Blumea 59, 2014: 6–9
www.ingentaconnect.com/content/nhn/blumea

RESEARCH ARTICLE

http://dx.doi.org/10.3767/000651914X681126

Ficus cornelisiana, a new species of *Ficus* subsection *Urostigma* (*Moraceae*) from the Sino-himalayan region

B. Chantarasuwan[1,2,3], Y.-Q. Peng[4], P. Baas[1], J.-Y. Rasplus[5], B.-J. van Heuven[1], P.C. van Welzen[1,3]

Key words

China
Ficus
Moraceae
new species
Vietnam

Abstract A small fig tree has been misidentified as *Ficus orthoneura* for a long time. However, morphologically it is distinct from *F. orthoneura* and *F. hookeriana*. Typical are the ellipsoid, puberulous receptacle and caducous basal bracts. Leaf anatomy shows a multiple epidermis with the cells in the inner layer much larger than in the outer layer and thus both layers resemble an epidermis with a separate hypodermis. The abaxial cuticle is strongly sculptured, the palisade layer shows some long subdivided cells, and enlarged lithocysts are only present abaxially. Because of these differences we hereby describe it as a new species, named in honour of Cornelis (Cees) Berg: *Ficus cornelisiana*.

Published on 4 April 2014

INTRODUCTION

During the last 10 years a fig tree developed in Xishuangbanna Tropical Botanical Garden (XTBG, China) on a beautiful limestone rock purchased in Hanoi (Vietnam). The origin of the plant is uncertain, it can be an accidental introduction from Vietnam or it may be native in Kunming. Presently, the tree is on display in XTBG.

The plant was originally identified as *F. orthoneura* H.Lév. & Vaniot (Léveillé 1907). However, it also resembled *F. hookeriana* Corner (1959). The plant was compared with both species as described in Chantarasuwan et al. (2013). Also, leaf anatomy (Chantarasuwan et al. submitted) was used to identify the XTBG plant.

Morphology showed that the specimen deviates distinctly from *F. hookeriana* and *F. orthoneura* (Table 1), while leaf anatomy showed some resembling characters with *F. hookeriana* and *F. orthoneura,* especially in the multiple epidermis with the cells in the second layer much larger than in the outer layer and in the abaxial cuticula that is strongly sculptured. On the other hand, the specimen lacks sclerenchyma caps in the midrib and petiole, and in that is clearly distinct from *F. hookeriana* and *F. orthoneura*. However, this difference may have been induced by the good treatment in the garden, where it is not subjected to drought stress that normally results in the formation of sclerenchyma.

Because of the differences, the specimen merits distinction as a new species. The new epithet *cornelisiana* honours the late Prof. Cornelis C. Berg, the worldwide *Ficus* expert.

[1] Naturalis Biodiversity Center, section Botany, P.O. Box 9517, 2300 RA Leiden, The Netherlands;
corresponding author e-mail: bhanumas.chantarasuwan@naturalis.nl.
[2] Thailand Natural History Museum, National Science Museum, Klong 5, Klong Luang, Pathum Thani, 12120, Thailand.
[3] Institute Biology Leiden, Leiden University, P.O. Box 9505, 2300 RA Leiden, The Netherlands.
[4] Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, 88Xuefu Road, Kunming 650223, Yunnan, China.
[5] INRA - Centre de Biologie pour la Gestion des Populations, Campus International de Baillarguet, 34988 Montferrier-sur-Lez, France.

LEAF ANATOMICAL METHODS

For leaf anatomy, dry leaves were rehydrated by boiling in water for a few minutes and were then stored in 50 % alcohol. Cross sections were made with a Reichert slide microtome from three parts: 1) the middle of the lamina including the midrib; 2) a part of the lamina with the margin; and 3) three zones of the petiole: base, middle, and top near the lamina. Sixteen pieces were collected from each part. Free hand paradermal sections were taken from the adaxial and abaxial leaf surfaces. Half of the sections and paradermal sections were bleached and stained with safranin/haematoxylin. All sections were dehydrated and mounted in Euparal. Cuticular macerations were made by placing a leaf sample in a 1 : 1 mixture of hydrogen peroxide (30 %) and acetic acid (99–100 %) at 60 °C overnight. The cuticle was cleaned the following day and placed in a mixture of 0.5 % Sudan IV in 70 % alcohol at 40 °C for 2–3 h and mounted in glycerin jelly.

Ficus cornelisiana Chantaras. & Y.Q. Peng, *sp. nov*. — Fig. 1, 2

Leaves (sub)cordate. Figs stipitate, receptacle ellipsoid, minutely brown puberulous; internal hairs absent. Staminate flowers dispersed, numerous. — Type: *Yan-Qiong Peng s.n.* (holo XTBG; iso L), China, Yunnan, Kunming, Xishuangbanna Tropical Botanical Garden (cultivated), 23 June 2006.

