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whorls are farther apart, and the stem is not red where they branch off, as in *Elodea*."

It has been variously named as under:—

Hydrilla verticillata, Caspary, in Bot. Zeit., xiv, 899 (1856).

H. ovalifolia, Rich., Mém. Inst. Paris, ii, 76, t. 2 (1814).

H. dentata, Casp., Bot. Zeit., xi, 805 (1853).

Udora verticillata, Gorski in Eichwald. Skizze v. Lithuan, etc., 127 (1830).

U. lithuanicus, Besser, in Flora, ii, Beibl. 12 (1832).

U. occidentalis, Koch, Syn. Fl. Germ., ed. i, 669 (1837).

U. pomeranica, Reichb., Icones, f. 104 (1845).

? *Serpicula verticillata*, L.f. supp. plant., 416 (1781).

Asch. und Graeb., Syn. Milleleup. Fl., i, 399 (1897).

In Europe it occurs near Stettin in Pomerania, S.E. Prussia; Russia—in Wilna, Finland, and Witsbk governments; in Asia, Central Africa, Madagascar, Mauritius, and Australia.

How far the species is really indigenous to Europe is doubtful. Mr. Pearsall considers that the richness of the "Water" in aquatic vegetation is the result of the large number of aquatic birds that occur there: "wild ducks, coots, water-hens, etc., by the score." But it seems hardly possible that seeds could be conveyed from such far distant places; perhaps on the mud of the feet?, but I doubt in the crops, as Danish naturalists have determined that birds on migration *as a rule* fly with empty stomachs, and several that a friend of mine dissected in the spring migration to England had done the same.

ADDITIONAL MOSSES FROM DUNCRAIG, WEST ROSS-SHIRE.

By JAMES STIRTON, M.D., etc.

(Read 8th April 1915.)

For several years I have been considerably exercised in the study of a peculiar, almost unique, group of mosses the area of whose growth and spread is rather restricted. This area forms a narrow belt from north to south, extending from the Island of Lewis to the south of Ireland and from the west coast of Scotland to the Outer Hebrides. In the

Annals of Scottish Natural History¹ I have already spoken of the similar, or rather of the almost identical, habitats of other two remarkable mosses, viz. *Myurium Hebridarum* (Sch.) and *Hedwigidium imberbe* (Smith). Since then the latter of these two has been found in Scotland where it had previously been long sought in vain. The first station is close to Loch Awe, and in 1905 near Arisaig three others in rather close series were found. Besides these, two others might be associated with them, viz. *Campylopus Shawii* (Wils.) and *Glyphomitrium Daviesii* (Dicks.), the former confined strictly within the limits, the latter diverging a little towards the east, as on Bowling Hills, etc., but reaching Wales and extending, although sparingly, to the Island of Lewis.

I might have added others by way of strengthening my views of the peculiar part played in the world's history by this peculiar strip of land, but sufficient has been stated for my present purpose. I now revert to the group which plays the most important part in this respect.

This group may fairly well be placed under one genus, as Dr. Braithwaite has done, viz. under *Leptodontium* at p. 255, vol. i, of his work on British Mosses.

- Leptodontium flexifolium* (Dicks.).
- „ *recurvifolium* (Tayl.).
- „ *gemmascens* (Mitt.).
- „ *terrenum* (Stirn.).
- „ *Rossii* (Stirn.).

The first moss has been known for more than a century, and its area of growth is accordingly more extended as it has been detected in two places on the continent of Europe, but by far the main sources of supply are the western parts of Great Britain. It is the only member hitherto found in fruit. It is also much smaller than the others, but its structure, as viewed under the microscope, connects it rather closely to the rest of the group; the second has been known for more than half a century, and remained for many years the only instance of its class; the third differs widely from the rest inasmuch as it produces propagula at the apices of the leaves much as in *Ulota*

¹ Ann. Scot. Nat. Hist., 1907, p. 42.

phyllantha (Brid.). It is, however, otherwise barren. Accordingly, I had doubts from the first of its claims to rank as a member of this group. A closer examination of its minuter structures has confirmed my resolution to reject it from association with the others. Besides, its only habitat hitherto known, viz. the straw-thatch of the older and smaller cottages, is certainly adverse to such an association. The area of growth—from the English Channel on its eastern side to the Frith of Tay—is also adverse to such a connection. Lastly, the shape of its leaves, sharply lanceolate, militate the most against it as well as the difference in their areolation. The fourth of this series, described in the *Annals of Scot. Nat. Hist.* for July 1900,¹ as well as in one or two other parts of the same magazine, is mainly characterised by the leaf in its upper third being abruptly as well as convexly narrowed to rather less in breadth than a half of the lower or broader part but still showing the pagina on each side of the narrowed nerve which can be traced to within a short distance of the broad round apex.

