NOTES.

NOTE ON OPHIOGLOSSUM SIMPLEX, RIDLEY.—In the ANNALS OF BOTANY, vol. xviii, p. 205, I described from a single specimen, received through Prof. Groom from Mr. Ridley, the details of this Sumatran species. It differs from other Ophioglossaceae in the apparent absence of the sterile lamina, while the fertile spike is well developed. It was concluded, however, partly from the examination of the plant itself, partly from comparison, that the absence was not primitive, but the result of abortion. The species was referred to § *Ophioderma*, a section of the genus the species of which form a natural group anatomically distinct. Its three representatives were held to illustrate phases of decrease of the sterile lamina, from *O. pendulum*, where it is large, through *O. intermedium*, where it is small, to *O. simplex*, where the extreme condition is seen. This state may be attributed to the presence of mycorhiza, which makes nutrition of the large spike still possible in the dense wet forest in which it grows, notwithstanding that the usual assimilating organ is functionally non-existent. Campbell, however (Mosses and Ferns, second edition, p. 258), considers that *O. simplex* is not a reduced, but a primitive, form, and, in fact, 'the most primitive type of the genus yet discovered.'

Any further facts relating to so rare, and at the same time so debatable, a form, will have their interest. It was then a pleasure to hear from Prof. E. Rosenstock, of Gotha, that the plant had been again collected in Sumatra, in dense forest, on the Lalah river (Indragiri, West Coast). He was kind enough to send the specimens for examination, and consents to this note being published.

The specimens were evidently referable to *O. simplex* Ridley, but instead of the sterile leaf being entirely absent, as it appeared to be in Ridley's specimen which I examined, several of the elongated spikes bore, at a short distance below the fertile region, a more or less pronounced outgrowth, evidently representing a sterile lamina, while below that point there was a slightly increased width of the stalk. In dried specimens of such succulent organisms it is difficult to be certain of the natural form: there is, however, little room for doubt that Dr. Rosenstock's specimens were very like the plant figured by Sir William Hooker as *O. intermedium*, but with the sterile lamina very much smaller.

The fact that the minute sterile lamina thus exists in some, though perhaps not in all, specimens of *O. simplex* gives justification for the reduction hypothesis which I previously advanced, and links the species closer with *O. intermedium* and *O. pendulum*. In his latest contribution to the morphology of the Ophioglossaceae which deals with certain of their embryos (Ann. Jard. Bot. Buit., 1907) Professor Campbell has held as the most primitive forms of the genus those which diverge most widely from the type usual in other Pteridophytes. In holding *O. simplex* to be primitive he appears to take the same view in respect of a mature plant. It appears to me, however, to be a more probable view to hold those forms which are least divergent, such as the type of *O. vulgatum*, to be relatively primitive, while the three species of § *Ophioderma*

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show varying degrees of specialization, for which the mycorhizic habit and the habitat give a reasonable explanation. Moreover, the anatomical fact that the leaf-trace in *O. pendulum* and *O. simplex* is composed of several strands at the base in place of one (l. c., p. 21) supports the opinion that they are not primitive types of the genus. Lastly, the fact that the vestigial lamina is clearly seen in some of Prof. Rosenstock's specimens would be less easily harmonized with the view of *O. simplex* as a primitive form than it would with the theory of reduction above expressed.

F. O. BOWER.

GLASGOW, *February*, 1908.

PRELIMINARY NOTE ON NUCLEAR DIVISION IN MNIUM HORNUM.—Nuclear division in the Mosses has up to the present time received but little attention. Beer[1] found four chromosomes in the dividing spore-mother-cells of *Funaria hygrometrica*, but stated later[2] that the number in this plant and in several other species, including *Mnium hornum*, was far greater. He also refers to the compound nucleoli in the spermatogenic cells of *Atrichum undulatum*.

The premeiotic divisions have been studied in the developing archesporium of *Mnium hornum*. The resting nucleus is made up of a fine homogeneous network and a single large centrally placed nucleolus. The latter contains almost the whole of the chromatin and by its persistence dominates the early stages of the division. At its first appearance the spireme consists of broad band-like masses of chromatin which are found especially at the periphery of the nucleus; by the further contraction of the chromatin a thin, thread-like spireme is formed. At this stage the nucleolus stains much less deeply, loses its sharp outline, and, a little later, breaks up and disappears. Twelve chromosomes are formed by the breaking up of the spireme, and these become arranged on the equator of the spindle showing the slender, hook-like form characteristic of the somatic divisions. The diaster originates in the usual manner by the splitting of the chromosomes, and during the anaphase and telophase the latter pass through changes resembling those described in the prophase.

A short period of rest elapses after the final division of the archesporial cells. The resting nucleus of the spore mother-cells shows the characteristic nucleolus and a somewhat coarser reticulum than that of the premeiotic cells. The closely coiled spireme arises by an increase of the chromatin in the nuclear reticulum. Contraction of the thread then takes place and results in a definite synapsis. On emerging, the thread thickens at the expense of the nucleolus which gradually disappears. The spireme divides up into six chromosomes which show the O- and the irregular X-forms characteristic of the reduction division. After separation the chromosomes pass outwards to form the daughter-nuclei. These do not enter into a completely resting condition, but quickly undergo the homotype division. This resembles the premeiotic divisions in its chief features. A full description of the divisions with figures will shortly be published.

M. WILSON.

ROYAL COLLEGE OF SCIENCE, S. KENSINGTON.

[1] New Phytologist, vol. ii, 1903, p. 166.

[2] On the Development of the Spores of *Riccia glauca*. Annals of Botany, vol. xx, 1906, p. 278, footnote.

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