

Mitsuru Hotta*: **Notes on the wild banana of Borneo****

堀田 満*: ボルネオ産野生バナナの記**

(Pl. VII)

In 1902 Beccari described four species of the genus *Musa* for the first time from Borneo: that is *M. campestris*, *M. borneensis*, *M. microcarpa*, and *M. hirta*. Except for *M. microcarpa*, they are distinct from all the species hitherto described under the genus. In 1950 and 1957, Cheesman gave taxonomical critics on two species, *M. borneensis* and *M. microcarpa*. Very recently in 1960, Simmonds added a new species, *M. beccarii*, from Sabah of Northern Borneo.

Members of the Borneo Expedition organized by the University of Kyoto in 1963-64 collected as a whole six species of the genus. Among them, two are very little known and interesting species, i. e. *M. hirta* and *M. campestris*, and three seem to be new to science. During our stay in Borneo, I gave special attention to that genus, as this is still very imperfectly known there. In fact, I could have observed the wild banana growing abundantly in the river-side or in the open place along the road-side. The wild bananas of Borneo, it seems, show considerable manifold nature in every characteristics, and in addition, it was ascertained that each species has actually very narrow geographical and ecological distribution. It is my impression from field experience that Borneo might be an important center of specific differentiation of the genus. The number of the wild species of *Musa* in Borneo may count more than 10 or even 20, though only 5 species have been described up to present.

In this paper I have described three new species and gave some critical notes to the others. I wish to express my deep sense of gratitude to Dr. J. S. Gould, Dr. M. Miyairi, Dr. P. S. Ashton, and Mr. H. Horita, who are so much helpful to our field survey. Cordinal thanks are also due to Professor S. Kitamura of the University of Kyoto for his kind supervision, and finally I wish to express my

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appreciation to Professor T. Tuyama of Ochanomizu University for his critical reading of the manuscript.

1. *Musa textilis* group *Musa textilis* is listed up in Merrill's 'Enumeration' as a cultivated plant in North Borneo, but Cheesman (1949) did not refer to any Bornean specimens belonging to this category, and Cheesman and Simmonds, in their excellent works on the genus *Musa*, made no report on the member of the Sect. Australimusa from Borneo. Of our collection, three specimens seem to be closely related to *M. textilis*, a member of the Sect. Australimusa, and one is referable to this species.

Musa* cf. *textilis Née in Annal. Cienc. Nat. **4**: 123 (1801); Cheesman in Kew Bull. **1949**: 267 (1949). Fig. 1. A, B.

BRUNEL. Seria: between Labi and Bt. Puan, in open place along the roadside, mixed with *M. campestris*, alt. 50-100 m, Dec. 25, 1963, M. Hotta 13017.

Above specimen accords very well with *Musa textilis* of the Philippines, but our specimen slightly differs from the description given by Cheesman on *M. textilis* by its larger size of the whole plant and elliptic or ovate free tepal with bittently truncate apex. These are not essential differences for the specific distinction. This specimen has only young inflorescence lacking mature seeds. In addition, the male flower of ours closely resembles the following new species, *M. muluensis*, by its 5-apiculated teeth of the compound tepal, and its usually bittently truncated free tepal, shorter than the stamen and the sterile style. *Musa muluensis* belongs to the Sect. Australimusa as clearly suggested by its seed shape. Thus, our specimen may represent a new form of *M. textilis* that is wild on Bornean side, or new infraspecific taxon belonged to this species.

Musa muluensis M. Hotta, sp. nov. Fig. 1. C~E. Pl. VII. 6.

Planta stolonifera; inflorescentiae pars feminea horizontalis, pars mascula pendula, pedunculo puberulente; bractee imbricatae, deciduae; flores feminei ca. 10, biseriati; flores masculi 10-12, biseriati; tepalum liberum ellipticum vel oblongo-ellipticum, rotundatum vel truncatum, 2 cm longum; semina numerosa, depresso-ovoidea, multo tuberculata, umbonibus oppositis.

