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Silvianthus (Carlemanniaceae) a genus and family new to Thailand

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ABSTRACT

Silvianthus tonkinensis Hook f. is recorded from North Thailand. The species is illustrated, and an emended description of the species is given. An overview of the character states of the genus is presented.

INTRODUCTION

During the Thai–Danish expeditions in 1993 and 1995, specimens of the genus *Silvianthus* were collected along with seeds for growing in the greenhouse at AAU. The species has now been flowering and fruiting here, and was identified as *S. tonkinensis*. This provided the opportunity for a study of this poorly known genus.

Silvianthus tonkinensis (Gagnep.) Ridsd., Blumea 24: 42. 1978.— *Quiducia tonkinensis* Gagnep., Bull. Soc. Bot. Fr. 95: 33. 1948.— *Silvianthus clerodendroides* Shaw in Kew Bull. 19: 507. 1965.

Small shrub to 3–4 m, secondary xylem well developed. Stem glabrous, swollen above the nodes when young; petiole 5–11 cm; blade elliptic to ovate 25–50x13–25 cm, base attenuate and often oblique, apex acute to acuminate, glabrous on both sides, but with minute, sessile glands invisible to the naked eye. Inflorescence terminal later becoming pseudolateral, sessile, and head-like. Flowers heterodistylous, (4–)5-merous. Calyx-tube absent; calyx-lobes green, linear to band-shaped, 11–14 mm long, glabrous. Corolla yellow, often slightly zygomorphic, corolla-tube ca. 18 mm long, ca. 3 mm in diam, outside glabrous, inside sparsely hairy in the upper 3/4; corolla-lobes 5-angular ca. 4.5x5.5 mm long, aestivation induplicate-valvate, outer surface glabrous, inner surface glandular hairy. Stamens 2; filaments ca. 1.8 mm (thrum) and 0.7 mm (pin) long,

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inserted in corolla-tube, ca. 9 mm (thrum) and ca. 5.5 mm (pin) from the base; anthers 4.5–5.0 mm long, ca. 1.5 mm wide. Style ca. 6 mm (thrum) and ca. 9 mm (pin) long; stigma ca. 3.5 mm (thrum) and ca. 2.2 mm (pin) long. Ovary inferior, obconic ca. 3x3 mm. Fruits berries, dehiscent from the apex by 5 valves, white and often with a reddish tinge, depressed obovate, 8–10x10–13 mm, with outward curving calyx-lobes. Seeds black, remaining on the central placentas. Fig. 1.

Distribution. Laos, Vietnam, S. China, Thailand (Nan, Larsen et al 44715, 46347).

NOTES ON MORPHOLOGY AND ECOLOGY

The stem remain green for a long time after that secondary xylem is formed. It is swollen just above a node, and here the secondary xylem is loose with much parenchyma, flexible when slightly wilted. Above the swollen part the xylem is compact, and the stem is rigid. The swollen part of the stem function as a pulvinus in bending the stem in response to light or gravity. It appears similar to what is found in many Caryophyllaceae.

The inflorescence is terminal, but as a new shoot soon extends from a leaf axile just below the young inflorescence, it appears to be lateral (Fig. 1A): it is pseudo-lateral. The inflorescence is a determinate thyrse. The partial inflorescences are cincinni, where a flower develops in the axiles of both the prophyls. As a result, the inflorescence branches carries alternating pairs of flowers on the upper side. This kind of inflorescence is also found in *Mouretia* (Tange, 1997), a genus in the Rubiaceae with one species in Thailand. The condensed inflorescence appears head-like (Fig. 1A).

The flowers are heterostylous, and 5-merous except the terminal flower in each inflorescence which is 4-merous.

The corolla is yellow, and often slightly zygomorphic when open (Fig. 1B).

The two stamens are adnate to the corolla-tube, they are not on a radius to either the sepals or the petals, and this unusual placement can also be followed in vascular strands in the ovary tissue.

The pollen is spherical and tricolporate, with reticulate tectum. Associated with the heterostyly is a dimorphism in pollen size. Thrum pollen is ca. 38 µm and pin pollen is ca. 30 µm in diam., such a size difference is common for heterostylous plants.

