Standard Pharmacognostic Characterisation of Fak khaao as Pharmaceutical Preparation for Skin Diseases Treatment

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ABSTRACT

Fak khaao, Thai local name, has been used for dietary as well as medicinal purpose in Thai Traditional Medicine, for example, antimicrobial activity, anticancer, antioxidant agents and antidiabetes, etc. (Putiyanan, 2004). The aims of this work were to collect and identify botanical name of Fak khaao, Momordica cochinchinensis (Lour.) Spreng., as a voucher specimen and to standardize pharmacognostic characters for quality controlling of the material before the formulation process. The macroscopic characters were studied for sample collecting and microscopic characters of transverse section of Fak khaao's leaves were compared to the leaf powders showing the upper and lower epidermis, trichome, collenchyma, palisade mesophyll, spongy mesophyll, stoma (guard cell), vascular bundles, etc., which were similar to microscopic description of drug powders. The values of stomatal index, veinlet termination number, vein-islet number and palisade ratio were calculated for standardization of samples which were 11.84±1.77, 5.95±1.31, 2.38±0.40 and 4.49±0.73, respectively. The results established the standard characters of Momordica cochinchinensis (Lour.) Spreng., being botanical name of Fak khaao, which can be used to produce leaf extract preparation for the treatment of skin diseases.

Key words: *Momordica cochinchinensis* (Lour.) Spreng., Fak khaao leaf, Standard pharmacognostic

INTRODUCTION

"Fak khaao" is indigenous of Thailand (Putiyanan, 2003). It has been used for dietary as well as medicinal purpose in Thai Traditional Medicine, for example, antimicrobial, anticancer, antidiabetes and antioxidant agents. It was found that most researches emphasized on the fruits and the roots of Fak khaao (Yeung et al., 1987). However, this study focused on using Fak khaao's leaves which are valuable parts of this plant, thus, helped conserve natural resources.

OBJECTIVE

The aims of this work were to collect and identify *Momordica cochinchinensis* (Lour.) Spreng. (Ridley, 1924) as a voucher specimen, and to standardize pharmacognostic characters for quality controlling of the material before the formulation process.

MATERIALS AND METHODS

Fak khaao were obtained from various places in Chiang Mai. The method of taxanomic identification and authenticated specimen are as follows: collect the whole plant including roots, leaves, flowers and fruits, then remove all dirt. Choose about 5 blooming and just-budding flowers, with leaves and fruits if possible. If the specimen is not complete, collect more in other seasons with note attached. Collect at least 5 duplicates, i.e., 2 duplicates for taxonomic identification and 3 duplicates for herbarium specimen preparation. Collect sufficient samples for studies in antimicrobial activities and powder identification with strain solution preparation.

RESULTS AND DISCUSSION

Taxonomic Identification (Ridley, 1924)

Herbarium specimen of Fak khaao (family Cucurbitaceae) was identified by taxonomic evaluation and deposited in the medicinal plant herbarium, Faculty of Pharmacy, Chiang Mai University for authenticated specimen (voucher specimen) no. 010082.

Morphological Description of Fak khaao (Fig 1-2)

Botanical name : *Momordica cochinchinensis* (Lour.) Spreng
Family : Cucurbitaceae
Vernacular name : Fak khaao (Central), Kheekaa khruea (Pattani), Phak khaao (Northern) or Phukhuu-doh (Karen-Mae hong son)

Deciduous woody climber, stem robust, angular, glabrous. Leaves: petioles 5-10 cm long, with 2-5 glands in the upper part; blades decurrent on the upper part of the petiole, papery to slightly subcoriaceous, suborbicular, divided to about the middle, sometimes nearly to the base in 3 (rarely 5) lobes; base cordate, with several glands as on the petiole; 12-20 cm diameter, both sides glabrous or nearly so; lobes oblong-lanceolate or ovate, divergent, acute at the tip, sides entire, rarely undulate or dentate; nerves 3-5 from the base of the blades, prominent above, visible below; secondary nerves 4-5 pairs on each side of the midnerve, basal ones with 1-2 branches, finer venation reticulate, distinct.

