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Association Internationale des Botanistes für das Gesamtgebiet der Botanik.

Herausgegeben unter der Leitung

des *Präsidenten*:

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Prof. Dr. Wm. Trelease.

des *Secretärs*:

Dr. J. P. Lotsy.

und der *Redactions-Commissions-Mitglieder*:

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Prof. Dr. C. Wehmer und Dr. C. H. Ostenfeld.

von zahlreichen Specialredacteurs in den verschiedenen Ländern.

Dr. J. P. Lotsy, Chefredacteur.

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Alle für die Redaction bestimmten Sendungen sind zu richten an:
Redaction des Botanischen Centralblattes, Haarlem (Holland), Spaarne 17.

Wernham, H. P., The systematic anatomy of the genus *Canephora*. (Beih. bot. Cbl. 1. XXVIII. p. 453—472. 7 figs. 1912.)

The anatomical characters of the genus *Canephora* are associated with xerophily. The parenchyma is for the most part of thick-walled elements. The intercellular space-system is inconspicuous, even in the leaves where the lacunae are but feebly developed; the epidermis in all parts is provided with a remarkably thick cuticle. The fibres have exceptionally thick walls, with lumina almost or quite obliterated. The xylem vessels, too, are small as seen in section, and have small lumina. The petiole is traversed by three vascular bundles — one large median strand and two quite small lateral ones. The leaf-blade is comparatively thick in all the species examined although *C. Goudotii* shows some leaning to a thinner type. The guard-cells of the stomata are always associated each with a subsidiary cell placed parallel to the pore and so the stomata conform to the so called „Rubiaceous” type. The peduncle of the inflorescence is invariably borne in the axil of a leaf, and so must be regarded morphologically as a stem-structure. Tannin is plentiful in the cells, especially abundant in the palisade tissue. Calcium oxalate occurs in diverse forms; raphides non observed. Crystal-sand is abundant in the phloem. — The characters of the singular species (*C. madagascariensis* Gm., *C. angustifolia* Wernh., *C. Goudotii* Wernh.) are explained. Matouschek (Wien).

Häuser, R., Untersuchungen an Makrogametophyten

Botan. Centralblatt, Band 134. 1917.

von Piperaceen. (Beitr. allg. Bot. I. 1. p. 115—149. 39 Textfig. 1916.)

Bei *Peperomia magnoliifolia*, *P. marmorata*, *P. blanda* und *P. resedifolia*, ferner bei *Piper subpeltatum* wurde die Entwicklung des Makrosporangiums, die Bildung der Makrospore und die Organisation der Gametophyten studiert.

Die Archesporzelle wird schon früh gebildet, ihre Teilung in die vordere Deckschichtinitiale und die hintere Embryosackmutterzelle geht erst im vielzelligen Nucellus vor sich. Aus den Dermatogenzellen entwickelten sich bei *Piper* zwei, bei *Peperomia* nur ein Integument. Die Bildung der Integumente und ihr weiteres Wachstum wurde in allen Details verfolgt.

Bei der weiteren Ausbildung der Makrospore zeigt sich, wie schon frühere Forscher festgestellt haben, dass bei der meiotischen Teilung die Ausbildung von Zellwänden ganz unterbleibt oder dass gebildete Wände wieder aufgelöst werden. Der Verf. fand bei *Peperomia resediflora* und *P. blanda* Ausbildung von Wänden nach den beiden Schritten der Meiosis und deren nachträgliche Lösung. Bei *Peperomia marmorata* und bei *Piper subpeltatum* unterbleibt die Wandbildung völlig.

Aus der so entstandenen Synmakrospore (diesen Ausdruck gebraucht der Verf. und bekennt sich damit zu der Ansicht, dass jeder der freien Kerne einer Makrospore homolog zu setzen sei) entwickelt sich nun bei *Piper subpeltatum* ein normaler achtkerniger Embryosack. Ihre weitere Entwicklung wurde nur bei *Peperomia magnoliifolia* verfolgt. Es zeigen sich dort eine Eizelle, eine Synergide, sechs Antipodenzellen und acht Polkerne. Die Polkerne verschmelzen zu dem Endospermitialkern, der wahrscheinlich mit dem zweiten Spermakern kopuliert.

Im theoretischen Teil der Arbeit neigt der Verf. zu der Ansicht Coulters, dass die aus der Teilung des Kernes einer Embryosackmutterzelle hervorgegangenen haploiden Kerne als Makrosporen zu betrachten seien.

- W. Bally.

Meyer, A., Die Allinante. Zugleich eine Antwort auf die Darstellung von Guilliermond im 32. Bande dieser Berichte p. 282. (Ber. Deutsch. Bot. Ges. XXXIV. p. 168—173. 1916.)

Unter „Allinanten“ versteht der Verf. ergastische Gebilde der Zelle, welche aus einem Allin, einem Körper der Stoffgruppe der Alline, bestehen, die sich durch eine Reihe von mikrochemischen Reaktionen charakterisieren lassen. Die Allinante geben hauptsächlich folgende mikrochemische Reaktionen: 3 proz. Salpetersäure, Pikrinsäure in wässriger Lösung, Jodjodkalium, Osmiumsäure, Formaldehyd fixieren ohne Kontraktion, siedendes Wasser, Alkohol und Quecksilberchlorid fixieren unter Kontraktion und Deformation. Jodjodkalium und Pikrinsäure färben. 2 proz. Kalilauge löst. Eau de Javelle löst. Pepsin greift bei 40 Grad nicht an. Trypsin greift bei 20 Grad die Allinante viel langsamer an als die Substanz der Zellkerne. Dazu kommt, dass das Allin der Moose und der Monokotyledonen sich mit Schwefelwasserstoff grau färbt.

