

BOOK REVIEWS
OF PUBLICATIONS RELATED TO BOTANICAL WORK
IN THE NETHERLANDS

P. MAHESHWARI and R. N. KAPIL, *Fifty Years of Science in India. Progress of Botany.* Indian Science Congress Association. Calcutta 1963. VII + 178 pp. and 59 pictures.

This synoptic book apparently forms part of a series which has been edited by the Indian Science Congress Association in commemoration of its Golden Jubilee. The composition of the botanical part here reviewed was entrusted to the well-known embryologist P. MAHESHWARI and to R. N. KAPIL, apparently one of his pupils. As appears from the title, the contents cover a period of some 50 years, but special attention has been given to the last 25 years. Even though it is stated that intensive scientific research in India is hardly as old as that period, the material available appeared to be so overwhelming that "only the most important and significant aspects of Indian Botany" could be dealt with. Accordingly, the bibliography, though comprising no less than 817 references to over 300 authors—the vast majority Indian—is said to be "highly selective, representing no more than a fraction of the total literature of the country". In the concluding "General Considerations" it is stated that fifty years ago only some 5 M.Sc. degrees in Botany were taken. This figure had risen to 25 in 1925, 61 in 1948, and 470(!) in 1961.

Apart from a short "Introduction", the book contains chapters on the following subjects: Algae, Fungi etc., Bryophytes, Pteridophytes, Gymnosperms, Taxonomy, Morphology and Anatomy, Embryology, Cytogenetics, Plant Breeding, Ecology, Physiology, and Palaeobotany. Each of these chapters is conveniently subdivided into paragraphs and covers 5 (Ecology) to 24 (Embryology) pages.

It may be generally true that summaries of this kind are often of little but local interest, except in so far as they give the reader an idea of the often underrated scientific activities in a country of which he should like to know more than he does. While most specialists are well aware of what is going on in their fields in other parts of the world, there is always a chance that they may profit by taking cognizance of results in related fields. Thus they may come across information which would otherwise have escaped them. This, at least, was my experience when I scanned this little volume.

In fact, I found it quite interesting and stimulating reading. The style is concise, yet very clear throughout all chapters, including those outside the specialities of the composers, who must have done a great amount of reading on the basis of a wide knowledge of botany. The result is amazing and quite profitable. There is no undue chauvinistic "advertising" and next to a very matter-of-fact and well-balanced mention of the more outstanding contributions made by Indian workers to various parts of botany, there is similarly objective information with regard to the fields which in India have so far been neglected or which have not yet been fully developed, as well as about problems and subjects which should be tackled

in future, some of them quite urgently. All this makes the impression that the information gathered is fully dependable.

Whereas of course the chapters on embryology (P. MAHESHWARI c.s.) and palaeobotany (B. SAHNI c.s.), fields in which world-famous schools have been raised in India, are of paramount importance, much attention has been given to floral anatomy, wood anatomy, and cytology. Next to these, I came across such interesting topics as: apogamy and apospory in mosses and ferns, the presence of various basic chromosome numbers in one genus (e.g. *Lycopodium*); initial cells in the shoot apex and meiosis in *Isoetes*; axial and foliar origin of axillary shoots; cytological evidence for keeping *Thuja* apart from *Biota*, and *Taxaceae* from *Cephalotaxaceae*, anatomical evidence for the relationship between *Magnolia* and the *Bennettitales*, the *Chloranthaceae* and the *Ranales*, and the amalgamation of *Idenburgia* and *Nouhuysia*, embryological evidence for elucidating the systematic position of *Paeonia*, *Butomus* e.a., *Santalaceae*, *Stackhousia*, *Sphenoclea*, *Cercidiphyllum*, etc.; interesting data on high chromosome numbers: *Ophioglossum* $n = \pm 630$, highest among plants, *Morus nigra* $n = 154$, highest among Angiosperms, the original basic number apparently being 7, lowest number in *Morus*: 28 haploid.

There are lists of regional and local floras, of ecological descriptions of various vegetation types, a survey of phytogeography and supposed migrations; nine herbaria are mentioned, of which that of Calcutta is by far the greatest (2 million specimens). In the chapter on Physiology the more or less fantastic work of the late J. C. Bose, including his many ingenious instruments for measuring supposed or real life processes, as well as more recent investigations are briefly reviewed.