Flowers: male solitary, peduncle robust, glabrous, 5-30 cm long, with a sessile bract, cucullate and firm, orbicular-reniform, emarginated-retuse at the summit, narrowly emarginate at the base, often glandular, both margins entire or often with several fine hairs, external surface glabrescent, interior side scabrous;

3-4 x 4-5 cm; inserted in the upper part of the peduncle. Receptacle thicked, c. 15 mm diameter at the throat, 5 mm at the base. Sepals triangular-lanceolate, pointed, finely pubescent or scabrous, 5 equal lobes, 10-16 x 6-8 mm. Petals 5, 5-6 x 1.5-2.5 cm; obovates-oblong, hairy inside, glabrous outside, yellow, base black; stamens 5, inserted on the receptacle; filaments flat, connectives thickened, hairy along the margin, coherent medially; anthers coherent, linear, corrugate. Female flowers solitary; pedicel 3-10 mm long, finely pubescent; bracts smaller than the male bracts, inserted near the middle of the pedicel. Ovary ellipsoid, densely and harshly muricate; Berries ovoid, fleshy, densely covered with rough tubercules, yellow then red at maturity, often orange; 10-15 x 6-10 cm. Seeds numerous, ovoid, undulate or lobulate on the sides, brown, 26-28 x 5-6 mm; testa finely and irregularly sculptured-rugose.

Pharmacognostic Identification

The results of macroscopic characters of leaf crude drugs showed petioles 5-10 cm. long, with 2-5 glands in upper part, acute apex, nerves 3-5, secondary nerves 3-5 and finer reticulate venation. The microscopic characters are shown in Fig 3 – Fig. 8. The transverse section of Fak khaao's leaves showed the upper and lower epidermis, trichome, collenchyma, palisade mesophyll, spongy mesophyll, stoma (guard cell), vascular bundles, etc., which were similar to microscopic description of drug powders. The values of stomatal index, veinlet termination number, vein-islet number and palisade ratio were 11.84±1.77, 5.95±1.31, 2.38±0.40 and 4.49±0.73, respectively.

CONCLUSION

Pharmacognostic study, using macroscopic and microscopic characterization of Fak khaao demonstrated the differences in the cell shape, detail and size of each tested strain after detecting by microscope. This technique could be applied in the systematic identification of the leaves. Subsequent study on antimicrobial activity of the leaf extracts will be reported in the upcoming part. The results established the standard characters of *Momordica cochinchinensis* (Lour.) Spreng., which can be used to produce leaf extract preparation for the treatment of skin diseases in further part.

ACKNOWLEDGEMENTS

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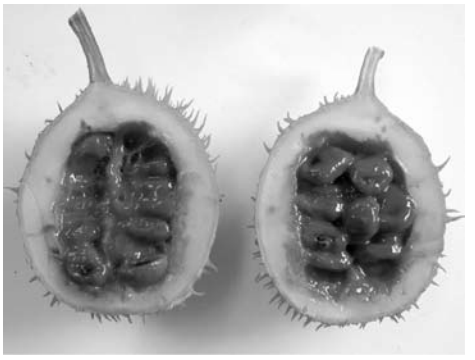

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Figure 1. Macroscopic character of *Momordica cochinchinensis* (Lour.) Spreng. 1. the plant; 2. male flower; 3. female flower; 4. ripe fruit; 5. ripe fruit and seeds inside 6. dry seeds.

