

A Dendrological Study on the Japanese *Aceraceae*, with Special Reference to the Geographical Distribution

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CONTENTS

INTRODUCTION	1
TERMS AND ABBREVIATIONS	3
INDEX OF SPECIES, VARIETIES AND FORMS.....	3
PLANT-GEOGRAPHICAL SURVEY, WITH SOME TAXONOMICAL NOTES.....	5
LITERATURES	45
和文摘要.....	47
TABLES	50
FIGURES (ILLUSTRATIONS).....	54
DISTRIBUTION MAPS	70

INTRODUCTION

In this paper the author treats of questions concerning the classification and distribution, especially putting emphasis on the latter, of the plants of the genus *Acer* native in the Japanese floristic region, in which the area from the Southern Kuriles and Southern Saghalien, through Hokkaido, Honshu, Shikoku and Kyushu, to Yakushima Isl. of Southern Kyushu is included.

The family *Aceraceae* consists, in a view generally accepted, of two genera, *Acer* and *Dipteronia*, to the latter of which only one (or two) species in Central China belongs. Some authors support the separation of *A. negundo* L. from *Acer* as a distinct genus. On the other hand, Hall (1961) questions the necessity of maintaining *Dipteronia* as a genus independent of *Acer*, on the ground of floral anatomy.

In Japan, the family is exclusively composed of the genus *Acer*. Many studies of the Japanese *Aceraceae* made so far were codified by Koidzumi (1911 a, b) as an excellent monograph, and almost all species recognized today were described in it. In the taxa minor than species, however, some modification had to be still made to his work by later authors, which is chiefly caused, besides some additions of new findings, by the degradation or raise of the rank of varieties and forms consequent on the obtaining of further informations and on the change of the conception itself of variety and form. Such modification is also made here. In the treatment of the rank of variety and form, the writer takes them principally as follows: a variety has some fairly clear characters different from the other varieties of the same species and shows more or less a geographical segregation; a form is different in one or occasionally more characters from the other forms in the same species or in the same varieties but does not

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show any clear geographical segregation. When the classification is carried out on the basis of this view, it is found in the present subject that a variety has generally not one but two, three or more correlated specific characters, while a form is mostly different in the fewer characters from the others and the characters vary continuously into those of the others. Thus, it is intended here to remove as much as possible the confusion of the estimation of variety and form. A rather macroscopic view is taken for the adoption of variety and form. Consequently, such variations as variegated leaves, the sole difference of the size of leaves or others are scarcely taken up, being regarded as accidental or individual ones which are not worth being ranked even in form.

A table-method is introduced for showing the interspecific differences of characters. This method was also proposed by Kanai (1962: 23) for taking off the inconvenience of the usual method by dichotomous key. The advantages of this method are that 1) all the characters cited can be easily compared with one another, 2) the arrangement of an intended order among species and among characters can be made, 3) phylogenetic characters which are not always important as key can be shown, 4) incorrection is easily found, and so on. On the other hand, its short-comings are that 1) the table becomes wider, 2) a whole column must be used for showing a character specific only to limited species. For reducing these defects, some unimportant minute characters which have been already described by earlier authors are omitted from the table. For the same reason, varieties and forms are put out of the table and explained in the description of each species.

Some space is devoted, though the description is very imperfect, to the size of trees, the appearance of bark and young twigs, flowering season and habitat condition, which are often neglected and difficult to be known enough by herbarium specimens. The size of trees was also described by Rehder (1940), but it was generally underestimated at least on Japanese maples. Here is usually mentioned the maximum size of trees observed mostly by the author. To know the flowering season is convenient for collectors of flowers which have important taxonomic characters.

For showing the distribution of all species and varieties, their localities are carefully plotted on the maps. The data are almost wholly based on herbarium specimens preserved in Japanese herbaria, but complemented partly by the data of reliable literatures. The important localities which include the southern and the northern limits are explained with collection data in the description. Approximate elevational ranges in the Kanto district are also shown.

Some illustrations are prepared for the varieties of *A. Mono*, for the species and the varieties of Sect. *Palmata*, and for *A. Tschonoskii* and *A. micranthum*. They are sketched faithfully as much as possible from herbarium specimens.

At the end of the paper, there are present the distribution maps, the above mentioned illustrations, and the tables of the characters of the Japanese species of the gen. *Acer*, of the Japanese varieties and forms of *A. Mono*, and of the varieties and forms of *A. amoenum*.

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TERMS AND ABBREVIATIONS

Andro-monoecious: each tree (each inflorescence in the case of *Acer*) bears both perfect and functionally staminate flowers; but, in the case of *Acer*, if the stamens of perfect flowers are completely functional is questionable, because the filaments of stamens are always shorter in perfect flowers than in staminate flowers.

Andro-dioecious: each tree (accordingly each inflorescence) bears either perfect or functionally staminate flowers.

Pref(s): Prefecture(s) (県) C.: County (郡) T.: Town (町) V.: Village (村)
spec(s): specimen(s) lit.: literature

INDEX OF SPECIES, VARIETIES AND FORMS

1) *Acer* Mono Maximowicz

var. *glabrum* (Lév. et Vnt.) Hara

f. *glabrum*

Ezo-itaya

f. *magnificum* (Hara) Hara

Ô-ezoitaya

var. *marmoratum* (Nichols.) Hara

f. *marmoratum*

Enkô-kaede

f. *piliferum* Ogata

Ke-enkôkaede

f. *connivens* (Nichols.) Rehder

Urage-enkôkaede

f. *puberulum* Ogata

Ke-urageenkôkaede

var. *taishakuense* Ogata

Taishaku-itaya

var. *glaucum* (Koidz.) Sugimoto

Urajiro-itaya

var. *Mayrii* (Schw.) Sugimoto

Aka-itaya

- | | |
|---|-----------------------|
| var. <i>trichobasis</i> Nakai | Itomaki-itaya |
| var. <i>ambiguum</i> (Pax) Rehder | |
| f. <i>ambiguum</i> | Oni-itaya |
| f. <i>pulvigerum</i> Ogata | Miyama-oniitaya |
| 2) <i>Acer Miyabei</i> Maximowicz | |
| var. <i>Miyabei</i> | Kurobi-itaya |
| var. <i>Shibatai</i> (Nakai) Hara | Shibata-kaede |
| 3) <i>Acer Sieboldianum</i> Miquel | |
| f. <i>Sieboldianum</i> | Itaya-meigetsu |
| f. <i>microphyllum</i> (Maxim.) Hara | Ko-hauchiwa-kaede |
| 4) <i>Acer japonicum</i> Thunberg | |
| f. <i>japonicum</i> | Hauchiwa-kaede |
| f. <i>microphyllum</i> (Koidz.) Rehder | Ezo-meigetsu-kaede |
| 5) <i>Acer tenuifolium</i> (Koidz.) Koidzumi | Hina-uchiwa-kaede |
| 6) <i>Acer Shirasawanum</i> Koidzumi | Ô-itaya-meigetsu |
| 7) <i>Acer palmatum</i> Thunberg | Iroha-momiji |
| 8) <i>Acer amoenum</i> Carrière | |
| var. <i>amoenum</i> | |
| f. <i>amoenum</i> | Ô-momiji |
| f. <i>latilobatum</i> (Koidz.) Ogata | Hiroha-momiji |
| f. <i>palmatipartitum</i> (Koidz.) Ogata | Fukagire-ômomiji |
| f. <i>horonaiense</i> (Nakai) Ogata | Horonai-kaede |
| var. <i>nambuanum</i> (Koidz.) Ogata | Nanbu-koha-momiji |
| var. <i>Matsumurae</i> (Koidz.) Ogata | |
| f. <i>Matsumurae</i> | Yama-momiji |
| f. <i>latialatum</i> (Nakai) Ogata | Hondôji-kaede |
| 9) <i>Acer Ginnala</i> Maximowicz | |
| var. <i>aidzuense</i> (Franch.) Ogata | Karakogi-kaede |
| 10) <i>Acer ukurunduense</i> Trautvetter et Meyer | |
| f. <i>ukurunduense</i> | Ogarabana |
| f. <i>pilosum</i> Nakai ex Hara | Usuge-ogarabana |
| 11) <i>Acer nipponicum</i> Hara | Tetsu-kaede |
| 12) <i>Acer distylum</i> Siebold et Zuccarini | Maruba-kaede |
| 13) <i>Acer rufinerve</i> Siebold et Zuccarini | Urihada-kaede |
| 14) <i>Acer capillipes</i> Maximowicz | |
| var. <i>capillipes</i> | Hosoe-kaede |
| var. <i>morifolium</i> (Koidz.) Hatusima | Yakushima-onaga-kaede |
| 15) <i>Acer crataegifolium</i> Siebold et Zuccarini | Me-urinoki |
| 16) <i>Acer Tschonoskii</i> Maximowicz | |
| var. <i>Tschonoskii</i> | Mine-kaede |
| var. <i>australe</i> Momotani | Nangoku-minekaede |

17) <i>Acer micranthum</i> Siebold et Zuccarini	Ko-minekaede
18) <i>Acer nikoense</i> Maximowicz	Megusurinoki
19) <i>Acer carpinifolium</i> Siebold et Zuccarini	Chidorinoki
20) <i>Acer argutum</i> Maximowicz	Asanoha-kaede
21) <i>Acer diabolicum</i> Blume	Oni-momiji
22) <i>Acer pycnanthum</i> K. Koch	Hananoki
23) <i>Acer cissifolium</i> (Sieb. et Zucc.) K. Koch	Mitsude-kaede

PLANT-GEOGRAPHICAL SURVEY, WITH SOME TAXONOMICAL NOTES

- 1) ***Acer Mono*** Maximowicz in Bull. Phys.-Math. Acad. St.-Pét. 15: 126 (1856).
A. laetum var. *parviflorum* Regel in Bull. Phys.-Math. Acad. St.-Pét. 15: 219 (1857).
A. pictum var. *mono* Maxim. ex Franchet, Pl. David. 1: 77 (1883).
A. pictum var. *parviflorum* (Regel) Schneider, Ill. Handb. Laubh. 2: 225 (1907).
A. pictum auct. non Thunberg, Siebold et Zuccarini in Abh. Akad. Muench. 4-2: 156 (1845)—Maxim. in Bull. Acad. St.-Pét. 26: 443 (1880)—Pax in Engl., Bot. Jahrb. 7: 235 (1886); in Engl., Pfl.-reich IV-163, Ht. 8: 47 (1902)—Rehder in Sargent, Tr. Shr. 1: 117 (1905)—Léveillé in Bull. Soc. Bot. France 53: 592 (1906).

That the original specimen of *Acer pictum* Thunb. is not an *Acer* but *Kalopanax pictus* (Thunb.) Nakai was disclosed and explained at full length by Nakai (1931: 124-126; 1935 b: 440-442).

Many closely related species included in Sect. *Platanoidea* Pax (Ser. *Platanoidea* Pojarkova in the sense of Momotani, 1962b: 184-185) are found in Europe, Central Asia, China, Corea and Manchuria.

Acer Mono Maxim. is distributed in South-eastern Siberia (the region along the Amur), Saghalien, Manchuria, Corea and Japan. This is a very variable species. Contrary to Rehder's opinion (1938: 80), however, the variations in the size, shape, lobing and hairs of leaves, in the size, number and direction of samaras, in the hairs and color of 1-year twigs and in the appearance of trees more or less correlate one another, and some distinct varieties and forms based on these characters are discerned in Japan. Moreover, these varieties show fairly clear geographical segregation as against Rehder (l. c.) also in this regard. Therefore, they may be considered respectively even as independent species, in one view, as often made so in var. *Mayrii*, to which other varieties should insist upon equal rights. The character of the hairs on the under surface of leaves and in 1-year twigs is most important as a key to distinguish the Japanese varieties, and the characters of them are shown in Tab. 2 and Fig. 1-7.

The type locality of this species lies in the region along the Amur. Though which variety of *A. Mono* is meant by the type is not clearly known in Japan, the writer supposes that it may possibly be var. *glabrum* which is widely spread in Corea, Manchuria, Amur, Saghalien and Northern Japan. At least in Saghalien, *A. Mono* is represented exclusively by this variety, but it is unknown whether other varieties are found in the Amur region. The Russian Botanist, Pojarkova (1933: 279), draws a figure

as *A. Mono* Maxim., which agrees well with the feature of var. *glabrum*; and a figure drawn under the name *A. pictum* Thunb. which is there considered as endemic and only one species of the group in Japan seems to indicate var. *Mayrii*. At any rate, some varieties from Corea, Manchuria and Amur, or from China, must be further examined.

var. **glabrum** (Lév. et Vnt.) Hara, Enum. Sperm. Jap. 3: 105 (1954).

f. **glabrum**

Ezo-itaya.

A. Hayatae var. *glabra* Léveillé et Vaniot in Bull. Soc. Bot. France 53: 590 (1906).

A. mono var. *velutinum* Nakai, Rep. Veg. Mt. Apoi 22 & 59 (1930), nom. subnud.; in Bot. Mag. Tokyo 45: 126 (1931).

A. mono var. *acutissimum* Nakai, l. c. 22 & 59 (1930), nom. subnud.; l. c. 127 (1931).

A. mono var. *eupictum* Nakai, l. c. 59 (1930), nom. nud.

A. pictum var. *velutinum* Nakai ex Koidzumi, Fl. Symb. Or.-Asia. 54 (1930).

A. mono var. *glabrum* f. *acutissimum* (Nakai) Hara, Enum. Sperm. Jap. 3: 105 (1954).

A. pictum auct. non Thunb., Koidzumi, Rev. Acer. Jap. 58 (1911), pro parte—Matsushima, Ind. Pl. Jap. 2-2: 330 (1912), pro parte—Miyabe et Kudo, Icon. Ess. For. Tr. Hokkaido 3: 21, t. 71 (1930).

A big tree up to 25 m. high, 1 m. in diameter. The bark of trunks is grey to dark grey and somewhat fissured, often becoming blackish for something adhesive like fungi. 1-year twigs are characteristically pubescent with the base of the petioles of leaves, and yellowish brown. In young vigorous and adventitious shoots, however, twigs and petioles are sometimes completely glabrous, and the circumstance is just the same in the leaves of var. *marmoratum* f. *connivens* and var. *ambiguum*, too. Leaves are somewhat polymorphic as seen in Fig. 1, occasionally having dentate-lobes in sterile branches (Fig. 1, c), and often pilose beneath along main veins as in var. *marmoratum* f. *connivens*. The trees with pilose leaves seem to scarcely occur in the regions along the Japan Sea side, but in other regions they appear at nearly the same ratio with the trees of glabrous leaves. In some trees, the hairs become so much thin that they are hardly perceptible, and the trees with such leaves are almost indistinguishable from those with glabrous leaves. The variation is here considered as unworthy of a taxonomical form.

It is a characteristic of this variety that the sepals of flowers are hairy outside while they are quite glabrous in the other Japanese varieties. Rehder (1938: 82) reports that sepals are ciliate in var. *tricuspis* and another variety both from Central China, the latter of which he considers as typical *A. mono*, and he adds that the sepals seem to be quite glabrous in the Japanese specimen. Samaras vary from nearly horizontal to upright or connivent in the direction and are often falcate somewhat outward in the middle part of the wings.

The type specimens of var. *velutinum* Nakai and var. *acutissimum* Nakai have respectively the leaves similar with those as seen in Fig. 1, d and Fig. 1, a, and both are considered to be only individual forms.

Flowers open usually in mid-May to early-June, early ones in early-May and late ones in mid-June. Fruits become ripe in autumn assuming a brown color in the wings.

In Saghalien, this maple reaches as far north as near lat. 51°N., but does not almost extend beyond the Schmid's Line (spec.: Pilwo—Kudo & Tatewaki, 1922, SAP & TUS; lit.: Arkai & Dui—Schmidt, 1868, p. 119). In the Kuriles, it ends inside the Miyabe's Line, that is, at the eastern part of Etorofu Isl. (specs.: Shibetoro—K. Miura, 1906, SAP; G. Tanaka & K. Miyabe, 1910, SAP; specs.: Shana—T. Kawakami, 1898, SAP; K. Miura, 1906, SAP). In Hokkaido, it is found in the whole districts. In Honshu, it attains the Noto Peninsula along the coast of the Japan Sea, with very rare occurrence in inland regions, and farther westward the Isls. of Oki (specs.: the coast of Ushiki, Fuse V. & Befu, Kuroki V., Oki Isls.—I. Maruyama, 1949, TNS). On the Pacific side, however, it enters deeply inland in the Kitakami mountains of Iwate Pref. and goes southward to the northern coast of Miyagi Pref. (spec.: Ara-shima Isl., Motoyoshi C.—G. Koidzumi, 1928, KYO; specs.: Tsubaki-jima Isl., Motoyoshi C.—S. Sugaya & al., 1955, TUS & M. Kikuchi, 1956, IUM). In the region from the southern part of Iwate Pref. to the northern part of Miyagi Pref., this variety comes to have connection with the northernmost elements of var. *marmoratum*, and both become closely similar in the shape of leaves. The writer observed, in Mt. Goyô of Iwate Pref., a number of the trees growing side by side, among which some are pubescent in 1-year twigs showing the characteristic of var. *glabrum*, while others glabrous as seen in the commonest form of var. *marmoratum*.

As noticed by Mizushima (1956: 103) and Momiyama (1957: 10), this maple occurs often in the coastal lowlands. The writer caught the sight of a number of the fairly big trees growing on the hills along the shoreline through the western coast of the Hidaka district in Hokkaido and they were mixed mainly with deciduous oaks, or sometimes in nearly pure stands. It is also noticeable that this maple is found in many small islands, namely, Kaiba Isl. (Saghalien), Rebun and Rishiri Isls. (Hokkaido), Okushiri Isl. (Hokkaido), Tobishima Isl. (Yamagata Pref.), Sado Isl. (Niigata Pref.), Oki Isls. (Shimane Pref.), Sangon-jima Isl. (Iwate Pref.), Ara-shima and Tsubaki-jima Isls. (Miyagi Pref.). In the mountains, this maple occupies generally places of rather bad site condition, sometimes occurring even in very moist flat at the foot of slopes, on the margin of high moors or on dry ridges.

f. **magnificum** (Hara) Hara, Enum. Sperm. Jap. 3: 106 (1954). Ô-ezoitaya.

A. *mono* var. *magnificum* Hara in Bot. Mag. Tokyo 50: 247 in adnota (1936).

A. *mono* var. *latialatum* Hara. l. c. 248, f. 16 (1936).

A. *mono* var. *glabrum* f. *latialatum* (Hara) Hara, l. c. 106 (1954).

This form is larger in the size of leaves and fruits than the typical form. It is found scatteredly in the area of the present variety. The f. *latialatum* Hara was named to a form which has the conspicuously wide wings of fruits as shown in Fig. 1, e. But it is best considered as an individual variation of f. *magnificum*, because such remarkable samaras seem generally to be scarcely found and considered only as accidental.

var. **marmoratum** (Nichols.) Hara, Enum. Sperm. Jap. 3: 106 (1954).

f. **mamoratum**

Enkô-kaede, (Itaya-kaede).

- A. pictum* var. *marmoratum* Nicholson in Gard. Chron. ser. 2, 16: 375 (1881).
A. pictum var. *eupictum* Pax in Engl., Bot. Jahrb. 7: 236 (1886).
A. pictum var. *dissectum* Wesmael in Bull. Soc. Bot. Belg. 29: 56 (1890).
A. Lobelii subsp. *pictum* Wesmael, l. c. 56 (1890).
A. pictum var. *angustilobum* Makino in Bot. Mag. Tokyo 6: 51 (1892), nom. nud.;
 15: 113 (1901).
A. pictum α. *typicum* subvar. *eupictum* Pax in Engl., Pfl.-reich IV-163, Ht. 8: 47
 (1902).
A. mono var. *dissectum* (Wesmael) Honda in Bot. Mag. Tokyo 46: 371 (1932).
A. subpedatum H. Koidzumi in Shiseki-meishô-tennenkinenbutsu-chôshahôkoku, Na-
 gano-ken 14: 346 (1933).
A. mono var. *dissectum* subvar. *Tashiroi* Hisauchi in Journ. Jap. Bot. 10: 104, f. 1
 b (1934).
A. mono f. *marmoratum* (Nichols.) Rehder in Journ. Arn. Arb. 19: 81 (1938).
A. mono f. *dissectum* (Wesmael) Rehder, Bibl. Cult. Tr. Shr. 414 (1949).
A. mono var. *eupictum* f. *heterophyllum* Nakai in Journ. Jap. Bot. 25: 133 (1950).
A. mono var. *marmoratum* f. *Tashiroi* (Hisauchi) Hara, Enum. Sperm. Jap. 3: 107
 (1954).

A form with variegated leaves, on which the original description of *A. pictum* var. *marmoratum* Nicholson was based, is considered to be not worthy of adopting in the taxonomic rank. There are often found individuals whose leaves are deeply, or deeply and dentately lobed, occasionally almost to the base of blades (Fig. 3, a, b, d), to each variation of which some different names had been given. It was demonstratedly proposed, however, by Mizushima (1956 b: 285-286) that they only mean juvenile forms of the present maple, in other words, that *A. Mono* var. *marmoratum* f. *dissectum* Rehder, including f. *Tashiroi* Hara, is a juvenile form of f. *marmoratum*. That neither flowers nor fruits are seen in the former was also indicated by him. The writer came to the same conclusion with him, finding that the distribution areas of both forms agree well as shown in Map 2, and that there is a continuity in the shape of leaves between them (Fig. 2, 3). Such difference of the shape of the leaves between adult and juvenile trees is found likewise well in the leaves of f. *connivens* Rehder, but in this case any distinction has not been made between adult and juvenile forms, though another name (f. *subtrifidum*) has been given to a juvenile form which has dentate-lobed leaves. To the writer's thinking, other varieties of *A. Mono*, especially var. *trichobasis* Nakai may have been often confused with var. *marmoratum*, and as the result the adult and the juvenile form of var. *marmoratum* may have been considered taxonomically different.

Usually a medium-sized tree, but occasionally a big one up to 25 m. high, 90 cm. in diameter. The bark of trunks is grey or greyish brown, and 1-year twigs are greenish or dark brown and glabrous. Leaves are glabrous except the basal axils of main veins on the lower surface. Fruits are small and the wings are upright or spread at an acute angle.

Flowers are out in late-April to mid-May. Fruits become ripe in autumn.

