Contributions to the Knowledge of the Old World Species of the Genus Mahonia.

BY

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With Plates I—XXXVII.

THE genus *Mahonia* comprises numerous species which are distributed mainly over Asia and America. The genus was thoroughly examined by Fedde from systematic, anatomical, and morphological points of view.* This author maintains the opinion that the genus *Mahonia* should be treated as quite distinct from *Berberis*.† Recently Rehder has put back a few species to *Berberis*, but without giving any reasons.‡

Since the publication of Fedde's monograph several new species have been described, chiefly from China. In Fedde's work there are mentioned some seven species occurring in China. This number was increased by Hemsley and Wilson in describing a new species in 1906,§ and soon afterwards by Gagnepain with three new species in 1908.‖ Meanwhile Léveillé added another species *M. ganpiensis*, which is however of a doubtful nature.¶ Quite recently, in 1913, C. K. Schneider, who worked out Wilson's Chinese *Berberideae*, has added seven new species.** He also gives in the same publication an enumeration of all the known Asiatic species, accompanied by an analytical key. According to this author, there are eighteen species known to occur in Asia, and all except two species are natives of China. Sprague has lately pointed out that *M. confusa*, Sprague, which was published in 1912, is not included in this enumeration, and that at least some of the specimens referred by Schneider to *M. Fortunei* represent the co-type specimens of

* Fedde, Versuch einer Monographie der Gattung Mahonia, in Engl. Bot. Jahrb. xxxi, 1901.

† Fedde, l.c. p. 66 et seq.

‡ Rehder in Mitteilung. d. Deutsch. Dendrol. Gesellsch., 1912, p. 184.

§ Hemsley and Wilson, in Kew Bull., 1906, p. 152.

‖ Gagnepain in Bull. Soc. Bot. Fr. lv, 1908.

¶ Léveillé, Florilegium Chinense xciv, in Fedde, Repert. vi, 1909, p. 372.

** C. K. Schneider, in Sargent, Pl. Wilsonianae, i, pt. 3, 1913.

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*M. confusa.** This species—*M. confusa*—is moreover described by Schneider in his work as *M. Zemanii*, as the present writer has pointed out.† As a matter of fact, there are a few others to which no references at all are made in Schneider's enumeration, some long known from India, and some from China.‡

Before we enter into the systematic account of the genus some remarks may perhaps be made upon morphological features.§

The leaf of *Mahonia* is always imparipinnate and is furnished with a pair of stipules at the base. The stipules are adnate to the petiole and only their upper free portions are noticeable. For the sake of simplicity, these free portions alone are taken into account in the descriptions given in the following pages. They may be long, short, deflexed, curved, straight, and so forth. When the stipules are completely united with the petiole, they are conveniently described as being "absent."

The rhachis of the leaf extends, as a rule, beyond the uppermost pair of leaflets, so that the terminal leaflet appears as if "petiolulate." The length of this terminal extension of rhachis varies to some extent, even within one species. In certain species the terminal extension is usually reduced to a minimum in length, resulting in the terminal leaflet becoming apparently "sessile," e.g. in *M. Fortunei*. Sometimes a terminal leaflet is united at the base with one of the leaflets of the uppermost pair which often appears to consist of a single leaflet. In this case the terminal leaflet is broader than usual and is more or less deeply cleft on one side. In rarer instances such conspicuous lateral incisions, which indicate fusion of two or more organs, cannot be detected in the terminal leaflet, consequently the leaflet is only abnormally broader and apparently more lengthily "petiolulate" than usual. The presence or absence of the terminal extension of rhachis cannot therefore be regarded as a good distinguishing character of species in this genus. In the following descriptions no mention is made of the presence of this extension of rhachis unless it happens to be of diagnostic value. In this connexion it may perhaps be pointed out that the length of petiole, namely, the distance between the base of the petiole and the lowermost pair of leaflets, is an important diagnostic feature not to be overlooked.‖ In many species the petiole is very short, measuring only a few centimeters, whilst in some it is comparatively long. While the presence or absence of the

* Sprague, in Kew Bull., 1914, p. 232.

† Takeda, ibid., 1915, p. 128.

‡ For example, *M. acanthifolia, M. Leschenaultii, M. trifurca, M. ganpiensis*, etc.

§ In reference especially to the group "Longibracteatae," for which see Fedde, l.c. p. 73, etc.

‖ Cf. Fedde, l.c. p. 36.

terminal extension of rhachis cannot be taken as a criterion for distinguishing *M. Fortunei* and *M. confusa*, the above-mentioned character is always decisive.*

It hardly needs mentioning that the leaflets are sessile among the species belonging to the " Longibracteatae."†

The inflorescence is a raceme, usually simple, but occasionally branched near the base, thereby more or less assuming the nature of a panicle. The flowers are invariably stalked and are disposed on the rhachis either rather loosely or densely, according to the species. They are arranged in a spiral, or in some cases even in a subwhorl.‡

The bracts subtending each flower afford a good distinguishing character of species. They may be small, scaly, pointed or blunt, narrow or broad, and so forth. They are persistent, and increase in size at the time of fruit, but as a rule only very slightly.

The pedicels may be longer or shorter than the bracts which subtend them. They may in the fruit-bearing stage become thickened, recurved, spreading, or nodding only at the apex.

The prophylls are as a rule entirely suppressed in the group *Longibracteatae*.§ It is however of much interest to record here that conspicuous prophylls, similar to, or sometimes smaller and narrower than, the bracts are seen in our new species, *M. bracteolata* and *M. Mairei*. They are present in most of the flowers of these species situated below the middle of the inflorescence, occurring one or two on each pedicel.

The flowers are yellow in colour, and are, in some species, fragrant. Three whorls of sepals are invariably present, two whorls of petals, two whorls of stamens with three members in each, and a pistil in the centre.‖ A few species have however been described as having only six sepals. Examination of specimens has convinced the present writer that those statements are erroneous. In most cases the sepals of the outermost whorl are minute and much smaller than the others. In some cases however they are almost or quite as large as those of the middle whorl or even of the innermost whorl. To regard the outermost sepals as bracts is absurd.¶

Shape, size, and nervation of sepals and of petals are liable to variation to a certain extent, yet they exhibit very distinctive

* Cf. Fedde, l.c. p. 36; also Schneider, l.c. p. 379, under the remarks on *M. Zemanii*.

† Cf. Fedde, l.c. p. 37.

‡ Fedde, l.c. p. 41, states this phenomenon is brought about by the unequal growth of the rhachis.

§ Cf. Fedde, l.c. p. 42.

‖ Cf. Fedde, l.c. p. 42.

¶ Cf. Fedde, l.c. pp. 42, 43.

features in each species. In the accompanying plates the writer has endeavoured to show, for a few species, dissected floral organs from more than one specimen. It will be seen from those figures that the variation is only slight, and not so great as is often supposed. In the following descriptions, therefore, measurements of these organs are given as far as possible. It must be borne in mind that when dissecting for this purpose, a fully developed flower has to be chosen. Figs. 141–157 have been taken from three specimens of the same species in different stages of development.

The stamens are very characteristic in each species. The filament generally exceeds the anther or in certain species is nearly equal in length. It is generally more or less thickened just below the anther, and in some cases it is furnished with a tooth-like projection on each side. This feature is very stable throughout the genus. Only in one case has the writer come across a specimen of a usually edentate species possessing more or less rudimentary teeth (fig. 42). Whether this specimen ought to be regarded as a dentate variety has not been decided from lack of sufficient material. The connective is an extension of the filament. As has been pointed out by Gagnepain, this organ affords a good diagnostic character.* In the majority of species it is as broad as or slightly broader than the filament, but in a few cases it is much narrower. In many species it is more or less triangular and often apiculate, in others almost truncate. It should always be remembered that a mature stamen has to be examined. An undeveloped stamen possesses generally an almost truncate connective which may later become decidedly triangular. The figures above referred to clearly illustrate this fact. A herbarium specimen shows only a certain stage in the life-cycle of a plant, and no more. Herbarium botanists have to bear carefully this fact in mind. It has not seldom happened that different stages of one and the same species have been described as distinct species.

The ovaries are either furnished with or are almost devoid of a distinct style. Sometimes it is not at all easy to decide whether a very short style is present or whether the style is totally absent. The number of ovules contained in the ovary is not very constant. This character is not of much use in distinguishing closely allied species.

The fruit is a berry, generally bluish-black in colour and more or less covered with waxy powder. The berries are ovoid in the majority of species, but in some cases they are globose.

* Gagnepain, Les Mahonia asiatiques de l'herbier du Muséum, in Bull. du Mus. Nation. d'Hist. Nat. Paris, xiv, 1908.

As regards the classification of the genus mention must first be made of the subdivisions proposed by Fedde. He divided the genus *Mahonia* into four groups, three of which occur in America, while the fourth, *Longibracteatae*, is represented mainly in the Old World, and with it only are we concerned at present. Fedde distinguishes the Asiatic species in the first place by the nature of the leaflets and particularly by the teeth—whether these occur along the whole length of the margin or are confined to the upper region of the leaflet.*

Gagnepain, who paid special attention to the Asiatic species, points out that the size, length, consistency, teeth, etc., of a leaflet are subject to variation and are not definite, so that these characters cannot be made use of in an analytical key of the species.† He further mentions the important features exhibited by the sepals, petals, stamens, and ovary. The same author gives a key to the Asiatic species based upon these characters combined with certain others. In the first place he distinguishes two subdivisions by means of the stamens.‡

Schneider, on the other hand, distinguishes two primary groups by the ovary—whether the ovary is provided with a distinct style or not.§ Other organs made use of by this botanist are the leaves, pedicels, bracts, and occasionally the number of ovules contained in the ovary.

The writer is of opinion that most of the characters above mentioned, except perhaps the consistency of the leaflet and the number of ovules, are relatively reliable, and may be regarded as good diagnostic characters. It is however difficult to decide which of these organs should be reckoned of primary importance as showing actual relationship between each species. It appears that Schneider's arrangement based on the presence or absence of style is more natural than Gagnepain's system. It is, as is pointed out above, not always easy to make out whether a stigma is actually sessile or shortly stalked. For instance, Schneider himself places his *M. Zemanii* (=*M. confusa*, Sprague), which possesses a practically sessile stigma, in his first division, the members of which are characterised by having a distinct style. This method is therefore not very easy in practice especially when fruit is lacking. It must however be admittted that according to this classification closely related species, such as *M. Fortunei* and *M. confusa*, would fall into the same group, whereas they would be distantly separated if the stamens were made the primary principle for subdivision.

The writer regrets not being in a position to express more

* Fedde, l.c. pp. 78, 79.

† Gagnepain, l.c. p. 133.

‡ Gagnepain, l.c. p. 134.

§ Schneider, in Sargent, Pl. Wilsonianae, i, p. 380, 1913.

fully his opinion of the existing classifications or to put forward a new one, since his observations have been made only on a limited number of species most of which are represented by specimens of flower or of fruit alone. Certain species, the type specimens of which exist only in some continental herbaria, are known to the writer only from descriptions. In such cases it is not always possible to form an adequate idea of those species and to find out their exact relationship to other species. Under such circumstances no definite view as to the affinity is expressed in the following pages. The writer may however call attention to the fact that the relative length of sepals—whether the outermost ones are markedly shorter than, or nearly equal in length to, those of the other whorls—may possibly show natural relationship. Unfortunately the writer has been unable to examine this point in all the species, and must leave it undecided.

As a result of the present investigation, there are ten or possibly eleven species occurring in India, twenty-four or twenty-five species in China, three or possibly more species in Formosa, and one species in each of the following regions—Malacca, Annam, Siam, Java, Burma, and the Philippine Islands. In Japan we have *M. japonica*, DC. which is frequently cultivated in gardens. Strangely enough its native country is up to the present unknown. According to Chikinshô, a Japanese gardening manual, a *Mahonia* was imported into Japan in 1684. It is however not certain whether this was *M. japonica* or *M. Fortunei*,* nor in what country it originated.

The present study was commenced in 1912 and, though very much interrupted, has been carried out in the Kew Herbarium. During that time the writer had the privilege of examining all the specimens preserved in the Herbarium, Royal Botanic Garden, Edinburgh, and also the Indian specimens in the Herbarium, Royal Botanic Garden, Calcutta. In addition to those, most of the specimens kept in the British Museum have also been consulted. The writer expresses his sincere thanks to the authorities of the above-mentioned establishments for their courtesy in allowing him to study the valuable specimens. The writer is indebted to Dr. B. Hayata for giving him an opportunity of examining specimens from the remoter parts of Formosa when he visited Japan in 1913. The writer also takes this opportunity of thanking Mr. J. S. Gamble for the loan of the Indian specimens of his own herbarium.

* This species is also very frequently cultivated in Japan, having been originally imported from China.

I. THE INDIAN SPECIES.

Since 1855 when Sir J. D. Hooker and Dr. Thomson unhesitatingly united * all the Indian species published up to that date together with *M. japonica* into a single species, *Berberis nepalensis*,† almost all the later workers have indiscriminately followed this opinion, especially with regard to the Indian species. Seventeen years afterwards Hooker and Thomson themselves recognised a variety *Leschenaultii*, which had been described before as a distinct species.‡ This variety was again differentiated from the type by Fedde,§ but has been entirely ignored by all others, including the more recent observers such as Gagnepain ‖ and Schneider.¶ Thus there is only one species known as a native of India, and this species is distributed over the whole of the Himalayas, Nepal and Assam, and if the var. *Leschenaultii* is treated as the same species, it also occurs in the Nilghiri. Moreover, some authors have recorded its occurrence even outside India, namely, Malacca, Burma,** Java,†† China,‡‡ Formosa,§§ Philippine Islands,|||| etc. It is also often stated in literature that certain other species are related to or are comparable with *M. napaulensis*. It is therefore necessary to ascertain the real *M. napaulensis*, DC. and this has been one of the writer's chief objects in this paper.