Small tree, up to 5 m tall; branches drying brown or grey brown; leafy twig 0.8–1 cm thick, glabrous, periderm persistent. *Stipules* 0.4–0.5 cm long, persistent, minutely puberulous to glabrous and up to 7 cm long in the open shoot. *Leaves* not articulate; petiole 3.5–5 cm long, glabrous, epidermis persistent; lamina elliptic to obovate, 13–15 by 5.5–7 cm, (sub)coriaceous, base (sub)cordate, apex obtuse or subacute, the acumen blunt, both surfaces glabrous; lateral veins 12 or 13 pairs, usually furcate away from the margin, the basal pairs up to 1/4–1/3 the length of the lamina, mostly branched, tertiary venation reticulate. *Figs* axillary or just below the leaves, solitary or in pairs, peduncle 1–3 mm long, puberulous; basal bracts 3, caducuous; receptacle ellipsoid, 0.8–1 cm diam when dry, with stipe 1–3 mm long, surface usually wrinkled when dry, brown

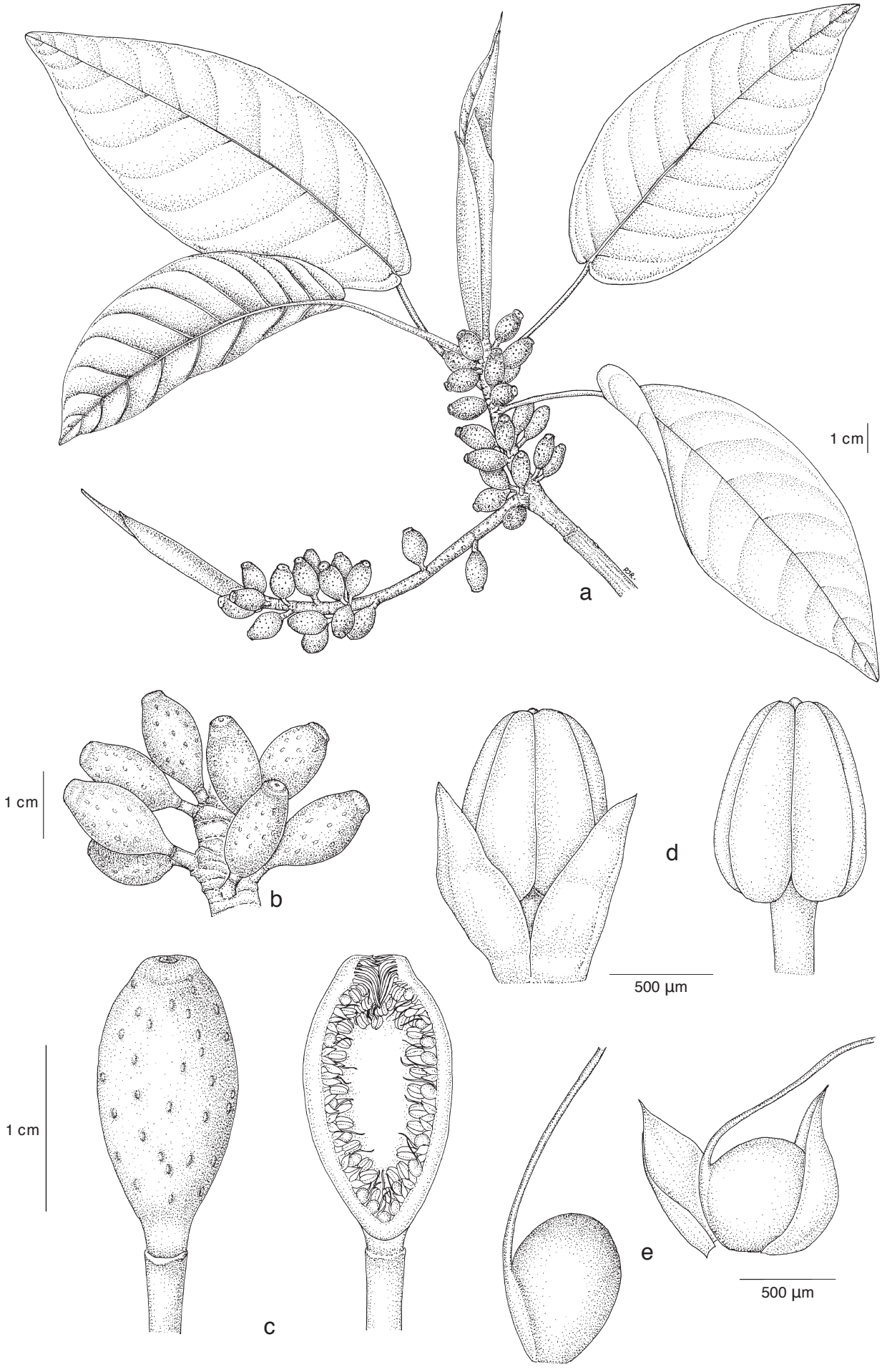

Fig. 1 *Ficus cornelisiana* Chantaras. & Y.Q. Peng. a. Twigs with leaves and figs; b. figs; c. fig in longitudinal section; d. staminate flowers with and without tepals; e. pistillate flowers with and without tepals (all: *Yan-Qiong Peng s.n.*, L). — Drawing: Pajaree Inthachup, 2013.

Table 1 Comparison of morphological characters of *F. cornelisiana*, *F. orthoneura* and *F. hookeriana*.

Characters	*F. cornelisiana*	*F. orthoneura*	*F. hookeriana*
Receptacle form	ellipsoid	subglobose	subglobose
Peduncle	1–3 mm long	2–5 mm long	sessile
Receptacle stipe	1–3 mm long	absent	absent
Receptacle indumentum	brown puberulous	glabrous	glabrous
Basal bracts of receptacle	3, free, caducous	3, free, persistent	3, connate into a cup, persistent

Fig. 2 Living parts of *Ficus cornelisiana* Chantaras. & Y.Q. Peng. a. Twig with leaves and figs; b. twigs with young leaves and figs; c. fig in longitudinal section, note the caducous basal bracts. — Photos by Yan-Qiong Peng.

