

Notes on the Japanese Primulas.

BY

H. TAKEDA, D.I.C.

With Plates XIV-XXV.

UNLIKE her neighbouring country China, Japan possesses comparatively few species of this genus. However, more than half of the indigenous species are endemic. Since the publication of Thunberg's *Flora Japonica*¹ not a few botanists have directed their attention to Japanese Primulas in their floristic and systematic works.² In Professor Matsumura's *Index Plantarum Japonicarum*, vol. ii, pt. ii, published in 1912, the following 16 species are enumerated as natives of Japan:—

- P. cortusoides*, Linn.,
- P. cuneifolia*, Ledeb.,
 - α. typica*, Makino,
 - β. hakusanensis*, Makino,
 - γ. heterodonta*, Makino,
- P. eximia*, Greene,
- P. farinosa*, Linn.,
 - var. *armena*, C. Koch, *lusus japonica*, Makino,
 - var. *Faurieae*, Miyabe,
 - var. *mistassinica*, Pax,
- P. Hayaschinei*, Petitm.,
- P. japonica*, A. Gr.,
- P. jesoana*, Miq.,
- P. kisoana*, Miq.,
- P. Matsumurae*, Petitm.,
- P. nipponica*, Yatabe,
- P. nivalis*, Pall.,
- P. prolifera*, Wall.,
- P. Reinii*, Fr. et Sav.,
- P. sibirica*, Jacq.,
- P. Sieboldii*, E. Morr., and
- P. tosaensis*, Yatabe.

¹ Thunb., *Fl. Japon.* (1784.)

² A. Gray, *On the Botany of Japan*, etc., in *Mem. Am. Acad. Arts and Sc.*, vi (1859). Miquel, *Prol. Fl. Japon.* (1866-7.) Maximowicz, in *Mél. Biol.*, vi (1867). Franchet et Savatier, *Enum. Pl. Japon.*, i-ii (1875-9). Franchet, in *Bull. de la Soc. Philom. de Paris* (1886-8.) Makino, in *Tôkyô Bot. Mag.* (1897, 1898, 1902). Petitmengin, *Les Primulacées Sino-Japonaises*, in *Bull. Herb. Boiss. sér. 2*, vii (1907). Petitmengin, *Sur une Primevère monocarpique du Japon*, in *Bull. Herb. Boiss. sér. 2*, viii (1908).

[Notes, R.B.G., *Edin.*, No. XXXVII, Nov. 1913.]

Lately I undertook a critical study of the Japanese Primulas in the Herbarium at Kew. During that time Professor Bayley Balfour was so kind as to give me the privilege of examining all the specimens of the Japanese Primulas preserved in the Herbarium of the Royal Botanic Garden, Edinburgh, and to give me valuable criticisms and encouragement, for which I express my sincere thanks.

As the result of my study I recognise 11 species, 3 varieties, and 2 forms as natives of Japan. Of each of them I give a short account in the following pages. As to the arrangement I generally follow Pax,¹ although I do not always agree with him.

P. SIEBOLDII, E. Morren. Plate XIV.

P. Sieboldii, E. Morren, in Belg. Hort., xxiii (1873), forma *a.*
hortensis, Takeda.

Syn. :—

P. Sieboldii, E. Morr., Belg. Hort., xxiii (1873), p. 97, tab. 6.

P. Sieboldii, Pax, in Engl. Pflanzenreich, iv (1905), p. 22,
pro parte.

P. cortusoides, var. *amoena*, Lindl., in Gard. Chron. (1862),
p. 1218; Hook., in Curtis Bot. Mag. (1865), tab. 5528.

P. Sieboldii, E. Morr., forma *β. spontanea*, Takeda.

Syn. :—

P. Sieboldii, Pax, in Engl. Pflanzenreich, iv (1905), p. 22, *pro parte*.

P. cortusoides (non Linn.), Thunb. Fl. Japon., p. 82; Maxim.,
Prim. Fl. Amur., p. 192; Miq., Prol. Fl. Japon., p. 283; Fr. et
Sav., Enum. Pl. Japon., i, p. 299; Petitm., in Bull. Herb. Boiss.,
vii (1907), p. 532.

P. patens, Turcz., in Bull. Soc. Nat. Mosc. (1838), p. 99, nom. nud.

P. cortusoides, var. *patens*, Turcz., Fl. Baic.-Dah., ii (1856),
p. 224.

This species was first recorded from Japan by Thunberg, who took it for *P. cortusoides*, Linn. Many later botanists have also called it *P. cortusoides*, as the list of synonyms shows. The name *P. cortusoides* was also applied to another species, *P. saxatilis*, Kom., only recently described, although it has been cultivated in Europe over one hundred years. These three plants—*P. Sieboldii*, *P. cortusoides*, and *P. saxatilis*—stand in close relation, and particularly the two last mentioned are intimately allied. The only marked distinction between *P. cortusoides*, Linn., and *P. saxatilis*, Kom., is in the length of pedicels. They are as long as or a little longer than the calyx in *P. cortusoides*. They

¹ Pax, in Engler's Botan. Jahrb., x (1888-9); Pax et Knuth, Primulaceae in Engler's Pflanzenreich, iv (1905).

are nearly or even more than five times longer in *P. saxatilis*. This character is not always clearly shown in herbarium specimens of young stage, but seems to be well marked in cultivated individuals of *P. saxatilis*. In consequence of scarceness of trustworthy specimens of *P. cortusoides*, I have been unable to settle the question whether the pedicels of *P. cortusoides* always remain short even in the fruit-bearing stage. If this character fails to distinguish those two plants, there would exist no other point of specific distinction between them, excepting the more globose calyx-base of *P. saxatilis*. A careful comparison of living specimens is very much desired.

As far as we are aware, *P. saxatilis* is distributed over Eastern Asia, with extension from the Altai through Amurland as far as Korea, whereas *P. cortusoides* is found in Western Siberia extending from the Urals to the Altai.

Turning to *P. Sieboldii*, we can easily distinguish this species from the other two by the almost glabrous and markedly accrescent calyx with patent lobes. This holds good in wild as well as in cultivated forms of this species. The patent nature of the calyx-lobes was noticed by Turczaninow as long as seventy-five years ago, when he proposed to call the plant *P. patens*. Later, when publishing its description, he unfortunately changed the name to *P. cortusoides* var. *patens*. Therefore we are unable to use the suggestive name *patens*, because in 1873 E. Morren described a garden variety of this species under the name of *P. Sieboldii*, and this name, in spite of its being somewhat unsuitable for a species occurring wild, must be adopted. Now I propose to distinguish two forms with the names *α. hortensis* and *β. spontanea*, as I have indicated above.