It has been found that the statements above referred to are erroneous and that the true *M. napaulensis* has never been found outside Nepal. It may also be noted here that the only specimens of this species existing in herbaria are those collected by Buchanan in 1802 and by Wallich in 1821; it has never been gathered since except the fragments of a leaf which are reproduced in our plate.

De Candolle distinguishes a var. *Roxburghii* ¶¶ which, as a result of a careful examination of the co-type specimens, has

* Hook. et Thoms. Fl. Indica, i, p. 219.

† The oldest specific name given by De Candolle in 1821 is "*napaulensis*." Later it is often spelled "*nepalensis*."

‡ Hooker, Fl. Brit. Ind. i, p. 109, 1872.

§ Fedde, l.c. p. 123.

‖ Gagnepain, in Bull. du Mus. Nation. d'Hist. Nat. Paris, xiv, 1908.

¶ Schneider, in Sargent, Pl. Wilsonianae, i, 1913.

** Kurz, Forest Fl. of Burma, i, p. 58, 1877; Hemsley, in Journ. Linn. Soc. Bot. xxviii, p. 17, 1890.

†† Miq. Fl. Ind. Bot. i, 2, p. 88, 1859.

‡‡ Hance in Journ. Bot., n.s. xi, p. 2, 1882; Forbes et Hemsl., Ind. Fl. Sin. i, p. 31, 1886; Franch. Pl. Delav. i, p. 35, 1889. See also the introductory remark on the Chinese species, p. 224.

§§ Matsumura in Tôkyô Bot. Mag. xii, p. 54, 1898; Matsum. et Hayata, Enum. Pl. Formos., p. 18, 1906; Hayata, Fl. Mont. Formosae, p. 47, 1908.

|||| Merrill in Phil. Journ. Sc. i, suppl., p. 190, 1906.

¶¶ DC. Prodr. i, p. 109, 1824.

been found to be quite a distinct species and has consequently been raised to that rank.

Hooker and Thomson's var. *Leschenaultii*,* or *Berberis Leschenaultii*, Wall. is an absolutely different species, and can by no means be confused with or united to *M. napaulensis*, DC.

Fedde has described two new varieties of this species, one of of which, var. *macrophylla*,† is very doubtful, since the original specimen was derived from a plant cultivated in the Botanic Garden in Petrograd which was apparently sterile.

The other var. *pycnophylla*,‡ seems to be closely related to *M. napaulensis*, but is a distinct species, being distinguished above all by the nature of the leaf and of the bracts in the inflorescence. The fruit is unknown in both *M. napaulensis* and in *M. pycnophylla*, so that it is impossible to say whether any further difference is exhibited by the fruit apart from the number of ovules, a character not always very reliable.

Since Hooker and Thomson's reduction of *Berberis acanthifolia*, Wall. to *B. nepalensis* (=*M. napaulensis*) no one has attempted to confirm or disprove this view. The writer has examined Wallich's type specimens and has been led to the conclusion that *M. acanthifolia* should be treated as a distinct species.

Further remarks are to be found under each species.

1. **M. napaulensis,** DC. (Plates I–II, and Plate XXXIII, figs. 1–5.)

M. napaulensis, DC., Syst. ii, p. 21, 1821, excl. *β*; Ej. Prodr. i, p. 109, 1824, excl. *β Roxburghii*.

B. pinnata, Ham. ex DC., Syst. ii, p. 21, 1821.

B. miccia, Ham. ex Don, Prodr. Fl. Nepal. p. 205, 1825.

Folia 3–7-juga, jugo infimo a stipulis 1–2 cm. distante, ejus foliolis quam alia multo minoribus, late oblongis vel ovatis. Petiolus basi dilatatus ibique vaginiformis, stipulis duabus linearibus ad 8 mm. longis praeditus. Foliola coriacea, supra nitidissima subtus subnitida, oblonga vel late oblonga vel ovata, basi rotundata vel subtruncata, raro subcordato-truncata, rarius cuneato-rotundata, obliqua, 5–11 cm. longa, 3–4 cm. lata, e basi 5-nervia, venis parum elevatis subtus prominentibus, margine spinoso-dentata, spinis in latere inferiore 5–10, in superiore 4–7; foliolum terminale majus, basi rotundatum vel subcordatum. Racemi 5–7 fasciculati, 12–20 cm. longi, e basi densiflori, rhachi subcrassa. Bracteae florum oblongo-lanceolatae, tenues, 4–6 mm. longae. Pedicelli filiformes, erecto-patentes, 5–7–10 mm. longi. Sepala externa minima, oblonga vel ovato-oblonga,

* Hook. f. et Thoms. in Hooker, Fl. Brit. Ind. i, p. 109, 1872.

† Fedde, l.c. p. 125.

‡ Fedde, l.c. p. 124, fig. 4, A.

obtusa, 3–4 mm. longa, ad 2 mm. lata, 5-nervia, nervis lateralibus brevioribus, mediana oblongo-elliptica, obtusa, 5–6 mm. longa, circiter 3 mm. lata, 5-nervia, nervis lateralibus brevioribus, interna mediis consimilia. Petala sepalis internis paulo breviora, apice biloba, 3-nervia, basi nectariis binis distinctis praedita. Stamina edentata, connectivo triangulari, antheris filamentum fere aequantibus. Ovarium circa 5 mm. longum, stylo brevi, ovulis 4–5. Bacca desideratur.

Hab.—Narainhetty, Nepal (Hamilton ! 15. xi. 1802, 23. xii. 1802) ; Nepal (Wallich ! 1. 1821, No. 1480, partim). Residency Garden, Nepal. " It grows freely in the hills round Kabani " (Manners-Smith ! leaf).

Obs.—There are only a few specimens in herbaria ; one in the Kew Herbarium, one in the Wallichian Herbarium, and two in the British Museum. De Candolle's specimens are preserved in Delessert's Herbarium in Geneva. Dr. Briquet kindly consented to their being sent to the writer for examination, but owing to the war the specimens have not arrived.

2. **M. Griffithii,** Takeda, sp. nov. (Plate III.)

Folia ad 13-juga, jugo infimo a stipulis 2 mm. tantum distante, ejus foliolis quam alia multo minoribus ovatis vel subrotundatis. Petiolus stipulis duabus filiformibus ad 7 mm. longis praeditus. Foliola coriacea, supra nitidissima, subtus nitida, oblonga vel ovata 5–7 cm. longa, 2–3 cm. lata, basi cuneata vel rotundata, subobliqua, e basi 5-nervia, nervis primariis immersis, venis subinconspicuis, spinis in latere inferiore 4–5, in superiore 3–4 ; foliolum terminale paulo majus, basi rotundatum vel rotundato-cuneatum. Racemi plures quam 10, fasciculati, rhachi crassa, e basi densiflori. Flores desunt. Bracteae fructiferae minutae, longe triangulares, acutae, ad 2 mm. longae. Pedicelli crassiusculi, breves, 2–4 mm. longi, apice nutantes. Bacca ovoidea vel obovoidea, ad 10 mm. longa, stylo prominente (1.5 mm. longo) praedita, atro-coerulea, pruinosa, stigmate punctiformi 1 mm. diametro coronata.

Hab.—Bhutan (Griffith ! No. 1739, Hb. Kew, Brit. Mus.).

Obs.—The present species is very similar in appearance to the preceding one, differing however in the more numerous leaflets, the base of which is more cuneate, in the smaller triangular bracts of the inflorescence and in the shorter and stouter pedicels. There are very few specimens of this species in herbaria, and all belong to the same collection of Griffith No. 1739. Unfortunately no flower-bearing specimen has come under observation, so that it is impossible to make any conclusive comparison with *M. napaulensis*.

3. **M. pycnophylla,** (Fedde), Takeda, sp. nov. (Plate IV and Plate XXXIII, figs. 6–13.)

M. nepalensis var. *pycnophylla*, Fedde, in Engl. Bot. Jahrb. xxxi, p. 124, fig. 4, A, 1901.

Folia 5–6-juga, jugo infimo stipulis magnopere approximante, ejus foliolis quam alia minoribus ovalibus vel quadrato-ovatis. Petiolus basi dilatatus, stipulis filiformibus circa 10 mm. longis praeditus. Foliola valde coriacea, rigida, crassa, supra plus minusve nitida, subtus pallidiora, nervis prominentibus, oblonga vel ovato-oblonga, basi rotundato-cuneata vel subtruncata, obliqua, 6–10 cm. longa, 4–5 cm. lata, e basi 5-nervia, margine pauci-dentata, dentibus in latere inferiore 4–6, in superiore 2–4 ; foliolum terminale alia subaequans, basi rotundatum. Racemi plures fasciculati, saepe basi subramosi, densiflori. Bracteae florum ovatae vel ovato-lanceolatae, acutae, 2–4 mm. longae. Pedicelli filiformes, erecto-patentes, 5–7 mm. longi. Sepala externa ovata, obtusa, 1.5–2.5 mm. longa, ad 2 mm. lata, mediana ovalia 5–6 mm. longa, 3 mm. lata, interna elliptica, ad 7 mm. longa, 3.5 mm. lata, omnia 5-nervia. Petala elliptico-oblanceolata, 5–5.5 mm. longa, apice bifida, trinervia, basi nectarifera, nectariis binis distinctis. Stamina edentata, filamento antheris paulo longiore, apice subdilatato, connectivo triangulari. Ovarium ad 4 mm. longum, 2-ovulatum. Bacca ignota.

Hab.—Khasya (Griffith ! No. 450, Hb. Kew, Brit. Mus. ; Hooker and Thomson ! 4000 ft., Brit. Mus.). Environs of Mamlu Punji, 4800–5000 ft. (Schlagintweit ! No. 12,641, Brit. Mus.).

Obs.—As has been mentioned above, this species differs from *M. napaulensis* in the much thicker leaf, less shining and provided with fewer spines, and in the much smaller bracts.

4. **M. Roxburghii,** (DC.) Takeda, sp. nov. (Plate V and Plate XXXIII, figs. 52–57.)

M. napaulensis var. *Roxburghii*, DC., Prodr. i, p. 109, 1824.

B. pinnata, Roxb. Hort. Beng. p. 25, 1814, nomen nudum, Ej. Fl. Ind. ii, p. 184, 1832, nec Ham.

Folia 4–5-juga, jugo infimo stipulis approximante vel ad 2 cm. distante, ejus foliolis quam alia multo minoribus ovatis. Petiolus basi dilatatus, stipulis filiformibus 4–7 mm. longis praeditus. Foliola coriacea oblonga, 6–8 cm. longa, 3–4 cm. lata, supra subnitida, subtus pallidiora, basi rotundato-cuneata vel subtruncata, obliqua, e basi 5-nervia, nervis venisque prominentibus, margine sinuato-dentata, dentibus in latere inferiore 3–6, in superiore 2–5 ; foliolum terminale paulo majus, basi rotundatum vel rotundato-cuneatum. Racemi 4, fasciculati, ad

12 cm. longi, densiflori, rhachi tenui. Bracteae florum minutae, triangulares acutae, ca. 2 mm. longae. Pedicelli filiformes, apice plus minusve nutantes, circiter 5 mm. longi. Sepala externa ovalia, circa 4 mm. longa, 3 mm. lata, mediana oblongo-ovalia, 7 mm. longa, 4 mm. lata, interna elliptica, 8 mm. longa, ad 3 mm. lata, omnia 5-nervia vel sub 6-nervia. Petala oblonga, 7 mm. longa, apice bifida, basi nectariis binis distinctis praedita, 3-nervia. Stamina edentata, connectivo truncato, filamento antheras subaequante. Ovarium 4 mm. longum, stylo brevi, ovulis duobus. Baccam non vidi.

Hab.—In Hort. Bot. Calcutt. cult. e Manipura transmissa (Hamilton ! No. 342, in Hb. Edin., Hb. Brit. Mus. et in Hb. Wall. ! No. 1480, D.).

Obs.—Among the known Indian species this is very distinct in having the stamens with a truncate connective. The leaf and flower are very different from those of *M. napaulensis*.

5. **M. acanthifolia,** G. Don. (Plate VI and Plate XXXIII, figs. 14–23.)

