

TRANSACTIONS  
OF THE  
ROYAL SOCIETY OF NEW ZEALAND

BOTANY

VOL. 2

No. 11

SEPTEMBER 18, 1963

New and Rare Mosses in New Zealand

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[Received by the Editor, November 2, 1962.]

*Abstract*

Two new moss species and one new variety are described, and three species, *Campylium stellatum*, *Conostomum curvirostre* and *Pleuridium subulatum* are recorded for New Zealand.

INTRODUCTION

THE plants mentioned in this paper, together with a new species of *Scouleria* being described elsewhere by Dr H. Persson, bring up to date the published record of mosses known to occur in New Zealand. Unfortunately none of the new species had capsules, and to this extent the genus in which each has been placed must be provisional. The occurrence in New Zealand of the Eastern Australian *Conostomum curvirostre* is not surprising, and further adventives such as *Pleuridium subulatum* can be expected though few such mosses have been detected here yet. The addition, however, of another Northern Hemisphere moss, *Campylium stellatum*, as probably indigenous in the Southern Hemisphere only in New Zealand adds to this small list of mosses and is hard to explain except on the assumption that further exploration will show that these mosses have a wider distribution than is yet known.

ACKNOWLEDGMENTS

Grateful acknowledgment is made to the following: Dr H. Persson, of Riksmuseum, Stockholm; E. B. Bartram, of Pennsylvania; Professor Winona H. Welch, of De Pauw University, Indiana, and J. H. Willis, of the National Herbarium and Melbourne Botanic Gardens, for specimens they sent me for comparison and for reports on specimens sent to them; Dr G. A. M. Scott, of Otago University, for making the drawings, help with the Latin descriptions, and helpful criticism of the text; the collectors, who are named in the text, for sending in the specimens.

1. *Campylium stellatum* (Schreb.) Bryhn

Yellow-green, to about  $1\frac{1}{2}$  inches high, rather stout. Leaves from an erect ovate-deltoid or cordate base, narrowed to a long, gradually tapering, acuminate, squarrose acumen which is channelled with entire margins. Cells long and narrow, uniform almost to the base with a well marked area of golden incrassate oval cells there, with larger or smaller more or less distinct auricles.



Craigieburn Range, Canterbury, 4,500–5,500ft, in *Danthonia rigida* grassland, collected by C. J. Burrows, February, 1962; Herb. K.W.A., No. 7,296.

E. B. Bartram confirmed my identification, remarking that it was a more robust form than most of the American plants (of which he sent two specimens) but that there did not appear to be any structural differences he could detect. The British plant is apparently more robust, H. N. Dixon (1924) describing it as robust with stout stems 2–4 inches high, so it appears to be a variable species. The strikingly spreading leaves distinguish it from any of our related species except *Cratoneuroopsis relaxa*, which, however, has shorter and broader leaf cells.

The distribution of the species as given by Brotherus (1924) is Europe, Asia, and N. America. The remote virgin alpine district in which Burrows found it would indicate that it is an indigenous rather than an introduced species.

## 2. *Chorisodontium burrowsii* n. sp.

Planta laxe vel dense caespitosa, terricola. Caulis 2–5cm altus, breviter irregulariterque ramosus, sine lanugine, haud nitens, sordide vel flavo-viridis. Folia 5–7mm longa, erecto-patentia vel patentia, vix curvata ad falcata, praesertim ad apices uno latere inclinantia, dum sicca minime mutata, e base 0.4–0.8mm lato, leniter in acumen integrum vel apice paulo dentatum producta; lamina canaliculata,  $\frac{1}{4}$ – $\frac{1}{2}$  longitudinis foliorum aequantia. Costa longe exserta, perlata, base 200–300 $\mu$  lata, leniter in subulam longam haud pellucidam, fulvam haud piliformem producta. Cellulae alares magnae, hyalinae, parietibus fuseis, auriculas amplas formantes, ad costa attingentes; cellulae inferae cito minores,  $\pm$  quadratae, ca. 25 x 12 $\mu$  ad 12 x 12 $\mu$ , in lamina obscurae 7–8 x 7–8 $\mu$ , raro aliquae paucae infernae juxta margine longiores angustioresque sed vix limbum formantes. Folia perichaetalia parum manifesta, foliis ramorum aequantia vel minora, breviter vaginantia, erecta. Seta rubra, flexuosa, erecta (sed in his plantis obsoleta et fracta). Fructus ignotus.