The book is well and lavishly illustrated. Among the most interesting pictures there are embryological details as well as reconstructions of such spectacular fossils as *Williamsonia seawardiana*, *Pentoxylon*, and *Glossopteris* (with *Ottokaria* fructification and *Vertebraria* stems), the latter, however, without reference to the older publications of Mrs Edna Plumstead in South Africa. It is not clear whether Pant's suggestion (1962) that the "rhizome" of *Rhynia* should rather be interpreted as the gametophyte, is made independent from the same supposition published by Merker (in 1955 etc.), whom he fails to quote.

Admitted fields which Indian botany has so far too much neglected are taxonomy, physiology, and ecology. There are too few botanical museums and herbaria, practically no laboratories of general biology, and there are only six botanical gardens, none of which is affiliated to a university. There is a need for some hill and marine stations and much work should in future be devoted to plant breeding and to cytogenetics of vegetables, fodder crops, and forest trees.

Unfortunately indexes are lacking. It might have been useful to add some alphabetical indexes on authors, subjects, and plant names with references to the text.

The book is well-printed, the paper is of a good quality, but the paper cover is of a rather poor kind. Copies can be ordered from: The Indian Science Congress Association, 64, Dilkhusa Street, Calcutta 17.

H. J. LAM

W. R. VAN WIJK (Ed.), *Physics of Plant Environment*. North-Holland Publishing Company, Amsterdam, 1963, 382 pp.; Price Guilders 40.—.

As is indicated in the title of this book by the authors (BORGHORST, BUSINGER, DERKSEN, SCHMIDT, SCHOLTE UBING, DE VRIES and VAN WIJK) the reaction of

plants to their environment is not discussed at all. Therefore anyone who expects to learn something about the interaction of plants and environment will surely be disappointed.

The aim of the authors has been to explain the basic facts of meteorology and soil physics and to express the observed phenomena in mathematical formulae as much as possible.

After an ample discussion of the physics of radiance, temperature and humidity of the atmosphere and of the soil, two chapters follow on the physics of greenhouse climate and on atmospheric pollution.

It is clear that in dealing with physics only of so complicated things as atmosphere and soil only rather simple phenomena can be fixed in mathematical formulae. After studying this book the reader will undoubtedly have got a clearer insight in some factors concerning climate and soil. This will doubtlessly be of value to botanists and agriculturists.

But if one is experimenting with plants, one practically always will find that environment is constantly changing and that all these changing factors are interacting with each other in the plants so much that it usually will be impossible to introduce any sensible mathematical formulation covering all these data. In the introduction VAN WIJK writes: "The very purpose of the mathematical physical treatment is to isolate the essential characteristics of the problem and to abstract them from the less essential ones". Biologists and agriculturists may find that, when they are cultivating plants in the field, the essential characteristics are already too manyfold to be caught in mathematical formulae.

The words "Plant Environment" in the title may suggest that some space might have been given to controlled plant environment as in climate chambers or in a phytotron. Nothing of the kind can be found although the authors come halfway by discussing the greenhouse climate which might be considered to be the climate of a very deficient phytotron.

In this greenhouse climate heating and air circulation problems get full attention. Very few pages are dedicated to artificial illumination during wintertime. When mentioning the type of lamps used for this purpose the author only gives data of ROODENBURG from 1949, which data are rather obsolete now. This is the reason why one of the most often used lamps, the high pressure mercury vapor lamp with fluorescent bulb, is not mentioned.

For most biologists and agriculturists the book contains too much "physics" and too little "plant". However students of ecology and plant geography may find several interesting data.

