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# THE GENUS TRENTEPOHLIA IN SOUTH-EASTERN QUEENSLAND

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## SUMMARY

The genus *Trentepohlia* is recorded for the first time from Queensland. The following species are listed and discussed: *T. aurea* (L.) Martius, *T. bossei* de Wild., *T. odorata* (Wiggers) Wittr., *T. rigidula* (Muell. Arg.) Hariot, *T. abietina* (Flot.) Hansg., *T. effusa* (Kremp.) Hariot, *T. bogoriensis* de Wild..

The Trentepohlieae are a widely distributed group of subaerial algae, particularly well developed in tropical and subtropical regions; however, up to the present, no representatives have been recorded from Queensland apart from the record by Bailey (1913) of *Mycoidea parasitica* Cunningham.

The cells typically contain an orange-red haematochrome, and members of the genus *Trentepohlia* are reported to be responsible for brilliant colouring of rocks, walls and tree trunks in some localities. Biswas (1932) describes the colour effects on the trunks of *Oreodoxa regia* in Calcutta due to lichens and various algae, among which are several species of *Trentepohlia*. In south-eastern Queensland, only one species, *T. odorata*, is responsible for brilliant colouring of exposed surfaces, and this species prefers well weathered hardwood to the trunks of living trees. Any yellow-green or orange-red colouring of the latter is due usually to *Protococcus viridis* Ag. and to various lichens.

### Key to the Species of *Trentepohlia* from South-Eastern Queensland

- Capillary projections present on many cells ..... *T. bogoriensis*
- Capillary projections absent
  - Cells mostly under 10  $\mu$  diam.
    - Filaments often tapered towards the apex; cells 2-4(6) diam. long ..... *T. effusa*
    - Filaments usually not tapered towards the apex, except for the apical cells; cells 1-2 diam. long ..... *T. abietina*
  - Cells mostly over 10  $\mu$  diam.
    - Cells cylindrical or almost so
      - Filaments usually not over 600  $\mu$  long, readily dissociating; forming a pulverulent stratum ..... *T. odorata*
      - Filaments usually over 600  $\mu$  long, not dissociating readily; stratum usually somewhat furry
        - Cells mostly  $1\frac{1}{3}$ -2 diam. long ..... *T. bossei*
        - Cells mostly 2-4 diam. long ..... *T. aurea*
    - Cells barrel-shaped, sub-ellipsoid or sub-globose
      - Filaments closely associated to form a more or less pulverulent stratum; cells mostly about 1 diam. long ..... *T. odorata*
      - Filaments not closely associated to form a more or less pulverulent stratum; cells mostly 1-2 diam. long ..... *T. rigidula*

*Trentepohlia aurea* (L.) Martius Pl. 1, fig. 8-10.

Hariot 1889, p. 366; 1890, p. 192; de Wildeman 1891, p. 131, pl. 17, fig. 1-6; Printz 1939, p. 153, pl. 7, fig. G-P, pl. 11, fig. W.

The long, sparsely branched filaments, sometimes gradually tapered, are composed of cells 10-22  $\mu$  broad and 2-4 (6) diam. long. In the collections available, the sporangia are sessile and either terminal or lateral. In one collection the apical cells commonly carry irregular caps of wall material, but in other respects this specimen is similar to the other collections.

*Hab.*: On tree trunks or rocks in light rainforest, often very common in forests of *Nothofagus moorei* (Muell.) Krasser, where the orange to green tufts of filaments may occur densely on rocks, tree trunks and twigs of *Citriobatus*. McPherson Range, *all seasons*, sporangia *Nov.-Dec.* (J. W. Herbert).

*Trentepohlia bossei* de Wildeman Pl. 1, fig. 1-7.

De Wildeman 1891, p. 134, pl. 18, fig. 4-13; Printz 1939, p. 150, pl. 2, fig. I-M, pl. 5, fig. A-E.

Specimens assigned to this species are frequently found in the same habitat as *T. aurea*, and may be superficially very similar to specimens of that species. Both occur as loose tufts of intricate filaments or as a furry mat of limited extent. They may sometimes be distinguished under a lens by the somewhat silken sheen of filaments of *T. aurea* compared with the dull appearance of those of *T. bossei*. Though the plants here assigned to *T. bossei* undoubtedly come very close to some specimens which have been referred by various authors to *T. aurea* they may readily be distinguished from Queensland representatives of this latter species by the proportionally shorter cells which are 1½-2 diam. long compared with 2-4 (6) diam. long in *T. aurea*. *T. bossei* is further distinguished from Queensland plants of *T. aurea* by the possession of pedicellate as well as sessile sporangia.