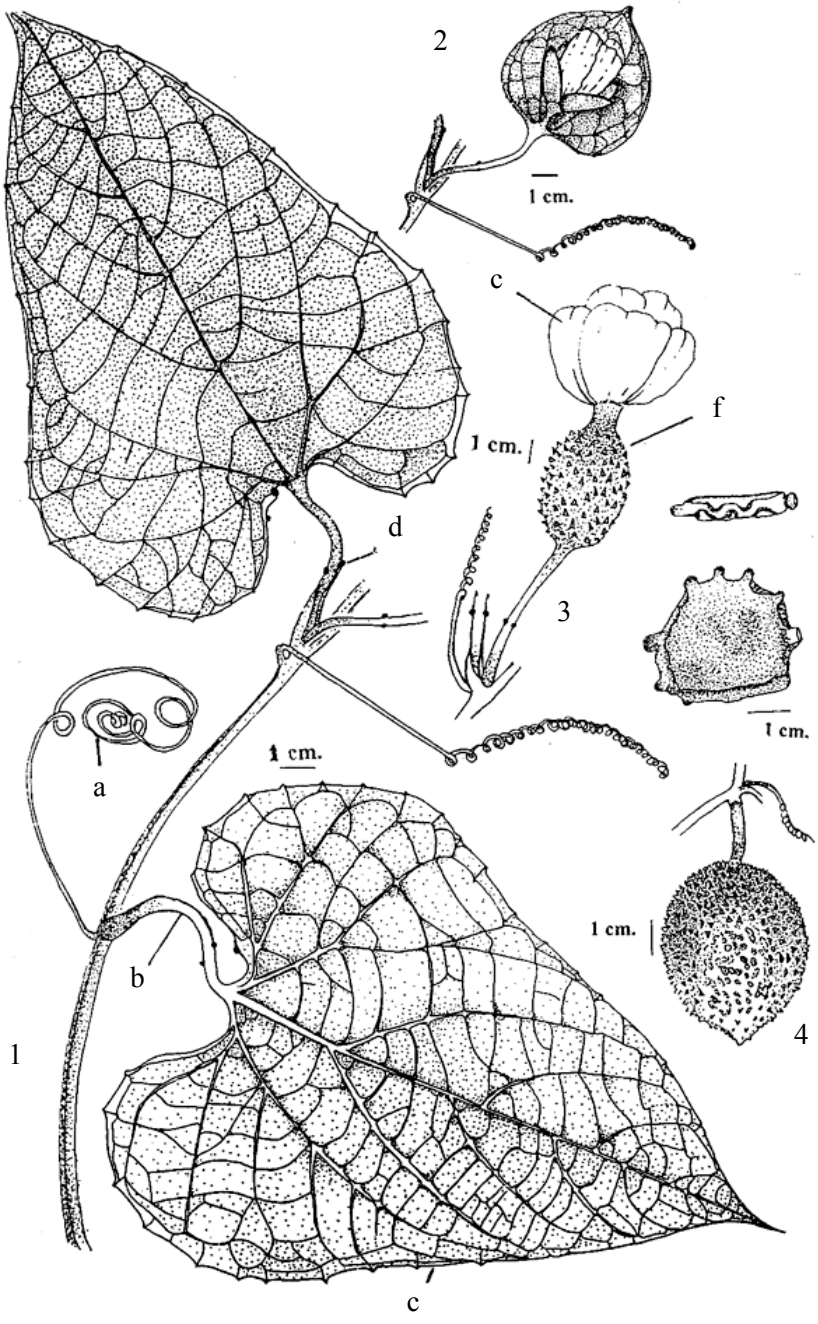


Figure 2. Macroscopic character of *Momordica cochinchinensis* (Lour.) Spreng.
1. the plant; 2. male flower; 3. female flower; 4. fruit; 5. seed (*a: tendril, b: petiole, c: lamina, d: gland, e: petal, f: inferior ovary*).

