MOSSES OF TASMANIA *(continued)*, TRIBE 2, WEISSIÆ.

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It will be understood from the previous papers that the Andreæaceæ and the Sphagnaceæ are so far removed from other mosses as to each form separate sub-orders, the remaining sub-order Bryaceæ containing two Sections, which are again divided into Tribes. Tribe 1, of this sub-order, containing Phascæ and Bruchia, has already been described, and we now notice Tribe 2.

The Weissiæ are a low and tufty growing tribe, with narrow leaves, and are difficult subjects for the tyro to identify. The tribe includes the genera Gymnostomum, Weissia, and Symblepharis; the first of these is distinguished by the total absence of a peristome around the mouth of the capsule; the second, Weissia, bears a peristome of sixteen teeth; and the last, Symblepharis, has eight pairs of bifid teeth at the summit of the capsule. The three genera are similar in their mode of growth, generally not more than half-an-inch in height, and, when dry, the foliage curls and twists around the fruit-stalks, or anything they come in contact with; under an ordinary botanising lens they resemble a multitude of miniature rams' horns. The capsule, with its fruit-stalk, is generally yellowish-green, the rim around the mouth of the capsule being of a decided reddish colour.

The fact that these three genera of mosses are placed in one tribe (Mitten places them in the Tribe Tortulæ), and yet that one of them is gymnostomous, is in conflict with the ordinary view that split-mosses and naked-mouthed mosses are the earliest forms. The affinity of the vegetative systems of the three genera appears too close to strongly support such a view, notwithstanding the entire absence of the peristome in the genus Gymnostomum. Indeed, M. Philibert, in the *Bryological Review*, 1884,* states his belief that the earlier structure is the perfect peristome from which the others have varied by degeneration, and he would have us regard the Encalypta †(extinguisher moss) as the central point whence all the other forms of moss-plants have diverged, all those which have a

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† Since reading the above paper, I have received from Alfred J. Taylor Esq., some magnificent fruited specimens of the genus Encalypta found by him at the summit of Mount Rumney.

peristome nearly identical in structure being probably of a common origin; also, that it is difficult on any other theory to account for the almost complete identity of the peristome in *Dicranum, Fissèdens, Campylopus, Dicranella, Cynodontium, Trematodon, Dichodontium, and Leucobryum.*

That gymnostomous mosses as well as peristome-bearing mosses existed in the upper Miocene age we have abundant proof. In reply to a request for information on this subject from Baron Von Müller, whose life-long investigations in botanical science constitute him the highest authority in the Southern Hemisphere, he, with his usual courtesy, informs me "that Gæppart found one Phascum in amber; also, in amber, several species of Dicranum, as D. fuscescens, D. flaggillare, D. scoparium, and D. pellucidum; a Hymenostomum, which Schimper finds very similar to H. microstomum; two species of Polytrichum allied to P. urnigerum and P. septentrionale; and a Catherinea allied to C. undulata. Schimper has described a Fontinalis from the upper Miocene formation, and Bragniart another from that geological age. Of Hypnum, several species have been found by Herrs Ettingshauren, Unger, and Saporta in Schists; and Ludwig and Schimper discovered some Hypnums in lignite, in which also some species of Sphagnum occur." After alluding to the special works of the above-mentioned authors, I am particularly referred to Schimper's "Paleontologie Vegetate," a work we unfortunately do not possess in the Library.

It is therefore evident that gymnostomous Sphagnum and Phascum, single-peristomed Dicranum, and the perfectly-developed double-peristomed Hypnum flourished side by side comparatively in the upper Miocene age. Had no Phascum or Sphagnum been in this formation we should have been in a better mood to embrace M. Philibert's view; on the other hand, had no perfectly-developed Hypnum been there found we might have felt a little closer drawn to the old views of development from gymnostomous forms.

Had moss-plants been as large as Sigillaria pachyderma we might have known more of their history, the little we have received creates the want for more. If the perfect double-peristome is the earliest structure, from what allied form can it have varied? Does it not appear more probable that the double-peristome has been developed by slight variations, one small step at a time, through climatic influences, from the single-peristome? May not the single-peristome, in like manner, be developed from the gymnostomous plant; the gymnostomous from the splitting capsule—the latter through leafy, then frondose jungermannia, lichens, fungi, or algæ; and all from the unicellular organism; the primary organism originating from beyond the limit of present discovery?

If, for instance, in a plant of any of the species of three genera comprising the Tribe Weissiæ, after fertilisation of the archegonium, the slightest deviation in the division of the cell by septa should take place, we should most probably have a variation of greater or less significance in the fructification:* it is, therefore, astonishing to note the almost complete immutability of the Natural Law which maintains, for trillions of generations, not only the generic but also the much more minute specific characters of so small a part as is the tooth of a deristome. And if such diverse forms have really been developed from a unicellular organism how vast the intervening period must have been.

Genus 5.—Gymnostomum.

Beardless Moss.

The Greek words of which the name of this genus is composed are γυμνος (naked) and στομα (mouth), referring to the naked orifice of the capsule. According to Bridel, this plant is frequently found intermixed with Phascum and Weissia, and has an erect simply-branched stem about half-an-inch high. The capsule is seated on a high and seldom arcuate fruit-stalk; it is small, and loves to be near the habitations of mankind, growing in both barren and cultivated fields amongst grass. It is generally found in tufts, seldom growing solitary. In its fresh state it is a graceful little plant, but cannot be well observed without the aid of a lens. The essential generic characters are the naked mouth and the linear lancet-shaped leaves.