This maple is endemic to Japan and distributed in Honshu, Shikoku and Kyushu. The northern limit lies in the southern part of Iwate Pref. (spec.: Todogasaki, Omoi T., Miyako City—M. Kikuchi, 1961, IUM; spec.: Hanaizumi, Hanaizumi T., Nishi-iwai C.—M. Kikuchi, 1961, IUM). But in this region, as previously mentioned, the difference from var. *glabrum* is extremely delicate, and the deeply-lobed leaves characteristic in the juvenile form of this variety seem to scarcely appear. This maple occurs mainly in the region along the Pacific side. The southern limit is Mt. Takakuma in Kagoshima Pref., Kyushu (spec.: K. Ide, 1925, KAG). It is also found in Ôshima Isl. of the Izu Isls.

This maple occurs over a wide range of soil condition. But it is more common in somewhat dry places as the middle to the upper part of gradual slopes, although showing its best development on moderately well drained, moist sites at stream-sides. In the Kanto district, it occurs from 100 m. to 1500 m. above the sea level.

f. **piliferum** Ogata in Journ. Geobot. 12: 95 (1964). Ke-enkôkaede.

This form is pubescent in 1-year twigs and the base of petioles like var. *glabrum*, but otherwise agrees with the typical form. It is rarely found in the area of the typical form.

f. **connivens** (Nichols.) Rehder in Journ. Arn. Arb. 19: 81 (1938).

Urage-enkôkaede.

A. pictum β. Maximowicz in Bull. Acad. St.-Pét. 26: 443 (1880), pro parte.

A. pictum var. *connivens* Nicholson in Gard. Chron. ser. 2, 16: 375 (1881).

A. pictum var. *dissectum* subvar. *subtrifidum* Makino in Bot. Mag. Tokyo 18: 114 (1904).

A. pictum var. *pedatifidum* Sugimoto in Nippon Journ. Bot. 1: 24 (1926).

A. mono α. *typicum* Sugimoto, l. c. 2: 68 (1928), cum subvar. *pubinerve* Sugimoto, var. *dissectum* Sugimoto, subvar. *pubinerve* Sugimoto, subvar. *pedatifidum* Sugimoto et subvar. *subtrifidum* Sugimoto.

A. mono var. *nikkoense* Honda in Bot. Mag. Tokyo 46: 372 (1932).

A. mono var. *subtrifidum* (Makino) Honda, l. c. (1932).

A. mono var. *nikkoense* subvar. *subtrifidum* (Makino) Honda ex Hisauchi in Journ. Jap. Bot. 10: 104, f. 1 a (1934).

A. mono f. *subtrifidum* (Makino) Rehder, Bibl. Cult. Tr. Shr. 414 (1949).

A. mono var. *connivens* (Nichols.) Hara, Enum. Sperm. Jap. 3: 105 (1954).

A. pictum var. *dissectum* auct. non Wesmael, Koidzumi, Rev. Acer Jap. 63 (1911).

This maple has been generally treated in the relation of variety with the typical form (f. *marmoratum*). The difference, however, only lies in that this maple is pilose along the main veins on the lower surface of leaves, while the other glabrous, and moreover the distribution area of both agrees fairly well on the whole. Therefore, they are ranked here in the relation of form.

The northern limit is likewise the northern to central part of Iwate Pref. (spec.:

Seki, Yamagata V., Kokonoe C.—M. Kikuchi, 1958, IUM; spec.: Todogasaki, Omoi T., Miyako City—M. Kikuchi, 1961, IUM). The southern limit lies near the borders of the Prefectures of Kumamoto, Miyazaki and Kagoshima (spec.: Mt. Yatake, Hitoyoshi City—S. Kurata, 1964, TOFO). In the regions of both limits, this maple seems not very abundant in comparison with f. *marmoratum*. In Central Honshu, the distribution of this maple is somewhat inclined northward when compared with that of f. *marmoratum* and does not occur in the Bôshû Peninsula and the Izu Isls. In the Izu Peninsula, it is also very rare, while f. *marmoratum* is fairly common there. But in more inland region, for example in the Chichibu mountains, the former is more common than the latter.

This maple has the similar growth-habit with f. *marmoratum* and occurs from 300 m. to 1600 m. above the sea level in the Kanto district.

f. **puberulum** Ogata in Journ. Geobot. 12: 95 (1964). Ke-urageenkôkaede.

This form differs from f. *connivens* in the point that 1-year twigs are pubescent as those of var. *glabrum*. It is rarely found mixed with f. *connivens*.

var. **taishakuense** Ogata in Journ. Geobot. 12: 94 (1964). Taishaku-itaya.

The leaves of this variety are pilose on the whole lower surface, along the main veins of the upper surface and on the petioles. It has also juvenile form in the shape of leaves, which somewhat resembles the case of the preceding variety. The hair in the parts above mentioned is usually more thick in the leaves of juvenile trees.

This is only found on limestones of Taishaku-kyô Valley in Hiroshima Pref. (specs.—Z. Taishiro, 1929, KYO, TI & TNS; T. Tsuyama, 1932, TI; K. Ogata, 1963, TOFO).

var. **glaucum** (Koidzumi) Sugimoto in Nippon Journ. Bot. 2: 96 (1928).

Urajiro-itaya.

A. pictum var. δ . *glaucum* Koidzumi et subvar. *latilobum* Koidzumi, Rev. Acer. Jap. 64, f. 9 b; t. 32, f. 10 (1911).

A. latilobum (Koidz.) Koidzumi in Bot. Mag. Tokyo 30: 328 (1916).

A. mono var. *glaucum* (Koidz.) Honda in Bot. Mag. Tokyo 46: 373 (1932).

A small tree up to 5-7 m. high, 10-15 cm. in diameter. Leaves are remarkably characterized by being glaucous beneath, and sometimes only 3-lobed even in the twigs with fruits (Fig. 4, f). Fruits are fewer, generally 1-3 in an infructescence, rarely attaining 7 or so (Fig. 4, a). The wings of fruits are somewhat shorter and the spreading angle is obtuse to right. Inflorescences are usually 3-branched from the base by the complete reduction of the main axes (Fig. 4, a, b).

Flowers are out in early May. Fruits become ripe in autumn.

This maple is distributed limitedly in the Prefectures of Yamagata and Niigata (including its adjacent part of Fukushima Pref.) which lie in the Japan Sea side of Northern Honshu. In these regions it seems not always rare and is found in the sunny and rather dry places of hillsides in lower altitude.

var. **Mayrii** (Schwerin) Sugimoto in Nippon Journ. Bot. 2: 69 (1928).

Aka-itaya, Akame-itaya, Beni-itaya.

A. Mayrii Schwerin in Mitt. Deuts. Dendr. Ges. 10: 58 (1901).

A. pictum var. *Mayri* Henry in Elwes et Henry, Tr. Gr. Brit. Irel. 3: 662 (1908).

A. pictum α. *typicum* subvar. 4. *Mayri* (Schwerin) Koidzumi, Rev. Acer. Jap. 63, t. 32, f. 8, 9 (1911), pro parte.

A. mono var. *Mayri* Koidzumi ex Nakai, Rep. Veg. Mt. Apoi 59 (1930), comb. nud.

A. pictum var. *Mayrii* Koidzumi, Fl. Symb. Or.-Asia. 54 (1930), pro var. nov.

A. mono var. *Mayri* (Schwerin) Murai, Fl. Central Iwate 63 (1935).

A big tree, sometimes attaining 25 m. high, 1 m. in diameter. The bark of trunks is grey or greyish light-brown, and smooth till late unlike var. *glabrum*. 1-year twigs are quite glabrous, often purplish red and glaucous. Leaves are most commonly semi-circular, 5-shallow-lobed (Fig. 5, a), occasionally much shallowly 5-lobed (Fig. 5, c) and rarely 3-lobed (Fig. 5, b) or dentate-lobed in young vigorous shoots (Fig. 5, e), bright green but red at the base of blades and petioles and glabrous beneath except the base of main veins and the apex of the petioles. Fruits are magnificent and of light-colored. Such appearance of leaves, twigs, fruits and the bark of trunks gives something bright about this maple in comparison with var. *glabrum* which always assumes some dark tone. Though this maple comes in contact with var. *glabrum* and var. *ambiguum* in large area, it is easily distinguished from them by being glabrous in leaves and 1-year twigs.

Flowers are out in early- to mid- or late-May. Fruits become ripe in autumn.

This maple is endemic to Japan and distributed in Hokkaido and Honshu. In Hokkaido it reaches as far north as the northern part of Teshio Province (spec.: Horonobe, Teshio C.—H. Hara, 1934, TI), but seems to scarcely occur in the eastern part, i. e., the regions of Tokachi, Kushiro, Nemuro and Abashiri, where a specimen was collected (spec.: Mt. Rausu, the Shiretoko Peninsula—Y. Yokomizo, 1958, SAP). It is also found in the Island of Okushiri. In Honshu, it goes southward mainly along the regions on the Japan Sea side and reaches Mt. Kanmuri in Shimane Pref. (spec.: Mt. Kanmuri, Kanoashi C.—T. Naito, 1930, KAG) and the Island of Oki (spec.: Tôgô V.—Furumi, 1927, TI), but it is not known from the Island of Sado. It is scarcely found on the Pacific side beyond a line linking Mt. Hayachine¹ (Iwate Pref.), Mt. Goyô² (Iwate), Mt. Kurikoma (Iwate—Miyagi), Mt. Zaô (Miyagi), Mt. Azuma (Fukushima), Mt. Kasshi³ (Fukushima), Mt. Tanigawa (Gunma), Mt. Shirouma (Nagano), the Hida mountains⁴ (Gifu), Mt. Ibuki⁵ (Shiga), Ashiu⁶ (Kyoto), Mt. Daisen (Tottori) and Mt. Azayama⁷ (Shimane).

Specs.: 1—M. Kikuchi, 1960, IUM; S. Kurata, 1950, TOFO. 2—K. Ogata, 1962, no. 4795, TOFO. 3—H. Kanai, 1957, TI. 4, Arisu Pass, Kiyomi V., Ôno C.—Kasahara, 1940, IUM. 5—T. Shimizu, 1956, KYO. 6, Ashiu, Chii V., Kita-kuwata C.—Z. Tashiro, 1933, KYO. 7—S. Hattori, 1926, TI.

This maple occurs on moderately moist, well-drained and fertile soils, and that is more noticeable when compared with var. *glabrum* which usually grows on rather bad conditions. This is a mountaineous plant and does not occur in the coastal region,

unlike var. *glabrum*.

var. **trichobasis** Nakai in Journ. Jap. Bot. 18: 611 (1942).

Itomaki-itaya, Motoge-itaya.

A. pictum var. *Savatieri* Pax in Engl., Bot. Jahrb. 7: 236 (1886), pro parte.

A. pictum α. *typicum* subvar. *Savatieri* (Pax) Pax in Engl., Pfl.-reich IV-163, Ht. 8: 47 (1902), pro parte.

A. pictum α. *typicum* subvar. *Savatieri* f. *septenlobum* Koidzumi, Rev. Acer. Jap. 63 (1911), cum f. *novemlobum* Koidzumi, f. 5 a.

A. mono var. *Savatieri* (Pax) Sugimoto in Nippon Journ. Bot. 2: 69 (1928).

A. mono var. *Savatieri* (Pax) auct. non Nakai, Hara, Enum. Sperm. Jap. 3: 107 (1954).

? *A. mono* var. *eupictum* (Pax) auct. non Nakai, Hara, l. c. 106 (1954).

According to the original description, *A. pictum* var. *Savatieri* Pax is localized in Hakodate (Hokkaido), Sagami (=Kanagawa Pref., Honshu), Hakone (Kanagawa Pref.) and Nikko (Tochigi Pref., Honshu). Later authors have likewise considered that the maple meant by Pax is distributed in Hokkaido and Honshu, Japan. Nakai (1932 b: 45) also reported '*A. mono* var. *Savatieri* Nakai' from Central Corea. On the other hand, Nakai (l. c., 1942: 611-612) published *A. Mono* var. *trichobasis* Nakai and indicated that it occurs restrictedly in Central Honshu of Japan. But the last name has been scarcely noticed by any author, and was cited by Hara (l. c., 1954) as a synonym of '*A. mono* var. *Savatieri* (Pax) Nakai' whose area includes Japan (Hokkaido and Honshu) and Corea. The writer, however, considers that the original specimens described by Pax consist of var. *glabrum* from Hokkaido and maybe var. *trichobasis* Nakai from Central Honshu, and that later authors have confused these two varieties of *A. Mono*. The name *A. Mono* var. *Savatieri* is not here adopted, because Pax's description of 1886 and 1902 (l. c.) is not applicable well to the present variety but points rather to var. *glabrum*, for which the name may be taken after further study.

Usually a medium-sized tree up to 15-20 m. high, 40-50 cm. in diameter. The bark of trunks is grey, sometimes yellowish or whitish grey and smooth. 1-year twigs are light-brown and quite glabrous. Leaves are relatively invariable in the shape, commonly 7-9-lobed but occasionally 5-lobed (Fig. 6), usually glabrous except the basal axils on the under surface and the apex of the petioles which are often more thick brown-villose in this variety than in the others. A sterile specimen collected by Kurata in 1947 in the Senzu National Forest in Shizuoka Pref. (TOFO) is sparingly pilose almost all over the back of leaves.

Flowers seem to be out in early-June. Fruits become ripe in autumn.

This maple is endemic to Japan and the area is mainly limited, as almost precisely indicated by Nakai (1942), to Central Honshu, that is, the regions surrounded by Nikko (Tochigi Pref.), Mt. Mitsumine (Saitama), Mt. Tanzawa (Kanagawa), Mt. Hakone (Kanagawa), the southern end of the Akaishi Range (Shizuoka), Mt. Ena (Gifu), Mt. Ibuki (Shiga), Mt. Hodaka (Nagano) and Mt. Akagi (Gunma). Recently more other

localities came to be known from Mie Pref. (spec.: Mt. Fujiwara—H. Hara, 1956, TI; spec.: Mt. Miike—K. Ogata, 1964, TOFO), from Shiga Pref. (spec.: Mt. Ryōzen—K. Ogata, 1964, TOFO), from the Kii Peninsula (spec.: Mt. Inamura & Mt. Sanjō in the Ōmine mountains—K. Ogata, 1964, TOFO) and from Kochi Pref. of Shikoku (spec.: Mt. Torigata—T. Shimizu, 1960, KYO), and it is a very interesting fact that these additional localities, including Mt. Ibuki, are all lime-stone regions.

This maple occurs from 900 m. to 2000 m. above the sea level, having its center in 1000 m. to 1600 m., and usually on moist but well-drained and fertile soils at stream-sides to the middle part of slopes. There seems to be found the elevational habitat segregation between this variety and var. *ambiguum*, the latter of which occupies commonly the similar soil condition in lower altitude.

var. *ambiguum* (Pax) Rehder, Man. Cult. Tr. Shr. ed. 2: 570 (1940).

f. *ambiguum*

Oni-itaya.

A. ambiguum Dippel, Handb. Laubh. 2: 457, f. 218 (1892).

A. pictum var. *ambiguum* (Dipp.) Pax in Engl., Bot. Jahrb. 16: 401 (1892).

A. Dippeli Schwerin in Gartenfl. 42: 460 (1893).

A. pictum var. *Paxii* Schwerin, l. c. 458 (1893).

A. mono var. *Paxii* (Schwerin) Sugimoto in Nippon Journ. Bot. 2: 69 (1928).

A. mono var. *Paxii* (Schwerin) Honda in Bot. Mag. Tokyo 45: 43 (1931).

A. mono f. *ambiguum* (Pax) Rehder in Journ. Arn. Arb. 20: 416 (1939).

A. mono var. *truncatulum* Nakai in Bull. Sci. Mus. Tokyo 33: 17 (1953).

A big tree up to 25 m. high, 90 cm. in diameter. The bark of trunks is yellowish or greyish brown. 1-year twigs are yellowish brown and glabrous. Leaves are characteristically covered, all over the underside, with hairs which are very short in comparison with those of var. *marmoratum* f. *connivens*, ca. 0.2–0.3 mm. long, straight and erect on all veins. And the hairs give yellowish dim luster to leaves beneath and make us feel rough or sometimes velutinous. But, occasionally, leaves become thinly-haired or almost glabrescent, and those in young vigorous shoots are sometimes quite glabrous. *A. Mono* with such hairs on the under surface of leaves, namely the present variety, is nearly endemic to Japan and it is wrong, as indicated by Momiyama (1957: 10), that this maple has been said to be distributed in the Corea Peninsula (Koidzumi, 1902: 63; Nakai, 1915: 18 & 1942: 612; Kawamoto, 1943: 458; etc.). Leaves are usually somewhat large-sized, shallowly or to the middle 5–7-lobed, and occasionally much shallowly lobed (Fig. 7).

Flowers are out in late-April to early-May. Fruits become ripe in early-October and the seeds germinate easily in the laboratory.

This maple occurs in Hokkaido, Honshu, Shikoku and Kyushu, and, through the Island of Tsushima, seems to reach the Island of Koje on the southern coast of Corea. There are collected some specimens from the last-named two islands, all of which have very poorly-haired leaves (Tsushima—specs.: Mt. Mitake—Y. Yabe, 1901, TI; Z. Tashiro, 1933, KYO; spec.: Kuhara V., Kami-agata C.—Y. Yabe, 1901, TI; spec.: Tsushima

Isl.—T. Nakai, 1921, TI; Koje—2 specs.—T. Nakai, 1928, TI). In Hokkaido, this maple is distributed limitedly on the southwestern coast of the Hidaka district, where it is not very rare in the regions a little inner from the coast. In Honshu, it is spread over almost all the country, though it seems to occur not very much in the regions along the Japan Sea side of Northern Honshu. It is not known from Sado Isl. (Niigata Pref.) and Oki Isls. (Shimane Pref.). In Shikoku and Kyushu, it is found chiefly in the central highlands, and the southern limit in Kyushu lies in the southern part of Kumamoto Pref. (spec.: Nishi V., Kuma C.—K. Mayebara, 1921, KYO). It is also found in Mt. Tara of Nagasaki Pref. (spec.—H. Hara, 1941, TI).

This maple occurs commonly on moderately moist, well-drained and fertile soils at stream-sides or in the lower to the middle part of slopes, and in the Kanto district, it occupies the zone from 200 m. to 1000 m. above the sea level, occasionally reaching an elevation of 1300 m. This maple always takes the best sites when it occurs with var. *marmoratum* or var. *glabrum*, and as previously mentioned, it gives the place, in Central Honshu, to var. *trichobasis* above the elevation of about 1000 m.

f. *pulvigerum* Ogata in Journ. Geobot. 12: 96 (1964). Miyama-oniitaya.

The form is pubescent in 1-year twigs and at the base of the petioles of leaves, as seen in var. *glabrum*. But the hairs of leaves are of the same quality with those of the typical form. The sepals of flowers are not hairy, as the typical form, unlike var. *glabrum*. This form is found in the almost whole area of var. *ambiguuum* from Hokkaido to Kyushu with considerable frequency, and the spots are marked in Map 7. More localities will be known, when further examined. The writer often met, in the Chichibu mountains (Saitama Pref.), in Mt. Mitake (Tokyo), in the mountains of Niikappu (Hidaka, Hokkaido) and in others, with the trees of both forms belonging to var. *ambiguuum* growing together.

2) **Acer Miyabei** Maximowicz in Bull. Acad. St.-Pét. 32: 485 (1888).

A closely related species, *A. campestre* L. and its varieties are found widely and commonly throughout Europe, with the exception of the greater part of Scandinavia, Finland and Northern Russia, and moreover extend into Caucasus and Northern Persia, and reaches partly African coast along the Mediterranean (Pax, 1902, Tab. 2; Pojarkova, 1933, Tab. 3). *A. campestre* is usually a small tree, rarely attaining 20 m. high or more and commonest in hedgerows in England and the Continent (Elwes & Henry, 1908: 651-655).

var. **Miyabei** Kurobi-itaya.

A. Hayatae Léveillé et Vaniot in Bull. Soc. Bot. France 53: 590 (1906).

A big tree, often attaining 25 m. high or more and 1 m. in diameter. The bark of trunks is grey and somewhat fissured when young, and becomes yellowish light grey, falling off in thin scales, as age advances. Young twigs are more or less pubescent when unfolding, usually turning glabrous. Trees are andro-monoecious.

Flowers are out in mid-May to mid-July. Fruits with horizontal wings are densely

pubescent at the locule-part.

This species is endemic to Japan and has a remarkable distribution, the localities of which are restricted in the Hidaka and the Ishikari districts of Hokkaido, the northern half of Iwate Pref. and the northern part of Akita Pref. of Northern Honshu, and a part of Gunma and Nagano Pref. of Central Honshu. Among these areas, the former two are occupied by the typical form and the last by var. *Shibatai*. It is said that the Yūbari and the Hidaka mountain ranges of Hokkaido have a close connection with the Kitakami region of Iwate Pref. in Honshu on the distribution of plants, and this species is explained by Tatewaki (1960: 43) as one of the most distinguishable examples showing this fact.

This species is found in very moist, somewhat swampy and flat places as stream-sides in the field, and it is not always rare in the western coast of Hidaka which is the type locality. The writer was told by M. Kikuchi that he saw a number of the big trees growing in a colony in the vicinity of Shinden, Oguni Village of the Kitakami mountains. There are known a few specimens collected from the northern part of Akita Pref. (specs.: Jinba, Yatate V., Kita-akita C.—K. Uno, 1937, KYO; G. Koie, 1937, TNS; spec.: Nakakura V., Kita-akita C.—G. Koie, 1955, TNS). This species does not go farther north or east than the line linking Sapporo City, Furano Town of Sorachi County (the north of Mt. Yūbari) and the east of Obihiro City, and on these borders it occurs rarely (spec.: Sapporo City—H. J. Veitch, 1892, TI; spec.: Maruyama Park, Sapporo City—M. Mizushima, 1943, TI; spec.: Torinuma Park, Furano T.—K. Ogata, 1962, TOFO; spec.: Ikeda T., Nakagawa C., Tokachi Prov.—Yokoyama, 1933, SAP). It does not occur in the Oshima Peninsula.

This maple is seldom cultivated in Japan, though there is a big, thriving tree in the Botanic Garden of Hokkaido University, Sapporo, which was bearing many fruits in August of 1962.

var. *Shibatai* (Nakai) Hara in Bot. Mag. Tokyo 64: 79 (1951).

Shibata-kaede.

A. *Shibatai* Nakai in Bot. Mag. Tokyo 51: 365 (1937).

This variety is glabrous or extremely less hairy in the locule-part of fruits, and otherwise agrees well with the typical form. It is localized in the restricted parts of Central Honshu, i. e., Kawakami Village, Minami-saku C., Nagano Pref., Mt. Akagi in Gunma Pref. (spec.: Kurobidake—J. Matsuno, 1917, TI) and the Oze Moor in Gunma Pref. The specimens from these localities examined by the writer are all included in this variety, although Hara & Mizushima (1954: 448) write that some specimens from the Oze Moor have densely pubescent samaras as in the typical form.