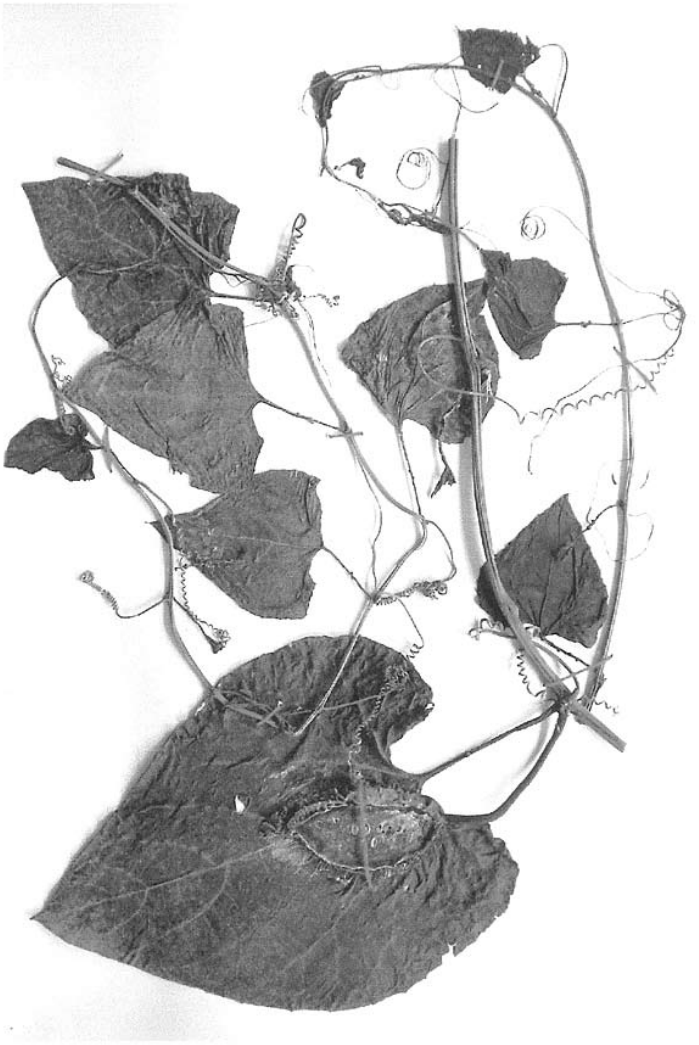


Figure 3. Macroscopic character of *Momordica cochinchinensis* (Lour.) Spreng.: herbarium specimen no. 010082 : deposited at Herbarium of Faculty of Pharmacy, Chiang Mai University for authenticated reference specimen : voucher specimen.