The fifth of the series was only discovered in October 1914 near Blairmore on the Frith of Clyde. The following is its description:—

Leptodontium Rossii (Stirn.).—In rather large lax somewhat convex tufts of a deep or bluish green colour above, changing abruptly below to a dirty pale colour; stems strong upright, simple, or at times dichotomously divided, rarely fastigiately branched above, from an inch to an inch and a half long; leaves clasping stem, rather laxly arranged around it, curled inwardly in upper half or crisped when dry, spreading widely or even recurved (outwards) when wet, ovate oblong, smooth throughout or not papillose, margin plane, serrate in upper half with intermediate lesser serratures (or less pronounced), in lower third serratures much less or nearly vanishing; nerve strong, latit. near base .07-.08 mm., smooth throughout, tapering upwards and vanishing rather abruptly about .09 mm. from blunt and rounded apex, which is strongly and equally serrated without any apiculus such as are seen in the other three members of the group; central basal cells large, oblong,

¹ *Ann. Scot. Nat. Hist.*, 1900, p. 176.

attached with broad hyaline, characteristic walls, $\cdot 05$ – $\cdot 07$ by $\cdot 02$ – $\cdot 032$ mm., thickly granular but soon showing a tendency to become hyaline and then in double layer, such cells outwardly, rather abruptly narrower and hyaline, upwards cells soon bluntly quadrate but still showing the broad hyaline walls, $\cdot 02$ – $\cdot 027$ mm. in longer diameter, near margin and upwards to apex cells somewhat smaller and showing within minute particles well defined, which present much the appearance of stereids.

Now, if the three larger species of this group are placed closely alongside one another in a wet state, they present mutual appearances of such a character that the eye alone is sufficient to discern a close general affinity. A closer inspection through a field lens confirms this view. Under a moderate power of the microscope the configuration of the leaves, the peculiar arrangement of the marginal serratures, the rather unusual disposition of their upper divisions, etc., point to a common origin; inspected more closely under a higher power, the minuter structures and configurations show manifest differences in each to such an extent as fully to warrant specific distinction.

As all this is merely preliminary to what I may have to say in another communication, I shall desist meanwhile from asserting conditions necessary to what may be called a theory, such as is shaping itself, as time goes on, more definitely in my mind.

While searching for specimens of *Leptodontium gemmascens* (Mitt.) on the old thatched roofs of the highland cottages, its usual habitat, I came across another moss which had, to the best of my recollection, not been previously observed, viz. :—

Campylopus obtectus, sp. n.—In dense broadly expanded convex tufts of a vivid green above, in thickness about one-eighth to nearly a quarter of an inch, below this abruptly changing to a pale yellowish colour; stems upright generally single, but occasionally emitting short lateral branches; leaves closely appressed to stem when dry, slightly spreading but straight when wet, closely arranged around stem, broad, short and bluntish at apex ($\cdot 05$ mm. broad), which has two or three teeth but none elsewhere throughout leaf; nerve broad, nearly half that

of base, tapering upwards and ceasing a little below apex by the breadth of two or three cells; margin plane entire, incurved in upper half so as to render leaf hollow; no auricles at base properly so called, but cells there next nerve large, oblong attached, hyaline but with *thickish* walls, .045-.065 by .018-.025 mm., outwards on the same level cells about half the breadth, also hyaline, upwards lessening until the rhomboid chlorophyllose prevail to apex, a little longer at first, soon ending above into the smaller, .01-.013 by .007-.01 mm. Near Plockton, September 1914.

The next moss was discovered in 1913 near Plockton, but although I searched the same locality closely next year, only a few capsules, not quite ripe, were secured.

This is a very singular moss, and I am not yet quite certain that its systematic place has been determined.

