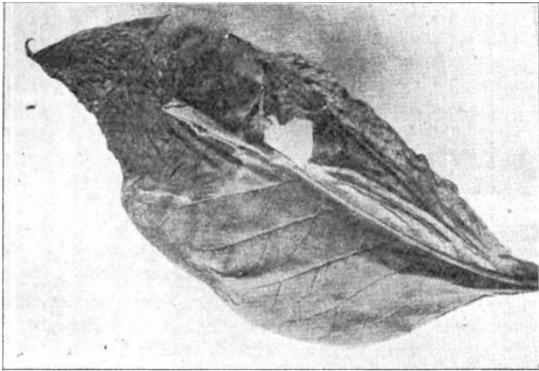


FIG. 1.—Tobacco-leaf from the hothouse, showing the typical reddish-brown shrivelled spots of the Granville tobacco wilt. The remainder of the leaf was green. *Bacterium solanacearum* abundant in vascular system of the midrib and in many side veins. Plant inoculated in stem, by needle-pricks, on September 23, 1905, using a pure culture of the North Carolina tobacco organism. Photographed February 20, 1906.

attacks to which this crop is subject, and the conditions which influence its successful growth. It seems also to be substantially proved by the author's own examinations and the weight of evidence which he has been able to accumulate, that the various forms of tobacco wilt, including those described by the Dutch

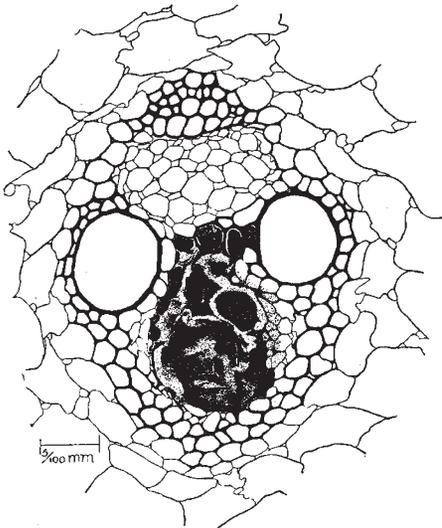


FIG. 2.—*Bacterium vascularum* in stem of sugar-cane received in 1902 from New South Wales. The figure represents a bundle in cross-section. The ground tissue, endodermal sheath, and phloem are still free, also a part of the xylem, including the two big pitted vessels. Sectioned from paraffin and stained with Flemming's triple stain, the contrast being not exaggerated.

and Japanese writers, are due to the same organism, *Bacterium solanacearum*, Smith, which causes the well-known rot of potatoes, tomatoes, and other solanaceous plants. This parasitic disease of tobacco has been known for the last twenty-five years in Japan, and the damage caused is widespread in all countries

where tobacco is cultivated; the loss has often been enormous, and many planters have been driven to harvest their crop while unripe and half-grown, in order to save some portion of it.

The specific communicable disease of the sugar-cane, caused by a one-flagellate schizomycete, *B. vascularum*, Cobb, is, so far as is known, confined to this one host plant. It is responsible for a considerable reduction of sugar-content, and is apt to give trouble in the sugar factory, gumming the machinery, and interfering with proper clarification and crystallisation. The disease is most prevalent in the southern hemisphere, and it is satisfactory to learn that it has not been reported from the British West Indies or Porto Rico. It is, however, specially liable to be transmitted in cane cuttings, and planters in these islands are warned to be careful to guard against its introduction. The question of the origin and nature of the "gum," which is such a typical feature accompanying vascular bacterial diseases, is extremely interesting, and it is disappointing to find that nothing has been done on this point since Greig-Smith's work in 1904. His researches, undertaken upon the lines of qualitative chemistry, are entirely confirmatory of the bacterial origin of the "gummosis," as he concludes from tests of the chemical reactions that the "gum" and the bacterial slime from pure cultures on agar are identical. Apparently the mucilaginous substance blocking up the vessels is a bacterial zooglea, but its exact composition has not yet been determined, and remains one of the many unsolved problems of biochemistry. It would seem that these plant-gums are derived by the bacteria from the saccharine contents of the cell-sap, and are clearly not a degeneration product of the cell-wall, as was formerly supposed.

The book is profusely illustrated with excellent photographs and drawings showing all stages of the diseases cited and innumerable inoculation experiments.

M. C. P.

ZOOLOGY AT THE BRITISH ASSOCIATION.

SECTION D held its meetings in the lecture theatres of the Universities of Melbourne and Sydney, and presented a full and varied series of papers. It will be noticed from the subjoined summary that about one-half the time of the section was devoted to the consideration of researches on Australian material.

Recent Work in Antarctica.

A discussion on the past and present relations of Antarctica was arranged by Section D, in conjunction with the Sections of Geology, Botany, and Geography. An account of the contributions of the geologists and geographers to this discussion appeared in NATURE of October 19 (p. 241), so that it is only necessary to refer here to the observations made by Mr. Hedley and Prof. Seward on the biological relations of Antarctica.

Mr. C. Hedley stated that naturalists have deduced the age, climate, contour, fauna, and flora of Tertiary Antarctica from the nature of Antarctic refugees now living in southern lands. For instance—(1) the monotremes, once perhaps numerous, are represented by two widely different types which survive in Australia, Tasmania, and Papua; the bones of other monotremes occur in South American deposits; (2) the Thylacines are recent in Tasmania, and fossil in South America and Australia. Either we must consider that these groups arose independently in each hemisphere, or that they spread from the one to the other. In the latter case a south polar land offered the most direct