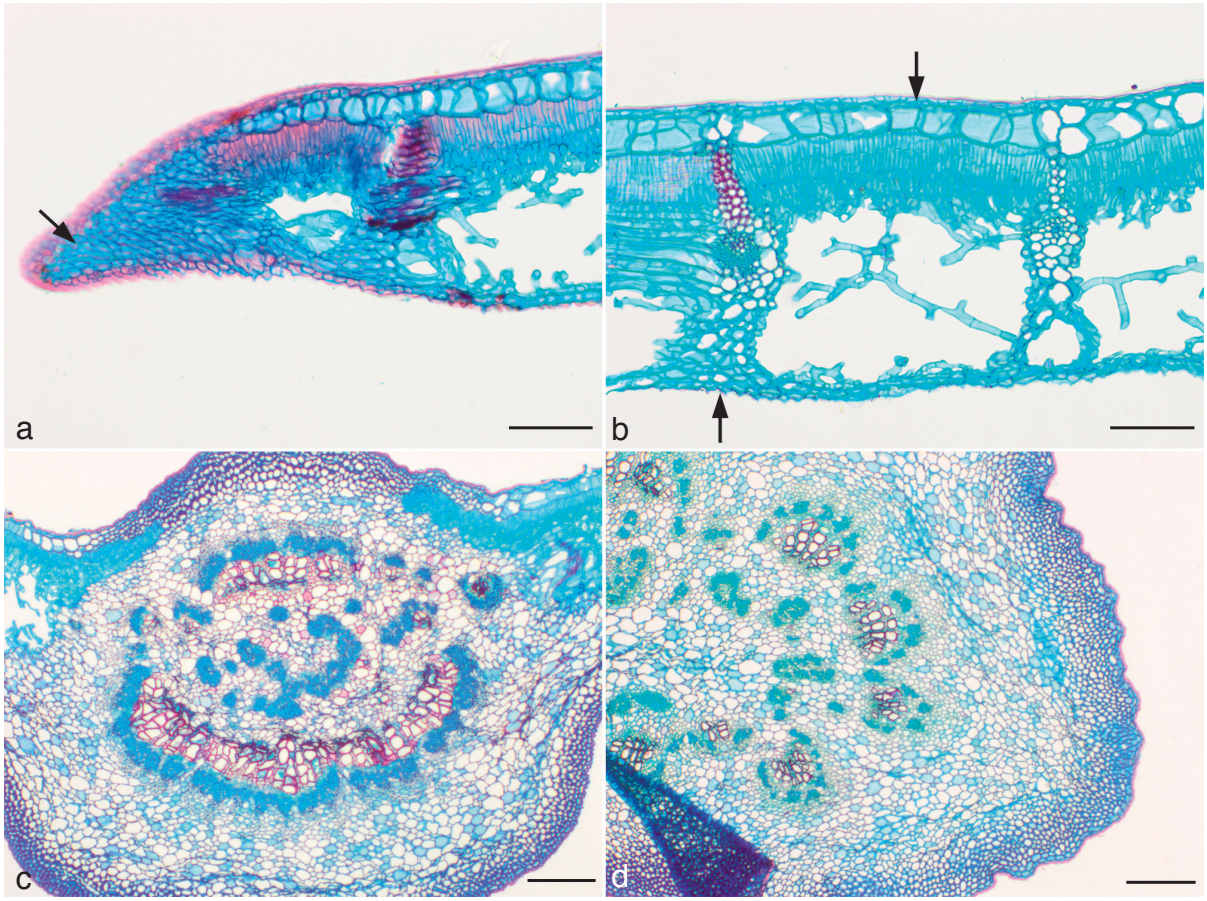

Fig. 3 Cross section of the lamina of *F. cornelisiana* Chantaras. & Y.Q. Peng. a. Leaf margin without marginal sclerenchyma (arrow); b. lamina showing a multiple epidermis with cells in the second layer much larger than in the outer layer (upper arrow) and abaxial cuticula strongly sculptured (lower arrow); c. midrib composed of a cylinder of separate to partially merged bundles in two opposing arcs without fibre caps; d. petiole with cylinder of separate bundles, without sclereid caps (all: *Yan-Qiong Peng s.n.*, L).

puberulous, black at maturity, apex flat to convex; ostiole 2.5–3 mm diam, upper ostiolar bracts brown puberulous; internal hairs absent. *Staminate flowers* dispersed, numerous, sessile; tepals 3 (or 4), free, reddish brown. *Pistillate flowers* sessile; tepals (2 or) 3, ovate to elliptic, free, reddish brown; ovary red-brown, without or with stipe.

Distribution — Only known from the type, cultivated in XTBG, of Sino-himalayan origin (either endemic in Yunnan or in northern Vietnam, the place where the rock originated on which the plant is growing).

Note — The abundant, dispersed staminate flowers suggest passive pollination.

LEAF ANATOMY

Material studied: type (see above) — Fig. 3

In surface view — Indumentum abaxially of glandular hairs with 1-celled heads. Cuticle smooth adaxially, strongly ridged abaxially. Anticlinal walls straight. Radiating epidermal cells around lithocysts 5–8 abaxially. Stomata 18.5–25 by 12.5–18.5 µm; giant stomata 25–28 by 18.5–22 µm.

In transverse section — Cuticle about 2 µm thick above lamina, above midrib and margin 5–8 µm thick. Epidermis multilayered adaxially, cells in outer layer smaller than in inner layer; abaxially outer periclinal epidermal wall and cuticle strongly ridged resulting in seemingly papillate appearance in sectional