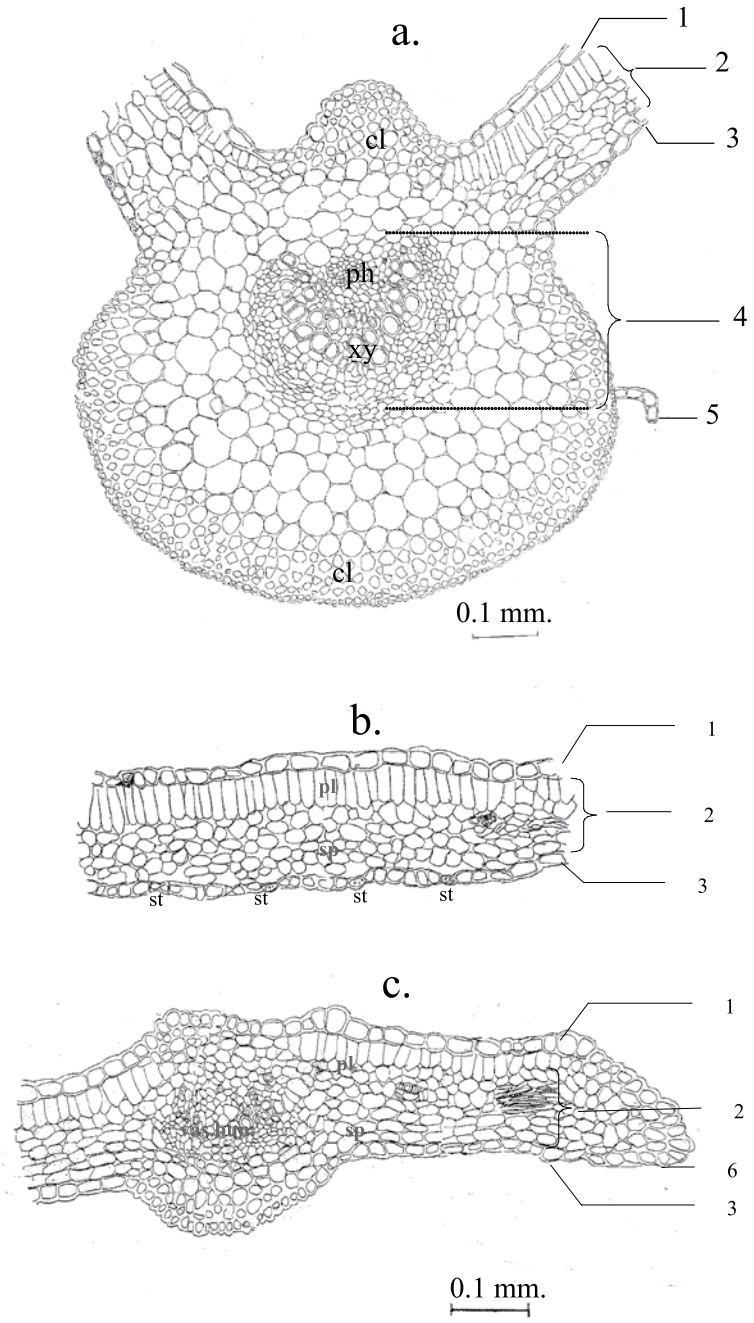
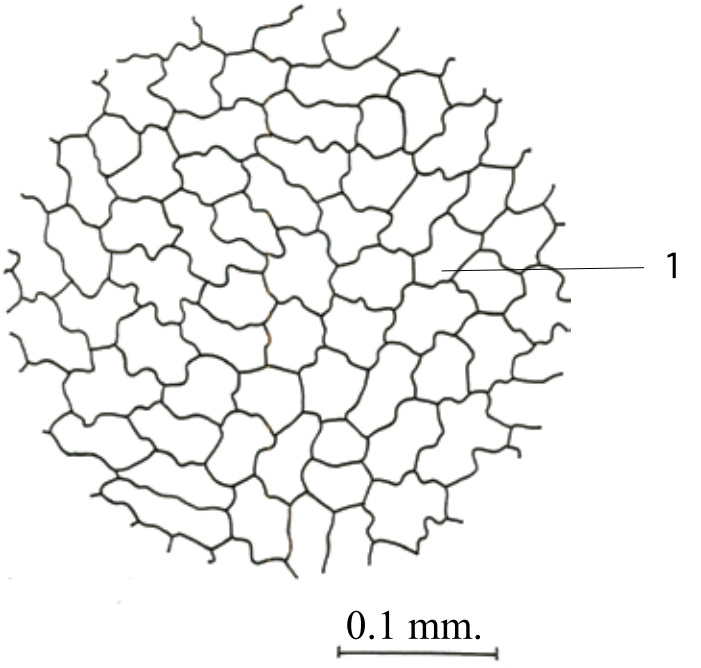
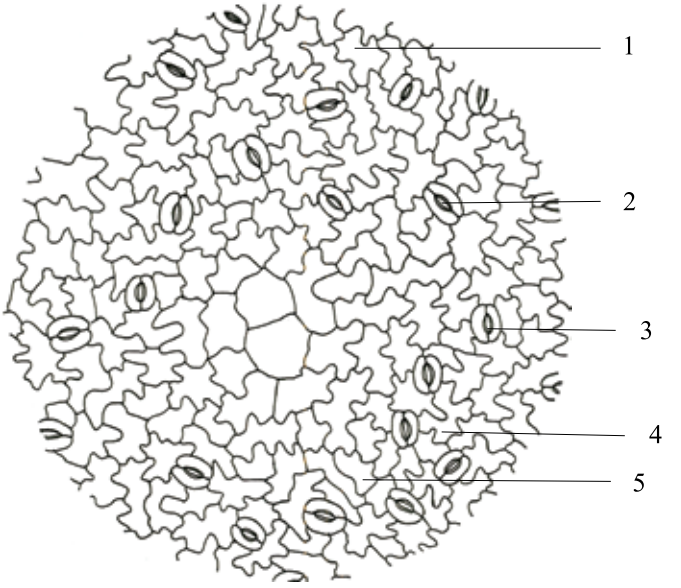


Figure 4. X-section leaf of *Momordica cochinchinensis* (Lour.) Spreng..: (a.) cross midrib, (b.) cross leaf blade, (c.) cross leaf margin 1. upper epidermis; 2. mesophyll; 3. lower epidermis; 4. vascular bundle; 5. trichome; 6.leaf margins (*cl: collenchyma (lacunar type), pl: palisade cells, sp: spongy cells, ph: phloem, xy: xylem, st: stomata, vas bun: vascular bundle*).



a. Upper epidermis of the lamina



b. Lower epidermis of the lamina

Figure 5. Surface section of epidermis of *Momordica cochinchinensis* (Lour.) Spreng.. leaf 1. epidermal cell; 2. guard cell; 3. stoma(ta); 4. subsidiary cell; 5. neighbouring cell.

