69.7 × 48.2 μ, range 60.1 – 86.7 × 40.1 – 53.4 μ. Exine is 3.4 μ thick, and surface is striato-reticulate with prominent ridges (striae) running along the polar diameter (figure 1). The ridges (2.19 μ broad) bear 4–6 rows of irregularly distributed and variously sized and mostly circular luminae (figure 2). The depressions (lirae) between the ridges (0.41 μ) are deep. The ridges are slightly raised on either side (equatorial) of the pore giving a hooded appearance at side view.

According to Bremekamp[3] the pollen morphology of the genus *Strobilanthes* has interesting taxonomic bearing. He has employed pollen morphological characters together with megasporic ones in breaking up the genus into a number of genera. Pollen morphology of about 65 species of the genus has been previously described,[4,5] all based on light microscopic study, and the available information reveals that the genus is recognizably eurypalynous with respect to aperture morphoform, exine pattern and pollen shape. Vishu-Mittre and Gupta[4] have distinguished two types of pollen grains in the genus based on aperture form, *viz* colporate and porate; and based on exine pattern also two types such as banded and spinulose. The present species falls under the porate and banded type, which has relatively advanced morphological feature.

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FOLIAR SCLEREIDS IN *PERSOONIA* R. Br. EX. KNIGHT (PROTEACEAE)

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IN recent years more attention has been given to the types of leaf sclereids to obtain an overall perspective of their use in taxonomy. An attempt has been made in that direction, here in respect of the genus *Persoonia*, an Australian element of the Proteaceae. In this paper we describe the varied types of idioblasts and discuss some pertinent taxonomic problems.

Herbarium specimens were kindly provided by the herbaria in Calcutta, Lucknow, Sydney (CAL, LWG and NSW in Holmgren *et al*[1]). A list of examined species and their idioblasts are summarized in table 1.

The leaf sectors were cleared by the technique of Rao *et al*[2] and the varied idioblasts were categorised after Rao and Bhupal[3] and Rao and Das[4], and unstained preparations were used for camera lucida drawings and photomicrography.

The comparative study of the cleared laminae, hand sections and macerations revealed the presence of varied idioblasts of morphological interest. The details of the main forms are as follows:

Conventional tracheids: They are simple and mostly undilated or tapering veinlet endings without morphological differentiation. They are commonly observed in the laminae of *P. angustiflora, P. comata, P. gunnii, P. juniperina, P. linearis, P. media, P. microcarpa, P. pinifolia, P. quinquenervis, P. revoluta, P. saccata, P. oblongata, P. tenuifolia*, and *P. virgata.*

Tracheoids: At the veinlet endings they have been observed in the laminae of *P. caleyi, P. chamaepence, P. chamaepitys, P. cornifolia, P. fastigata, P. hirsuta, P. tertifolia, P. myrtilloides* and *P. sericea*. Usually two types, namely pitted brachytracheoids and selerotracheoids are recognised, and both the categories or exclusively one category occur in a single leaf of the above mentioned species. Sometimes tracheoids-in-aggregates have been observed in *P. chamaepence, P. chamaepitys, P. gunnii, P. rigida* (figure 4) and *P. tenuifolia.*

Sclereids: They have been encountered in the laminae of 20 out of 40 species of *Persoonia*. They are of varied types showing diffuse patterns of distribution: Dermal sclereids of varied size tightly packed in *P. scabrella* (figure 5); Sub-spheroidal to oval or broadly