Die so definierten Gebilde werden von den bisherigen Autoren als Chondriosomen oder Mitochondrien beschrieben. Der Verf. meint nun, dass sehr verschiedenartige Dinge im Pflanzenreich

unter diesem Namen gegangen seien. Scharf von den Allinanten seien die Trophoplasten, die auch niemals aus einem Allinant entstehen, zu unterscheiden. Diesen Irrtum hätten Smirnow, Duesberg und Hoven, Pensa, Lewitzky, Guilliermond und andere Autoren begangen. Guilliermond hat sogar fadenförmig gestreckte Zellsaftvakuolen mit Chondriosomen verwechselt. Ob die im Tierreich vorkommenden Chondriosomen alle den Allinanten analog seien, lässt sich heute noch nicht sagen. Aber auch dort handelt es sich wohl meistens wie im Pflanzenreich um wesentlich aus einem Eisennuklein aufgebaute ergastische Gebilde, die wahrscheinlich Reservestoffe darstellen.

W. Bally.

Windel, E., Ueber die Beziehungen zwischen Funktion und Lage des Zellkernes in wachsenden Haaren. (Beitr. allg. Bot. I. 1. p. 45—79. 11 Textfig. 1 Taf. 1916.)

Die Annahme Haberlandts, dass sich der Zellkern in wachsenden Pflanzenzellen in der Nähe der Stelle des lebhaftesten Wachstums befinde, ist nicht unwidersprochen geblieben. So hat z. B. Küster festgestellt, dass an vielen Haaren, besonders bei Wurzelhaaren von in der Luft oder im Wasser lebenden Wurzeln der Kern an der Basis lagert. Den Nachweis, dass diese Haare ein ausgesprochenes Spitzewachstum aufweisen hat er allerdings nicht gebracht.

Der Verf. hat nun einige Fälle solcher basaler Kernlagerungen im Zusammenhang mit den Wachstumserscheinungen näher untersucht. Bei den einzelligen oberirdischen Haaren von *Sinapis alba* wurde in ganz jungen Haaren apikale, in etwas älteren mehr und mehr basale, in ausgewachsenen schliesslich definitiv basale Kernlagerung konstatiert. Durch Bestäubung mit Tierkohle und sorgfältige Messung derartig markierter Haare konnte der Verf. zeigen, dass diese verschiedene Kernlagerung in engem Zusammenhang mit dem Wachstum steht. Einer ausgesprochenen Spitzenwachstumsperiode folgt eine Zeit, während der sich das Wachstum auf das ganze Haar erstreckt. Schliesslich ist aber nur noch eine basale Wachstumszone vorhanden.

Von Wasserpflanzen wurden *Hydrocharis morsus ranae* und *Hydromistria stolonifera* herangezogen. In den Wurzelhaaren zeigt der Kern eine ausgesprochene basale Lagerung. Das war schon früher bekannt und der Verf. konnte als neu den Nachweis liefern, dass sich diese Haare dennoch durch Spitzenwachstum auszeichnen. Er glaubt aber trotzdem, dass sich auch hier das Wachstum nicht ohne Abhängigkeit vom Kern abspiele. Der Einfluss des Kernes soll durch die im Wasser recht intensive Plasmaströmung gesichert sein. Für diese Annahme sprechen Versuche des Verf., die darauf hinzielten, die betreffenden Wasserpflanzen in Sand zu kultivieren. In den Wurzelhaaren dieser Pflanzen zeigten die Kerne nun häufig apikale Lagerung und Hand in Hand damit geht eine deutliche Verlangsamung der Plasmaströmung. Ferner befindet sich bei *Azolla caroliniana* an Haaren, die unter der Wurzelhaube entstehen, der Kern stets an der Spitze des Haares.

W. Bally.

Castle, W. E., New light in blending and mendelian inheritance. (American Naturalist. L. p. 321—334. 1916.)

The results, obtained by Hoshino from his crossings with

pea-varieties differing in floweringtime and flowercolour, and published in his paper "On the inheritance of the flowering time in peas and rice" (Journ. Coll. Agr. Tohoku imp. Univ. Sapporo Japan. VI. p. 229—288) are criticised by the author of this paper and led him to the following concluding remarks:

In typical Mendelian inheritance determiners of allelomorphic characters may meet each other generation after generation in a common zygote, separating again in gametogenesis without apparent modification of either in consequence of their conjugation in a heterozygote. This is well illustrated in the color inheritance of animals and plants.

In typical blending inheritance the determiners of contrasted parental conditions apparently blend into a determiner of intermediate character, the gametes formed by an F_1 individual being practically as uniform in character as those of either parent individual. Blending is illustrated in the inheritance of ordinary size differences in birds and mammals.

A third type must now be recognized which is a compromise between these two, for it exhibits Mendelian segregation of the contrasted parental conditions but with modification due to partial blending of the unlike determiners in the F_1 -zygote. The blending increases and evidences of segregation decrease with every generation during which the contrasted characters remain in conjugation. Consequently with every generation of inbreeding or self-fertilization following a cross of this sort, a stable intermediate class is more and more closely until its realization is complete. Under this type comes flowering time of peas according to Hoshino's observations.

M. J. Sirks (Bunnik).

Castle, W. E., Variability under inbreeding and crossbreeding. (American Naturalist. L. p. 178—183. 1916.)

The paper discusses the results, obtained by Walton in his researches about inbreeding (closebreeding) and crossbreeding of *Spirogyra*. Zygospores of the former sort (close fertilized) were found to be on the average larger and more variable than those of the latter sort (crossbred), contrary to the prevailing idea that cross fertilization leads to increased variability. The writer points out, that a F_1 -generation is, in general, not more variable than the parents were, while the greater variability, caused by crossbreeding, can only be seen for the first time in the F_2 -generation.

The conclusion reached at by Castle, after reviewing Walton's results, runs as follows: "All the cases with which Walton has dealt are cases of blending inheritance and as regards them it is true, that continuous inbreeding tends to the production of a more varied population (but not of more variable separate lines) whereas crossbreeding tends to produce a less variable population (devoid of differences between families) but nevertheless a population more variable than the single lines of a self-fertilizing or constantly inbred population".

M. J. Sirks (Bunnik).

Cockerell, T. D. A., Collarette flowers. (Journ. of Heredity. VII. p. 428—431. 1916.)

