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von zahlreichen Specialredacteuren in den verschiedenen Ländern.

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Payson, E., The pollination of *Asclepias cryptoceras*. (Bot. Gaz. LXI. p. 72—74. 1916.)

The general mechanism of an Asclepiad flower is well known and is only briefly recapitulated in the present paper. The "jewel milkweed" (*Asclepias cryptoceras*) differs from the typical asclepiad in several important respects. The flowers are nodding instead of erect, and, as a direct adaptation to this, the hoods are closed except for a small opening at the apex; the horn is small and included or hidden within the hood; the lips of the slit are firmly closed, and instead of offering an easy entrance to their trap seem to make the entrance difficult. In many kinds of milkweed the hoods and the upper part of the column are borne on a pedicel several millimeters in lenght. The hoods are sessile in *Asclepias cryptoceras*.

The pollination of the jewel milkweed, in southwestern Colorado at least, is apparently accomplished by only one species of insect, *Bombus Morrisoni* Cressn., a bumblebee. This bee is a full match for the large flower, yet it has a rather difficult time obtaining the nectar. Since the flowers are nodding and since the pedicel is absent, there are no footholds offered, and the bumblebee must continually scramble to keep its position. The hoods guide its feet to the slits, and the bee forces them open, and in order to free itself loosens the corpusculum and drags out the pollinia firmly fastened to its feet. When they dry they are in a convenient position to enter the next slit that chances to open in the bee's scrambling for a foothold.

The fragrance of the flowers is so intense that one would ima-

gine many insects would be attracted, yet such is not the case. Occasionally a fly or a bee, except the species of bumblebee mentioned, would alight on them, but was capable neither of obtaining nectar nor of dislodging the pollinia. M. J. Sirks (Wageningen).

Guilliermond, A., Nouvelles recherches sur les corpuscules métachromatiques. (C. R. Soc. Biol. LXXIX. p. 1090—1093. Paris. 1916.)

L'étude de Diatomées, de moisissures (*Plegolus nigricans, Penicillium glaucum, Botrytis cinerea, Dematium pullulans*), et de levures (*Pustularia vesicula*) a montré que, contrairement à l'opinion de Dangeard, les corpuscules métachromatiques existent bien sous forme de granules dans les vacuoles, et ne résultent pas de la précipitation d'une substance contenue à l'état liquide dans la vacuole. Leur évolution est tout à fait superposable à celle de l'anthocyane. Ils apparaissent dans de petites vacuoles en formation, sous l'aspect de petits granules, qui augmentent peu à peu de dimension, prennent l'aspect de grosses sphérules, puis se dissolvent dans les vacuoles.

D'ailleurs ce qui prouve bien que les corpuscules métachromatiques ne résultent pas de la précipitation d'un contenu dissous dans la vacuole, c'est que dans les Spirogyres, ils naissent dans le chromatophore et y restent localisés pendant toute leur évolution. L'auteur a, à ce sujet, des préparations qui ne laissent pas subsister le moindre doute.

Les observations vitales que l'auteur vient de faire, n'infirment en aucune manière, l'origine mitochondriale qu'il leur a assigné autrefois. M. J. Sirks (Wageningen).

Guilliermond, A., Sur une méthode permettant de colorer dans la cellule végétale les grains d'amidon au sein des mitrochondries. (C. R. Soc. Biol. LXXIX. p. 806—809. Paris 1916.)

L'amidon, formé au sein des mitochondries, reste incolore par les méthodes mitochondriales et apparaît au début de sa formation dans la mitochondrie comme un petit grain incolore ayant l'apparence d'une vacuole. Pour démontrer que cet aspect est bien dû à l'existence d'un grain d'amidon dans la mitochondrie, l'ateur a eu recours à la méthode suivante: Les coupes fixées et colorées par la méthode de Regaud étaient traitées par une solution de iodo-iodure de potassium, puis montées au baume de Canada. Mais cette méthode est assez délicate, et les préparations montées au baume ou dans d'autres milieux ne peuvent être conservées que quelques jours.

C'est pour cela que l'auteur a cherché pour une autre méthode et il en a trouvé une dans celle de Champy-Hull (fixation d'après Champy, coloration de Hull). Avec cette méthode, le grain d'amidon apparaît dès sa naissance teint en bleu intense par le bleu de toluidine au sein du chondrioconte qui est coloré en rouge foncé par la fuchsine et se détache avec une remarquable netteté du cytoplasme qui a pris avec l'aurantia une teinte orange.

Cette méthode a l'avantage d'être plus facile que la méthode de iodo-iodure que l'auteur avait préconisée antérieurement et surtout de donner des préparations qui, montées au baume, se conservent indéfiniment. Il est à remarquer, toutefois, que la méthode de

Champy fixe moins bien les cellules de la racine de ricin que la méthode de Regaud. Pour obvier à cet inconvénient, l'auteur à essayé de combiner les méthodes de Regaud et de Hull. Il a obtenu en fixant une racine de ricin par la méthode de Regaud, et en la colorant par la méthode de Hull, de superbes préparations, mais cette technique ne permet pas de colorer l'amidon qui reste incolore. Il faut donc attribuer la coloration de l'amidon par la méthode de Champy-Hull à une modification chimique de cette substance sous l'influence de la fixation d'après Champy laquelle le rend colorable par le bleu de toluidine.

M. J. Sirks (Wageningen).

Michell, M. R., The embryo sac of *Richardia africana* Kth. (Botan. Gazette. LXI. p. 325—336. Pl. 21—23. 1916.)