The garden variety bears flowers of larger size and of colours varying from pure white to deep crimson and almost purple. Some of them have the corolla inside pink or white and outside crimson or pale mauve. In some varieties the corolla tube is deep crimson. The corolla-lobes are sometimes very broad, and sometimes considerably narrowed towards the base.

The wild form also shows to some extent plasticity in colour and shape of the corolla-lobes.

The inflorescence is usually a simple umbel, but occasionally the axis grows out, producing another tier of flowers.

I may perhaps mention here that *P. cortusoides* var. *lichiangensis*, Forrest,¹ is not a variety of *P. cortusoides*, but belongs to a distinct species. It is distinguished above all by the sinuate leaf, thick lanate indumentum on the petiole and scape, and the larger bell-shaped calyx. This species, if it is different from *P. polyneura*, Franchet, should retain the name *P. lichiangensis*, Forrest.

P. Sieboldii is distributed in Japan over Yezo, Hontô, and

¹ G. Forrest in Notes, Roy. Bot. Gard., Edin. (1908), p. 217.

Kyûshû, growing in damp places. Its area of distribution extends also into North Eastern Asia as far as the Altai.

P. JESOANA, Miq. Plate XV.

P. jesoana, Miq., Prol. Fl. Japon., p. 283; Fr. et Sav., Enum. Pl. Japon., i, p. 299; Pax, in Engl. Pflanzenreich, iv (1905), p. 32.

This is a species with a very similar appearance to *Cortusa Mattioli*. The leaf is longly stalked with thin petiole. The lamina is orbiculate reniform in outline, cordate at the base, and shallowly 5-9-lobed with broadly ovate and sharply denticulate lobes. The inflorescence is a single umbel, but in luxuriant specimens there is a second umbel superposed. The flower is of a deep crimson colour, but not particularly attractive.

The plant is usually glabrescent, but sometimes more or less pubescent all over, and then is easily mistaken for the next species, when one runs down a key.¹ While the calyx of *P. kisoana* is invariably thickly pubescent with long soft hairs, the calyx of *P. jesoana* is never lanate-pubescent.

The systematic position of this species is undoubtedly very close to *P. septemloba*, Franch., a Yunnan species, and it belongs to the series of the Himalayan *P. geraniifolia*, Hook. f., and possibly of the Siberian *P. Kaufmanniana*, Regel.

P. jesoana is found in woods in Yezo and in the mountainous districts of Central Japan. It is also distributed in the Korean Peninsula² as well as the Island of Quelpart,³ which is of great interest from the phytogeographical point of view.

P. KISOANA, Miq. Plate XVI.

P. kisoana, Miq., Prol. Fl. Japon., p. 283; Fr. et Sav., Enum. Pl. Japon., i, p. 299; Makino, in Tôkyô Bot. Mag. (1894), p. 173; Pax, in Engl. Pflanzenreich, iv (1905), p. 32.

One of the most beautiful, interesting, and rare of the Japanese Primulas. This species has a close relationship to the preceding. As characteristics this species has thick lanate indumentum, especially on the petiole, under surface of the lamina, scape, and even on the pedicel. The calyx densely hirsute is the character which distinguishes this from the foregoing species. The leaf has the lamina smaller than in the other species, with obtuse denticulation, and petiole thicker and more fleshy. This species, *P. kisoana*, Miq., is probably to be placed near *P. mollis*, Nutt., a Himalayan plant.

This species is found in S.W. Japan, but only rarely. No

¹ Two forms of this species may be distinguished as follows:—forma α . *glabra*, Takeda—*Planta tota levis*; forma β . *pubescens*, Takeda—*Petiolis, scapis pedicellisq.ue molliter villosulis*.

² See. T. Nakai, Fl. Koreana, ii, p. 78.

³ The specimen from Quelpart (Faurie, no. 1900) belongs to the pubescent form.

more specimens have been recorded from Kiso, where the type specimen is said to have been found and named accordingly.

The plant was in cultivation in Japanese gardens nearly two centuries ago. Its figure and description, together with figures of other species, such as *P. Sieboldii*, probably of *P. cuneifolia* var. *hakusanensis*, and *P. modesta*, are given in a book of gardening called *Chikin Shô Furoku*, vol. i, published in 1733. In this book the plant is called with a vernacular name "katsu-kô-sô," which means super-crimson flower, so named because the flower is of deep rose colour. This name is still in use amongst lovers of flowers.

Pax created a new section of *Primula* called *Fallaces*,¹ in which he includes in his latest work² four species, namely, *P. jesoana*, Miq., *P. kisoana*, Miq., *P. Reinii*, Fr. et Sav., and *P. tosaensis*, Yatabe. There is no room for doubt that the first two are allied, while the last two form another group. There exists no relationship whatsoever between these two sets of species. As I have said above, the first two species should be transferred into Pax's sect. *Sinenses*, whereas the other two may probably form a section of their own, on account of their general habit and especially of their long capsule. The capsule of *P. jesoana* does not exceed the calyx, but is as long as or slightly shorter than the calyx. Pax is also wrong in the key of sections in placing his *Fallaces* under the heading of "*Folia non vel vix distincte lobata*," since all the species which he includes in his *Fallaces* have leaves distinctly lobed.

P. TOSAENSIS, Yatabe. Plate XVIIA.

P. tosaensis, Yatabe, in Tôkyô Bot. Mag., iv (1890), No. 45, tab. 14; *id.* Iconogr. Fl. Japon., i (1891), 1, p. 31, tab. xii; Makino, in Tôkyô Bot. Mag. (1894), p. 174; Pax, in Engl. Pflanzenreich, iv (1905), p. 33.

This and next species undoubtedly form a group which is distinguished from the section *Sinenses* above all by the nature of capsule, which is often more than twice as long as the calyx.

This species is well characterised by Yatabe in the above cited publications, and also by Pax. As far as I am aware it has been recorded only from the Province of Tosa, Shikoku.

P. REINII, Fr. et Sav. Plate XVIIIB.

P. Reinii, Fr. et Sav., Enum. Pl. Japon., ii, p. 428; Makino, in Tôkyô Bot. Mag. (1894), p. 174; Pax, in Engl. Pflanzenreich, iv (1905), p. 32.

This species is easily distinguished from other Japanese congeners by its almost circular leaf, which is deeply cordate at the

¹ In Engler's Bot. Jahrb., x (1888-9), p. 170.