R. VAN DER VEEN

J. W. LINDEMAN en A. M. W. MENNEGA, *Bomenboek voor Suriname. Herkenning van Surinaamse Houtsoorten aan hout en vegetatieve kenmerken. Met tekeningen van W. H. A. HEKKING.*—Uitgave van de Dienst van 's Lands Bosbeheer in Suriname, Paramaribo.—Ook verschenen als Mededeling van het Botanisch Museum en Herbarium van de Rijksuniversiteit te Utrecht, juli 1963, no. 200, 312 blz., 1 gekleurde titelplaat, 5 morfologische en anatomische tekeningen in de tekst, 22 bomenfoto's op 16 platen tussen de tekst, 94 tekeningen van morfologische details en 2 schematische anatomische platen buiten de tekst, 96 foto's van kopske houtdoorsneden $\times 10$ buiten de tekst en één

meetplaatje in een apart zakje op blz. 3 van het omslag.—Ingeleid door Ir I. A. DE HULSTER, ten tijde van het ter perse leggen Hoofd van de Dienst van 's Lands Bosbeheer.—Prijs fl. 20.— (ingen.) of fl. 22.— (geb.); bestel-adres: Lange Nieuwstraat 106, Utrecht, of Dienst Landsbosbeheer Paramaribo Suriname.

SUMMARY. This is a most useful book for identifying Surinam trees and woods (mainly from the northern lowlands) according to both vegetative characters and wood-anatomical properties. Its having been prepared in the well-known and fruitful Utrecht school founded by the late Pulle and continued by his successor Lanjouw vouches for a good quality and trustworthiness. To a certain extent (illustrations!) it may also serve the British and French Guyana's; the text, however, is entirely in Dutch but for very short introductions (both one page only) in English and Spanish.

Alle tropische landen krijgen vroeg of laat behoefte aan een "bosflora", of, zoals het hier genoemd wordt, een "bomenboek". Sommigen beginnen er mee en bouwen zo'n bosflora later uit tot een volledig florawerk, anderen, zoals wij degelijke Nederlanders, beginnen met een echte flora, die vele jaren werk vraagt, en trekken die tenslotte uit tot een bosflora. In het onderhavige geval is het eigenlijk verwonderlijk, dat dit bomenboek niet eerder als een rijpe vrucht van de Utrechtse "boom der kennis des goeds en des kwaads" is gevallen, want Pulle's "school" bestaat al zo'n 60 jaar en heeft ons in die tijd voorzien van een "Flora of Surinam" en een menigte systematici.

Een boek als dit—en dat geldt eigenlijk voor alle systematische publicaties—kan eigenlijk alleen op zijn deugdzaamheid worden beproefd door het te gebruiken, en langdurig te gebruiken. Aangezien dit de recensent moeilijk zou vallen, moet ik mij dus wel tot een paar opmerkingen over de "buitenkant" beperken.

Wanneer men dan zulk een kloek boekdeel in handen krijgt, fraai en volledig geïllustreerd, goed gedrukt op behoorlijk papier, en bovendien afkomstig van een "goed nest" en stoelend op degelijk ouder werk als Pulle's "Enumeration", de "Flora of Surinam" en Pfeiffer's "Houtsoorten van Suriname", dan kan de eerste indruk zijn, dat zulk een boek is als de spreekwoordelijke goede wijn. Maar als men dan, zoals reeds gezegd, gedwongen is meer op details te letten, dan blijkt het toch niet zo vlekkeloos als men aanvankelijk dacht, en na herhaalde lezing kan men het neerleggen met een gevoel van: ja, een mooi boek, een nuttig boek, een nodig boek . . . maar juist daarom is het een beetje jammer, dat aan sommige details niet die vorm is gegeven, die het geheel tot een monumentaal werk zou hebben gemaakt. Er rammelt nl. iets, er blijft iets onbevredigends van achter, dat moeilijk onder woorden te brengen is. Tracht men dit te doen dan kunnen de volgende gedachten opkomen.

Het eerste punt is een zekere heterogeniteit. De auteurs kennende, kan dit niet aan een gebrek van samenwerking of wederzijds begrip toegeschreven worden. Is het dan wellicht de aard van de stof? Hadden morfologie en anatomie, resp. behandeld door Dr. Lindeman en Mej. Dr. Mennega, dan toch meer gescheiden moeten worden gehouden? Ja en neen! Ja, omdat de twee technieken zozeer uiteenlopen en ook, zoals ook wordt toegegeven, in nogal verschillende mate betrouwbaar zijn. Neen, omdat het toch wenselijk is aan de morfologische beschrijving der soorten ook een anatomische karakteristiek toe te voegen, zodat één

gecoördineerd geheel ontstaat, een volledig "pen portrait". Bij onze huidige kennis is opheffing van de natuurlijke discrepantie blijkbaar onmogelijk en men kan deze discrepantie dus niet aan de auteurs wijten.