The ovary is inferior, and bilocular. The rounded, papillose placentas are attached to the middle of the septum. The septum is in an oblique angle to the median plane.

The ovules are anatropic, unitegmic, tenuinucellate, and the cells of the inner layer of the integument become tall and dark-staining, and probably function as a nutritious layer, termed an integumental tapetum or endothelium.

The seeds have narrow exotesta cells parallel with the length of the seed. These cells have thickened radial walls, the outer and inner walls are unthickened. Below the exotesta is a few layers of parenchymatic cells. The endosperm is ruminant, it has 8–10 longitudinal ridges along the length of the seed (Fig. 2G,H). In the furrows between the longitudinal ridges and bordering the endosperm, is a row of flattened cells, these are the former endothelium cells. They have slightly thickened walls, the thickenings appear to be of the same substance as the thickenings in the exotesta cells. The endosperm is rich in oil.



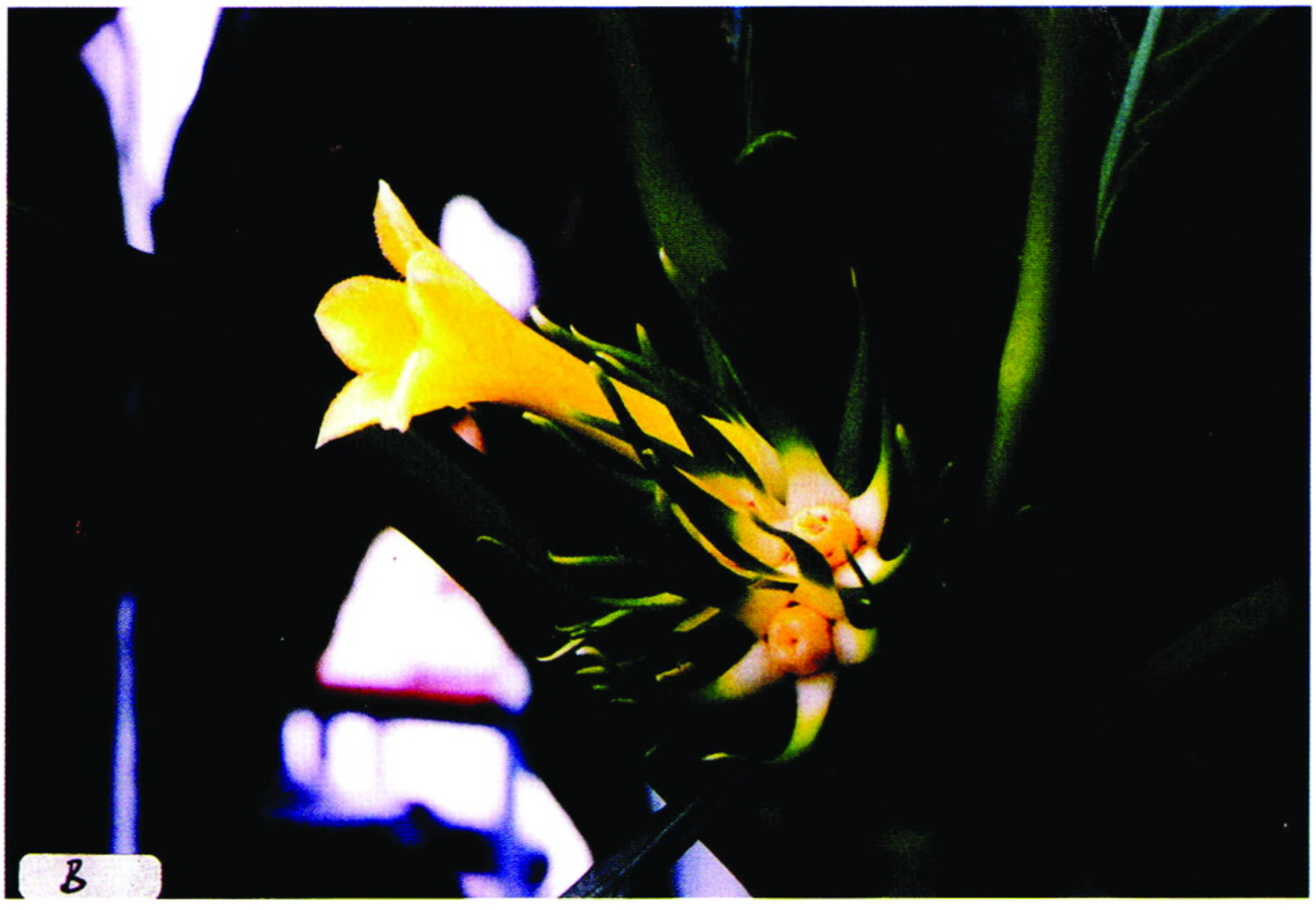


Figure 1. A. Flowering branch; B. Flower.





Figure 1. (continued) C. Infructescens; D. Open fruit.
Photo: (A) Kai Larsen, S. China; (B, C, D): C. Tange, Nan, Thailand.

The fruit is entirely fleshy. At full maturity the berry opens by irregular longitudinal splitting from the apex by 5 valves, each carrying a calyx-lobe. The result is that the placentas with mature seeds are presented (Fig. 1D). The black seeds make a strong contrast to the otherwise white fruit. The fruit become white after anthesis, because intercellular airspaces are formed in the fruit walls. The outer epidermis often have a reddish tinge (Fig. 1C).

Glandular hairs are present on external surfaces, and in the upper part of the inside of the corolla-tube and on the inside of the corolla-lobes. The glands on external parts consist of a short stalk and usually four cells (rarely more) forming the head (Fig. 2D, 3D). The glandular hairs in the corolla (Fig. 2E, F, 3E) are different in having a long unicellular (rarely multicellular) stalk, a "neck" cell, and a multicellular head. When the corolla open these glandular hairs secrete a substance that make the opening of the corolla wet.