Plants suckering, the pseudostem 3-4 m tall, slender, waxless, green with variable rusty-brown shade near the base; juice watery; petioles slender up to 40 cm long, deeply grooved above with erect and slightly infolded margins, tightly clusping at the base; leaf-blade 2 m long and 40 cm wide, being attenuated towards the apex, obtuse at the top, often unequal at the base; inflorescence at first horizontal, 5-7 basal hands

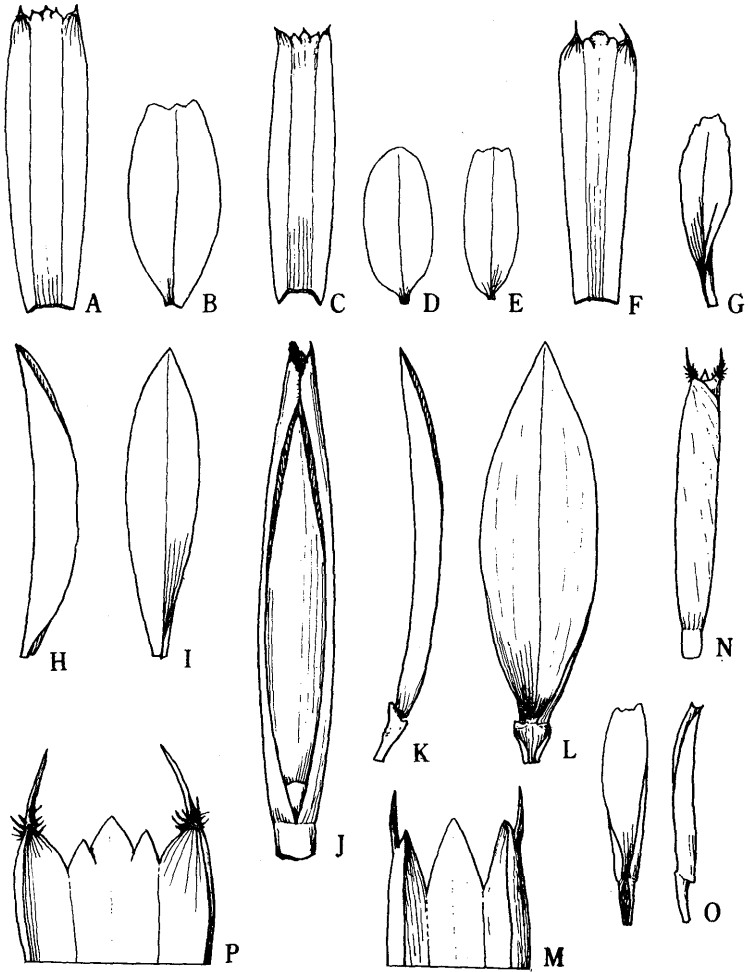


Fig. 1. Male flowers and tepals. A, B. *M. cf. textilis*; C, D, E. *M. muluensis*; F, G. *M. campestris*; H, I. *M. tuberculata*; J, K, L, M. *M. flavida*; N, O, P. *M. hirta* (natural size except M & P).

female, distal hands male, peduncles and rachis puberulous; female flowers about 10 per bract in two rows; male axis pendulous, slender; male bud oblanceolate-oblong, acute, the bracts imbricate and outermost being about four-fifth of the whole length of the bud; male bracts deciduous, brownish crimson, shining with a

polished appearance, lanceolate-oblong, about 8 cm long, 3 cm wide, obtuse or sometimes abruptly retuse, persisting after the subtended flowers have dropped, reflexed but not strongly rolled back; male flowers about 10-12 per bract in two rows, the compound tepal 3.5 cm long, minutely 5-toothed at the apex, outer lobes 2.5 mm long, acute with short dorsal appendage, the free tepal 2 cm long, 0.8-1.0 cm wide, elliptic or oblong elliptic, rotundate or bittently truncate, reddish purple near the midrib and the basal part, the stamens 5, with anthers 1.8 cm long and filaments 1.2 cm long, the sterile style 3.5 cm long, with ellipsoidal stigma; fruit bunch horizontal, about 6 hands of 10 fruits each; mature fruits 8-9 cm long, 1.6 cm in diameter at the middle, the pedicel 1.8 cm long, apical appendix 7-10 mm long and with abruptly truncate broad apex; seeds numerous, compressed obovoid with distinct small umbo at the top, covered with many tubercles, about 4 mm long and wide.

SARAWAK. 4th Division: along Sungai Payau, from Sungai Melinau Paku to Rubang Payau, G. Mulu, in river-side open place, alt. 50-100 m, March 22, 1964, M. Hotta 15260.

The present new species belong to the Sect. Australimusa, as shown by its imbricate bud with polished outer side and by compressed obovoid seed with an umbo at the top. This species has a strong resemblance in general appearance with *M. textilis*, but differs from it by the smaller and more slender plant, and the tuberculate seeds.

