sults of the two methods the presence of *P. campestris* is shown on the seeds of all four of the seed plants examined.

Full details of these studies will soon appear in Bulletin No. 251 of the New York Agricultural Experiment Station.

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Geneva, N. Y.

A NOTABLE PALEOBOTANICAL DISCOVERY.

The term Cycadofilices proposed by Potonié for the group of synthetic genera, which in Paleozoic times were abundant and widely distributed, and which so curiously combine filicinean and cycadean anatomical characters with foliar organs entirely fernlike in form, seems likely to become a permanent acquisition to taxonomy; although some students, following so eminent an authority as Zeiller, still regard the Cycadofilicales as merely a specialized group of ferns.

The announcement a few months ago* by Professors Oliver and Scott that the gymnospermous seeds named by Williamson *Lagenostoma,* were borne by a species of *Lyginodendron* is most interesting. This identification is based on the identity of the capitate, often stalked, glands, which clothe the enclosing envelope, with those clothing the vegetative organs of *Lyginodendron Oldhamium.* These glands show the closest possible agreement in size, form and structure, and no other known Carboniferous plant possesses them. In addition, the vascular system of the enclosing cupule was well developed, the structure of the large bundle agreeing with the petiolar strand in *Lyginodendron;* and the minute characters in the former are in close agreement with those of the xylem of the foliar organs of the latter, so that the evidence presented is fairly conclusive.

Now *Lyginodendron* with a number of species under a variety of names ranges from the lower Carboniferous into the Permian. The calcified remains, often beautifully preserved and including roots (*Kaloxylon*), stems (*Lyginodendron*) and leaves (*Sphenopteris*) have been associated with the carbonaceous impressions of large finely divided fronds of the *Sphenopteris* type.

The minute structure of these parts is as well known as in living forms, as are the corresponding structures in *Heterangium,* another genus, considered in a general way ancestral to *Lyginodendron* and exhibiting a balance of filicinean characters; while in the latter, though many filicinean characters remain, the cycadean features are more pronounced, the primary bundles are isolated and arranged around a large pith, the vascular bundles both primary and secondary are similar to those of the peduncles in living cycads, and the roots, while agreeing with those of the Marattiaceæ when young, after their secondary thickening are entirely gymnospermous.

The fructifications of this curious plant have hitherto remained unknown, although certain poorly preserved filicinean remains of the *Calymmatotheca* type have been so regarded.*

The structure of the seed as now set forth furnishes a preponderance of gymnospermous features, at the same time emphasizing the combination of transitional characters which distinguish the Cycadofilicales, and furnishes good ground for supposing that many of the plants which furnished the elegant fronds of *Alethopteris, Neuropteris,*† *Sphenopteris,* etc., had already advanced in seed, bearing as far as, if not farther than, the modern Cycads.

The seed under consideration, as does the similar one of *Lagenostoma ovoides,* approaches the cycadean type in that the integument and nucellus are distinct in the apical region only, where the former becomes massive and complicated, consisting of nine chambers radiating from the micropyle. The free portion of the nucellus tapers upward reaching the exterior and plugging the micropylar opening; the separation of the nucellar epidermis from the underlying parenchymatous body of the free part of the nucellus forms a bell-shaped

* Read before the Royal Society, May 7, 1903, and reprinted from the *Proceedings.*

* Described by Benson (Ann. Bot. **18**: 161–177, pl. 11, 1904) and regarded as the microsporangial sori of Lyginodendron.

† In a recent note Professor Oliver (New Phytologist, **4**: 32, 1904) records seeds on the fronds of Neuropteris heterophylla.

pollen chamber, open apically and containing pollen grains in its lower part. The vascular system of the seed consists of nine bundles radiating from a single supply bundle and running to the apex.

It furnishes something more than suggestive evidence of the origin of the Mesozoic Bennettitales and Cycadales, on the one hand, and the Paleozoic Cordaitales and other and later gymnospermous orders on the other hand, from some type of Paleozoic Cycadofilicales, the latter leading back to the true Filicales as recently diagrammatically set forth by Coulter.*

Professor Seward† has styled this discovery of Oliver and Scott as 'one of the most important contributions to botany published in recent years.' The full details, which are promised soon, will be awaited with impatience.‡

EDWARD W. BERRY.

CURRENT NOTES ON METEOROLOGY.

ANTARCTIC METEOROLOGY.

A RECENT number of the *Bulletin of the American Geographical Society* (Vol. XXXVI., 1904, 22–29) contains an account of Dr. Otto Nordenskjöld's Swedish Antarctic expedition of 1902–03, in which are numerous notes of meteorological interest. During five months, beginning with May, there was a period of storms with short intermissions never exceeding three days, during the whole of which period the average wind velocity was 23 miles an hour, and during a whole fortnight it averaged 45 miles. The gales from the southwest brought the lowest temperature recorded. The stormiest day, in June, with a mean wind velocity of 63 miles an hour, was one of the coldest experienced (— 24° F.). The mean temperature for the first year was about 10.2° F.; that of the summer being 28.2° F. The general direction of the winds was southwest, *i. e.*, out from the south polar region.

VERTICAL DECREASE OF TEMPERATURE IN THE FREE AIR.

AT the February meeting of the Royal Meteorological Society in London, Mr. W. H. Dines read a paper on 'Observations by Means of Kites at Crinan in the Summer of 1903,' this being a continuation of the work done in the previous summer, already referred to in these columns. The results of the ascents during August, 1903, show a mean temperature gradient for the first 5,000 ft. of 3.2° per 1,000 feet. This is at the rate of about .59° C. per 100 meters. In the previous summer the average rate per 100 meters was found to vary from .56° C. per 100 meters in a column of 500 meters to .43° C. at 3,500 meters. The averages thus accord quite closely with those given in Hann's 'Lehrbuch der Meteorologie,' pp. 157–161.

THE SAHARA AND THE SOUDAN.

ACCORDING to Sir Frederic Lugard, High Commissioner for Northern Nigeria, the sands of the Sahara are gradually encroaching on the districts of the Sudan which border the desert on the south. Sir Frederic is of the opinion that the desiccation of the country is chiefly caused by the destruction of the young acacias and tamarinds, which are cut down by the natives, and given to the camels for fodder.

MONTHLY WEATHER REVIEW.

THE *Monthly Weather Review* has recently contained an unusual number of articles of general interest. Vol. XXXII., No. 1, 1904, contains an account of the tornado of January 22, at Moundville, Ala. This tornado was first noted about 1.20 A.M., the previous evening having been warm, with fairly heavy rains at intervals, and the wind blowing in heavy gusts from southeast and south. At Moundville nearly every building was demolished, and thirty-six persons were killed and eighty injured, out of a total population of about 300. The storm moved northeast; the

* 'Morphology of the Spermatophytes,' p. 172, 1901.

† Presidential Address, Botanical Section, British Association for the Advancement of Science, Southport, 1903.

‡ These were read before the Royal Society, January 21, 1904, and a new class of seed-plants, the Pteridospermæ, was proposed to include these and similar remains.