Except for the glandular hairs, and short unicellular hairs in the corolla-tube, the plants are entirely glabrous.

Large idioblasts containing a single druse are present.

Ecology. *S. tonkinensis* is a species that is found along streams in evergreen hillside forests. In the greenhouse it was found that both pin and thrum plants was self sterile. When flowers were pollinated with pollen from the other morph, there was development of fruit and seeds. There are only few flowers open in an inflorescence at the same time. The flower opens in the morning, and the next day it is wilted or have already fallen. During anthesis copious amounts of nectar is produced from the conic disk. The seeds are probably dispersed by birds, because the black seeds make a clear contrast to the white fruit when it open.

DISCUSSION

The other species in the genus, *S. bracteatus* Hook.f., differs in having oblong to spathulate calyx-lobes, otherwise the two species are similar. The collectors of *S. bracteatus* often states that the flowers are pink, but it is really the fruits that are pinkish. The two species are very close, and further study, and more collections may show that they are conspecific, and have continuos distribution. *S. bracteatus* is now known from Nepal, Assam and N. Burma.

The family Carlemanniaceae was established by Shaw (1957) for *Carlemannia* and *Silvianthus*. He concluded that the two genera must be kept together, but he suggests no obvious relatives to the Carlemaniaceae. The present study gives new morphological and anatomical information on *Silvianthus* e. g. heterostyly, flower diagram, and seed anatomy, but this have not given me any obvious candidates for closely related families.

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REFERENCES

Shaw, H. K. Airy. 1957. On a new species of the genus *Silvianthus* Hook.f., and on the family Carlemanniaceae. Kew Bull. 19: 507–512.

Tange, C. 1997. A revision of the genus *Mouretia* (Rubiaceae). Nord. J. Bot. 17: 123–132.