The finding of the fossils of this species at the central part of Miyagi Pref. from the Upper Miocene layer (Endo, 1955, Plate 36 & 37) shows that this species was probably distributed continuously from Northern to Central Honshu in ancient times, and it is considered that the two varieties have been differentiating since the geographical isolation of distribution.

3) **Acer Sieboldianum** Miquel, Ann. Mus. Bot. Lugd.-Bat. 2: 87 (1865).

Allied species included in Sect. *Palmata* are found in Central China, Formosa, Corea, Manchuria, Japan and Pacific North America. They are remarkably characterized by having typical palmate leaves and bisexual paniculate-corymbose inflorescences, supported with a pair of leaves, from terminal buds on branchlets. Besides the present one, such species of this group are found in Japan, as *A. japonicum*, *A. tenuifolium*, *A. Shirasawanum*, *A. palmatum* and *A. amoenum*. Though these species in Japan are closely related one another and the difference among them is fairly delicate, yet they are distinctly recognized respectively as an independent species, by not a single but some correlating characters. The spaces kept among them, however, get nearer when the species in Corea and Manchuria are taken into consideration, and with the further information of the species in these regions, some modification may have to be made on the mutual relation of the species in Japan.

As the species of this group are generally in a very near relationship, natural hybrids between them are expected. In fact, there are sometimes found something like that in the herbarium specimens, and *A. Sieboldianum* var. *yezoense* Miyabe et Tatewaki and *A. japonicum* var. *stenolobum* Hara may be both regarded as hybrids between *A. japonicum* and *A. amoenum*.

f. **Sieboldianum**

Itaya-meigetsu.

A. japonicum var. *Sieboldianum* (Miquel) Franchet et Savatier, Enum. Pl. Jap. 2: 317 (1877).

A. Sieboldianum α. *typicum* Maxim. in Bull. Acad. St.-Pét. 31: 25 (1886)—Koidzumi, Rev. Acer. Jap. 36 (1911), cum subvar. *albiflorum* Koidzumi.

A small tree up to 10 m. high or so, rarely attaining 18 m. high, 25 cm. in diameter. The bark of trunks is grey and smooth, and 1-year twigs are greenish brown and flocculous at least when young, later becoming glabrous and often glaucous. Some, however, are densely whitish villose in 1-year twigs, in the petioles of leaves and in the peduncles and pedicels of flowers. Trees are andro-monoecious.

Flowers are out from mid-May to early-June, but early ones in southern Japan even in mid-April. Fruits become ripe in October.

This is one of the commonest maples in Japanese mountains except Hokkaido, and its range is spread over the whole of Honshu, Shikoku and Kyushu. It reaches northward to the Lake of Towada in Northern Honshu (specs.—S. Muramatsu, 1932, TI; M. Kikuchi, 1949, IUM), while southward to the Island of Yakushima (specs.—T. Makino, 1909, TI; Kawagoe, 1911, KAG; G. Koidzumi, 1921, KYO; G. Masamune, 1927, TI; T. Inokuma, 1938, TOFO; T. Suzuki & al., 1961, TI). It is also found in Tsushima Isl. (Nagasaki Pref.) and the Oki Isls. (Shimane Pref.) (Tsushima—spec.: Mt. Mitake, Kamiagata C.—Y. Yabe, 1901, TI; spec.: Anagizaka—T. Nakai, 1921, TI; spec.: Mt. Ariake, Shimo-agata C.—K. Nakashima, 1933, KYO; Oki—spec.: Goka V., Ochi C.—?, 1927, TI; spec.: Befu, Kuroki V., Chibu C.—I. Maruyama, 1949, TNS; spec.: Sainokami, Tsuma V., Ochi C.—I. Maruyama, 1949, TNS).

This maple occupies the wide elevational range, and in the Kanto district it occurs from 400 m. to 1800 m. above sea level. It is found in almost whole slopes from the bottoms to the ridges.

f. *microphyllum* (Maxim.) Hara, Enum. Sperm. Jap. 3: 115 (1954).

Ko-hauchiwa-kaede.

A. *Sieboldianum* γ. *microphyllum* Maximowicz in Bull. Acad. St.-Pét. 31: 25 (1886).

A. *Sieboldianum* α. *typicum* subvar. *microphyllum* (Maxim.) Koidzumi, Rev. Acer. Jap. 37 (1911).

This form is compared with typical form as follows: f. *Sieboldianum*—leaves large and wide, ca. 6 cm. long, 9 cm. across, the lobes ovate, long acuminate and somewhat roughly serrate (Fig. 8, a); f. *microphyllum*—leaves small and roundish, ca. 4.5 cm. long, 6 cm. across, the lobes elliptic and finely serrate (Fig. 8, b). This form varies continuously, through the intermediate one, into the typical form. There are rarely found trees with very small leaves and fruits (Fig. 8, c), and such a form may be due to the influence of environments. The var. *tsusimense* Koidzumi is considered to be included in this form, and the typical form is also found in the Island of Tsushima which is the type locality of the former.

This form occurs commonly in the whole area of the typical one.

4) **Acer japonicum** Thunberg, Fl. Jap. 161 (1784).

f. **japonicum**

Hauchiwa-kaede.

A. *circumlobatum* Maximowicz in Bull. Acad. St.-Pét. 12: 225 (1867).

A. *circumlobatum* α. *insulare* Pax in Engl., Bot. Jahrb. 7: 200 (1886).

A. *japonicum* f. *macrophyllum* Schwerin in Gartenfl. 42: 709 (1893).

A. *japonicum* var. *villosum* Koidzumi, Rev. Acer. Jap. 42 (1911), cum f. *macrophyllum* Koidzumi.

A. *japonicum* var. *circumlobatum* (Maxim.) Koidzumi, l. c. 42, t. 25, f. 4, 5 (1911).

A. *monocarpon* Nakai in Bot. Mag. Tokyo 40: 584 (1926).

A. *kobakoense* Nakai, Rep. Veg. Mt. Daisetsu 13 & 21 (1930), nom. subnud.; in Bot. Mag. Tokyo 45: 123 (1931).

A. *japonicum* var. *kobakoense* (Nakai) Hara in Bot. Mag. Tokyo 50: 193 (1936), pro syn.; Hara, Enum. Sperm. Jap. 3: 103 (1954).

A. *japonicum* var. *macrophyllum* (Koidz.) Honda, Nom. Pl. Jap. 203 & 503 (1939).

A. *japonicum* var. *insulare* (Pax) Ohwi, Fl. Jap. 745 (1953), comb. nud.; in Bull. Sci. Mus. Tokyo 33: 79 (1953).

A. *japonicum* f. *villosum* (Koidz.) Hara, Enum. Sperm. Jap. 3: 102 (1954).

What is really meant by *A. circumlobatum* can not be clearly known only through the original description. Koidzumi (l. c., 1911) made this a variety of *A. japonicum* and gave a figure. Judging from the figure and his description he seems to consider it as most characterized by the fruits with horizontally spreading wings. The characteristic which is also found in Maximowicz's description is taken up as only one key-character of this

maple by Ohwi (l. c., 1953) who made the combination *A. japonicum* var. *insulare* (Pax) Ohwi. As the wing-angle of the fruits, however, varies continuously from nearly horizontal to acute in *A. japonicum* (Fig. 8), the characteristic seems not so important. In Koidzumi's figure is drawn a fruit a little larger than that of the typical *A. japonicum*. But the writer could not find anything particular also in the size of fruits.

There are sometimes found trees with very large leaves up to 14 cm. long or more (f. *macrophyllum* Schwerin), or ones being thick villose in young twigs, in the petioles of leaves and in the peduncles and pedicels of flowers (var. *villosum* Koidzumi). These, however, are considered as only individual and fluctuant variations.

According to the original author's sketch (preserved in TI) of the type specimen in Herb. Mus. Hist. Nat. Paris., *A. monocarpon* Nakai does not mean a kind of a monocarpellate deformity as explained by Koidzumi (1944: 386) but a form of *A. japonicum* in which an inflorescence has only one fruit (Fig. 8, f). The writer, however, met with some examples in the mountains of Hokkaido and Iwate Pref. of Northern Honshu, in which a tree bears inflorescences consisting of one, two or sometimes three fruits, though there was certainly an inclination that the number of fruits in an inflorescence is relatively fewer in such trees than in the common ones. This form is also disregarded here. The circumstance is almost the same with *A. kobakoense* Nakai which is considered as an accidental form of *A. japonicum* with nearly simple and somewhat rough serrations in the leaves (Fig. 8, g).

On *A. japonicum* var. *stenolobum* Hara (Fig. 11, g) and *A. Sieboldianum* var. *yezoense* Miyabe et Tatewaki, the writer takes them as hybrids between *A. japonicum* and *A. amoenum*. In the former, the fruits which are small-sized and whitish pilose suggest at once those of *A. japonicum*, while the leaves resemble those of *A. amoenum* in long petioles and in the shape of the long-elliptical ovate lobes, the leaves also having the mixed characters of both the species in the size, in the number of the lobes and in the subduplicate fine serrations. In addition to these, it seems rather well to agree with *A. amoenum* in the point that the branches of inflorescences are relatively long. The type locality of *A. Sieboldianum* var. *yezoense* lies in Hokkaido (Nopporo, Ishikari Prov.) as *A. japonicum* var. *stenolobum* (Mt. Apoi, Hidaka Prov.). From Hokkaido, however, there is known neither specimen nor reliable report of *A. Sieboldianum*, and in the region, there are found only two species of Sect *Palmata*, that is, *A. japonicum* and *A. amoenum*. Under the consideration of this fact, it may be clearly said that at least this maple does not belong to *A. Sieboldianum*, and it seems also to possess the mixed characters of the above two species.

The present maple is a small tree up to 10 m. high or so, rarely attaining 15 m. high, 25 cm. in diameter. The bark of trunk is grey and smooth. 1-year twigs are pale green or sunburnt-red above and flocculous at least when unfolding, usually becoming glabrous later. Trees are andro-monoecious.

Flowers which are remarkably characteristic in the large size and the purplish sepals bloom in early-May to early-June.

This maple is endemic to Japan and most common in the upper part of the temperate zone to the lower part of the subalpine zone of Honshu and Hokkaido, but not found neither in Kyushu and Shikoku nor in the Kuriles and Saghalien. It reaches in Hokkaido northeastward to the Shiretoko Peninsula and the southern part of Teshio Province (spec.: Iwaubetsu, the Shiretoko Pen.—M. Tatewaki, 1951, SAP; spec.: the Kotanbetsu River, Tomamae V., Teshio Prov.—S. Ishikawa, 1891, SAP.) In Southern Honshu, it occurs in the regions along the highlands of the Chugoku district and ends in Mt. Kanmuri on the borders of Shimane Pref., Hiroshima Pref. and Yamaguchi Pref. (spec.—T. Oda, 1930, KYO). It is also found in the highlands of the Kii Peninsula (spec.: Mt. Ôdaigahara—Y. Momiyama, 1938, TOFO; lit.: Mt. Chôsendake & Mt. Misen—Yatoh, 1958, p. 104).

In the Kanto district, this maple occurs commonly from 900 m. to 1800 m. above the sea level, rarely attaining almost the forest limit. It is usually found on somewhat dry, sunny places from the middle to the upper part of slopes.

f. **microphyllum** (Koidzumi) Rehder, *Bibl. Cult. Tr. Shr.* 423 (1949).

Ezo-meigetsu-kaede.

A. japonicum γ. *microphyllum* Koidzumi, *Rev. Acer. Jap.* 42, t. 25, f. 6 (1911).

This form differs from the typical form in having roundish and small-sized leaves (Fig. 8, e). It is found scatteredly in the area of the typical form.

5) **Acer tenuifolium** (Koidzumi) Koidzumi in *Bot. Mag. Tokyo* 30: 327 (1916).

Hina-uchiwa-kaede.

A. Shirasawanum var. *tenuifolium* Koidzumi, *Rev. Acer. Jap.* 39, t. 23 (1911).

A. dissectum var. *tenuifolium* (Koidz.) Koidzumi in *Bot. Mag. Tokyo* 39: 316 (1925).

This maple distinctly differs from *A. Shirasawanum* Koidzumi, especially in the size of trees and the appearance of fruits, and moreover the leaves are smaller, a little narrower, thinner, more deeply lobed and less hairy beneath than those of the latter. This is a small and poor-looking tree up to 8 m. high, 15 cm. in diameter. The bark of trunks is dark grey, and 1-year twigs are pale-green, almost glabrous and sometimes glaucous. Trees are andro-monoecious.

Flowers bloom in May. An inflorescence bears about ten flowers, among which female ones are only one or two, rarely attaining six. Fruits seem to become ripe in autumn.

This species is distributed in Central to Southern Japan, i. e., from the southern part of Fukushima Pref., through Southern Honshu and Shikoku, to the central range of Kyushu.

Northern limit:

spec.: Hayasaka Pass, Ônuma C., Fukushima Pref.—T. Saito, ?, KYO; spec.: Shirakawa T., Nishi-shirakawa C., Fukushima Pref.—Y. Ueno, 1946, TI.

Southern limit:

spec.: Shiibaru to Momiki, Yatsushiro C., Kumamoto Pref.—S. Hatusima, 1951,

KAG; spec.: Ôkawachi, Shiiba V., Higashi-usuki C., Miyazaki Pref.—S. Hatusima, 1938, KAG.

It does not occur in the Hokuriku district, and is rare even in the northern parts of the Prefectures of Nagano and Gunma (spec: the Lake of Nojiri, Nagano Pref.—K. Hisauchi, 1936, TI; spec.: Shibakurazawa, Mt. Tanigawa, Gunma Pref.—H. Kanai, 1951, TI; spec.: Oze, Gunma Pref.—?, 1912, TI).

In the Kanto district, it is found scatteredly almost all over the slopes from 600 m. to 1300 m. above the sea level.

6) **Acer Shirasawanum** Koidzumi, Rev. Acer. Jap. 38, t. 22 (1911).

Ô-itaya-meigetsu.

A big tree up to 20 m. high, 80 cm. in diameter. The bark of trunks is dark grey or greyish brown. 1-year twigs are green, sometimes glaucous, and almost glabrous, or soon becoming so if flocculously pilose when unfolding. Trees are andro-monoecious.

Flowers bloom in early-May to late-May or early-June. An inflorescence bears usually six to ten fruits which are remarkably characterized by being horizontally spreading, large samaras (Fig. 9, g). Seeds germinate fairly well in the laboratory.

This species is distributed in Central to Southern Honshu and Shikoku, Japan. The northern limit lies in the vicinity of Mt. Azuma, Fukushima Pref. (spec.: Tsuchiyu Pass—G. Koidzumi, 1912, KYO & TI). The western limit is Mt. Kanmuri at the western end of the Chugoku range (specs.—Z. Tashiro, 1937, KYO; ?, 1930, KYO). In Shikoku, it is found in such highlands as Mt. Akaishi, Mt. Tsutsujô and Mt. Tebako. It has not been reported from Kyushu and the Hokuriku district of Honshu.

In the Kanto district, this maple occupies the lower to the middle part of the sub-alpine zone from 1200 m. to 1800 m. in elevation, and it is common, for example in the Chichibu mountains, in the place higher than 1500 m. In the Hira mountains of Shiga Pref. (the Kansai district) whose summit is 1174 m. in altitude, however, this maple occurs even from 700 m. There are known some plants which decrease the elevational range in the Kansai district in comparison with the more northern district, and this species may be considered as one of such cases. But in the mountains of Ômine and Ôdaigahara of Nara Pref. in the same Kansai district, it occurs usually from 1500 m. and seems not to appear in such lower altitude. It may be rather singular that this maple has not been collected in the regions along the Japan Alps with a exception of Mt. Shirouma (spec.—S. Kuwajima, 1949, TNS) and in the Mikuni Range of Central Honshu.

This maple occurs at the moist but well-drained sites from the bottom to the upper part of slopes, and we occasionally find some big trees growing together.

7) **Acer palmatum** Thunberg in Nov. Act. Soc. Sci. Upsal. 4: 36 & 40 (1783), excl. specim. ramis florif., pro major. part. Iroha-momiji, Iroha-kaede.
A. polymorphum Siebold et Zuccarini in Abh. Akad. Muench. 4-2: 158 (1845), pro

parte; non Spach 1834.

A. septemlobum Sieb. & Co. in Jaarb. Nederl. Maats. Aanmoed. Tuinb. 1844; 23, t. 2, f. c (1844), nom. subnud.; non Thunberg 1784.

A. polymorphum γ . *palmatum* K. Koch, Hort. Dendr. 89 (1853).

A. palmatum β . *quinelobum* K. Koch in Ann. Mus. Bot. Lugd.-Bat. 1: 251 (1864).

A. formosum Carrière in Rev. Hort. 39: 300 (1867).

A. palmatum f. *genuina* Miq. in Sieb. et Zucc., Fl. Jap. 2: 84, t. 145, excl. f. 9 (1870).

A. palmatum var. α . *Thunbergii* Pax in Engl., Bot. Jahrb. 7: 202 (1886), pro parte.

A. palmatum var. *Thunbergii* subvar. *eupalmatum* Schwerin in Gartenfl. 42: 652, f. 133. 1 (1893), f. *normale*—Pax in Engl., Pfl.-reich IV-163, Ht. 8: 26 (1902).

A. palmatum subsp. α . *genuinum* (Sieb. et Zucc.) Koidzumi, Rev. Acer. Jap. 44, t. 26, f. 1-6 (1911), cum var. a. *spectabile* et b. *amabile* Koidzumi.

A. eupalmatum (Schwerin) Koidzumi in Bot. Mag. Tokyo 39: 316 (1925).

A. roseo-marginatum var. *eupalmatum* (Schwerin) Koidzumi in Bot. Mag. Tokyo 43: 382 (1929).

A. palmatum var. *palmatum* (K. Koch) Rehder in Journ. Arn. Arb. 19: 85 (1938).

A. palmatum subsp. *palmatum* (Thunb.) Hara, Enum. Sperm. Jap. 3: 108 (1954).

According to Koidzumi (l. c., 1925) and Nakai (1932 a: 608-609), the original specimens of *A. palmatum* Thunberg consist of two species mounted on two sheets, the present species and a form of *A. amoenum* Carrière. In Thunberg's *Icones Plantarum Japonicarum* 5, t. 4 (1805) is drawn a figure made out artificially of these two species. As Hara (l. c., 1954), however, the writer applies this name to the present species, considering that the figure in Thunberg's *Icones* indicates fairly well the present species, especially in the appearance of fruits.

This maple has been often treated in the relation of a variety or a subspecies with *A. amoenum*. But it is clearly different from and hardly confused with *A. amoenum* in the appearance of leaves, the shape and the size of fruits and other characteristics. These characters of this species are very invariable, as seen in Fig. 9, e, in comparison with those of *A. amoenum* which is extremely polymorphic. And the same thing seems to be true to some degree also in the cultivated forms of these two species, namely, those of large variation belonging mostly to *A. amoenum*. It may be compared too as showing the specific characters of these two species that the pericarps of fruits are thin and weak in *A. palmatum*, but thick and hard in *A. amoenum*, and that the outer-most scales of winter buds cover only the halves of the next scales in the former but do almost completely in the latter.

This maple attains very big and thriving trees occasionally up to 1 m. or more in diameter in the oldest ones, spreading branches in all directions. The bark of trunks is grey or greyish light-brown, and 1-year twigs are almost glabrous from the beginning and green or sunburnt-red above. Trees are andro-monoecious.

Flowers are out, nearly at the same time with leaves, from mid-April to late-April or early-May, and earlier in early-April when cultivated in lower places. Fruits become

ripe about early-October and the seeds germinate easily. We often find some seedlings grow naturally under cultivated trees.

The distribution of this maple lies mainly in Central to Southern Japan and seems also to extend farther westward, through the Island of Tsushima, to the southern part of Korea and the coastal regions of the Yellow Sea and the East China Sea in Continental China. There are only known a few specimens from the last named regions, which are apparently identical with those of Japan (spec.: Daiichi Park, Tsingtao, the Shantung Peninsula—T. Kanashiro, 1943, KYO; spec.: Hangchow, Chekiang—?, 1910, TNS). The specimens from the southern part of Korea, that is, Isl. Querpaert, Isl. Wang, Mt. Cholla (S. Chella) and others, seem generally to have somewhat larger locules of fruits than those from Japan. Therefore, one in Korea, if further examined, may be considered as a variety of this species as done by Nakai (1915: 11) who named it *A. palmatum* var. *coreanum* Nakai. But, Nakai's observation that this variety is different from the typical form in Japan in lacking petals in female flowers is almost decidedly incorrect, because the absence of petals or sepals is found only in a few restricted species of all maples and has never been verified on any species of Sect. *Palmata*. This species are also found in the inner region of Eastern China and Formosa (spec.: Mt. Lu, Kiangsi, China—?, 1935, KYO; specs.: Mt. Nanhuta & Piyanan Pass, Taipei Prov., Formosa—J. Ohwi, 1933, TNS). The specimens mentioned here which are all sterile are pilose along the veins of leaves beneath, in the petioles and in young shoots. Li (1952: 293) gives the name *A. palmatum* var. *pubescens* Li to the plants of Formosa and speaks as follows: "...it differs from the Japanese plants chiefly in the pubescence being present not only on the young branches and inflorescences, but also on mature leaves and petioles."

The distribution in Japan: This maple reaches northward to the mountains of Azuma in the northern part of Fukushima Pref. (spec.: Mt. Azuma—G. Koidzumi, 1910, KYO), from which it goes southward mainly along the regions on the Pacific side of Honshu to Shikoku and Kyushu. The southern limit is the southern part of Kyushu (spec.: Mt. Shibi, Kagoshima Pref.—?, 1927, KYO; spec.: Sakatani V., Minami-naka C., Miyazaki Pref.—S. Hattori & I. Furusawa, 1945, TI). On the Japan Sea side, it does not occur north of Fukui Pref. (spec.: Mt. Hino, Takefu City, Fukui Pref.—S. Mimura, 1960, TOFO). The plants in the Island of Tsushima are also considered as the same with the typical form (spec.: the foot of Mt. Mitake—Y. Yabe, 1902, TI; spec.: Nita V., Kami-agata C.—K. Nakashima, 1934, KYO).

This species occurs in the wide range of soil condition, and in the Kanto district, it is found from 100 m. to 1100 m. above the sea level.

This maple is one of the most representative garden plants in Central and Southern Japan, and in Tokyo, it occupies the large percent of cultivated maples.

8) ***Acer amoenum*** Carrière in Rev. Hort. 39: 280 (1867).