Closely or loosely tufted on earth. Stems 2–5cm high, rather slender, shortly and irregularly branched, without tomentum, dark or yellowish green, not glossy. Leaves 5–7mm long, erecto-patent to spreading, slightly curved to falcate and second especially in the terminal tufts, little altered when dry, gradually narrowed from a 0.4 to 0.8mm wide base to an acute acumen, lamina usually only  $\frac{1}{4}$ – $\frac{1}{2}$  of total length, channelled, margins quite entire or slightly dentate at the apex. Nerve wide and strong, 200–300 $\mu$  wide at base, forming  $\frac{1}{4}$ – $\frac{1}{2}$  of width there, gradually narrowed to a long entire subula formed mostly of the nerve which is dark opaque yellowish and not hair-like. Alar cells enlarged, hyaline with, usually, brown walls forming large auricles which extend in to the nerve; lower cells few, mostly quadrate but from ca. 25x12 $\mu$  and quickly decreasing to 12x12 $\mu$  and passing into the opaque upper cells, ca. 7–8 x 7–8 $\mu$ , marginal cells not differentiated except that occasionally several rows of longer, narrower cells at the base may extend a short way up the leaf. Perichaetial leaves inconspicuous, equal to or shorter than the others, shortly sheathing and erect. Seta red, flexuous, erect, old and broken off, the longest to 2.5cm. Capsule not seen.

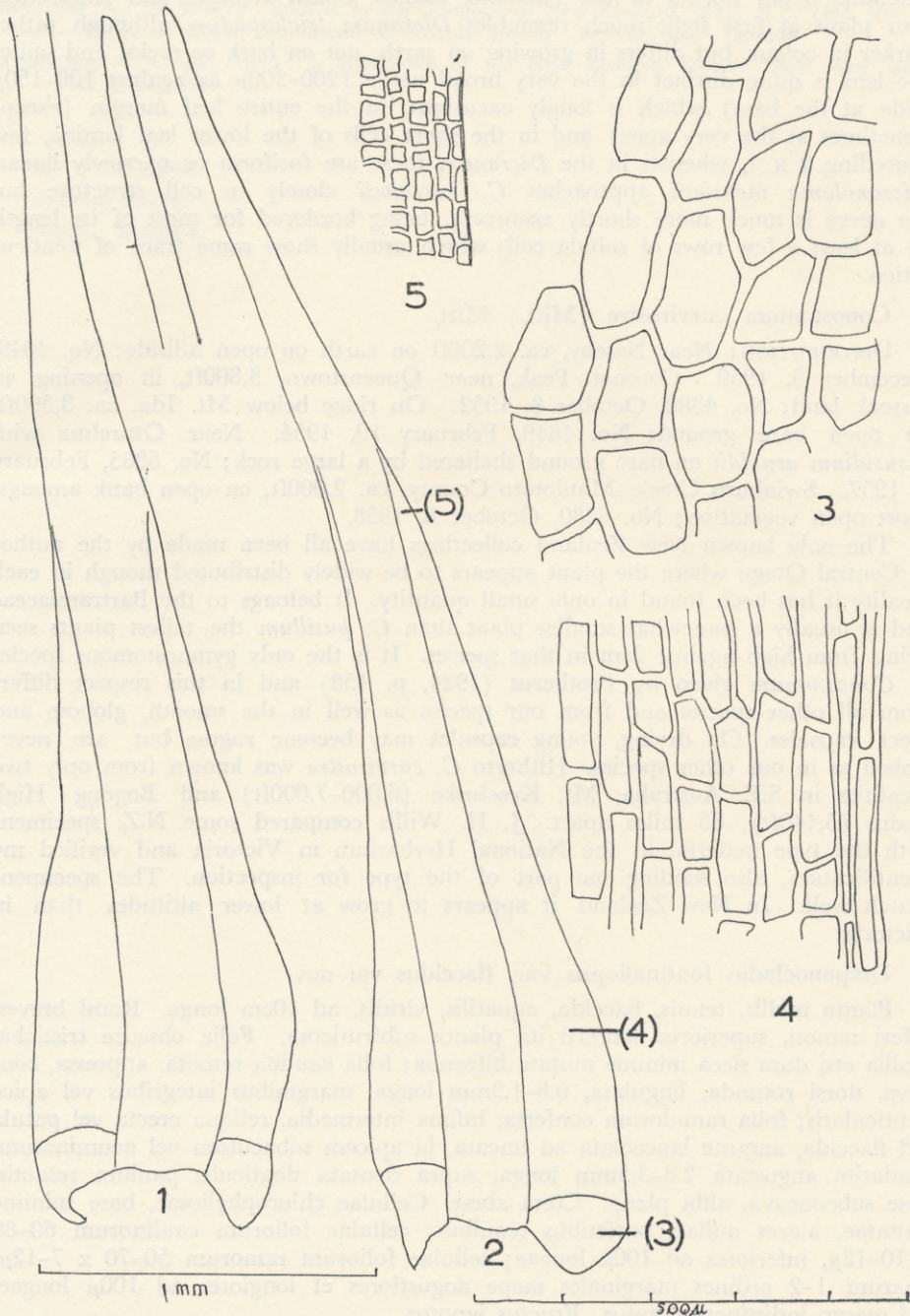
DISTRIBUTION: Rough Creek Basin, Arthurs Pass, South Island, S.–S.E. aspect, 4,800–5,500ft on damp bank, C. J. Burrows, March, 1960; type No. 6991 in herb.; K. W. Allison. Dr Burrows retained part of the type gathering and parts were sent to Dr H. Persson and E. B. Bartram.

