TASMANIAN BRYOPHYTA.

By L. Rodway.

(Read April, 1912.)

INTRODUCTORY.

The Tasmanian Bryophyta have received a considerable amount of attention by both collectors and specialists, and the results of their labours are recorded in many different publications. Only two efforts have been made to compile the descriptions, first, in Hooker's noble "Flora Tasmaniae," published very many years ago, and, second, in Bastow's excellent little Handbooks of the Mosses and Hepatics. Unfortunately, many errors have crept in, and plants have been recorded as Tasmanian that probably do not live here. Also the treatment of this group has undergone considerable revision since these publications. The peristome has lost much of its charm for taxonomists, and more attention is paid to habit and structural features. But the principal reason why a revision of the group is at present justified is because the persistent labour of W. A. Weymouth has added about a hundred and nfty new species to our list; besides which he has submitted his large collection to European experts: the Hepatics to Stephani, the Sphagna to Warnstoft, Orthotrica to Venturi, and the rest to V. F. Brotherus. It seemed a pity such splendid work should be unavailable for the local student, and as Mr. Weymouth is indisposed to undertake it, the following articles are produced with his full consent.

The work will not be a mere compilation, but the descriptions will all be original from the specimens in Archer's, Weymouth's, and my collections, and, with few exceptions, these have been identified by the above-mentioned experts. Very few others will be included, and where this is so, full mention will be made. Otherwise all plants that cannot be verified will be excluded. This will, perhaps, mean rejecting some that should be included, but as this is intended somewhat as a new departure, it is best to go as far as possible in eliminating erroneous identifications. For this reason, and the necessity of abbreviation,

synonomy has been reduced to a minimum. Much interesting information, as the position of the male element, local and geographical distribution, description of variation, have been left out.

The botanical student will gain greatly from the study of this group, if only from the accuracy required to successfully pursue it. The microscope is an absolute necessity for the discrimination of species.

It is quite out of the question to avoid technicalities, but they have been reduced as far as consistent. Where reference is made to the shape and size of the cell of a leaf, this is to be understood to refer to the average cell at about the upper third of the organ.

BRYOPHYTA.

This is one of the primary groups of plants found today on the surface of the earth. It is clearly circumscribed, that is, it is not continuous with any other group. It is developed and expanded along lines peculiarly its own, bringing its existing members to a condition of specialisation that gives little hint whence they were descended. The reproductive organs are constructed upon similar lines to those of the ferns, and may indicate a like origin far back in the earth's history; or it may have been evolved as a lateral effect from a quite unknown and parallel line. Palæontology has not yet helped us.

The gametophyte is always the preponderating generation; in only one genus, the saprophytic Buxbaumia, is it relatively much reduced. The sporophyte is always dependent upon, and appears but a member of the gametophyte, so much so that it is generally referred to as the fruit.

Bryophytes are always small, sometimes minute. They mostly affect damp localities, some of them preferring partial or complete submergence. Their reproduction can only be effected by the aid of continuous water in at least sufficient quantity to enable the free swimming spermatozoids to reach the archegonia, a distance which, in some cases, is considerable.

In all cases bryophytes are homosporous, though in many instances the plants produced are strictly unisexual

The group is composed of two sections clearly marked off from one another, mosses and hepatics. There is a superficial resemblance, causing both to be spoken of as mosses, but the difference between them is great. When the spore of a true moss germinates, there is first produced a more or less copious development of a septate filament, the protonema, which bears a superficial resemblance to a filamentous alga. The moss plant appears as a bud upon this. With a hepatic the protonema is slight or absent, and the distinction between it and the plant body is not well marked. The plant in the former group is always differentiated into stem and leaf, and growth is apical from a single three-sided initial cell, except in Fissidens, where in the branches it is reduced to a two-sided wedge. In hepatics there is much greater variety of form from leafy stems to flat undifferentiated plates. The tissues are simple; in large forms there is often a simple water-conducting system, but no epidermis and no stomata. In some hepatics there is a peculiar air-conducting system, but of an entirely different character to that of the higher plants. Except in one genus, Anthoceros, the chloroplasts are small and discoid; in Anthoceros they are single and bell-shaped, a feature recalling the condition in some algae. The presence in this genus of pyrenoids is another feature peculiarly algal.

Propagation may be effected in either section in various ways, detached portions, buds, gemmae, or even single cells. This is commoner in the hepatics. Reproduction is always by antheridia and archegonia, which are considered strictly homologous with those organs, as found in ferns. The antheridia are simple flask-shaped, or rarely spherical, bodies, superficial, except in few hepatics, and derived from a single cell. The spermatozoids are elongated, curved, and bear at the anterior end two long flagella, by means of which they maintain energetic progression in water. The archegonia are flask-shaped, generally superficial, sunk in the frond in some thalloid hepatics. At maturity the archegonium contains one naked egg-cell in its venter, and the disorganised substance of the canal cells oozes out from the apex of the elongated neck. A spermatozoon attracted by this substance enters the archegonium and fertilises the egg.

The embryo soon surrounds itself by a wall, and immediately commences to develop. This new being, the sporophyte, remains permanently attached to the parent plant, sending a foot into it, through which it absorbs all or at

least the greater part of its nourishment. The shape of the sporophyte, or, as it is commonly called, the sporogonium, will be described under the proper sections, but it always consists of a capsule containing at maturity a mass of spores for dispersal, and is generally borne upon a stalk or seta.