Some varieties and forms in the Tab. 3 are distinguishable mainly by the shape of

leaves. The forms of var. *amoenum* are closely connected with one another through continuous intermediate forms.

var. **amoenum**

A. palmatum Thunberg in Nov. Act. Soc. Sci. Upsal. 4: 36 & 40 (1783), quoad specim. ramis florif. tantum.

A. polymorphum Siebold et Zuccarini in Abh. Akad. Muench. 4-2: 158 (1845), pro parte; non Spach 1834.

A. polymorphum δ . *septemlobum* K. Koch, Hort Dendr. 80 (1853).

A. palmatum γ . *septemlobum* K. Koch in Ann. Mus. Bot. Lugd.-Bat. 1: 251 (1864).

A. palmatum var. *septemlobum* Nicholson in Gard. Chron. ser. 2, 16: 137 (1881).

A. palmatum var. *Thunbergii* subvar. *septemlobum* f. *euseptemlobum* Schwerin in Gartenfl. 42: 678, f. 137, 17 (1893)—Pax in Engl., Pfl.-reich IV-163 Ht. 8: 26 (1902), sphalm. *subseptemlobum*.

A. palmatum subsp. *septemlobum* Koidzumi, Rev. Acer. Jap. 46, t. 27 (1911), excl. basonym et syn. nonnull.; non *A. septemlobum* Thunberg 1784.

A. euseptemlobum (Schwerin) Koidzumi in Bot. Mag. Tokyo 39: 306 (1925).

A. sanguineum var. *euseptemlobum* (Schwerin) Koidzumi in Bot. Mag. Tokyo 43: 382 (1929).

A. sanguineum var. *amoenum* (Carr.) Koidzumi in Act. Phytotax. Geobot. 3: 148 (1934).

A. palmatum var. *heptalobum* Rehder in Journ. Arn. Arb. 19: 86 (1938).

A. palmatum var. *amoenum* (Carr.) Ohwi, Fl. Jap. 745 (1953) comb. nud.; in Bull. Sci. Mus. Tokyo 33: 79 (1953).

A. palmatum subsp. *amoenum* (Carr.) Hara, Enum. Sperm. Jap. 3: 109 (1954).

According to Nakai (1932 a: 609), *A. polymorphum* Sieb. et Zucc. can not be used on account of the presence of an older homonym of Spach in 1834. *A. septemlobum* Thunb. was described on the basis of the specimen of *Kalopanax pictus* (Thunb.) Nakai (Koidzumi, 1925: 306; Rehder, 1938: 87).

Usually a medium-sized tree up to 15 m. high, 25 cm. in diameter, occasionally attaining 40 cm. or more in diameter in good soil conditions along valleys. The bark of trunks is grey or greyish light-brown and smooth. 1-year twigs are green and almost glabrous from the beginning, but sometimes caducous-flocculous. Fruits are medium-sized among the species of Sect. *Palmata*, with horizontally spreading to nearly upright wings (Fig. 9 & 10), the wings are commonly narrow with a close resemblance to those of *A. Sieboldianum* but occasionally wide like those of var. *Matsumurae* f. *latialatum*, and the pericarp is thick, hard and veined in comparison with those of *A. palmatum*. Trees are andro-monoecious.

Flowers are out in late-April or early-May to late-May. Fruits become ripe in October. There are sometimes found trees in which the wings of fruits are of reddish or purplish colored, as seen also in var. *Matsumurae* and *A. palmatum*.

This maple is endemic to Japan and its range is widely spread from Hokkaido,

through Honshu and Shikoku, to the southern part of Kyushu. In Hokkaido, it reaches as far north or east as the regions of Abashiri and Kushiro, but scarcely extends beyond the line linking Sapporo City and Abashiri City (spec.: Niitokoro, Okedo V., Abashiri Prov.—M. Tatewaki, 1936, SAP; spec.: Onneyu, Rubeshibe V., Abashiri Prov.—M. Tatewaki & T. Yamanaka, 1937, SAP). In Honshu and Shikoku, it is common almost everywhere except for the Japan Sea side regions of Northern Honshu where var. *Matsumurae* predominates. It is also found in Ōshima Isl. and Mikurajima Isl. of the Izu Isls., in the latter of which this maple is perhaps only one representative of *Aceraceae* (specs.: Ōshima Isl.—Y. Jôtani, 1932, TNS; S. Yodono, 1949, TNS; S. Okuyama, 1950, TNS; M. Mizushima, 1950, TI; Matsuda, ?, KYO; spec.: Mikurajima—Y. Jôtani, 1934, TNS). The southern limit lies in the main land of Kagoshima Pref., Kyushu (spec.: Shinkawa-keikoku, Aira C.—S. Hatusima & S. Sako, 1959, KAG). There is a specimen of f. *palmatipartitum* from Yakushima Isl. of Southern Kyushu (spec.: Shimo-yaku V.—G. Masamune, ?, TI), but this locality of the species is very questionable, because no other report has been made from the island and the collector himself does not record the locality in his floristic literatures (1934 & 1935).

This maple occupies the wide range of soil conditions from the lower to the upper part of slopes, and in the Kanto district it occurs from 200 m. to 1300 m. above the sea level.

f. **amoenum**

Ō-momiji

A. palmatum auct. non Thunb., Miyabe et Kudo, Icon. Ess. For. Tr. Hokkaido 3: 17, t. 69 (1930).

A. palmatum var. *Matsumurae* (Koidz.) Makino, Ill. Fl. Nippon 351, f., 1051 (1940), pro parte descrip. et ad fig.

Leaves have principally finely and regularly serrated ovate lobes as seen in Fig. 9, k, but they vary continuously into those of f. *latilobatum* on one side (Fig. 9, h, m), and into those of f. *palmatipartitum* on the other side (Fig. 10, a, d, e, g). Leaves, especially those in young vigorous shoots, are sometimes incisedly cut in the lobes, or at the same time deeply lobed (Fig. 10, f, g), but even in such cases they can be generally distinguished from var. *Matsumurae* in having fine and low serrations and fewer lobes.

This form is found in almost the whole area of var. *amoenum*.

f. **latilobatum** (Koidz.) Ogata, comb. nov.

Hiroha-momiji.

A. palmatum subsp. *septemlobum* var. *latilobatum* Koidz., Rev. Acer. Jap.: 47, t. 26, f. 7, 8 (1911).

A. amoenum var. *latilobatum* (Koidz.) Nakai in Bot. Mag. Tokyo 46: 611 (1932).

A. euseptemlobum var. *latilobatum* Koidzumi in Ishii, Engei-Jiten 1: 386 (1949), comb. nud.

A. palmatum var. *amoenum* f. *latilobatum* (Koidz.) Ohwi, Fl. Jap. 746 (1953), comb. nud.; Hara, Enum. Sperm. Jap. 3: 109 (1954).

This form is the main constituent of var. *amoenum* in the frequency of occurrence

rather than the preceding form, and distributed in almost the whole area of var. *amoenum*, excepting the regions along the Japan Sea side in Northern Honshu where it seems to disappear completely.

f. **palmatipartitum** (Koidz.) Ogata, comb. nov. Fukagire-ômomiji.

A. palmatum subsp. *septenlobum* var. *palmatipartitum* Koidzumi, Rev. Acer. Jap. 47 (1911).

A. ornatum var. *miyajimense* Nakai in Bot. Mag. Tokyo 46: 613 (1932).

A. ornatum var. *Matsumurae* b. *spontaneum* f. *miyajimense* (Nakai) Nemoto, Fl. Jap. Suppl. 454 (1936).

A. euseptemlobum var. *palmatipartitum* (Koidz.) Koidzumi in Ishii, Engei-Jiten 1: 386 (1944), comb. nud.

A. palmatum subsp. *Matsumurae* f. *miyajimense* (Nakai) Hara, Enum. Sperm. Jap. 3: 111 (1954).

A. palmatum subsp. *amoenum* f. *palmatipartitum* (Koidz.) Sugimoto, New Keys Jap. Tr. 298 (1961).

The name *palmatipartitum* was originally given to a cultivated form of *A. amoenum* var. *amoenum*. The type specimen of *A. ornatum* var. *miyajimense* Nakai (Fig. 10, d) was collected in a small island of the Inland Sea, Miyajima Isl. in Hiroshima Pref., by B. Hayata in 1913. But this is undoubtedly included in the present form as reconized by Fig. 10, d-e, not belonging to a variety of *A. ornatum* which is a synonym of *A. amoenum* var. *Matsumurae*. Moreover, it is difficult, as mentioned later, to consider that an element of var. *Matsumurae* reaches as far as such a southern region.

This form is scatterdly found in almost the whole area of var. *amoenum* except for the regions along the Japan Sea side.

f. **horonaiense** (Nakai) Ogata, stat. nov. Horonai-kaede.

A. horonaiense Nakai in Bot. Mag. Tokyo 40: 584 (1926).

A. palmatum subsp. *amoenum* f. *horonaiense* (Nakai) Hara, Enum. Sperm. Jap. 3: 109 (1954).

This form is fairly common in Hokkaido and somewhat noticeable in the big, roughly serrated and dark green leaves. In Honshu, however, these characteristics become gradually faint as going south, though still maintained to some degree in Iwate Pref. of Northern Honshu, and in Central Honshu they seem to be mixed into those of f. *latilobatum*.

var. **nambuanaum** (Koidz.) Ogata, stat. nov. Nanbu-koha-momiji.

A. nambuana Koidzumi in Act. Phytotax. Geobot 6: 210 (1937).

A. palmatum subsp. *amoenum* var. *nambuanaum* (Koidz.) Hara, Enum. Sperm. Jap. 3: 110 (1954).

This form, which is seemingly a small sized form of f. *latilobatum*, is here treated in the rank of variety, because it is considered to have fairly constant characters in the shape and the size of leaves, and furthermore the locality seems to be restricted in the Pacific side of Northern Honshu. The specimens are collected from the central

part of Iwate Pref. (spec.: Nagaoka V., Shiba C.—Y. Fukuda, 1936, no. 913, Type, KYO; spec.: the foot of Mt. Hayachine—S. Kurata, 1950, TOFO; spec.: Iwanowatari, Ôkawa V., Shimo-hei C.—K. Ogata, 1962, TOFO) and from Kinkazan, Miyagi Pref. (spec.—M. Kikuchi, 1962, TNS).

var. *Matsumurae* (Koidz.) Ogata, comb. nov.

f. *Matsumurae*

Yama-momiji.

A. palmatum var. *Thunbergii* subvar. *septemlobum* Schwerin in Gartenfl. 52: 678 (1893), pro parte.

A. palmatum subsp. *Matsumurae* Koidzumi, Rev. Acer. Jap. 49, t. 28, f. 1, 2 (1911), cum *α. spontaneum* f. *circumlobatum*.

A. Matsumurae (Koidz.) Koidzumi in Bot. Mag. Tokyo 39: 306 & 318 (1925).

A. ornatum var. *Matsumurae* (Koidz.) Koidzumi in Bot. Mag. Tokyo 43: 383 (1929).

A. ornatum var. *Matsumurae* b. *spontaneum* (Koidz.) Nemoto, Fl. Jap. Suppl. 454 (1936), cum f. *circumlobatum* (Koidz.) Nemoto.

A. palmatum var. *Matsumurae* (Koidz.) Makino, Ill. Fl. Nippon 351 (1940), pro parte, excl. fig., comb. nud.

This maple is generally considered as different in having incised subduplicate serrations from var. *amoenum* with nearly simple serrations. By many authors, however, it has been more or less confused with some forms of var. *amoenum*, for example, f. *amoenum* (Miyabe & Kudo, 1930, t. 69; Makino, 1940, f. 1051) or f. *horonaiense* (Kawakami, 1902, f. 13), the cause of which lies partly in that var. *amoenum* itself has occasionally the incised serrations of leaves, and partly in that the Japanese name "Yama-momiji" is often used as a general term of *A. amoenum* including var. *Matsumurae*. It should be most emphasized, as first indicated almost precisely by Sugimoto (1961: 298 & t. 13, f. 4) with a good illustration, that the area of this maple is confined mainly in the regions along the Japan Sea side of Central to Northern Honshu. The original author Koidzumi (l. c., 1911) himself includes erroneously Hokkaido, Honshu, Shikoku and Kyushu of Japan, and Formosa as the locality of this maple. In the area of this variety, there are discerned some variations as indicated in Fig. 11, b-f, which never occur in the regions along the Pacific side. It may be said that the leaves of them are generally characterized by having somewhat rough or incisedly duplicate serrations and commonly 9 lobes. But, further study must be made on this maple.

The border of the distribution area runs approximately on the line linking Mt. Iwate (Iwate), Mt. Azuma (Yamagata), Mt. Iide (Niigata), the Oze Moor (Fukushima), Mt. Tanigawa (Gunma), Mt. Shirouma (Nagano) and Mt. Hakusan (Ishikawa), ending in the central part of Fukui Pref. Whether this maple occurs in Hokkaido is very questionable, though having been said so by almost all authors. The writer could find no distinct specimen of this variety collected in the region except only a few doubtful specimens, one of which considered as most similar to this variety in the remarkably duplicate serrations of leaves and in the relatively broad wings of fruits like those of var. *Matsumurae* f. *latialatum*, is shown in Fig. 10, h. Nothing can not be said now on this

problem more than that such a form seems very rare. It may at least be said that the clear form of this variety is not present in Hokkaido.

f. **latialatum** (Nakai) Ogata, comb. nov. Hondôji-kaede, Hirohane-yamamomiji.

A. palmatum subsp. *Matsumurae* subvar. *elegans* Koidzumi, Rev. Acer. Jap. 50 (1911).

A. ornatum var. *lati-alatum* Nakai in Bot. Mag. Tokyo 46: 613 (1932).

A. ornatum var. *Matsumurae* b. *spontaneum* f. *lati-alatum* (Nakai) Nemoto, Fl. Jap. Suppl. 454 (1936).

A. Matsumurae var. *elegans* Koidzumi in Ishii, Engei-Jiten 1: 387 (1944), nom. nud.

A. palmatum subsp. *Matsumurae* f. *latialatum* (Nakai) Hara, Enum. Sperm. Jap. 3: 111 (1954).

The wings of fruits are broad in this form. It may be rather common than the typical form.

9) **Acer Ginnala** Maximowicz in Bull. Phys.-Math. Acad. Sci. St.-Pét. 15: 126 (1856). var. **aidzuense** (Franch.) Ogata, comb. nov. Karakogi-kaede.

A. tataricum var. *aidzuensis* Franchet in Bull. Soc. Bot. France 26: 84 (1879).

A. ginnala α. *euginnala* Pax in Engl., Bot. Jahrb. 7: 185 (1886), pro parte.

A. Ginnala f. *aidzuense* (Franch.) Schwerin in Gartenfl. 42: 231 (1893).

A. Ginnala var. *yezoense* Koidzumi, Rev. Acer. Jap. 31, t. 18, f. 6 (1911).

A. aizuense (Franch.) Nakai in Bot. Mag. Tokyo 40: 146 (1926).

A. aizuense var. *yezoense* (Koidz.) Makino et Nemoto, Fl. Jap. ed. 2: 689 (1931).

A. subintegrum Pojarkova in Act. Inst. Bot. Acad. Sci. USSR. ser. 1, 1: 152, f. 6 (1933).

A. tataricum var. *Ginnala* auct. non Maximowicz, Miquel in Arch. Néerl. Sci. Nat. 2: 470 & 476 (1867), pro parte—Maxim. in Bull. Acad. St.-Pét. 26: 446 (1880), pro parte.

A. tataricum auct. non L., Franch. et Sav., Enum. Pl. Jap. 1: 89 (1874), 2: 323 (1877)—Léveillé in Bull. Soc. Bot. France 53: 593 (1906).

A. Ginnala auct. non Maxim., Rehder in Sargent, Tr. Shr. 1: 179 (1905), pro parte—Shirasawa, Icon. For. Tr. Jap. 2: 136 t. 44, f. 11-19 (1908)—Koidzumi, Rev. Acer. Jap. 30, t. 18 (1911)—Miyabe et Kudo, Icon. Ess. For. Tr. Hokkaido 3: 13, t. 67 (1929)—Ohwi, Fl. Jap. 746 (1953).

That this maple should be regarded as an independent species was held by Nakai (1926, l. c. & 1935 a: 418) for the reason that it differs from *A. tataricum* L. and *A. Ginnala* Maxim. by having less incised, more hairy leaves and young leaves dotted by granular glands on the lower surface. The writer, however, thinks it appropriate to regard this maple as a variety of *A. Ginnala*, due to the facts that this maple agrees well with the typical *A. Ginnala* except for the difference of the degree of the incision of leaves, that the leaves of young vigorous shoots of this maple have deeply incised lobes and become so similar to the leaves of *A. Ginnala* that the identification becomes difficult, and that the degree of the hairiness on the under side of leaves remarked by Nakai is a somewhat fluctuant character on the present maples. *A. Ginnala* and var.

aidzuense are clearly distinct from *A. tataricum* which has smaller and scarcely or not lobed leaves.

The typical form of *A. Ginnala* is distributed in Corea and another related species, *A. tataricum*, is spread widely from Eastern Europe to the Urals (Pojarkova, Tab. 6).

The var. *aidzuense* is a small tree or usually a shrub to 5-7 m. high, rarely attaining a size of 10 m. in height, of 20 cm. in diameter. The bark of trunks is grey, and 1-year twigs are purplish brown and pubescent when unfolding, soon becoming glabrous.

The flowering season is so various, corresponding to the climate of the localities, that it begins early in late-April in Kumamoto Pref. of Kyushu, while in mid- to late-July in such cold districts as the Oze Moor of Central Honshu or the eastern part of Hokkaido. This fact may show that this maple grows in a wide range of climate. In Kyoto City of Honshu, flowers are out in mid-May, and in the lower district of Nagano Pref. of Central Honshu in late-May to early-June. Fruits are ripe in autumn.

This maple is endemic to Japan and its range extends from Hokkaido, through Honshu and Shikoku, to Kyushu. It reaches north-eastward to the eastern coast of Hokkaido, that is, the Nemuro district and the southern part of the Abashiri district, but does not occur in Teshio Province and the greater part of Kitami Province, in the Kuriles nor in Saghalien (spec.: Bekkoi to Shibetsu, Nemuro Prov.—Y. Kudo, 1917, TUS; spec.: Memanbetsu V., Abashiri C.—?, 1955, SAP). The southern limit is the southern part of Kumamoto Pref. and except for the locality this maple is not found in Kyushu (spec.: Kume V., Kuma C.—Nabeshima, 1930, KYO; spec.: Taragi T., Kuma C.—Mayebara, 1919, TNS; spec.: Kurohiji V., Kuma C.—K. Mayebara, 1952, TNS). Two localities from the Chugoku district and one from Shikoku are known (spec.: Taishaku-kyô Valley, Hiroshima Pref.—K. Ogata, 1963, TOFO; specs.: Yawata V., Yamagata C., Hiroshima Pref.—Z. Tashiro, 1913, KYO & 1927, TNS; spec.: Higashi-uwa C., Ehime Pref.—Masateru Kikuchi, 1934, KAG).

This maple occurs almost restrictedly in marshy sites, where we often find a number of the trees forming bushy colonies. As above mentioned, this maple occupies a wide range of climate, and it may be said that the occurrence of this maple is influenced more strongly by the edaphic condition than the climatic condition, and that this maple does not show a clear climatic distribution pattern.

10) *Acer ukurunduense* Trautvetter et Meyer, Fl. Ochot. in Middendorf, Reise Sibir. 1-2: 24 (1856).

f. *ukurunduense*

Ogarabana.

A. Dedyle Maximowicz in Bull. Phys.-Math. Acad. St.-Pét. 15: 125 (1856).

A. spicatum var. *ukurunduense* (Trautv. et Mey.) Maxim., Prim. Fl. Amur. 65 (1859).

A. spicatum subsp. *ukurunduense* (Trautv. et Mey.) Pax in Engler, Bot. Jahrb. 7: 189 (1886).

A. caudatum Wallich var. *ukurunduense* (Trautv. et Mey.) Rehder in Sargent, Tr. Shr. 1: 164, t. 84 (1905), 2: 26 (1907).

A. lasiocarpum Léveillé et Vaniot in Bull. Soc. Bot France 53: 591 (1906).

A. ukurunduense var. *sachalinense* Nakai, Sylv. Korea. 1: 7 (1915).

A. vitifolium Hort. ex Rehder, Man. Cult. Tr. Shr. 569 (1927), pro syn.

A. spicatum auct. non Lam., Regel in Bull. Phys.-Math. Acad. St.-Pét. 15: 217 (1857)—Miquel in Arch. Néerl. Sci. Nat. 2: 470 & 477 (1867).

Some closely related species are found in Atlantic North America, Himalaya and Central China, and including the present species they are often treated in the relation of varieties or subspecies.

Usually a small tree or shrub to 3-10 m. high, but rarely an upright, considerably big tree up to 17 m. high, 25 cm. in diameter. The bark of trunks is greyish light brown, falling off in thin flakes, and grey in branches. 1-year twigs are yellowish brown, pubescent, often glaucous. Leaves are more or less villose beneath, but in seedlings or saplings generally almost glabrous, and the young twigs with such thin, glabrous leaves are sometimes misidentified in the herbarium specimens to be those of *Acer Tschonoskii*, which is easily distinguished from the present species by having no hair on 1-year twigs. Trees are basically andro-monoecious, but there is often found so-called andro-polygamous condition which means to have the two sexual types of trees; one whose inflorescences consist of only male flowers, and the other in which male and female flowers share the same inflorescences. The writer witnessed in the mountains of Chichibu in Saitama Pref., Mt. Kurohime in Nagano Pref. and in others that some trees whose inflorescences consist of only male flowers were mixed with andro-monoecious trees, and he could find apparently no difference between the growing sites of both types of trees.

Flowers are out, after the leaves, in mid-June to mid-July, but early ones from late-May to early-June, and late flowers are found even in mid- or late-August. Fruits are ripe in autumn.

This species is distributed in Japan (Honshu, Hokkaido), the Kuriles, Saghalien, the south-eastern part of Siberia, Manchuria and Corea.