De Wildeman gives the cell dimensions of this species as 9-12  $\mu$  broad and 2-3 diam. long, which is somewhat smaller and proportionally longer than in most Queensland filaments. However, Printz (1939) gives dimensions of 9-19  $\mu$ , which correspond well with the Queensland plants, and both authors figure filaments in which many cells have proportions similar to those found in Queensland specimens.

Growth of a branch from the supporting cell of a sporangium and even from the sporangium, and apparent supporting cells in an intercalary position were noted by de Wildeman, and have been seen also in the Queensland material.

*Hab.*: On tree trunks or rocks, usually in light rainforest. McPherson Range, Cunningham's Gap, Noosa Heads, *all seasons*, sporangia *June*.

*Trentepohlia odorata* (Wiggers) Wittrock Pl. 2, fig. 1-9.

Hariot 1889, p. 397; 1890, p. 195; Printz 1939, p. 160, pl. 12, fig. B.

*T. umbrina* (Kuetzing) Bornet; Hariot 1889, p. 400, pl. 8; Printz 1921, p. 28, pl. 9, fig. 264-273, pl. 10, fig. 274-289; 1939, p. 159, pl. 11, fig. A-J.

This species occurs very commonly in south-eastern Queensland on well-weathered hardwood such as telegraph poles, unpainted fences, and ringbarked

Eucalypts which have lost their bark, but has not yet been collected on bark. It is found predominantly, or sometimes almost exclusively, on the southern aspect of the substratum and forms an extensive, compact, velvety, orange-red stratum which appears brightest during wet weather when it may sometimes give the substratum the appearance of being painted. The stratum is very pulverulent and readily stains the fingers when touched. When moistened it gives off a faint to strong odour of violets.

In poorly developed plants, appearing as a pale orange stain, the short irregularly branched prostrate filaments are arranged without order in a thin stratum one to few cells thick. However, in better developed plants numerous more or less erect closely packed branches are present, sometimes more or less parallel, sometimes rather irregularly placed, to form a compact stratum to 600  $\mu$  high.

Cells of the basal filaments are subglobose to ellipsoid, those of the erect filaments usually subcylindric to cask-shaped, and generally about as long as broad, or a little longer or shorter, 17-25 x 14-24  $\mu$ . Cell walls are sometimes thin and smooth, particularly in some of the basal filaments, but in erect filaments are usually thicker, 2-4-(7)  $\mu$ , and often roughened and shaggy-scaly.

Sporangia are globose to subglobose, 20-30  $\mu$  diam., sometimes lateral but more usually terminal and either sessile or on a pedicel consisting of a bulbous basal portion and slender upper portion generally curved or with a sharp knee-like bend.

*T. odorata* and *T. umbrina* seem to have been distinguished mainly on the nature of the stratum, that of *T. umbrina* being of filaments arranged without definite order, that of *T. odorata* being generally thicker and of mainly erect more or less parallel filaments. Hariot (1889) has pointed out the close similarity between these two species and regards *T. umbrina* as a variety of *T. odorata*. Printz (1939) however, in his monograph of the genus, keeps these two species separate. From an examination of the Queensland material I can see little justification for this as there seem to be all gradations between strata with filaments irregularly arranged and those with erect filaments more or less parallel. I therefore follow Hariot rather than Printz, in regarding *T. umbrina* as a synonym of *T. odorata*.

*Hab.*: Widely distributed on the southern face of hardwood surfaces in open country, S.E. Queensland, *all seasons*.

*Trentepohlia rigidula* (Muell. Arg.) Hariot Pl. 3, fig. 1-19.

Hariot 1889, p. 403, fig. 17; 1890, p. 195; Printz 1939, p. 161, pl. 9, fig. B-E.

*T. torulosa* de Wildeman 1888, p. 181; 1891, p. 139; Bruhl & Biswas 1923, p. 21, pl. 7, fig. 25, a-f.