² In Engler's Pflanzenreich, iv (1905), p. 32.

base, so that it appears as if the leaf is peltate. The plant does not exceed 15 cm. even in the fruiting stage, and is usually much smaller. Young leaves are always densely clad with long, soft hairs. Inflorescence is composed of a few large showy flowers of deep rose colour with yellow eye.

This species grows on mountains of Central Japan. It has been introduced into English gardens only in recent years.

P. MODESTA, Bisset et Moore. Plate XVIII.

P. modesta, Bisset et Moore (ampl.), *a. genuina*, Takeda.

Syn. :—

P. modesta, Bisset et Moore, in Journ. Bot., xvi (1878), p. 134.

P. farinosa, subsp. *modesta*, Pax, in Engl. Pflanzenreich, iv (1905), p. 85.

P. farinosa, var. *luteo-farinosa*, forma *japonica*, Fr. et Sav., Enum. Pl. Japon., ii, p. 429.

P. farinosa, var. *armena*, *lusus japonica*, Makino, in Tôkyô Bot. Mag., xi (1897), pp. 110, 111; (1902), p. 143.

P. Matsumurae, Petitm., in Bull. Herb. Boiss., vii (1907), p. 528 (fide spec. origin.).

Several names have been attached to this plant by different botanists, most of whom regard this species as a variety of *P. farinosa*, probably on account of the mealy nature of the leaf, etc. Our species differs, however, from the true *P. farinosa*, firstly, in the very slightly gibbose calyx, secondly, in the less saccate bracts, and thirdly, in sulphurous but not silvery farina. The flower is of rose, or (very seldom) white colour with yellow eye, and has peculiar scent.

The plant is found on mountains of various parts of Japan, extending from Yezo (Island of Rishiri) as far south as Shikoku (Mt. Ishidzuchi).

P. modesta, Bisset et Moore, *β. Faurieae* (Franch.), Takeda. Plate XIX.

Syn. :—

P. Faurieae, Franch., in Bull. Soc. Philom. Paris, 7 sér. x (1886), p. 146.; Pax, in Engler's Bot. Jahrb., x (1888), p. 211; *id.* in Engl. Pflanzenreich, iv (1905), p. 111.

P. farinosa, var. *Faurieae*, Miyabe, in Mem. Bost. Soc. Nat. Hist. (1890), p. 249; Makino, in Tôkyô Bot. Mag. (1897), pp. 100, 111; (1902), p. 143.

Professor Miyabe has already pointed out¹ that this plant does belong to Pax's sect. *Farinosae*, despite which Pax in his latest work still places this plant in sect. *Macrocarpae*. This variety differs from the typical form of *P. modesta* merely in

¹ Miyabe, in Mem. Bost. Soc. Nat. Hist. iv, no. 7 (1890), p. 250.

the leaf, which is generally spatulate, and abruptly attenuated into a narrowly winged petiole, and is usually revolute and slightly or hardly denticulate on the margin. The length of capsule is, as in the typical form of the species, variable, so that no stress can be laid on this character at all.

This variety is widely distributed over Yezo and the Kurile Islands, and is usually found on cliffs near the sea. It has, however, been recorded from Hontô, as growing on Mt. Iwate, Province of Rikuchu.

P. MACROCARPA, Maxim. Plate XX.

P. macrocarpa, Maxim., in Mel. Biol., vi (1867), p. 269; Fr. et Sav., Enum. Pl. Japon., i, p. 300.

Syn. :—

P. farinosa, var. *mistassinica*, Makino, in Tôkyô Bot. Mag. (1897), p. 111, nec Pax.

P. Hayaschinei, Petitm., in Bull. Herb. Boiss., vii (1907), p. 528.

This is perhaps the smallest species of all the Japanese Primulas. It comes near to the preceding species, but is easily distinguished by its much smaller size and efarinose character. As was pointed out by Professor Miyabe,¹ this species also does not belong to Pax's *Macrocarpae*. At first glance it appears to be identical with *P. mistassinica*, Michx., of North America, differing however in the far less and very slightly saccate bracts and nearly orbiculate-spatulate leaf, which is thinner in texture, sharply denticulate, and abruptly tapers into the petiole. The flower has been described as white with yellow eye by both Maximowicz and Pax. This is not correct. The flower is rose-coloured with yellow eye, as in the foregoing species.

Pax regards *P. nipponica*, Yatabe, as identical with *P. macrocarpa*, Maxim., but this is a mistake. His description² of *P. macrocarpa* is a chimæra of *P. macrocarpa*, Maxim., and *P. nipponica*, Yatabe.

The present species is one of the rarest, and is found only on Mt. Hayachine, Province of Rikuchu.

P. JAPONICA, A. Gray. Plate XXI.

P. japonica, A. Gray, Bot. Japan (1859), p. 400; Miq. Prol. Fl. Japon., p. 283; Hooker, in Bot. Mag., tab. 5916; André, in Illustr. Hort., xviii, p. 134, tab. 69; Regel, Gartenfl., xxi (1873), p. 31, tab. 1950-1; Fr. et Sav., Enum. Pl. Japon., i, p. 299; Pax, in Engl. Pflanzenreich, iv (1905), p. 125.

This is probably the best known species of the Japanese Primulas in Europe, so that I need not describe it in detail.

¹ Miyabe, in Mem. Bost. Soc. Nat. Hist., iv, no. 7 (1890), p. 250.

² Pax, in Engl. Pflanzenreich, iv (1905), p. 114.

This species readily produces a hybrid with *P. pulverulenta*, a Chinese species. In Japan this plant is distributed over the central and northern parts of Hontô and Yezo. I have not seen any specimen of the true *P. japonica* outside Japan.

P. EXIMIA, Greene. Plate XXIIA.

P. eximia, Greene, in Pittonia, iii (1897), p. 251; Pax, in Engl. Pflanzenreich, iv (1905), p. 106; Yabe et Yendô, in Tôkyô Bot. Mag. (1903), p. 229.

It is highly interesting to find this Arctic species in Japan. It has been recorded from the Island of Shimushu, the northernmost of the Kuriles. The characteristics of this plant are the glabrous, lanceolate, and entire leaf, and the undivided corolla-lobes of purple colour.

P. CUNEIFOLIA, Ledeb. Plate XXII B.

There are three varieties of this species found in Japan, and they were at first described as distinct species. The species is easily distinguished from all other Japanese Primulas by its fleshy leaf and large crimson flower, the corolla-lobes of which are deeply divided into divaricate segments.