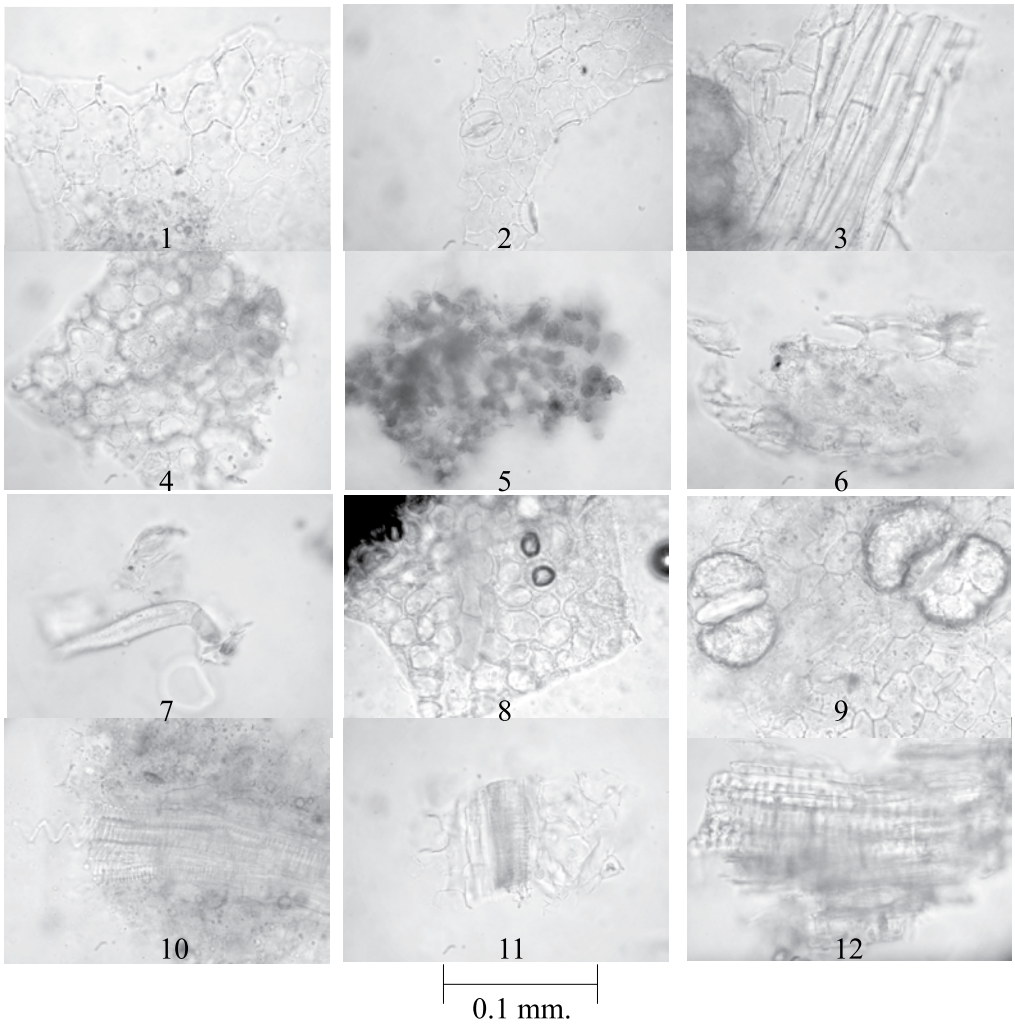


Figure 6. Powdered drug images of the leaf of *Momordica cochinchinensis* (Lour.) Spreng. 1. upper epidermis 2. lower epidermis 3. epidermis over vein 4. palisade cells beneath upper epidermis in surface view 5. spongy cells 6. leaf margin in sectional view 7. trichome 8. collenchyma 9. upper epidermis 10. vascular bundle and mesophyll 11. vascular bundle 12. vascular bundle from petiole.