Genus 6.—Weissia.

This genus was instituted by Hedwig in memory of Weissius, Professor of Botany, Göttingen. The plants are small, tender, and slightly branched; the capsule bears a peristome of sixteen teeth. They must be looked for on moist banks or damp sandy places; they may frequently be found in crevices along with Fissedens, and sometimes on wall tops. The species of this genus present much variation in form, and will sometimes be found very similar to Gymnostomums. The light green tufts have a beautiful cushion-like appearance, hence the English name for W. contraversa — *green-cushioned Weissia.*

Genus 7.—Symblepharis.

Wilson.

This genus is so named by Mr. Wilson because the teeth of the peristome shut close in a cone when dry, the name literally meaning *adhesion of the eyelids.* Bridel names the only species of this genus collected in Tasmania Olomitrium

* Hofmeister on the higher Cryptogamia.

perichætiale; Hooker names it Trichostomum perichætiale in Musc. Exot.; and Griffiths figures it as Didymodon perichætiale. The name Symblepharis is, however, expressive of the appearance of the capsule, and, as we find it in Flor. Tasm. arranged as above, it will be advisable so to accept it here. The perichætal leaves are very long, and, when dry, twist around the fruit-stalk sometimes as high as the capsule.

TRIBE 3.—FISSEDENTIÆ.

Genus 8.—Fissedens.

The character of the foliage of this genus at once distinguishes it from any other genus of mosses. It is the little beauty of the whole Natural Order. To make its acquaintances we must explore the very little caves and grottoes to be found n every shaded clayey bank, for the small plume-shaped fronds appear to avoid exposure to the strong light of day, as well as to seek shelter from the passing storm. At this time of the year the minute capsules cast off their lids and expand the bright red peristomes in order to permit the contained spores to mature and escape; in this state they present a charming appearance under a low power of the microscope. The foliage is distichous; this character gives the charm to the plant; indeed observed with a common pocket lens a tuft of Fissedens presents the appearance of a Lilliputian fernery with the addition of richly coloured masses of peristome crowning the gracefully curved fruitstalks.

The African traveller, Mungo Park, has made famous a variety of the first species of this genus, Fissedens bryoides; after being exposed in the sultry parts of that continent to many privations, towards the close of one day the traveller, sad, faint, and weary, sat him down to rest and consider his position; his eye rested upon one small tuft of this moss in the wilderness around him, he gathered it, and as he did so, after a little reflection, he took encouragement therefrom, and banished the fear of a scorching grave in the unknown waste from his mind, the promise of moisture was before him, and in a short time he escaped the danger that had just before appeared so threatening.

One species, F. adiantioides, fruits laterally, and, as its name implies, resembles, on a small scale, a species of Adiantum. The genus at one time belonged to the Dicrani, and if the form of the peristome, which is undoubtedly the Linnæan rule for drawing the generic distinction, be adhered to, it should abide amongst them; but when so great an authority as Mr. Wilson, the author of the Musc. Britt., thinks it wise to employ the characters founded on the difference of foliage, and when other eminent authorities concur therein, we must abide by that arrangement. The

peristome is similar in both genera, but the leaves of Fissedens are distichous, whilst those of Dicranum are inserted on all sides of the stem. The teeth of the peristome are bifid, and the divided limbs are usually bent back in the form of a flesh-hook: hence the original name of the genus Dicranum.

TRIBE 4.—LEUCOBRYACEÆ.

Genus 9.—Leucobryum.

White Fork-Moss.

Hedwig placed this moss amongst the Dicrani as the teeth of the peristome were similar, but the pale and sometimes bluish grey colour and cellular structure of the foliage sufficiently distinguish it from the Dicrani. Müller has consequently placed it in the Leucobryacæ, and he states that in viewing the leaves at an acute angle the prismatic colours are seen. It grows in moist ground, on heaths, in bogs, at the roots of trees, and on decaying wood.

TRIBE 5.—DICRANACEÆ.

Genus 10.—Dicranum, *Hedwig.*

Fork-Moss.

The peristome of Dicranum is similar to that of the two preceding genera, and at that point the similarity ceases. The stems of the plants of this genus are erect and branched, they grow vigorously in company with Bryum and Polytrichum, the leaves are generally bent to one side (secund), they are narrow and numerous, and usually have a fine narrow nerve to the apex of the leaf. The capsules are seated on high fruit-stalks, are frequently plentiful, they are cernuous, and sometimes erect. The lid of the capsule is furnished with a long beak, bent somewhat to the shape of a shoemaker's awl. They may be found on mountains and in valleys, in woods, fields, and almost everywhere, except in water. They usually grow in large tufts, and are frequent on old logs in the bush around Hobart. The fruiterers of the city generally have a good supply of Dicranum in their windows; it may be easily distinguished from other mosses by its long bristly bundles of leaves, which have somewhat the appearance of miniature horse-tails.

The accompanying photograph will convey a correct idea of the usual form of Dicranum capsule, also of the bifid apices of the teeth of the peristome. These photographs have been taken by the microscope with a 1½in. objective, a small camera without the lens, and an ordinary microscopic lamp.