Table 1 *Typology of idioblasts in the genus Persoonia*

Section I. **Pychostylis**		
P. saccata R. Br.	Max Koch 2129 (CAL)	CT
	Pritzel *s.n.* (CAL)	CT
P. saundersiana Kipp.	Max Koch 1127 (CAL)	P, R, F.
P. comata Meisn.	Mueller *s.n.* (CAL)	CT
P. falcata R. Br.	Mueller *s.n.* (CAL)	G
P. tertifolia R. Br.	Aplin 3220 (NSW)	ST
Section II **Acranthera**		
P. trinervis Meisn.	Fitzgerald *s.n.* (CAL)	G
P. angustiflora Benth.	Max Koch 1977 (CAL)	CT
P. microcarpa R. Br.	Drummond n260 (CAL)	CT
P. sulcata Meisn.	Fitzgerald *s.n.* (CAL)	CT
P. quinquenervis W. J. Hook.	Fitzgerald *s.n.* (CAL)	CT
P. rufiflora Meisn.	Kaspiew 903 (CAL)	I
P. scabrella Meisn.	Conveny & Haverslay 8360	(CAL) DS
Section III **Achlyanthera**		
P. elliptica R. Br.	Pritzel 104 (CAL)	F
P. ferruginea Sm.	Kaspiew 101 (CAL)	I
P. media R. Br.	Kaspiew 1709 (LWG)	CT
P. cornifolia A. Cunn. ex. R. Br.	Boorman *s.n.* (CAL)	ST
P. sericea A. Cunn. ex. R. Br.	Scortechini *s.n.* (CAL)	ST
P. mitchellii Meisn.	Kaspiew 14 (CAL)	G
	Kaspiew 1712 (LWG)	G
P. hirstuta Pers.	Mueller, *s.n.* (CAL)	Tracheoids with sheathing cells.
P. chamaepitya A. Cunn.	Scortechini *s.n.* (CAL)	ST
P. saligina Pers.	Kaspiew 580 (LWG)	I
P. confertiflora Benth.	Mueller *s.n.* (CAL)	SC
P. linearis Andr.	Kaspiew 103 (LWG)	CT
P. pinifolia R. Br.	Kapsiew 2056 (CAL)	CT
P. calevi R. Br.	Maiden 799 (CAL)	ST
P. revoluta Sieb, ex. Schult.	Scortechini 89 (CAL)	CT
P. longifolia R. Br.	Briggs 675 (NSW)	I
P. fastigata R. Br.	Johnson & Mc Gellivary 84043 (NSW)	ST
P. rigida R. Br.	Walter 1982 (CAL)	
	Constable 42742 (NSW)	ST
P. gunnii Hook. f.	Gunn *s.n.* (CAL)	CT
P. mollis R. Br.	Maiden *s.n.* (CAL)	SP
P. oblongata A. Cunn ex R. Br.	Scortechini *s.n.* (CAL)	SP
P. myrtilloides Siab. ex. Schult.	Maiden *s.n.* (CAL)	ST
P. virgata R. Br.	Kaspiew 903 (CAL)	CT
P. chamaepence Lhotsy.	Picton *s.n.* (CAL)	SC
P. juniperina Labill.	Kaspiew 805 (CAL)	CT
	Canning 118775 (NSW)	
P. tenuifolia R. Br.	Betche *s.n.* (CAL)	CT
P. acerosa Sieb. ex Schult.	*S. L., s.n.* (CAL)	P.R
P. toru A. Cunn.	*S.L.* 849 (CAL)	*CT.*

(CT – Conventional tracheids, P – Palosclereids, R – Rhizo sclereids, F – Fusiform sclereids, G – Gnarlyform sclereids, I – Idiofibrosclereids, SP – Spheroidal sclereids, SC – Sclerocysts, ST – Sclerotracheoids, DS – Dermal sclereids.

elliptic shaped sclereids in *P. mollis, P. oblongata* and *P. trinervis*; Gnarlyform sclereids in *P. falcata, P. mitchellii* (figure 3) and *P. trinervis*; Fusiform sclereids in *P. elliptica, and sub-epidermal strand composed of fusoid sclereids in P. myrtilloides* and *P. laevis*; Palosclereids or Rhizosclereids in *P. acerosa, P. lanceolata* and *P. saundersian*; Selerocysts or sclereids-in-aggregates in *P. confertiflora* (figures 1, 2); Idiofibro-