The ovary of *Richardia africana* is usually trilocular and has axile placentation. Four ovules are borne in each loculus. The ovule is not very decidedly anatropous and has two integuments.

By the time the embryo sac is mature only a few cells at the apex and base of the nucellus remain.

The primary sporogenous cell gives rise directly to a row of 4 megaspores. The embryo sac is derived from the lowest of these. An 8-nucleate embryo sac develops in the normal way.

The antipodals usually degenerate early, and when the embryo sac is mature often cannot be distinguished from the nucellus, which also undergoes a certain amount of degeneration.

The embryo sac persists for a long time in the stage when only 5 nuclei are distinguishable. The egg apparatus is normal and the 2 large polar nuclei lie in a mass of granular protoplasm at the base of the embryo sac.

The proembryo is spherical, with a minute suspensor.

In one ovule a 2-celled structure looking like a young embryo was found at the chalazal end of the embryo sac.

The endosperm develops from the base upward, and is probably accompanied by wall formation.

A few cells at the base of the endosperm are much larger than the rest. They possess hypertrophied nuclei and granular protoplasm. Their function is probably that of passing up food material to the young endosperm and embryo.

The process of fertilization is rather difficult to demonstrate. Only one case of undoubted fertilization has been observed. Even in its native habitat *Richardia* does not set seed freely. If pollination has occurred, usually most of the ovaries on an inflorescence have been pollinated.

Jongmans.

Nothnagel, M., Reduction divisions in the pollen mother cells of *Allium tricoccum*. (Botan. Gazette. LXI. p. 453—467. Pl. 28—30. 1 Fig. 1916.)

During late telophase of the last division of the sporogeneous tissue a row of vacuoles appears along the median longitudinal axis of each chromosome, these enlarging until each member is a ladder-like structure. Accompanying this there is an end to end approximation. Such is the condition of the resting nucleus.

The paired threads entering synapsis and there approximating are the two sides of the ladder, the connecting strands having broken down. This process does not represent the pairing of two

spirems. Throughout this period the chromosomes have retained their individuality.

The spirem, which consists of 16 end to end chromosomes, will take the form of radiating loops during second contraction, segmentation occurring at the outer bend. Each of the bivalents so formed consists of two somatic chromosomes that were end to end in the spirem.

Spindle fibers are the result of exosmosis of karyolymph into the cytoplasm, these being formed after the same fashion as the nuclear membrane. The membrane, if it persists, will be a part of the fibers.

The third contraction which accompanies fiber formation consists of a balling up of the chromosomes previous to the complete filling up of the cavity with fibers.

Each chromosome is an osmotic system in itself and capable of forming its own weft of fibers after the sap from the nuclear cavity has been exhausted.

The heterotypic division or the reduction of characters results from a transverse separation of whole chromosomes.

During early anaphase the halves of the chromosomes, which originated in presynapsis, separate longitudinally and at each telophase approximate end to end, forming the looping spirem of the daughter nucleus, 2 x chromosomes in length. Division in homotypic mitosis, therefore, results originally from a longitudinal separation.

The transverse separation of the 16 segments during early metaphase of the homotypic mitosis is immediately followed by their pairing.

To all appearances a typical mitosis is begun, but is varied and delayed for a time by a hetorotypic mitosis as the result of the various contractions, being finally completed in the homotypic division. Jongmans.

Sax, K., Fertilization in *Fritillaria pudica.* (Bull. Torrey Botan. Club. XLIII. p. 505—522. 3 Fig. Pl. 27—29. 1916.)

The results obtained from the study of fertilization in *Fritillaria pudica* are summarized by the author as follows:

In the mature embryo sac of *Fritillaria pudica* the egg cell cannot be distinguished from the other two cells of the egg apparatus.

The „Endospermanlage" extends up between and around the cells of the egg apparatus.

The pollen tube usually turns along the outer wall of the nucellus or embryo sac before entering. At this time the cells of the egg apparatus are all intact.

The pollen tube practically always enters and at least partly destroys one synergid.

Although a distinct appearance of motility is evident in many male nuclei, the majority do not suggest much motility.

The male nucleus and the egg nucleus fuse completely before division.

The upper polar nucleus, with the male nucleus in contact with it, migrates to the lower one, probably by cytoplasmic streaming.

The two polar nuclei and male nucleus fuse completely and the subsequent division is normal.

The two red bodies, the „X-Körper" of Nawaschin, which remain in the pollen tube after the male nuclei have been discharged, are very probably nuclei. They probably correspond to the two vegetative nuclei described in the pollen tube before the two male nuclei were discharged. Jongmans.

Altenburg, E., Linkage in *Primula sinensis*. (Genetics. I. p. 354—366. 1916.)

In *Primula sinensis* linkage is know between the dominant factors for magenta flower colour (R), short style (L) and green stigma (S) as between the allelomorphic recessive factors red flower (r), long style (l) and red stigma (s). The parents of the cross, made by the writer were L R S and l r s.; these F_1-plants showed to be short- and longstyled, the dominant L R S plant thas showing to be heterozygous for short long style. The long-styled F_1-plants were rejected by the writer; the short-styled F_1-individuals were in most cases used as male parent for back-crossing with the triple recessive l r s.; sometimes the reciprocal cross was made. The total number of individuals thus obtained was 3684; of these 1032 were l r s, 1063 L R S, 526 l r S, 634 L R s, 180 l R S, 156 L r s, 54 l R s and 39 L r S.