In most instances the sporogonium has the appearance of a primitive organ that has been developed upon the gametophyte for the purpose of propagation, but there are not wanting evidences of reduction. True stomata are present on the capsules of many mosses, as well as those of Anthoceros, of a similar type to those formed in ferns and higher plants, and in many cases they appear functionless. As such they are more likely to be vestiges left from a vigorous, possibly independent, condition than a rudimentary development towards efficiency.

The leaves of mosses are seldom very delicate, and the sporogonium is formed of firm persistent tissue. The hepatics may not be leafy, and when these organs are present they are very delicate, easily injured, and the sporogonium is never of firm consistence, often is very fugacious, the seta being pellucid, and the capsule soon bursting into four valves.

MOSSES.

Upon germination from the spore the plant first develops an elongated filament, the protonema. It consists of very long cells divided by oblique septa. On damp ground Sphagnum produces a flat, broad protonema, very like the prothallus of a fern. Andreaea produces a small tuberous growth from which arise protonemal filaments, which may under suitable conditions grow again into flat plates or cylindric masses. All the other mosses produce filamentous protonemata, which have a superficial resemblance to the structure of a filamentous alga. The protonema is commonly short-lived, but it may normally in some species, as, for instance, Ephemerum, be long-lived, and may be induced in other mosses to prolong its life and extent by any circumstance that prevents the development of leafy buds. The typical shoot of the moss plant starts its growth as a lateral bud on the protonema.

The protonema never bears other organs than the bud, and as it also grows copiously from any part of the plant,

even sometimes from the sporogonium, it probably has little philogenetic interest.

The shoot may be simple or branched, but always bears leaves. These organs are generally one cell thick, but may have one or two thicker nerves, but no lateral veins. The surface may be increased by erect plates or papillae upon the upper surface, or by a papillose condition of the cells, but no cuticle or stomata are present.

In Sphagnum the antheridia are globose, stalked, and produced singly in the leaf axils of specialised branches. In all others they are flask-shaped, and may be terminal or lateral, according to species. The archegonia terminate the axis, or, in other cases, may be lateral upon very dwarfed lateral branches. The leaves surrounding the archegonia become enlarged into a perichaetium. The archegonial neck is long. The embryo sends an absorbent foot into the tissue of the parent, and its upper portion develops into a capsule. In most mosses between the foot and the capsule there is formed an elongated seta. The base of the archegonium may also grow into a short column, the vaginule, at the base of the seta. In Andreaea and Sphagnum there is little or no seta, but the capsule is carried up on a prolongation of the axis, the pseudopodium.

In a few primitive mosses all the internal cells of the capsule develop into spores or become disorganised. A steady sterilisation of tissue accompanies advance in type. In Sphagnum and Andreaea the centre remains as permanent tissue to form the columella, and a bell or dome-shaped band of tissue alone forms spores. In the higher mosses the apex of this also becomes sterile, and the archesporium is reduced to a narrow cylinder or band. When the sporogonium elongates it ruptures the wall of the archegonium near the base, and carries it up as a hood, the calyptra.

The capsule and seta, as maturity advances, become tough and of persistent quality. In some primitive forms the capsule does not burst, but depends upon rotting for spore dispersal. In Andreaea the escape of spores is effected by the capsule opening by four or more longitudinal slits. In all others special provision is made for dispersal at the top of the capsule. A lid is formed, which falls off at maturity. This is often assisted by a ring of hygroscopic cells, the annulus, formed at the junction of lid and capsule. The mouth may be open or closed by a membrane, or, more

commonly, it is adorned by one or two series of hygroscopic teeth, the peristome. When there are two series, the outer is the exostome, the inner the endostome.

The seta and capsule have an epidermis, and in some instances possess effective or abortive stomata.

The classification of mosses has exercised the ingenuity of botanists for many generations. Some few families can be readily sorted out, but the greater number of species are so much constructed on one type, it is next to impossible to arrange them in natural families. Formerly the peristome was largely used as a means of grouping, but it is now considered of too artificial a character, and general habit is more depended upon. The following families are represented in Tasmania, and a fuller description will be found under the proper headings.

Mosses may be classified into four natural, but very unequal divisions:—

ARTHRODONTS: so named because the teeth of the peristome are made up of many distinct cells, giving them a jointed appearance.

ANARTHRODONTS: the peristome teeth are not segmented off by cells, but have usually the character of simple bristles.

SCHIZOCARPS: without a mouth, the capsule opens by four or eight longitudinal slits.

SPHAGNA: bog mosses of spongy structure, and a very distinct habit.

Div. 1, ARTHRODONTEI.—The teeth of the peristome are transversely jointed; they are typically sixteen in number; each tooth may be simple, or may be split more or less deeply into two legs. On the other hand, they may be geminate, that is, united in pairs or bigeminate, that is, united in fours. Sometimes the peristome is reduced or absent; in a few forms no mouth at all is formed; in these cases the plant is placed here from the resemblance of its other characters. Nearly all mosses met with belong to this division; they have all the same character of soft delicate structure.