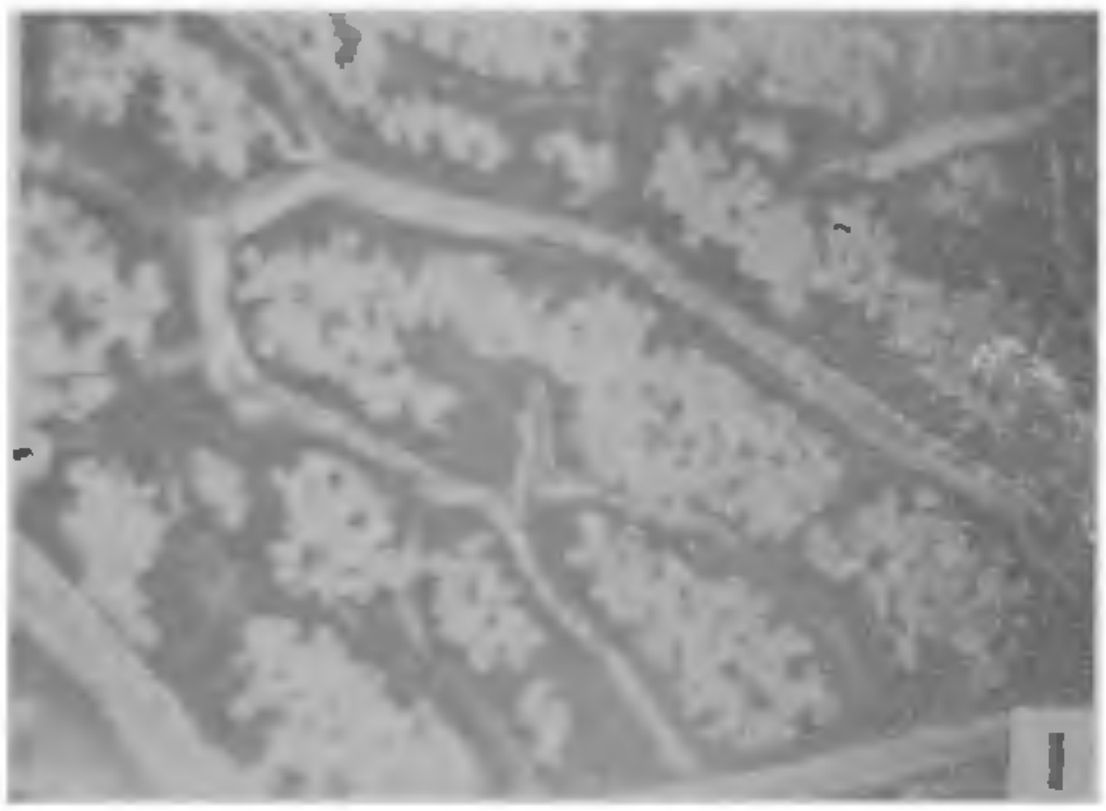
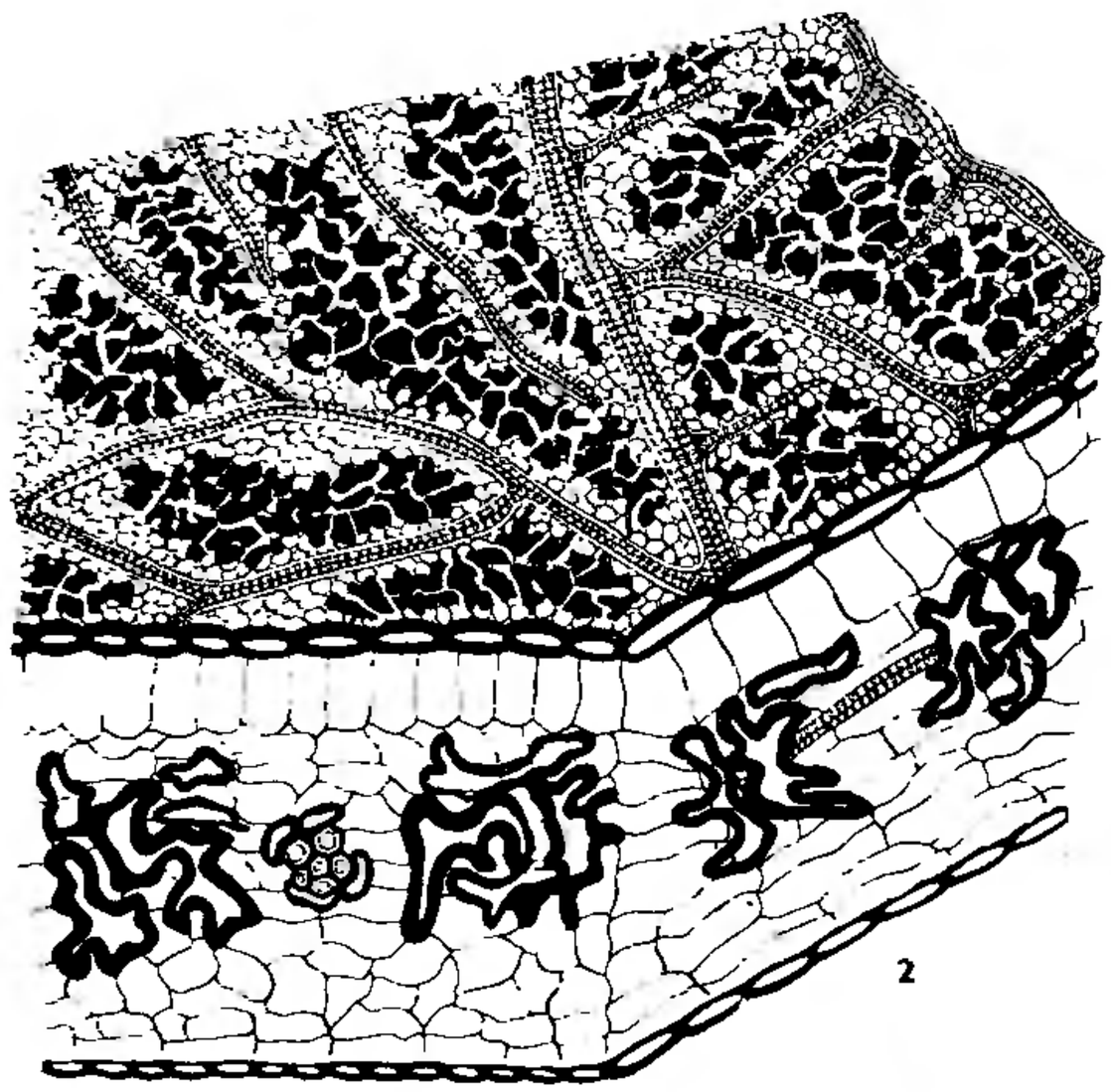
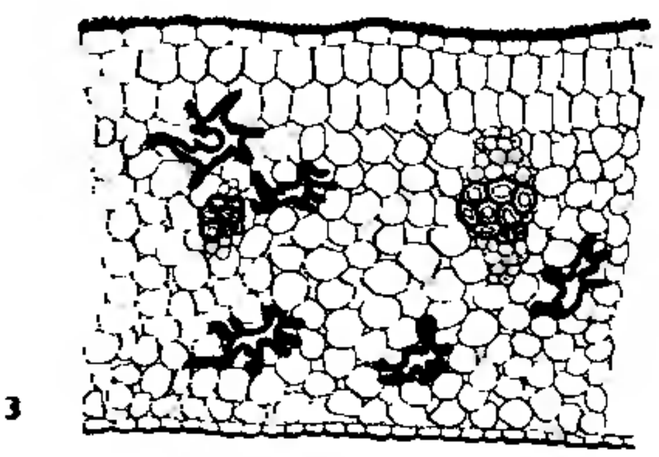