During field work on higher tussock country, Dr Burrows found two moss novelties, the above, and a *Scouleria* which is being described elsewhere, thus adding two new genera to our flora.

The genus *Chorisodontium* belongs to the Dicranaceae and is closely related to *Dicranum*, usually differing in the form of the lower leaf cells and stronger



nerve. Our plant seems to fit the genus well, but positive identification will need the verification of capsule characteristics. The plant was referred to both Dr H. Persson and E. B. Bartram, who agreed that it was apparently an undescribed



TEXT-FIG. 1.—Figs. 1-5—*Chorisdontium burrowsii*. K.W.A. No. 6991. Figs. 1-2—Leaves. Fig. 3—Alar cells. Fig. 4—Cells in lamina and border. Fig. 5—Cells in subula.



*Chorisodontium* and the former sent specimens of the two Southern American species. Brotherus (1924) gives 11 species for the genus, mostly from Columbia to Fuegia in South America with one species in St. Paul Island and another extending from Fuegia to the Falkland Islands, South Georgia and Antarctica. Our plant at first sight much resembles *Dicranum trichopodum* although rather darker in colour, but differs in growing on earth, not on bark or rocks, and under the lens is quite distinct in the very broad nerve ( $200\text{--}300\mu$  as against  $100\text{--}150\mu$  wide at the base) which is longly excurrent, in the entire leaf margin (except sometimes at the very apex) and in the short cells of the lower leaf lamina, few exceeding  $2 \times 1$ , whereas in the *Dicranum* these are fusiform or narrowly linear. *Dicranoloma menziesii* approaches *C. burrowsii* closely in cell structure but the nerve is much more shortly excurrent, being bordered for most of its length by at least a few rows of subula cells which usually show some trace of denticulation.

### 3. *Conostomum curvirostre* (Mitt.) Mitt.

DISTRIBUTION: Near Naseby, ca. 2,200ft on earth on open hillside; No. 4049, December 5, 1950. Coronet Peak, near Queenstown, 3,800ft, in opening in tussock land; No. 4380, October 8, 1952. On ridge below Mt. Ida, ca. 3,500ft, on open bare ground; No. 4849, February 19, 1954. Near Oturehua with *Pleuridium arnoldii* on bare ground sheltered by a large rock; No. 6085, February 6, 1957. Swinburn Creek, Maniototo County, ca. 2,000ft, on open bank amongst short open vegetation; No. 6280, October 8, 1958.