ARTHRODONTS are again divisible into two natural

sections that are to be recognised more from general habit than from consistent maintenance of the typical feature.

Section 1, ACROCARPS.—The fruit is borne on the end of the stem or branch. This may be obscured by a later growth thrusting the fruit to one side, or even, in some instances, mosses evidently having the closest affinity to this group may have laterally placed fruits.

Section 2, PLEURICARPS.—The fruit is normally lateral. Only in one genus, Hedwigia, which has affinity with both sections, is it apparently terminal.

The other divisions do not require special description.

The following rough guide may assist the student to refer his plant to its proper family :—

Div., ARTHRODONTEI.

Sec. ACROCARPI.

Fam. 1. TORTULACEAE.—Small, tufted. Leaves broad, rarely narrow; cells, small, round, or quadrate. Calyptra nearly always cucullate. Peristome single, when well-developed long and twisted, each tooth split low down into two slender legs; often much reduced or absent.

Fam. 2, DICRANACEAE.—Usually rather coarse. Leaves long, pointed; cells elongated, or in some small genera short, seldom papillose. Calyptra cucullate. Peristome single, teeth split above.

Fam. 3, GRIMMIACEAE.—Tufted or spreading. Leaves small, tough, and rather narrow; cells small, incrassate. Calyptra, except in Zygodon, mitriform. Peristome single, or with delicate filiform endostome processes; sometimes longer or absent.

Fam. 4, LEUCOBRYACEAE.—Leaves harsh, pale, formed of two kinds of cells, large empty ones, and intermediate narrow green ones. Peristome as in Dicranum.

Fam. 5, MNIACEAE.—Leaves soft, bright green, cells round, medium-sized, smooth. Fruit often from low down the stem. Both series of the peristome well-developed. Calyptra cucullate.

Fam. 6, FISSIDENTACEAE.—Leaves in two opposite rows, equitant; cells medium to large, papillose or smooth. Peristome single, of sixteen cleft teeth.

Fam. 7, BRYACEAE.—Erect, usually small. Leaves thin; cells rhomboid to linear, medium-sized, with thin walls. Peristome with both series well-developed.

Fam. 8, BARTRAMIACEAE.—Usually elongating. Leaves long, narrow, papillose; cells rectangular. Capsule broad, often globose. Peristome poorly developed or absent.

Fam. 9, SPLACHNACEAE.—Leaves thin, cells large. Capsule with a long or large neck. Calyptra minute.

Fam. 10, FUNARIACEAE.—Leaves thin, cells large. Capsule with a short, narrow neck. Calyptra with a large inflated base.

Sec. PLEURICARPI.

Fam. 11, HYPNACEAE.—Forms very diverse. Leaves thin, cells small, round to vermiform. Calyptra cucullate. Seta very long.

Fam. 12, NECKERACEAE.—Forms very diverse. Leaves various, cells usually round, small. Seta short to medium.

Fam. 13, LOPHIDIACEAE.—Usually erect. Leaves in three rows, two equal and lateral, one dorsal, and much smaller; cells rather small, round. Calyptra cucullate.

Fam. 14, PTERYGOPHYLLACEAE.—Leaves delicate; cells large, round, or nearly so. Calyptra mitriform.

Div. ANARTHRODONTEI.

Fam. 15, POLYTRICHACEAE.—Robust. Leaves narrow, usually harsh, linear, upper surface bearing longitudinal plates. Peristome teeth numerous, simple, very short, or long in Dawsonia.

Fam. 16, BUXBAUMIACEAE.—Small, erect, almost leafless. Capsule flat.

Div. SCHIZOCARPEAE.

Fam. 17, ANDREACEAE.—Brown or blackish-purple. Of hard texture. Cells round incrassate. Capsule opening by four longitudinal slits.

Div. SPHAGNALES.

Fam. 18, SPHAGNACEAE.—Soft, spongy, pale. Stems long, branches in whorls. Leaf cells of two kinds; large inflated tracheids, between which are narrow linear chlorophyllous ones.

Fam. 1—TORTULACEAE.

Generally small, sometimes minute, erect with few branches, rarely procumbent (Leptodontium). Leaves small, usually relatively broad, sometimes narrower to almost linear; cells small, rotund, quadrate, not incrassate, or slightly so; surface with nodulose papillae, or sometimes smooth; cells of the base commonly rectangular and colourless. Capsule erect, oblong to cylindric, globose in some minute forms, usually raised on a long slender seta; lid, conic or rostrate; calyptra narrow cucullate, mitriform in Encalypta; peristome single, absent in some small forms, of 16 short teeth in many others, culminating in a fine peristome, with a tubular cribiform base and 32 slender-twisted legs. In some small forms the capsule has no lid, and the spores are only liberated by the rotting of its walls.

A large and well-circumscribed family, the members of which will be easily recognised, but not readily defined. It is divisible into

four series: 1, Small forms with lidless capsules; 2, ovate-leaved forms, culminating in Tortula; 3, narrow-leaved forms, reaching the highest development in Barbula; 4, a genus with a calyptra that grows greatly at the base so as to form at maturity a large mitre, Encalypta. Though placed as the last forms of two series, Tortula and Barbula are very close, and there is no line of demarcation between them.

Lidless.

