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brane. Massart, on the protoplasm of the Schizophytes, concludes that the central body, even when it occurs, is not the homologue of a nucleus; nor is the "couche corticale" the homologue of a plastid. He regards the Schizophyceae as derived from the bacteria, but the group as a whole as nowise related to any other organisms. In his last paper, Massart introduces a deluge of new terms sufficient alone to form a supplement to any up-to-date dictionary. The analysis of the subject is clear, and in large part logically carried through; and a clean-cut vocabulary is prerequisite to clean-cut thinking, still more to lucid expression. Codifying such a terminology is an unqualified service to those who use it, as Czapek's forerunner has well proven, but every uninitiate will want to go armed with a "Nomenclator Massartianus" before "geanisopachynosis," "tonesagolic," "cathaptotropic," and the scores more like them become familiar terms.—E. B. COPELAND.

NOTES FOR STUDENTS.

NINE SPECIES of the Corallinae (verae) from Port Renfrew are described and figured by K. Yendo.¹⁸ Three of these are new species, viz., *Cheilosporum MacMillani*, *Corallina vancouveriensis*, and *Corallina aculeata*.—B. M. DAVIS.

THE NEW *Oscillatoria beggiatoides* is a colorless sulphur-bearing organism described by Arzichowsky,¹⁹ and considered by him as a transition between *Oscillatoria* and *Beggiatoa*. The sulphur grains are very small and lie close to the cell wall. The account of this interesting form is to be found among the descriptions of several species of *Beggiatoa*. It deserves better treatment in a language and a journal that will reach more botanists. The paper is written in Russian, with a very short and unsatisfactory résumé in German.—B. M. DAVIS.

PTERYGOPHORA CALIFORNICA is described and figured by MacMillan,²⁰ who presents some interesting observations on its anatomy and development. *Pterygophora* is a surge plant growing below the zone of *Lessonia* and above that of *Nereocystis*. The general morphology is closest to *Alaria*, but the distribution of the sori found in the lateral pinnae, together with the "disposition of cuticular caps in the paraphyses," suggest *Lessonia*. Some of the plants are very large, being ten feet long with stalks three inches in diameter.

¹⁸ YENDO, K., Corallinae verae of Port Renfrew. Minn. Bot. Studies II. 6: 711-722. pls. 51-56. 1902.

¹⁹ ARZICHOWSKY, W., Zur morphologie und systematik der *Beggiatoa* Trev. Bull. Jard. Imp. Bot. 2: 45-46. pl. 1. 1902.

²⁰ MACMILLAN, CONWAY, Observations on *Pterygophora*. Minn. Bot. Studies II. 6: 723-741. pls. -62. 1902.

The latter show rings of growth. The young plants have a single blade, as is true of all kelps, the lateral pinnae developing as outgrowths from the stipe below the blade in a manner similar to *Alaria*.— B. M. DAVIS.

HABITUAL POLYEMBRYONY has been observed by Hegelmaier²¹ in *Euphorbia dulcis* Jacq. In about two-thirds of the half ripe seeds there is more than one embryo, the number ranging from two to nine. In the ripe seed the number is smaller, usually two or three, and one of these considerably larger than the others. The embryo which develops from the egg is the only one which has a suspensor, and is also the one which becomes the largest embryo in the ripe seed. Of the other embryos, some come from synergids and some from cells of the nucellus. A large per cent. of the polyembryonic seeds are not capable of germinating on account of the disorganization of the embryo.— CHARLES J. CHAMBERLAIN.

THE TIMOTHY RUST, which has generally been referred to *Puccinia graminis* Pers., was set apart by Eriksson as the result of cultures in 1891-93, under the name *Puccinia Phlei-pratensis* E. & H. In a recent article²² the work of this period is critically examined, and many additional cultures, made during 1894-1900, are reported. The conclusion is reached that the species is autonomous, that it occurs on *Phleum pratense* and *Festuca elatior*, and that it may be transferred sparingly by cultures to *Phleum Michelii*, *Avena sativa*, and *Secale cereale*, but not to *Phleum asperum*, and other grasses. Neither will it infect the barberry, and it appears to have lost the power to form aecidia. It is doubtful if this species occurs in America. It has been reported under the name *P. graminis* once upon *Festuca elatior* (Vermont, 1898), but examination of the original material reveals an error; and once upon *Phleum pratense* (Wisconsin, 1884), which has not been re-examined.—J. C. ARTHUR.