The distribution in Japan: The southern limit is the central range of the Kii Peninsula which is the restricted localities of this maple in the Kinki district, where are only known the specimen once collected in Mt. Ômine (spec.: Ichinotôge to Misen, Mt. Ômine—Y. Momiyama, 1955, TI) and reports from Mt. Ôdaigahara (lit.—Y. Okamoto, 1937, p. 80, etc.) This species is fairly abundant in the highlands of the Chubu and the Kanto districts, i. e., the Ranges of the Japan Alps, Tateyama, Akaishi, Chichibu, Mikuni and Taishaku. It is not very much in Northern Honshu, especially in the regions along the Japan Sea side, Prefectures of Niigata, Yamagata and Akita. In Hokkaido, it is pretty common, but almost absent in Teshio Prov. and in the northern half of Kitami Prov. This species reaches as far north as Urup Isl. of the Kuriles (spec.: Tokotan River—Jinbo, 1891, SAP) and lat. about 51°N. in Northern Saghalien (spec.: Arkowa—Y. Okada, 1923, TI; spec.: Pilewo—K. Miyabe & T. Miyagi, 1906, SAP; spec.: Pupni—Y. Kudo & M. Tatewaki, 1922, SAP; lit.—Y. Kudo, 1924, p. 177), respectively in both the regions

crossing a little over the two floral lines, the Miyabe's Line lying in the Straits of Etorofu and the Schmidt's Line in Saghalien, which are generally considered as the northern borders of temperate plants. In the Continent, this species occurs more northward to lat. about 54°N. along the River Amur (lit.: the Uda Mountains—Schmidt, 1868, p. 36; lit.—Pojarkova, 1933, Tab. 8). In the Kanto district of Central Honshu, Japan, this maple is found in the sub-alpine coniferous zone from 1500 m. in altitude to near the forest limit, but in Mt. Hakkôda in the northern end of Honshu, from 700 m., and in Northern Hokkaido and northward from near the sea level.

This maple occurs over a very wide range of soil-moisture conditions—both very wet as stream-side and quite dry as ridges, but it is not generally found on well-drained, fertile soils.

f. *pilosum* Nakai ex Hara, Enum. Sperm. Jap. 3: 117 (1954). Usuge-ogarabana.

A. ukurunduense var. *pilosum* Nakai in Bot. Mag. Tokyo 28: 308 (1914).

The hair on the under side of leaves is very thin.

This form occurs commonly in the whole distributed areas of the species and the hairiness of leaves changes continuously into that of the typical form.

11) *Acer nipponicum* Hara in Journ. Jap. Bot. 14: 50 (Jan. 15, 1938). Tetsu-kaede.

A. parviflorum Franchet et Savatier, Enum. Pl. Jap. 2: 321 (1877).

A. pennsylvanicum subsp. *parviflorum* (Fr. et Sav.) Wesmael in Bull. Soc. Bot. Belg. 29: 62 (1890).

A. crassipes Hesse in Mitt. Deuts. Dendr. Ges. 21: 358 (1912), cum photo.; non Heer 1859.

A. brevilobum Hesse, Haupt-Preisverz. 1903-4: 80 (1903), nom. nud.—Kache in Mitt. Deuts. Dendr. Ges. 28: 226 (1919), pro syn.—Rehder in Journ. Arn. Arb. 19: 85 (Jan. 28, 1938).

The reason why the above synonyms had been invalidated was explained by Rehder (l. c., 1938), and he adopted at that time *A. brevilobum* Hesse. But just 13 days before Rehder, Hara (l. c., 1938) had published *A. nipponicum* Hara, finding that *A. parviflorum* Fr. et Sav. is a later homonym of *A. parviflorum* Ehrh. which is a synonym of *A. spicatum* Lam.

Usually a medium-sized tree up to 18 m. high, 25 cm. in diameter. The bark of trunks and branches is grey, smooth, and in young twigs dark green, smooth and somewhat lustrous. Trees are andro-monoecious, but andro-polygamous condition is also found as the case of *A. ukurunduense*. The writer observed at Mt. Kurohime, Nagano Pref., in 1961, that a number of the trees growing there all have the inflorescences consisting of only male flowers, and he could not find at last any tree having female flowers.

Flowers are out in late-June to mid-July, but in the lower altitudes earlier in early-June, and a cultivated tree blooms even on May 5 (spec.: University Forest of Kyoto—Y. Momotani, 1959, KYO). Flowering seems to be maintained in full bloom for a fairly

long period, and we often see late-flowering trees even in early-August. One inflorescence bears very many flowers amounting commonly to 400 or more, rarely to almost 1000, though the female flowers among them are very few, less than 1/10–1/30 of male flowers.

This species is endemic to Japan and distributed in the high mountaineous regions of Honshu, Shikoku and Kyushu. The northern limit is the vicinity of Mt. Hachimantai and Mt. Iwate both lying on the borders of Iwate Pref. and Akita Pref. in Northern Honshu (spec.: Fuigo-dake, Mt. Hachimantai—Y. Fukuda, 1932, KYO; spec.: Mt. Iwate—Y. Ogura, 1915, TI). The southern limit is the south-eastern corner of Kumamoto Pref., Kyushu (spec.: Mt. Kurobaru, Kuma C.—K. Mayebara, 1927, KYO; spec.: Mt. Ichifusa, Kuma C.—Z. Tashiro, ?, TNS). This maple is not rare in Central to Northern Honshu, but so in Southern Japan, namely in the districts of Kinki, Chugoku, Shikoku and Kyushu. This maple may be said to have somewhat an irregular distribution, lacking in the mountaineous regions as Kitakami, Nasu, Kiso and others where the presence of the tree should be rather natural from the point of view of its horizontal and elevational range, while there is occurrence in Mt. Amagi of the Izu Peninsula.

The trees are usually found at the lower to the middle part of slopes from 1000 m. to 2000 m. above the sea level, and in the Kanto district the center of the distribution is about from 1500 m. to 1800 m. In the Hokuriku district it sometimes occurs from 500 m. in altitude.

12) *Acer distylum* Siebold et Zuccarini in Abh. Akad. Muench. 4-2: 154 (1845).

Hitotsuba-kaede, Maruba-kaede.

A medium-sized tree to 10 m. high, 25 cm. in diameter. The bark of trunks is greyish light brown to yellowish grey, and 1-year twigs are greenish brown, smooth or somewhat flocculous. Trees are andro-monoecious.

Flowers are out in mid-May to early- or mid-June, but late ones in early-July. Fruits are ripe in early- to mid-October, and seeds germinate well in the laboratory without any special treatment.

This species is distributed mostly in the northern half of Honshu, Japan. The southern limit lies on the line from the central part of Fukui Pref., through the mountains of Ibuki (Shiga) and Suzuka (Mie), to the Ôdaigahara Mountains of the Kii Peninsula (spec.: Yasha-ike, Imajô T., Nanjô C., Fukui Pref.—S. Watanabe, 1964, TOFO; lit.: Ôdaigahara—K. Yatoh, 1958, p. 108). The northern limit is the central regions of Iwate and Akita Prefs. (spec.: Todogasaki, Omoi T., Miyako City, Iwate Pref.—M. Kikuchi, 1961, IUM; spec.: the foot of Mt. Iwate—Y. Takahashi, 1898, SAP; spec.: Mae-dake of Mt. Taihei, Taihei V., Minami-akita C., Akita Pref.—S. Muramatsu, 1930, TI).

This maple is generally not very common and especially rather rare in the regions along the Japan Sea side and in the border-regions of the distribution.

The trees are usually found in the upper temperate zone, in the Kanto district from 700 m. to 1400 m. above the sea level, sometimes reaching an elevation of 1600 m., and

in their northern limit from nearly the sea level to about 700 m. high.

The trees are growing on the moderately moist and fertile soils of mountain-sides or the foot of slopes.

13) *Acer rufinerve* Siebold et Zuccarini in Abh. Akad. Muench. 4-2: 155 (1845).

Urihada-kaede.

A. pennsylvanicum subsp. *rufinerve* (Sieb. et Zucc.) Wesmael in Bull. Soc. Bot. Belg. 29: 62 (1890).

A. rufinerve f. 1. *normale* Schwerin in Gartenfl. 42: 454 (1893).

Many allied species forming Sect. *Macrantha* which includes also the following Japanese species, *A. capillipes*, *A. crataegifolium*, *A. Tschonoskii* and *A. micranthum*, are widely distributed in Central to Eastern Asia and North America.

Usually a small tree up to 15 m. high, 20 cm. in diameter, attaining a very big one up to 20 m. high, 70 cm. in diameter. The bark of trunks is outstandingly of somewhat lustrous, thick green with some dark stripes lengthwise, but becomes gradually grey as age advances. 1-year twigs are greenish and brown flocculous with leaves when unfolding, soon turning glabrous. This species is practically distinguished from *A. capillipes* Maxim. as follows: *A. rufinerve*—leaves are dim green to pale green, provided with brown flocculous hairs along main veins beneath or at least with axillary tufts, pedicels of flowers short, ca. 3 mm. long, and fruits large, ca. 4-5 mm. long and across, spherically convexed; *A. capillipes*—leaves somewhat lustrous, dark green, sun-burnedly reddish in the petioles above, glabrous beneath, but provided with an axillary minute membrane at the veins beneath (excl. var. *morifolium*), pedicels of flowers slender, ca. 8-15 mm. long, fruits flat-elliptical, 4-5 mm. long, 3 mm. across.

Momotani (1961: 465-468; 1962 a: 101) noticed that *A. rufinerve* is more closely related to *A. nipponicum* than to most of Sect. *Macrantha* from the view of the folding manner of the cotyledons, the affinity of seed proteins and the structure of the pericarps, and he (1962 b: 180) established the new series *Rufinervia* for this species with some allied species, though the series was still left in Sect. *Macrantha* because *A. rufinerve* has unisexual simple raceme-inflorescences supported with one pair of leaves which condition is one of the important characters of Sect. *Macrantha*, while *A. nipponicum* is included in Sect. *Spicata* having bisexual, spike-like paniculate inflorescences supported with a few, generally not one, pairs of leaves. In fact, there is something in *A. rufinerve* which reminds us of *A. nipponicum*.

Flowers are out usually in late-April to early-May in Southern Japan, and in early- to mid-April in Central to Northern Honshu of Japan, but early flowers in lower altitudes in early-April, and late ones in deep mountains in mid-June or later. That thus the flowering season changes variously corresponding to the localities comes from that this maple occupies wide elevational ranges. For example, in the Kanto district it occurs in the elevational zone from 300 m. to 2000 m. above sea level, the center having some inclination to the lower altitudes.

This species is endemic to Japan and distributed in Honshu, Shikoku and Kyushu. It reaches southward to the Island of Yakushima in Southern Kyushu (spec.: Hananoe-gô to Kurio—S. Hatusima, 1950, KAG; spec.: Yakushima—S. Sako, 1954, KAG). It is also found in the following islands of Southern Japan; Koshiki-jima Isl. of Kagoshima Pref. (spec.: Shimo-koshiki-jima—S. Sako, 1957, KAG), the Gotô Isls. of Nagasaki Pref. (spec.: Nanatsu-dake, Fukue-jima—S. Hatusima, 1954, KAG) and the Oki Isls. of Shimane Pref. (spec.: Goka V.—Furumi, 1927, TI; spec.: Mt. Daimanji, Dôgo—H. Kawasaki, 1957, TI). The northern limit is the vicinity of Mt. Hakkôda in Aomori Pref. (spec.: Mt. Hakkôda—Faurie, 1897, KYO; spec.: Tôriya-bashi to Tsuta, Mt. Hakkôda—H. Takeda & M. Takeda, 1925, SAP). This is one of the commonest maples in Japanese mountains except for Hokkaido and found also in such lower, small islands as Miya-jima Isl. of Hiroshima Pref., Shôdo-shima Isl. of Hyogo Pref. and Kinkazan Isl. of Miyagi Pref.

The trees occur usually on rather dry soils from the middle to upper part of slopes, differing from *A. capillipes* which is found on moderately moist and fertile soils along streams.

14) *Acer capillipes* Maximowicz in Bull. Acad. St.-Pét. 12: 225 (1867).

var. *capillipes*

Hosoe-kaede, Ashiboso-urinoki.

A. pennsylvanicum subsp. *capillipes* (Maxim.) Wesmael in Bull. Soc. Bot. Belg. 29: 62 (1890).

A. capillipes var. *fujisanense* Koidzumi, Rev. Acer. Jap. 21 (1911).

A big tree sometimes attaining up to 25 m. high, 70 cm. in diameter. The bark of trunks is green with some dark stripes lengthwise, becoming gradually greyish brown to dark grey, somewhat fissured, as age advances. 1-year twigs are purplish or pinkish red, lustrous, smooth and often glaucous. Leaves are beautifully red when unfolding, glabrous and provided with a minute membrane at the axil of main veins beneath. Trees are andro-dioecious.

Flowering season is fairly restricted in a short period, that is, from late-May to early-June in Central Honshu. Fruits become ripe in early-October and the seeds germinate easily.

This maple is endemic to Japan and distributed in Honshu and Shikoku. The distribution is almost completely concentrated in the relatively small area of Central Honshu which includes the Prefectures of Nagano, Yamanashi, Gunma, Saitama, Tokyo, Kanagawa and Shizuoka, where this maple is even common, while in the regions other than these it is very rare. Several specimens are collected from the Prefectures of Gifu, Nara, Hyogo, Tokushima and Kochi (spec.: an upper stream of the Yôrô Falls, Gifu Pref., alt. 600 m.—H. Kanai, 1957, TI; spec.: Mt. Ômine, Nara Pref.—Z. Tashiro, 1927, KYO; spec.: Obadani, Kawakami V., Yoshino C., Nara Pref.—S. Sakaguchi, 1931, KYO; spec.: Mt. Rokkô, Kôbe City, Hyogo Pref.—S. Okamoto, 1962, TNS; spec.: Ishitate-yama, Naka C., Tokushima Pref.—S. Kurata, 1960, TOFO; specs.: Ichinotani

National Forest, the eastern foot of Mt. Inamura, Tosa C., Kochi Pref., alt. 1000 m.—T. Yoshinaga, 1931, KYO & Tokuuji, 1935, KYO). The northernmost locality was recently reported from the south-western part of Fukushima Pref. (lit.: the Menoko Moor, Shôwa V., Ônuma C.—M. Mizushima, 1964, p. 347). The distribution pattern of this maple resembles that of *A. Mono* var. *trichobasis* Nakai.

In the center of the distribution, for example, the mountains of Chichibu in Saitama Pref., this maple occupies the elevational range from 600 m. to 1300 m. above the sea level. It grows usually on moderately moist, well-drained and fertile soils along streams.

var. **morifolium** (Koidzumi) Hatusima in Journ. Jap. Bot. 29: 231 (1954).

Yakushima-onaga-kaede.

A. morifolium Koidzumi in Bot. Mag. Tokyo 28: 151 (1914).

A. insulare auct. non Makino, Makino in Bot. Mag. Tokyo 24: 293 (1910), pro parte.

This differs from the typical variety by having less or not lobed broad-ovate leaves without an axillary membrane at the veins beneath. The key-characters adopted by Sugimoto (1961: 295), namely the existence of hairs in ovaries and inflorescences, and the size of flowers and fruits, are questionable. A few specimens of this variety examined by the writer have nothing hairy in ovaries and inflorescences as the typical variety, and it seems to be unable to draw a clear line in the size of fruits between both varieties.

Momotani (1962 b: 180) included *A. morifolium* in his new series, Ser. *Rufinervia* typified by *A. rufinerve*, while *A. capillipes* in the Ser. *Macrantha*. In the point of the appearance of leaves and fruits, however, this maple is allied more closely with *A. capillipes* than with *A. rufinerve*, as noted by Hatusima (l. c., 1954).

This variety is endemic to Yakushima Isl. of Southern Kyushu, Japan. In the native land, flowers are out extremely early in mid- to late-March.

As pointed out by Hatusima (l. c., 1954), this maple has been often confused with *A. insulare* Makino, the cause of which may partly lie in that Makino (l. c., 1910) included erroneously the Island of Yakushima as the locality of *A. insulare* which is only known from the Island of Amami-ôshima and has closer alliance with *A. Kawakamii* in Formosa.

15) **Acer crataegifolium** Siebold et Zuccarini in Abh. Akad. Muench. 4-2: 155 (1845).

Uri-kaede, Me-urinoki.

A. crataegifolium f. l. *typicum* Schwerin in Gartenfl. 42: 455 (1893).

A. cucullobracteatum Léveillé et Vaniot in Bull. Soc. Bot. France 53: 590 (1906).

A. crataegifolium var. *macrophyllum* Hara in Journ. Jap. Bot. 10: 770 (1934).

A small tree up to 7 m. high, 15 cm. in diameter, and often shrub-like. Trees are andro-dioecious.

This is one of the early flowering trees, and we often meet the small, inconspicuous, but lovely, pale-greenish yellow flowers in the spring mountains, when most of other trees don't yet begin to open the buds. The buds of flowers and leaves of this tree

sprout in early- to mid-April, both almost at the same time. Fruits become ripe in autumn. Some dozen fruits in an inflorescence are arranged neatly in the same direction as its pedicels are parallel to the axis of the inflorescence. In young, vigorous shoots, it sometimes happens that the buds sprout untimely from the axils of hornotinous leaves.

Leaves are commonly small about 7 cm. long, 4.5 cm. wide, but rarely there are trees having very big leaves which are twice as large as common ones and such a form is named var. *macrophyllum* Hara, though it is not ranked later by the same author (Hara, 1954: 100).

This species is distributed in Southern Japan, and its range extends from the northern part of Fukushima Pref., through Honshu, southward to Shikoku and Kyushu, ending in the central part of Kyushu.

Northern limit:

spec.: the foot of Mt. Reisen, Sôma C., Fukushima Pref.—H. Hara, 1958, TI;

spec.: Mt. Bandai, Fukushima Pref.—M. Kikuchi, 1960, IUM.

Southern limit:

spec.: Kuwanokitsuru, Hitoyoshi City, Kumamoto Pref.—S. Kurata, 1964, TOFO;

spec.: Nishize V., Kuma C., Kumamoto Pref.—K. Mayebara, 1940, TI.

There are reports in more northern and southern regions of both limits above mentioned, namely from Miyagi Pref. and Kagoshima Pref. (lit.: Fujisone, Tamaura V., Natori, C., Miyagi Pref.—Murai, 1935, p. 75; lit.: Mt. Kirishima, Mt. Takakuma & Mt. Hoyoshi, Kagoshima Pref.—Naito & Kajiwara, 1934, p. 389). This species is almost lacking in the Hokuriku district, and does not occur north of the line linking Kanazawa City, Mt. Hodaka, Mt. Tanigawa, Mt. Nasu, Mt. Bandai and Mt. Reisen.

Trees are common in the lower mountains, and in the Kanto district they are found about 200 m. to 1100 m. above the sea level. They occur mostly at somewhat open places as the banks of streams, road-sides, or young secondary forests.

16) *Acer Tschonoskii* Maximowicz in Bull. Acad. St.-Pét. 31: 24 (1886).

Closely related species are found in China and Japan. This species has two varieties, besides the typical one, var. *rubripes* Komarov in Corea and Manchuria, and var. *australe* Momotani in Southern Japan.

This species is usually distinguished from *A. micranthum* Sieb. et Zucc. native in Japan in the appearance of leaves, in the size and number of fruits, in the length of pedicels and in the size of flowers. The writer examined some distinct specimens of both species in the Herbarium of the National Science Museum, Tokyo and obtained the following data on fruits. (The value is based on a well-developed fruit from each specimen.)

	Size of				Spreading angle of wing (degree)
	pedicel (long) cm.	samara (long) cm.	locule (long) cm.	wing (across) cm.	
<i>A. Tschonoskii</i> var. <i>Tschonoskii</i>	1.1~1.5	1.9	0.7	0.7	110
		2.1	0.8	1.0	90
		2.2	0.8	0.8	100
		2.3	0.85	0.7	25
		1.9	0.7	0.7	100
		2.3	0.85	0.85	30
		2.6	0.9	0.9	100
		2.3	0.8	0.9	50
		2.2	0.75	0.9	90
		2.2	0.8	0.8	30
<i>A. micranthum</i>	0.6 0.5 0.4 0.6 0.5 0.5	1.5	0.7	0.5	160
		1.6	0.65	0.6	160
		1.7	0.7	0.65	160
		1.6	0.7	0.55	100
		1.6	0.7	0.6	160
		1.7	0.6	0.55	150

This table shows that *A. Tschonoskii* has generally larger fruits with longer pedicels and narrower spreading wings. But some of var. *Tschonoskii*, particularly those of Central Honshu, and most of var. *australe* have shorter pedicels near those of *A. micranthum*. In a general way, the leaves of this species are large, wide and rufous-pubescent along veins beneath and in the petioles at least when young, while those of *A. micranthum* are small, narrow and scarcely pubescent or glabrous. The lobes of leaves are short acuminate in var. *Tschonoskii*, and long caudately acuminate in var. *australe* and *A. micranthum* (Fig. 12). But these characters of leaves are somewhat variable and it sometimes happens that both species become so closely similar that the identification is difficult. Fig. 12, d-e offer the examples which have large, wide but caudately acuminate leaves and the intermediate size of fruits and pedicels.

Flowers show decidedly remarkable specific character. In *A. micranthum*, the size of flowers does not reach the half of those in *A. Tschonoskii* and the sepals are very short in comparison with the petals, while the sepals in *A. Tschonoskii* are of the same length (var. *australe*) with or eight-tenths (var. *Tschonoskii*) of the petals.

When, thus, an access is found between *A. Tschonoskii* and *A. micranthum* in some characters, only the character of flowers seems to be most reliable to distinguish them. Such variations are likely to occur in *A. Tschonoskii* rather than in *A. micranthum* which is considered fairly invariable. In this connection, var. *rubripes* native in Corea and Manchuria has leaves which are wide, short lobed and finely but not so much incisedly serrate, large and few flowers like the Japanese varieties, and small fruits with short pedicels as var. *australe* (Fig. 12, i).

var. **Tschonoskii**

Mine-kaede.

A. pellucidobracteatum Léveillé et Vaniot in Bull. Soc. Bot. France 53: 592 (1906).

A. Tschonoskii var. *macrophyllum* Nakai in Yatsu, Nikko-no-shokubutsu-to-dôbutsu 167 (1936), nom. nud.

A. Tschonoskii f. *macrophyllum* (Nakai) Sugimoto, New Keys Jap. Tr. 456 (1961).

A. capillipes auct. non Maxim., Sargent in Gard. For. 6: 153 (1893).

A. Meikets auct. non Siebold, Nakai in Bull. Sci. Mus. Tokyo 31: 71 (1952).

A small tree up to 13 m. high, 15 cm. in diameter. The bark of trunks is grey, and young twigs are reddish brown and glabrous.

This is andro-dioecious species. There is rarely found, however, andro-monoecious condition. The writer observed a flowering tree of this species at Mt. Kurohime in Nagano Pref., on July 13 in 1961, which was quite male on the whole except for the lowest poor branch having only some female flowers. And these male and female flowers in a tree seemed both completely functional. There is found another case in some herbarium specimens in which male and female flowers share the same branch or even the same inflorescences (spec.: Sukayu Hot-spring, Mt. Hakkôda, Aomori Pref.—A. Kimura & al., July 2, 1952, TUS; spec.: *ibid.*—A. Kimura & al., 1955, TUS; spec.: Ôdake, Mt. Hakkôda—K. Hosoi, July 9, 1952, TI). The presence of both male and bisexual (although functionally female) flowers in an inflorescence is the fundamental condition in the andro-monoecious maples. But the presence of male and female inflorescences in a tree or a branch as seen in the present maple is not found in any inflorescence type of maples. Therefore this bisexual phenomenon may be considered only as accidental caused by something unusual like physiological unbalance.