The paper shows that the collarette form, nowadays wellknown by the many different varieties of collarette-dahlia's, was not something absolutely new when it appeared in the dahlia less than twenty

years ago. Experience with various *compositae* throws doubt on such an opinion, because in diverse but more or less related genera certain collarette-variations appear. These variations, occurring in *Dahlia*, *Helianthus*, *Ratibida* etc., run closely parallel. The first collarette sunflower of the chestnut and vinous forms of *Helianthus annuus*, was obtained in 1915. Quite unexpectedly a considerable number of plants showed this character, but the supplementary lobes were narrow and very variable; somewhat afterwards a wild plant of *H. annuus lenticularis* was found with genuine collarette characters. An individual of *Arnica pedunculata* Rydberg, called nov. var. *tubularis*, found also in 1915, shows strong tendencies to become collarette.

The latest and in some ways most surprising collarette to be discovered is in the long headed cone-flower, *Ratibida columnifera*. This form (var. nov. *appendiculata*) was found in Juli 1916. The rays possess long appendages, usually a pair, arising from the throat.

These parallel variations do suppose that the genetic composition of the whole group of genera is such that these particular changes arise from time to time, without reference to the environment. Whether, in any give case, they are due to original variations of the germinal substance, or are due to the cropping out of characters for which determiners have existed in the chromosomes for ages, may be extremely difficult to decide.

M. J. Sirks (Bunnik).

Collins, G. N. and J. H. Kempton. Patrogenesis. (Journ. of Heredity. VII. p. 106—118. 1916.)

A cross between *Tripsacum dactyloides* female, and *Euchlaena mexicana* male, has been carried through three generations without exhibiting any indication of the characters of the female parent. In attempting to explain this complete absence of the characters of the female parent two alternatives may be considered.

1. The characters of the female parent have been completely masked by those of the male, or
2. The male nucleus developed in the ovary to the complete exclusion of the female, representing in a way the counterpart of parthenogenesis.

In the three generations of the progeny of this hybrid at least 350 plants have been examined. This and the fact that a great variety of conditions has called forth great variation and induced many abnormalities without evoking any indication of *Tripsacum* characters has caused the first alternative to be dismissed. If the second alternative be adopted we are compelled to look upon the results of this cross as special type of inheritance not previously recognized. Hybrids showing a predominance of the characters of the male parent have been described as petroclinous, but in this cross and its successive progenies no trace of the characters of the female parent has been detected. No true hybridization or conjugation between the two nuclei appears to have taken place. For this form of false hybridization the name patrogenesis is proposed. The term patrogenesis would also serve to place the phenomenon in proper contrast with parthenogenesis. This is rendered appropriate by the occurrence of what appears to be true parthenogenesis in *Tripsacum*, when pollinated with maize. M. J. Sirks (Bunnik).

Milne, D., The Vitality of seeds passed by Cattle. (Agric. Journ. of India. X. 4. p. 353—369. Oct. 1915.)

Whole wheat grains were given to cattle with their fodder and the dung collected and the undigested grains tested. From 9,6% to 20,5% of the grains passed by them were capable of giving strong healthy plants. Grass grains were also tested but in this case none of the apparently undigested grains in the dung germinated.

A. D. Cotton.

Schüepp, O., Beobachtungen des lebenden Vegetationspunktes. (Verh. Schweiz. Naturf. Ges. 96. Jahresvers. 1913 in Frauenfeld. II. p. 217. Aargau, Sauerländer 1914.)

Bei der Pflanze *Lathyrus sativus* wurden die Topfpflanzen horizontal gelegt, sodass die Endknospe unter das Präpariermikroskop zu liegen kam. Das Präparieren geschieht schrittweise an 3 aufeinander folgenden Tagen. Der Altersunterschied aufeinander folgenden homologer Organe beträgt etwa 3 Tage. Ein Laubblatt war etwa 3 Wochen nach der Abgliederung vom Vegetationspunkte ausgewachsen. Wegpräparierte Teile wurden nie regeneriert; die Bruchflächen rundeten sich ab.

Matouschek (Wien).

Sprecher, A., Der osmotische Druck des Zellsaftes gesunder Mosaikkranke Tabakspflanzen. (Ann. Jard. bot. Buitenzorg, 2^{me} Série. XIV. p. 112—118. 1916.)

Die mancherlei Hypothesen und Erklärungsversuche, welche über die Natur und das Wesen der rätselhaften Mosaikkrankheit aufgestellt worden sind, haben den Verf. dazu geführt, eingehende Untersuchungen über den osmotischen Zellsaftdruck bei kranken und gesunden Tabakspflanzen anzustellen und vielleicht in der Weise die Frage zu lösen, ob hier eine Stoffwechselkrankheit vorliegt, oder nicht.

Resumierend sagt Verf. über seine Resultate: „Mosaikkranke Tabakspflanzen geben Säfte, welche ungefähr den gleichen Gefrierpunkt und daher den gleichen osmotischen Druck zeigen wie die Säfte gleichzeitig ausgepresster und auf der gleichen Entwicklungsstufe stehender, gesunder Pflanzen. Nur sind die Molekulargewichte der in den Säften aufgelösten festen Substanzen bei ersteren kleiner als bei letzteren, was mit dem geringeren Gehalt an organischen und einem Mehr an mineralischen Stoffen der Säfte kranker Pflanzen zusammenhängt.“

M. J. Sirks (Bunnik).

Bubák, F., Ein Beitrag zur Pilzflora von Galizien und Russland. (Hedwigia. LVII. p. 329—343. 1 A. 1916.)