*T. monilia* de Wildeman 1888, p. 181.

*T. monile* de Wildeman 1891, p. 140, pl. 19, fig. 15-17.

*T. moniliformis* Karsten 1891, p. 11, pl. 2, fig. 1, 10; Hariot 1892, p. 115.

*Physolinum monile* (de Wildeman) Printz 1921, p. 23, pl. 13, fig. 306-312; 1939, p. 190, pl. 32, fig. A-C (as *P. monilia*).

*Trentepohlia monile* has been distinguished from *T. rigidula* by the stronger constriction between cells and by the very thin, smooth cell wall, that of *T. rigidula* being thicker and roughened. The two species are maintained by

Printz (1939), although earlier Hariot (1892) believed the two to be the same, and Bruhl and Biswas (1923) reported an Indian specimen more or less intermediate between the two.

Some Queensland collections could be confidently assigned to either *T. monile* (e.g. pl. 3, fig. 10-19) or to *T. rigidula* (e.g. pl. 3, fig. 1-9), but another collection shows all intermediate conditions between the two with regard to cell shape and cell wall characters, and leaves no doubt that the specimens are all to be assigned to the one species.

Sporangia, which were found only in the plants with roughened walls, were lateral or terminal and sessile, or intercalary. Pedicellate sporangia, as reported by de Wildeman (1891) and Bruhl and Biswas (1923) were not found.

Specimens with roughened walls are distinguished from *T. odorata* by the absence of a pulverulent stratum and by the more distinctly torulose erect filaments.

Printz (1921) has removed *T. monile* to a distinct genus, *Physolinum*, distinguished from *Trentepohlia* by the fact that "new cells always originate from apical or lateral protruberances of older cells . . .", and that the sporangia produce aplanospores. However, depending on conditions, cell contents in some green algae become divided into either zoospores or aplanospores. Also, growth of the filament is mainly apical in *Trentepohlia*, and it is doubtful whether the type of cell division found in *T. monile* differs fundamentally from that in the other species of the genus. The type of division found in Queensland plants of *T. rigidula* illustrated in pl. 3, fig. 1, 2, 4, 5, seems to be intermediate between the two types. I therefore prefer to retain the species in the genus *Trentepohlia*.

*Hab.*: Mainly light rainforest. McPherson Range, Cunningham's Gap, Mt. Ballow, *all seasons*.

*Trentepohlia abietina* (Flotow) Hansgirg Pl. 4, fig. 1-3.

Hariot 1889, p. 384; 1890, p. 193; de Wildeman 1891, p. 136, pl. 18, fig. 17-21, pl. 19, fig. 1-3; Printz 1939, p. 147, pl. 1, fig. D-G.

The cells of this much branched species are subcylindric to subellipsoid; 6-10  $\mu$  diam. and 1-2  $\mu$  diam. long. Terminal cells often show slight tapering to the apex and are usually provided with a stratified cap of wall material. Such caps are not known in typical material of *T. abietina* but are reported in the forma *crassisepta* (Karsten) Hariot, and their presence in the Queensland material does not seem to be sufficient reason for excluding it from the species.

Sporangia are mostly lateral and sessile, sometimes terminal and sessile or pedicellate.

*Hab.*: On tree trunk in light rainforest. Mt. Mitchell, *Jan., June*.

*Trentepohlia effusa* (Krempelhuber) Hariot Pl. 4, fig. 1-6.

Hariot 1890, p. 193; Printz 1939, p. 166, pl. 16, fig. A-F.  
*T. setifera* (Farlow) Hariot 1888, p. 387, fig. 12.13.

In cell diameter, 3-10  $\mu$ , this species resembles *T. abietina*, but may be distinguished from that species by the simple or sparsely branched erect tapering branches to 500  $\mu$  long, with cells (1½) 2-4 (6)  $\mu$  diam. long. These branches arise from prostrate, cylindric or somewhat torulose filaments. Sporangia are sessile

and mostly lateral, sometimes terminal, and are borne on the prostrate filaments or on the lower parts of the erect filaments.

In the available literature, the characters separating this species from *T. dialepta* (Nylander) Hariot do not seem to be sharply defined.

*Hab.*: On tree trunk in light rainforest, Cunningham's Gap, Jan., Sept.