M. acanthifolia, G. Don, Gen. Hist. pl. i, p. 118, 1831.

B. acanthifolia, Wall. ex Walp. Rep. i, p. 103, 1842.

Folia ad 11-juga, jugo infimo stipulis filiformibus 5–7 mm. longis magnopere approximante, ejus foliolis quam alia multo minoribus semi-orbiculatis. Foliola coriacea, supra nitida, subtus subnitida, oblonga vel oblongo-ovata, 4–7 cm. longa, 2.5–4 cm. lata, basi truncata vel subcordata, e basi 5-nervia, nervis venisque subtus prominentibus, margine pauci- et sinuato-dentata, dentibus in latere inferiore 3–5, in superiore 2–4; foliolum terminale ceteris majus, basi rotundatum. Racemi 7–12, fasciculati, densi et multiflori, rhachi crassa. Bracteae florum lanceolato-triangulares, acutae, 3–5 mm. longae. Pedicelli filiformes, apice plus minusve nutantes, 5–6 mm. longi. Sepala externa minima, late ovata, acutata, ca. 2 mm. longa et lata, 5–7-nervia, mediana ovata, obtusa, 4–5 mm. longa, ad 3 mm. lata, 5-nervia, interna oblongo-elliptica, 7–8 mm. longa, ca. 3 mm. lata, 5-nervia. Petala oblonga 6–7 mm. longa, ca. 3 mm. lata, apice bifida, basi nectariis binis distinctis majusculis praedita, trinervia, nervis lateralibus saepius subramosis. Stamina petalis breviora, filamentis apice dilatatis sed edentatis quam antherae longioribus, connectivo apiculato-triangulari. Ovarium 2–4-ovulatum, stylo fere 1 mm. longo. Bacca ovoidea, 8–10 mm. longa, stylo conspicuo coronata, nigro-coerulea, pruinosa; pedicelli subcrassati, apice nutantes.

Hab.—Nepal (Wallich ! v. 1821, No. 1480A, quoad spec. fructif.); Kumaon (R. Blinkworth !); Pundoaoh, Assam (Wallich ! 1820, No. 1480C); Darjiling (Hook. fil., No. 41;

Gamble, Nos. 8561, fl. Oct. 1880, 1032, fl. Oct. 1874, 4036B, fr. March 1877).

Obs.—Among the Indian species *M. acanthifolia* can easily be distinguished by having very small outermost sepals, apiculate-triangular connective, and large luxuriant leaf with numerous leaflets which are furnished with a few large teeth. It is also more or less related to *M. Leschenaultii* (No. 8), differing however in the nature of the leaf, in the stamens, and in the fruit.

Var. ? *Drummondii*, Takeda (Plate XXXIII, figs. 24–29).

A planta typica foliolis tenuioribus multo dentatis, sepalis medianis minoribus orbiculato-ovatis ca. 3 mm. longis, ovario 3–4-ovulato differt. Baccam non vidi.

Hab.—" Himalaya orientali ca. 6000′ s.m. prope Darjeeling " (J. R. Drummond ! x. 1904, No. 14,814, Hb. Kew).

Obs.—Only a single specimen has been examined, and it may have been collected in a shady place.

6. **M. sikkimensis,** Takeda, sp. nov. (Plate VII and Plate XXXVII, figs. 1–8.)

Folia magis quam 9-juga, jugo secundo ab infimo distante, jugo infimo stipulis subulatis ad 10 mm. longis valde approximante, ejus foliolis quam alia multo minoribus. Foliola conferta, ovata, vel oblongo-ovata, basi truncata vel subtruncata, 2.5–6.5 cm. longa (forsan nonnunquam majora), 2–3.5 cm. lata, coriacea, nervis subtus prominentibus, pauci- et grossi-dentata, dentibus in latere inferiore 3–6, in superiore 2–5 ; foliolum terminale mihi ignotum. Racemi 5 fasciculati, breves, simplices, densiflori. Bracteae ovato-oblongae, obtusae, 3–4 mm. longae, 2 mm. latae. Pedicelli cum bractea aequilongi vel paululum longiores. Sepala externa ovato-triangularia, acuta, 3.5–4 mm. longa, 1.5–2 mm. lata, trinervia, nervis lateralibus multo brevioribus, mediana oblongo-ovalia, acuta, 5-nervia, 6 mm. longa, 3 mm. lata, interna medianis similia, acuta, longitudine 7 mm. superantia, 3.5 mm. lata, ad 7-nervia, nervis lateralibus brevioribus. Petala oblongo-elliptica, apice leviter bifida, 3-nervia nervis lateralibus a basi subramosis, basi nectarifera nectariis binis oblongis conspicuis. Stamina petalis breviora, filamentis quam antherae longioribus dentibus minutis bidenticulatis, connectivo mucronato-triangulari. Ovarium angustissime ovoideum stylo brevi ovulis 4. Baccam non vidi.

Hab.—Sikkim : Latong, 7000 ft. (King's collector, May 1885, Hb. Calcutta).

Obs.—The present species comes between *M. acanthifolia* and *M. borealis* ; from the former it differs in the shape and size of the sepals and petals, from the latter it is distinguished by the characters of the stamens and leaves. It seems to be related

also to *M. manipurensis* (v. infra), from which it differs by the characteristic stamens.

7. **M. borealis,** Takeda, sp. nov. (Plate VIII and Plate XXXIII, figs. 30–46.)

Planta valde variabilis. Folia 5–9-juga, jugo infimo stipulis filiformibus usque ad 10 mm. longis valde approximante, ejus foliolis quam alia multo minoribus. Foliola chartacea vel subcoriacea, supra nitida, subtus subnitida, oblonga vel oblongo-lanceolata, 5–10 cm. longa, 1.5–3 raro 4 cm. lata, basi truncata vel rotundato-cuneata interdum subcuneata, obliqua, e basi 5- vel sub-5-nervia, venis utrinque elevatis conspicuis, margine spinoso-dentata, dentibus in latere inferiore 5–10, in superiore 5–8 ; foliolum terminale aliis simile, basi rotundatum vel rotundato-subtruncatum. Racemi 5–8 fasciculati, densi et multiflori, rhachi crassa 5–10 cm. longa. Bracteae florum ovatae vel ovato-lanceolatae, acutiusculae vel obtusae, 3–5 mm. longae. Pedicelli bracteis breviores vel demum subaequilongi, subcrassi, erecto-patentes. Sepala externa ovata vel ovato-lanceolata, acutiuscula vel obtusa, ca. 5 mm. longa, mediana oblongo-ovata, acuta vel obtusa, ca. 7 mm. longa, interna oblongo-obovata vel oblonga, obtusa, 8.5 mm. longa, omnia trinervia vel subquinquenervia. Petala oblonga, apice bifida, basi nectariis binis distinctis praedita, 5–6 mm. longa, trinervia. Stamina petalis breviora, filamento antheris longiore apice dilatato edentato (vel subdentato ?), connectivo triangulari plus minusve apiculato. Ovarium 2–4-ovulatum. Bacca subglobosa, coeruleo-nigra, pruinosa, ad 8 mm. longa, 6 mm. lata, stylo 1 mm. longo ornata.

Hab.—North-west of India (Royle ! defl.). Kumaon : Binsao, 7000 ft. (Strachey and Winterbottom ! No. i (fr. fl.)* ; Dehra Dun (G. King ! fl. fr. Hb. Calcutt.) ; Jodi Forest in Jaunsar, 6000 ft., " common in moist places and under oak forest " † (Keshava Nand ! iii. 1890, No. 73, fl.) ; Garwhal : Massouree, 4000–7000 ft. (Stewart ! Jameson ! 16. iv. 1845) ; 5000–7000 ft. (Edgeworth ! 1844, fr.) ; Landour (Captain Vicary ! 1831, No. 42, defl.) ; Kashmir : Chamba Pass, 6000–7000 ft. (G. Watt ! v. 1878, No. 540, fl.) ; Chil to Dalhousie, 5000–7000 ft. (Lace ! xi. 1896, No. 1308, fl.).

Obs.—The present species is characterised by the oblong leaflets of rather thin texture with prominent veinlets, large bracts, short pedicels, and subglobose fruits. Its distribution is confined to the north-western parts of India.

The writer has seen a plant of a similar appearance to this

* The stamen of this specimen is subdentate, and the innermost sepal is not much larger than the middle one. Figs. 41–46.

† According to the collector the vernacular name of this plant is " Khoru."

species but differing in the possession of larger leaflets and longer pedicels (5–8 mm. in length). The racemes are also longer (over 20 cm.) and more numerous in the fascicle. As neither flowers nor ripe fruits are present in the specimens, a closer examination has been impossible.

Hab.—Massouree (without collector's name, iii. 1895 ? Hb. Kew) ; Saharampore garden (Jameson ! No. 421, Hb. Edin.).

8. **M. manipurensis,** Takeda, sp. nov. (Plate IX and Plate XXXIII, figs. 47–51.)

Folia 5–9-juga, jugo infimo stipulis filiformibus ad 7 mm. longis valde approximante, ejus foliolis minoribus quadrato-oblongis. Foliola coriacea, supra nitida, subtus subnitida, ovata vel late ovata, 3–6 cm. longa, 2–3 cm. lata, basi subtruncata vel truncata vel plus minusve cordata, e basi 5- vel sub-6-nervia, nervis plus minusve prominentibus, margine pauci-sinuato-dentata, dentibus in latere inferiore 3–5, in superiore 2–4 ; foliolum terminale paulo majus, basi rotundatum. Racemi 5–8 fasciculati, ad 10 cm. longi, densiflori, rhachi subcrassa. Bracteae florum ovatae, acutiusculae, conspicuae, ad 5 mm. longae. Pedicelli filiformes, sub anthesin erecto-patentes, 5 mm. haud excedentes. Sepala externa ovata, acutiuscula, 4 mm. superantia, 2 mm. lata, mediana oblongo-ovalia, obtusa, ca. 7 mm. longa, 4 mm. lata, interna elliptica vel oblongo-obovalia, 8–9 mm. longa, 4 mm. lata, omnia 3–5-nervia. Petala oblongo-ovalia, apice bifida, basi nectariis binis distinctis praedita, 7 mm. longa, 3.5 mm. lata, trinervia. Stamina edentata, connectivo depresso-triangulari, antheris filamento paulo brevioribus. Ovarium 4 mm. longum, stylo brevissimo praeditum, 1–2-ovulatum. Bacca ignota.

Hab.—Manipur: Kassonie range on the frontier of Burma, 6000 ft. (Watt ! No. 5956) ; Sirohifurad, N.E. ranges, 8000 ft. (Watt ! No. 6472). Typus in Hb. Kew et Edinb.

Obs.—In general appearance the present species seems to possess the leaf of *M. acanthifolia* and the flower of *M. borealis*.

9. **M. Simonsii,** Takeda, sp. nov. (Plate X and Plate XXXVII, figs. 9–15.)

Folia 6–9-juga, jugo infimo stipulis valde approximante, ejus foliolis quam cetera multo minoribus, jugo secundo ab infimo distante. Petiolus brevissimus, basi dilatatus, stipulis binis filiformibus ad 5 mm. longis praeditus. Foliola subcoriacea, utraque pagina flavido-subnitida, venis venulisque conspicuis, lanceolata, longe acuminata, basi rotundato-subcuneata, 7–11 cm. longa, 2–3 cm. lata, margine serrato-dentata, dentibus in latere

inferiore 6–10, in superiore 5–8 ; foliolum terminale aliis aequale vel longius, basi cuneato-rotundatum. Racemi 8 fasciculati, rhachi subcrassa, ad basim pauci-ramosi, sublaxiflori. Bracteae minutae, 1.5–2.5 mm. longae, triangulares, acutae. Sepala externa minima, elliptico-ovata, obtusiuscula, trinervia, nervis lateralibus mediano brevioribus, 2 mm. longa, 1.5 mm. lata, mediana elliptico-oblonga, obtusa, trinervia, nervis lateralibus brevioribus, ca. 5 mm. longa, 2 mm. lata, interna oblongo-obovata, trinervia, ad 7 mm. longa, 2.5 mm. lata. Petala oblonga, cum sepalis medianis aequilonga, apice bifida, basi nectarifera nectariis binis minutis, trinervia, nervis lateralibus subramosis. Stamina petalis paulo breviora, filamentis edentatis quam antherae paulo longioribus, connectivo anguste quadrato apice emarginato-truncato. Ovarium anguste ellipsoideum, 3-ovulatum, stylo brevi. Bacca ignota.

Hab.—Khasya Hills (Simons ! Nov. 1850, Hb. Calcutt.).

Obs.—A very distinct species amongst the Indian Mahonias. The leaf somewhat resembles that of *M. borealis*, but the structure of the flower, particularly of the stamens, is very different.

10. **M. Leschenaultii,** (Wall.) Takeda, comb. nov. (Plate XI and Plate XXXIV, figs. 58–82.)

B. Leschenaultii, Wall. ex Wight et Arn., Prodr. Fl. Pen. Ind. Or. i, p. 16, 1834 ; Wight, Icon. Pl. Ind. Or. tab. 940, 1840–56.

B. nepalensis var. *Leschenaultii*, Hook. f. et Thoms. in Hook. f., Fl. Br. Ind. i, p. 109, 1875.

M. nepalensis var. *Leschenaultii*, Fedde, in Engl. Bot. Jahrb. xxxi, p. 123, 1901.

Planta robusta. Folia 7–10-juga, jugo infimo stipulis filiformibus ca. 10 mm. longis approximante, ejus foliolis minoribus. Foliola coriacea vel chartaceo-coriacea, supra nitidissima, subtus subnitida, oblonga vel late oblonga, 3–9 cm. longa, 2–5 cm. lata, basi rotundato-subtruncata vel truncata, venulis prominentibus, margine spinoso-dentata, spinis in latere inferiore 4–8, in superiore 3–6 ; foliolum terminale vix vel non majus, basi rotundatum. Racemi plures fasciculati, saepe robusti et 30 cm. superantes, simplices vel raro subramosi, rhachi crassa, e basi ad apicem multiflori. Flores laxiusculi, longe pedicellati, pedicellis gracilibus erecto-patentibus ca. 10 mm. longis, bracteis late ovatis obtusis 3–4 mm. longis 2–3 mm. latis. Sepala externa late ovata, obtusa, ad 3 mm. longa et lata, mediana oblongo-ovata vel ovalia, obtusa, 4–5 mm. longa, 3–4 mm. lata, interna oblongo-ovalia, obtusa, 6–7 mm. longa, ca. 4 mm. lata, omnia 5–7-nervia, nervis plerumque subramosis. Petala oblongo-ovalia, 5–6 mm. longa, 3 mm. lata, plerumque 5-nervia, nervis subramosis, apice biloba, basi nectariis distinctis parvis praedita.