EPHEMERUM: Capsule globose, apiculate.

ACAULON: Capsule globose, not apiculate.

PHASCUM: Capsule oblong.

Leaves broad, usually obtuse, with a shortly excurrent nerve or hair point.

POTTIA: Leaves ovate; peristome absent.

TORTULA: Leaves ovate to broad; apiculate to hair pointed; peristome from rudimentary to well-developed.

STREPTOPOGON: Leaves broad, with a broad pale border.

Leaves lanceolate, acuminate.

WEISSIA: Small, erect; leaves linear-lanceolate; peristome small or none.

EUCLADIUM: Slender, erect; leaves linear-lanceolate; nerve vanishing.

TORTELLA: Leaves linear, yellowish; nerve shortly excurrent; peristome well-developed.

LEPTODONTIUM: Habit procumbent, elongated; leaves ovate, acute; peristome long, straight.

HOLOMITRIUM: Decumbent; leaves linear, green; nerve vanishing; lid very long subulate; peristome teeth short, incurved.

BARBULA: With a rufous tinge; leaves shortly lanceolate, acute, or acuminate; peristome short, to long, and twisted.

ENCALYPTA: Small, erect; calyptra very large, mitriform.

EPHEMERUM Hampe.

Minute and simple, arising from a peristent, byssoid, protonema. Leaves few, lanceolate; cells rhomboid, large and colourless. Capsule immersed in the leaves, globose, apiculate; calyptra thin, campanulate, cleft or lacerate at the base.

Microscopic, short-lived mosses, growing from a persistent alga-like protonema. Easily overlooked. There may be more than the one species in Tasmania.

EPHEMERUM CRISTATUM, H.f.W.

"Monoicus, very small, upon the filiform protonema. Leaves spathulate or lanceolate, acuminate, incised dentate, dentate on the nerve. Capsule immersed, subsessile, ovate-globose with an acute apiculus; calyptra campanulate, red-brown." Mitten.

Cheshunt.

Absent from all available collections.

ACAULON C. Muell.

Minute, gemmiform. Leaves in three rows, the upper ones largest, concave connivent; cells large rhomboid. Capsule nearly sessile, enclosed in the leaves, globose, not apiculate; calyptra very small, conic.

ACAULON APICULATUM, H.f.W.

Minute, yellow, the whole plant under 2 m.m. Leaves few, very broadly ovate, apiculate, serrate, nerve continuous. Capsule red, 0.3 m.m., nearly sessile within the leaves, globose.

Cheshunt, Bellerive, Domain, Hobart, etc. Fairly common on retentive soil; vanishing at the end of spring.

PHASCUM (L.) Schreb.

Very small, tufted, gregarious. Leaves ovate or lanceolate, entire, cells rhomboid-hexagonal, usually papillose. Capsule subglobose or ovate, obliquely apiculate, without a lid or mouth, on a very short seta, and usually immersed in the leaves.

PHASCUM CYLINDRICUM, Tayl.

Usually densely caespitose, about 4 m.m., inclusive of capsule. Leaves few, thick, papillose, acute, nerve continuous, about 1 m.m. Seta erect, strong, 1—1 5 m.m. Capsule erect, reddish, shining, narrow, oblong, apiculate, 1—2 m.m.

Domain, Hobart, Macquarie Plains, etc.

POTTIA Ehrh.

Small, simple, or divided in caespitose or pulvinate groups. Leaves broad, obovate or spathulate, pointed; cells rather large, quadrate-hexagonal, rectangular, and colourless at the base. Capsule, turbinate or subcylindric, teeth rudimentary or imperfect, sometimes absent; when well-developed, flat, lanceolate and bipartite; in a few instances the lid minute, and not falling, closely approximating to Phascum.

A group of small plants closely allied on the one side to Phascum, on the other to small forms of Tortula.

POTTIA TASMANICA, Broth.

Minute, erect, without the seta about 1 m.m. Leaves erect, broadly ovate, apiculate, papillose, margin recurved; nerve bold, continuous. Seta 2 m.m., capsule erect, oblong, 0.5 m.m.; lid, conic; peristome, none.

On the ground near Brighton.

TORTULA Hedw.

Small, erect, simple, or with few branches, generally caespitose, green, rarely brownish. Leaves from broad to spathulate, the greatest breadth above the middle; apex obtuse, but sometimes slightly acuminate; nerve excurrent in a short point, or colourless hair; cells rather small, rotund, or quadrate, opaque with a nodulose-papillate surface, rarely smooth; those towards the base longer and colourless. Capsule, oblong to cylindric, equal or slightly oblique, erect on a long seta; lid, conic to rostrate; calyptra, narrow, cucullate, long; peristome, from rudimentary to long and twisted with a cribrose base.

A large genus continuous with Pottia, and closely allied to Barbula, but forming a natural group. Separable into two sections, one with the nerve terminating in a short, stiff point, the other in a long colourless hair.

Leaf with a short, stiff point.

Peristome short; plants small.

Dark green; peristome straight—atrovirens.

Pale green; peristome twisted—recurvata.

Peristome long; plants robust.

Lid as long as the fusiform capsule ..... pungens.

Lid shorter than the cylindric capsule ..... pseudopilifera.

Leaf with a colourless hair point.