Flowers are usually out in early-June to early- or mid-July. Fruits seem to become ripe in autumn.

The area of this maple is spread almost continuously from the Southern Kuriles, through Hokkaido, to Central Honshu of Japan. It does not occur in Saghalien. It reaches north-eastward to Etorofu Isl. of the Kuriles (spec.: Shana—T. Kawakami, 1898, SAP; Bettoufu to Shamanbe—K. Miura, 1906, SAP) and northward to the northern part of Teshio Prov. in Hokkaido (spec.: Mt. Isosan-nupri, Teshio C.—M. Tatewaki, 1931, SAP). It is also found in Okushiri Isl., but not in the Islands of Rishiri and Rebun. In Honshu, it is distributed along the high mountain regions and ends in the central range of the Chubu district (spec.: Mt. Arashima-dake, Ôno City, Fukui Pref., alt. 1300 m.—G. Murata & T. Shimizu, 1954, KYO; spec.: Mt. Ena, Gifu Pref.—S. Kurata, 1955, TOFO; spec.: *ibid.*, alt. 2000 m.—H. Kanai, 1957, TI; spec.: Senzu National Forest, Shizuoka Pref.—S. Kurata, 1949, TOFO). This maple is native and common throughout the sub-alpine zone of higher mountains with *A. ukurunduense* Trautv. et Mey. In the Kanto district, it occurs from 1400 m. in elevation, continuously from 1600 m., and attains the forest limit. Trees are usually found in the middle to the upper part of slopes.

var. **australe** Momotani in Act. Phytotax. Geobot. 19: 72 (1962).

Nangoku-minekaede.

Momotani (l. c.) found such differences in *A. Tschonoskii* in Southern Japan as compared with the typical form in Northern Japan as follows, and named it var. *australe* Momotani.

var. *Tschonoskii*: the lobes of leaves are short acuminate; the sepals of flowers are eight-tenths as long as the petals; samaras are large, 1.9–2.3 cm. long, the pedicels 1.1–1.5 cm. long (Fig. 12, a–c).

var. *australe*: the lobes of leaves are long, caudately acuminate; the sepals of flowers are as long as the petals; samaras are small, 1.4–1.8 cm. long, the pedicels 0.4–0.8 cm. long (Fig. 12, f–h).

This maple is known from such mountain masses as Ômine (Nara Pref.), Tsurugi (Tokushima), Ishizuchi (Ehime) and Kujû (Oita). The last named locality was the first report of this species from Kyushu, which was made by Momotani (l. c.) based on a sterile specimen. This locality must be confirmed by the flowering specimens.

As previously stated, some of *A. Tschonoskii* from Central Honshu to a part of the Tohoku district have caudately acuminate leaves and short pedicels of fruits like this variety, so that the area of var. *australe* may be extended into these regions, after the careful examination of the flowers and other correlating characters.

Flowers are seen in Southern Japan from late-May to early-June.

17) ***Acer micranthum*** Siebold et Zuccarini in Abh. Akad. Muench. 4-2: 155 (1845).

Komine-kaede.

Usually a small tree up to 10 m. high, 15 cm. in diameter, but rarely attaining 18 m. high, 35 cm. in diameter. The bark of trunks is grey, and 1-year twigs are purplish brown, smooth and glabrous. Trees are andro-dioecious.

Flowers are out in late-May to mid-June and late ones in early- or mid-July. The flowering season is somewhat earlier than *A. Tschonoskii*, maybe due to the altitudinal difference of their occurrence. The size of flowers is one of the most important key-characters to distinguish this from *A. Tschonoskii* (Fig. 12, c & l). Fruits seem to be ripe in autumn.

There is rarely found such a big leaf in young vigorous shoots as 16 cm. long, 20 cm. wide (spec.: Mt. Hayachine, Iwate Pref.—S. Sugaya & al., 1916, TUS).

This species is endemic to Japan and distributed all throughout Honshu, in Shikoku and Kyushu. The northern limit lies in Aomori Pref. in the northern end of Honshu (spec.: Mt. Hakkôda—K. Hosoi, 1953, TI; spec.: Mt. Iwaki—N. Kinashi, 1902, KYO). It reaches south-westward to Mt. Takakuma and Mt. Kirishima in Kagoshima Pref., Kyushu (spec.: Mt. Takakuma—S. Kurata, 1957, TOFO; spec.: Mt. Kirishima—T. Naito & al., 1915, KAG). It is also found in Mt. Unzen in Nagasaki Pref. (spec.—Z. Tashiro, 1906, TNS; spec.—A. Kimura, 1925, TUS). In Shikoku it is known from the Odamiyama mountains and Mt. Ishizuchi in Ehime Pref., and from Nanogawa Village in Kochi Pref. In the regions along the Japan Sea side of Northern Japan, that is, the Prefectures of Toyama, Niigata, Yamagata and Akita, it is not very common.

In the Kanto district this maple occurs from 700 m. to 1800 m., rarely to 2300 m. above the sea level, but it much decreases the number above 1500 m. and gives place to *A. Tschonoskii*.

It is found in somewhat sunny places in the forest from the middle to the upper part of slopes.

18) ***Acer nikoense*** Maximowicz in Bull. Acad. St.-Pét. 12: 227 (Nov. 1867).

Megusurinoki, Chyōjanoki.

A. Maximowiczianum Miquel in Arch. Néerl. Sci. Nat. 2: 472 & 478 (Dec. 1867).

Negundo nikoense (Maxim.) Nicholson in Gard. Chron. n. s. 16: 815 (1881); non Miquel 1865.

Negundo? *nikoense* Miq. (1865-6: 90) is a synonym of *A. cissifolium* (Sieb. et Zucc.) K. Koch.

Closely related species are found in Corea, Manchuria and Central China. They are characterized by having 3-foliolate leaves and few-flowered, simple-racemose and terminal inflorescences on leafy branchlets.

A big but slender tree to 25 m. high, 70 cm. in diameter. The bark of trunks is greyish brown and young twigs are yellowish to reddish brown and white pilose. Trees are andro-dioecious.

Owing to the scarcity and tallness of this tree, few specimens with flowers have been collected (spec.: Tamura C., Fukushima Pref.—Y. Hattori, May 2, ?, ♂, KYO; spec.: Nikko, Tochigi Pref.—G. Koidzumi, May 7, 1912, ♂, TI). The writer collected also some male flowers with poor leaves on May 2 in 1962, in the grounds of Botanical Gardens of the University of Tokyo. Fruits are ripe in autumn. The seeds are firmly covered with the hard and thick pericarp which may make the germination difficult.

This species is endemic to Japan and distributed in Honshu, Shikoku and Kyushu. The northern limit is the central part of Miyagi and Yamagata Pref. (spec.: Mukaiyama, Sendai City—Y. Ogura, 1915, TI; spec.: *ibid.*—A. Kimura, 1948, TUS; spec.: Sekiyama Pass, Ōsawa V., Miyagi C.—Z. Tashiro, 1935, KYO; lit.: Higashi-gō V., Kita-murayama C., Yamagata Pref.—Y. Yuhki, 1934, p. 56). The southern limit lies in the central highland of Kyushu (spec.: Mt. Iwaudo, Momiki V., Yatsushiro C., Kumamoto Pref.—K. Nakashima, 1932, Kyushu Univ.; spec.: Mt. Shiraiwa, Shiiba V., Higashi-usuki C., Miyazaki Pref.—S. Hatusima & S. Sako, 1961, KAG).

The trees are not very rare in the Kanto district, occurring from 500 m. to 1500 m. above the sea level, but seldom seen in the Hokuriku district, almost as in Kyushu.

This species is mostly found on moderately moist, well-drained and fertile soils in the downslopes.

19) ***Acer carpinifolium*** Siebold et Zuccarini in Abh. Akad. Muench. 4-2: 154 (1845).

Chidorinoki, Yamashiba-kaede.

A. carpinifolium f. *magnificum* Sugimoto, New Keys Jap. Tr. 456 (1961).

Since Koidzumi (1911 a: 17) established the new section *Carpinifolia*, to this species has been given an isolated position from any other species. Especially, Momotani (1962 b: 188) considers that this species composes one of the three subgenera of the genus *Acer*. At any rate, the leaves are remarkably characteristic with a extreme resemblance to those of the genus *Carpinus*, and its allied species is found nowhere.

A small tree up to 10 m. high, 15 cm. in diameter at most. The bark of trunks is grey to dark grey, and in young branches and twigs light brown and smooth. Trees are andro-dioecious.

Pale or greenish-yellow flowers begin to bloom in late-April to early-May and end in mid- to late-May. Fruits become ripe in October, and the easy germination of seeds is obtained in the laboratory.

This species is endemic to Japan and distributed in Honshu, Shikoku and Kyushu. The northern limit is the central part of Iwate Pref. (spec.: Yamaya, Nagaoka V., Shiba C.—M. Kikuchi, 1957, IUM). The southern limit is the southern part of Kumamoto Pref., Kyushu (spec.: Nishi V., Kuma C.—K. Mayebara, 1927, TNS; spec.: Mt. Yatake, Hitoyoshi City—S. Kurata, 1964, TOFO). This species occurs very rarely in the Hokuriku district and does not go farther northward than the western end of Niigata Pref. (lit.: Mt. Kurohime, Niigata Pref.—Funabiki & Maruyama, 1953, p. 90). This is a mountaineous species as most species of the genus *Acer* and does not occur near the coast nor in small islands, only except for Kinkazan Isl. of Miyagi Pref. (specs.—G. Koidzumi, 1928, KYO; T. Inokuma, 1933, TOFO; S. Sugaya & al., 1955, TUS; M. Kikuchi, 1961, IUM).

The trees are found at the moist places of stream-sides but sometimes in the mesic forest of the flank. In the Kanto district, they occur from 200 m. to 1300 m. above the sea level and common in the zone between 500 m. and 1000 m.

20) ***Acer argutum*** Maximowicz in Bull. Acad. St.-Pét. 12: 226 (1867). Asanoha-kaede.

A. diabolicum subsp. *argutum* (Maxim.) Wesmael in Bull. Soc. Bot. Belg. 29: 63 (1890).

A. palmatum var. *plicatum* Léveillé in Bull. Soc. Bot. France 53: 592 (1906).

A. argutum f. *latialatum* Sugimoto, New Keys Jap. Tr. 456 (1961).

A. barbinerve auct. non Maximowicz, Miquel in Arch. Néerl. Sci. Nat. 2: 476 (1867), quoad pl. Jap.

Closely related speceis are found in Corea, Manchuria, Central China and Himalaya. This species is clearly distinguished from *A. barbinerve* of Corea and Manchuria by its character, besides the size and the wing-angle of fruits, that the leaves are finely and doubly serrate, while in the latter coarsely and singularly serrate.

A small tree to 8 m. high, 10 cm. in diameter. The bark of trunks is grey or greyish brown, and 1-year twigs are purplish brown, pubescent. Trees are andro-dioecious. The inflorescences, both male and female, are from the lateral buds of last

year branchlets, and never from the terminal buds, which are always applied only for the vegetative growth.

Flowers are out almost at the same time with leaves from early- to late-May, but early ones from late-April. Some dozen fruits, with horizontally spreading wings, in an infructescence are regularly arranged in a row as those of *A. crataegifolium*, the wings of fruits being parallel one another and falling at right angles with the axis of the infructescence.

This species is endemic to Japan and distributed in Honshu and Shikoku, and not reported from Kyushu. There is a distinct herbarium specimen of this species in which a locality of Manchuria is labeled (spec.: Chilin, Manchuria—M. Nishimura, 1910, TI), but there must be something amiss in this, because this species has never been reported from countries other than Japan. The northern limit is the central to southern part of Fukushima Pref. (spec.: Mt. Ôtakine—H. Hara, 1955, TI; spec.: Mt. Kasshi, Saigô V., Nishi-shirakawa C.—H. Kanai, 1957, TI). In the central mountaineous regions of the Kanto and the Chubu district, especially in Saitama, Yamanashi and Nagano (southern half) Prefs., this species is fairly common. It is scarcely found, however, in the northern regions of the same districts and in the Hokuriku district, showing the rare examples of the occurrence at Mt. Kurohime in northern part of Nagano Pref. (spec.—S. Kurata, 1961, TOFO) and Mt. Myôko in the southern part of Niigata Pref. (spec.—K. Watanabe, 1894, TNS). In South-western Honshu, the Kansai and the Chugoku district, and in Shikoku, this species occurs scatteredly in the regions of high mountaineous ranges. The southern limit lies in Mt. Kanmuri on the borders of Shimane, Hiroshima and Yamaguchi Prefs. (spec.—Ono, 1929, KYO) and in the Odamiyama mountains, Ehime Pref., Shikoku (spec.: Onigausu—S. Kurata, 1960, TOFO).

This maple occurs commonly in the upper temperate to the lower subalpine zone, and in the central part of the Kanto district from 800 m. to 1900 m. above the sea level, having its center from 1000 m. to 1500 m.

The trees are commonly found at stream-sides, but occasionally in the moist forest of down-slope.

21) *Acer diabolicum* Blume ex K. Koch in Miq., Ann. Mus. Bot. Lugd.-Bat. 1: 251 (1864). Oni-momiji, Kaji-kaede.

A. purpurascens Franchet et Savatier, Enum. Pl. Jap. 2: 320 (1877).

A. pulchrum Maximowicz ex Lavallée, Arb. Segrez. 29 (1877), nom nud.

A. diabolicum var. *purpurascens* (Fr. et Sav.) Rehder in Sargent, Tr. Shr. 1: 134, in adnota (1903).

A. diabolicum f. *purpurascens* (Fr. et Sav.) Rehder, Bibl. Cult. Tr. Shr. 426 (1949).

Some related species are found in China and Eastern Himalaya. They are remarkably characterized by having simple-raceme inflorescences from the lateral and leafless buds of last-year branchlets.

According to Pax (1902: 70-71) or Rehder (1940: 583), *A. purpurascens* Fr. et Sav.

points to a form whose flowers are purple and whose leaves are reddish when unfolding. These characters, however, seem to be generally considered unimportant, and also a difference in the length of locule-part between *A. purpurascens* and the present species is not so distinguishable, though Pax adopted this character in the key.

A medium-sized tree to 18 m. high, 35 cm. in diameter. The bark of trunks is grey, and young twigs are yellowish brown and pilose, soon becoming glabrous. Trees are dioecious, lacking stamens in female flowers.

Flowers are out, almost at the same time with or somewhat earlier than leaves, in mid-April to mid-May, and they are commonly yellow, greenish yellow, or purplish red. Fruits become ripe in autumn, and we often see them still remaining on naked trees through winter. In Botanical Gardens of the University of Tokyo, pretty many seedlings of natural growth are found around a mother-tree.

The species is endemic to Japan and distributed in Honshu, Shikoku and Kyushu. It reaches northward to the northern or central part of Miyagi Pref. (specs.: Kinkazan Isl.—G. Koidzumi, 1928, KYO; T. Inokuma, 1933, TOFO; S. Sugaya & al., 1955, TUS; M. Kikuchi, 1956, IUM; S. Kurata, 1961, TOFO; spec.: Tenshu-dai, Sendai City—A. Kimura, 1932, TUS; spec.: Sendai City—E. Uematsu, 1941, KYO; spec.: Motogoya to Futakuchi Pass, Akifu V., Natori C.—H. Ôhashi, 1960, TUS; lit.: Onikôbe, Tamatsukuri C. & Ono V., Kami C.—Murai, 1935, p. 75). The southern limit is the southern part of Kumamoto Pref. (spec.: the foot of Mt. Kunimi, Shiraito V., Kami-mashiki C.—K. Ogata, 1961, TOFO; lit.: Youra V., Kuma C.—Mayebara, 1931, p. 36), and it reaches westward to Nagasaki Pref. (spec.: Kyôgatake, Mt. Tara—S. Kurata, 1961, TOFO). This maple does not occur in the Hokuriku district, and is rather rare in the Southern Japan. It is not very common even in the Kanto district which is considered as the center of the distribution, and in Nagano Pref. and northward it comes to be scarcely seen.

It occurs in fairly open and sunny places, and in the Kanto district from 400 m. to 1300 m. above sea level.

Bean (1929: 141) mentions "The curious specific name is said to refer to the two horn-like, persistent styles attached to the inner side of the nutlets between the wings." The character is certainly recognized more remarkably in this than in the other maples, and in addition to this, the fruits covered with bristle hairs in the part of locules emphasize the diabolic impression. The Japanese common name "*Oni-momiji*" meaning 'devil maple', which was cited first in 1825 by Mizutani, might be derived from the same characteristics, though Makino's explanation (1940: 357) saying that the name is based on the wild and violent appearance of leaves may be more acceptable.

22) *Acer pycnanthum* K. Koch in Ann. Mus. Bot. Lugd.-Bat. 1: 250 (1863).

Hananoki.

A. rubrum var. *pycnanthum* (K. Koch) Makino in Bot. Mag. Tokyo 26: 148 (1912).

A. rubrum auct. non L., Makino in Bot. Mag. Tokyo 16: (93) (1902)—Koidzumi, Rev. Acer. Jap. 27, t. 16 (1911)—Matsumura, Ind. Pl. Jap. 2-2: 331 (1912).

A closely related species, *A. rubrum* L. with several varieties, is distributed in the eastern part of North America from the Atlantic Ocean to the Prairies and from Florida to southern Canada (Hutnik & Yawney, 1961: 1). *A. pycnanthum* is sometimes treated as a variety of *A. rubrum*. In the fossil, allied species are also found in Europe, Saghalien (Pax, 1885: 348-351, 1902, Tab. 1), Kamchatka, Greenland, Alaska and Pacific North America (Pojarkova, 1933: 257).

A big tree up to 25 m. high, 1 m. in diameter, with many branches and twigs. It blooms early in April before the leaves. As every twig has many, small and reddish flowers which are in fascicles from lateral leafless buds, the whole tree, at the flowering time, looks very beautiful. Trees are andro-dioecious. After flowering, the staminate inflorescences, with still remaining several pairs of bud scales, fall off from their bases, and then leaf-buds begin to sprout about the middle of April. In the flowers of female trees, after polination, the pedicels show enormous and rapid growth and reach to 3-10 cm. Fruits become ripe very early in comparison with any other maples, in early- to mid-May and soon flutter down, wearing long pedicels, to the grounds. Leaves of female trees seem to be out somewhat later than those of male trees.

The distribution is almost restricted in a small area within a circle of about 60 km. in diameter, centering around Mt. Ena on the borders of the Prefectures of Gifu and Nagano, in which the regions of the south-eastern part of Gifu Pref., the south-western part of Nagano Pref. and the northern end of Aichi Pref. are included*. Another locality came to be known from the Iyari Moor, Ômachi City, the northern part of Nagano Pref. about 120 km. north of Mt. Ena (spec.—H. Okuhara, 1962, TOFO; spec.—R. Yamazaki, 1962, TNS; spec.—H. Takahashi, 1962, TNS).

This maple is not very common even in the center of the distribution and usually occupies moist and somewhat swampy places in elevation of 400 m. to 500 m. above the sea level.

The trees produce easily adventitious buds, and therefore, when felled down, they are capable of sprouting sturdy and vigorous saplings from the stumps.

The trees have been cultivated for a long time (Makino, 1902), and in this case they grow well also in dry places. Some big trees, both wild and cultivated, are designated as natural monuments by the Government (Miyoshi, 1936: 330-335).

- 23) *Acer cissifolium* (Siebold et Zuccarini) K. Koch in Miquel, Ann. Mus. Bot. Lugd.-Bat. 1: 252 (1864). Mitsude-kaede.
Negundo cissifolium Siebold et Zuccarini in Abh. Akad. Muench. 4-2: 159 (1845).
Negundo? nikoense Miquel in Ann. Mus. Bot. Lugd.-Bat. 2: 90 (Prol. Fl. Jap. 22) (1866).

* A detailed map drawn up by J. Hama in 1921 on the distribution of this maple in Gifu Pref. is preserved in the Herbarium of Faculty of Science, University of Tokyo. Having visited the Ena region and checked up the map, the writer ascertained that it had been based on the very correct data. Kôno (1927) also gave a full report on the habitat of this maple in the Shimo-ina region of Nagano Pref. The map (Map 29) prepared here depends mostly on these data and some other literatures.

Crula cissifolia (Sieb. et Zucc.) Nieuwland in Amer. Midl. Nat. 2: 141 (1911).

Related species are found in Central China and North America. They are characterized by having leaves being foliolate in 3- to 9-leaflets and inflorescences from lateral, poorly leafy or leafless buds on branchlets, and included systematically in the group represented by *A. Negundo*. *A. cissifolium* is distinguished practically from *A. Negundo*, which is often cultivated in Japan, as follows: *A. cissifolium*: leaves invariably 3-foliolate, inflorescences, both male and female, long simple racemes, pedicels of flowers and fruits short, 3-9 mm. long; *A. Negundo*: leaves 3-7-(9)-foliolate, leaflets somewhat wider than those of the former species, male inflorescences fascicle-like, simple racemes, female ones long, simple racemes, pedicels of flowers and fruits long, usually 3 cm. long. Sterile specimens with 3-foliolate leaflets of *A. Negundo*, however, are sometimes misjudged to be *A. cissifolium*. It is noteworthy that another species in Central China, *A. Henryi*, has very short pedicels 1-2 mm long.

A. cissifolium is a big, but slender tree up to 20 m. high, 50 cm. in diameter. The bark of trunks is yellowish grey, and in 1-year twigs green or sunburntly reddish brown and pubescent. Trees are dioecious.

Flowers are out nearly at the same time with leaves in mid-May to late- or early-June, but rarely toward the end of April. Fruits are ripe in early-October in the Kanto district of Honshu and the seeds germinate easily in the laboratory.

This species is endemic to Japan and distributed in Kyushu, Shikoku, Honshu and Hokkaido. The southern limit is the southern part of Kumamoto Pref., Kyushu (specs.: Mt. Kunimi, Yatsushiro C.—K. Nakashima, 1937, TNS; K. Ogata, 1961, TOFO; lit.: Ue V. & Kume V., Kuma C.—Mayebari 1931, p. 36). In Kyushu and Shikoku, it is found not very much, occurring only in the central mountaineous regions. In Central and Northern Honshu, it is fairly common. In Hokkaido, the distribution is almost restricted to the two regions, the southernmost part of the Oshima Prov. and the region along the southern coast of the Hidaka Prov., which are geographically a little separated from each other. In the latter region, at least, this maple is never very rare, though big trees seem not to be found. Another locality of this species is known in Mt. Yūbari in the southern part of the Ishikari Prov. (spec.: Mt. Yūbari—S. Ishikawa, 1896, SAP). Tatewaki (1960: 43-52) gives a full explanation on the distribution of some plants including this species which have their northern limits in these regions of Hokkaido.