Behandelt folgende neue oder seltene Pilze:

Aus Galizien: *Leptosphaeria nigrificans* Bubák et Wróblewski n. sp., *Dermatea Crataegi* (Lasch) Jaap, *Niptera Agrostemmatidis* (Fuck.) Rehm, *Phyllosticta albobrunnea* Bubák et Wróblewski n. sp., *Placosphaeria Dianthi* Bubák et Wróblewski n. sp., *Dothiorella Pinastris* (Fr.) Sacc., *Fusicoccum umbrinum* (Bon.) Berl. et Vogl. [ist kein *Fusicoccum*, sondern *Phomopsis umbrina* (Bon.) Bubák], *Myxofusicoccum polonicum* Bubák et Wróblewski n. sp., *M. Rosae* (Fuck) Dieckie, *Ascochyta Phlomidis* Bubák et Wróblewski n. sp., *Septoria commutata* Bubák n. sp., *S. Gladioli* Pass., *S. podolica* Bubák et

Wróblewski n. sp., *S. Stenactidis* Vill., *Rhabdospora eryngiella* Bubák et Wróblewski n. sp., *Rh. uniseptata* Bubák et Wróblewski n. sp., *Ovularia Phlomidis* Bubák et Wróblewski n. sp., *Ramularia Telekiaae* Bubák et Wróblewski n. sp. [auch *Ovularia Mulgedii* Bubák gehört hierher: *Ramularia Mulgedii* Bubák], **Hormiactina** *Wróblewskii* Bubák n. g., n. sp., *Helminthosporium dematioideum* Bubák et Wróblewski n. sp., *Clasterosporium Wróblewskii* Bubák n. sp.

Aus Russland: *Cystopus candidus* (Pers.) Lév. [Turkestan], *Phyllosticta adjuncta* Bubák et Serebrianikow [Turkestan], *Ph. Atriplicis* Desm. [unvollständig beschriebene Art; die Pilze von *Atriplex* und *Chenopodium* sind *Ph. confusa* Bubák n. sp., Kursk, Böhmen, Niederösterreich, Berlin], *Ph. pallidocarpa* Bubák et Serebrianikow [Tambow], *Cytophoma pruinosa* (Fr.) Höhnelt [Jaroslawl], *Cytosporina Serebrianikowii* Bubák n. sp. [Jaroslawl], *Septoria atosanguinea* Bubák et Serebrianikow n. sp. [Transbaikalien], *S. botuliformis* Bubák et Serebrianikow n. sp. [Turkestan], *Rhabdospora subroseola* Bubák et Serebrianikow n. sp. [Tambow], *Coniothyrium globisporum* Bubák et Serebrianikow n. sp. [Turkestan], *Camarosporium Erianthi* Bubák et Serebrianikow n. sp. [Turkestan], *Monosporium reductum* Bubák et Serebrianikow n. sp. [Jaroslawl], *Torula (Trachytora) granulosa* Bubák et Serebrianikow n. sp. [Jaroslawl], *Septonema diversisporum* Bubák et Serebrianikow n. sp. [Jaroslawl].

Die neue Gattung **Hormiactina** gehört zu den *Mucedineae*, *Hyalodidymae*. Sie ist ausser von Wróblewski in Galizien von H. und P. Sydow bei Wannsee-Berlin gefunden worden und in der Mycotheca germanica Nr 281 als *Cylindrium elongatum* Bon. ausgegeben worden. Konidienträger und Konidien des neuen Pilzes sind abgebildet.

W. Herter (Berlin-Steglitz).

Jaap, O., Siebentes Verzeichnis zu meinem Exsiccatenwerk „Fungi selecti exsiccati“, Serien XXV bis XXVIII (Nummern 601 bis 700), nebst Beschreibungen neuer Arten und Bemerkungen). (Verh. bot. Ver. Prov. Brandenburg. LVII. p. 8—25. 1916.)

Ein grosser Teil der in der vorliegenden 7. Centurie ausgegebenen Pilze stammt aus Südeuropa (Dalmatien, Italien, Montenegro, Korsika, Südfrankreich), der Rest aus den Provinzen Brandenburg, Schleswig-Holstein, Hannover, Hessen-Nassau sowie aus Nieder-Oesterreich und der Schweiz.

Das Verzeichnis bringt die Beschreibung von 10 neuen Arten:

Valsella Kirchsteiniana auf *Salix aurita* L. (Prignitz), *Milesina Magnusiana* auf *Asplenium adiantum nigrum* L. (Korsika), *Uromyces hymenocarpi* auf *Hymenocarpus circinnatus* (L.) Savi (Dalmatien), *Myxofusicoccum alni* auf *Alnus glutinosa* (L.) Gärt. (Prignitz), *M. betulae* auf *Betula verrucosa* Ehrh. (Prignitz), *M. fraxini* auf *Fraxinus excelsior* L. (Prignitz), *Septoria thelygoni* auf *Cynocrambe prostrata* Gärt. (Dalmatien), *Ovulariopsis cisti* auf *Cistus monspeliensis* L. (Ligurien), *Ramularia aspleni* auf *Asplenium rutamuraria* L. (Lugano), *Cercospora cytisi* auf *Cytisus triflorus* L. Hér. (Genua).

Viele der ausgegebenen Pilze sind noch aus anderen Gründen interessant, worauf Verf. in den beigefügten Notizen hinweist. Einzelheiten müssen in Original nachgelesen werden.

W. Herter (Berlin-Steglitz).

Ramsbottom, J., A List of the British Species of *Phycomycetes*, etc. with a key to the genera. (Trans. Brit. Myc. Soc. V. 2. p. 304–317. 1915.)

The present list is the first published since Masee's "British Fungi: Phycomycetes and Ustilagineae", which appeared in 1891. The author has made it as complete as possible by including all the records which he has been able to trace.

In addition to the *Phycomycetes*, the groups *Phytophthoraceae* (*Plasmodiophoraceae*), *Acrasieae* and *Protomycetaceae* are also listed. New combinations are *Entophlyctis helioformis* (Dang.) Ramsb., *Pythium pythioides* (Roze et Cornu) Ramsb., and *Protomycopsis purpureo-tingens* (Mass.) Ramsb. E. M. Wakefield (Kew).

Ramsbottom, J., Notes on the list of British *Phycomycetes*. (Trans. Brit. Myc. Soc. V. 2. p. 318–323. 1915.)

Critical notes on the nomenclature of various species included in the Author's List, and also on certain unsatisfactory records. The new combinations listed in the above paper are also dealt with. E. M. Wakefield (Kew).

Ramsbottom, J., Some Notes on the History of the Classification of the *Phycomycetes*. (Trans. Brit. Myc. Soc. V. 2. p. 324–350. 1915.)