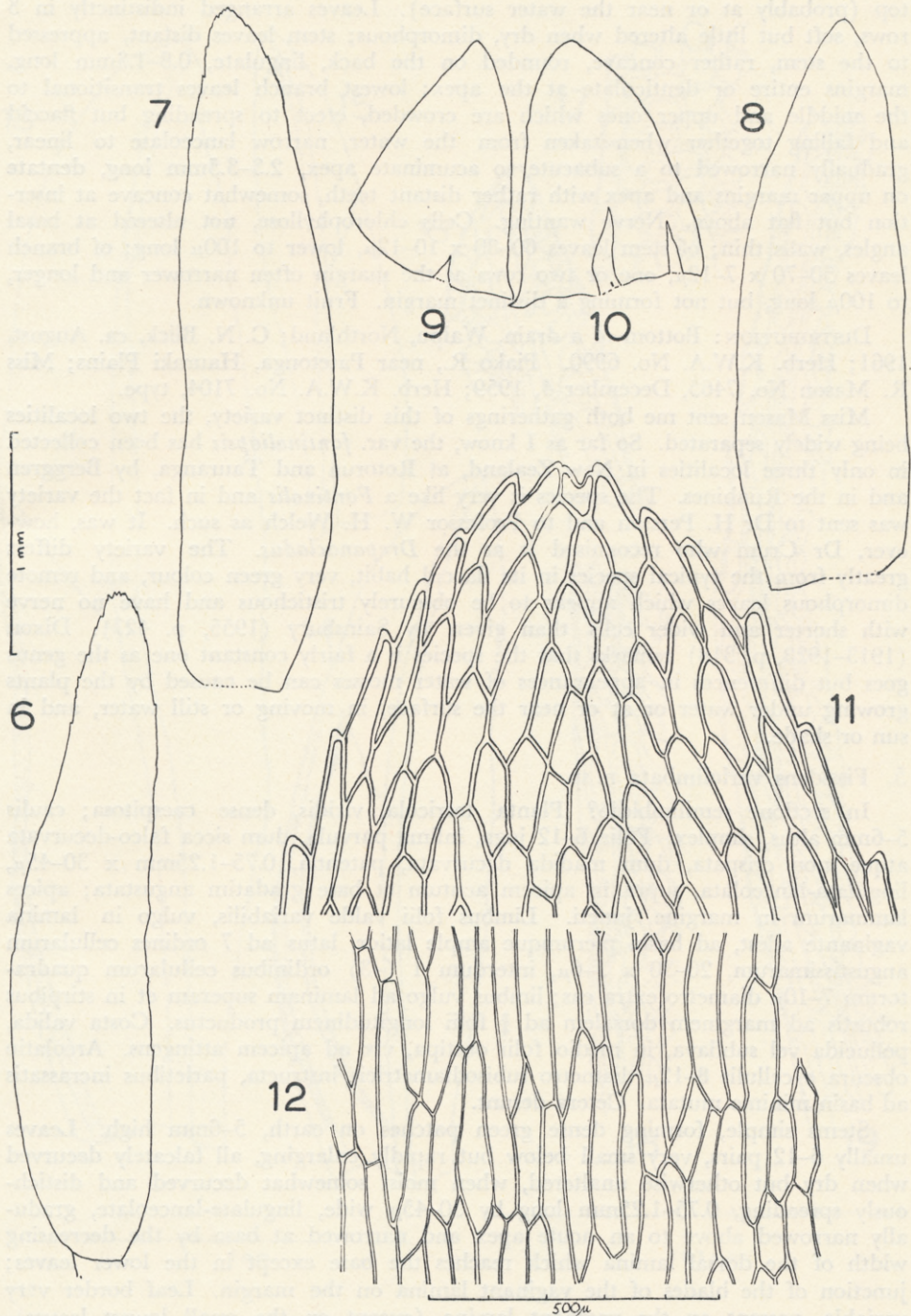
The only known New Zealand collectings have all been made by the author in Central Otago where the plant appears to be widely distributed though in each locality it has been found in only small quantity. It belongs to the Bartramiaceae and is usually a somewhat smaller plant than *C. pusillum* the tallest plants seen being 7mm high against 2cm in that species. It is the only gymnostomous species of *Conostomum* given by Brotherus (1924, p. 458) and in this respect differs from all other species and from our species as well in the smooth, globose and erect capsules. On drying, young capsules may become rugose but are never ribbed as in our other species. Hitherto *C. curvirostre* was known from only two localities in S.E. Australia, Mt. Kosciusko (6,000–7,000ft) and Bogong High Plains (5,440ft), 65 miles apart. J. H. Willis compared some N.Z. specimens with the type material in the National Herbarium in Victoria and verified my identification, also sending me part of the type for inspection. The specimens match well. In New Zealand it appears to grow at lower altitudes than in Victoria.