HASSENKAMP²³ describes the development of the cystocarp in two red algae, *Thuretella Shousboei* and *Chylocladia kaliformis*, and his results support Oltmanns' theory of the relation which the auxiliary cells bear to the fertilized carpogonium. He finds that when the carpogonium fuses with an auxiliary cell, the respective nuclei remain quite apart, so that the union concerns the cytoplasm alone. The sporogenous nuclei (sporophytic) are then active in developing the fertile portions of the cystocarp with the spores.

²¹ HEGELMAIER, F., Ueber einen neuen Fall von habitueller Polyembryonie. Ber. Deutsch. Bot. Gesells. 19: 488-499. 1901.

²² ERIKSSON, JAKOB, Ist der Timotheengrasrost eine selbständige Rostart oder nicht? Öfv. K. Vet.-Akad. Förh. 1902: 189-198.

²³ HASSENKAMP, A., Ueber die Entwicklung der Cystocarprien bei einigen Florideen. Bot. Zeit. 60: 65-86. pl. 2. figs. 12. 1902.

The results for Chylocladia are especially interesting, since they flatly contradict the conclusions of Hauptfleisch (Flora 75: 306. 1892). The latter described a number of secondary cell and nuclear unions following the sexual act and resulting in a large fusion cell. Hassenkamp seems to have overlooked a paper of mine (BOT. GAZ. 21: 109. 1896) which showed that Hauptfleisch's results for Champia, a genus closely related to Chylocladia, were incorrect. This omission is the more conspicuous since Oltmanns (Bot. Zeit. 56: 128. 1898) tried to smooth over the grave errors of Hauptfleisch by assuming that we were not dealing with the same form. Champia probably presents the same conditions as Chylocladia, as may be judged by comparing my figures with Hassenkamp's.— B. M. DAVIS.

KOHL²⁴ describes an accurate method of measuring the expansion and contraction of pith cylinders, etc., when placed in solutions of different concentrations. The object to be studied is fastened upright by its base in a suitable chamber provided with entrance and exit tubes for the application and changing of plasmolyzing solutions. To the upper end of the object is attached a thread which travels over two small pulleys at the same height and some distance apart. It is sufficiently weighted at its other end to remain taut, and bears a pointer between the pulleys. This pointer traverses a fixed horizontal scale which furnishes a means of measurement.

In the same paper is described a new form of self-registering auxanometer which the author designates as *photographic*. A revolving cylinder, covered with a sensitized collodion film, is enclosed in a dark box, in one of whose sides is a vertical strip of metal provided with an opening of 1^{mm} diameter. This strip is long enough to allow vertical movement without admitting light excepting through the opening. A minute incandescent lamp is fixed to the strip in such a manner that the rays from the lamp traverse the opening at right angles to the strip, and impinge upon the revolving film within the box. By means of a filament passing over a wheel the sliding strip may be fixed to any object whose upward movement is to be studied. As this rises the beam of light moves downward over the film, which, of course, will need to be developed in the usual way to bring out the record.— B. E. LIVINGSTON.

EDWARD C. JEFFREY²⁵ has published a paper entitled "The structure and development of the stem in the Pteridophyta and Gymnosperms." The author reaches the following morphological conclusions: There are two types of cauline central cylinder, protostelic and siphonostelic; the protostelic central cylinder is more primitive, and in its single concentric vascular strand no medulla is present; the siphonostelic central cylinder is tubular,

²⁴KOHL, F. G., Ein neuer Apparat zur Demonstration von Wachstums und Plasmolyse-Erscheinungen. Ein photographisches Auxanometer. Ber. Deut. Bot. Gesells. 20: 208-212. 1902.

²⁵Phil. Trans. Roy. Soc. London B. 195: 119-146. *pls.* 1-6. 1902.

has a medulla derived from the fundamental tissue, and is characterized by the presence of foliar and ramular lacunae, or by ramular lacunae only; the siphonostelic central cylinder sometimes ceases to be obviously tubular in the adult, and in such cases may be termed adelosiphonic; the siphonostelic central cylinder is primitively concentric, but in the Angiosperms, Gymnosperms, Osmundaceae, etc., has become collateral by reduction; the pith is to be regarded as an inclosed portion of the fundamental tissue. The phylogenetic features of the results are as follows: There are two phylogenetic types of tubular central cylinder, viz., that in which only ramular gaps are present, and that in which both ramular and foliar gaps occur, the former termed cladosiphonic, and the latter phyllosiphonic; the use of these constant and characteristic anatomical features results in the division of the Vasculares into two great primitive stocks—the Lycopsida, which are cladosiphonic and palingenetically microphyllous, and the Pteropsida, which are phyllosiphonic and palingenetically megaphyllous; the former including the Lycopodiales and the Equisetales, the latter the Filicales, Gymnosperms, and Angiosperms.—J. M. C.