Stamina brevia, filamentis crassis apice bidentatis cum antheris subaequilongis, connectivo crasso depresso-triangulari. Ovarium 3–4 mm. longum, stylo 1 mm. longo coronatum, 5–6-ovulatum. Bacca globosa, subnutans, 7–10 mm. diametro, stylo crasso distincto 1 mm. superante coronata.

Hab.—Nilghiri (Wallich! No. 1479; Gardener! 1847; Hohenacker! No. 1125; Wight! Nos. 49, 50; ex Hb. Ball Comm. G. S. Gough!; W. A.! No. 53; Carcorr Ghat (G. King! No. 1279B, fr.); Anamallaya hills (Beddome! No. 177); Tinnevelly hills (Beddome! No. 178); Ootacamund, 7500 ft. (Gamble! No. 12,443, fl. Sept. 1883); Sholas on Kundahs, 7000 ft. (C. E. C. Fischer! No. 2546, Feb. 1911); Minchiguli, 4800 ft. (C. E. C. Fischer! No. 976, fl.).

Obs.—A very distinct species amongst the Indian Mahonias in the globose berry which is furnished with a long style and borne on a slender pedicel, in the short thick stamen with a dentate filament, and in the short but broad sepals and petals which are thick in consistency and are strongly veined.

The present species occurs in the Nilghiri hills where it is found in abundance.

The writer has also examined in the Kew Herbarium a sterile specimen from Bhutan which possesses leaflets elliptical-oval, cuspidate-acuminate, margins incrassate and furnished with 8–12 shallow teeth on both sides. This is possibly a good distinct species, but owing to the lack of material it is left unnamed for the present. As far as the character of leaf goes it comes near *M. Veitchiorum*, a Chinese species, but differs from the latter in several respects.

II. THE CHINESE SPECIES.

The first record of Chinese species of this genus was made by R. Fortune who paid repeated visits to China during eighteen years from 1843. The first species discovered by this diligent collector was M. *Fortunei*,* and soon afterwards *M. Bealei* † and the so-called *M. trifurca* ‡ were found. In 1882 Hance recorded the occurrence of *M. napaulensis* in Szechwan, where Mesny collected a specimen in 1880.§ *M. Bealei* was subsequently reduced by Hemsley to *M. napaulensis*, and since *M. trifurca* is entirely ignored by this author, there are only

* *Berberis Fortunei*, Lindl. in Journ. Hort. Soc. i, pp. 231, 300, cum ic. xylogr., 1846.

† *Berberis Bealei*, Fort. in Gard. Chron. 1850, p. 212.

‡ *B. trifurca*, Fort. in Lindl. et Paxton, Flower Gard. iii, p. 57, fig. 258, 1852–53.

§ Hance, in Journ. Bot. n.s. xi, p. 2, 1882.

two species of this genus enumerated in Index Floræ Sinensis.* An examination of the specimen referred to by Hance shows that the record is an erroneous one, since the specimen consists of a rather abnormal leaf of *M. Fortunei*. Another specimen referred to *M. napaulensis* by Hemsley (l.c.) is also *M. Fortunei*. A third specimen similarly referred by the same botanist on the authority of Maximowicz is very unlikely to be the true *M. napaulensis*, DC. The third record of *M. napaulensis* occurring in China is that of Franchet.† The writer has had no opportunity of examining Delavay's specimen, but suspects that the identification was incorrect.

M. Bealei is fairly well characterised by Sir W. J. Hooker in the Botanical Magazine,‡ and is a good distinct species. This is however another plant which has been much confused with allied species.

Very little is known about *M. trifurca*. The writer is of opinion that this is an extreme form of *M. Fortunei*, since the latter species sometimes has broad leaflets with few teeth. For further discussion see under *M. Fortunei*.

In 1887 Oliver published a description with figures of a very distinct species under the name of *Berberis gracilipes*,§ which has again been described by Franchet as *B. subtrinervis*.‖

Later, Fedde,¶ Hemsley and Wilson,** Léveillé,†† Sprague,‡‡ and Schneider§§ have added more new species. The present writer recognises twenty-five species including his eight new species. In the following pages full descriptions of all the new species and of some inadequately described species will be given. There are six species, the specimens of which have not been at the writer's disposal, and on these no discussion has been attempted.

1. **M. Bealei,** Carr. (Plates XII–XIII and Plate XXXIV, figs. 83–103.)

M. Bealei, Carr. in Fl. des Serres, x, p. 166, 1854–55.

B. Bealei, Fort. in Gard. Chron. 1856, p. 212; Hook., Bot. Mag. ser. 3, xi, sub. tabb. 4848, 4852, 1855.

B. Bealei var. *planifolia*, Hook. ibid. sub tab. 4846, 1855.

B. japonica, Lindl. in Lindl. et Paxt. Fl. Gard. i, p. 11, fig. 2, 1850–51, non R. Br.

M. japonica, Fedde, l.c. p. 118, partim, excl. syn.

M. japonica var. *Bealei*, Fedde, l.c. p. 119, fig. 3, B.

* Forbes et Hemsl. Index Fl. Sin. i, p. 31, 1886.
† Franch. Pl. Delav. i, p. 35, 1889.
‡ Bot. Mag. sub tabb. 4846, 4852, 1855.
§ Oliver, in Hook. Ic. Pl. ser. 3, viii, tab. 1754, 1888.
‖ Franch. in Bull. Mus. Hist. Nat. Par. i, p. 63, 1895.
¶ L.c.
** Kew Bull. 1906, p. 152.
†† Fedde, Repert. vi, p. 372, 1909.
‡‡ Kew Bull. 1912, p. 389.
§§ Pl. Wilsonianae, 1913.

Planta robusta variabilis. Folia 5-9-juga, jugo infimo a stipulis paulo distante, ejus foliolis minoribus. Stipulae deficientes vel obsoletae vel raro bene evolutae ad 10 mm. longae. Foliola coriacea, crassa, inter se distantia vel valde approximata, quadrato- vel oblongo-ovata, raro ovato-deltoidea, basi aut truncata aut rotundato-cuneata, apice cuspidata, margine saepius revoluta, plerumque pauci-dentata, dentibus in latere inferiore 3–5–8, in superiore 2–4–6, supra nitida, flavido-viridia, nervis venisque vix vel paulo conspicuis, subtus opaca, nervis venisque elevatis; foliolum terminale aliis simile vel paulo majus. Racemi 6–15 fasciculati, simplices, densi- et multi-flori, rhachi crassa 8–15 cm. longa. Bracteae florum ovatae, acutatae, squamiformes, 2–3 mm. longae, ad 2 mm. latae. Flores flavi vel initio rubicundi, pedicellati, pedicellis filiformibus usque ad 6 mm. longis fructiferis nutantibus. Sepala externa ovata, acutata vel obtusa, 2–2.5 mm. longa, 1.5–2.5 mm. lata, 5-nervia, mediana ovalia, 4–6 mm. longa, 5-nervia, interna ovalia vel oblongo-ovalia, 5–8 mm. longa, 3–4 mm. lata, 5-nervia. Petala cum sepalis internis subaequilonga, apice bifida, basi nectariis binis distinctis praedita, 3-nervia. Stamina petalis breviora, filamento apice dilatato sed edentato antheris subduplo longiore, connectivo depresso-triangulari. Ovarium oblongo-ovoideum, 2- vel 3–4-ovulatum, stylo brevissimo, stigmate punctiformi. Bacca ovoidea, coeruleo-nigra, pruinosa, ca. 10 mm. longa, 6 mm. lata.

Hab.—Hupeh: Ichang (Henry! No. 3283, fl. No. 3250, alabastr.); Nant'o (Henry! No. 3913, defl.); Patung (Henry! No. 1450 fl.). Szechwan: Omeisan (Hugh! 1899). Kwantung: North River (Comm. Ford! No. 17, native collect., xi. 1888, fr.).

Obs.—Hooker distinguishes var. *planifolia* as having subdeltoid leaflets which are subimbricate and have a truncate base, and smaller flowers. In the course of the present study it was often found that the small-flowered form possesses two ovules whereas the "typical" form has 3–4 ovules. This character was not found to be constant. There is no difference whatever in the nature of the leaflets, although this was regarded by Hooker as the main point of distinction. All the specimens from China have been found to belong to the so-called var. *planifolia*, as they have small flowers and usually 2 ovules. So far no specimens of the large-flowered form collected in China have come under observation. Hooker's original specimens of these two forms sent from Messrs. Standish and Noble consist of leaf only, so that it is impossible to investigate these further. The leaf of the "type" form is however a rather abnormal one, having leaflets with cuneate base, whereas that of the var. *planifolia* represents a normal leaf of *M. Bealei*. It appears

therefore that var. *planifolia* really represents the typical form of this species, whereas the so-called type has been derived from a garden form. As there exists no definite difference between the two, there is no necessity to keep up the varietal name. For a comparison see the flowers delineated in our Plate XXXIV, figs. 83–103.

The only fruit-bearing specimen of this species from China, which is reproduced in our Plate XIII, appears at the first glance to be rather different from the ordinary form of *M. Bealei*. The writer is however of opinion that this is a form of our species bearing young berries. The nature of the inflorescence agrees very well with that of the typical form of *M. Bealei*.

The present species is frequently cultivated in this country and usually called *M. japonica* by florists. Although Fedde has united *M. Bealei* with *M. japonica*, these two species are very distinct, and there is no reason for confusing them.* The points of distinction will be mentioned under *M. japonica*.†

2. **M. flavida,** Schn. (Plate XIV and Plate XXXIV, figs. 104–109.)

M. flavida, Schn. in Sarg. Pl. Wilson. i, p. 382, 1913.

Adde notas sequentes :—Folia 60 cm. longa, 8-juga, foliolo terminali aliis subduplo longiore basi cuneato. Racemi usque ad 22 cm. longi, basi ramosi, rhachi sub-crassa, bracteis florum ovato-lanceolatis acutis acuminatisve rubro-brunneis 5–6 mm. longis. Sepala subcoriacea, externa ovato-deltoidea, acutiuscula, crassa, margine hyalina, nervis inconspicuis, fere 2 mm. longa et lata, mediana oblongo-ovalia, margine plus minusve hyalina, 3-nervia, 3 mm. longa, 2 mm. lata, interna obovato-oblonga, apice rotundata, 5-nervia, 6 mm. longa, 3 mm. lata. Ovarium 5-ovulatum.

Hab.—Yunnan : " Mengtz, mts. to S.E. 5000 ft., shrub 8 ft., yellow flowers " (Henry ! No. 10,180, Hb. Kew).

3. **M. Fordii,** Schn. (Plate XV and Plate XXXIV, figs. 110–115.)

M. Fordii, Schn., l.c. p. 383.

Adde notas sequentes :—Racemi 5–8 fasciculati, usque ad 15 cm. longi, rhachi gracili, bracteis florum minutis ovatis acutiusculis 2 mm. longis pedicellis gracilibus ad 5 mm. longis sub anthesin apice saepe nutantibus. Sepala 9, in cyclos tres disposita, externa ovalia, acuta, 3-nervia, 2 mm. longa, mediana late ovalia, obtusa, 5-nervia, 3.5 mm. longa, interna elliptica, 5-

* Hooker (Bot. Mag. sub tab. 4846) was the first to suggest the possible identity of these two species, but he left the matter undecided.

† See p. 241 of the present paper.

nervia, 4–4.5 mm. longa. Stamina filamento apice edentato nec dilatato sed leviter constricto antheris paulo longiore, connectivo truncato. Bacca obovoidea, 6–7 mm. longa, nigro-coerulea, pruinosa, stylo brevissimo coronata.

Hab.—Kwangtung: North River (native collector! xi. or xii. 1888, ex Hb. Hongkong, No. 17 addition to the No. 17 sent to Kew in Feb. 1889.*

4. **M. Mairei,** Takeda, sp. nov. (Plate XVI and Plate XXXV, figs. 116–120.)

Folia 6-juga, jugo infimo stipulis filiformibus ca. 10 mm. longis magnopere approximato, ejus foliolis aliis triplo vel quadruplo minoribus, jugo secundo ab infimo valde distante. Foliola oblonga, 7–10 cm. longa, 2.5–4 cm. lata, basi obliqua, apice plus minusve cuspidata, margine spinoso-dentata, dentibus in latere inferiore 7–12, in superiore 5–9, a basi 5-nervia, supra nitidissima, nervis depressis, venis reticulatis elevatis conspicuis, subtus nitida, nervis elevatis; foliolum terminale paulo majus, basi rotundato-cuneatum. Racemi 6–7 fasciculati, basi subramosi, rhachi crassa ad 20 cm. longa. Bracteae florum oblongo-ovatae, acutae, 3–4 mm. longae, patentes vel reflexae. Pedicelli filiformes, erecto-patentes, 5 mm. longi, basi saepe prophyllis filiformibus ornati. Sepala externa ovato-deltoidea, obtusa, crassiuscula, 5-nervia, nervis inconspicuis, 2 mm. longa et lata, mediana ovato-orbicularia, apice subrotundata, 4 mm. longa, 3.5 mm. lata, interna oblongo-ovalia, obtusa, 3–5-nervia, nervis subramosis, 7 mm. longa, 4 mm. lata. Petala oblongo-elliptica, apice bifida, basi nectariis binis distinctis instructa, trinervia, nervis subramosis. Stamina (juvenilia) edentata, connectivo conico apice subtruncato, antheris cum filamento subaequilongis vel paulo brevioribus. Ovarium cum stylo brevi 3.5 mm. longum, 4–5 ovulatum, stigmate 1 mm. diametro.