### 4. *Drepanocladus fontinaliopsis* var. *flaccidus* var. nov.

Planta mollis, tenuis, flaccida, aquatilis, viridis, ad 10cm longa. Rami breves, inferi remoti, superiores conferti ita planta subfruticosa. Folia obscure tristicha, mollia etsi dum sicca minime mutata biformia; folia caulina remota, appressa, concava, dorsi rotunda, lingulata, 0.8–1.3mm longa, marginibus integribus vel apice denticulatis; folia ramulorum conferta, infima intermedia, reliqua erecta vel patula sed flaccida, anguste lanceolata ad lineata, in apicem subacutum vel acuminatum, gradatim angustata 2.3–3.5mm longa, supra dentata denticulis paulum remotis, base subconcava, alibi plana. Costa abest. Cellulae chlorophyllosae, base minime mutatae, alares nullae, parietibus tenuibus; cellulae foliorum caulinarum  $60\text{--}80 \times 10\text{--}12\mu$ , inferiores ad  $100\mu$  longae; cellulae foliorum ramulorum  $50\text{--}70 \times 7\text{--}12\mu$ , quarum 1–2 ordines marginales saepe angustiores et longiores ad  $100\mu$  longae, sed margo indistincte notatus. Fructus ignotus.

Soft, slender, flaccid, growing in water, green, to 10cm long; branches short, distant below, freely produced and crowded above to form a somewhat bushy





TEXT-FIG. 2.—Figs. 6–12—*Drepanocladus fontinaliopsis* var. *flaccidus*. K.W.A. No. 6990.  
 Figs. 6–8—Branch leaves. Figs. 9–10—Stem leaves. Fig. 11—Apex of branch leaf. Fig. 12—  
 Mid lower half of branch leaf.



top (probably at or near the water surface). Leaves arranged indistinctly in 3 rows, soft but little altered when dry, dimorphous; stem leaves distant, appressed to the stem, rather concave, rounded on the back, lingulate, 0.8–1.3mm long, margins entire or denticulate at the apex; lowest branch leaves transitional to the middle and upper ones which are crowded, erect to spreading but flaccid and falling together when taken from the water, narrow lanceolate to linear, gradually narrowed to a subacute to acuminate apex, 2.3–3.5mm long, dentate on upper margins and apex with rather distant teeth, somewhat concave at insertion but flat above. Nerve wanting. Cells chlorophyllose, not altered at basal angles, walls thin; of stem leaves 60–80 x 10–12 $\mu$ , lower to 100 $\mu$  long; of branch leaves 50–70 x 7–12 $\mu$ , one or two rows at the margin often narrower and longer, to 100 $\mu$  long, but not forming a distinct margin. Fruit unknown.

DISTRIBUTION: Bottom of a drain, Waipu, Northland; C. N. Blick, ca. August, 1961; Herb. K.W.A. No. 6990. Piako R., near Patetonga, Hauraki Plains; Miss R. Mason No. 7465, December 4, 1959; Herb. K.W.A. No. 7104, type.