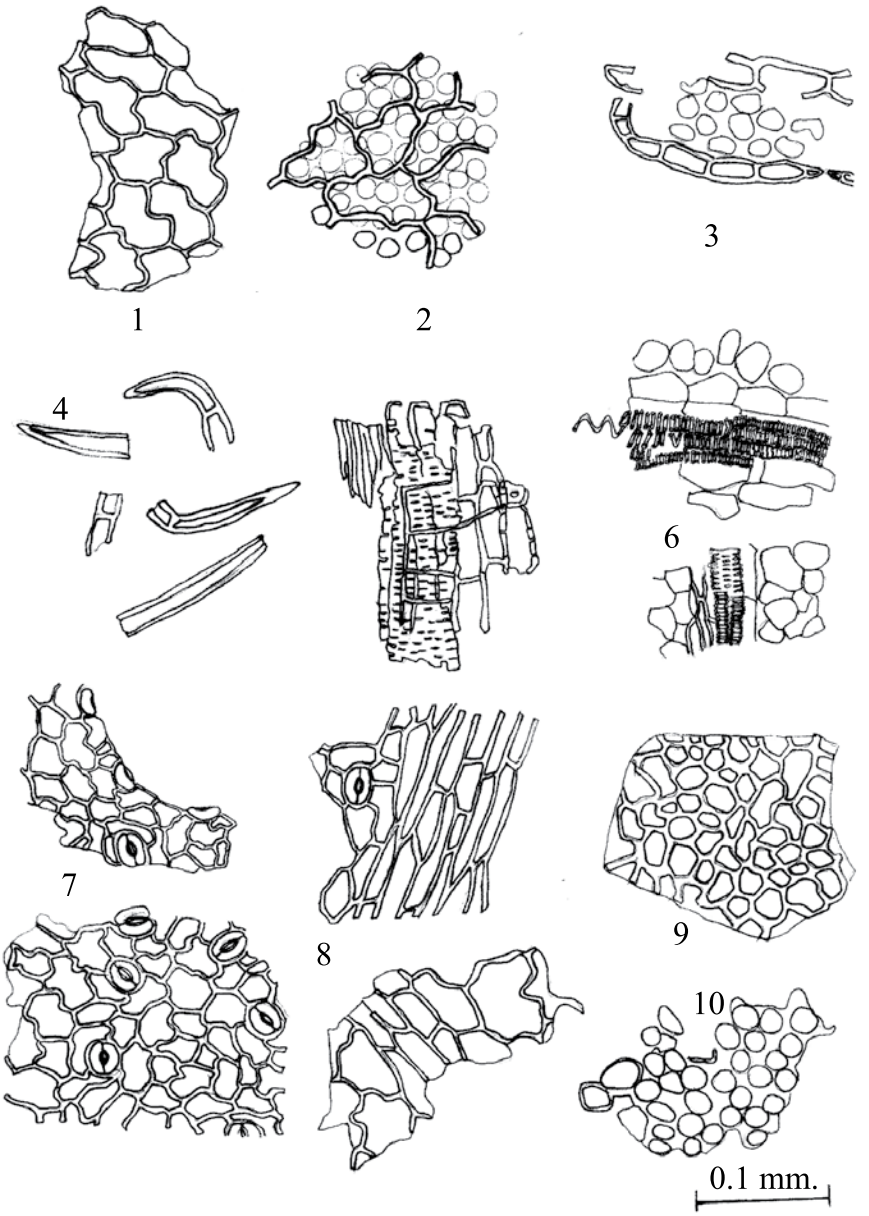


Figure 7. Powdered drug images of the leaf of *Momordica cochinchinensis* (Lour.) Spreng. 1. upper epidermis in surface view 2. palisade cells beneath upper epidermis in surface view 3. leaf margin in sectional view 4. trichome 5. vascular bundle from petiole 6. vascular bundle from mesophyll 7. lower epidermis in surface view 8. epidermis over vein 9. collenchyma 10. spongy cells.