*Trentepohlia bogoriensis* de Wildeman Pl. 2, fig. 10-12.

Printz 1939, p. 167, pl. 17, fig. I-J, pl. 18, fig. G-H.

This species is readily distinguished from other species of the genus so far found in Queensland, by the presence of capillary projections from many of the cells of the prostrate filaments which are 5-9  $\mu$  diam. New filaments frequently arise from the apex of these hairs.

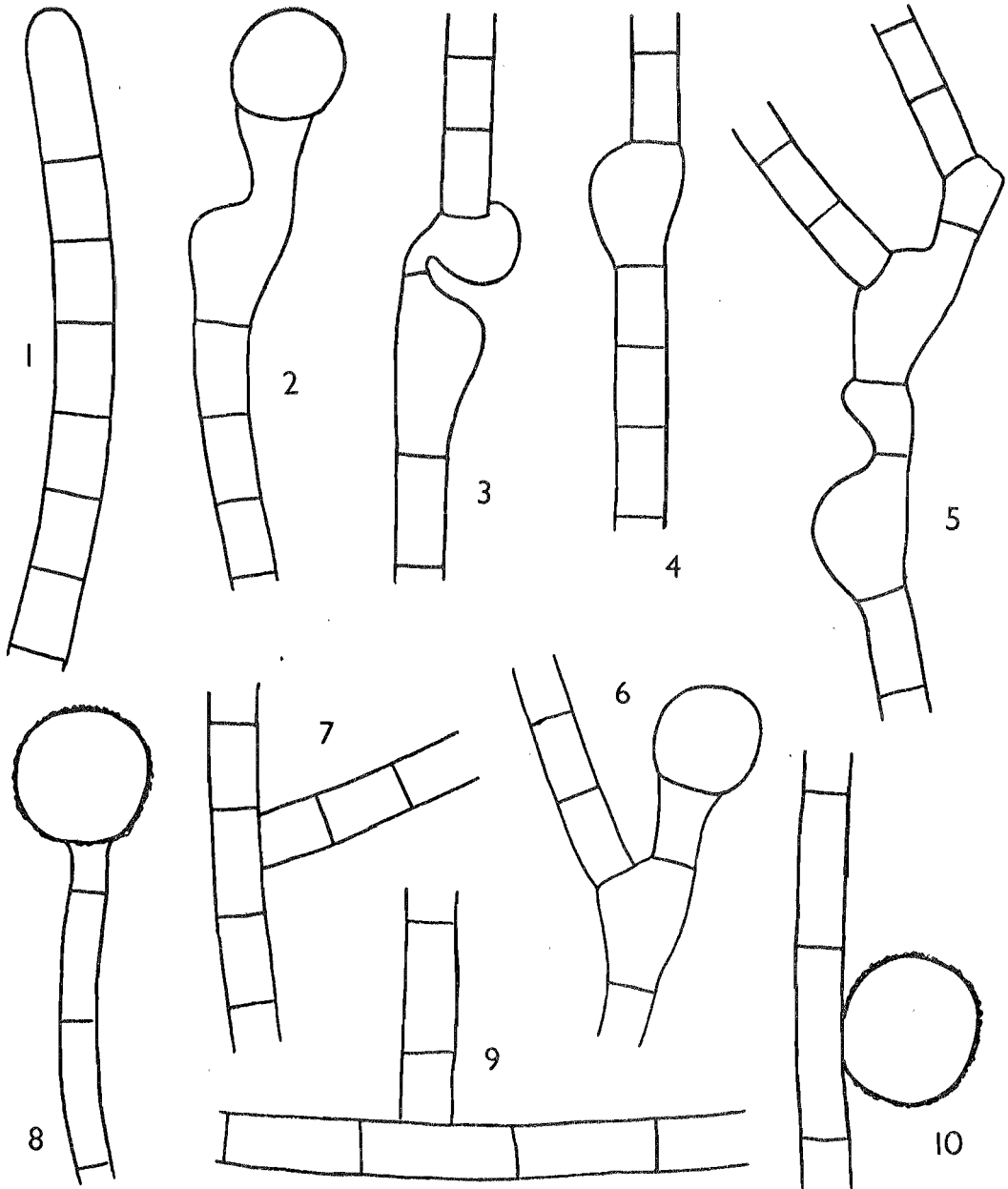
*Hab.*: On trunk of trees and of *Cyathea* sp. in light rainforest. McPherson Range, Cunningham's Gap, Jan., May.