Musa tuberculata M. Hotta, sp. nov. Fig. 1. H, I. Pl. VII. 3.

Pseudocaulis 4-5 m altus; inflorescentiae pars feminea horizontalis, pars mascula pendula, pedunculo pubescente; bracteae imbricatae; flores masculi ca. 9-10, biseriali; tepalum liberum lineare, acutum; semina numerosa, depresso-obpyriformia, multo tuberculata.

Pseudostems 4-5 m tall, suckering; petioles 60-70 cm long, grooved above, tightly clusping at the base (?); leaf-blade oblong, becoming narrower towards the apex, about 3 m long and 40 cm wide, rounded at the tip, the two sides unequal at base; inflorescence at first horizontal, about 8 basal hands female, distal hands male, quite pendulous; peduncles and rachis minutely pubescent; male bud in advanced stage of anthesis obovoid, the bracts imbricate; the bract pale yellowish crimson with dark color at the apical and marginal parts, oblong, obtuse, 15 cm long, 6 cm wide, soon deciduous; male flowers 9-10 per bract in two rows, the compound tepal 4.5-5.0 cm long, apex 3- or irregularly 5-toothed, the outer lobes about 1.5 mm long, acute

with dorsal filiform appendage of 2 mm long, the free tepal 4 cm long and 1 cm wide, broadly linear, strongly curved, acute at the apex, cuneate at base, the stamens 5, shorter than the free tepal, the sterile style 3.5 cm long, with ellipsoidal stigma that is 6 mm long and 2.5 mm wide; fruit bunch horizontal, lax, about 9 fruits on each hand; individual fruit 11-12 cm long (including pedicel of 2 cm long), 2.0-2.5 cm in diameter; seeds numerous, depressed obpyriform, 4-5 mm across and 5-6 mm high, with many tubercles.

BRUNEI. Brunei Temburong: along Sungai Lacquan, a branch of Sungai Batu Apoi, in river-side open place, on rich and deep soil, standing mixed with *M. flavida* and *M. campestris*, Jan. 31, 1964, M. Hotta 13878.

From the characteristics of polished and imbricate male bud, and also from the general appearance of plant, this new species seems to be closely related to *M. textilis*. On the other hand, the male flowers and the seeds are alike to those of *M. borneensis*. In the field, I, at first, referred this specimen to *M. textilis*, but on careful examination, it proved that the flower is larger than that described by Cheesman (1949), and that the tuberculate seed is also larger, measuring 4-5 mm across and 5-6 mm high. *Musa muluensis* and *M. cf. textilis* (Hotta 13017) are the bananas similar to *M. tuberculata* in the areas we surveyed, but they have short free tepals with the apex rounded up or bitten truncated. According to Beccari's and Cheesman's description, *M. tuberculata* differs distinctly from *M. borneensis* in the arrangement and the number of flowers; the former has about 10 flowers biserially arranged in a bract, the latter has fewer, usually 4 uniserially arranged in a bract.

2. *Musa borneensis* group In our collection, there is a specimen bearing large male flowers with the free tepal lanceolate in shape and acute at tip. This male flower is very similar to that of *M. borneensis*. This specimen may represent a new species belonging to the Sect. Callimusa.

Musa flavida M. Hotta, sp. nov. Fig. 1. J~M. Pl. VII. 1.

Planta 4-6 m alta, stolonifera; inflorescentiae pars feminea horizontalis, pars mascula pendula, pedunculo pubescente; bractea flavida, late ovata; flores masculi ca. 4, uniseriati, tepalo in apicem composito tridentato; tepalum liberum lanceolatum, acutum.

Plants suckering, large, the pseudostems 4-6 m tall; petioles 70-90 cm long, grooved with incurved margins, the basal part narrowly expanded with scarios margins; leaf-blade 2.5-3.0 m long, 50-60 cm wide, oblong, slightly narrowed to-