The author traces the history of the study of *Phycomycetes*, beginning with the observations of the early microscopists.

Notes and comments are made on the various systems of classification proposed, down to those in use at the present day.

E. M. Wakefield (Kew).

Rutgers, A. A. L., Onderzoekingen over het ontijdig afsterven van peperranken in Nederlandsch-Indië I. Overzicht der vroegere onderzoekingen. [Investigations about the dying out of pepervines in the Dutch East Indies. I. Survey of previous investigations]. (Meded. Labor. Plantenziekten. Buitenzorg. N^o. 18. 28 pp. Holl. m. Eng. résumé. 1915.)

The writers own summary runs as follows:

I. In the southern parts of the district Malang, East Java (Zimmermann, Zehntner) and in British India (Butler) a wilt disease has been found, caused by a fungus, which fills the woodvessels by its mycelium, whereby the vine dies. The symptoms of this disease are typical. It is not possible to say whether the three above-named investigators have seen the same fungus.

II. In the residency „Lampongsche Districten” of southern Sumatra (Zimmermann), in the southern parts of the district Malang, East Java (Zehntner) and in British India (Barber, Butler), a fungus has been found, which runs through the woodvessels with a few hyphae, apparently without doing any harm. Zehntner is the only one who writes, that he has found intermediate stages between this fungus and the fungus of the wilt disease.

III. Everywhere in the residency „Lampongsche Districten” in West Java, Middle Java, East Java and in British India eelworms (*Heterodera radicicola* Greef.) have been found in the roots

of pepper. Zimmermann and van Breda de Haan think the eelworms the primary cause, if not the only one of the death of the pepper vines; Zehntner has found eelworms, but is not sure as to what extent they are harmful, Barber and Butler think them of secondary importance.

IV. The results obtained at the Government pepper farm at Faliperamba (Madras) emphasize that the method of cultivating and manuring is most important in connection with the premature dying out of pepper vines.

M. J. Sirks (Bunnik).

Rutgers, A. A. L., Onderzoekingen over het ontijdig afsterven van peperranken in Nederlandsch-Indië. II. De pepercultuur op Banka. [Investigations about the dying out of pepervines in the Dutch East Indies. II. Pepper-Cultivation in Banka.] (Meded. Labor. Plantenziekten. Buitenzorg. N^o. 19. 36 pp. 24 pl. 1916.)

As summary of his paper the author writes:

I. Pepper has been introduced in Banka about 40 years ago by Chinese from Riouw. Since 20 years the Bankanese (Malay natives in Banka) have been planting pepper, imitating the Chinese. The export from Banka amounted in 1913 to 2½ million Guilders. (over £ 200,000.)

II. Peper-cultivation in the Dutch East Indies has two distinct forms: on the one hand the cultivation, as practised since many centuries by the Malay in Sumatra, a form of agriculture based on exhausting the virgin soil and leaving it alone afterwards, on the other hand the cultivation, as practised by the Chinese, a refined form of horticulture. The pepper-cultivation in Banka is of the latter type.

III. The pepper-cultivation by the Chinese in Banka is marked by the following characteristics:

A. The pepper is grown at dead stakes without shadow.

B. By careful tillage, big plantholes, big burying-trenches and the use of first rate cuttings for planting, vines are grown with an extensive and vigorous rootsystem.

C. The pepper vines remain producing 20 or even 30 years as a result of careful cultivation and abundant manuring with "burnt earth", oil-cakes, cattle manure, fish manure etc.

D. The average production of each vine amounts to 3 kattie (= 4 lbs.) white pepper a year.

IV. The pepper cultivation by the Bankanese is a cheap imitation of the cultivation by the Chinese. Tillage, burying of the young vines and manuring are usually neglected. The vines are dying out within 9 years; the production of each vine is less than 1 kattie (= 1.3 lbs) white pepper a year.

V. The following diseases and pests have been found in Banka:

A. Prematurely dying out as a result of planting in unsuitable soil.

B. Prematurely dying out as a result of insufficient care.

C. The leaves are eaten by a beetle. (*Holotrichia* sp.)

D. The stems are eaten by termites.

E. The fruits are damaged by a small weevil, which eats small holes in the unripen seed.

F. On the leaves lice have been found.

G. Larvae have been found boring in the branches.

H. A. cobweb fungus has been found on the leaves.

VI. The peppervines of the Bankanese show a marked difference from those of the Chinese: the last-named ones produce 4 lbs. white pepper a year during 20 years, the first-named ones three times less during one third of that time.

There is no other reason for this difference than the careful cultivation by the Chinese and the neglecting of several necessary measures by the Bankanese. Which one of the measures of the Chinese is the most important cannot be stated theoretically. Only experiments especially arranged for this purpose can settle this point.

M. J. Sirks (Bunnik).

Sharples, A., *Ustulina zonata* — a fungus affecting *Hevea brasiliensis*. (Bull. 25, Dept. of Agric., Fed. Malay States. p. 1—24. 10 pl. 1916.)

The author has continued the investigations on *Ustulina zonata* causing a disease of *Hevea brasiliensis*, a preliminary general account of which was given by Brooks (Bull. 22). The present paper is a full account of the disease as it occurs in Malaya, and several facts additional to those noted by Brooks are established.

The conidial stage of the fungus is described fully, and several variations in the form of the fruit-body are figured. The progress of the rot in roots and collar was observed both in the field and in artificial inoculations. The fungus is a wound parasite, and it is shown that it usually follows attacks by boring beetles. The borers easily enter trees in which the bark has been bruised or scorched by fire. The borer-attacks are most common during the thinning-out period, and *Ustulina* quickly follows them, infecting stems and branches. Hence the thinning-out period is the most dangerous one with reference to the parasitism of this fungus.

Strict sanitation-methods, both at the time of planting and at the time of thinning-out, are advocated as the most effective method of dealing with the disease, which appears to be very common in Malaya.

Cultures of the fungus on artificial media, from both conidia and ascospores, are described.

E. M. Wakefield (Kew).

Rand, F. V. and E. M. A. Enlows. Transmission and control of bacterial wilt of Cucurbits. (Journ. Agr. Res. III. p. 417—434. pl. 53—54. June 12, 1916.)