Batesons view that the various gametic ratios are due to reduplication implies a segregation of these types in different parts of the plants. It would follow on this hypothesis in its original form that entire anthers or ovaries should contain one gametic type. To test this view the author has kept separate seeds resulting from the single anthers and ovaries.

From these researches the following conclusions may be drawn:

In *Primula sinensis* the pairs of factors studied may be arranged in the order: long or short style, red or magenta flower, red stigma or green stigma.

Crossovers between the pairs of linked factors, long or short style, and red or magenta flower, respectively, take place without reference to the crossovers between the pairs of linked factors, red or magenta flower color and red stigma or green stigma, respectively; that is, there is no interference.

Single anthers and single ovaries of the heterozygous individuals produce all classes of gametes. Reduction of factors must therefore accompany cell divisions occurring within many or all the anthers and ovaries.

The proportions of the various gametic classes of linked factors is about the same for the anthers and the ovaries.

M. J. Sirks (Wageningen).

Bridges, C. B., Non-disjunction as proof of the chromosome theory of heredity. (Genetics. I. p. 1—52. 107—163. 1916.)

Experimental proof is given in this paper that particular chromosomes, the X-chromosomes, are the differentiators of sex; the X-chromosome constitution of an individual is the cause of the development by that individual of a particular sex, and is not the result of sex already determined by some other agent. The sex is not determined in the egg or the sperm as such, but is determined at the moment of fertilization, for the X sperm of a male gives rise to a female when it fertilizes an egg containing an X, but to a

male if it fertilizes an egg containing an Y or no sex chromosome at all. Likewise the Y sperm of a male gives rise to a female when fertilizing an XX egg and to a male when fertilizing an X egg. These facts in connection with the fact that an X egg of a female produces a male if fertilized by an X-sperm prove that the segregation of the X chromosomes is the segregation of the sex-differentiators. The presence of two X chromosomes determines that an individual shall be a female, the presence of one X chromosome that the individual shall be a male. The origin of these chromosomes whether maternal or paternal is without significance in the production of sex. The Y chromosome is without effect upon the sex or the characters of the individual, for males have one Y, two Y's or may lack Y entirely (males lacking Y are sterile); and females may have one or two supernumerary Y's with no change in appearance in any case. M. J. Sirks (Wageningen).

Daniel, L., Sur les variations specifiques du chimisme et de la structure provoquées par le greffage de la Tomate et du Chou Cabus. (C. R. Ac. Sc. Paris. CLXII. p. 397—399. 1916.)

L'auteur a étudié une parabiose entre la Tomate et le Chou Cabus, où chacun des associés, simplement relié à son associé par des tissus cicatriciels, conserve le libre usage de ses appareils propres et n'emprunte pas ceux du voisin. Il semble donc, qu'une telle union soit celle qui doive le moins se prêter aux réactions mutuelles et aux échanges réciproques de matières. Cependant, il arrive parfois qu'elle amène des changements anatomiques très profonds chez l'un ou l'autre conjoint.

La soudure entre la Tomate et le Chou-Cabus était parfaite; la communication entre les deux plantes s'était effectuée à la fois par les parenchymes médullaires très étendus et par les bois qui étaient soit accolés directement, soit réunis par des parenchymes de réparation. Les coupes des deux plantes ainsi soudées ont révélé des faits très inattendus. Le Chou s'était profondément modifié au contact de la Tomate. Il avait acquis des cellules sableuses, réparties comme chez son conjoint, mais en moindre abondance. Le contenu de ces cellules était bien l'oxalate de chaux, car les masses granuleuses traitées par l'acide chlorhydrique ou le perchlorure de fer ordinaire se dissolvaient en entier. Avec l'acide sulfurique étendu, elles donnaient des aiguilles de gypse dans la Tomate comme dans le Chou, mais avec plus de lenteur chez celui-ci. En outre, l'endoderme du Chou contenait de l'amidon et il n'y en avait pas à ce moment chez la Tomate; cell-ci était plus riche en matières grasses que le Chou.

Fait plus curieux et plus intéressant encore: le Chou présentait, dans toute la région de soudure et au-dessus dans la tige, un liber interne médullaire très net et très développé, semblable comme aspect et disposition à celui de la Tomate.

Les deux modifications sont, à l'opinion de l'auteur, des plus instructives. Dans le cas présent, les changements observés sont dus à l'action specifique de la Tomate sur le Chou, car on ne les observe pas dans les greffes des Choux de même race faites avec le Navet. L'auteur ne peut pas dire si les variations singulières ainsi produites sont des exceptions analogues aux hybrides de greffe ou bien s'il s'agit de modifications plus générales. M. J. Sirks (Wageningen).

Daniel, L., Sur un fruit de noyer contenant une amande de coudrier. (Rev. génér. de Bot. XXVIII. p. 11—14. 1916.)

Mention est faite d'un fruit de noyer, provenant d'un noyer cultivé (*Juglans regia*) dont les basses branches s'entremêlaient avec celles des Coudriers (*Corylus avellana*) voisins. Cette noix renfermait une noisette. La coque, rugueuse comme à l'ordinaire, avait une forme conique et ne comprenait qu'une seule pièce. La noix n'avait pas de commissures et sur une sorte de pédoncule brunâtre reposait une véritable graine de Coudrier, reliée au pédoncule par un long filament, comme dans les noisettes véritables. Autour de cette graine, on trouvait des tissus désagrégés comme chez le Coudrier. Cependant il y avait quelques différences. L'ornementation était plus simple que dans la graine du Coudrier; les sillons et les cordons de la surface étaient plus nombreux et à la base se voyait un sillon circulaire.