ITEMS OF TAXONOMIC INTEREST are as follows: ALICE EASTWOOD (Proc. Calif. Acad. Sci. III. Bot. 2: 285–293. 1902) has described new species of *Streptanthus*, *Polygonum*, *Eriogonum*, *Garrya*, *Convolvulus*, *Castilleja* (3), *Mimulus*, *Phacelia*, *Gilia*, *Cryptanthe*, *Aster*, and *Madia*, all from the Sierra Nevada mountains of California.—W. A. KELLERMAN (Jour. Mycol. 8: 50–51. *pl. 1*. 1902) has published a new species of *Rhytisma* on *Ilex*.—J. C. ARTHUR (*idem* 51–56) has published 3 new species of *Puccinia*.—ELLIS and EVERHART (*idem* 62–73) have published 59 new species of fungi from the vicinity of Tuskegee, Alabama.—P. HENNINGS (*Hedwigia* 41: 104–118. 1902), in his first paper on Putteman's collection of fungi from São Paulo, has described as new genera *Puttemansia* (Pezizaceae), *Pseudomelasmia* (Leptostromataceae), and *Tetracrium* (Mucedinaceae); and from the Javanese collection of Zimmermann the same author (*idem* 142) has described a new genus (*Zimmermanniella*) of Dothideaceae.—J. B. S. NORTON (Trans. Acad. Sci. St. Louis 12: 35–41. *pls.* 5–8. 1902) has published new species of *Cyperus*, *Argemone*, and *Brauneria* from the southwestern U. S.—T. MAKINO (Bot. Mag. Tokyo 16: 119. 1902) has published a new genus (*Semiaquilegia*) of Ranunculaceae from Japan, said to be intermediate between *Aquilegia* and *Isopyrum*, and founded on *Isopyrum adoxoides*.—J. MATSUMURA (Jour. Coll. Sci. Tokyo 16: pt. 2. *pls.* 4. 1902), in his revision of the Japanese species of *Alnus*, has described 3 new species.—K. YENDO (*idem pls.* 7), in a revision of the “*Corallinae verae*” of Japan, has described 20 new species.—ELMER D. MERRILL (*Rhodora* 4: 142–147. 1902), in “Notes on N. Am. grasses,” has described new species of *Panicularia*, *Poa*, *Bromus*, and *Elymus*.—J. M. C.

INTERCELLULAR KARYOGAMY is the term applied to that condition in the basidiomycetes by which the nuclei are associated in pairs throughout long periods of vegetative activity, but finally fuse in the basidium or teleutospore at the end of the vegetative phase in the life history. The fusion is believed by a number of investigators to be a sexual act, and the association of the nuclei in pairs for so long a time is considered an extension of the period when the gamete nuclei were really differentiated. There are several accounts of the fusion of nuclei in the basidium, several botanists claiming that only two nuclei enter this structure and fuse, while others (Wager and Rosen) have reported as many as three, four, six, and eight concerned with this phenomenon. Ruhland²⁶ in a recent paper throws the weight of his studies upon several of the hymenomycetes in favor of the predominance and possible universality of two primary nuclei entering the basidium and there uniting to form the secondary basidium nucleus, which later divides just previous to spore formation. His conclusions thus accord with the recent paper of Harper (*BOT. GAZ.* 33 : 1. 1902). We do not yet know when the paired condition of the nuclei arises in the life history of any basidiomycete, and this is a very important period, for events may occur at that time which make these nuclei physiologically gametes. However, it is much to know that these pairs of nuclei lie in a definite path of development which ends with their final fusion in the teleutospore and basidium. The more thoroughly we understand these processes in the basidiomycetes the sharper appears the distinction between them and nuclear fusions in the ascus. The two events have no morphological relation to one another. That in the ascus is certainly not concerned with gamete nuclei, whatever may be its physiological significance.— B. M. DAVIS.

²⁶RUHLAND, W., Zur Kenntniss der intracellularen Karyogamie bei den Basidiomyceten. *Bot. Zeit.* 59 : 487-206. *pl.* 7. 1901.