Referring to *Bacillus tracheiphilus* and is spread by insects.

Trelease.

Adams, C. C., An Ecological Study of Prairie and Forest Invertebrates. (Bull. Ill. State Lab. Nat. Hist. XI. Art. 2. p. 30—280, with map and 63 pl. Sept. 1915.)

This voluminous study illustrated also by 18 figures in the text can be synopsized best by a transcript of the table of contents.

Introductory.

General description of the region and location of the ecological stations.

I. General description of the region.

II. The ecological stations.

Description of the prairie habitats and animals.

I. Prairie area nord of Charleston, Station I.

1. Colony of swamp grasses (*Spartina* and *Elymus*), Station Ia.
2. Colony of wild rye (*Elymus virginica submuticus*), Station Ic.
3. Wet area of swamp milkweed (*Asclepias incarnata*), Station Id.
4. Cone-flower and rosin-weed colony, Station Ie.
5. Colony of blue stem (*Andropogon*) and drop seed (*Sporobolus*) bordered by swamp milkweed, Station Ig.
6. Supplementary collections from Station I.
- II. Prairie area near Loxa, Illinois, Station II.
- III. Prairie area east of Charleston, Station III.
 1. The Bates woods, Station IV.
 2. The upland oak-hickory forest, Station IVa.
 3. Embarras valley and ravine slopes forested by the oak-hickory association, Station IVb.
 4. Lowland or "second bottom", red oak-elm-sugar maple woodland association, Station IVc.
 5. Supplementary collections from the Bates woods, Station IV.
 6. Small temporary stream in the south ravine, Station IVd.
- General characteristics of the grass environment.
 1. Topography and soils of the State.
 2. Climatic conditions.
 3. Climatic centers of influence.
 4. Relative humidity and evaporating power of the air.
 5. Temperature relations in the open and in forests.
 6. Soil moisture and its relation to vegetation.
 7. Ventilation of land habitats.
 8. The tree trunk as a habitat.
 9. Prairie and forest vegetation and animal life.
 10. Source and rôle of water, used by prairie and forest animals.
- Animal Associations of the prairie and the forest.
 - I. Introduction.
 - II. The prairie association.
 1. Swamp prairie association.
 2. The cottonwood community.
 3. Swamp-grass association.
 4. Low prairie association.
 5. Upland prairie association.
 6. The Solidago community.
 7. Dry prairie grass association.
 8. A milkweed community.
 - III. Relation of prairie animals to their environment.
 1. Black soil prairie community.
 2. The prairie vegetation community.
 3. Interrelations within the prairie association.
 - IV. The forest associations.
 1. Introduction.
 2. Dry upland (*Quercus* and *Carya*) forest associations.
 3. Artificial glade community in lowland forest.
 4. Humid lowland (hard maple and red oak) forest association.
 5. Animal association of a temporary stream.
 - V. Relation of the deciduous forest invertebrates to their environment.
 1. Forest soil community.
 2. Forest fungus community.
 3. The forest undergrowth community.
 4. The forest crown community.

5. The tree-trunk community.
 6. The decaying wood community.
 7. Interrelations within the forest association.
- Ecologically annotated list.
- I. Prairie invertebrates.
 - II. Forest invertebrates.
- Bibliography.

Harshberger.

Bailey, I. W. and E. W. Sinnott. The Climatic Distribution of certain Types of Angiosperm Leaves. (Amer. Journ. Bot. III. p. 23—39. Juni 1916.)

The authors believe that there is a very clearly marked correlation between leaf-margin and environment in the distribution of Dicotyledons in the various regions of the earth. Leaves and leaflets with entire margins are overwhelmingly predominant in low-land tropic regions; those with non-entire margins in mesophytic cold-temperate areas. In the tropic zones, non-entire margins are favored by moist uplands, equable environments, and protected, comparatively cool habitats; in the cold-temperate zones, entire margins are favored by arid environments and other physiologically dry habitats. Correlations between leaf margin and prevailing climatic influences are more strikingly shown among trees and large shrubs than among herbs, as might be expected naturally, when the fundamental differences between those important growth forms are taken into consideration. The determination of the percentages of entire and non-entire leaves in Cretaceous and Tertiary Dicotyledonous floras, affords a simple and rapid means of gauging the general climatic conditions which existed in the regions where these plants flourished. There is grave danger in inferring, the authors think, because a certain foliar character has remained unaltered through long periods of geologic time, or has varied greatly among closely related forms, that the leaf is inherently "conservative" or "inconstant".

Harshberger.

Bray, W. L., The Development of the Vegetation of New York State. (Techn. Pub. N^o 3. N. Y. State Coll. of Forestry at Syracuse Univ. 186 pp. with 52 figures and colored map. Nov. 1916.)

The object of this bulletin is to present a study of the development of the vegetation of the state for the purpose of furthering the scientific education of the people of the state. For this purpose Dr. Bray travelled the state and ascended the highest peaks of the Adirondocks. He treats of the subject dynamically giving a general view of classification, growth forms and plant associations, as also a sketch of the geologic history of the plant life including a discussion of the glacial period and its effect upon New York vegetation. Several chapters deal with the modern aspect of the flora, its content, zonal relations and extra-continental connections. The purely ecologic portion discusses the development of vegetation as influenced by the substratum and under this general caption the aquatic, marsh, swamp, bog and other formations and associations are described. A short account of New York vegetation under cultural condition is given.

Harshberger.

Kroeber, A. L., Floral Relations among the Galapagos Islands. (Univ. Calif. Publ. in Bot. VI. p. 199—220. March 10, 1916.)

After a careful comparison of the flora of the different islands of the group which are tabulated, the author concludes that so far as the number of joint species is concerned, the floras of the various Galapagos islands do not show any unaccountable relations or mysteries, but almost exactly such connections as might be expected. Secondly, Islands in proximity have more species in common than those that are far apart. Thirdly, there appears to be a slightly greater influence of the southeastern than of the western and central groups upon most of the smaller islands.

Harshberger.