La graine germa et donna des cotylédons inégaux dont le plus grand était recourbé sur le plus petit; la gemmule porta des feuilles de Noyer, imparipennées et lisses, rappelant entièrement, ainsi que la tige et la racine, la germination normale de Noyer. Malheureusement la jeune plante périt par cause d'un traitement mal.

L'auteur émet l'hypothèse que la plante était le produit d'une hybridation naturelle entre le Noyer et le Coudrier. Cette hybridation aurait été suivie de la formation d'un embryon à caractères paternels, ayant déterminé sur les parties jeunes de l'ovaire et de l'ovule de la mère l'apparition de caractères paternels (Xénies); la plante retourna alors au type maternel. Il serait intéressant d'essayer de féconder artificiellement le Noyer par le Coudrier en recueillant et conservant le pollen de cette espèce pour le porter sur le stigmate mûr du Noyer au moment propice, après suppression des châtons mâles non ouverts. M. J. Sirks (Wageningen).

Davis, B. M., Hybrids of *Oenothera biennis* and *Oenothera franciscana* in the first and second generations. (Genetics I. p. 197—251. 1916.)

The extensive studies, made by the writer about hybrids of *Oenothera biennis* and *O. franciscana* seem to have an especial value since the germination of seeds in some of the cultures was experimentally determined to be complete. They are the first cultures of this character to be described and although the mortality among the seedlings was great, the writer thinks it probable that the cultures were much more largely representative of their genetical possibilities than when in past years seeds have been sown in the earth.

The results of these studies appear to give positive evidence of a segregation of factors in the F_2-generation of a character to be expected in Mendelian inheritance. The differentiation of the classes in the F_2 was unmistakable and a remarkable feature of these classes was the firm correlation of many characters indicating a remarkable linkage of certain factors. That the situation, if Mendelian, is very complex becomes apparent from the extent of the linkage. Although certain of the cultures, because grown from seed forced to a complete germination, are probably fairly representative of the genetical possibilities of the F_1-hybrid parents it must be remembered that very large numbers of plants either died or could

not be brought to maturity. Furthermore, there was a large amount of sterility in the pollen (about 50%) and to almost as great a degree in the seeds produced by the F_1-generation. For these reasons the author has refrained from speculation on the possible ratios that might be suggested for the appearance of classes or of characters on Mendelian hypotheses. The high degrees of sterility both gametic and zygotic present problems of irregularities so great as to render speculation at present most unsafe. Also the parent species have not themselves passed the tests of a pure species, and there are suggestions in the facts of seedsterility in *O. franciscana* and of pollen-sterility in *O. biennis* that these species are not strictly homozygous. Mendelian studies on the *Oenotheras* seem to the writer at present to be quite hopeless except as they are concerned with parent material exhaustively tested for its genetic purity or of which the genotypes are most thoroughly known.

M. J. Sirks (Wageningen).

Harris, J. A., Studies on the correlation of morphological and physiological characters: the development of the primordial leaves in teratological bean seeds. (Genetics. I. p. 185—196. 1916.)

The purpose of the present paper is to publish the results of one attempt to determine something of the more fundamental physiological characteristics to which incapacity for survival may be due. In the seed, the primordial leaves of the bean are minute structures. If innate physiological conditions of a kind which may affect growth be associated with morphological variations, one might expect some influence of these factors to be recorded in the size or other characteristics which result from the relatively enormous expansion which these organs undergo in the course of germination and the establishment of the young seedling. This study was undertaken to determine whether the influence of such factors is discernable.

The writer could show that the weight of primordial leaf tissue developed by morphologically aberrant seedlings of *Phaseolus vulgaris* is on the average less than that produced by normal controls grown under conditions as nearly as possible comparable. So far as determined, a reduction in the volume of primordial leaf tissue occurs irrespective of the kind of abnormality. The type of abnormality does, however, determine within wide limits the degree of reduction in the amount of leaf tissue.

A first attempt has been made to ascertain by means of the conductivity and freezingpoint methods, whether there are differences in the concentration in molecules and ions in the cell sap of the leaves of teratological and normal plants. The evidences suggest that there may be a lower concentration of both electrolytes and total solutes in the tissue fluids of the teratological plants. If, on more extensive investigation, this should prove to be true, it would be quite in agreement with the results for leaf weight, indicating that the morphologically aberrant individuals have a smaller capacity for absorbing electrolytes or for synthesizing electrolytes and non-electrolytes. The differences are, however, so slight and so variable that further and more refined determinations will be necessary to demonstrate the existence of any relationship. So far as data are available, they demonstrate merely that no clear difference

exists in the properties of the sap of the leaf tissue of the two types of leaves. M. J. Sirks (Wageningen).

Harris, F. S. and **J. G. Hogenson.** Some correlations in sugar beets. (Genetics. I. p. 334—347. 1916.)