wards the apex, roundly truncate at the tip, unequally rounded or slightly cordate at the base; inflorescence large, the peduncle and rachis minutely pubescent, basal 12 hands female; female flowers about 5 per bract in one row; male axis pendulous, 3 cm in diameter, with very dense scars of bracts; male bud in advanced stage of blooming obovoid, nearly rounded at the tip, the bracts densely arranged on the rachis, slightly imbricate; bract creamy yellow, shining, broadly ovate, rounded, shallowly dish-shaped, rather thin, leatherly in texture, strongly deflexed at flowering and slightly rolled back at the apical part, soon deciduous; male flower about 4 per bract, uniseriate, the abortive ovary about 4 mm long, connated each other at the base, the compound tepal 6 cm long, strongly ribbed at the dorsal angles, with 3 teeth, outer lobes acute with short dorsal appendages, the central lobe acute, the free tepal lanceolate, acute, recurved outwards, transversely corrugated at the basal part, 3.5 cm long, the stamens 5, as long as the free tepal, the filament about 2.0-2.5 cm long, the anther 3.0-3.5 cm long; fruit bunch large, horizontal, consisting of 12 hands of usually 5 fruits each, the fruits uniseriate; fertile fruit and seed unknown.

BRUNEI. Brunei Temburong: along Sungai Lacquan, a branch of Sungai Batu Apoi, alt. ca. 50 m, river-side open place, mixed with *Musa campestris* and *M. tuberculata*, Jan. 31, 1964, M. Hotta 13876.

In 1959 Simmonds stated on a plant of the Sect. *Callimusa* from Borneo, that this is "a large plant with yellow sap, large dense horizontal bunches and yellow male bracts. We have, unfortunately, been unable to raise plants at the I.C.T.A." The present new species seems to be the same with this Simmonds' plant as shown by the large size of plant and yellowish male bracts. Fruit of our specimen is not yet well developed (this plant is non parthenocarpic), but I found a few uniseriate flowers on each bract, tridentate compound tepal of male flower, and boat-shaped free tepal with acute apex. By those characters, this species is deemed as an ally of *Musa borneensis*.

3. *Musa campestris* and *M. hirta* These two species have been known to us only through Beccari's descriptions. Simmonds stated in his notes on banana taxonomy (1960), that "*M. hirta* is something of a mystery; it is described as a small plant with erect bunches, red bracts, hairy coherent fruits and angular-subglobose seeds. Though in aspect it must resemble a *Callimusa* the seeds disagree and it may be that its affinity will turn to lie with *Musa beccarii*." Our party could fortunately collect these two little known species. Our specimens well match

Beccari's excellent descriptions and figures, except in a few details. Therefore, the descriptions based on our specimens and field observations may better be given here as follows:

Musa campestris Beccari, Nelle Foreste di Borneo, 622, fig. 79 (1902). Fig. 1. F, G. Pl. VII. 5.

Plants emitting stolons freely, the pseudostem slender, 1.5-2.0 m high, green and marked with brackish purple blotches; leaf-blade up to 2 m long, 40 cm wide; petioles 50-70 cm long, with scarious margins, strongly grooved, slightly expanded into narrow auricles at the basal part; inflorescence quite erect; peduncle pubescent; sterile bracts usually 1, with narrow and short foliage lamina, 50-70 cm long, base broadened, lower side green, upper side reddish purple, usually persistent at the opening of the male flowers; 5-7 basal hands female, upper hands male; female flowers 3-5 per bract, in a single row or partly in two rows, the ovary 5.5-6.5 cm long, white, the compound tepal 3.5-4.0 cm long, the free tepal obovate, 3.0-3.5 cm long, staminodes shorter than the style, 1.0-1.4 cm long, the style 3 cm long, with a globose stigma 7-8 mm in diameter; male bud, in advanced stage of blooming, narrowly ovoid, acute, the bracts imbricate; bract purplish pink, the outer surface shining without shade of glaucousness, lanceolate-oblong or ovate, the lowest ones about 10 cm long, 4 cm wide, deflexed but not rolled back, very soon deciduous; male flowers 3-6 per bract in a single row or partly in two rows, the compound tepal 3.2-4.0 cm long, orange in the upper part and nearly white at the base, ribbed at the dorsal angles, with 5-toothed apex, the outer lobes ovate, cuspidate, inner three lobes rotundate, central one larger than the laterals, the free tepal 2.3-3.5 cm long, oblanceolate, rotundate and entire or with a few irregular serrations, the stamens longer than the free tepal, filaments 1.4-1.8 cm long, anthers 1.5-2.0 cm long; fruit bunch rather compact, its peduncles and rachis pubescent, the fingers inflexed to stand almost parallel to the rachis; individual fruit 8-13 cm long, about 2 cm in diameter, cylindrical with 4-5 angles, pedicel short and obscure, apical part bottle-neck-shaped with truncate apex, the pericarp thin, powdery green and usually bloched reddish purple; seeds cylindrical obpyriform, tuberculate, 4-5 mm long, 2.5-3.0 mm in diameter.