Reed, E. L., Ecologic Notes on *Drosera annua*. (Torreya: XVI. p. 125—130. June 1916.)

Drosera annua is a newly described species found in open oak woods near College Station, Texas. The climatic and soil conditions of the neighborhood are described with the aid of two graphs and several tables and the plants inside and outside of a quadrat are listed. The author states that *D. annua* is an annual, appearing about February 1. It grows in a fine sand with a small per cent of silt and clay with a low nitrogen content. Such a soil dries rapidly. The water content of its habitat ranges from 6 to 25 per cent during the life period of the plant. The minimum requisite of water in this soil is 6 per cent, while the optimum lies somewhere beyond this point.

Harshberger.

Rhoads, S. N., William Young Jr. (of Philadelphia) "Botaniste de Pensylvanie" and his Long-Forgotten Book being a Facsimile Reprint of his "Catalogue d'Arbres Arbustes et Plantes Herbacées d'Amérique", published in Paris in 1783. With Prefatory Account of the Author and Critical Notes by the Editor, privately printed. (Philadelphia 1916.)

This attractively bound book is a photographic reprint of the one published in 1783 and which came to light though the purchase of a volume from a second handbook dealer in Edinburgh, Scotland. William Young lived near John Bartram and was a rival of his in the plant trade with European plant lovers and botanists. He was made Queen's botanist and died in 1785, aged 43 years. He travelled extensively in the southern states and his catalogue is the first book on botany published by an American.

Harshberger.

Rocky, J. F., Palmyra Island with a Description of the Flora. (Bull. 4 College Hawaii Publications. 53 pp. 20 pl. with map. April 19, 1916.)

This is a detailed description of Palmyra Island and its plant covering, which consisted of 38 species of plants, 12 algae, 3 fungi, 7 lichens, 1 moss, 2 ferns and 13 flowering plants. Palmyra Island, which is a coral atoll with 52 islets, has the following flowering plants: *Pandanus Rockii* Martelli n. sp., *Pandanus pulposus* Martelli var. *Cooperi* n. var., *Monerma repens* (R. Br.) Beauv.

Ess., *Cocos nucifera* L. forma *palmyrensis* O. Becc., *Fleurya ruderalis* (Forst.) Gaud., *Boerhaavia tetrandra* Forst., *Portulaca oleracea* Linn., *Lepidium owaiahiense* Cham. & Schlecht., *Suriana maritima* Linn., *Ochrosia oppositifolia* (Lam.) K. Sch., *Ipomoea glaberrima* Bojer., *Tournefortia argentea* Linn. Harshberger.

Higgins, J. E., Growing Melons on Trees. (Journ. of Heredity. VI. p. 208—219. 1916.)

As results of his studies in breeding Papaya (*Carica papaya* a.o.) the author speaks in this paper about the different types of trees, the peculiarities of sex, the change of sex, the origin of hermaphrodites, crossing the different forms, and gives a list of ideals in breeding the papaya. These ideals are the following ones:

1. Vigor of tree. It is important with the papaya, as with other species, to use vigorous individuals as parent stocks.

2. Early and low fruiting habits. There is a wide variation in the plants in this respect, some producing no fruit on the first five or six feet of the stem, while others bear fruit which almost touches the soil. It is believed that this character may be transmissible, and the advantage of early and low-bearing trees is obvious.

3. Freedom from the branching habit. Trees that produce side branches freely require considerable pruning to prevent the numerous new shoots from taking the nourishment which should go to the fruit.

4. Productivity but not excessive bearing. Trees that have long bare spaces on their stems and those whose fruits are so numerous as to crowd each other should be avoided in favor of such as have the fruits well spaced with just sufficient room to mature normally.

5. Hermaphroditism. It is essential to a profitable industry that the number of "drone" male trees be kept very small.

6. Suitable size in fruit. For home use or for the fresh fruit market the extremely large varieties are not popular, and the breeder of table varieties will not, therefore, attempt to originate such forms. On the other hand there is a place for these if the fruit is to be grown as feed for poultry or other live stock. For papain production, other things being equal, the large fruit would be best.

7. Yield in papain. Where the production of papain is made an industry there can be little doubt that the average yield of this drug could be very greatly increased by judicious breeding.

8. Uniformity of shape. The breeder must seek to establish varieties which will have reasonable uniformity of shape as well as symmetry and smoothness. It is not necessary that all varieties be alike, but there must be uniformity in pack. In breeding from hermaphrodite trees there will be a large number of pistillate trees in the offspring. Although the long form is not necessarily confined to the hermaphrodite tree, nevertheless pistillate trees do not usually yield fruit of this shape. For this reason the breeder may think it best to work for two forms of fruit — the long, tending to cylindrical, for the hermaphrodite, and the obovoid for the pistillate. The fruits of such an orchard would be packed as two varieties.

9. Uniformity in ripening. This is an important consideration. Some papayas ripen and decay at the outer end or the point while the inner half near the stem is too green to be eaten. The ideal papaya in ripening shows its first yellowing along the ribs about midway of the fruit and ripens uniformly toward each end.

10. Coloring before softening. Some fruits ripen with very little colour, while others acquire a beautiful yellow when still hard, and may be kept for several days. The latter are so much more attractive on the table and in the market that they should be sought after in breeding.

11. Color of flesh. Those of pale whitish flesh must give place to the fruits of yellow, pink, or red color within. Recently some have been grown with a quite decidedly reddish blue.

12. Easily separable placenta. If the placenta adheres tightly to the inner portions of the fruit and is more or less buried in the flesh, it is difficult to remove the seeds without marring the appearance of the fruit. On the other hand, it is a distinct advantage if the placenta and seeds can be readily removed without scraping the flesh.

13. Flavor. This is without doubt the most important factor to be considered. Experience has shown that specific flavors can be transmitted, and this affords the breeder an opportunity to originate and establish varieties of high quality. These flavors cannot well be described, but are easily recognized and appreciated.

14. Keeping qualities. The ideal papaya should be a good keeper, and this character has been found after enough in the fruit of individual trees to lend much encouragement to the breeder.