The writers publish some tables that show the following correlations of characters in sugar beets:

1. Weight of beet with percentage sugar = — .2878 ± .0074.
2. Percentage sugar in the mother beet with quantity of seed produced = .0049 ± .0143.
3. Height of plants with weight of seed produced = .3985 ± .0128.
4. Weight of mother with quantity of seed produced = .3075 ± 0.131.
5. Number of stems on each plant with the quantity of seed produced = .2771 ± 0.133.
6. Number of days to mature with quantity of seed produced = .1954 ± 0.156.
7. Number of leaves on each stalk with quantity of seed produced = .1217 ± .0143.
8. Days to mature with leight of plant = .1748 ± .0163.
9. Percentage of sucrose in mother with days to mature seeds = .1292 ± .0155.
10. Percentage of sucrose in mother beet with member of leaves on each stalk = .2484 ± .0134. M. J. Sirks (Wageningen).

Copeland, E. B., Growth phenomena of *Dioscorea.* (Philipp. Journ. Sc. C. Botany. XI. 5. p. 227—241. 1916.)

At the end of his paper, the writer publishes the following summary:

Previous observations, that a nutation of shoots of *Dioscorea* ceases in darkness, are in general correct. Especially active stems may nutate and twine around a support in darkness.

Prof. Newcombe's observation that the failure to twine in darkness is due to changes a number of centimeters from the apex is correct.

The rate of growth of vigorous young shoots is but slightly, if at all, influenced by the illumination.

The elongating region is much shorter in darkness than in light. The part of the stem which executes the movements, in active nutation in light, almost, or quite, ceases to elongate in darkness, and it is for this reason, that twining ceases in darkness.

The short elongating region in etiolated shoots may be explained biologically as a selected adaptation to the condition under which young shoots in nature are most likely to find themselves in darkness — this is, in the soil, where a long growing region would be just as dangerous as the production of ample leaves.

The growing shoots of *Dioscorea* are excellent material for the analysis of the influence of temperature or other external conditions upon growth, into: A, effect on the growing region; B, effect on the metabolic processes, which make food available; and C, translocation of food to the growing region. Low temperatures, applied either to the food store, or to the stem through which the food must pass to the growing region, result in prompt checking of growth.

It is suggested that the blasting of the growing point and its

replacement by a branch, which at first grows at a right angle to the axis from which it springs, is a selected phenomenon, by which the plant, the shoot of which is under unfavorable conditions, tests a wholly different line, instead of using itself up in one attempt to reach a place where conditions are good. Jongmans.

Hooker, H. D., Physiological observations on *Drosera rotundifolia*. (Bull. Torrey Botan. Club. XLIII. p. 1—27. 11 text fig. 1916.)

The red pigment which is found in the leaves and roots of *Drosera rotundifolia* is probably trihydroxylmethylnaphtoquinone.

The rosette habit is conditioned by transpiration.

The inflexion of *Drosera* tentacles is produced by an acceleration of the rate of growth on the convex side and in the median section. The unbending is caused by an increase in the rate of growth on the concave side and in the median section, accompanied by compression of the convex side.

In both cases the acceleration commences near the base and extends towards the gland. The amount of growth is greatest near the base and decreases apically.

A tentacle is capable of reacting three times. During each reaction an apical portion of the bending region becomes fully grown. *Drosera* tentacles have intercalary, basipetal growth.

The bending of the exterior tentacles is nastic; of the central tentacles, tropic. The unbending is in all cases owing to autotropism. Jongmans.

Forsaith, C. C., A report on some allochthonous peat deposits of Florida. Part I. Topographical. (Botan. Gazette. LXII. p. 32—52. 1 Diagram. 1916.)

This part contains the description of the different deposits examined by the writer. The object of the investigation is to determine the relative amounts of the two main types of peat formation. The allochthonous deposits are those which are represented by a gradual amassing of drifted, wind-blown, and sedimentary vegetable material in permanent, open, and quiet bodies of water. The autochthonous are those which have resulted from a gradual accumulation of successive generations of plants in situ, in the presence of more or less permanent but concealed water.

Allochthonous peat is characteristic of deep permanent lakes and the lower portion of marshes; autochthonous peat is characteristic of the upper portions of marshes, the upper strata of filled lakes, and swamps.

From what studies it was possible to make in regard to the average extent of these two types of peat formation it is evident that those of a lacustrine character (allochthonous) are of vastly greater numerical and quantitative importance than those of an autochthonous nature. Jongmans.

Roe, M. L., A contribution to our knowledge of *Splachnidium*. (Botan. Gazette. LXII. p. 400—408. Pl. 14—18. 1916.)

Splachnidium rugosum Grev. is a monotypic genus, which has been placed by various investigators in different groups. Most

authors have placed it with the *Fucaceae.* The present writer was able to make his researches on new material, collected near Cape Town. The material was inadequate for the study of reproduction, but furnished a good series for the development and fate of the „apical cell". The writer's results are following:

The initial row of *Splachnidium* is similar in origin and development to the „initial" of the *Fucaceae,* except that in *Splachnidium* it involves an entire linear row of thallus tissue, it may or may not include a terminal hair; and it accompanies vegetative as well as reproductive activity.

It seems unwise to place *Splachnidium* under a separate family; rather it is preferable to retain it under the *Fucaceae,* regarding it as a primitive member of that group for the following reasons: 1) it closely resembles the *Fucaceae* in the structure of the thallus, but has an apical meristem in place of a segmenting apical cell with consequent dichotomy; b) true conceptacles are present which in origin and development are of the same general type as those of the *Fucaceae,* but are scattered indefinitely over the entire plant body; c) the reproductive sacs may prove to contain isogamous gametes. Jongmans.

Lindau, G., Die höheren Pilze (Basidiomyceten). Bd I der Kryptogamenflora für Anfänger. 2. Aufl. (Berlin, J. Springer. 1917).

