versity of California. Although this paper deals primarily with taxonomic entomology, it contains many good records of American cecidia.—MEL. T. COOK.

Cytology of the Uredineae.—FROMME[17] described the processes taking place in the formation of spores of the flax rust, *Melampsora Lini* (Pers.) Desm., thereby adding another rust to those whose life histories are fully known. Interest in these forms centers largely in the aecidium. The sequence of events here is essentially like that occurring in aecidia of the *Caeoma* type, and differs only in the formation of two sterile cells above each gamete instead of one. The gametes fuse laterally in pairs, but occasionally irregularities apparently occur, since basal cells with three or more nuclei are found; however, the mode of origin of these cells was not observed. The spermatiophores also differ from the usual form. They are divided into a number of cells, from each of which a branch bearing a spermatium arises. The spermagonia and aecidia are closely associated and mature at the same time. The formation of the uredospores and teleutospores offers nothing noteworthy.

In a preliminary paper, KUNKEL[18] gave an account of the highly interesting discovery that the widely distributed blackberry rust (*Caeoma nitens*), which as a result of infection experiments reported by TRANZSCHEL and by CLINTON has been regarded as the aecidial form of *Puccinia Peckiana*, is in reality a rust of the *Endophyllum* type. This conclusion was based upon the observation that the aecidiospores of this fungus on germination produce promycelia and sporidia instead of germ tubes. The nuclear phenomena occurring in the germinating aecidiospores are described in a later paper. The processes agree in all essentials with those in the germinating aecidiospore of *Endophyllum*. At maturity the aecidiospore contains two nuclei; these fuse just before germination begins, so that the germinating aecidiospore is uninucleate. The fusion nucleus usually passes into the germ tube, where two divisions take place. Occasionally the first division occurs in the spore, as also reported by HOFFMAN[19] for *Endophyllum Sempervivi*. Five cells are formed in the promycelium; the basal one, which is continuous with the spore cavity, contains very little protoplasm and no nucleus. Sporidia arise from the other cells in the usual way. At the time of germination the sporidia are generally binucleate as a result of a division of the original nucleus. These facts, as well as some negative results of infection experiments on blackberry leaves reported by the author, leave no doubt that the orange rust of the blackberry is an independent fungus of the type of *Endophyllum*, and not, as hitherto supposed, the aecidial generation of

[17] FROMME, F. D., Sexual fusions and spore development of the flax rust. Bull. Torr. Bot. Club **39**:113–129. *pls. 2.* 1912.

[18] KUNKEL, L. O., The production of promycelium by the aecidiospores of *Caeoma nitens* Burrill. Bull. Torr. Bot. Club **40**:361–366. *fig. 1.* 1913.

———, Nuclear behavior in the promycelium of *Caeoma nitens* Burrill and *Puccinia Peckiana* Howe. Am. Jour. Bot. **1**:37–47. *pl. 1.* 1914.

[19] Rev. BOT. GAZ. **54**:437. 1912.

Puccinia Peckiana. The wonder is that the true nature of this exceedingly common fungus has remained so long unknown.

Although the cell rows forming the peridial wall in the aecidia of rusts are usually considered to be homologous with the spore chains, it is generally believed that the intercalary cells characteristic of the spore chains are not produced in the peridium. This belief is shown to be erroneous by KURSSANOW,[20] who has investigated the development of the aecidia of a number of rusts belonging to different types, and finds that a complete homology exists between the spore chains and the cell rows of the peridium. The basal cells of the peridium give rise to a series of cells each of which divides, cutting off a small cell in the lower outer corner. These small cells, which correspond to the intercalary cells, thus lie toward the outside of the rows of cells forming the peridial wall. By the growth of the peridial cells they are crowded still farther outward. Their walls soon become gelatinous and their structure is entirely obliterated, so that they are not recognizable in any but the youngest parts of the aecidium. This fate undoubtedly accounts for their remaining long unobserved. The basal cells of the peridial rows, as well as the peridial cells themselves and the "intercalary" cells, are binucleate, like the basal cells of the spore chains, in all cases except in a form of *Aecidium punctatum* Pers. (*Puccinia Pruni-spinosae* Pers.), which had uninucleate basal cells, giving rise to uninucleate aecidiospores and peridial cells. This form resembles in this respect the aecidium with uninucleate cells which was described by MOREAU[21] on *Euphorbia silvatica*. This form, which was the first aecidium having uninucleate cells discovered, has uninucleate basal cells also.—H. HASSELBRING.

Resistance of mosses to drought and cold.—It has long been known that many mosses are able to survive long periods of extreme drought, although much of this knowledge has been based upon inexact and insufficient data. It is a matter of much satisfaction, therefore, to have their resistance proved by the exact and extensive results of IRMSCHER[22] based upon careful experiments with a large range of species. He finds resistance to drying related in a remarkable degree to the ordinary habitat of the species, but often surprisingly great even for aquatic and mesophytic forms. Thus, while the leaves of some species of *Fontinalis* succumbed to a week's air-drying or to five days in a desiccator, *Philonotis fontana* and three species of *Hypnum* died only after 15–20 weeks in dry air or 10–18 weeks in the desiccator. The mesophytic species from deciduous forests, like *Barbula subulata*, *Bryum alpinum*, *Mnium*

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[20] KURSSANOW, L., Über die Peridienentwicklung im Aecidium. Ber. Deutsch. Bot. Gesells. **32**:317–327. *pl. 1.* 1914.

[21] MOREAU, Mrs. F., Sur l'existence d'une forme écidienne uninucléeé. Bull. Soc. Mycol. France **27**:489–492. *fig. 1.* 1911.

[22] IRMSCHER, E., Über die resistenz der Laubmoose gegen Austrocknung und Kält. Jahrb. Wiss. Bot. **50**:387–449. 1912.