

## ON THE OCCURRENCE OF SILICA GRAINS IN WOODS OF HIBBERTIA (DILLENIACEAE)

by

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**Summary**

Silica grains are common in the woods of New Caledonian species of *Hibbertia*. The grains are generally restricted to the ray parenchyma cells with a single grain per ray cell. Grain size, shape, and surface texture are quite variable. The systematic significance of silica grains in *Hibbertia* cannot be assessed until additional species are examined. This is the first documented report of silica grains occurring in woods of the Dilleniaceae.

**Key words:** Silica grains, rays, *Hibbertia*, Dilleniaceae.

**Introduction**

Aside from the brief mention of silica in the rays of *Hibbertia* by Ingle and Dadswell (1956), no previous investigations dealing with the wood anatomy of Dilleniaceae (Baretta-Kuipers, 1972; Dickison, 1967, 1979; Dickison et al., 1978; Metcalfe & Chalk, 1950) have described the occurrence of silica grains. Ter Welle (1976) specifically reported silica to be absent in the Neotropical representatives of the family. Examination of the woods of recent collections of *Hibbertia*, however, has shown that silica grains are widespread among and abundant within a number of New Caledonian members of the genus. This study discusses the presence of this previously undescribed feature in the Dilleniaceae.

**Material and Methods**

With a single exception, the species examined were collected either by Dr. J.M. Veillon (ORSTOM, Nouméa) or the author. All specimen identifications were provided by Dr. Veillon. Sections were cut between 15–20  $\mu\text{m}$  in thickness and subsequently bleached with domestic bleach for one or two minutes, rinsed in water, and mounted unstained. Scanning electron microscopy (SEM) was employed to record details of silica grain morphology. All specimens are from New Caledonia and herbarium vouchers are housed at NOU and NCU. The following specimens of *Hibbertia* Andrews were studied:

*H. altigena* Schltr., Dickison 185, 231; *H. baudouinii* Brongn. & Gris, FPAw 13033; *H. deplancheana* Bureau ex Guill., Dickison 279,

282; *H. lanceolata* Bureau ex Guill., Dickison 226, Boulet in Veillon 5369; *H. lucens* Brongn. & Gris ex Pancher & Siebert, Dickison 216, Veillon 5366, 4830; *H. nana* Däniker, Dickison 253; *H. oubatchensis* Schltr., Veillon 5431; *H. pancheri* (Brongn. & Gris) Briquet, Dickison 240, 275, Veillon 4833, 5340, 5345; *H. podocarpifolia* Schltr., Veillon 4872; *H. rubescens* Vieill. ex Guill., Veillon 4827; *H. tontoutensis* Guill., Veillon 4868, 4875; *H. trachyphylla* Schltr., Dickison 173, 175; *H. vanierei* (Montr.) Beauvisage, Dickison 281, Veillon 4856.

**Results and Discussion**

With the exception of *H. nana*, silica grains are present in all of the New Caledonian species of *Hibbertia* that were examined. Although the siliceous nature of the deposits has not been chemically verified, the general shape of the grains and the fact that they are not birefringent under polarised light indicates that they are most probably silica.

The grains are, for the most part, abundant and restricted to the ray parenchyma cells. A single grain may occur in each ray cell, or, some cells may be without deposits (Figs. 1, 2). No constant pattern of distribution is present. Silica occurs in both the upright as well as procumbent or square ray cells, although the grains in the upright cells of the marginal ray extensions are often smaller than those in cells of the ray body. Small, solitary grains may also occur sporadically in the axial parenchyma cells. Never more than a single grain was observed in each ray cell, although occasionally grains were composed of very small particles giving them a clustered appearance. *Hibbertia rubescens* is the only species examined that contained both silica grains and raphide crystals; the raphides occurring in enlarged axial parenchyma cells.

Silica grains in *Hibbertia* are quite variable in size, ranging between 5 and 32  $\mu\text{m}$  in diameter along the longest axis. Grain diameter for all species most frequently ranges between 9 and 20  $\mu\text{m}$ . Shape varies between more or less oval, globular, oblong and very irregular (Figs. 1, 2). Some collections contain both