Een tweede mogelijke oorzaak van dit gebrek aan eenheid kan gelegen zijn in de op blz. 3 gesignaleerde vertraging bij de druk en in het verschil in het tijdstip van afdrucken van de tekst enerzijds en de foto's en platen aan de andere (blz. 10). Wellicht is het aan deze omstandigheden te wijten, dat de nummering van boomfoto's en platen niet op de een of andere manier in overeenstemming is gebracht met die van de soorten in de tekst; wellicht ook, dat blz. 5/6 blijkbaar later zijn verwijderd, overgedrukt en weer ingeplakt, waarbij een foute verwijzing naar duplicaten van de figuren 1 en 2 is blijven staan (overigens ook in de Engelse en Spaanse inleidingen).

Vervolgens kan men zich afvragen voor wie het boek nu eigenlijk bestemd is. Voor "al degenen, die geïnteresseerd zijn in de boom- en houtsoorten van Suriname" is nogal vaag. Blijkens het gebruik van het Nederlands en de zeer eenvoudige, en m.i. niet altijd even verantwoorde en evenwichtige terminologie van de morfologische en anatomische inleidingen is het bestemd voor voornamelijk Nederlands begrijpende, niet speciaal botanisch opgeleide gebruikers. Een nadere verklaring was hier wel op zijn plaats geweest. Mocht dit de bestemming zijn, dan lijken mij de zeer korte, elk 1 blz. lange inleidingen in het Engels en Spaans, overbodig.

Dan zijn er nog een aantal kleinigheden die wat storend werken, zoals de ongewone en onnodig onvolledige lettering der platen; de over het algemeen wat al te sterke verkleining der overigens goede platen; de vermelding (blz. 11) dat opmerkingen over overeenkomsten met andere soorten enz. ook in de tabel met kleine letter zijn gezet; dit is alleen in de tekst het geval; de, lijkt mij, niet geheel volledige of voldoende doordachte tabel van Surinaamse namen, en de ongewone nummering van genera en soorten.

Het belangrijkste deel van het werk wordt uiteraard ingenomen door de twee dichotome tabellen en de alfabetisch gerangschikte soortbeschrijvingen, waarbij de ongeveer 100 allerbelangrijkste met een sterretje zijn aangeduid; waarom dit alleen in de tekst en in de anatomische tabel is gebeurd en niet in de morfologische is niet duidelijk. Een vermelding van de gemiddelde afmetingen der bomen ware wel prettig geweest; vermelding van de zeehoogten minder, omdat voornamelijk laaglandbomen zijn opgenomen.

Het, overigens summiere, overzicht van familieverbanden lijkt in een boek als dit enigszins overbodig. Voor bosbouwer en botanicus is het evenwel belangwekkend te vernemen, hoeveel soorten houtige planten van iets groter formaat in de Surinaamse bossen voorkomen en hoeveel daarvan opname zijn waardig gekeurd. Dit wordt in de tabel op blz. 298/9 familiesgewijs vermeld, maar weer niet gesommeerd (de auteurs zijn blijkbaar niet erg statistisch aangelegd). Doet men dit dan bemerkt men, dat Suriname telt 68 boomfamilies met 1011 soorten in 321 genera (als ik goed geteld heb), waarvan zijn opgenomen 53 families met 358 soorten in 185 genera. De 10 aan soorten rijkste families zijn achtereenvolgens: *Leguminosae* (140 spp.), *Myrtaceae*, *Lauraceae*, *Euphorbiaceae*, *Annonaceae*, *Sapotaceae*, *Moraceae*, *Guttiferae*, *Melastomaceae*, *Lecythidaceae* (35 spp.).

Dit alles zijn evenwel, zoals gezegd, opmerkingen over de buitenkant. Ik ben ervan overtuigd dat de auteurs een boek hebben geleverd, waarop lang is gewacht en dat goed zal voldoen. Daaraan doet de bovenstaande kritiek geen afbreuk.

Ik wens het dan ook gaarne toe: een veelvuldig gebruik, een spoedige tweede druk maar dan zonder "onregelmatigheden" en een spoedige vertaling in het Engels. Om daarvoor belangstelling op te wekken, voegde ik een "summary" toe.