In dieser neuen Auflage ist gegenüber der alten (von 1911) nur sehr wenig geändert. Die Figurentafeln sind die gleichen geblieben. Im Text ist hauptsächlich in sofern eine Aenderung eingetreten als die langen Schlüssel durch Einsetzen der Untergattungen und Wiederholung der Zahlen übersichtlicher gestaltet wurden.

Derjenige Teil, an dem zweifellos ein verbessernder Hebel hätte angesetzt werden können, die Tafeln (vergleiche die Besprechung darüber in Naturw. Zeitschr. für Forst- und Landw. 1912) ist leider der gleiche geblieben. Und gerade für ein Anfängerbuch wäre es von grösstem Wert mehr Gewicht auf durchaus charakteristische Abbildungen zu legen. Die kleinen Figuren sind derart schematisch, dass daraus recht wenig entnommen werden kann. Dass das Buch im übrigen gute Dienste leistet, geht am besten daraus hervor, dass schon nach so kurzer Zeit eine zweite Auflage nötig war.

Neger.

Melhus, J. E., J. Rosenbaum and **E. S. Schultz.** *Spongospora subterranea* and *Phoma tuberosa* on the Irish potato. (Journ. Agr. Research. VII. p. 213—253. Pl. A and 7—14. 1916.)

The authors present important results of a series of studies on the geographical distribution of *Spongospora subterranea* and the factors governing the same, relation of the fungus to the roots and stems of the potato plant and of other hosts, damage caused to the tubers, relation to soil types and moisture. *Spongospora subterranea* exists in six different potato-growing sections of the United States, all northern, except the one in Florida. This distribution is strikingly similar to that of *Phytophthora infestans* and lies wholly within its geographical range, which is confined to the northern part of the United States and to certain sections of the South (Florida) in which a potato crop is grown during the winter. The

influence of climate is demonstrated by the following facts: No infections resulted on the progeny of powderry-scab-infected seed potatoes planted in 15 different localities along the Atlantic seaboard. However, 8 lots of soil out of 12, shipped from as many of these localities to northern Maine and planted with infected seed produced a crop showing powdery-scub. The disease is always most prevalent on wet, poorly drained land. Periods of damp, rainy, and cloudy weather favor the development of *S. subterranea.* Numerous cases indicate that the disease can live in the soil for more than three years, and from facts and hand the writers believe that it can live for at least five years and probably much longer. All underground portions of the potato plant may become infected with *S. subterranea.* Infection develops earlier on the roots than on the tubers; on the tubers it appears about the stem end first. Galls are often very numerous on the root system of potato plants growing in infected soil, while the tubers are absolutely free from infection. This leads to the conclusion that the critical test for the presence of the disease in a field is the freedom of the root system, and that the roots and not the tubers are the organs of the plant which determine the resistance of potato plants to the disease. Besides the potato, there are seven other solanaceous hosts of *S. subterranea,* including the tomato. The disease manifests itself on these hosts in the form of large destructive galls on the roots, these being fully as injurious as those on the potato plant. The histology of the galls on all the hosts is very similar and has many points in common with *Plasmodiophora brassicae* on cabbage. The absence of the canker stage of *S. subterranea* in the United States may be due to the short growing period afforded the potato crops in infected districts. Among the saprophytic fungi found associated with the sori of *S. subterranea* is a species of *Papulospora,* which caused much confusion in earlier writings. Practical suggestions for combating the disease are given, viz: early harvesting and seed treatment; the possibility of finding a resistant variety has not yet been exhausted. No soil treatment will eradicate the disease, but sulphur at the rate of 900 pounds per acre applied broadcast reduces the amount of infection by *S. subterranea.* Several types of dryrot follow *S. subterranea.* The percentage of these secondary rots as found in nature in infected tubers varied from 30 to 70. The most serious of these rots is a dryrot due to a species of *Phoma,* designated by the writers as: „*Phoma tuberosa,* n. sp."

Van der Lek (Wageningen).

Pratt, O. A., A western fieldrot of the Irish potato tuber caused by *Fusarium radicicola.* (Journ. Agric. Research. VI. p. 297—309. Pl. 34—37. 1916)

This paper is concerned with certain rots attacking the potato tuber while growing in the field. Under the head of fieldrot are considered several types of decay occurring in potato tubers while yet in the field — a stem-end rot, a lenticel rot, and a rot proceeding from eye infections. The name „blackrot" best describes them: a comparatively dry rot, dark to nearly black in color, proceeding from the stem end, lenticels, and occasionally from the eyes of the tuber. It is confined principally to potatoes of the round type. The jelly-end rot of the Burbank group is a soft, wet rot of the tubers, light to dark brown in color, commonly a stem-

end rot; lenticel and eye infections are seldom found in connection with the jelly-end rot of the Burbank group. At first it was thought that these rots were to distinct diseases; inoculations in 1915 left no doubt in the writer's mind that *F. radicicola* was capable of causing both types of rot. The fungus is apparently widely distributed on partly decayed tubers and roots of plants. (The writer isolated it from the roots of *Populus deltoides,* where he found it associated with crownrot). The disease appears at it worst under dry-land-farming conditions and in raw desert land; this fact suggests that *F. radicicola* may be well distributed throughout the desert soils. The disease in one of great economic importance but variing greatly from year to year; the year 1914 might be called an epidemic one. In that year a freeze occurred in June which killed the vines to the ground, the plant coming up anew and producing a crop; often the origin of infection could be traced from the frozen tip of the vine down through the stem to the infected tubers. The principal conclusions of the writers experimental work (experiments in the field, laboratory and storage experiments) are: *F. radicicola* is capable of causing a jelly-end rot of potatoes of the Burbank group and a black rot of potatoes of the round type. Neither blackrot nor jelly-end rot makes any progress in storage at or below a temperature of 50° F. Seed infected with blackrot will produce infection in the resulting product. Blackrot may be controlled fairly well by planting potatoes only on lands which have been in cultivation for a number of years and by giving the growing crop the proper amount of water, care and attention.