P. cuneifolia, Ledeb., *α. typica*, Makino, in Tôkyô Bot. Mag. (1902), p. 140, excl. syn. *P. saxifragaefolia*, Lehm.

Syn. :—

P. cuneifolia, Duby, in DC. Prodr., viii, p. 39.

P. cuneifolia, *α. Dubyi*, Pax, in Engl. Pflanzenreich, iv (1905), p. 112.

This is the typical form, and was first described by Ledebour nearly a century ago. The plant is, on the whole, smaller than the other forms, and the leaf has exclusively simple, large acute teeth on the margin, whereas in the other forms the dentation is often mixed with double teeth.

This form is found in Japan only, in Yezo and the Kuriles. Outside Japan it is distributed in Eastern Siberia.

P. cuneifolia, Ledeb., *β. hakusanensis*, Makino, in Tôkyô Bot. Mag. (1902), p. 141. Plate XXIII A.

Syn. :—

P. hakusanensis, Franch., in Bull. Soc. Phil. Paris, 7 sér. x (1886), p. 144; Makino, in Tôkyô Bot. Mag. (1897), p. 112; (1899), p. 83; Pax, in Engl. Pflanzenreich, iv (1905), p. 113.

P. cuneifolia, Fr. et Sav., Enum. Pl. Japon., ii, p. 429, nec Ledeb.

This variety is characterised by sharp, shallow denticulation on the margin of the leaf. All other essential points agree well with those of the typical form of the species, so that it seems to me to be more natural to regard this as a variety.

The plant is found in the Alpine pastures on high mountains of Central and Northern Japan.

P. cuneifolia, Ledeb., *γ. heterodonta*, Makino, in Tôkyô Bot. Mag. (1902). Plate XXIII B.

P. heterodonta, Franch., in Bull. Soc. Phil. Paris, sér. 7, x (1886), p. 145; Makino, in Tôkyô Bot. Mag. (1897), p. 112; (1899), p. 83; Pax, in Engl. Pflanzenreich, iv (1905), p. 112.

A luxuriant form of *P. cuneifolia*. The leaf is slightly thinner than that of the preceding variety, and has very obtuse, large teeth, which are often provided with denticulation.

This variety is found on high mountains of Northern Hontô.

P. NIPPONICA, Yatabe. Plate XXIV.

P. nipponica, Yatabe, in Tôkyô Bot. Mag., iv (1890), p. 3, tab. 13; *id.* Icon. Fl. Japon., i, 1, p. 35, tab. 13; Makino, in Tôkyô Bot. Mag. (1899), p. 82; (1902), p. 142.

Syn. :—

P. cuneifolia, Franch., in Bull. Soc. Phil. Paris, sér. 7, x (1886), p. 144, nec Ledeb.

Another Japanese species with fleshy leaf. This is, however, easily distinguished from the other species of the same group by its smaller leaf with few simple, obtuse teeth, and corolla not exceeding 10 mm., white with yellow eye.

This is not uncommon on certain high mountains in Northern Hontô, growing in the Alpine pasture in abundance. It has been recorded nowhere outside Japan.

EXCLUDED SPECIES.

In the foregoing pages I have discussed all the recorded Japanese Primulas with the exception of the following four species:—*P. nivalis*, Pall., *P. prolifera*, Wall., *P. sibirica*, Jacq., and *P. veronicoides*, Petitm.

Blanc and Decrock¹ record the occurrence of the first three in Japan. They do not, however, give any evidence or reference to publications, so that it is difficult to see what source their statements have been derived from. At the present moment I can only discard these species from the flora of Japan until sufficient evidence confirms their being indigenous.

¹ Blanc et Decr., Distribution des Primulacées, in Bull. Herb. Boiss. (1898), p. 681.

The fourth has been described by Petitmengin¹ from the Loochoo. This plant proves to be identical with *Stimpsonia chamaedrioides*, Wright.²

HYBRIDIZATION.

Hybridization is very common amongst Primulas. Even in the field, when two or more closely allied species grow together, hybridization often takes place, as in the Alps and elsewhere. In Japan, this has hardly been known, since different species grow in different localities, but not mixed together. As far as the breed is concerned all the species are pure. All the garden forms of *P. Sieboldii* have been produced only by natural crossing between different forms of the same species which is rather plastic in nature.

This species has been a favourite of plant growers over two centuries.

ANALYTICAL KEY TO SPECIES AND VARIETIES.

With the purpose of facilitating identification of the Japanese Primulas, I add a key to the species :—

Clavis Specierum Varietatumque Primularum Japonicarum.

- | | | | |
|---|---|----------------------|--------------------|
| 1. Folia plus minusve lobata, distincte petiolata | . | . | 2. |
| Folia basi in petiolum attenuata, nec lobata | . | . | 6. |
| | | | |
| 2. Folia oblonga vel ovato-oblonga, lobata,
lobis numerosis. Calyx infundibuli-
formis, laciniis acutis patentibus, post
anthesin accrescens. Rhizoma repens | . | <i>P. Sieboldii.</i> | |
| Folia ambitu rotundata, reniformia, vel late
ovata. Rhizoma erectum, breve | . | . | 3. |
| | | | |
| 3. Plantasaepe robusta, ultra 15 cm. alta. Calyx
ultra medium fissus, lobis acuminatis | . | . | 4. |
| Planta tenuis. Calyx ad medium fissus | . | . | 5. |
| | | | |
| 4. Planta plerumque altissima, glabrescens
vel villosula. Folia reniformi-orbicu-
lata, profunde cordata, palmate 5-7-9-
lobata, lobis late triangularibus, acute
denticulatis. Calyx glaber vel leviter
hirtellus | . | . | <i>P. jesoana.</i> |

¹ Petitmengin, Sur une Primevère monocarpique du Japon., in Bull. Herb. Boiss. sér. 2, viii (1908), p. 108.

² Apud A. Gray, Bot. Japan (1859), p. 401, in Adnot.