Figure 1. *P. confertiflora* (Mueller *s.n.*) surface view of a sector of cleared leaf under polarised light. Note the birefringence of sclerocysts/sclereids-in-aggregates in areoles × 120.



2



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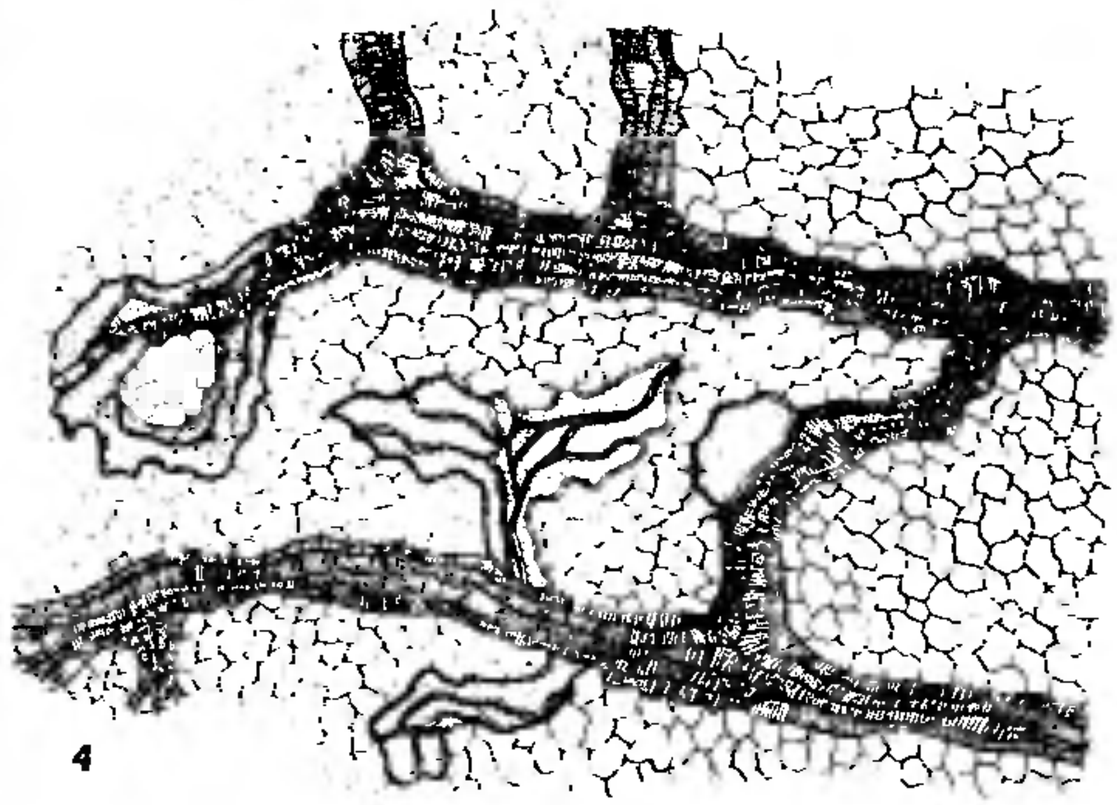
Figures 2, 3. Semi-diagrammatic sketches, c. 300 ×. **1.** *P. confertiflora* (Mueller) *s.n.*) showing sclerocyst in areoles (surface view) and lobed sclereids-in-aggregates in sectional view. **3.** *P. mitchellii* (Kaspiew 14,) with diffuse gnarlyform sclereids × 120.