In large, lax, convex extended tufts of a deep or livid green colour above, turning in time to a lighter green, dark brown below; stems upright from an inch to an inch and a half long, slender, simple or sparsely dichotomously divided; leaves laxly or distantly arranged around stem or from three to four in a complete whorl, spreading when wet, slightly crisped or rather hooked anteriorly in the upper half when dry, rather broadly ovate below, lanceolate above and acute; nerve strong, pale then a deep red, broad below, latit. near base, .11-.16 mm., tapering to apex, which it reaches or very nearly so, margin entire but broadly recurved near base, as much as .04 mm., narrowing upwards to near apex, strongly papillose as well as pagina; alt. of papillæ, .003-.005 mm.; leaves hyaline becoming slightly granular upwards, cells at base long, undulating or even sinuose on margin, narrowly oblong, rather widely apart, becoming brown as well as the whole leaf, when also the undulations are nearly obliterated, .04-.06 by .005-.007 mm., showing connecting tubes and pores with neighbouring cells, merging upwards into shorter broader cells, apart, granular, .02-.03 by .007-.009 mm., ultimately passing upwards into roundish cells with irregular walls, showing bright points in a dark ground, .009-.014 mm. in slightly longer diameter; seta long, slender, smooth, undulating with a wider deeper

bend next capsule dark-red ; capsule often nearly pendulous owing to the wide bend of seta, long, straight, cylindrical or slightly broader below, brown, operculum concolorous also slender, upright, long, more than half the length of capsule. This moss, although nearly ripe, is too young to show peristome, and yet the columella within capsule is fairly well defined throughout and is also slender. On earth covering rocks in the old, probably primeval, forest of Duncraig near Plockton.

As already stated, there are several peculiarities in this moss, but there are two that stand out more prominently, viz. the areolation which approaches in several respects that of a section of *Rhacomitrium* while its external and more obvious appearance is otherwise quite at variance with any of the species of that genus. The seta is also curiously bent or rather geniculate below the apothecium, not unlike that of *Campylostelium*. I am so impressed with these differences that I am inclined, even in the absence of the peristome, to put it under a new genus and call it *Limneria viridula* (gen. nov.).

Another curious and beautiful moss has been under observation for several years. I have waited in expectation of finding it in fruit, but in vain. It grows in several places on the west coast of Scotland, but most luxuriantly near the base of the famous Duncraig, forming the highest and most precipitous rocks of their kind in Great Britain. It possesses characters in common with three genera, viz. *Pohlia*, *Bryum*, and *Mnium*. Meanwhile I have inserted it under *Bryum*. I have no scruples, as I have had in other instances, in describing it in a barren condition, as the external characters are so obvious and well marked as to render it easily discernible even in the field.

Bryum intortulum, n. sp.—In rather extended lax tufts of a bright green colour above, abruptly showing below, at first sight, merely dense masses of tomentum of a beautiful port-wine colour, covering and almost concealing the rest of the plant ; stems slender, upright, about an inch and a half long, in other instances, with male inflorescence alone, twice this length, pale at first afterwards red, emitting nearly at right angles, rather frequently, short branches ; leaves laxly disposed around the stems, long, spreading widely in a wet

state, straight, narrowly ovate-lanceolate, the apex very acute and rendered shortly acuminate by the excurrent slightly denticulate nerve, in a dry state spirally twisted or rope-like from three to four complete rounds giving the leaf the appearance of a large, long, straight, sharp-pointed spine at an angle from the stem about 50 degrees; margin of leaf entire, composed of from four to seven rows of very long narrow cells up to apex, where they join the excurrent, slightly denticulate nerve, reflexed from base as much as .05 mm., narrowing upwards but extending up three-fourths whence the margin becomes plane; nerve strong, red for a short distance at base, where latit. is .07-.1 mm., upwards pale, narrowing to apex; cells in the lowest fourth of leaf large, oblong, attached with thickish opaque walls, .075-.09 by .022-.027 mm., upwards lessening until they become oblongo-hexagonal to apex, .04-.05 by .015-.022 mm.; barren.

As I have already stated elsewhere, this craig is engaging my attention in another direction. On its plant-life is very varied, and such that I have not hitherto found a parallel to it on any part of the west coast.

THE SCOTTISH ALPINE BOTANICAL CLUB EXCURSION,
1914. By ALEXANDER COWAN.

(Read 10th June 1915.)

The members met on 20th July at the Ogilvy Arms Hotel, Kirriemuir, which they made their headquarters, as they were unable to obtain suitable accommodation at the hotel at Clova; and though this was some distance from the ground proposed to be visited, the fact of motor transport being now available materially reduced the inconvenience caused and the time lost, as in the old days when horse-drawn vehicles had to be used.

On 21st July they motored up Glen Clova, intending to botanise in Glen Fee, which they had visited on previous occasions without special leave having been asked for. On arrival, however, at the shooting-lodge they were informed by the stalker that the ground was strictly preserved and that the party could on no account visit it for