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## PLATE 1.

Fig. 1-7: *Trentepohlia bossei*, x 480. Fig. 3-6, showing abnormal branching from the supporting cell and the sporangium.

Fig. 8-10: *Trentepohlia aurea*, x 480. Fig. 8 and 10, with sporangia.

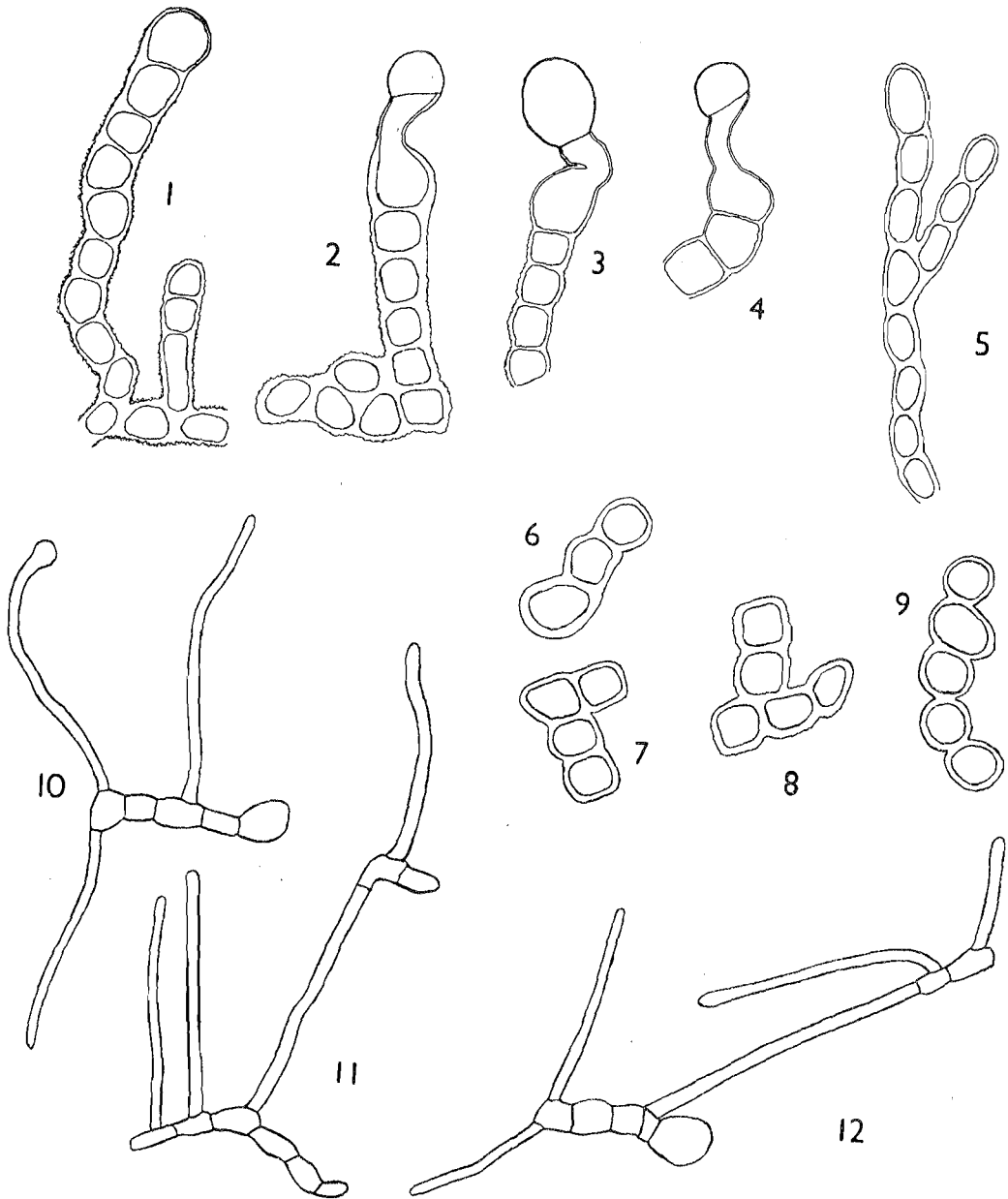


PLATE 2.