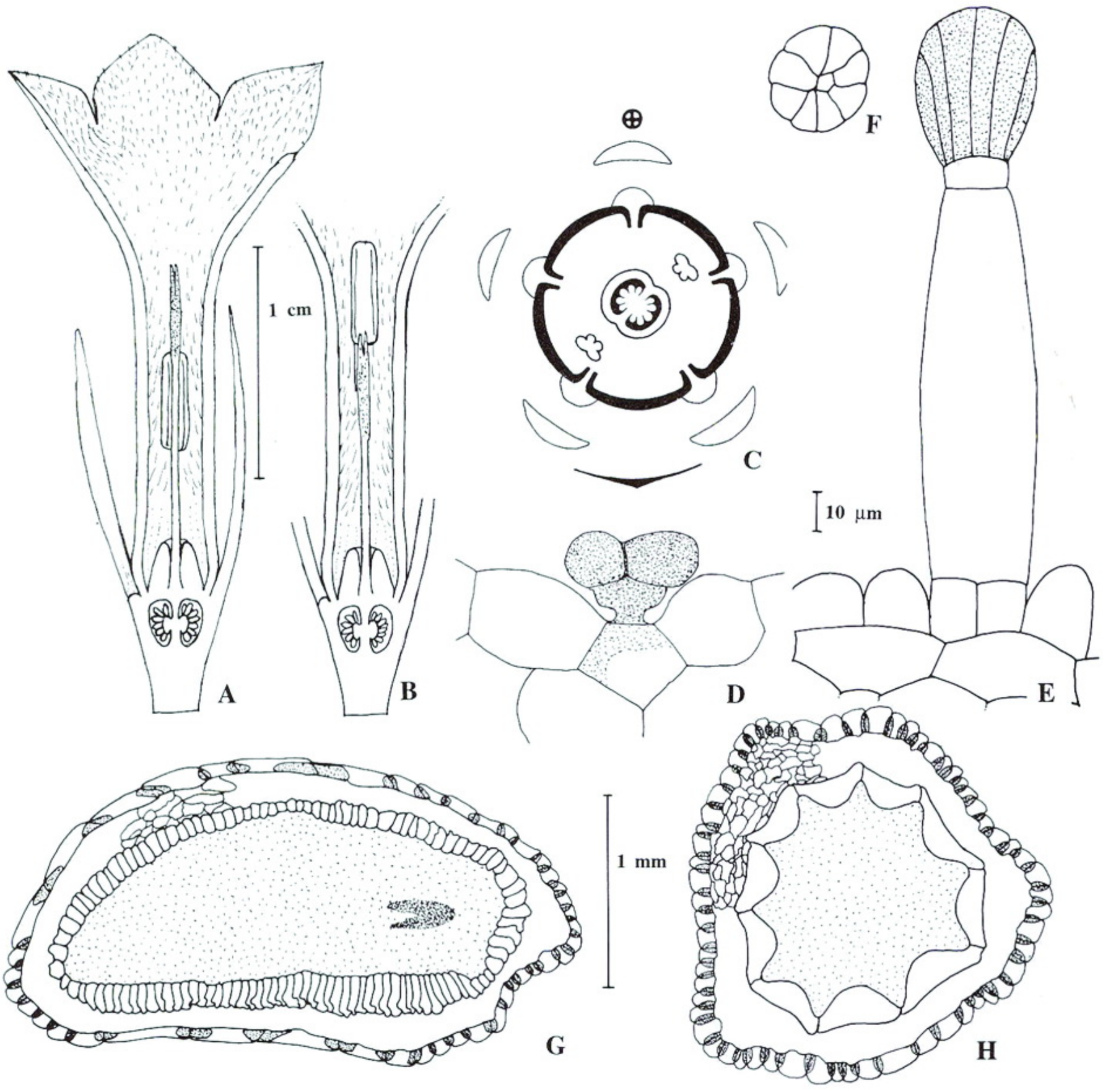


Figure 2. A. Longitudinal section of pin flower; B. Longitudinal section of thrum flower; C. Flower diagram; D. Glandular hair from lower leaf surface; E. Glandular hair from inner surface of the corolla; F. Cross section of glandular head; G. Longitudinal section of seed; H. Cross section of seed. Drawn from Larsen et al 44715.