Hab.—Yunnan: vicinity of Yunnan-sen (Maire! No. 101, Hb. Edinb.).

Obs.—This species is closely related to *M. flavida*, Schn. but differs in the looser and paler inflorescence, smaller less pointed and often reflexed bracts, conical but truncate connective, and in the occasional presence of prophylls on the pedicel.

5. **M. bracteolata,** Takeda, sp. nov. (Plate XVII and Plate XXXV, figs. 121–125.)

Folia 3-7-juga, jugo infimo a stipulis filiformibus ca. 10 mm. longis 5–12 mm. distante, ejus foliolis multo minoribus ovatis

* Cf. under *M. Bealei.*

vel subrotundatis. Foliola oblonga vel oblongo-lanceolata, crassa, firmissima, 3–7 cm. longa, 1.5–2 cm. lata, basi truncata vel rotundato-truncata, utrinque dentibus 5–12 spinoso-dentata, supra pallide viridia, venis elevatis, subtus pallidiora, subglauca, nervis inconspicuis; foliolum terminale paulo majus, basi rotundatum vel subtruncatum. Racemi plures, ad 10 cm. longi, densiflori, basi ramosi ibique non floriferi, rhachi gracili sed firma plus minusve pruinosa. Bracteae florum ovatae vel ovato-lanceolatae, acuminatae, 3–4 mm. longae, saepe rubellae. Flores juveniles erubescentes, longe pedicellati, pedicellis erectis 5–10 mm. longis in fl. basilaribus medianisque bracteolatis, bracteolis 1–2 bracteae similibus sed minoribus. Sepala externa ovato-deltoidea, acuta, 3 mm. longa, 2.5 mm. lata, mediana ovata, obtusa, 5 mm. longa, 3.5 mm. lata, interna oblongo-ovalia, 8 mm. longa, 4 mm. lata, omnia 5-nervia, nervis subramosis. Petala oblongo-elliptica, apice leviter retusa, 3-nervia, nervis lateralibus basi subramosis, nectariis binis distinctis ornata. Stamina filamento crasso edentato antheras subaequante, connectivo depresso-deltoideo. Ovarium cum stylo (1 mm. superante) 5 mm. longum, 6–8-ovulatum. Bacca desideratur.

Hab.—Yunnan: "dry open situations on the margins of pine forests on the divide between the Hoching and Lichiang valleys, 7000–9000 ft. Lat. 26°45′ N. Spinous-leaved shrub of 3–7 ft. Flowers bright yellow tinged purplish-rose in bud, fragrant" (Forrest! No. 7364, Hb. Edinb.).

Obs.—A very distinct species well characterised by the conspicuous prophylls and thick tough leaflets.

6. **M. dolichostylis,** Takeda, sp. nov. (Plate XVIII and Plate XXXV, figs. 126–130.)

Folia ad 8-juga, jugo infimo stipulis subulatis usque ad 15 mm. longis maxime approximato, ejus foliolis valde minoribus. Foliola firmissime coriacea, oblonga vel oblongo-ovata, 6–8 cm. longa, 3–5 cm. lata, basi obliqua, margine plus minusve revoluta, spinoso-dentata, dentibus in latere inferiore 4–7, in superiore 3–4, raro numerosioribus, flavido-viridia, supra subnitida, nervis impressis venis reticulatis, subtus pallidiora, nervis elevatis, venis inconspicuis; foliolum terminale aliis paulo majus vel subaequale, basi cuneatum. Racemi plures, multi- et densiflori, 20 cm. longi vel ultra, rhachi crassa. Bracteae florum oblongae vel oblongo-ellipticae, obtusae, deflexae, sub anthesin 3 mm. longae, deinde valde accrescentes et usque ad 9 mm. longae, 3 mm. latae. Pedicelli 5 mm. longi, crassiusculi, erecti vel erecto-patentes. Sepala externa ovata, acuminata, 4 mm. longa, 3 mm. lata, subquinquenervia, mediana late ovalia,

obtusa, 5 mm. longa, 3 mm. lata, 5-nervia, interna oblonga, obtusa, ad 9 mm. longa, 4 mm. lata, 5-nervia, nervis saepe subramosis. Petala anguste oblonga, apice leviter bifida, lobis in specimine nostro convergentibus, basi nectariis binis distinctis ornata, 3-nervia, 9 mm. longa, 3 mm. lata. Stamina filamento apice incrassato edentato antheris longiore, connectivo triangulari apice subemarginato-truncato. Ovarium ellipsoideum, stylo 3 mm. longo vel paulo ultra coronatum, 4-ovulatum. Bacca juvenilis globosa, matura ignota.

Hab.—Yunnan: vicinity of Yunnan-sen (Maire! No. 2003, Hb. Edinb.).

Obs.—A species well marked by the robust foliage and long styles.

7. **M. conferta,** Takeda, sp. nov. (Plate XIX and Plate XXXV, figs. 131–135.)

Folia 7–20-juga, jugo infimo stipulis subulatis patentibus vel deflexis ca. 10 mm. longis magnopere approximato, ejus foliolis quam alia valde minoribus. Foliola coriacea, rigida, valde conferta, oblonga vel ovato-oblonga, plus minusve falcata, 3–6 cm. longa, 2–3 cm. lata, basi truncata vel rotundato-truncata, utraque pagina nitidissima, supra flavido-viridia, nervis plus minusve impressis, subtus pallidiora nervis venisque elevatis, margine pauci-sinuato-dentata, dentibus in latere inferiore 3–4, in superiore 2–4; foliolum terminale aliis majus, basi rotundatum vel cordato-rotundatum. Racemi, ut videntur, pluri-fasciculati, simplices, ad 18 cm. longi, rhachi crassa, multi- et densi-flori. Flores pro genere magni, aurei. Bracteae florum ovatae, acutae, ca. 5 mm. longae, leviter carinatae, subcoriaceae. Pedicelli bracteis longiores, erecto-patentes, demum recurvo-patentes, subcrassi. Sepala externa ovata vel oblongo-ovata, obtusa, ad 3 mm. longa, subquadrinervia, mediana late elliptica, 5 mm. longa, 3 mm. lata, subquinquenervia, interna oblongo-ovalia, 9 mm. longa, 4 mm. lata, 5-nervia. Petala sepalis internis paulo breviora, oblongo-spathulata, 3-nervia, apice bifida, basi nectariis binis ellipticis conspicuis ornata. Stamina 5 mm. longa, filamento apice subdilatato edentato cum antheris subaequilongo, connectivo late triangulari obtuso-apiculato. Ovarium anguste ovoideum, cum stylo conspicuo 5 mm. longum, stigmate 1 mm. diametro, 3-ovulatum. Baccam non vidi.

Hab.—Yunnan: "Fen chen Lin, mt. forests, 6500 ft., shrub 4 ft., yellow flowers" (Henry! No. 10,180A, Hb. Kew, Edinb.).

Obs.—A very handsome plant, worth cultivating. It is easily distinguished from any other species of this genus by its beautiful foliage and large flowers which are densely crowded in the raceme.

8. **M. Hancockiana,** Takeda, sp. nov. (Plate XX and Plate XXXV, figs. 136–140.)

Folia 4–6-juga, infimo jugo a stipulis filiformibus ad 15 mm. longis distante, ejus foliolis quam alia dimidio minoribus ovatis. Foliola subcoriacea, elliptica, 5–6 cm. longa, 2–3 cm. lata, inter se distantia, basi rotundato-cuneata, margine spinoso-serrata, dentibus in latere inferiore 7–12, in superiore 4–6, supra atro-viridia, opaca, nervis depressis, subtus pallida, nervis venisque elevatis; foliolum terminale aliis majus, basi cuneatum vel rotundato-cuneatum. Racemi 15 cm. superantes, simplices, sublaxiflori. Bracteae florum membranaceae, ovatae, subcuspidato-acutae, 3 mm. longae. Pedicelli filiformes, erecto-patentes, 5 mm. longi, graciles. Sepala externa ovata, obtusa, 3–4-nervia, 2.5 mm. longa, mediana ovato-elliptica, 5-nervia, 5 mm. excedentia, interna late-oblanceolata, 7 mm. superantia, 7-nervia. Petala elliptica, retusa, 6 mm. longa, basi nectariis binis conspicuis ornata, 3-nervia, nervis lateralibus subramosis. Stamina 4.5 mm. longa, filamento edentato antheris longiore, connectivo quadrato-triangulari crasso. Ovarium cum stylo crasso 5 mm. longum, 3–5-ovulatum. Bacca ignota.

Hab.—Yunnan: Mengtsz, in forest 9000–9500 ft., shrub, flowers rich yellow (Hancock! ii. 1894, No. 151, Hb. Kew).

Obs.—A distinct species having comparatively small leaves with elliptical leaflets which are distantly disposed.

9. **M. lomariifolia,** Takeda, sp. nov. (Plates XXI–XXII and Plate XXXV, figs. 141–151.)

Folia multijuga, jugis 10–20, jugo infimo stipulis subulatis patentibus valde approximato, ejus foliolis quam alia multo minoribus ovatis vel subrotundatis basi saepe subcuneatis. Foliola inter se subdistantia, basilaria oblongo-ovata, mediana et superiora lanceolata vel late lanceolata, longe cuspidato-acuminata, patentia vel erecto-patentia, saepe falcata, 4–7 cm. longa, 1–2 cm. lata, basi truncata vel rotundato-truncata, plus minusve obliqua, coriacea vel subcoriacea, supra nitida nervis vix prominentibus (in specc. in locis umbrosis nascentibus venis subelevatis), subtus pallidiora, nervis conspicuis, venis subobscuris, margine incrassata, leviter revoluta, distanter spinoso-dentata, dentibus in latere inferiore 3–6, in superiore 2–4; foliolum terminale aliis longius, basi rotundatum vel rotundato-cuneatum. Racemi 8–17 fasciculati, simplices, basi saepe bracteis sterilibus vestiti, densi- et multi-flori, rhachi crassa substricta. Bracteae florum ovato-lanceolatae, acutae. Pedicelli filiformes, bracteas superantes, nutantes, saepe pruinosi. Sepala externa ovata vel oblongo-ovata, obtusa, ca. 2 mm. longa, mediana ovato-elliptica,

obtusa, 6 mm. longa, interna elliptica vel ovato-elliptica, ad 8 mm. longa, omnia 3–5-nervia. Petala oblongo-elliptica, sepalis internis paulo breviora, trinervia, apice leviter bifida, basi nectariis binis oblongis ornata. Stamina filamento antheris duplo longiore apice subdilatato edentato, connectivo triangulari apiculato. Ovarium elongatum, ca. 5 mm. longum, stylo brevi, ovulis 2–3–4–5. Bacca ovoidea, 6–7 mm. longa, pruinosa.

Hab.—Yunnan: " hills to the east and north of Tengyueh, 7000–8000 ft. Spinous-leaved shrub of 4–8 ft. Flowers bright yellow, non-fragrant. Shady moist gullies " (Forrest ! xi. 1912, No. 9244, fl., v. 1912, No. 7724, fr.; Hb. Edinb.); " Mekong and side valleys at an elevation of from 8000 to 12,000 ft. Shrub of from 4 to 12 ft. Fl. bright yellow " (Forrest ! ix. 1904, No. 141, alabastr., Hb. Edinb.); " Milê district, in mountain wood. Shrub 6 ft., yellow flowers " (Henry ! No. 10,309).

Obs.—A very distinct species easily recognised by its multijugous leaves which resemble some species of *Lomaria*. The above description of the flower has been taken mainly from the specimen collected by Forrest (No. 9244), which possesses fully developed flowers. The other specimens examined have either young flowers or flower buds.

The same species has been collected in Formosa. Remarks upon the Formosan specimens will be found on p. 238.

10. **M. Veitchiorum,** (Hemsl. et Wils.) Schn. (Plate XXIII and Plate XXXV, figs. 158–162.)

M. Veitchiorum, Schn. in Sargent, Pl. Wils. i, p. 383, 1913.
B. Veitchiorum, Hemsl. et Wils. in Kew Bull. 1906, p. 152.

Adde descr. Folia ad 7-juga, foliolis in infimo jugo multo minoribus stipulis brevissimis magnopere approximatis. Racemi 6–8 fasciculati, ad 10 cm. longi vel ultra, rhachi crassa. Bracteae florum majusculae, lanceolatae, longe acuminatae, 10 mm. superantes, pedicellis triplo majores. Sepala 9 in cyclos tres disposita, externa oblongo-lanceolata, acuta, 5-nervia, 5.5 mm. longa, mediana oblongo-elliptica, 6 mm. superantia, 5-nervia, interna oblongo-ovata, obtusa, 5–7-nervia, 7 mm. longa. Petala late oblanceolata, leviter bifida, basi nectariis binis magnis ornata, 5-nervia. Stamina petalis breviora, filamento ad apicem versus subdilatato edentato antheris subduplo longiore, connectivo subtruncato.