Surface papillate.

Margin plain ..... princeps

Margin revolute ..... muralis.

Surface smooth ..... papillosa.

TORTULA ATROVIRENS (S.M.) Lindb.

Syn: Desmatodon nervosus, Br. Sch.

Small and usually massed in clusters. Stem about 2 m.m. Leaves dingy green, oblong, 1.7 m.m.; nerve very bold, reddish, just excurrent in a short, dense apex; cells small, opaque, quadrate, the surface with a short nodulose papilla, basal cells rectangular; margin closely revolute. Seta slender, about 1 c.m.; capsule oblong, erect, 1 m.m.; lid short, conic; peristome teeth red, arising from a short basal membrane, irregular, unequal, usually rather short, and banded in pairs, not twisting, often very reduced.

Very common on ground.

TORTULA RECURVATA, Hook.

Stems very short, erect, tufted. Leaves pale green, oblong, 2 m.m.; nerve bold, shortly excurrent in a hard point; margin closely revolute, surface minutely nodulose; cells irregularly quadrate above, rectangular below. Seta slender, 2 c.m.; capsule fusiform to cylindric, unequal, 2 m.m.; lid short, conic; peristome teeth red, short, divided to the base, twisted.

On the ground Bellerive, Swansea

TORTULA PUNGENS, H.f.W.

Dark green, in loose cushions. Stems 1—2 c.m. Leaves mostly in a terminal coma, spreading, 2—2.5 m.m., narrow, oblong, flexuose, apex obtuse or round, with a slight acuminate centre; margin plain; nerve shortly excurrent in a hard point; cells rotundo-quadrate, surface obscurely nodulose, basals linear; perichaetials loose, often not distinct. Seta pale, 1—2 c.m.; capsule fusiform, 2 m.m.; lid subulate, as long as the capsule; peristome teeth long, slender, red, split to the base, irregularly twisting.

Kingston, Margate, Sheffield.

TORTULA PSEUDOPILIFERA (Hpe C.M.)

Very similar to the last, more robust, stems ascending, 2—4 c.m. Leaves patent, oblong, obtuse, mostly 3 m.m; margin revolute in the middle, plain above; nerve shortly excurrent in a hard point; cells rotundo-quadrate, opaque; surface finely nodulose papillate; perichaetials loosely sheathing with subulate apices. Seta 3 c.m.; capsule cylindric oblique, erect, or nearly so, 3—4 m.m.; lid conic, half length of capsule; peristome pale, basal membrane short or none, teeth slender, very irregularly twisted.

Wattle Hill, Margate. Foot of Mt. Wellington.

TORTULA PRINCEPS, De Not.

Syn. T. Muelleri Br. Schimp.

,, antarctica Hpe.

,, rubella H.f.W.

,, pandurifolia Hpe. C.M.

,, cuspidata, H. f. et W.

Tufted. Stems about 1 c.m. Leaves lyrate-spathulate to broadly ligulate, obtuse, 3 m.m.; tipped with a cuspidate colourless point half the length of leaf; margin recurved below, plain above; nerve continuous; cells more or less opaque, quadrate, obscurely papillose, lower ones rectangular. Seta red, about 2 c m.; capsule narrow, cylindric, slightly oblique, mostly 3 m.m.; lid cylindric to conic, about half length of capsule; peristome red, rather long, twisted, lower portion a white cribrose tube.

Very common on rocks and earth. Variable in robustness of detail, upon which many species have been established.

TORTULA MURALIS (L.) Hedw.

Small, but generally closely massed. Stems about 5 m.m. Leaves densely crowded, oblong to ligulate, obtuse, 1.5 m.m., the upper ones with a plain hair point longer than themselves; margin strongly revolute; nerve bold; cells opaque, irregularly quadrate, the nodulose papillae very depressed. Seta 1 c.m.; capsule fusiform dark, 1.5 m.m.; lid half as long or shorter, conic oblique; peristome red, short, twisted.

Very common, principally on walls.

TORTULA PAPILLOSA, Wils.

Densely tufted, forming dark green mats on living bark. Leaves recurved, short, very broadly spathulate to almost rotund, very obtuse, with a short hyaline hair; margin plain; nerve broad, continuous, usually bearing gemmae on the upper surface, with prominent irregular papillae on the lower surface; cells smooth, rotund, thin-walled, not opaque, lower ones larger quadrate. Capsule not seen. "Capsule erect, short, on a short seta, cylindraceous; lid conico-subulate, oblique; peristome pale, half-length of capsule, its lower third tubular." Braithwaite.

Very common on elm, willow, etc., in gardens.

STREPTOPOGON (Hampe).

Rather robust, pulvinate. Leaves thin, almost pellucid, with a bold nerve, margined with a band of three or four series of elongated colourless cells, minutely serrulate; cells incrassate, rotund, minutely papillose, in the lower portion very long, linear, yellow, continuous with the margin. Fruit absent in all available collections. Calyptra recorded as mitriform.

STREPTOPOGON CRISPATUS (Hampe).

Syn: Tortula mnioides, Schew.

Yellowish green, stems 2.4 c.m. Leaves patent, crowd-

ed, ovate, with a narrow base and acute apex, 4 m.m.; very crisped when dry, bearing gemmae on the upper surface; midrib red, slender, excurrent in a short or long cuspidate point.