H. J. LAM

Dr. A. F. M. REIJNDERS, *Les Problèmes du Développement des Carpophores des Agaricales et de quelques Groupes voisins. Avec une préface de Roger Heim.* 1963, Publ. Dr. W. Junk, The Hague, XV + 412 p. 55 pl. Price f 60,—.

This remarkable book consist of four parts: In the Introduction the historical backgrounds of the study are discussed. Moreover, the methods used in the author's own investigations are mentioned, especially the treatment and staining of the crosssections. The technical terms, used in the text, are explained in an alphabetical list.

Part two describes the development of the capophores of 76 Basidiomycetes belonging to the Agaricales and to *Cantharellus*. These descriptions, all of them based on the author's own investigations, are illustrated by a large number of microphotographs filling 55 plates. Unfortunately, the quality of some of the photographs leaves much to be desired, especially those made with a high magnification.

The third part contains a synoptic list of data partly collected from the literature and partly obtained from the author's own investigations discussed in part two. The list runs to 76 pages and includes about 300 species belonging to the genus *Cantharellus*, to the Agaricales sensu Singer (1962) and to a few families of the Gastromycetes (Secotiaceae, Hydnangiaceae). Besides the name of the fungus (with author and sometimes also with synonyms) the morphology, shape and development of the primordia and of the mature stage of the carpophores are given. Moreover, short descriptions are added of the type of development (gymnocarpous and various angiocarpous types), the morphology of the young and full-grown lamellae and their development, the morphology of the trama in stipe, pileus and lamellae, etc.

In the fourth, general, part all the data are discussed at some length; from this part an extensive English summary is given (p. 369-382). In this part the author discusses the literature on the development of the various carpophores, compares these data with the results of his own investigations and expounds his ideas on the significance and function of the different stages and parts of the carpophores. He also discusses physiological and phylogenetic problems, especially the relationship of the different families of the Agaricales and the connection of the Agaricales with some fungi placed in the Gastromycetes. He supports the theory that the last-mentioned fungi are descended from the Agaricales.

The book ends with a voluminous list of literature and with indices of the authors, the botanical names and the technical terms. The book is well got-up and bound in cloth.

Especially the fourth part of the book is of interest as it contains a complete and therefore very useful compilation of our knowledge with regard to the carpophore development and with regard to the relationship of the Agaricales so far as this can be deduced from the development. Surely, everybody working with

agaric fungi will welcome this book which will prove to be indispensable to him in future. The book should find a place in every botanical library.

J. A. VON ARX

MARGIT KOVÁCS, Die Moorwiesen Ungarns. Die Vegetation Ungarischer Landschaften—Band 3. Verlag der Ungarischen Akademie der Wissenschaften, 1962, 214 pp. DM 38,—.

In the greater part of the book the author gives a lengthy description of the Hungarian marsh-grasslands, following rather rigidly the classical method of Braun-Blanquet, and basing her classification of grasslands mainly on the one given by S6o (1957). With the help of 24 vegetation tables the following associations (each with many subassociations and facies) are described: the grasslands of calciferous marshes (*Schoenetum nigricantis*, *Juncetum subnodulosi*, *Caricetum davallianae*, *Seslerietum uliginosae*), the periodically wet and dry marsh-grasslands (*Molinion coeruleae*) on calciferous soils (*Molinietum coeruleae*) and on acid soils (*Junceto-Molinietum*), and a special *Molinia*-vegetation on wet sand (*Molinio-Salicetum rosmarinifoliae*). Each association is compared with the corresponding vegetations of Western and Central-Europe on the strength of data obtained from literature. These data have not been used as much as one could have wished: although the register of literature is of an admirable completeness (especially for the Balkans), in the perusal of this literature the necessary criticism is sometimes lacking, which may be partly due to the authors lack of knowledge of Western languages. For instance, in comparing the European *Schoenetum nigricantis*-vegetations, one record of Jonas (1933), which Jonas himself points out as to be not in the least characteristic for this association, is regarded as typical for a Western-German *Schoenetum*. For the Netherlands one record of a *Schoenetum* from the island of Texel (den Hartog, 1951) is taken as an example, but it is not compared with the "Overzicht" of Westhoff c.s. (1946), although this is also on the list of literature. Moreover some synonyms of plant names have been taken as different species: *Cirsium anglicum* and *C. dissectum* e.g. are put separately in the tables. It is also inconvenient that the author in her field work made no distinction between *Juncus effusus* and *J. conglomeratus* (neither between *Eleocharis palustris* ssp. *palustris* and ssp. *uniglumis* for that matter), although these species have a very different ecological behaviour.