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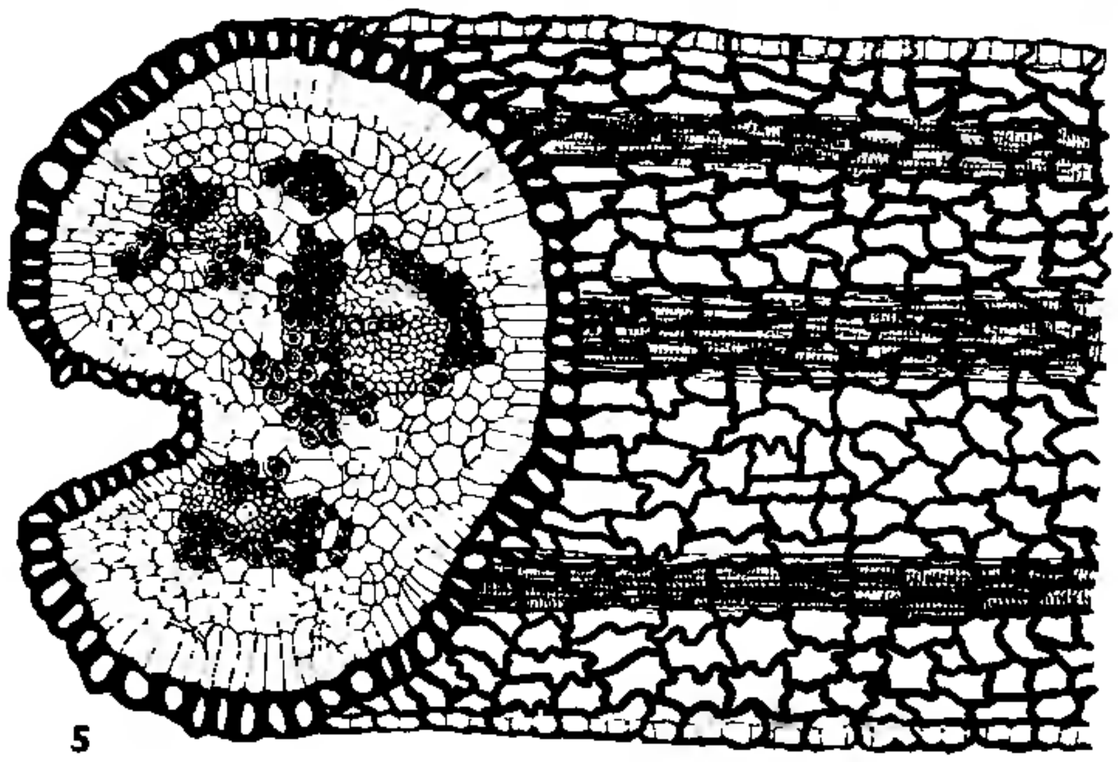

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Figures 4, 5. 4. *P. rigida* (Constable 42742) with sclerotracheoids-in-aggregates × 120. **5.** *P. scabrella* (Conveny & Haverslay, 8360) with non-idioblastic tissue forming sclereids in the epidermal layer × 150.

sclereids in *P. ferruginea, P. longifolia, P. rufiflora, P. saligina, P. trinervis* and *P. junipernia.*

Persoonia is an Australian Proteaceae with an exception of a single New Zealand species, namely *P. toru.* Bentham adopted three sections under this genus, namely *Pycnostylis, Acranthera* and *Achlyanthera.* Among the 60 species recognised by Bentham only 40 species were available for restudy. Following Bentham's classification, an attempt has been made to sort out the varied idioblasts with a view to see how far they are useful for taxonomic consideration.