Hab.—Szechwan: loco non indicato (Henry ! No. 8993, fr.); Mt. Omei (Wilson ! Nos. 3142, fl., 4725, fl.). Yunnan: " Hills to the east of Tengyueh, 6000–7000 ft. Spinous-leaved shrub of 3–5 ft. Flowers golden-yellow ? In fruit. Amongst scrub in open situations in side valleys " (Forrest ! No. 7890); " Ma-

chang-kai valley, north of Tengyueh, 6000–7000 ft. Spinous-leaved shrub of 4–8 ft. Flowers bright-orange-yellow, fragrant. Open shady situations on the margin of forests" (Forrest! No. 9756).

Obs.—A well characterised species, having thick elliptical leaflets with small spinous serration on the margin, very long bracts, and large outer sepals. This species may have some relationship with *M. polyodonta*, as Schneider considers, but is a stouter plant in every respect.

11. **M. Fortunei,** (Lindl.) Fedde. (Plate XXIV and Plate XXXVI, figs. 163–167.)

M. Fortunei, Fedde in Engl. Bot. Jahrb. xxxi, p. 130, pro parte, fig. 3, E, 1901; Schn. in Sargent, Pl. Wils. i, p. 380, pro parte, 1913.

B. Fortunei, Lindl. in Journ. Hort. Soc. i, pp. 231, 300, c. ic. xylogr. 1846; Forbes et Hemsl. Ind. Fl. Sin. i, p. 31, 1886.

M. trifurca, Hort. ex Loudon, Encycl. Pl. Suppl. ii, p. 1346, 1855; Fedde, l.c. p. 125, fig. 4, B.

B. trifurca, Fort. in Paxt. and Lind. Fl. Gard. iii, p. 57, fig. 258, 1852–53.

B. japonica var. *trifurca*, Rehd. in Mitteil. d. Deutsch. Dendrolog. Gesellsch. 1912, p. 184.

B. nipalensis, Hance in Journ. Bot. n.s. xi, p. 2, 1882, nec Spr.

Hab.—China: (Fortune! Nos. 32 (1846), 42 (1852), 43 (no date). Szechwan: Chung-king (Mesny! 1880, in Hb. Hance, No. 2287); Mt. Omei and Min River (Faber! No. 469); Mt. Omei (Hugh! 1899); Yachou Fu, woodlands, 500–800 met. (Wilson! No. 2882).

Obs.—This species is variable as regards the shape and size of leaflets. In the more normal specimens the leaflets are narrow, gradually tapering towards the base. Sometimes the leaflets are much broader (over 2 cm.) and are furnished with a few coarse teeth (Faber, No. 469).* The terminal leaflet is usually longly cuneate at the base, but occasionally a leaflet with roundish base is met with (Fortune, No. 42). Where very few teeth are present in a broad leaflet, we get the so-called "*trifurca*," which is only an extreme form (e.g. the terminal leaflet in Fortune, No. 42). There seems however to be no necessity to keep up this name, since there are all gradations. The terminal leaflet is as a rule "sessile," but in one case the writer has seen a terminal leaflet stalked (Mesny in Hance, No. 2287). This is probably due to the fact that the terminal one is fused

* Fortune, No. 42 possesses leaflets up to 5 cm. broad with round or almost truncate base; the teeth on the margin are very coarse.

with those of the uppermost pair; in this case the terminal leaflet possesses a round base.

12. **M. confusa,** Sprague. (Plate XXV and Plate XXXVI, figs. 168–172.)

M. confusa, Sprague, in Kew Bull. 1912, p. 339, 1914, p. 232; Takeda, ibid. 1915, p. 128.

M. Fortunei, Fedde, l.c. p. 130, pro parte; Schn. l.c. p. 380, pro parte.

M. Zemanii, Schn. l.c. p. 378, 1913.

Hab.—Chung Ching (Chüng tsing in Shensi ?) (Bourne ! fr.). Hupeh: Ichang and immediate neighbourhood (Henry ! Nos. 3117, 3351, 3351A); Nant'o and mountains to northward (Henry ! No. 2689, fl.); Western Hupeh (Wilson ! No. 2680, fl.). Szechwan: Mt. Omei (Wilson ! No. 3143; Hugh ! 1899).

Obs.—This species obviously comes near the preceding, differing however in many respects, as pointed out by the writer.* The petal is bifid in this species, while in *M. Fortunei* it is entire. The stamen also differs from that of the other species in having a truncate connective. Sprague lays great stress on the "stalked" character of the terminal leaflet. This character is however subject to variation and cannot always be relied upon. A good distinguishing character in a sterile specimen is the length of the petiole, as first noticed by Schneider.† While *M. confusa* has a very short petiole, *M. Fortunei* possesses a comparatively long one (about 5 cm.). It may also be mentioned that the leaflets of *M. confusa* are narrower and thinner than those of *M. Fortunei* and have shallower teeth on the whole.

It may be pointed out that some specimens above referred to (including those which form the type specimens of *M. confusa*) have the terminal leaflet "stalked" while others have the terminal leaflet "sessile." Moreover, those specimens with the "stalked" terminal leaflet often have broader lateral leaflets than the others. These facts might induce some botanists, especially those who consider the "stalked" or "sessile" features as very important, to attempt to separate the material into two species or at least varieties. There are however no other dividing characters. Certain specimens bearing the broader leaflets have a "sessile" terminal leaflet together with those of the more usual type (e.g. Henry, No. 3351), while another specimen collected by Henry (No. 2689) which bears

* Takeda, in Kew Bull. 1915, p. 128.

† Schneider, l.c. p. 379.

narrow leaflets possesses in one of the leaves a " stalked " terminal leaflet. Further, the specimen collected by Hugh on Mt. Omei and above referred to has narrow leaflets (about half an inch broad or less, and never reaching three-quarters of an inch), yet all the terminal leaflets in this specimen are " stalked." It is evident therefore that separation of forms or species by means of " stalked " or " sessile " terminal leaflets alone is not defensible. Not only in this species, but also in many others the terminal leaflet is either " stalked " or " sessile " in the same species, and often in the same specimen, as has already been pointed out in the introduction.

In the case of *M. confusa* it might be possible to distinguish two forms by the width of the leaflets, but how far such a distinction may be practicable in nature is a question to which the writer is not prepared to give an answer.

13. **M. Fargesii,** Takeda, sp. nov. (Plate XXVI and Plate XXXVI, figs. 173–178.)

Folia 7-juga, jugo infimo stipulis filiformibus ca. 10 mm. longis patentibus vel deflexis magnopere approximato, ejus foliolis minoribus. Foliola coriacea, marginata, oblonga vel ovato-oblonga, cuspidata, basi rotundato-truncata vel subtruncata, 3.5–5.5 cm. longa, 2.5–4 cm. lata, margine pauci- et grossi-dentata, dentibus in latere inferiore 3–5, in superiore 2, utraque pagina subnitida, nervis venisque elevatis; foliolum terminale majus, basi cuneatum. Racemi plures quam 10 fasciculati, erecti, stricti, rhachi virgata simplici. Bracteae florum ovatae vel ovato-lanceolatae, acutae, 4–6 mm. longae. Pedicelli capillares, erecto-patentes, apice subnutantes, cum bracteis aequilongi. Sepala externa oblongo-deltoidea, acuta, 2.5 mm. longa, 1.5 mm. lata, trinervia, mediana ovato-oblonga, obtusa, cymbiformia, carinata, 5 mm. longa, 2.5 mm. lata, quinquenervia, interna oblongo-elliptica, obtusa, 5.5 mm. longa, 2.5 mm. lata. Petala elliptico-oblanceolata, apice bifida, 5 mm. longa, 2 mm. lata, trinervia, basi nectariis binis distinctis ornata. Stamina cum sepalis externis aequilonga, filamento ad apicem subdilatato edentato antheris paulo longiore, connectivo lato truncato. Ovarium parvum, oblongo-ovoideum, 2.5 mm. longum, stigmate minuto, ovulis 5–7.

Hab.—Szechwan: Chenkow (Farges! in Hb. Kew, sine dato).

Obs.—The leaf bears a similar appearance to that of *M. japonica*, but the inflorescence is quite different, being straight, and having smaller denser bracts. There is also a great difference in the flowers of these two species.

14. **M. longibracteata,** Takeda, sp. nov. (Plate XXVII and Plate XXXVI, figs. 179–183.)

Folia 5-juga, jugo infimo stipulis filiformibus ut videntur brevissimis magnopere approximante, ejus foliolis quam alia dimidio minoribus. Foliola crassa, coriacea, supra flavido-viridia, nervis immersis, infra pallidiora, nervis inconspicuis, oblonga, 4–7 cm. longa, 2–3.5 cm. lata, mucronato-apiculata, basi cuneato-rotundata vel subrotundata, obliqua, margine spinoso-dentata, dentibus in latere inferiore 4–5, in superiore 3–4; foliolum terminale majus, basi longe cuneatum, apice mucronato-apiculatum, utrinque dentibus 6 spinoso-dentatum. Racemi 7–8 fasciculati, usque ad 10 cm. longi, simplices, a basi densiflori. Flores ut videntur pallide flavi. Bracteae florum lanceolatae, longe acuminatae, ca. 10 mm. longae. Pedicelli ad 5 mm. longi, erecto-patentes, ebracteolati. Sepala externa lanceolata, cymbiformia, acuminata, 4–6 mm. longa, 1.5–2 mm. lata, mediana late lanceolata vel oblongo-lanceolata, obtusa, saepe apice leviter retusa, 5–6 mm. longa, ad 3 mm. lata, interna medianis consimilia sed tenuiora, omnia trinervia, nervis lateralibus subramosis. Petala oblongo-elliptica, 4–5 mm. longa, 3 mm. lata, trinervia, apice bifida, basi nectariis binis vix distinctis ornata. Stamina filamento lato edentato antheris longiore, connectivo angustissimo truncato. Ovarium ad 3 mm. longum, 2-ovulatum stigmate sessili. Bacca ignota.

Hab.—Yunnan: "In open situations amongst scrub in side valleys on the eastern flank of the Tali Range, lat. 25° 40′ N., 8000–10,000 ft." (Forrest! No. 4345, Hb. Edinb.).

Obs.—This species is more or less closely related to *M. Veitchiorum*, from which it differs in the shape of the leaflets, the inconspicuous nectaries, and in the very narrow truncate connective.

15. **M. polyodonta,** Fedde. (Plate XXXVI, figs. 184–189.)

M. polyodonta, Fedde in Engl. Bot. Jahrb. xxxi, p. 126, fig. 3, D, 1901.

Adde notas sequentes: Racemi ad 8 fasciculati, breves, ad 5 cm. longi, simplices, densiflori, rhachi gracili. Bracteae florum lanceolatae, acuminatae, 5 mm. longae. Pedicelli bracteis breviores. Sepala externa anguste ovata, acuminata, 3–3.5 mm. longa, carinata, mediana late lanceolata, acutiuscula, 5–5.5 mm. longa, interna oblongo-elliptica, 6 mm. longa, omnia 3-nervia. Petala oblanceolata, leviter bifida, 4 mm. longa, 3-nervia, basi nectariis binis minutis ornata. Stamina petalis breviora, filamento edentato antheris subduplo longiore, connectivo angustissimo truncato. Ovarium stylo brevi praeditum, 2-ovulatum.

Hab.—Szechwan: Chenkow (Farges! No. 759).

16. **M. Sheridaniana,** Schn. (Plate XXVIII and Plate XXXVI, figs. 190–194.)

M. Sheridaniana, Schn. in Sargent, Pl. Wils. i, p. 384, 1913.

Adde notas sequentes: Racemi ad 5 fasciculati, fructiferi ad 7 cm. longi, pedicellis ad 4 mm. longis apice nutantibus. Sepala externa ovata, obtusa, 1.5 mm. longa, 5–6-nervia, mediana late ovalia, 5-nervia, 3.5 mm. longa, interna late obovata, utrinque 1-dentata (an semper ?), 5-nervia, 6 mm. longa, 4 mm. lata. Petala obovata, basi nectariis binis subrotundatis ornata, trinervia. Bacca majuscula, ovoidea, nigro-coerulea, 15 mm. longa, 10 mm. lata, estylosa, stigmate punctiformi coronata.

Hab.—Hupeh: "Changyang, woods, 8000 ft. Bush 4 ft., flower yellow" (Wilson! No. 426).

Obs.—So far as is known the fruit of the present species is the largest in this genus.

17. **M. gracilipes,** (Oliver) Fedde. (Plate XXXVI, figs. 195–199.)

M. gracilipes, Fedde, in Engl. Bot. Jahrb. xxxi, p. 128, fig. 5, 1901.

B. gracilipes, Oliv. in Hook. Ic. Pl. ser. 3, viii, tab. 1754, 1887.

M. subtrinervis, Fedde, l.c. p. 129.

B. subtrinervis, Franch. in Bull. Mus. Hist. Nat. Paris, i, p. 63, 1895.

Hab.—Szechwan: Mt. Omei (Faber! No. 85, fl.; Wilson! Nos. 3144, fr., 4727, fl.).

18. **M. nitens,** Schn.

M. nitens, Schn. in Sarg. Pl. Wils. i, p. 379, 1913.

Hab.—Szechwan: "Hungya Hsien, red sandstone cliffs, alt. 1100 m." (sec. Schn. l.c.) (Wilson! No. 2881).