view. Stomata level with epidermis, only outer cuticular ledges present. Enlarged lithocysts abaxially. Mesophyll dorsiventral. Palisade 1- to partly 2-layered. Midrib composed of a cylinder of separate to partially merged bundles to two opposing arcs without fibre caps; subepidermal ground tissue not sclerified. Petiole with cylinder of separate bundles, without sclereid caps; peripheral ground tissue not sclerified. Pith bundles present in midrib and petiole. Veins vertically transcurrent; minor veins embedded in mesophyll. Sclerenchyma strands in margin absent. Druse crystals present in mesophyll, phloem parenchyma of midrib and petiole; prismatic crystals present in palisade, periphery of the bundle sheaths around the veins, and in the parenchyma of midrib and petiole.

Acknowledgements The first author wishes to thank the Royal Thai Government on behalf of the Ministry of Science and Technology for a scholarship and he also likes to acknowledge the support from the Thailand National Science Museum, both enabled him to study for a PhD in Leiden, the Netherlands. We are grateful to Dr. Steve Compton, University of Leeds, to pass on a sample of the new species to Leiden and Pajaree Inthachup, Bangkok Herbarium (BK), for the beautiful drawing.

REFERENCE

Chantarasuwan B, Berg CC, Van Welzen PC. 2013. A revision of Ficus subsection Urostigma (Moraceae). Systematic Botany 38: 653–686.

Chantarasuwan B, Baas P, Van Heuven B-J, Baider C, Van Welzen PC. submitted. Leaf anatomy of Ficus subsection Urostigma (Moraceae). Botanical Journal of the Linnean Society.

Corner EJH. 1959. Taxonomic notes on Ficus Linn., Asia and Austrasia; I. Subgen. Urostigma (Gasp.) Miq. The Gardens' Bulletin of Singapore 17: 368–415.

Léveillé H. 1907. Nouveaux Ficus chinois. In: Feddes F, Repertorium Novarum Specierum Regni Vegetabilis 4: 65–67. Berlin.