In the Kanto district of Central Honshu, this maple occurs from 200 m. to 1300 m. above the sea level, decreasing the elevation as it goes north, and in Iwate Pref. of Northern Honshu from near the very coast of the Pacific to about 700 m. in the central mountains.

Trees are usually found in somewhat open and moderately moist places as stream-sides or road-sides.

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本邦産カエデ科樹木の樹木学的研究

大学院学生 緒 方 健

摘 要

I 本論文は日本産カエデ科樹木の分類およびそれに基づいた種の分布を知ることがを目的とし、とくに後者に重点がおかれている。日本産とは、ふつうに日本植物区系に属すると考えられている南樺太、南千島から北海道、本州、四国、九州を通じて屋久島までの地域を意味している。この地域において、筆者は23種、11変種、12品種のカエデ科樹木を認めた。種の分類、識別的性質を示すために一覧表形式がとられている。また、識別の比較的困難なイタヤカエデ類、イタヤメイゲツ・オオモミジ類、ミネカエデ類については葉・果実などの図を用いて説明した。変種以上のものの分布図を作成した。分布の資料は、一部を信頼できる文献によったほかはすべて腊葉標本を検することから得た（分布図には、文献によった地点は○で記されている）。それらの標本は、鹿児島大学、京都大学、東京大学理学部、同農学部、東北大学、岩手大学、北海道大学、国立科学博物館に所蔵されているもの、および筆者が採集したものである。本文中では、分布、種の若干の性質と変品種についての説明等を行なった。

II 分類学的考察：種の順序は、近縁のものからなるグループ毎に、一応系統学的意味を考慮して（とくに花の性質を重視して）配列した（しかし、系統学上の問題に関しては、今後くわしく追求するつもりで本論文には論じられていない）。

1. イタヤカエデ類。わが国には1種に属する7変種が産するが、これらは、互いに形態的差違が明瞭でかつ分布も異なるので、それぞれを独立の種とすることも可能である。a. エゾイタヤは *Acer Mono* の基準形であると推定される。b. 従来の“エンコウカエデ”は“イタヤカエデ”の幼形であるという水島 (1956b) の説は、両者の分布を調べた上からも妥当である。c. 従来の“イトマキイタヤ” (*var. Savatieri*) にはエゾイタヤとの混同がある。ここでは、*var. trichobasis* の学名を用いる。

2. イタヤメイゲツ。a. コハイタヤメイゲツ (*var. tsusimense*) は区別しない。b. エゾノイタヤメイゲツ (*var. yezoense*) は、ハウチワカエデの変種とされたモミジハウチワ (*A. japonicum var. stenolobum*) とともに、ハウチワカエデとオオモミジの雑種であると考えられる。

3. ふつうハウチワカエデの変種とされている シナノハウチワ (*A. circumlobatum*) は全く区別できない。

4. イロハモミジはオオモミジ類とは別種と考える。

5. オオモミジ類。 a. この類はオオモミジ, ナンプコハモミジ, ヤマモミジの3変種に分ける。 b. ヤマモミジの分布は本州北部の日本海側(青森から福井まで)に限られ, それ以外の地域からの多くの報告は誤認と思われる。 c. ヤマモミジの品種とされたミヤジマカエデはオオモミジの品種フカギレオオモミジと同じものである。

6. カラコギカエデは朝鮮, 満州にある *A. Ginnala* の変種と考える。

7. ヤクシマオナガカエデをホソエカエデよりもウリハダカエデに近いとする桃谷(1962b)の説には同意できない。ここでは, 初島(1954)と同様ホソエカエデの変種とする。

III 地理分布: 本文中では分布を概観したほか, 南限, 北限など主要な分布地における採集記録をあげた。

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Appendices

Table 1—3

Figure 1—12

Map 1—30

Explanation: Solid marks (●, ▲) show the localities which were verified by examining specimens, while open marks (○, △) are those taken from reliable literatures.

Table 1 The Characters of

Specific name (Japanese name)	Bud-scale (pairs)	Sexuality	Inflorescence					Flower			Size (w×l) of		
			Type	Position	Pre-lvs (pairs)	Average no. of		No. of					
						fls	frs	pts	sps	sts	lc (mm.)	wing (mm.)	
Mono (イタヤカエデ)	5-8-imbricate	♂♀ (キ♂?)	compound	terminal on elongated twigs with one or a few pairs of lvs	-2, 3-	10-100	-3-30	5	5	8	variable (Table 2)		
Miyabei (クロビイタヤ)			broad loose- fld. panicle			-15-	3-8	5	5	8	8×8	10×22	
Sieboldianum (イタヤメイゲツ)	5-valvate		corymboso- panicle		1	15-20	4-8	5	5	8	4×5	7×15	
japonicum (ハウチワカエデ)						10-15	-5-	5	5	8 (7)	4×5	8×20	
tenuifolium (ヒナウチワカエデ)						-10-	1-3-	5	5	8 (6, 7)	4×5	7×15	
Shirasawanum (オオイトヤメイゲツ)						10-20	5-10	5	5	8	5×6	9×18	
palmatum (イロハモミジ)						10-20	-5-	5	5	8 (6, 7)	2.5×3.5	6×13	
amoenum (オオモミジ)						15-30	5-10	5	5	8	4×5	8×18	
Ginnala (カラコギカエデ)						6-9-imbricate		broad dense- fld. panicle		-2, 3-	30-150	10-40	5
ukurunduense (オガラバナ)	2, 3-valvate		spike-like elongated panicle			100-200	40-80	5	5	8 (7, 9)	4×4	5×13	
nipponicum (テツカエデ)	2-valvate					400-1000	20-40	5	5	8 (9)	7×8	13×25	
distylum (マルハカエデ)					1	40-100	-7-20	5	5	8 (7)	6×7	9×25	
rufinerve (ウリハダカエデ)		♂キ♀ (♂キ♀)	simple			-15-	-15-	5	5	8	5×5	8×17	
capillipes (ホソエカエデ)			raceme			20-50	20-50	5	5	8 (6, 7)	3×4	5×11	
crataegifolium (メウリノキ)						-10-	-10-	5	5	8	4×7	7×15	
Tschonoskii (ミネカエデ)						-10-	-10-	5	5	8	6×8	8×14	
micranthum (コミネカエデ)						20-30	20-30	5	5	8	5×7	6×13	
nikoense (メグスリノキ)	8-15-imbricate			few-fld. raceme			3-5 (♂)	3-	6	6	12 (11, 14)	9×10	14×30
carpinifolium (チドリノキ)	8-12-imbricate			raceme			-15- (♂)	-7-	0-4(♂) 4(♀)	4 (5)	5, 6 (4, 8)	5×9	9×20
argutum (アサノハカエデ)	2-valvate		fascicled raceme (♂) raceme (♀)	lateral on last-year twigs	0 (♂) 1 (♀)	7-10 (♂)	-10-	4	4	4 (♂) 0-2(♀)	5×6	9×18	
diabolicum (オニモミジ)	8-12-imbricate		raceme		0	5-11 (♂)	3-9	connate (♂) 4, 5(♀) 4, 5(♀)		8(9)(♂) 0 (♀)	8×8	10×25	
pycnanthum (ハナノキ)	5-7-imbricate		fascicle (cyme)			5-10 (♂)	4-6	0-5(♂) 5(♀)	5 (6)	5, 6	5×6	9×20	
cissifolium (ミツデカエデ)	2-valvate		raceme		0 (1)	20-40	20-40	4	4	4 (♂) 0 (♀)	5×8	7×18	

-3, -3-, 3-5 and 3- mean respectively 3 or a little less than 3, about 3, 3 to 5 and 3 or a little more than 3.

the Japanese species of *Acer*

Fruit			Leaf					Hairiness on 1-year twig	Tree size	Others
Wing-angle (degree)	Appearance of lc	Pedice (mm.)	No. of lobe	Blade (w×l) (cm)	Petiole Blade (length)	Serration	Hairiness on undersurface			
	flat	—	3-9	variable	2/3-5/3	entire	hairy or glabrous*	pilose or glabrous*	small to big	*see Table 2
180	flat*	—	5	14×12	2/3-1	obtusely dentate	pubescent	pubescent when young	big	*locule-part thick pilose or not, according to varieties, see p. 15
130-160	convex, veined	—	(7)-9-	7×5	2/3-1	double	oft. thin villose along main veins	smt. white villose	middle	1-year twig and lf more or less hairy when unfolding
0-160		—	9-11	13×10	-1/3-	rough double	nearly glabrous	glabrous	middle	
90-120		—	-11-	5.5×5	-4/5	incisedly double	glabrous	glabrous	small	
160-180		—	11-13	9×6.5	-1-	fine double	thin villose along main veins	glabrous	big	
120-160	(not veined)	—	5-7	5×4.5	4/5-1	double	glabrous	glabrous	big	pericarp thin, weak and not veined
90-150 (0-180)		—	5-9	8×7	1/2-4/5	single or double	glabrous	glabrous	middle to big	
0-45	concave	—	1-3	5×8	1/3-1/2	smw. irregular	oft. pubescent along main veins	glabrous	small to middle	
0-45	concave	—	5-(7)	12×11	-2/3-	incisedly rough	thick or thin villose*	pubescent	small to middle	*variation according to forms, see p. 30
-90-	spherical	—	5	15×13	2/3-1	fine double	nearly glabrous	glabrous	middle	1-year twig and lf brown flocculous when unfolding
0-90	spherical	—	not divided	9×13	1/3-1/2	low obtuse	glabrous	glabrous	middle	
70-120	spherical	2-5	3-(5)	11×10	1/4-2/5	fine smw. irregular	nearly glabrous*	glabrous	middle	*with minute brown-hair-tufts at axils of main veins
90-150	spheroidal	8-15	1-3-(5)	11×13	1/3-2/3	fine smw. irregular	glabrous*	glabrous	big	*with minute membrane at axils of main veins
180	flat, smw. concave	5-10	1-3-(5)	3.5×5.5	1/3-1/2	low single	glabrous	glabrous	small	frs arranged in the same direction along axis of infl
30-110		11-15 (4-8)*	5	9×7	-2/3-	incisedly double	oft. brown flocculos along main veins	glabrous	small to middle	fl large, ca. 9 mm. in diameter *var. australe
-160- (100)		-5-	5	6×6	1/3-1	incisedly double	usu. glabrous	glabrous	small to middle	fl small, ca. 4 mm. in diameter
90-130	convex	-10-	3-folio- late	4.5×11	-2/3-	obtusely dentate	thick or thin villose	thick or thin villose	big	petiolule of terminal lflet -8-mm. long, lateral lflet sessile
90-130	flat	20-30	not divided	5×13	-1/8	consp. double	pubescent along main veins	glabrous	small	lf resembles one of Gen. Carpinus, with parallel veins
150-180	flat, smw. veined	20-30	5-(7)	9×8	(1/3)-1-(2)	consp. double	pubescent along main veins	pubescent	small	frs arranged in the same direction neatly along axis of infl
0-30	convex, bristled	5-30	5	12×10	2/3-4/5	dentately rough	pubescent when young	pubescent when young	middle	
30-60	flat	6-10	1-3	6.5×6	1/2-1	smw. irregular	glabrous or pubescent along main veins	glabrous	big	lf glaucous beneath
30-60	flat, veined	3-6	3-folio- late	3.5×8	-1-	rough	white tufty along main veins	pubescent	big	petiolule -15-mm. long in terminal lflet, -5-mm. in lateral one

Abbreviations ♂♀: andromonoecious, see p. 3 ♂♂♀♀: androdioecious ♂♀♂♀: dioecious fl, fls: flower, -s sp, sps: sepal, -s fr, frs: fruit, -s pt, pts: petal, -s st, sts: stamen, -s lc, lcs: locule, -s lf, lvs: leaf, -s pre-lvs: number of the leaf-pair on the twig with an inflorescence fld.: flowered usu.: usually smt.: sometimes smw.: somewhat oft.: often occ.: occasionally consp.: conspicuously

Table 2 The Characters of the Japanese varieties and forms of *Acer Mono Maxim.*

Scientific name (Japanese name)	Hairiness on 1-year twig	Hairiness on leaf-back	Leaf-size & leaf-shape	Fruit size	Wing-angle of fruit	Others	Tree size
<i>var. glabrum</i> (エゾイタヤ)	pubescent	glabrous, or pubescent only along main veins	middle, smw. polymorphic, 5- 7-, middle- to shallow-lobed	middle large	acute to horizontal	peduncle & pedicel usu. pilose, sepal hairy out- side	big
<i>f. magnificum</i> (オホエゾイタヤ)							
<i>var. marmoratum</i> (エンコンウカエデ)	glabrous	glabrous	small to middle, semicircular, rounded- to slightly cordate- based, 5-middle-lobed (juvenile forms deep-lobed, occ. to near the base, smt. fewly dentate- lobed)	small	acute to right		middle to big
<i>f. piliferum</i> (ケエンコンウカエデ)	pubescent	pubescent only along main veins					
<i>f. connivens</i> (ウラゲエンコンウカエデ)	glabrous						
<i>f. puberulum</i> (ケウラゲ エンコンウカエデ)	pubescent						
<i>var. taishakuense</i> (タイシヤクイタヤ)	glabrous	pubescent only along main veins					
<i>var. glaucum</i> (ウラジロイタヤ)	glabrous	glabrous & glaucous	small, semi-circular, rounded- to truncate-based, 3-5-middle- lobed	small	right to obtuse	peduncle usu. 3-divided from the base, caused by reduction of main axis, frs fewer	small to middle
<i>var. Mayrii</i> (マカイタヤ)	glabrous	glabrous	large, semi-circular, rounded- to slightly cordate-based, 5- middle- to shallow-lobed	large	acute to right	1-year twig purplish red, often glaucous	big
<i>var. trichobasis</i> (イトモキイタヤ)	glabrous	glabrous (basal tufts of main veins often thick)	large, circular, cordate-based, 7-9- middle- to shallow-lobed	middle	right to horizontal		middle
<i>var. ambiguum</i> (オエイタヤ)	glabrous	covered wholly with short, upright hairs	large, circular to semi-circular, rounded- to cordate-based, 5- 7- middle- to shallow-lobed	middle	acute to right		big
<i>f. pulvigerum</i> (ミヤマオエイタヤ)	pubescent						

Table 3 The Characters of the varieties and forms of *Acer amoenum* Carr.

Scientific name (Japanese name)	Leaf				Others
	No. of lobe	Shape of lobe	Serration	Average size	
var. <i>amoenum</i> (オオモミジ)	(5), 7, (9)	ovate			
f. <i>latilobatum</i> (ヒロハモミジ)	5, 7	broad ovate	fine, simple and regular (occasionally incised in the leaves of elongate shoots)	middle, ca. 9 cm. wide, 6 cm. long	
f. <i>palmatipartitum</i> (フカギレオオモミジ)	7, (9)	oblong			leaves deeply lobed often to near the base
f. <i>horonaiense</i> (ホロナイカエブ)	(5), 7, 9	broad ovate and the apex snw. long acuminate	somewhat rough, partly incised	large, ca. 14 cm. wide, 10 cm. long	fruits generally large
var. <i>nambuunum</i> (ナンプロコハモミジ)	7	ovate	simple and regular	small, ca. 6.5 cm. wide, 4.5 cm. long	
var. <i>Matsumurae</i> (ヤマモミジ)					
f. <i>latialatum</i> (ホンドウカジカエブ)	7, 9	oblong to ovate	rough, argute and usually incised-duplicate	middle to small, ca. 8 cm. wide, 5 cm. long	wings of fruits broad, ca. 1 cm. wide

Figures

Figure 1

Acer Mono Maxim. var. glabrum (Lév. et Vnt.) Hara (Ezoitaya)

- a Univ. Forest, Yamabe V., Sorachi C., Hokkaido—T. Inokuma, 1930, TOFO
- b the same as above
- c Iwaizumi T., Shimohei C, Iwate Pref.—K. Ogata, 1962, TOFO
- d Shizunai V., Hidaka Prov., Hokkaido—K. Ogata, 1962, TOFO
- f, 1 Yamada T., Shimohei C., Iwate Pref.—K. Ogata, 1962, TOFO
- f, 2 Sapporo City, Hokkaido (cult.)—T. Inokuma, 1927, TOFO
- f, 3 the same as d
- f, 4 the same as a
- f, 7 the same as a
- f, 8 the same as c
- g Mt. Ureira, Iwaizumi T., Shimohei T., Iwate Pref.—S. Kurata, 1961, TOFO
- h Sotokaifu V., Sado Isl., Niigata Pref.—S. Kurata, 1955, TOFO
- i the same as h

f. **magnificum** (Hara) Hara (Ôezoitaya)

- e Mt. Apoi, Hidaka Prov., Hokkaido—H. Hara, 1933, the type specimen of *A. Mono* var. *latialatum* Hara, TI
- f, 5 Furano T., Sorachi C., Hokkaido—K. Ogata, 1962, TOFO
- f, 6 Ôkawa V., Shimohei C., Iwate Pref.—K. Ogata, 1962, TOFO

Figure 2

Acer Mono Maxim. var. marmoratum (Nichols.) Hara (Enkôkaede)

- a Univ. Forest, Kameyama V., Kimitsu C., Chiba Pref.—J. Suzuki, 1927, TOFO
- b Ume V., Minami-amabe C., Oita Pref.—S. Kurata, 1962, TOFO
- c Tanzawa Mts., Kanagawa Pref.—S. Kurata, 1956, TOFO
- d Mt. Hino, Takefu City, Fukui Pref.—S. Mimura, 1960, TOFO
- e Nishina V., Kamo C., Shizuoka Pref. (Izu Pen.)—K. Hachiya et al., 1948, TOFO
- f Inazusa V., do.—S. Kurata, 1948, TOFO
- g Kawazu T., do.—S. Kurata, 1959, TOFO
- h Ôno V., Futaba C., Fukushima Pref.—T. Tomita, 1932, TOFO
- i Mt. Kiyosumi, Awa C., Chiba Pref.—Y. Momiyama, 1938, TOFO

Figure 3

Acer Mono Maxim. var. marmoratum (Nichols.) Hara (Enkôkaede)

- a Kawazu T., Kamo C., Shizuoka Pref. (Izu Pen.)—S. Kurata, 1959, TOFO
 - b Mt. Shichimen, Minobu V., Minami-koma C., Yamanashi Pref.—T. Inokuma, TOFO
 - c Chûzenji Lake, Nikkô T., Kami-tsuga C., Tochigi Pref.—?, 1899, TOFO
 - d Mt. Butchô, Nishi-ibaragi C., Ibaragi Pref.—T. Inokuma, 1934, TOFO
 - e Mt. Goyô, Kasshi V., Kamihei C., Iwate Pref.—K. Ogata, 1962, TOFO
- var. **taishakuense** Ogata (Taishakuitaya)
- f Taishaku-kyô Valley, Hiba C., Hiroshima Pref.—Z. Tashiro, 1929, TI
 - g do.—K. Ogata, no. 7483 g, 1963, the type, TOFO

Figure 4

Acer Mono Maxim. var. glaucum (Koidz.) Sugimoto (Urajiroitaya)

- a Muramatsu T., Naka-kanbara C., Niigata Pref.—K. Ogata, 1962, TOFO
- b the same as a
- c Mt. Myôjô, Kotaki V., Nishi-kubiki C., Niigata Pref.—S. Kurata, 1953, TOFO
- d the same as a
- e Mt. Azuma, Yama C., Fukushima Pref.—G. Koizumi, ?, TI
- f Mt. Nadera, Yamagata Pref.—G. Koizumi, 1911, TI

Figure 5**Acer Mono Maxim. var. Mayrii** (Schw.) Sugimoto (Akaitaya)

- a Univ. Forest, Yamabe V., Sorachi C., Hokkaido—T. Inokuma, 1930, TOFO
- b Mt. Naeba, Minami-uonuma C., Niigata Pref.—S. Kurata, 1957, TOFO
- c Nopporo, Ishikari Prov., Hokkaido—T. Inokuma, 1927, TOFO
- d, 1 Mt. Kurohime, Kami-minochi C., Nagano Pref.—K. Ogata, 1961, TOFO
- d, 2 Mt. Togakushi, do.
- d, 3 the same as a
- d, 4 the same as a
- d, 5 Towada Lake, Aomori Pref.—T. Inokuma, 1927, TOFO
- d, 6 the same as c
- d, 7 Mt. Eniwa, Chitose T., Iburi Prov., Hokkaido—K. Ogata, 1962, TOFO
- e Mt. Moiwa, Sapporo City, Hokkaido—K. Ogata, 1962, TOFO

Figure 6**Acer Mono Maxim. var. trichobasis** Nakai (Itomakiitaya)

- a Chūzenji Lake, Nikkō T., Kami-tsuga C., Tochigi Pref.—T. Inokuma, 1940, TOFO
- b Nakano V., Minami-tsuru C., Yamanashi Pref.—Y. Momiyama, 1937, TOFO
- c Mt. Minobu, Minami-koma C., Yamanashi Pref.—I. Mine, 1930, TOFO

Figure 7**Acer Mono Maxim. var. ambiguum** (Pax) Rehder (Oniitaya)

- a Nikkō, Kami-tsuga C., Tochigi Pref.—T. Inokuma, 1926, TOFO
- b Goka V., Haibara C., Shizuoka Pref.—S. Kurata, 1950, TOFO
- c, 1 Bot. Gard. of Kagoshima Univ., Kagoshima City (cult.)—K. Ogata, 1961, TOFO
- c, 2 Mt. Moriyoshi, Kita-akita C., Akita Pref.—K. Ogata, 1962, TOFO
- c, 3 Univ. Forest, Ōtaki V., Chichibu C., Saitama Pref.—K. Ogata, 1961, TOFO
- c, 4 Miumaya V., Higashi-tsugaru C., Aomori Pref.—T. Inokuma, 1934, TOFO
- c, 5 the same as c, 3
- c, 6 Univ. Forest, Kameyama V., Kimitsu C., Chiba Pref.—K. Ogata, 1961, TOFO
- d the same as c, 3—T. Inokuma, 1929, TOFO
- e Towada Lake, Aomori Pref. —T. Inokuma, 1927, TOFO

Figure 8**Acer Sieboldianum** Miq. (Itayameigetsu)