- Planta tota pilis pluricellulatis villosa.
 Folia reniformi-orbiculata, subtus dense
 villosissima. Calyx villosulus *P. kisoana*.
5. Folia oblongo-orbiculata vel late ovata,
 subtus ad nervos pubescentia, basi
 leviter cordata. Calycis lobi angusti,
 subulati, acuti *P. tosaensis*.
 Folia rotundata, profunde cordata, umbelli-
 formia, molliter et dense pubescentia.
 Calycis lobi ovati, abrupte mucronu-
 lati *P. Reinii*.
6. Folia membranacea, plus minusve venosa 7.
 Folia carnosa, glaberrima. Planta tenuis 11.
7. Folia subtus luteo-farinosa 8.
 Folia efarinosa 9.
8. Folia obovata vel obovato-spathulata, non
 revoluta, margine denticulata *P. modesta, a. genuina*.
 Folia spathulata, rotundato-spathulata,
 basi abrupte in petiolum anguste
 alatum attenuata, revoluta, margine
 obsolete denticulata *P. modesta, β. Faurieae*.
9. Planta minima. Folia spathulata, infra
 5 cm. longit. *P. macrocarpa*.
 Planta elata 10.
10. Folia obovato-oblonga, argute et irregulariter
 dentata. Calyx aperte campanu-
 latus, lobis late triangularibus acumi-
 natis *P. japonica*.
 Folia oblanceolata, integra. Calyx anguste
 campanulatus. Corollae lobi integri *P. eximia*.
11. Folia paucies et obtuse dentata. Flores
 infra 10 mm. diam., albi *P. nipponica*.
 Folia saepe multoties et acute dentata vel
 denticulata. Flores ultra 10 mm.
 diam., purpurei; corollae lobi bipartiti,
 segmentis divergentibus 12.
12. Folia cuneata, acute et simplice dentata *P. cuneifolia, a. typica*.
 Folia duplici-dentata vel denticulata 13.
13. Folia obovata acute denticulata . *P. cuneifolia, β. hakusanensis*.
 Folia late obovata, obtuse crenato-dentata,
 dentibus saepe denticulatis *P. cuneifolia, γ. heterodonta*.

LIST OF PLATES.

Illustrating H. Takeda's Paper on the Japanese Primulas.

The plates are taken from photographs by Mr. R. M. Adam of dried specimens in the Herbarium of the Royal Botanic Garden, Edinburgh, with the exception of Plates XX and XXV supplied by Mr. Takeda.

- PLATE XIV. *Primula Sieboldii*, E. Morren.
 XV. *Primula jesoana*, Miq.
 XVI. *Primula kisoana*, Miq.
 XVIIa. *Primula tosaensis*, Yatabe.
 XVIIb. *Primula Reinii*, Fr. et Sav.
 XVIII. *Primula modesta*, Bisset et Moore.
 XIX. *Primula modesta*, Bisset et Moore, var. *Faurieae*, Takeda.
 XX. *Primula macrocarpa*, Maxim.
 XXI. *Primula japonica*, A. Gray.
 XXIIa. *Primula eximia*, Greene.
 XXIIb. *Primula cuneifolia*, Ledeb.
 XXIIIa. *Primula cuneifolia*, Ledeb., var. *hakusanensis*, Makino.
 XXIIIb. *Primula cuneifolia*, Ledeb., var. *heterodonta*, Franch.
 XXIV. *Primula nipponica*, Yatabe.
 XXV. *Primula yuparensis*, Takeda. Sp. nov.

ADDITAMENTUM.

While the foregoing paper was in the press the writer had an opportunity of receiving specimens of a *Primula* belonging to the *Farinosa* series, collected on the summit of Mt. Yuparo, Yezo, by Mr. H. Yanagisawa, a student of the Agricultural College, Tohoku Imperial University, at Satporo. As this plant has proved to be a new species, a description of it is given below.

The specimens of *P. eximia*, Greene, from the Island of Shimushu, which are preserved in the Herbarium of the Science College, Imperial University, Tôkyô, were closely examined, when the writer visited that country this summer. They agree very well with the description given by Pax in his monograph. This species is said to be exceedingly rare in Japan, only two specimens having been collected.

A new species of *Primula* belonging to the *Candelabra* section has lately been described from Formosa, under the name of *P. Miyabeana*, Ito et Kawakami.¹ Like other species of this genus only known from outside the Old Japan, this species is excluded from our consideration.

Primula yuparensis, Takeda. Sp. nov. Plate XXV.

Gracilis. Folia in sicco uti videtur plus minus carnosula, oblanceolata, acuta, basin versus sensim attenuata, acutata, margine plana, minute denticulata, glabra, venosa, subtus parce albo-farinosa, mox subefarinosa, $1\frac{1}{2}$ –3 cm. longa, 5–10 mm. lata. Scapus folia valde superans, $1\frac{1}{2}$ –6 cm. altus, superne parce albo-farinosus, umbellam pauci-(2- vel 3-) florum gerens. Bractee subulatae basi rotundato-dilatatae, leviter saccatae, usque ad 7 mm. longae. Pedicelli graciles, in fructu plus minus elongati, stricti, plus minus farinosi. Calyx 7 mm. longus, urceolatus, viridis, minute nigro-punctatus, parce farinosus, ad medium fissus, lobis lanceolatis, acutis. Corolla purpurea, tubo calycem subduplo superanti, limbo 15 mm. diametienti, lobis obcordatis, emarginatis. Capsula calycem paulo superans.

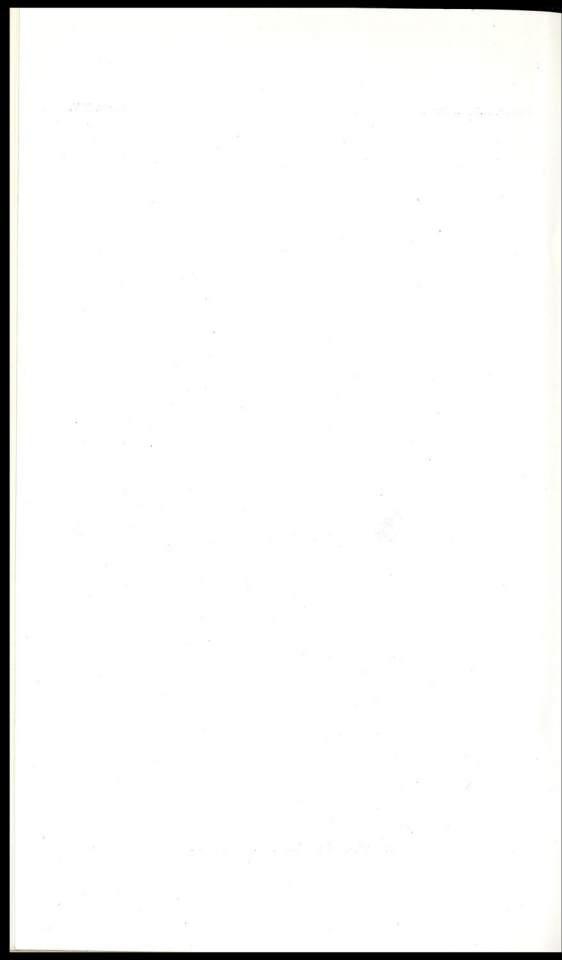
Affinis *P. farinosae*, Linn., sed differt ab ea praesertim inflorescentia pauciflora, floribus majoribus, corollae tubo calycem valde superanti. Inter species japonenses prope *P. modestam*, Biss. et Moore, collocanda, a qua farina alba nec lutea, foliis vix petiolatis, inflorescentia pauciflora, floribus majoribus facile distinguitur.