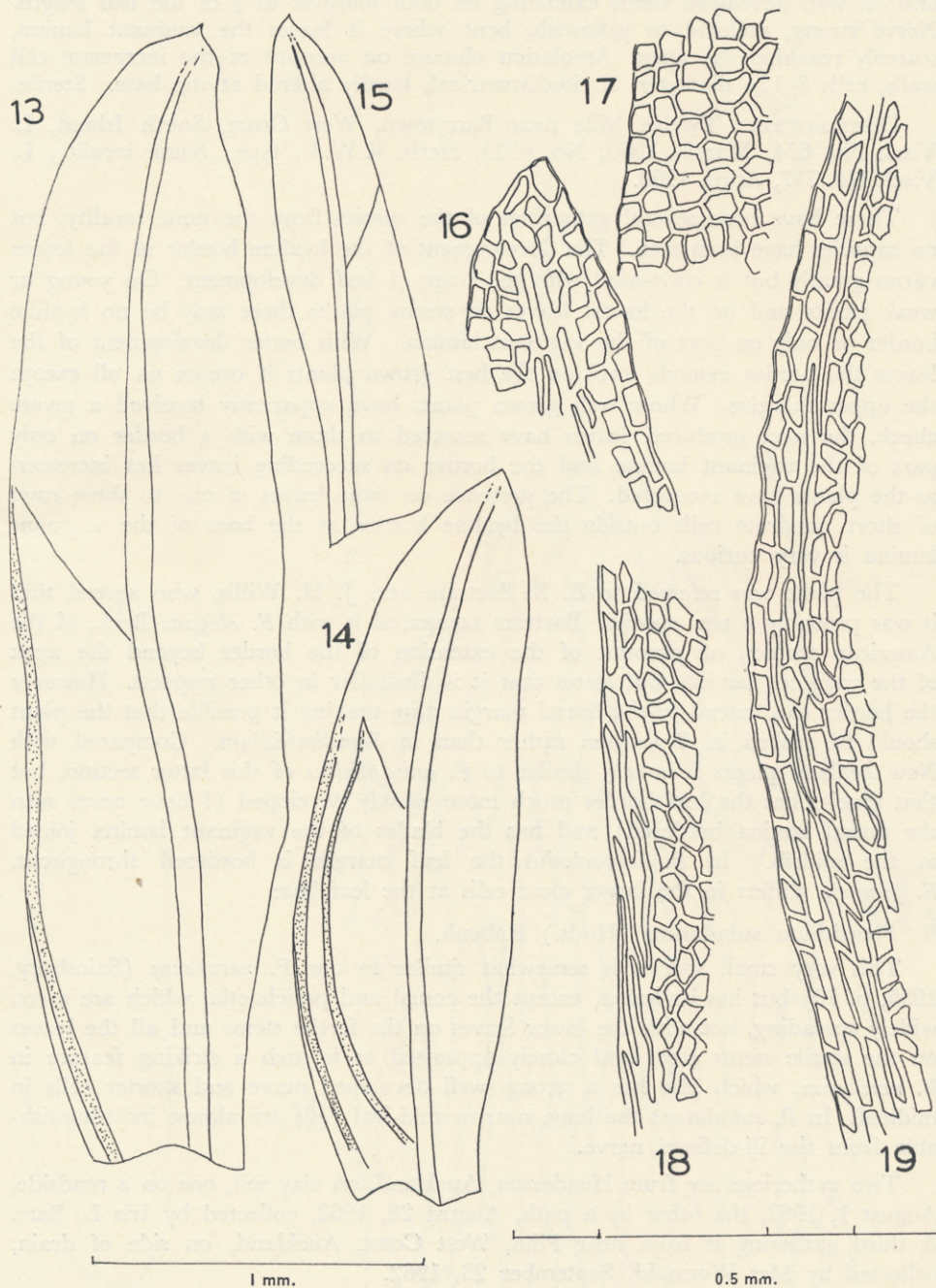
Miss Mason sent me both gatherings of this distinct variety, the two localities being widely separated. So far as I know, the var. *fontinaliopsis* has been collected in only three localities in New Zealand, at Rotorua and Tauranga, by Berggren and in the Ruahines. The species is very like a *Fontinalis* and in fact the variety was sent to Dr H. Persson and to Professor W. H. Welch as such. It was, however, Dr Crum who recognised it as the *Drepanocladus*. The variety differs greatly from the typical species in its flaccid habit, very green colour, and remote dimorphous leaves which appear to be obscurely tristichous and have no nerve with shorter and wider cells than given by Sainsbury (1955, p. 427). Dixon (1913–1928, p. 318) remarks that the species is a fairly constant one as the genus goes but differences in appearances of water mosses can be caused by the plants growing under water or at or near the surface, in moving or still water, and in sun or shade.

##### 5. *Fissidens variolimbata* n. sp.

In sectione semilimbido? Planta terricola, viridis, dense caespitosa; caulis 5–6mm altus, simplex. Folia 6–12 juga, infima parvula, dum sicca falco-decurvata atque non crispata, dum madida decurvata, patentia, 0.75–1.25mm x 30–45 $\mu$ , lingulata-lanceolata, supra in apicem acutum et base gradatim angustata; apices laminarum in margine juncti. Limbus folii valde variabilis, vulgo in lamina vaginante adest, ad basin plerumque ample latior, latus ad 7 ordines cellularum angustissimarum, 20–30 x 3–6 $\mu$ , interdum 1 (–3) ordinibus cellularum quadratorum 7–10 $\mu$  diametro extra eas; limbus vulgo ad laminam superam et in stirpibus robustis ad marginem dorsalem ad  $\frac{3}{4}$  folii longitudinem productus. Costa valida, pellucida vel subflava, in medio folii obstipa, vix ad apicem attingens. Areolatio obscura e cellulis 8–12 $\mu$  diametro subisodiametricis instructa, parietibus incrassatis ad basin minime mutata. Cetera desunt.