Obs.—A very distinct species having leaflets markedly cuneate at the base, and with both sides symmetrical.

19. **M. decipiens,** Schn.

M. decipiens, Schn. l.c. p. 379.

Hab.—Hupeh: Changyang Hsien (Wilson! No. 2884).

Obs.—A very well-marked species with a leaf consisting of only a few (1–2) pairs of leaflets, the lowermost of which is situated at a distance of 4.5–8 cm. from the base of petiole,* while the terminal leaflet is broadly ovate with a cordate-rotundate base. Schneider's suggestion as to its affinity with *M. napaulensis* does not commend itself to me.

* In the original description the length is given as 2–4 cm.

20. **M. hypoleuca,** Takeda, sp. nov. (Plate XXIX.)

Folia 8–9-juga, jugo infimo stipulis filiformibus ca. 10 mm. longis maxime approximante, ejus foliolis multo minoribus, orbiculatis vel ovatis. Foliola inter se distantia, ovata, 5–6 cm. longa, 3–4 cm. lata, basi truncata vel rotundato-truncata, subobliqua, subabrupte acuminata, margine leviter spinoso-serrata, dentibus in latere inferiore 5–8, in superiore 3–5, chartacea, supra virens, subtus glauca; foliolum terminale aliis simile, ovatum, basi rotundatum. Flores et fructus desiderantur.

Hab.—Yunnan: Mengtsz, S.W. mts., 6000 ft., shrub 3 ft. (Henry ! No. 9863, in Hb. Kew).

Obs.—A very distinct species, easily distinguished from other species by the foliage alone. Unfortunately neither flower nor fruit has been collected. This species is possibly related to the preceding species.

The writer greatly regrets that no specimens of the following species have been at his disposal. They are:

M. Bodinieri, Gagn. in Bull. Soc. Bot. Fr. lv, p. 85, 1908.

M. Duclouxiana, Gagn. l.c. p. 87.

M. eurybracteata, Fedde, in Engl. Bot. Jahrb. xxxi, p. 127, fig. 4, C, 1901.

M. ganpiensis, Léveillé, in Fedde, Repert. vi, p. 372, 1909.

M. Leveilleana, Schn. in Sarg. Pl. Wils. i, p. 385, 1913.

M. setosa, Gagn. l.c. p. 86.

From the descriptions most of them appear to be good distinct species. *M. eurybracteata* appears to be a form of *M. Fortunei,* but it is impossible to settle the question from the original description alone. *M. ganpiensis* does not seem to be a *Mahonia* at all, since the author says: "*folia paripinnata*" . . . "*stigmate . . . villoso.*" As far as the writer's knowledge goes, there is no *Mahonia* with a paripinnate leaf, or a villous stigma. It may, however, be possible that the terminal leaflet was missing from the type specimen, and some fluff of blotting paper might have remained on the stigma when pressed. Apart from these *bêtises,* the whole description is so vague, lacking in all the important points but characters common to the genus, that no one can picture this species at all. It would therefore be wise to disregard it altogether.

III. THE FORMOSAN SPECIES.

The first record of *Mahonia* in Formosa is that of Professor Matsumura,* and afterwards there is that of Dr. Hayata,† who mentions the occurrence of a single species, *Berberis nepalensis,*

* Matsum. in Tôkyô Bot. Mag. xii, p. 54, 1898.

† Hayata, Fl. Mont. Form. p. 47, 1908.

in a few places in the mountainous districts. Through the kindness of Dr. Hayata the writer has had an opportunity of examining some of the specimens referred to. Unfortunately the specimens are very imperfect, some consisting of leaves alone, others are accompanied with young flowers only.

It has been found, however, that there are at least three species indigenous to Formosa, and no doubt more will be discovered.

1. **M. lomariifolia,** Takeda, sp. nov. vide supra, p. 231. (Plate XXXV, figs. 152–157.)

B. nepalensis, Hayata, Fl. Mont. Formos. p. 47, 1908, pro parte.

Hab.—Arisan (G. Nakahara ! xi. 1906). Gauzan, 8012 ped. (S. Nagasawa ! 31. x. 1905, No. 567).

Obs.—The specimen from Arisan is very young and possesses small immature flowers about 3 mm. in length, while the ovary has 2–3 ovules. The figures given in our plate of this specimen appear at first glance quite different from those of typical *M. lomariifolia*, being smaller in every respect. In particular the organs situated near the centre of the flower are very immature. The other specimen is also imperfect. It possesses leaves more than 8-jugate, leaflets coriaceous, longly cuspidate-acuminate, distantly spinose-dentate, nerves and veins more or less visible on the under surface. The inflorescence is very young with flowers hardly developed.

2. **M. morrisonensis,** Takeda, sp. nov. (Plate XXXVI, figs. 200–206.)

B. nepalensis, Hayata, l.c. pro parte.

Folia magis quam 7-juga, foliolis chartaceo-coriaceis inter se plus minusve distantibus, (inferioribus quam alia multo minoribus,) medianis lanceolatis, longe acuminatis plus minusve falcatis basi rotundato-truncatis obliquis 7–10 cm. longis 2–2.5 cm. latis margine spinoso-serratis, (dentibus in latere inferiore 10–12, in superiore 5–8,) supra nitidis, nervis venisque elevatis, subtus pallidioribus, nervis venisque prominentibus. Racemi densiflori. Flores tantum juveniles visi pedicello brevi 2–3 mm. longo suffulti, bracteis lanceolatis ca. 3 mm. longis praediti. Sepala externa lanceolata, acuminata, 2.5 mm. longa, 1 mm. lata, cymbiformia, obscure trinervia, mediana late lanceolata, acuta, cymbiformia, 3.5 mm. longa, ad 1.5 mm. lata, trinervia, interna oblongo-lanceolata, acuta, 5 mm. longa, ad 2 mm. lata, 5-nervia. Petala oblanceolata apice leviter bifida, basi nectariis binis distinctis ornata, trinervia, 4 mm. longa. Stamina petalis breviora,

filamento edentato antheris subduplo longiore, connectivo truncato. Ovarium oblongum, 3 mm. longum, 3-ovulatum stylo brevi coronatum. Bacca ovoidea, 6 mm. longa, 4 mm. lata, atro-coerulea, pruinosa, stylo brevi (ad 1 mm. longo), pedicello 3–4 mm. longo, bracteis 5–6 mm. longis coriaceis viridescentibus praedita.

Hab.—Mt. Morrison, 7500 ped. (T. Kawakami et U. Mori! 16. xi. 1906, fl. juv. et fr.).

Obs.—Amongst the Formosan species known at present this is distinguished by having chartaceous leaflets and truncate connective.

There is another specimen from Mt. Morrison (U. Mori! 17. x. 1906) consisting of a single leaf. The leaf is about 45 cm. in length with about 12 pairs of leaflets which are similar to those of the preceding species, but thicker in texture, hardly falcate, and provided with less numerous teeth (5–8 on the lower and 4–6 on the upper margin). It is possible that this specimen belongs to a distinct (and probably new) species, but at present it is left undescribed.

IV. THE JAPANESE SPECIES.

There is only one species known from Japan, and this has not been found wild, so far as the writer's experience goes. It may have been introduced from a neighbouring country as a cultivated plant, but the writer has seen no typical specimen of *M. japonica* collected outside Japan.

This is the oldest species of this genus, having been first described * and figured † as *Ilex japonica*, then transferred to *Berberis*,‡ and finally to *Mahonia*.§ Many years afterwards this species was confused with *M. Bealei*,‖ and this mistake has often been repeated. These two species may show some resemblance in foliage under abnormal circumstances, yet an absolute distinction can always be seen in the inflorescences. While *M. Bealei* has racemes rather straight, stout, and densely beset with small bracts, those of *M. japonica* are rather slender, straggling, and loosely furnished with large ovate bracts. The flowers of these species are totally different (compare figs. 83–103 and 207–211). As *M. japonica* is not sufficiently understood, a full description of it is given below.

* Thunb. Fl. Japon. p. 77, 1784.
† Thunb. Ic. Fl. Japon. iv, tab. 2, 1802.
‡ R. Br. in Tuckey, Congo Exped. App. p. 22, 1816.
§ DC. Syst. ii, p. 22, 1821.
‖ Lindl. in Lind et Paxt. Fl. Gard. i, p. 11, 1850–51.

M. japonica, (Thunb.) DC. (Plate XXX and Plate XXXVI, figs. 207–211.)

M. japonica, DC. Syst. ii, p. 22, 1821.

Ilex japonica, Thunb. Fl. Japon. p. 77, 1784; Ic. Pl. Japon. iv, tab. 2, 1802.

B. japonica, R. Br. in Tuckey, Cong. Exped. App. p. 22, 1816.

M. japonica, pro parte et var. *gracillima,* Fedde, l.c. pp. 118, 120.

B. japonica var. *gracillima,* Rehd. in Mitteil. d. Deutsch. Dendrol. Gesellsch., 1912, p. 184.

Folia ca. 7-juga, jugo infimo a stipulis obsoletis vel deficientibus paulo distante, ejus foliolis quam alia dimidio minoribus. Foliola inter se distantia, coriacea, lanceolato-ovata vel oblongo-ovata, saepe subfalcata, basi cuneato-rotundata vel cuneata, apice cuspidato-acuminata, margine grosse spinoso-dentata, dentibus in latere inferiore 4–6, in superiore 3–5, supra nitida viridia vel atro-viridia, in sicco nervis venisque conspicuis leviter elevatis, infra flavido-viridia, nervis venisque subconspicuis; foliolum terminale aliis simile, basi cuneatum. Racemi ad 10 fasciculati, 10–20 cm. longi, divergentes, simplices, laxiflori, rhachi subcrassa. Bracteae ovatae vel lanceolato-ovatae, acuminatae, virides, 5–8 mm. longae, 2–4 mm. latae. Pedicelli graciles, sub anthesin 6–7 mm. longi, tandem ad 10 mm. elongati, nutantes. Sepala externa ovato-deltoidea, obtusa, 2.5 mm. longa et lata, 7-nervia, mediana late ovalia, 3.5 mm. longa, 2.5 mm. lata, 5-nervia, interna ovalia, 7 mm. longa, 4 mm. lata, 5-nervia. Petala sepalis internis paululum breviora, 3-nervia, apice bifida, basi nectariis binis indistinctis ornata. Stamina petalis breviora, filamento lato edentato antheris duplo longiore, connectivo lato truncato. Ovarium ovoideum, 4–5-ovulatum, stylo brevissimo, stigmate 1 mm. diametro superante. Bacca ovoidea, atro-purpurea, pruinosa ad 8 mm. longa, 4 mm. lata.

Hab.—Japan (ex Hb. Lugdno. Batav. steril.); Garden at Nagasaki (Oldham! No. 686), Tôkyô (Terasaki! v. 1906), etc.

Obs.—From the above description and the figures referred to, it will easily be seen that the present species differs from *M. Bealei* in many respects. Fedde's var. *gracillima* is nothing but the typical *M. japonica,* while his *M. japonica* is a mixture of *M. japonica* and *M. Bealei.*

The writer has received from Mr. G. Reuthe, Keston, Kent, specimens of *Mahonia* labelled as *M. intermedia* and *M. Bealei.* As these specimens are represented by leaves alone it is difficult to determine them with certainty, but the former appears to be the typical *M. japonica* and the latter a large form of the same species. If these specimens actually represent the so-called *M.*

intermedia and *M. Bealei* known among the florists, and if the identification be correct, we may regard these two names as synonyms of *M. japonica*.* It is strange that *M. Bealei* is known amongst florists as *M. japonica*.

V. THE SIAMESE SPECIES.

The occurrence of this genus in Siam was made known first in the year 1911 † by Craib. Specimens were identified as *M. nepalensis*, but this identification was subsequently considered doubtful by the same botanist and the record cancelled.‡ The writer is deeply indebted to Mr. Craib for kindly handing over his specimens together with newly acquired material for investigation. This species has proved to be new to science, and has been named *M. siamensis*.

M. siamensis, Takeda. (Plate XXXI and Plate XXXVI, figs. 212–217.)

M. siamensis, Takeda, in Kew Bull. 1915, p. 422.

M. nepalensis, Craib, in Kew Bull. 1911, p. 11, non DC.

Folia ad 45 cm. longa, 7–8-juga, jugo infimo stipulis subulatis ad 10 mm. longis subdeflexis valde approximante, ejus foliolis quam alia 2–3-plo minoribus. Foliola inter se plus minusve approximata, lanceolata vel ovato-lanceolata, basi cuneata vel subtruncata, obliqua, apicem versus sensim attenuata nec cuspidato-acuminata, firmissime coriacea, supra nitida, nervis immersis, subtus pallidiora, nervis venisque elevatis, 5–10 cm. longa, 2–4 cm. lata, spinoso-denticulata, dentibus in latere inferiore 5–9, in superiore 4–8; foliolum terminale aliis simile, basi subrotundatum. Racemi 6–10 fasciculati, densiflori, rhachi crassa basi saepe subramosa sub anthesi 5–15 cm. longa 2 mm. diametro demum elongata et incrassata, fructifera robusta ad 30 cm. longa vel ultra ad 5 mm. diametro subtereti. Bracteae florum ovatae, acutae, scariosae, 3–6 mm. longae, 2–4 mm. latae. Pedicelli 5–10 mm. longi, demum ad 7–12 mm. elongati, stricti, patentes. Sepala externa ovato-deltoidea, minuta, 2 mm. longa et lata, 5-nervia, mediana rotundato-ovata, ad 4 mm. longa, 3 mm. lata, 7-nervia, interna oblongo-elliptica, 8 mm. longa vel paulo ultra, 4.5 mm. lata, apice integra vel interdum leviter bifida, 7-nervia. Petala elliptica, apice biloba, basi nectariis binis distinctis ornata, 7.5 mm. longa, 4 mm. lata, 5-nervia. Stamina petalis breviora, filamento apice leviter incrassato

* Fedde (l.c. p. 120) regards *M. intermedia* as being conspecific with *M. napaulensis*.