BRUNEI. Tutong: lake Merimbun, river-side open place, forming a large population, Dec. 10, 1963, M. Hotta 12460, native name *Pisang hutan*. Brunei Temburong: Bt. Peradayan, in the vicinity of Labu, alt. 100-300 m, on the edge of secondary forest, Jan. 26, 1964, M. Hotta 13657.

Musa hirta Beccari, l. c. 624, fig. 78. Fig. 1. N~P. Pl. VII. 2, 4.

Plants small, the pseudostems 1.0-1.5 m tall, suckering freely; petioles 50-80 cm long, grooved with incurved scarious margins, the basal part abruptly expanded into large corrugate black auricles, the auricles 10-20 cm long, 3-4 cm wide; leaf-blade 65-150 cm long, 20-30 cm wide, oblong lanceolate, bright green, apex acute or truncately obtuse, base obtuse and shortly decurrent to the petiole, the two sides at the base equal or slightly unequal; inflorescence erect; peduncle and rachis densely pubescent; sterile bracts usually 1, deciduous; 5-6 basal hands female, upper hands male; male bud in advanced stage of blooming ovoid and top-shaped, the bracts imbricate; bract purplish pink, shining, oblong-rhombic, attenuately narrowing into the tip, boat-shaped as a whole, thick and coriaceous in the center, thinner near the edges, slightly deflexed at the flowering time, not recurved backwards, soon deciduous; male flowers persistent or rot and drop off from the rachis in wet condition, 8-12 per bract in two rows, the abortive ovary 3 mm long, the compound tepal 3.5-4.5 cm long, ribbed at the dorsal angles, with 5-toothed apex, the outer lobes ovate, 3 mm long, with hairy filiform appendage 3 mm long, the inner three lobes thin, glabrous, acute, the central lobe larger than the laterals, 2 mm long, the free tepal oblanceolate with bittently obcordate apex, transversely corrugated at the basal part, 3.0-3.5 cm long, 1 cm wide at the widest part near the apex, the stamens 5, nearly as long as the compound tepal, filament 2.6-3.0 cm long, fruit bunch small, erect and loosely packed, consisting of 5-6 hands of 3-6 fruits each; fruits connated laterally about two thirds of its length, densely covered by the soft yellow hairs, individual fruit bottle-shaped, ridged, 4.5 cm long, 2.5 cm in diameter; seeds cylindrical obpyriform, 3 mm in diameter, 5 mm long, longitudinally and obscurely ribbed with many tubercles.

SARAWAK. 4th Division: Minah camp, alt. 30-80 m, road-side open place in lowland dipterocarp forest, Oct. 13, 1963, M. Hirano & M. Hotta 37; Minah camp, river-side open place, in lowland dipterocarp forest, Oct. 17, 1963, M. Hotta 14069.

This species frequently occurs in the open place along the river-side, in Bintulu district. By the shape of connated fruit with dense yellow hairs, the small size of plants, number and arrangement of the flowers, our specimens agree very well with Beccari's description of *M. hirta*. There is, however, discrepancy in the seeds between the original description and our specimens. Beccari described as "semina parva, 4 mill. longa numerosa, late ovata vel irregulariter globosa vel obtusissime angulosa, rugoso-tuberculata." Judging from this description, this species has no

position in the Sect. *Callimusa* as mentioned by Simmonds, but our materials have cylindrical obpyriform seeds which are undoubtedly the feature of the Sect. *Callimusa*. By the very unique and distinct characteristics of fruit, our plants are referred with no doubt to *M. hirta*. Aforesaid discrepancy may presumably lie in the variability in this feature.

Explanation of the plate VII

1. *Musa flavida*. 2. fruit bunch of *M. hirta*. 3-6. seeds ($\times 2$). 3. *M. tuberculata*. 4. *M. hirta*. 5. *M. campestris* (Hotta 12460). 6. *M. muluensis*.