Stems simple, forming dense green patches on earth, 5–6mm high. Leaves usually 6–12 pairs, very small below but rapidly enlarging, all falcately decurved when dry but otherwise unaltered, when moist somewhat decurved and distichously spreading, 0.75–1.25mm long by 30–45 $\mu$  wide, lingulate-lanceolate, gradually narrowed above to an acute apex and narrowed at base by the decreasing width of the dorsal lamina which reaches the base except in the lower leaves; junction of the blades of the vaginant lamina on the margin. Leaf border very variable, present on the vaginant lamina (except on the small lowest leaves), markedly wider near the insertion where sometimes up to a width of 7 rows of linear cells, 20–30 x 3–6 $\mu$ , with sometimes 1 (–3) rows of quadrate cells 7–10 $\mu$  diameter outside these. Border usually extending some way up the upper lamina





TEXT-FIG. 3.—Figs. 13–19—*Fissidens variolimbata*. K.W.A. No. 6925. Figs. 13–15—Leaves, two showing border on vaginant lamina. Fig. 16—Leaf apex. Fig. 17—Cells three-quarter way up leaf. Fig. 18—Marginal cells a-quarter way up from base. Fig. 19—Border of vaginant lamina near base.



and on well developed stems extending on both margins to  $\frac{3}{4}$  of the leaf length. Nerve strong, pellucid to yellowish, bent where it leaves the vaginant lamina, scarcely reaching the apex. Areolation obscure on account of the incrassate cell walls, cells 8–12 $\mu$  diameter,  $\pm$  isodiametrical, hardly altered at the base. Sterile.

DISTRIBUTION: Twelve Mile near Barrytown, West Coast, South Island, L. Visch No. 674, March, 1960; No. 6925, Herb. K.W.A., type. Same locality, L. Visch No. 717, April, 1960.

There have been several gatherings of the species from the same locality, but no capsules have been seen. The development of the hyaline border of the leaves varies greatly but is correlated with the stage of leaf development. On young or weak plants and on the lowest leaves on strong plants there may be no hyaline border or only on part of the vaginant lamina. With better development of the leaves the border extends until on the best grown plants it occurs on all except the upper margins. Where well grown plants have apparently received a severe check, the next produced leaves have reverted to those with a border on only part of the vaginant lamina and the border on succeeding leaves has increased as the plants have recovered. The presence on some leaves of one to three rows of short quadrate cells outside the hyaline border at the base of the vaginant lamina is very curious.

The plant was referred to E. B. Bartram and J. H. Willis, who agreed that it was probably a new species. Bartram compared it with *F. elegans* Brid., of the American tropics, on account of the extension of the border beyond the apex of the vaginant lamina, but states that it is dissimilar in other respects. However the border can extend to the dorsal margin also, making it possible that the plant should be placed in *Bryoidium* rather than in *Semilimbidium*. Compared with New Zealand plants it is very similar to *F. anisophyllus* of this latter section, but that species has the leaf border much more weakly developed (I have never seen the dorsal lamina bordered) and has the blades of the vaginant lamina joined at the midrib. In *F. leptocladus* the leaf margin is bordered throughout. *F. pungens* differs in the larger clear cells at the leaf base.

#### 6. *Pleuridium subulatum* (Huds.) Rabenh.

This very small species is somewhat similar to our *P. nervosum* (Sainsbury, 1955, p. 70) but has its leaves, except the comal and perichaetial which are erect, widely spreading, not with the lower leaves on the fertile stems and all the leaves on the sterile stems erect and closely appressed as is such a striking feature in *P. nervosum*, which also has a strong, well developed nerve and shorter cells in midleaf. In *P. subulatum* the long, narrow mid-leaf cells are almost indistinguishable from the ill-defined nerve.

Two gatherings are from Henderson, Auckland, on clay soil, one on a roadside, August 1, 1962, the other by a path, August 28, 1962, collected by Iris L. Barr. A third gathering is from near Piha, West Coast, Auckland, on side of drain, collected by Mrs Wormald, September 23, 1962.

These two localities are only about 10 miles apart in what can be considered artificial habitats near a large city, so it is likely that the species is an adventive. Mrs Barr states that it is common "out on the road by her gate, and also about two miles away". Brotherus (1924, p. 157) gives the distribution of the species as Europe, N. Africa, Madeira, Eastern Asia, and N. America.



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