† Craib in Kew Bull. 1911, p. 11.

‡ Craib, Contr. to the Fl. of Siam, in Aberdeen Univ. Studies, No. 57, p. 10, 1912.

edentato antheris longiore, connectivo depresso-triangulari apiculato. Ovarium globoso-ovoideum, stylo 2 mm. longo, stigmate capitato 1.5 mm. diametro, ovulis 4–6. Bacca globosa, ad 5 mm. diametro, stylo ca. 2 mm. longo coronata, atro-coerulea, pruinosa.

Hab.—Chiengmai, Doi Sutep: "5000–7500 ft. Shrub to 10 ft. high; berries blue; evergreen jungle" (Kerr! iv. 1910, No. 1107, fr.); ibid. "1670 m. Shrub about 4 m. high, evergreen jungle" (Kerr! 11. iv. 1914, No. 1107A).

Obs.—This plant appears to be of uncommon occurrence. It may be remotely related to *M. longibracteata*, but differs in many points. It also resembles *M. flavida*, but the flower of the Siamese species is much larger and the whole plant is not reddish-brown as in the other.

VI. THE MALACCAN SPECIES.

From this district *M. napaulensis* has been recorded,* the specimen having been collected by Griffith in Mergui. Griffith's specimen (No. 120) is, unfortunately, deflorate, so that no decided opinion can be formed thereupon. It has a similar appearance to *M. siamensis*, and may possibly be the same or a closely related species.

VII. THE BURMESE SPECIES.

From Burma also *M. napaulensis* has been recorded.† The writer has had no opportunity of examining any specimens supporting that record. The only specimen of *Mahonia* from Burma, which the writer has seen, is *M. siamensis* (v. supra), collected in the Southern Shan States: Keng Tung, about 4000 ft., by R. W. MacGregor in October 1909, No. 1236 fl. (Hb. Calcutt.).

It may perhaps be presumed that the specimen recorded by Hemsley from "Shan Hills" belonged to the same species.

VIII. THE ANNAM SPECIES.

M. annamica, Gagnep. is the only species hitherto found in Annam.‡ From the original description it seems to be quite a distinct species. The specimen however has not been seen by the writer.

* Hook. f. and Thoms. in Hook. f. Fl. Brit. Ind. i, p. 109, 1872.

† Kurz, Forest Fl. of Burma, i, p. 58, 1877; Hemsley, in Collett and Hemsley, On Plants from Upper Burma and the Shan States, in Journ. Linn. Soc., Bot. xxviii, p. 17, 1890.

‡ Gagnepain, in Bull. Soc. Bot. Fr. lv, p. 84, 1908.

IX. THE JAVANESE SPECIES.

In the year 1859 Miquel recorded the occurrence of *Berberis napaulensis* in Java. The writer has had no opportunity of examining Miquel's specimen nor any other collected in Java. It is probably an erroneous record. Miquel's brief description of his specimen does not go beyond the generic characters.

X. THE PHILIPPINE SPECIES.

The Philippine species furnishes us with another instance of a wrong record of *M. napaulensis*. The writer has fortunately been enabled to examine several excellent specimens with both flower and fruit, and found that he was dealing with another new species, a description of which follows.

M. philippinensis, Takeda, sp. nov. (Plate XXXII and Plate XXXVI, figs. 218–222.)

M. nepalensis, Merrill, in Phil. Journ. Sci. i, Suppl., p. 190 (1906).

Folia 15–30 cm. longa, 5–10-juga, infimo jugo stipulis subulatis vel filiformibus ad 13 mm. longis magnopere approximante, ejus foliolis quam alia 2–3-plo minoribus oblongo-ovatis. Foliola inter se plus minusve distantia, papyraceo-chartacea vel chartaceo-coriacea, 3–6 cm. longa, 2–3 cm. lata, ovato-lanceolata, basi truncata vel rotundato-truncata, obliqua, apicem versus sensim acuminata, spinoso-dentata, spinis in latere inferiore 4–6, in superiore 3–4, supra nitida, venis inconspicuis, infra subnitida, nervis venisque elevatis; foliolum terminale aliis paulo majus, basi truncatum vel rotundato-truncatum. Racemi 5–6 fasciculati, graciles, sub anthesin 10–20 cm. longi, fructiferi ad 20 cm. longi vel ultra. Bracteae florum ovato-lanceolatae, acutae vel acutiusculae, 2–3 mm. longae, 2 mm. latae. Pedicelli erecto-patentes, graciles, 8–13 mm. longi. Sepala externa ovata, obtusa, 2 mm. longa, 1–1.5 mm. lata, ad 5-nervia, mediana ovato-orbiculata, 5-nervia, 3–3.5 mm. longa, 3 mm. lata, interna elliptica, 6 mm. longa, 3 mm. lata, 5–7-nervia. Petala cum sepalis internis aequilonga, late elliptica, apice leviter bifida, basi nectariis binis distinctis ornata, 3–5-nervia. Stamina edentata, antheris filamento subduplo brevioribus, connectivo lato truncato. Ovarium ovoideum, 3 mm. longum, stylo brevissimo 0.5 mm. longo, ovulis 2. Bacca globosa, ad 8 mm. diametro, nigro-coerulea, pruinosa, stigmate punctiformi coronata.

Hab.—Benguet, Luzon (Loher ! No. 60, fl., fr.; Elmer ! No. 5929, fr.; Williams ! No. 1460, fl., defl.).

The present investigation clearly shows that our knowledge of the genus *Mahonia* has been and still is very imperfect. It is remarkable how numerous are the species which have erroneously been recorded as *M. napaulensis*, without their real nature being satisfactorily understood. No doubt many more new species are still to be found, while many more specimens of the known species must be collected and carefully examined before they can be adequately defined.

[INDEX TO THE SPECIES.

INDEX TO THE SPECIES.

EXPLANATION OF PLATES I–XXXVII.

Illustrating H. Takeda's Paper on the Old World Species of Mahonia.

PLATE I.—*M. napaulensis*, DC. $\times\frac{4}{11}$.
" II.—*M. napaulensis*, DC. $\times\frac{4}{7}$.
" III.—*M. Griffithii*, Takeda. $\times\frac{4}{11}$.
" IV.—*M. pycnophylla*, Takeda. $\times\frac{4}{11}$.
" V.—*M. Roxburghii*, Takeda. $\times\frac{1}{2}$
" VI.—*M. acanthifolia*, G. Don. $\times\frac{4}{11}$.
" VII.—*M. sikkimensis*, Takeda. $\times\frac{2}{5}$.
" VIII.—*M. borealis*, Takeda. $\times\frac{4}{11}$.
" IX.—*M. manipurensis*, Takeda. $\times\frac{4}{11}$.
" X.—*M. Simonsii*, Takeda. $\times\frac{2}{5}$.
" XI.—*M. Leschenaultii*, Takeda. $\times\frac{4}{11}$.
" XII–XIII.—*M. Bealei*, Carr. $\times\frac{4}{11}$.
" XIV.—*M. flavida*, Schn. $\times\frac{4}{11}$.
" XV.—*M. Fordii*, Schn. $\times\frac{4}{11}$.
" XVI.—*M. Mairei*, Takeda. $\times\frac{1}{2}$.
" XVII.—*M. bracteolata*, Takeda. $\times\frac{1}{2}$.
" XVIII.—*M. dolichostylis*, Takeda. $\times\frac{1}{2}$.
" XIX.—*M. conferta*, Takeda. $\times\frac{4}{11}$.

PLATE XX.—*M. Hancockiana*, Takeda. $\times\frac{4}{11}$.
,, XXI–XXII.—*M. lomariifolia*, Takeda. $\times\frac{1}{2}$.
,, XXIII.—*M. Veitchiorum*, Schn. $\times\frac{4}{11}$.
,, XXIV.—*M. Fortunei*, Fedde. $\times\frac{4}{11}$.
,, XXV.—*M. confusa*, Sprague. $\times\frac{4}{11}$.
,, XXVI.—*M. Fargesii*, Takeda. $\times\frac{2}{5}$.
,, XXVII.—*M. longibracteata*, Takeda. $\times\frac{1}{2}$.
,, XXVIII.—*M. Sheridaniana*, Schn. $\times\frac{4}{11}$.
,, XXIX.—*M. hypoleuca*, Takeda. $\times\frac{4}{11}$.
,, XXX.—*M. japonica*, DC. $\times\frac{1}{2}$.
,, XXXI.—*M. siamensis*, Takeda. $\times\frac{4}{11}$.
,, XXXII.—*M. philippinensis*, Takeda. $\times\frac{4}{11}$.

In the following Plates all the figures are magnified six times, except fig. 206, which is of natural size. In each species the outermost, middle, and innermost sepals, petal, stamen and often pistil are shown in the order mentioned. Where the middle and innermost sepals are very similar, only one of them is delineated.

PLATE XXXIII. FIGS. 1–5.—*M. napaulensis*, DC. (Buchanan, Nepal), fig. 2 = middle sepal.
,, ,, ,, 6–9.—*M. pycnophylla*, Takeda (Hooker et Thomson, Khasya).
,, ,, ,, 10–13.—The same (Griffith, Khasya).
,, ,, ,, 14–18.—*M. acanthifolia*, G. Don (Wall., type).
,, ,, ,, 19–23.—The same (Hook., Darjiling).
,, ,, ,, 24–29.—*M. a.* var. *Drummondii*, Takeda (Drummond, Darjiling).
,, ,, ,, 30–34.—*M. borealis*, Takeda (Keshava Nand, Jodi Forest).
,, ,, ,, 35–40.—The same (Lace, Chil to Dalhousie).
,, ,, ,, 41–46.—The same (Strachey and Winterbottom, Binsao).
,, ,, ,, 47–51.—*M. manipurensis*, Takeda (Watt, Manipur).
,, ,, ,, 52–57.—*M. Roxburghii*, Takeda (Buchanan, hort. Calcutta).
PLATE XXXIV. FIGS. 58–62.—*M. Leschenaultii*, Takeda (Ball, Nilgherry).
,, ,, ,, 63–67.—The same (Wight, No. 50).
,, ,, ,, 68–72.—*M. Leschenaultii*, Takeda (Gardener, 1848).
,, ,, ,, 73–77.—The same (Hohenacker, No. 1125).
,, ,, ,, 78–82.—The same (Wight, No. 49).
,, ,, ,, 83–88.—*M. Bealei*, Carr. (Henry, No. 3283).
,, ,, ,, 89–93.—The same (Henry, No. 1450).
,, ,, ,, 94–98.—The same (hort. Kew, " type " form).
,, ,, ,, 99–103.—The same (hort. Kew, var. " planifolia ").
,, ,, ,, 104–109.—*M. flavida*, Schn. (Henry, No. 10,180).
,, ,, ,, 110–115.—*M. Fordii*, Schn. (ex Hb. Hongk. No. 17, addition).
PLATE XXXV. FIGS. 116–120.—*M. Mairei*, Takeda (Maire, No. 101).
,, ,, ,, 121–125.—*M. bracteolata*, Takeda (Forrest, No. 7364).
,, ,, ,, 126–130.—*M. dolichostylis*, Takeda (Maire, No. 2003).
,, ,, ,, 131–135.—*M. conferta*, Takeda (Henry, No. 10,180A).
,, ,, ,, 136–140.—*M. Hancockiana*, Takeda (Hancock, No. 151).
,, ,, ,, 141–146.—*M. lomariifolia*, Takeda (Forrest, No. 9244).
,, ,, ,, 147–151.—The same (Henry, No. 10,309, not fully developed).
,, ,, ,, 152–157.—The same (Formosan spec.; from a very young flower).
,, ,, ,, 158–162.—*M. Veitchiorum*, Schn.

PLATE XXXVI. FIGS. 163–167.—*M. Fortunei*, Fedde (Fortune).
" " " 168–172.—*M. confusa*, Sprague.
" " " 173–178.—*M. Fargesii*, Takeda (Farges, Chenkow).
" " " 179–183.—*M. longibracteata*, Takeda (Forrest, No. 4345).
" " " 184–189.—*M. polyodonta*, Fedde (Farges, No. 759).
" " " 190–194.—*M. Sheridaniana*, Schn. (Wilson, No. 426).
" " " 195–199.—*M. gracilipes*, Fedde.
" " " 200–206.—*M. morrisonensis*, Takeda (Kawakami and Mori, 16. xi, 1906; young flower).
" " " 207–211.—*M. japonica*, DC.
" " " 212–217.—*M. siamensis*, Takeda (Kerr, No. 1107A).
" " " 218–222.—*M. philippinensis*, Takeda.
PLATE XXXVII. FIGS. 1–8.—*M. sikkimensis*, Takeda.
" " " 9–15.—*M. Simonsii*, Takeda.