Hab. in montibus Yuparo, ins. Yezo (H. Yanagisawa, 9 Aug. 1913).

¹ Miyabe Festschrift, (1911) I, pl. xxix.



PRIMULA SIEBOLDII, E. MORREN.





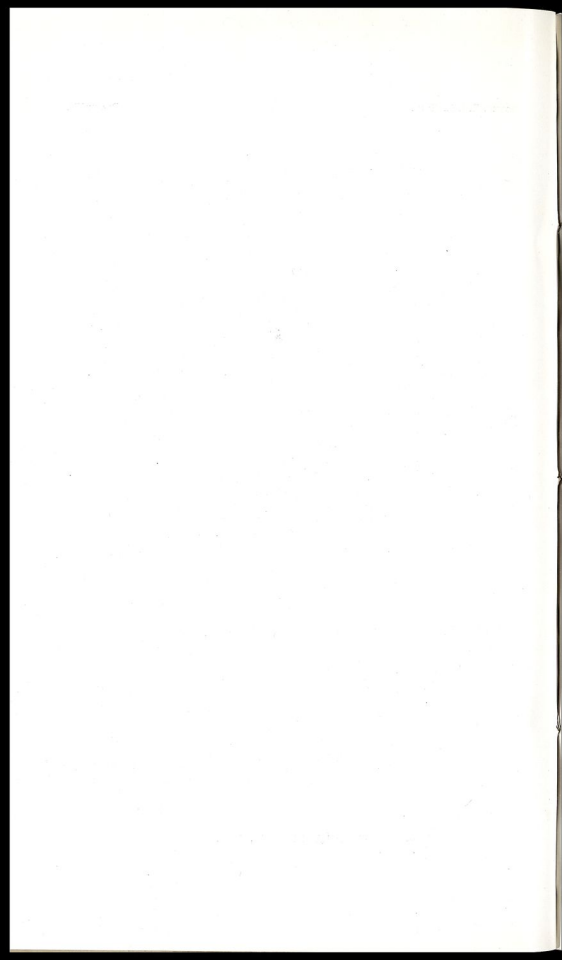
Ex herb. H. Takada.

Thaxter, Augustus.

Primula jesoana Miq.

Not in umbelliferis pedis montis Shiroanai
H. j. p. 1875

PRIMULA JESOANA, MIQ.





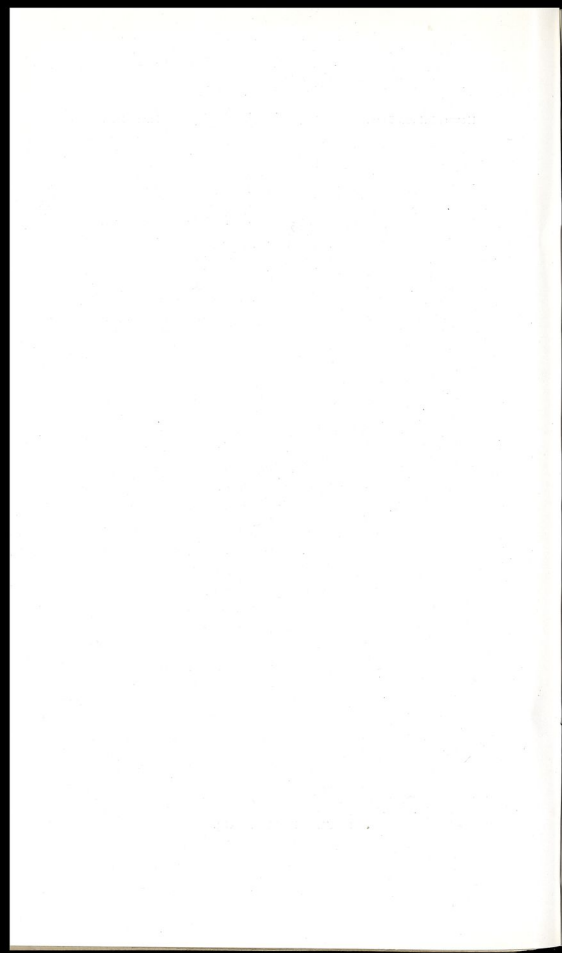
P. kisoana Miq.

Determined by H. T. Oct. 1912

Primula kisoana
(Hakko-do)

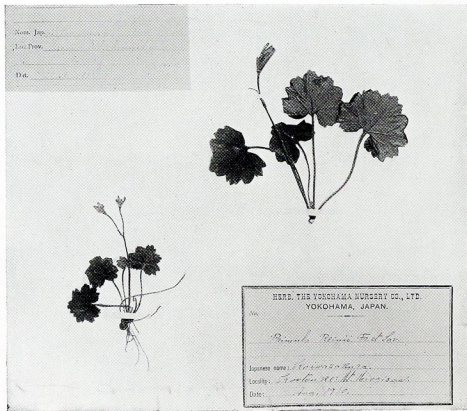
May 1910

PRIMULA KISOANA, MIQ.