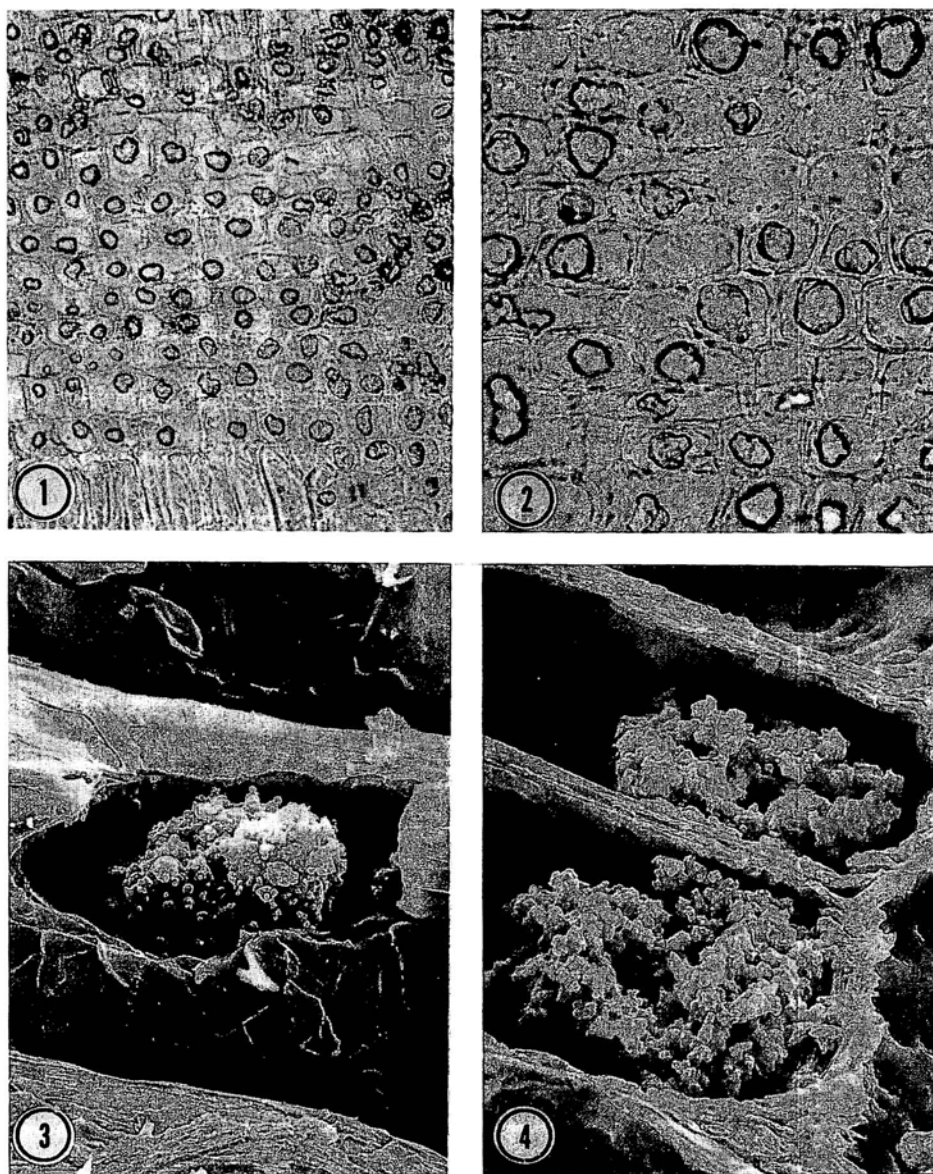


Fig. 1–4. Silica grains in *Hibbertia*. — 1: *H. trachyphylla* (Dickison 173), radial section showing abundant silica grains in the ray parenchyma cells, x 125. — 2: *H. altigena* (Dickison 231), radial section of wood showing solitary silica grains in most ray cells, x 230. — 3: *H. deplancheana* (Dickison 282), SEM illustrating granular surface of silica grain, x 2,600. — 4: *H. tontoutensis* (Veillon 4875), SEM illustrating very granular silica grains, x 4,300.

compact and loosely built grains. Grain surface is irregular and varies from mostly smooth to very granular (Figs. 3, 4). The largest grains may nearly fill the entire volume of a cell. Both size and shape are quite variable within a species.

The presence of silica grains in the woods of twelve out of thirteen species examined suggests that silica is widespread among the New Caledonian species of *Hibbertia* and appears to be a constant character in these species. As far as is known, none of the Australian hibbertias are siliceous. The distribution of silica grains in *Hibbertia* is restricted, occurring in the ray parenchyma and only very sporadically in the axial parenchyma strands. The fact that silica has not been reported previously is undoubtedly the result of, in the absence of bleaching, ray cells filled with very dark-staining materials that obscure cell contents.

Raphides are diagnostic for the Dilleniaceae, occurring in the wood of all genera with the possible exception of *Schumacheria* (Dickison, 1967; Baretta-Kuipers, 1972). Raphides do not appear to be a common feature of the wood of New Caledonian hibbertias, as enlarged, raphide-bearing wood parenchyma cells were confirmed for only a single species in this investigation.

The potential systematic value of silica grains within *Hibbertia* cannot be fully assessed until additional species are studied. The limited distribution of silica within the family, however, makes this character of limited diagnostic significance.

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