Van der Lek (Wageningen).

Weir, J. R. and **E. E. Hubert.** A serious disease in forest nurseries caused by *Peridermium filamentosum.* (Journ. Agric. Research. V. p. 781—785. 1916.)

Peridermium filamentosum Peck has been found to cause a serious disease of yellow-pine seedlings (*Pinus ponderosa* Laws). The various forms of *Peridermium* occurring an lodgepole pine (*Pinus murrayana* „Oreg. Con ") the trunk form, known locally as the „hipcanker" and the branch-gall form in the Rocky Mountain region, with the exception of the folicolous species, have been demonstrated to be *Peridermium filamentosum,* having an alternate stage on species of *Castilleja.* The fact that the same species of *Peridermium* attacks both the lodge-pole pine and the yellow pine increases the difficulty of control of this fungus. The seedlings in the nursery beds are being sprayed during the infection period. An effort is being made to eradicate the alternate host from the vicinity by mechanical or chemical means. The felling and burning of trees near by infected with *Peridermium* will reduce the changes of infection.

Van der Lek (Wageningen).

Copeland, E. B., The genus *Loxogramme.* (Philipp. Journ. Science. C. Botany. XI. 1. p. 43--48. Pl. 1—4. 1916.)

This paper contains an historical review of the genus, some additional notes to the description and a key to the species. Most of the species are illustrated on the plates. Three new species are described. *L. linearis* (Formosa), between *L. parallela* and *L. Fauriei,* and more like the former, from which it differs in being larger throughout and in the less caudate but broader paleae. *L. africana*

(Angola), differs from *L. lanceolatum* (Sw.) Presl in the shape of the frond, which has an almost uniformly broad central part; the texture is thicker, and the stipe much longer. *L. Fauriei* (Formosa), differs from *L. lanceolata* in the paleae, in being more coriaceous, and most conspicuously in the sori. From *L. malayana,* it differs most notably in not being winged to the base; and the fronds are more scattered and more coriaceous. *L. malayana* nom. nov. (*Anthrophyum lanceolatum* Bl. non *Grammitis lanceolata* Sw.). This species is decidedly taller than *L. lanceolata* (Sw.) Presl, broadest near the tip, then less acuminate, and winged nearly or quite down to the insertion on the rhizome. The sori are spreading, and imbricate when in full fruit, and may reach nearly to the margin.

Jongmans.

Chamberlain, C. J., *Stangeria paradoxa.* (Botan. Gazette. LXI. p. 353—372. Pl. XXIV—XXVI. 1 Fig. 1916.)

This paper, which is, like several earlier papers on cycads, largely descriptive, contains some field observations on the occurrence of *Stangeria* and the description of the structure and development of the sporangia, and the gametophytes, and observations on fertilization and the embryogeny. The results are summarized as follows.

Stangeria is probably monotypic, with *S. paradoxa* as its single polymorphic species.

At fertilization there is a pairing of chromosomes resembling the pairing in the heterotypic mitosis, so that the number during the metaphase of the first division is apparently haploid, although really diploid.

There are two free nuclear periods in the embryogeny, the first comprising 9 or 10 simultaneous mitoses and extending throughout the proembryo, and the second with only 2 or 3 mitoses and confined to the lower part of the proembryo. The embryo and suspensor are formed from the second series.

There is an evanescent segmentation of the entire egg, as in *Dioon.*

The young embryo is very narrow and its haustorial structures are more conspicuous than in any other cycad yet described.

Polarity, which may appear even at the beginning of embryogeny, becomes more and more marked as development proceeds.

Jongmans.

Chase, A., The structure of the spikelet of *Aphanelytrum.* (Bot. Gazette. LXI. p. 340—343. 1 Fig. 1916.)

The genus *Aphanelytrum* was placed by Hackel as a subgenus to *Brachyelytrum.* New collections of the single species, *A. procumbens,* proved that this opinion is not right but that the genus belongs to the tribe *Festucaceae.* A new description of the genus is given at the end of the paper. Jongmans.

Gagnepain, F., *Combretum* et *Terminalia*: leurs caractères distinctifs. (Notulae systematicae. III. 9. p. 281—283. 1916.)

Les deux genres *Combretum* et *Terminalia* sont très voisins. Le caractère différentiel que les *Combretum* sont pétalés et les *Termi-*

nalia apétales n'est pas satisfaisant, parcequ'il y a quelques *Combretum* absolument dépourvus de pétales. L'auteur trouve un autre caractère dans les poils scutellés des *Combretum*. Les *Combretum* apétales sont toujours pourvus de poils scutellés, tandisque les *Terminalia* n'en possèdent pas. Jongmans.

Gagnepain, F., Deux nouveaux *Anogeissus*. (Notulae systematicae. III. 9. p. 280, 281. 1916.)