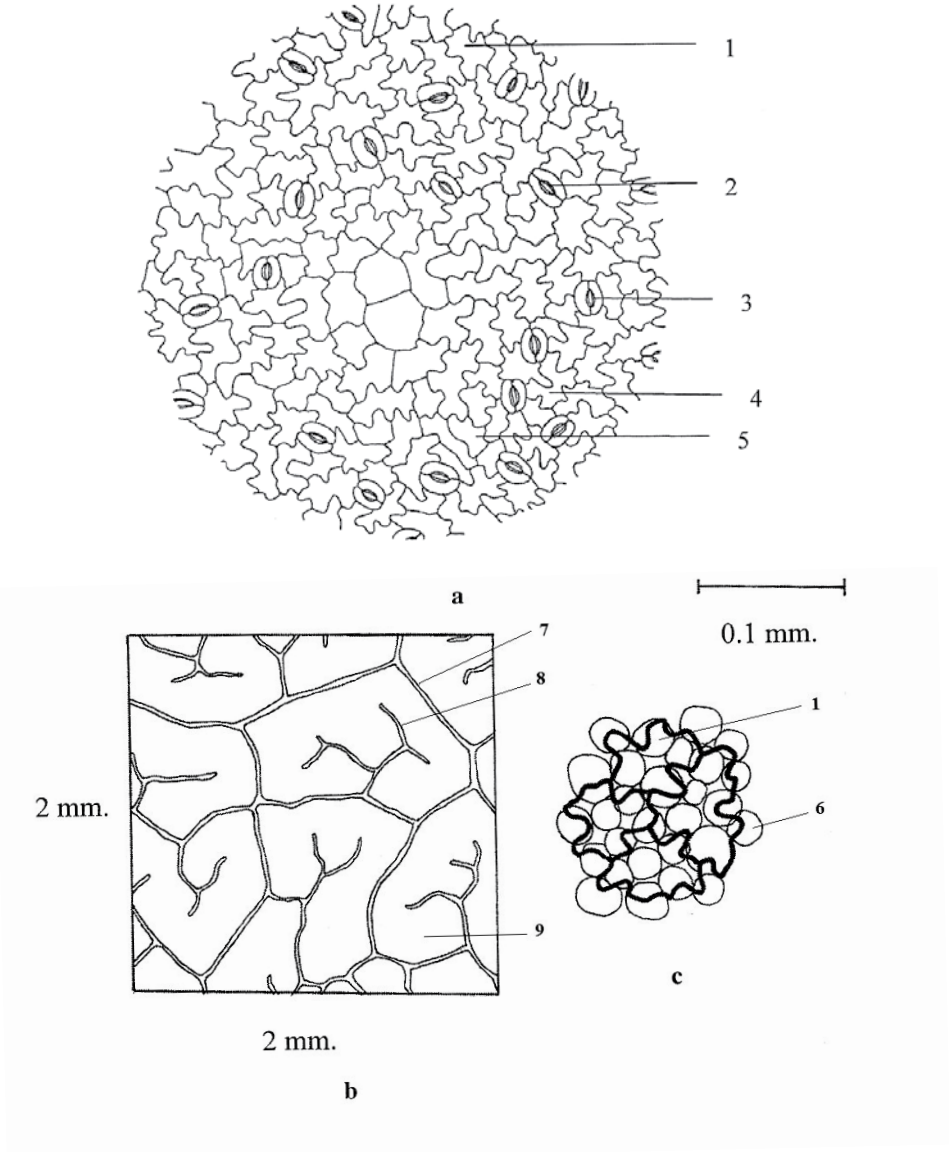


Figure 8. Constant value of leaf structure of *Momordica cochinchinensis* (Lour.) Spreng. a. stomatal number and stomatal index; b. veinlet termination and vein-islet number; c. palisade ratio 1. epidermal cell; 2. guard cell; 3. stoma(ta); 4. subsidiary cell; 5. neighbouring cell; 6. palisade cell (mesophyll); 7. vein; 8 veinlet and 9. vein-islet.

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