A study of the diverse types of idioblasts in the above classification reveals the presence of dissimilar types of idioblasts in one and the same sections. Notwithstanding that similar form types of idioblasts are not present in all the species of a particular section,

the distinct idioblasts of certain species provide a useful clue for identification of the taxa. A few striking instances are mentioned here.

Bentham[6] is of the opinion that *P. mitchellii* Meisn. resembles *P. sericea* to such an extent that *P. mitchellii* may be considered a variety of *P. sericea* A. Cunn. This is supported by the findings of only tracheoids in *P. sericea* and gnarlyform sclereids in *P. mitchellii. P. confertiflora* referred by Mueller and Meisner to *P. ferruginea* which they resemble at first sight but the ovary is perfectly glabrous and the affinity appears to be much greater with *P. lanceolata*. The presence of sclerocysts or sclereids-in-aggregates in *P. confertiflora* and diffuse rhizosclereids in *P. lanceolata*, however is significant. The presence of idioflbrosclereids in *P. ferruginea* and sclerocysts in *P. confertiflora* does not uphold their similarity. The non-idioblastic tissue composed of tightly packed sclereid like cells grouped under dermal pattern is a characteristics feature in *P. scabrella*. This feature is not a wide spread phenomenon in Angiosperms[5]. Bentham's opinion is that *P. rigida* R. Br. sometimes resembles *P. sericea* A. Cunn. in external features. It is found however, that the presence of sclerotracheoids-in-aggregate in both the species there is also a good deal of similarity in their endomorphic features.

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TWO NEW COMBINATIONS IN THE GENUS *USNEA*

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INVESTIGATIONS on the type specimens of certain taxa of the genus *Usnea* from India, have necessitated two new combinations at the specific level as discussed below. The method of Walker and James[1] has been adopted for thin layer chromatography.

The taxon *Chlorea rigidula* Stirt., described by Stirton[2] was diagnosed "Thallus pallide lutescens vel albidocinerascens elongatus, nonnihil angulosus praesertim infra et axillis compressus, ramosissimus, apicibus attenuatis et plerumque fibrilloso-contextis. Axis crassus vel crassiusculus, pallidus vel saepe et praesertim infra pallide rufescens, solidus, fibrillae medullares compactae albae, K flaventes dein rubentes vel rufo-ferrugineae, I—".

Motyka[3] discussed the taxon *Chlorea rigidula* Stirt. under *Usnea indica* Mot. and remarked "E descriptione inclarum, qua ratione haec planta sit *Chlorea*, dum apothecia non commemorata et secundum descriptionem est typica Usneae species. Ut plerumque e descriptione species non diagnoscenda; sat autem exacte respondit U. indicae, saltem melius quam alicui aliae possibileque haec est species. In Museo Britanico deest specimen Stirtoni huius speciei. Sit id revera, tum nomen Stirtoni restituendum."

The taxon *Chlorea rigidula* Stirt. was based on the two syntype collections: (1) India, Nilgherries, G. Watt 13 (BM) and (2) Canada, Lake Superior, Roy (?). None of the two is preserved at the Stirton's herbarium in GLAM vide Woodward (in litt.). But the syntype material annotated *Chlorea rigidula* Stirton in pencil preserved at BM was borrowed for investigation. The major part of this syntype corresponds with the protologue of *Chlorea rigidula* Stirt. stated above, and intermixed with that there are few fronds of *Usnea himalayana* Bab.

Chlorea rigidula Stirt. has no relationship with *Usnea indica* Mot., as was envisaged by Motyka[3]. According to the basic branching system in the genus *Usnea* as outlined by Asahina[4], the former has deliquescent type of branching, while the latter has filamentose type of branching.

Chlorea rigidula is a typical *Usnea*, and in addition, it corresponds with the type collections of *Usnea venosa* Mot. and authentic materials of *U. ceylonica* Mot., and thus the latter two are conspecific with