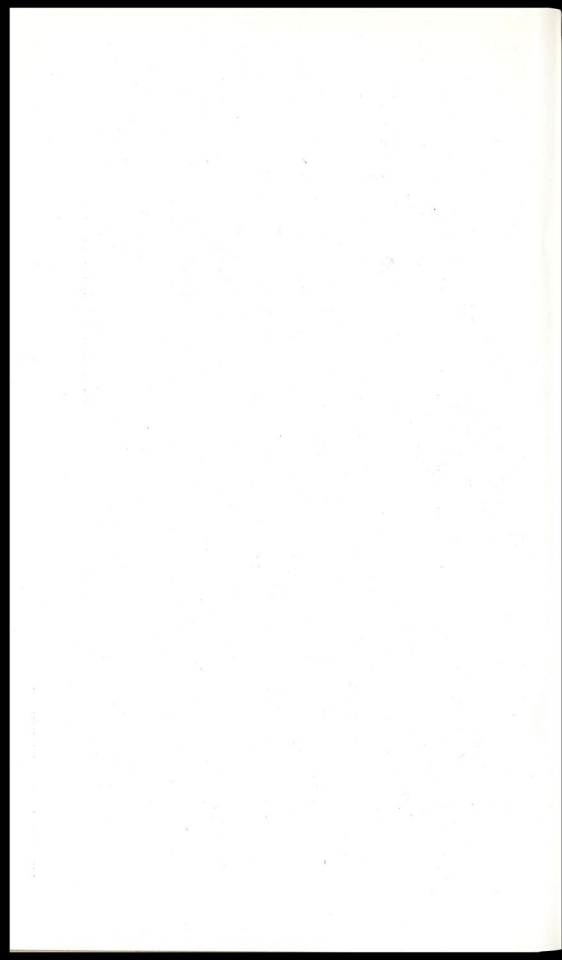


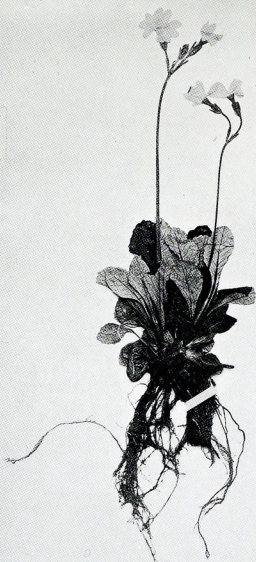


A.—PRIMULA TOSAENSIS, YATABE.



B.—PRIMULA REINII, FR. ET SAV.



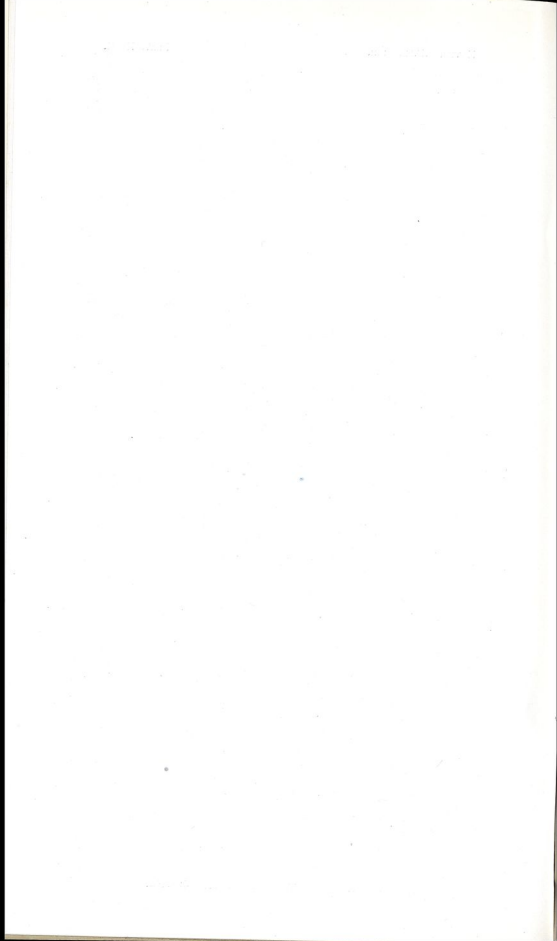


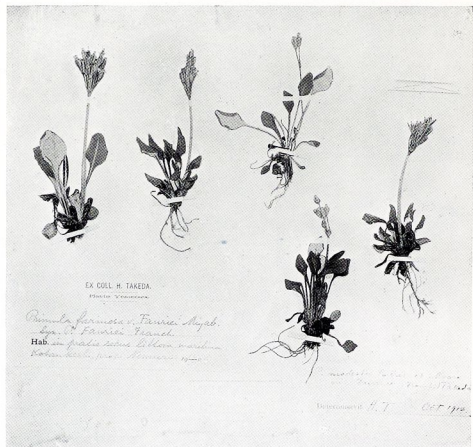
P. modesta Bisset et Moore

Determinavit H. T. Oct. 1912

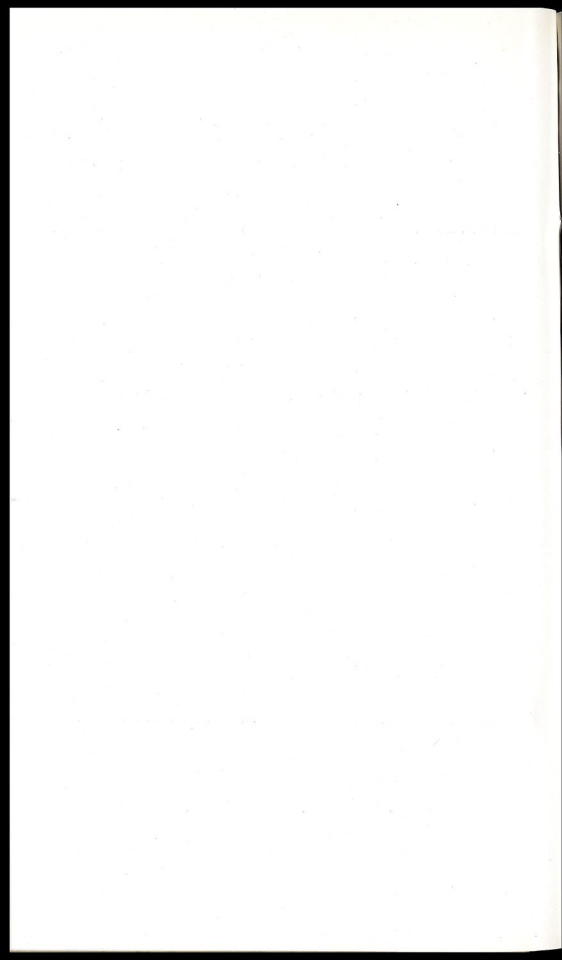
Primula Farinosa
(*yukiwariso*)

may 1912



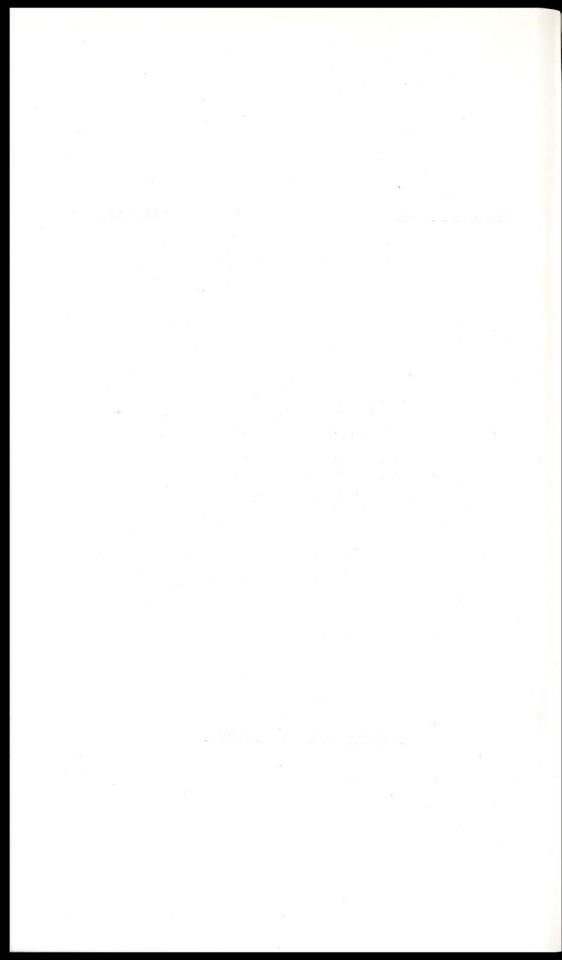


PRIMULA MODESTA, BISSET ET MOORE, VAR. FAURIEAE, TAKEDA.