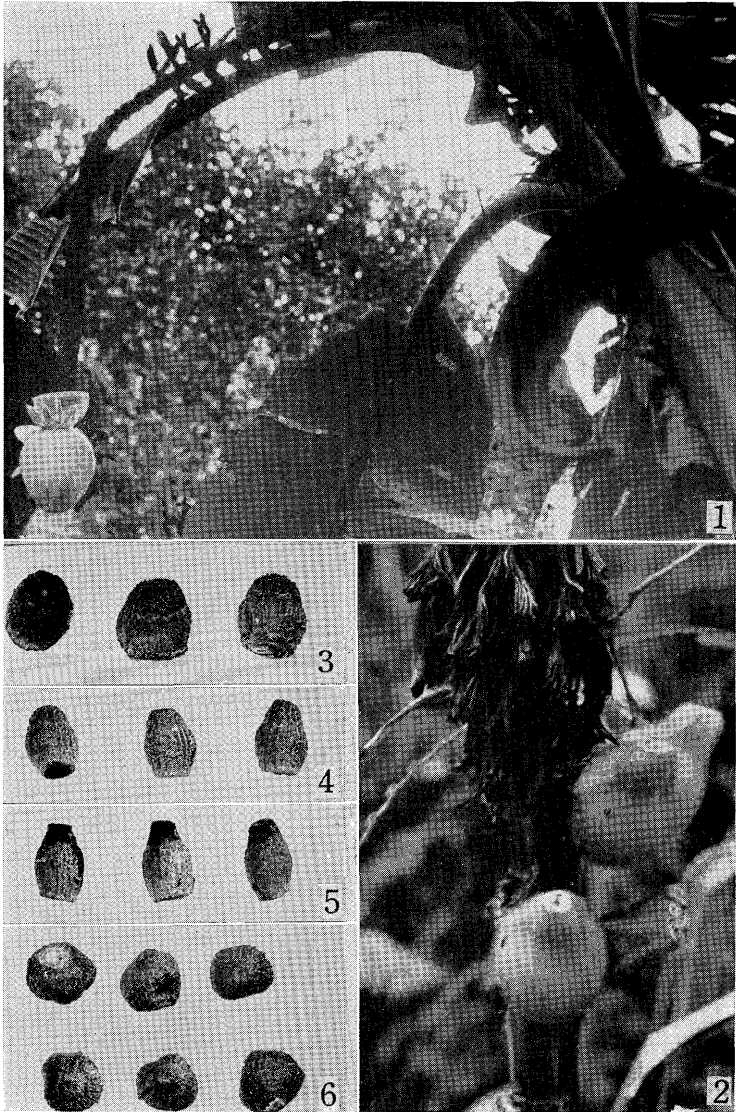
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ボルネオの野生バナナについては1902年に Beccari が、また最近に Simmonds が報告しているだけで、くわしいことはわかっていない。京都大学ボルネオ調査隊、1963—64 が採集した資料は6種から成り、そのうちの3種はボルネオから未報告の *Australimusa* 節に属し、*M. textilis* と考えられるもの、および2新種、*M. muluensis* と、*M. tuberculata* とであった。これら新種は種子の表面に不定形の小突起を生じることでいちじるしい。残りの3種は *Callimusa* 節のもので、1種は苞が黄色大型であり、かつて Simmonds が新種であろうとして North Borneo に存在することを報じた系統に近縁か同じと思われる新種 *M. flavida* である。

他は Beccari が報告しただけになっているボルネオ特産の稀な2種、*M. campestris* と *M. hirta* とであった。特に *M. hirta* は特異な果実と種子が彼によって記載され、その系統的關係がよくわからなかったものであるが、今回の資料によって *Callimusa* 節の一員であることがわかった。

□伊沢凡人：原色日本薬用植物事典，第4巻，i—iv+pp. 217—331，col. photo. no. 355—461 (1967) 誠文堂新光社，3500円。本書については既刊分を御紹介してあるが、第4巻を以て完結になった。科の和名の五十音順配列のうち、マオウ科—リンドウ科が入り、全部顕花植物である。次に *Syllabus der Pflanzenfamilien* 最新版 (1954, 1964) の体系にもとづく医療植物の分類表 (主として科の級位まで) を掲げる。巻末の14頁分に植物性生薬全般の薬理・薬効両面からの分類整理を行い、医学と薬学とのかけ橋を創立している。門外漢には難解ではあるが、著者の意欲が溢れる部分であろう。残る31頁分は和欧両名への総索引である。

2年に亘る刊行が終り、通覧すれば全巻に流れる著者の東西医学・薬学の結合への苦心と努力とを汲み取れる。読者により色々な活用の仕方があろう。学校図書室にも家庭にも備えて良い本である。各巻共に同じ価格である。 (水島 正美)



M. Hotta: Wild banana of Borneo