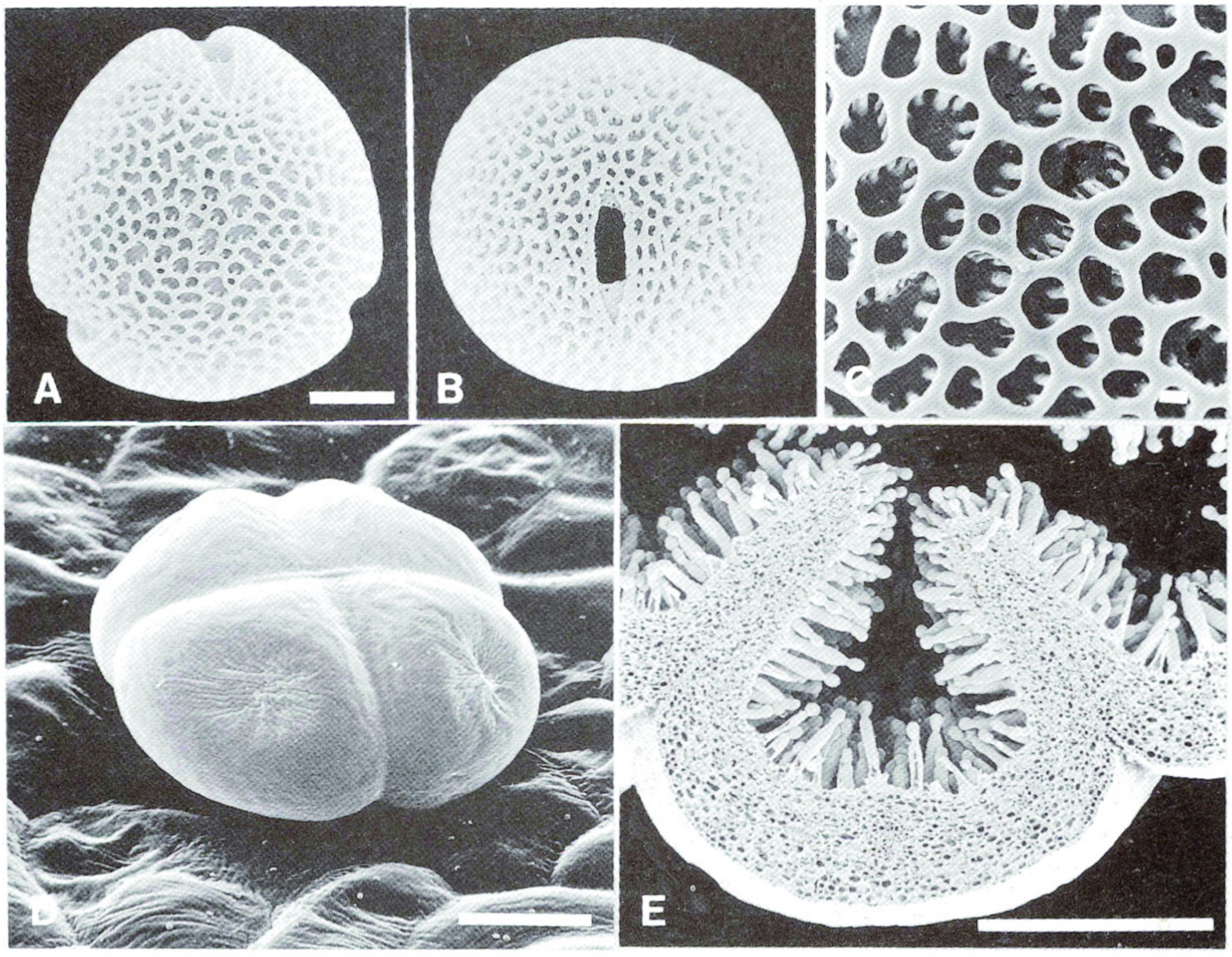


Figure 3. A. Pollen in polar view; B. Pollen in equatorial view; C. Detail of tectum; D. Glandular hair from lower surface of leaf; E. Cross section of corolla-lobe in bud, with glandular hairs on the inner surface. (From Larsen et al. 44715). Scalebars: 1 mm (E), 10 μm (A, B, D), 1 μm (C).