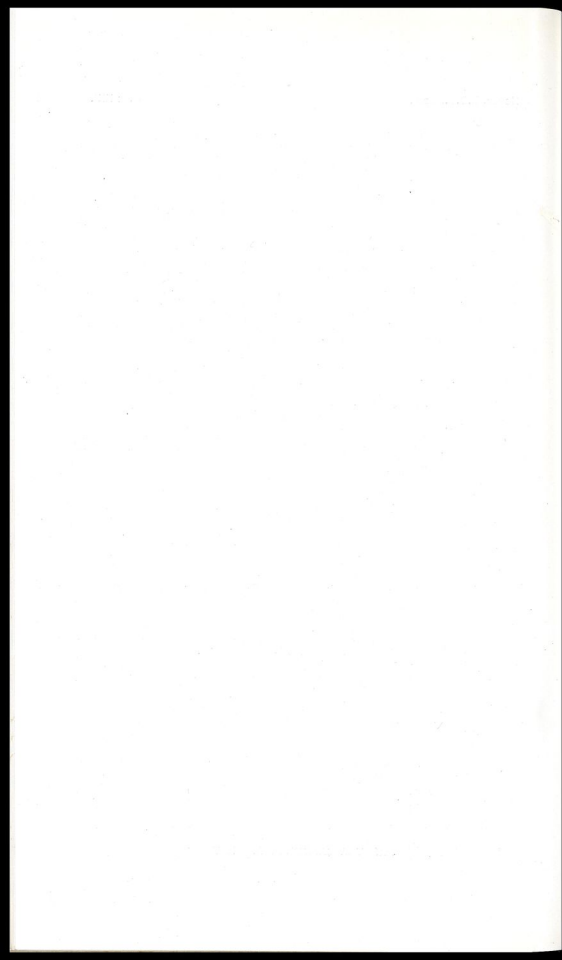


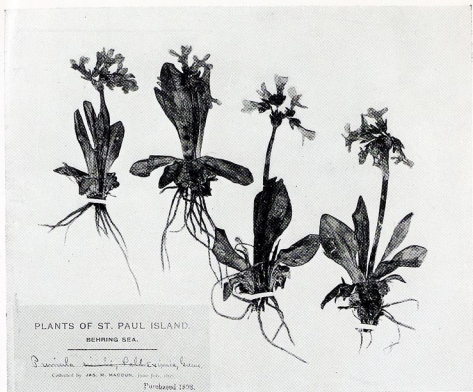
PRIMULA MACROCARPA, MAXIM.





PRIMULA JAPONICA, A. GRAY.



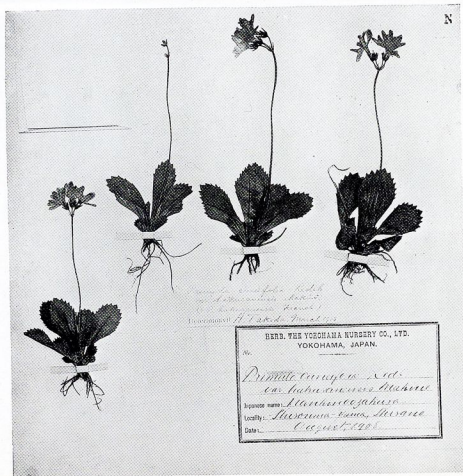


A.—PRIMULAEEXIMIA, GREENE.



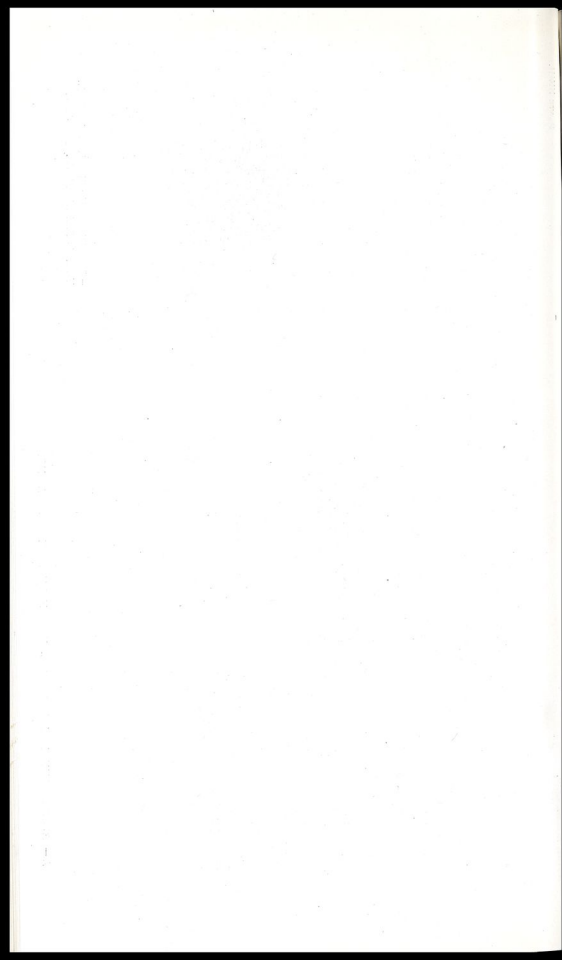
B.—PRIMULA CUNEIFOLIA, LEDEB.

THE JOURNAL OF THE



A.—PRIMULA CUNEIFOLIA, LEDEB., VAR. HAKUSANENSIS, MAKINO.

B.—PRIMULA CUNEIFOLIA, LEDEB.,
VAR. HETERODONTA. FRANCH.





PRIMULA NIPPONICA, YATABE.



PRIMULA YUPARENSIS, TAKEDA.