In the second part of the book many ecological data are given, viz. brief descriptions of soil profiles, the contents (at various depths) of lime, organic matter and moisture. Also determinations of pH-H₂O (in some cases also pH-KCl), of hygroscopicity and capillary capacity were carried out, while valuable data are given as to the depth of the watertable in the various associations. On the other hand P- or K-contents were not determined. Beside much information on soil characteristics, many data are given concerning the microclimate of the various associations, viz. the daily heating and cooling in vegetation and in soil, and the evaporation and moisture content of the air in the course of the day. However it is not quite clear why all these data are inserted, as the relation between the differences in microclimate and differences in vegetation remains obscure.

A survey of the Hungarian marsh-grasslands, to be used by agriculturists, ends the book. Indications for measures for improvement of these grasslands are given and much stress is laid on the improvement by oversowing with valuable species or drainage. Too little attention, however, is paid to fertilisation.

Summing up, we may state that although the comparisons with the European marsh-vegetations are of questionable value, the description and summary of the Hungarian marsh-vegetations is important work and of great value to everyone who wants to compare these vegetations over a large region. Moreover, the book is a sound basis for extensive studies of the European literature on this subject. Also the text is supplemented by many excellent photographs of vegetations and single plants, made by the author.

E. M. EISMA-DONKER

L. Bos, Symptoms of virus diseases in plants. Published by the "Centre for Agricultural Publications and Documentation", Wageningen 1963, 1-132. (mededeling 307 van het Instituut voor Plantenziektenkundig Onderzoek te Wageningen). f. 11.50; £ 1.3; £ 3.50.

This attractive edition is a reprint of publication 307 of the Institute of Phytopathological Research at Wageningen. In a preface Dr. J. P. H. van der Want, Professor of Virology, points to the fact that disease symptoms in plants are usually the only means for quickly recognising virus diseases. There is great confusion in the use of terms describing phenomena caused by viruses. In addition one finds in the English language terms for which no exact equivalents can be found in other languages. For this reason Dr. Bos undertook the task to give a systematic description of different types of symptoms due to virus infections with references to literature published in different languages. The result of this study is laid down in this useful book containing about 90 pages of text, a list of references of about 10 pages followed by 5 lists of terms arranged according to language alphabetically with their equivalents in English, Dutch, German, French and Italian. Derivations of the terms from latin are given. In order to choose those definitions and names to which a majority of the plant virologists would agree, the manuscript was sent to a great number of research workers in many countries, who criticized the equivalents. The book is illustrated by 40 excellent photos and drawings and one coloured plate.

When trying to define what is meant by certain terms in phytopathology one realizes that in literature the same terms and expressions are used for symptoms of different characters. This is even more striking when terms used in different languages are compared. This is one of the difficulties with which the author was confronted when he tried to bring more conformity in phytopathological terms. Particularly terms arisen in practice and since long in use are defined in many ways. One may agree with Docters van Leeuwen's opinion that growth abnormalities induced by viruses should not be classified as galls.

It may be asked, however, which difference exists between a tumor caused by wound tumour virus and one caused by i.e. *Plasmodiophora brassicae* on plant roots from a histological point of view. The plant reacts to different factors in similar ways. The author omitted the term "gall" wisely from the lists with equivalents. Still the problem was not solved as the main difficulty encountered by the author concerned the question whether a name indicates a disease or that one symptom of a disease is meant. Also the development of the disease may be taken into account. If Dr. Bos had chosen to use terms only as an indication for symptoms characteristic for a certain disease in its most spectacular stage, he would have kept to the title

of his book. In that case he would have done for virus what APPEL and WESTERDIJK did for fungal diseases in their time: basing a system on the most spectacular stage. Dr. Bos, who apparently was not satisfied with such a static approach, went over to a more dynamic concept, considering probably that a disease can be compared with a film consisting of a range of pictures, hardly deviating from the normal situation at the start until the final stages leading to an equilibrium between host and parasite or to the death of the plant. In the chapter "Naming of symptoms", the author informs the reader that he is inclined "to prefer the use of the processes as a basis for naming symptoms", "since static situations seldom if ever occur in living material". With this ontogenetic approach the author sets himself a heavy task. He admits that no short terms are available to indicate complicated processes and therefore, next to applying terms to symptoms, descriptions of processes remained indispensable. This choice of the dynamic approach leads him inevitably to the origin of all deviations: the biochemical changes induced by virus in cells.