Anogeissus Pierrei n. sp., Cochinchine (Pierre 929, Thorel 668), paraît voisin de l'*A. phillyreaefolia* Heurck et Muell. Arg., et en diffère par sa grande taille qui en fait un bel arbre, par ses feuilles aiguës et par ses fruits 2 fois plus larges au moins. *A. tonkinensis* n. sp., Tonkin (Balansa 2394), espèce bien distincte des *A. acuminata* et *Pierrei* par ses feuilles plutôt opposées qu'alternes, par la direction réfléchie de ses fruits inférieurs, par leur glabréité, par la forme suborbiculaire du fruit et de sa partie centrale fertile.
Jongmans.

Gagnepain, F., Quelques *Saxifragacées* nouvelles. (Notulae systematicae. III. 7. p. 222—223. 1916.)

Itea Thorelii n. sp. (Tonkin, Balansa 3152; Laos, Thorel 3474). Cette espèce diffère de l'*I. riparia* Coll. et Hemsl. par les feuilles plus étroites d'un tiers ou même de moitié; par les inflorescences deux fois plus courtes, unilatérales, sessiles; par les fleurs un tiers plus courtes et étroites; par les étamines atteignant à peine le sommet des pétales ou la moitié du stigmate; par les anthères jamais sagittées même sur le sec et par le stigmate atteignant à peine la moitié de la hauteur des pétales.

Polyosma cambodiana n. sp. (Cambodge, Pierre 612). Cette espèce ressemble au *P. integrifolia* Bl., mais en diffère par la taille très réduite, par les pedicelles plus longs et par les fruits globuleux. Il peut être comparé aussi au *P. philippensis* Merrill. Jongmans.

Gagnepain, F., Un genre méconnu: *Aphyllodium*. (Notulae systematicae. III. 9. p. 251—255. 1911.)

L'*Aphyllodium biarticulatum* a été appelé *Hedysarum biarticulatum* par Linné. De Candolle en fait une section *Aphyllodium* du genre *Dicerma*. F. Mueller le fit passer dans le genre *Desmodium*. Bentham, Baker, Schindler etc. ont suivi cet exemple. Pourtant l'espèce en est très différente. Il y en a 4 différences entre cette espèce et les *Desmodium*: stipules opposées aux feuilles, uniques, trifides; feuilles palmées et, non pennées, sans stipelles; bractées stipuliformes et non foliacées; style articulé au-dessous du milieu. Il y a là des différences d'ordre générique, la dernière surtout, et l'auteur est d'opinion qu'il faut en faire un genre autonome et réétablit le genre *Aphyllodium* avec une espèce unique l'*A. biarticulatum* L. Jongmans.

Gagnepain, F., Un *Kalanchoe* nouveau d'Indo-Chine. (Notulae systematicae. III. p. 275, 276. 1916.)

Kalanchoe Chevalieri sp. nov. (A. Chevalier 30537), se distingue du *K. brachycalyx,* qui comme la nouvelle espèce ne présente pas

d'articulation au style, par les fleurs ni velues, ni glanduleuses, par les styles, à proportion plus longs, par les sépales non soudées au tiers inférieur. Jongmans.

Griffiths, D., Additional species of *Opuntia.* (Bull. Torrey Bot. Club. XLIII. p. 523—531. Pl. 30. 1916.)

Opuntia columbiana (Pasco, Washington), spines and body of the plant vary greatly in color, *O. cucumiformis* (received from european collections as *O. ciribe* Engelm.) but it has little relation to that species. *O. calantha,* received from European collections as *O. microdisca* Weber, but differs from that plant in almost every diagnostic character. *O. longiclada* (Pl. 30), from european collections. *O. platynoda,* from european collections. *O. microcarpa* Engelm., new description, it has been named by Engelmann from Stanley's figures and has now the first time been recognized (Solomonville, Arizona, etc.). *O. crystalenia* (Cardenas, Mexico) common upon the Mexican highlands and often cultivated. *O. ithypetala,* received from Berlin as *O. Hanburyana* O. Weber, it is more closely related to *O. Schumanni* O. Weber, it does not agree with *O. Hanburyana* in any particular. *O. rubiflora,* from european collections as an unpublished variety of *O. camanchica* Engelm. et Bigel; it is, however, a good species. *O. megalantha,* received from Berlin as *O. Bergeriana* A. Weber. The character of the flowers excludes it from this species. It differs also in general habit, nature of spination and form and character of joints. Jongmans.

Long, W. H., Five undescribed species of *Ravenelia.* (Botan. Gazette. LXI. p. 417—424. 1916.)

Ravenelia roemerianae, on *Acacia roemeriana,* Texas, closely related to *R. versatilis*; *R. morongiae,* on *Morongia uncinata,* Texas; *R. thornberiana,* on *Acacia constricta paucispina,* resembling *R. versatilis* by the urediniospores having two rows of germ pores, but distinguished by the fact that the two rows of germ pores are equidistant from the equator of the spore; *R. reticulatae,* on *Calliandra reticulata,* Arizona, closely related to *R. texensis,* but differs from this species in having an entirely different host and in having smaller and thinner-walled urediniospores, while practically all of its telial characters are different; *R. annulata,* on *Lysiloma latisiliqua,* Florida, closely related to *R. lysilomae,* but differs from this species in its smaller and differently shaped sori, in its acuminate urediniospores with hyaline cylindrical bases and 6 germ pores, and in its smaller and very irregularly-shaped teliospore heads with only about one-half as many spores to each head as *R. lysilomae.* Jongmans.

Personalnachricht.

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