Fig. 1-9: *Trentepohlia odorata*, x 350. Fig. 1-4, with sporangia.

Fig. 10-12: *Trentepohlia bogoriensis*, x 450. Fig. 10 and 12, with sporangia.



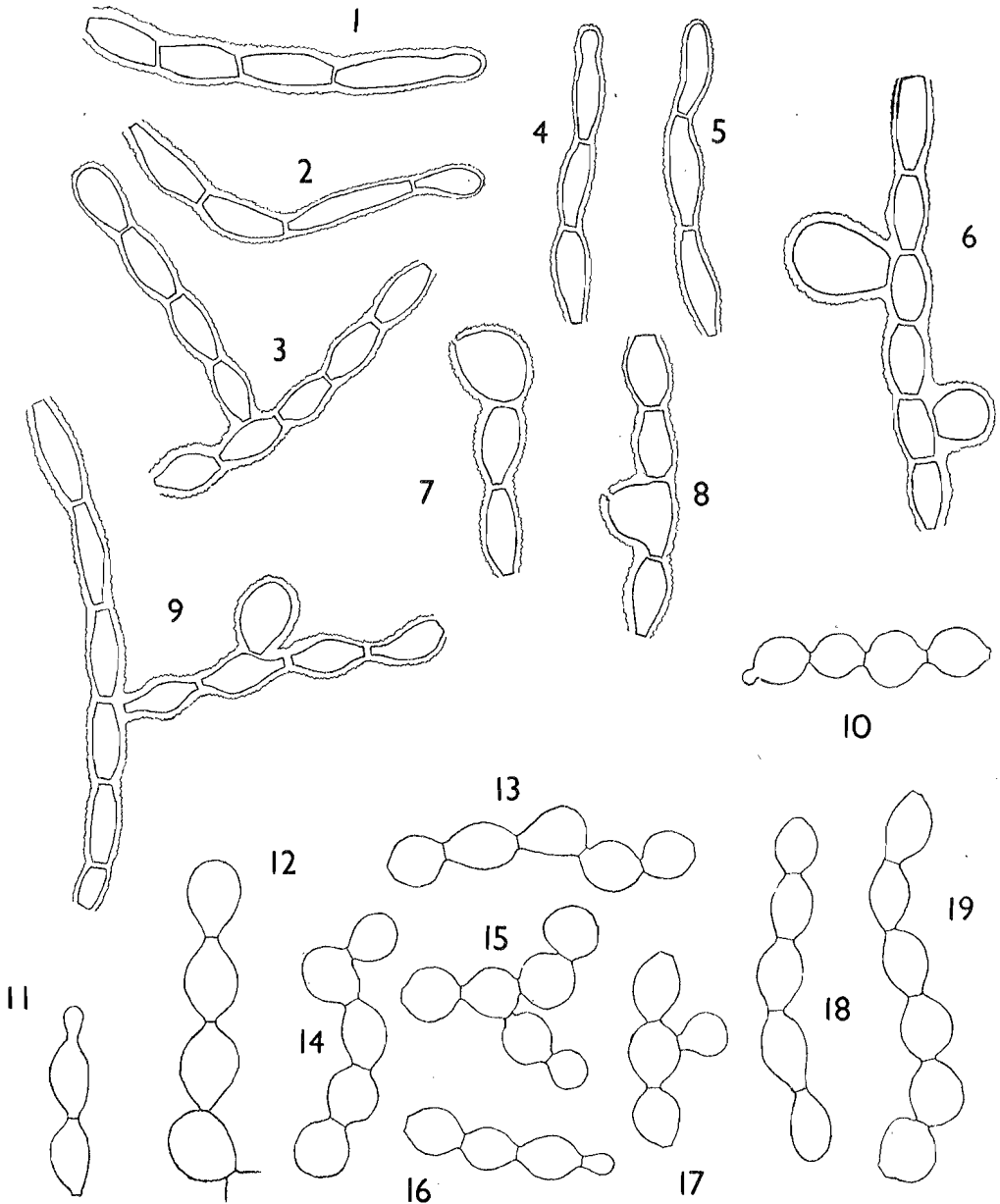
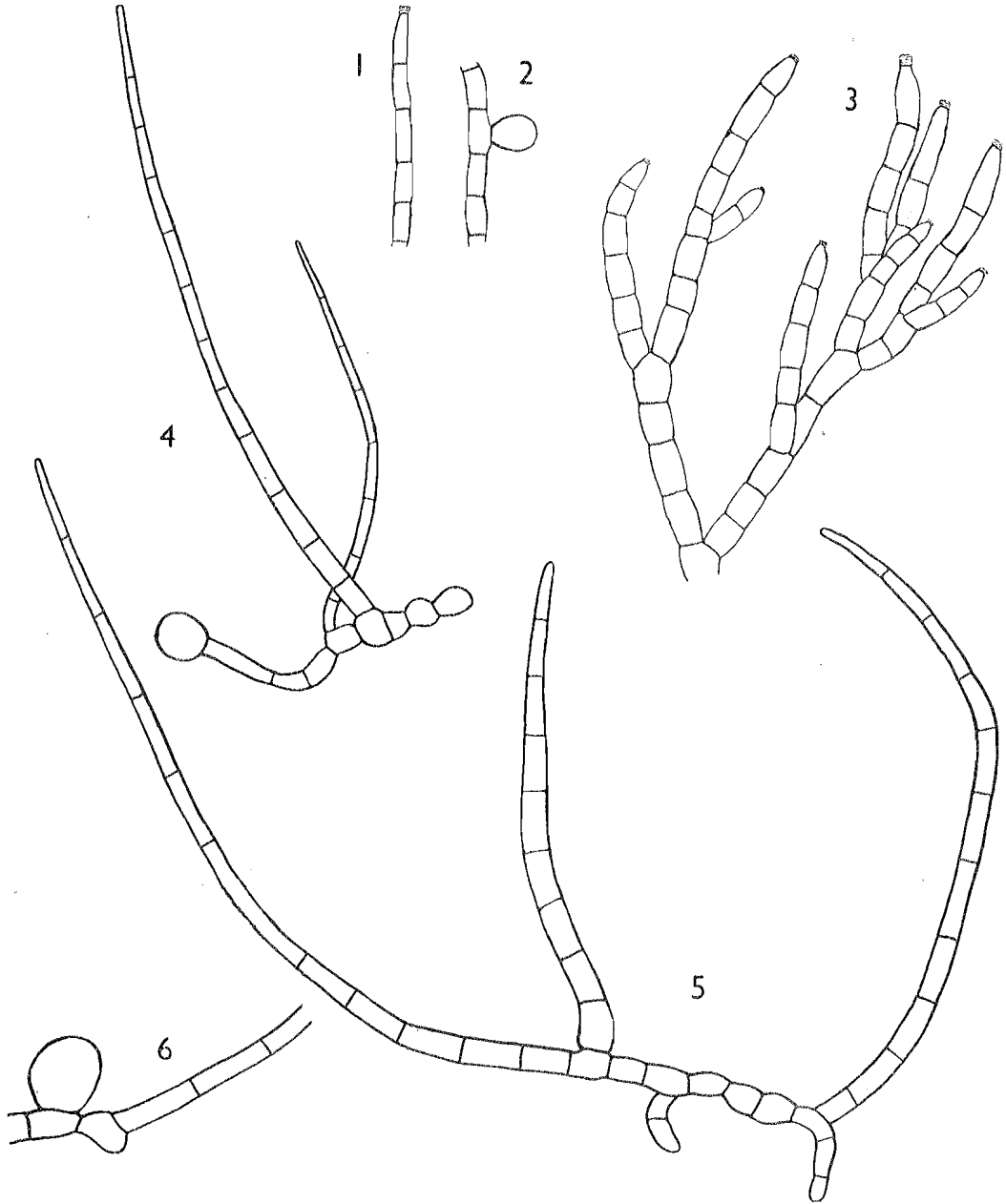


PLATE 3.

Fig. 1-19: *Trentepohlia rigidula*, x 350. Fig. 6-9, with sporangia.



## PLATE 4.

Fig. 1-3: *Trentepohlia abietina*, x 480. Fig. 2, with sporangium.  
 Fig. 4-6: *Trentepohlia effusa*, x 480. Fig. 4 and 6, with sporangia.