In following the development of a deviation from the start it was necessary to explain the meaning of the most common phytopathological terms. In an introduction some of these terms are discussed. One can agree with the definitions given here as many virologists seem to have done. Still some questionmarks can be put: it may be asked if insects introducing virus into a plant are "inoculating" it. The German synonym "impfen" also indicates that inoculation can only be performed intensionally by man. Though terms as syndrome, incubation period and hypersensitivity are clearly explained, the difference between susceptibility and sensitivity is less clear. A low degree of sensitivity is not identical with resistance though it is often considered in that way. This chapter seems to be too short to deal more thoroughly with the aspects of these general terms. It could have been omitted.

In the chapter "Absence of symptoms" it becomes clear how much confusion there exists in literature i.e. the terms inapparency, latency and masking. One has to agree with the author when he remarks that the use of one or another term "often depends on the accuracy and the tools with which the reaction of the plant is studied". In the chapter on the "sequence of symptoms" the conditions under which they occur are discussed, giving the reader a good picture of the diversity of possibilities. The main chapter "Description of the symptoms" is divided in nine sections, the first of which deals with histochemical and cytological deviations. Section II deals with reduction in growth and yield, an important economic aspect of some virus diseases. The author points to the difficulty to decide between the causal factor: a virus disease or malnutrition. Section III deals with colour deviations of leaves, stems, flowers, fruits and seeds. It need not be told that attention is also given to breaking of colours in tulips. Section IV deals with water deficiency in host tissues leading to wilting. The origin of this desiccation is still unknown and more research in this field would be useful. In Section V necrosis in leaves, stems and fruits is discussed and section VI is dedicated to abnormal cork formation in a number of heterogeneous virus-hostplant combinations, such as "sore shin" in *Lupinus polyphyllus* and in the bark of *Citrus* diseased by "psorosis". Chapter VII is one of the most interesting parts of the book, dealing with malformations. Among the primary malformations directly caused by infection, histoid or organoid deviations may occur, a distinction, derived from Küster. They all are due to a disturbed action of phytohormones. Symptoms like enations, excrescences and tumors are reckoned to the histoid deviations. Special attention is given to the term canker, referring among others to a necrosis surrounded by wound tissue on a woody stem.

The author suggests to distinguish between "cancerous tumours": cancer like abnormalities induced primarily by a virus infection with a necrosis and on the other hand "tumorous cankers", if callus formation occurs secondarily. It seems rather an artificial distinction and in using these terms a description of the developmental processes will not be superfluous. Special attention is given to the significance of "proliferation" a word deduced from latin: proles = offspring or sprouts and fero = to bear, thus meaning "bearing sprouts". Its translation by "woekering" in Dutch and "Wucherung" in German does not seem correct. Would not "proliferatie" do better? A great many symptoms are described as organoid malformations. Many of them are due to virus infections, others are the result of treatments with weedkillers, while other malformations have still to be reckoned to the teratomata, appearing spontaneously. A great many of these aberations are described, the author's special field of research. Secondary malformations, symptoms following necrosis or growth inhibition in some parts of leaves or stems, are mentioned in section IX.

Because Dr. Bos has not kept to the title of his book, the scope of it goes far beyond a dull description of symptoms and terms to be applied. The discussions in the field of phytopathology are worth reading. They stimulate the reader to undertake further research to clarify some unsolved questions. That not all phytopathologists will agree with every definition is not astonishing. Though a virologist is free to use terms in the way he thinks best, it is hoped that this book will be consulted frequently and that it may find its way also to those who are not yet acquainted with symptoms and terminology. Congratulations to Dr. Bos with this result of his extensive study.

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