On branches of trees, Mt. Wellington, Mt. Roland.

WEISSIA (Hedw).

Small, simple, erect, usually grouped in caespitose patches. Leaves narrow, with a well-developed rib, vanishing near apex, or shortly excurrent, papillose and opaque, rarely smooth and transparent; cells small, quadrate, incrassate, those below rectangular thin walled. Capsule oblong, erect, or slightly inclined, with a thickened annulus; calyptra cucullate, lid rostrate; peristome of 16 irregular, short, entire, perforate or cleft, erect, teeth, or absent, mouth is then often closed by a membrane.

Gymnostomous.

Nerve vanishing ..... calcarea.

Nerve excurrent ..... weymouthi.

With a peristome.

Nerve vanishing.

Cells nodulose .....microcarpa

Cells smooth ..... bicolor.

Nerve excurrent ..... flavipes.

WEISSIA CALCAREA, C.M.

Syn: Gymnostomum calcareum, Nees.

Very small, caespitose in a flat mass. Stems seldom exceeding 2 m.m. Leaves erecto-patent, spathulate, rather obtuse, 1.5 m.m.; nerve well-developed, vanishing in the upper portion; cells quadrate, incrassate, prominently papillose, rectangular and thin-walled below. Seta about 5 m.m.; capsule slightly inclined, narrow, oblong, constricted below the narrow red annulus, 1 m.m.; lid rostrate half to as long as capsule; peristome none; mouth furnished with a narrow membraneous border.

On damp rocks in shade.

WEISSIA WEYMOUTHI, C.M.

Small, caespitose, yellow, stems usually 2 m.m. Leaves patent, lanceolate with a broad base and acute apex, concave, 3 m.m.; surface and margin minutely papillose; nerve rather broad, shortly excurrent; cells opaque, small, quadrate, rectangular below. Seta about 1 c.m., capsule oblong, erect, or nearly so, annulus red, 1.3 m.m.; lid rostrate, half as long; peristome none.

WEISSIA MICROCARPA. Hf et W.

Small, usually in dense caespitose masses; stems simple, under 1 c.m. Leaves narrow, recurved, concave, acute, 2 m.m.; margin irregularly subserrulate; nerve narrow, canaliculate, vanishing below the apex; cells rather regular, rotundo-quadrate, mostly less than 6 u. in longest diameter, minutely nodulose; those of the base long rectangular. Seta 1.5 c.m.; capsule broadly oblong, erect, 1 m.m.; annulus dark; lid with a subulate rostrum, quite half as long; peristome short and irregular.

Common on shady banks. Mt. Faulkner.

WEISSIA BICOLOR (Hpe).

Very similar to W. microcarpa. Leaves obtuse to subacute, sometimes with an acute indurated apex, 1.8 m.m.; margin undulate, otherwise plain; nerve medium breadth, canaliculate, not well-defined, and vanishing at a distance from the apex; cells strongly incrassate, very irregular, rotundo-quadrate to oblong, up to 20 u. in longest diameter, quite smooth, those at the base linear, their lumina often connected. Seta 1 c.m.; capsule oblong, 0.8—1 m.m.; lid rostrate, about half as long; peristome teeth short, erect, lanceolate, irregular.

Mt. Wellington, Mt. Nelson, Mt. Field, etc. On damp rocks.

WEISSIA FLAVIPES, Hf et W.

Small, yellowish, caespitose, stems 5 m.m. Leaves patent, linear-lanceolate, very acute, 3 m.m., concave; margin involute to plain; nerve excurrent; cells opaque, irre-

gular, rotundo-quadrate, nodulose, lower ones rectangular. Seta slender, yellow, 1.5—2 c.m.; capsule narrow, oblong, not constricted at the mouth, erect, 1.5 m.m.; annulus red; lid rostrate, half as long; peristome teeth irregular, entire, or perforated above.

On the ground. Common.

EUCLADIUM, Schimp.

Medium or small, slender, tufted, simple, or with few dichotomous divisions. Leaves lanceolate, with a bold nerve, papillate, not opaque, cells quadrate, rectangular in the lower part. Seta rather long and slender, capsule erect, ovate; lid rostrate; peristome of 16 erect teeth, which may be entire or bi-trifid, sometimes wanting.

Differing from Weissia only in the taller growth.

EUCLADIUM TASMANICUM, Broth.

Pale green; stems very slender, about 2 c.m. Leaves squarrose, recurved, subacute, narrow linear-lanceolate, 1 m.m.; concave, margin and surface strongly papillose, rib vanishing below the apex. The rest not seen.

On limestone near Frenchman's Cap. (T. B. Moore.)

TORTELLA, C.M.

Medium-sized, tufted. Leaves linear, rather long, with a bold nerve and a white hyaline sheathing base, papillose; cells rather small quadrate, those of the hyaline base large rectangular, very thin-walled. Seta long; capsule erect, ovate or cylindric; lid conic or rostrate; peristome of 16 slender teeth, often twisted.

Intermediate between Weissia and Barbula.

TORTELLA KNIGHTII (Mitt).

Syn: Barbula Knightii, Mitt.