M. J. Sirks (Bunnik).

Preusse-Sperber, O., Die Kautschukzonen Amerikas. (Der Tropenpflanzer. XIX. p. 191—209, 272—285, 322—334. 11 Abb. 1916.)

Der stets wachsende Verbrauch an Kautschuk und die Unsicherheit in der Lieferung, die bisher das ursprüngliche Kautschukland Amerika auszeichnete, haben es mit sich gebracht, dass schon jetzt die in den jungen *Hevea* Plantagen Ostasiens jährlich gewonnenen Kautschukmengen diejenigen von den wildwachsenden Kautschukbäumen Amerikas überwiegen. Verf. zeigt nun in der vorliegenden Abhandlung, dass Amerika leicht allen noch so hoch geschraubten gegenwärtigen und zukünftigen Anforderungen genügen kann, wenn nur genügend Arbeiter zur Verfügung stehen und rationellere Methoden als bisher angewendet werden. Die rund 40,000 t Rohkautschuk, die jährlich das Amazonasgebiet liefert, stellen nur die Ausbeute von etwa 20 Millionen Bäumen dar, während mindestens noch weitere 30 Millionen Bäume in dieser Zone existieren, die noch nie angezapft worden sind. Dazu kommen noch die grossen, vom Zapfmesser bisher ebenfalls unerührt gebliebenen Kautschukwälder Kolumbiens und Panamas.

In Amerika gewinnt man den Kautschuk bis jetzt nur von *Hevea brasiliensis*, *H. benthamiana* (liefern Para Fine-Kautschuk), *H. andinensis*, *H. lutea*, *H. guyanensis* (Weak Fine-Kautschuk), *Mimusops balata* (Balate-Kautschuk), *Manihot* Arten (Ceara Kautschuk), *Castilloa elastica*, *C. ulei* (Caucho Kautschuk) und *Parthenium argentatum* (liefert Guayule Kautschuk). Ausserdem lohnt sich die Kautschukgewinnung von *Hevea cuneata*, *H. collina*, *H. nigra*, *H. paludosa*, *H. spruceana*, *H. discolor*, *H. similis*, *H. viridis*, *Hancornia speciosa* und — bei Anwendung geeigneter Methoden — von *Micrandra siphonioides*, *Sapium tapuru*, *Hevea minor* und *H. microphylla*. Dass diese Arten noch nicht ausgebeutet werden, hängt teils mit dem Arbeitermangel zusammen, teils auch damit, dass die Gebiete, in denen sie in erster Linie vorkommen, durch Bahnen noch nicht erschlossen sind u. dergl. m. Solange die Zapfer

in der Nähe der Flüsse genügend Bäume finden, werden selbstverständlich diese ausgenutzt.

Unter sich zerfallen die Kautschukzonen Amerika's in fünf Einzelzonen, in die Para Fine-, Weak Fine-, Balate und Ceara-, Caucho- und schliesslich Guayule-Zone, so genannt nach den Kautschuksorten, die in den betreffenden Zonen gewonnen werden. Damit ist jedoch nicht gesagt, dass nur die den betreffenden Kautschuk liefernden Arten in diesen Zonen vorkommen. Diese Arten werden in den einzelnen Zonen infolge ihrer Häufigkeit in erster Linie zur Ausbeutung herangezogen. Vorkommen und Verbreitung der verschiedenen Arten schildert Verf. genauer, er macht auch Angaben über den Standort, über Durchschnittserträge usw. Die botanischen Unterschiede werden nur kurz berührt.

Verderbliche Zustände herrschen gegenwärtig noch in der Anwerbung von Arbeitern. 80% aller Kautschukzapfer bilden Schuldklaven, die den wirtschaftlichen Wert ihrer Arbeit nicht kennen. Nur unrationelle Ausbeutungsmethoden, die vom Verf. im einzelnen besprochen werden, kommen zur Anwendung. Sie ergeben meist ein unreines Produkt. Nur das Räucherverfahren liefert einen Kautschuk, der an Nervigkeit und Elastizität von keinem anderen übertroffen wird. Alles dies, besonders auch die hohen Exportzölle haben die Anlage von Kautschukplantagen in Ostasien begünstigt. In Amerika befindet sich die Kultivierung von Kautschukbäumen noch im Stadium des Experimentierens. Verf. teilt eine Reihe diesbezüglicher Versuche mit. Den grössten Erfolg verspricht jedoch das Anlegen von gemischten Kulturen. Da neuerdings von den einzelnen Staaten für das Pflanzen von Kautschukbäumen Prämien ausgesetzt werden, so dürfte sich wohl bald ein Umschwung nach dieser Richtung hin bemerkbar machen.

Eine weitere Verbesserung der Lage zu gunsten der amerikanischen Kautschukzapfer verspricht aber besonders der Ausbau der Verkehrsnetze, der von den in Betracht kommenden Regierungen emsig betrieben wird, ferner die Nutzbarmachung der drahtlosen Telegraphie für ihre Zwecke und vor allem der von M. v. Hassel erfundene automatische Zapfapparat, der während des ganzen Jahres in Tätigkeit sein kann und die Arbeit von 30 Zapfern leisten soll. Hält dieser Apparat das, was man von ihm erwartet, so wird die gesamte Kautschukgewinnung in eine bedeutend verbesserte Lage versetzt. Für Amerika ist aber der Apparat noch von grösserer Bedeutung als für Ostasien, da sich hier ein Arbeitermangel weniger fühlbar macht. 1 kg Para Fine, welches bisher 7—8 M kostete, stellt sich mit dem Apparat auf 4—5 M, kann vielleicht noch billiger geliefert werden.

Alle diese Tatsachen scheinen dafür zu sprechen, dass die amerikanischen Kautschukzonen einer bedeutend besseren Zukunft entgegengehen, als bisher angenommen wurde.

Verf. stellt noch die 16 gängigsten Marken mit Angabe der Spezies, die sie liefern, zusammen und macht an der Hand eines reichhaltigen statistischen Materials einige recht interessante Darlegungen über die Bedeutung des Kautschuks im Welthandel.

H. Klenke (Braunschweig).

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