Yellowish green, densely caespitose, stems usually under 1 c.m. Leaves crowded, squarrose, linear, acute re-

curved, undulate, 4—5 m.m.; upper edge of hyaline sheath ascending from rib to margin; rib rather slender, shortly exserted. Seta 2—3 c.m.; capsule erect, cylindric, 2 m.m., yellow; annulus red; calyptra long, acute; lid conic, rather obtuse, half as long as capsule; peristome teeth pink, slender, free from the base, twisted, more than half as long as the capsule.

On ground and deadwood, Mount Wellington.

LEPTODONTIUM Hampe.

Suberect or decumbent, often elongated and branched. Leaves small, ovate, squarrose; nerve bold, vanishing below the apex; cells irregularly rotund, incrassate, the surface papillose, rough with acute nodules. Capsule narrow, erect; lid conic; calyptra cucullate; peristome of 32 filiform, straight, smooth, unequal legs.

LEPTODONTIUM PAPILLATUM (Hf. et W.)

Syn: Didymodon papillatum, Hf. et W.

Habit decumbent, spreading, dark, the tips yellowish green, stems often 2—4 c.m. Leaves patent, ovate, acute, imbricate, trifarious, coarsely papillate, 1.5 m.m.; margin revolute, except at the apex; nerve rather narrow, vanishing below the apex; cells rotund, incrassate, only slightly enlarging towards the base. Seta 1 c.m.; capsule 1.5 m.m. Very seldom found in fruit.

On ground about Hobart, New Norfolk, etc.

HOLOMITRIUM, Mitt.

Shortly creeping with erect, simple branches, forming loose tufts. Leaves subulate from a short sheathing base, smooth; nerve slender, vanishing at the upper third of the lamina; cells small, round, incrassate, those of the base larger, rectangular. Seta long; capsule narrow, oblong erect; lid subulate long; calyptra long, narrow, split on one side at the base. Peristome of 16 short incurved teeth appearing as a cone at the mouth of the capsule.

HOLOMITRIUM PERICHAETIALE, Brid.

Syn: Symblepharis perichaetialis, Wils.

Stems depressed, branches few, erect, dark green. Leaves linear, from a short, narrow sheathing base, patent to squarrose, undulate, 3.5 m.m.; margin undulate, plain; apex sub-acute. Perichaetials longer sheathing; cells vermiform; nerve excurrent in a long hair point. Capsule 3 m.m.; lid very slender, as long as the capsule.

On deadwood, Koonya.

BARBULA, Hedw.

Habit that of Tortula, but generally tinged with brown. Leaves small, lanceolate to ovate, tapering from a broad base to an acute or sub-acute apex; nerve vanishing or shortly excurrent; cells small papillose, rotundo-quadrate, the basal ones small and rectangular. Seta long; capsule oblong to cylindric; calyptra cucullate; lid conic to rostrate; peristome from short incurved to long and twisted, usually with a short or no basal membrane.

Distinguished from Tortula only by the ferruginous colour and acuminate leaves. The two genera are often combined.

Nerve vanishing in apex.

Lid conic. Peristome short ..... rubella.

Lid rostrate. Peristome long..... australasiae.

Nerve continuous or excurrent.

Perichaetials very long..... calycina.

Perichaetials short.

Margin revolute..... subtorquata.

Margin revolute in lower part only
... ... unguiculata.

BARBULA RUBELLA (Hoff), Mitt.

Loose, procumbent, dark green, in the younger protions becoming ferruginous red; stems slender, mostly 1—2 c.m. Leaves patent, slightly recurved, nearly flat, oblong lanceolate, rather obtuse, but with usually a short apiculus, 1.5 m.m.; cells small, papillate, rather opaque; midrib

very prominent on the lower surface, vanishing in the apex. Seta slender, 2—3 c.m.; capsule erect, cylindric, 1.5 m.m.; lid conic; peristome teeth pale red, short, erect, on a short basal membrane.

On deadwood and on ground Bellerive.

BARBULA AUSTRALASIAE, H.f. et W.

Small, in dense reddish-brown tufts; stems erect, usually under 5 m.m. Leaves erecto-patent, slightly recurved, 1—2 m.m.; lanceolate, from a broad sheathing base tapering to an acute apex, concave; midrib dark, broad, flat, lost in the apex; margin incurved; cells rotundo-quadrate, strongly incrassate, very obtusely papillate. Seta 1 c.m.; capsule erect, dark brown, ovate-cylindric, 1 m.m.; lid rostrate-conic, nearly as long; peristome teeth nearly as long as the capsule, straight, or very nearly so.

On ground Bellerive, Eaglehawk Neck.

BARBULA CALYCINA, Schw.

Robust for the genus in dense ferruginous tufts, stems erect, 1—2 c.m. Leaves crowded, erecto-patent, ovate-lanceolate, 3 m.m.; nerve bold, continuous or shortly excurrent; cells rotund, incrassate, nodulose-papillate, lower ones linear, colourless. Perichaetials very long, closely sheathing. Seta yellow, long and slender, 4—5 c.m.; capsule erect fusiform, 1.3 m.m.; lid with a subulate rostrum as long as the capsule; peristome pale, twisted, as long as the capsule, the teeth split to the base; calyptra very long, filiform.

Slopes of Mt. Wellington. Common.

BARBULA SUBTORQUATA, C.M. et Hampe.

Stems in loose tufts, usually 1 c.m., high, brownish. Leaves lanceolate, tapering to a very acute point, 2 m.m.; margin revolute; nerve rotund continuous; cells small, rotundo-quadrate, smooth or obscurely papillose, incrassate, elongated and subhyaline below. Seta slender, 2—3 c.m., red; capsule cylindric, slightly oblique, dark, 2 m.m.; lid cylindric, half as long; peristome with a short base, closely twisted.

On ground Eaglehawk Neck.

BARBULA UNGUICULATA (Huds), Hedw.

In loose depressed mat., yellowish green, then brownish stems, 1—2 c.m. Leaves patent, ovate-lanceolate, acute from the thickened, shortly excurrent nerve, about 2 m.m.; lower margin recurved; nerve bold, keeled, shortly excurrent; cells quadrate, not strongly incrassate, obscurely papillate. Seta 2—3 c.m., purple; capsule narrow, oblong; lid conic-subulate, no annulus; peristome deep red, twisted.

On ground New Town.

ENCALYPTA, Schreber.

Small caespitose or solitary. Leaves ligulate or spathulate; cells round or rectangular, becoming rather longer and colourless towards the base. Capsule cylindric, erect; lid long, rostrate; calyptra mitriform, rostrate, very large, and exceeding the capsule; peristome none, or of 16 small, simple, or divided teeth.

ENCALYPTA AUSTRALIS, Mitt.

Erect, simple, about 2—10 m.m. Leaves dark green, crowded, erect, broadly elliptic, obtuse, 2 m.m.; nerve red, broad, vanishing in the apex; cells rather large quadrate, coarsely nodulose, papillate. Seta 2—10 m.m.; capsule smooth, broadly cylindric, erect, 2 m.m.; annulus red; lid nearly flat with a subulate rostrum nearly as long as the capsule; calyptra mitriform, 5 m.m.; peristome absent.

Lindisfarne, Bellerive, Waterworks, Hobart.

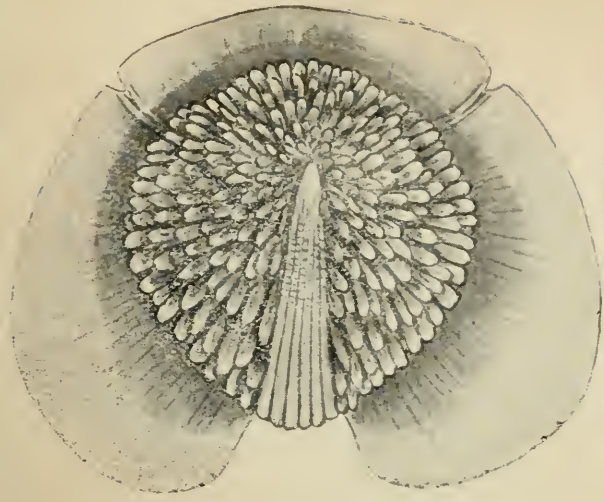

Fig. 1.

Fig 2.

Fig. 4.

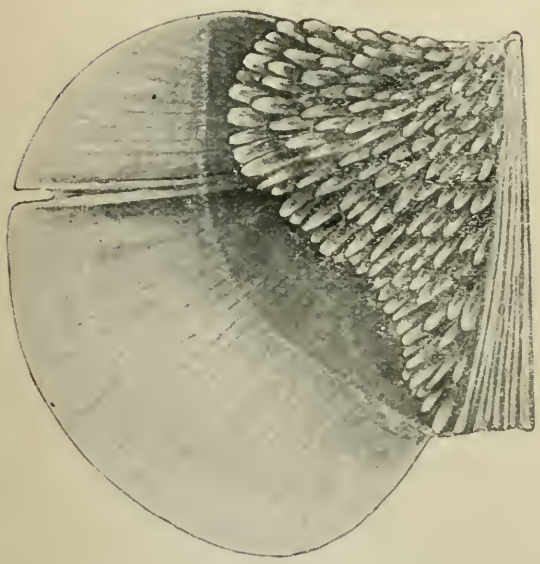

Fig. 3.

Fig. 5.

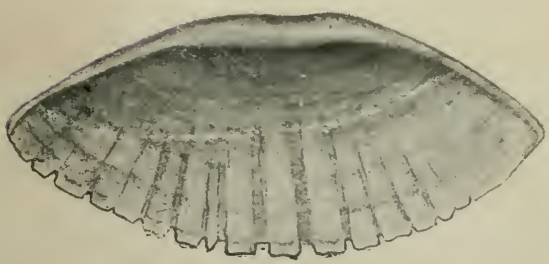

Fig 6.

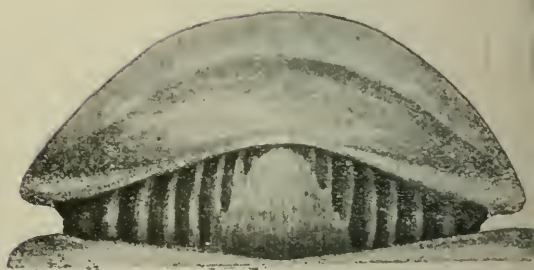

Fig. 7.