- a Mt. Moriyoshi, Kita-akita C., Akita Pref.—K. Ogata, 1962, TOFO
- c Seto City, Aichi Pref.—Y. Momiyama, 1938, TOFO
- d Nakano V., Minami-tsuru C., Yamanashi Pref.—Y. Momiyama, 1937, TOFO
- f. **microphyllum** (Maxim.) Hara (Kohauchiwakaede)
 - b Hinokage T., Nishi-usuki C., Miyazaki Pref.—K. Ogata, 1961, TOFO
- Acer japonicum** Thunberg (Hauchiwakaede)
 - f Mt. Ashibetsu, Yamabe V., Sorachi C., Hokkaido—K. Ogata, 1962, TOFO
 - g Sōunkyo, Kamikawa V., Kamikawa C., Hokkaido—T. Nakai, 1928, the type specimen of *A. kobakoense* Nakai, TI
 - h Ōkawa V., Shimohei C., Iwate Pref.—K. Ogata, 1962, TOFO
 - i Mt. Moriyoshi, Kita-akita C., Akita Pref.—K. Ogata, 1962, TOFO
 - j Univ. Forest, Ōtaki V., Chichibu C., Saitama Pref.—K. Ogata, 1961, TOFO
 - k the same as i
- f. **microphyllum** (Koidz.) Rehder (Ezomeigetsukaede)
 - e Iwaizumi T., Shimohei C., Iwate Pref.—K. Ogata, 1962, TOFO

Figure 9**Acer tenuifolium** (Koidz.) Koidzumi (Hinauchiwakaede)

- a Usui Pass, Usui C., Gunma Pref.—K. Ogata, 1961, TOFO
- b Mt. Hira, Shiga C., Shiga Pref.—M. Hutoh, 1959, TOFO

- c Ôtaki V., Nishi-chikuma C., Nagano Pref.—T. Inokuma, 1932, TOFO
 d Univ. Forest, Ôtaki V., Chichibu C., Saitama Pref.—T. Inokuma, 1929, TOFO
Acer Shirasawanum Koidzumi (Ôitayameigetsu)
 g Nakano V., Minami-tsuru C., Yamanashi Pref.—Y. Momiyama, 1937, TOFO
 i Chûzenji, Nikkô T., Kami-tsuga C., Tochigi Pref.—T. Inokuma, 1925, TOFO
 j Nikkô T., do.—T. Inokuma, 1940, TOFO
Acer palmatum Thunberg (Irohamomiji)
 e Univ. Forest, Ôtaki V., Chichibu C., Saitama Pref.—K. Ogata, 1961, TOFO
 f Mt. Mitake, Nishitama C., Tokyo—K. Ogata, 1962, TOFO
Acer amoenum Carrière (Ômomiji)
 k Shiobara, Shioya C., Tochigi Pref.—K. Ogata, 1962, TOFO
 l Univ. Forest, Yamabe V., Sorachi C., Hokkaido—T. Inokuma, 1930, TOFO
f. latilobatum (Koidz.) Ogata (Hirohamomiji)
 h Nanogawa V., Agawa C., Kochi Pref.—T. Makino, 1889, TI
 m Mt. Minobu, Minami-koma C., Yamanashi Pref.—T. Inokuma, 1931, TOFO

Figure 10**Acer amoenum** Carrière (Ômomiji) (continued from Fig. 9, k-l)

- b
 c Mt. Daisen, Tôhaku C., Tottori Pref.—K. Kanei, 1940, TOFO
 f Mt. Himekami, Tamayama V., Iwate Pref.—K. Ogata, 1962, TOFO
 h Horomi, the suburbs of Sapporo City, Hokkaido—M. Mizushima, 1943, TI
f. palmatipartitum (Koidz.) Ogata (Fukagireômomiji)
 a Mt. Minobu, Minami-koma C., Yamanashi Pref.—T. Inokuma, 1932, TOFO
 d Itsukushima Isl., Saeki C., Hiroshima Pref.—B. Hayata, 1913, the type specimen of *A. ornatum* var. *miyajimense* Nakai, TI
 e Mt. Mitake, Nishi-tama C., Tokyo—K. Ogata, 1962, TOFO
 g Univ. Forest, Yamabe V., Sorachi C., Hokkaido—K. Ogata, 1962, TOFO
f. horonaiense (Nakai) Ogata (Horonaikaede)
 i Mt. Eniwa, Chitose T., Iburu Prov., Hokkaido—K. Ogata, 1962, TOFO

Figure 11**Acer amoenum** Carr. var. **nambuanum** (Koidz.) Ogata (Nanbukohamomiji)

- a Ôkawa V., Shimohei C., Iwate Pref.—K. Ogata, 1962, TOFO
 var. **Matsumurae** (Koidz.) Ogata (Yamamomiji)
 b Miumaya V., Higashi-tsugaru C., Aomori Pref.—M. Kusaka, 1934, TOFO
 e Muramatsu T., Naka-kanbara C., Niigata Pref.—K. Ogata, 1962, TOFO
 f

f. latialatum (Nakai) Ogata (Hondôjikaede)

- c the vicinity of Hondôji, Nishi-murayama C., Yamagata Pref.—?, 1887, TI
 d

“**Acer japonicum** Thunb. var. **stenolobum** Hara” (*A. japonicum* Thunb. × *A. amoenum* Carr.?)

- g Mt. Apoi, Samani C., Hidaka Prov., Hokkaido—H. Hara, 1933, the type, TI

Figure 12**Acer Tschonokii** Maximowicz (Minekaede)

- a Mt. Yatsugatake, Suwa C., Nagano Pref.—T. Inokuma, 1926, TOFO
 b, 1 Mt. Kamagatake, Kita-koma C., Yamanashi Pref.—S. Ikeno, 1905, TOFO
 b, 2 Mt. Iwaki, Naka-tsugaru C., Aomori Pref.—Y. Tokashiki, 1961, TOFO
 b, 3 Mt. Sukawa, Nishi-iwai C., Iwate Pref.—?, 1890, TOFO
 b, 4 Mt. Sumon, Kita-uonuma C., Niigata Pref.—S. Kurata, 1950, TOFO
 c Mt. Kurohime, Kami-minochi C., Nagano Pref.—K. Ogata, 1961, TOFO (×4)
 d Mt. Kurikoma (Mt. Sukawa), Kurihara C., Miyagi Pref.—S. Okuyama, 1952, TNS
 e Mt. Shirakimine, Nozumi V., Nei C., Toyama Pref.—R. Kotô, 1937, TNS
 var. **australe** Momotani (Nangokuminekaede)
 f Mt. Ishizuchi, Kami-ukena C., Ehime Pref.—K. Ochi, 1940, TNS

- g Mt. Tsutsujō, Tosa C., Kochi Pref.—S. Okuyama, 1950, TNS
 h Mt. Tsurugi, Oe C., Tokushima Pref.—J. Nikai, 1905, TNS
 var. **rubripes** Komarov (Chyōsenminekaede)
 i Mt. Odae, Kangwon-do (Mt. Gotai, Kogendo)—Chung In-Cho, 1946, TNS
Acer micranthum Siebold et Zuccarini (Kominekaede)
 j (lf.) Mt. Hira, Shiga C., Shiga Pref.—M. Hutoh, 1959, TOFO
 j (infr.) Mt. Hakutai, Ōtaki V., Chichibu C., Saitama Pref.—K. Kominami, 1930, TOFO
 k, 1 Mt. Ontake, Nishi-chikuma C., Nagano Pref.—?, 1899, TOFO
 k, 2 Nakano V., Minami-tsuru C., Yamanashi—S. Kurata, 1961, TOFO
 k, 3 Mt. Daisen, Seihaku C., Tottori Pref.—K. Kanei, 1940, TOFO
 l Univ. Forest, Ōtaki V., Chichibu C., Saitama Pref.—K. Ogata, 1961, TOFO (×4)

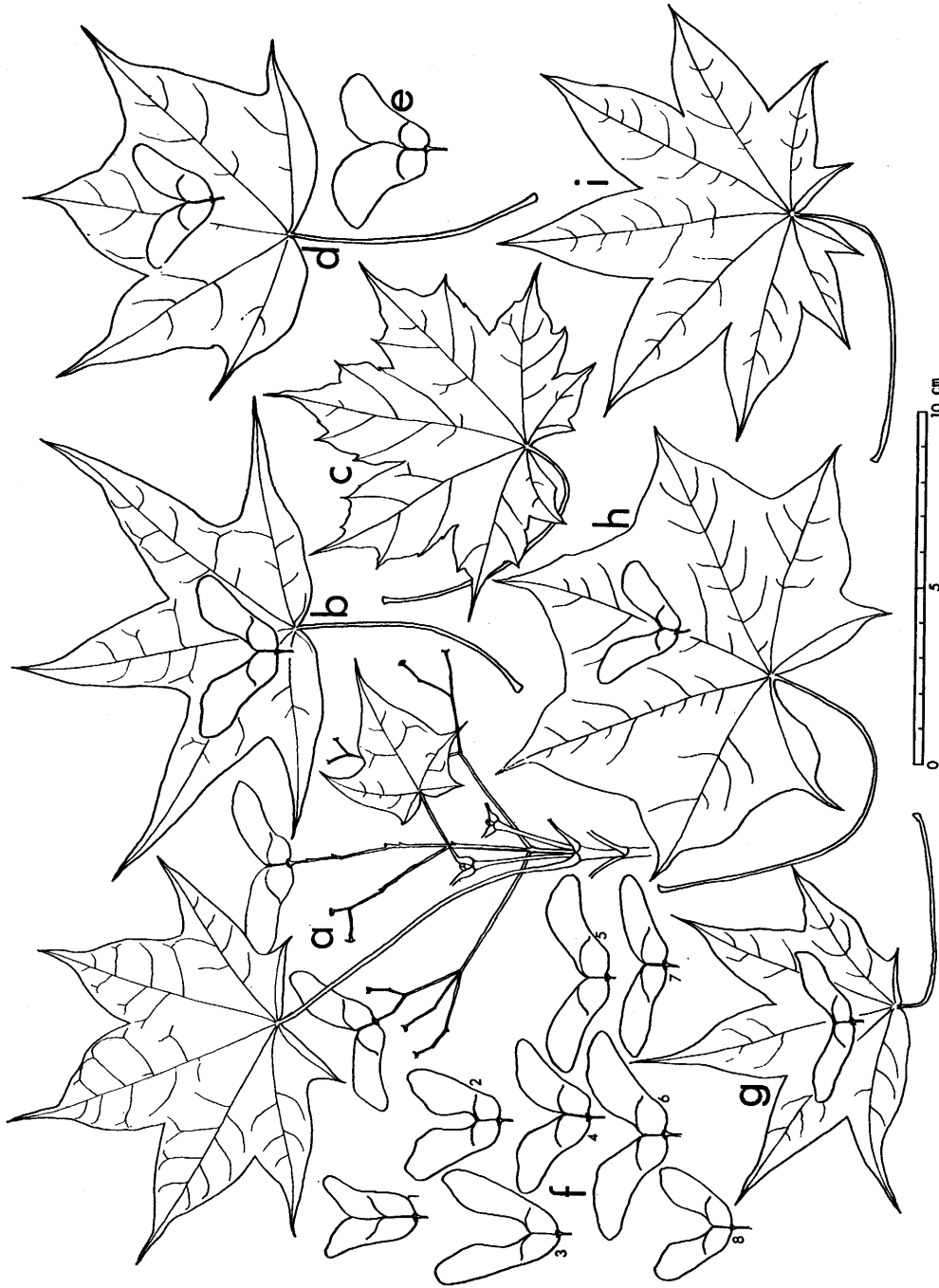


Figure 1

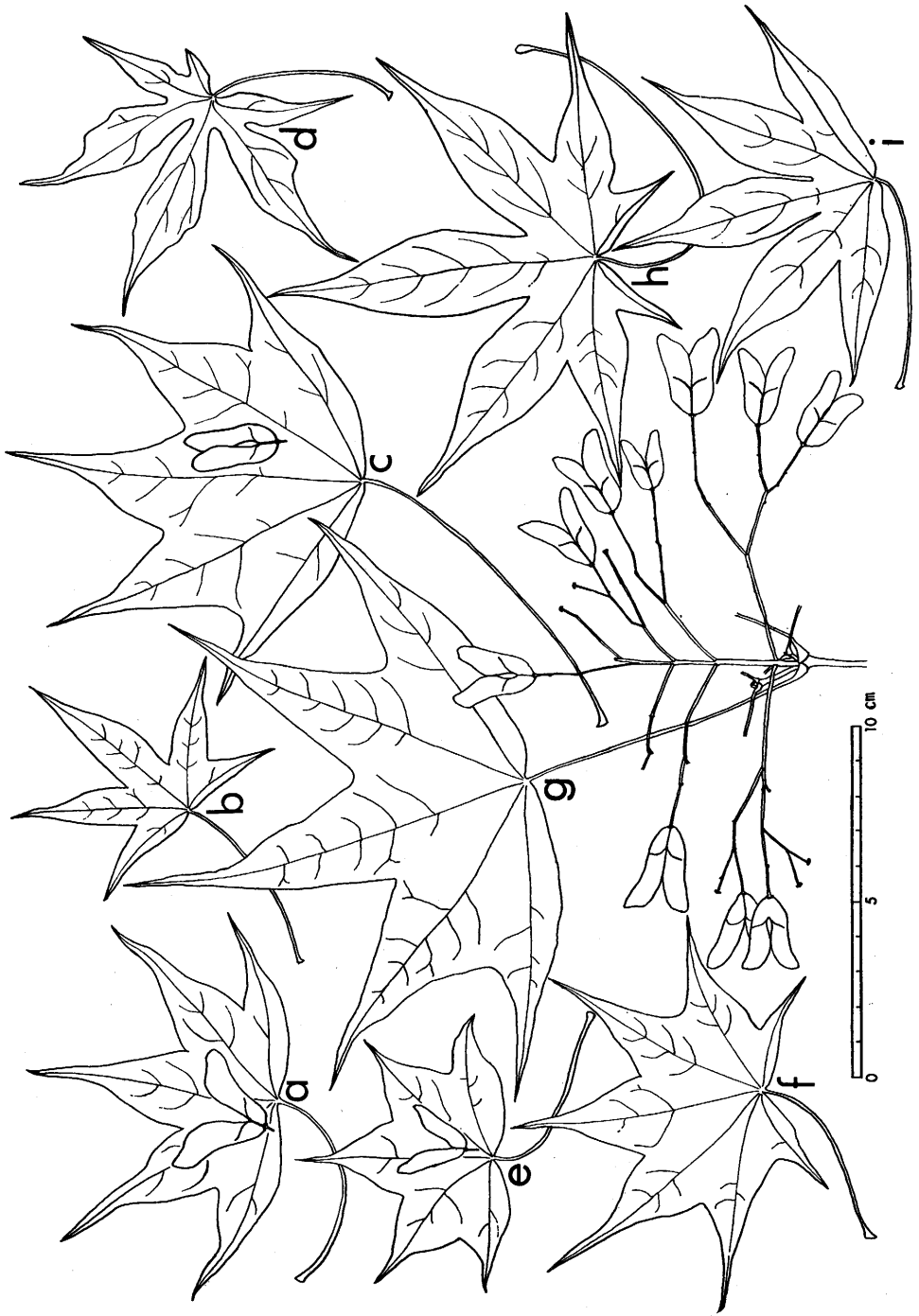


Figure 2

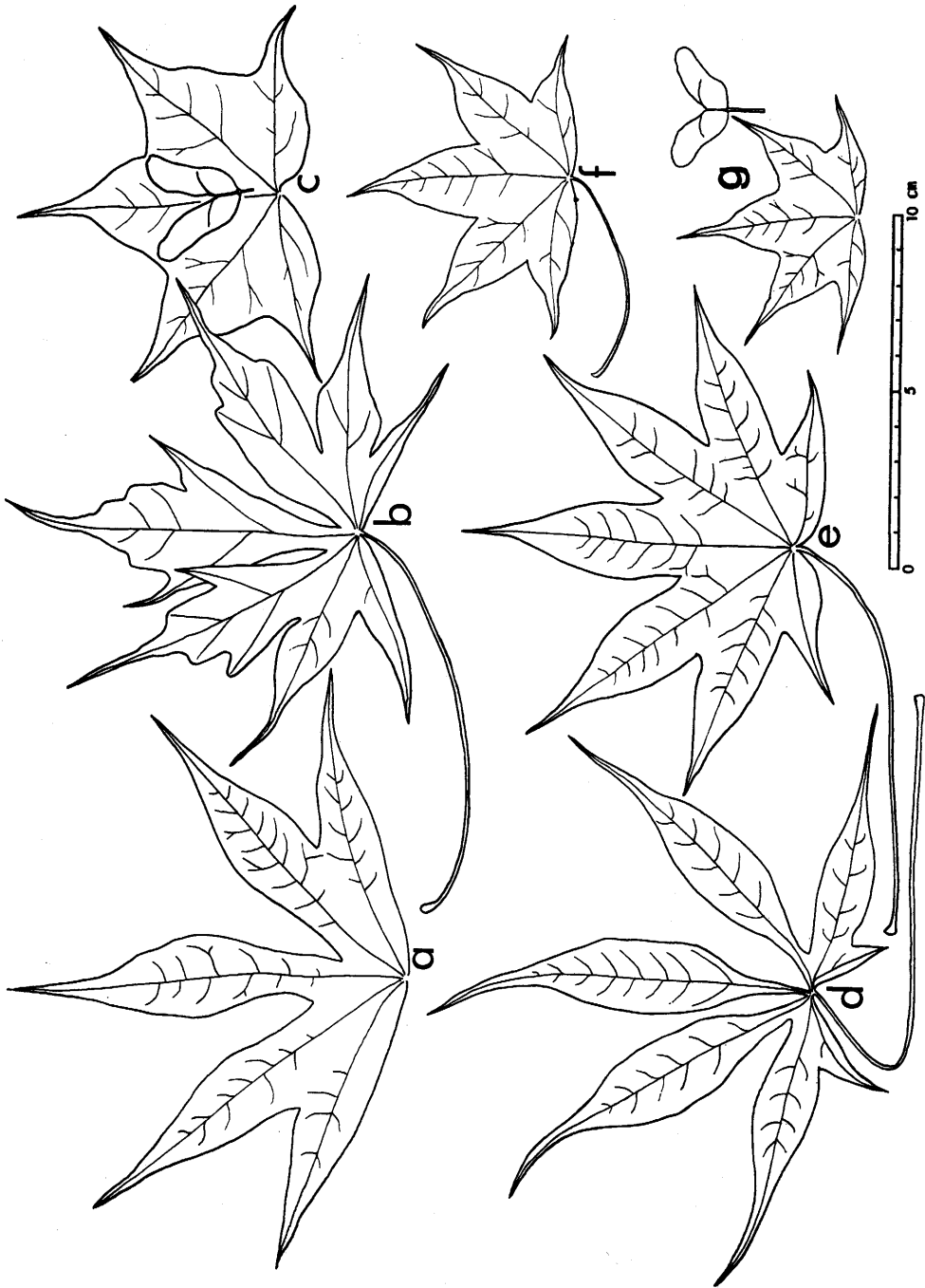


Figure 3

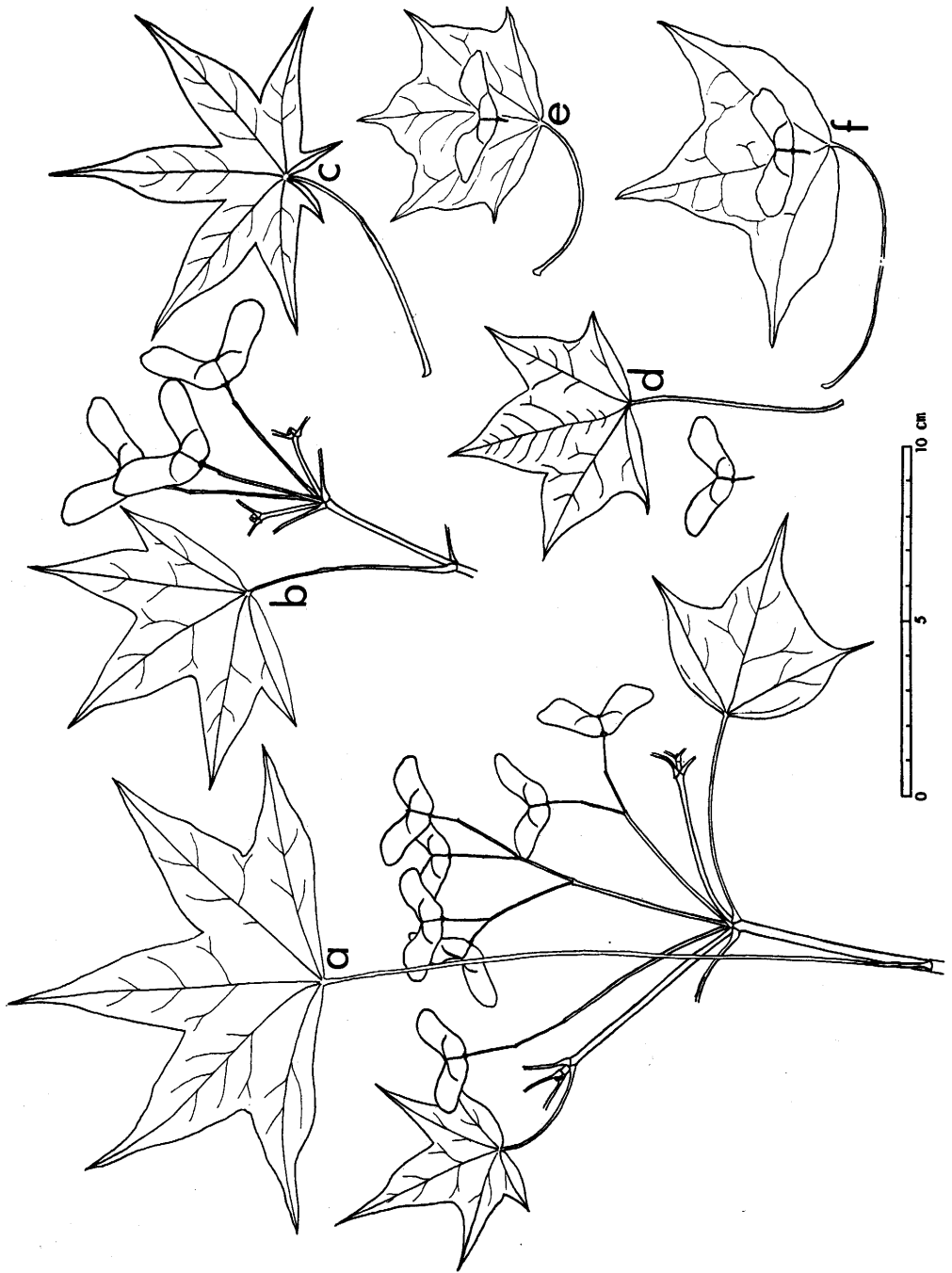


Figure 4



Figure 5

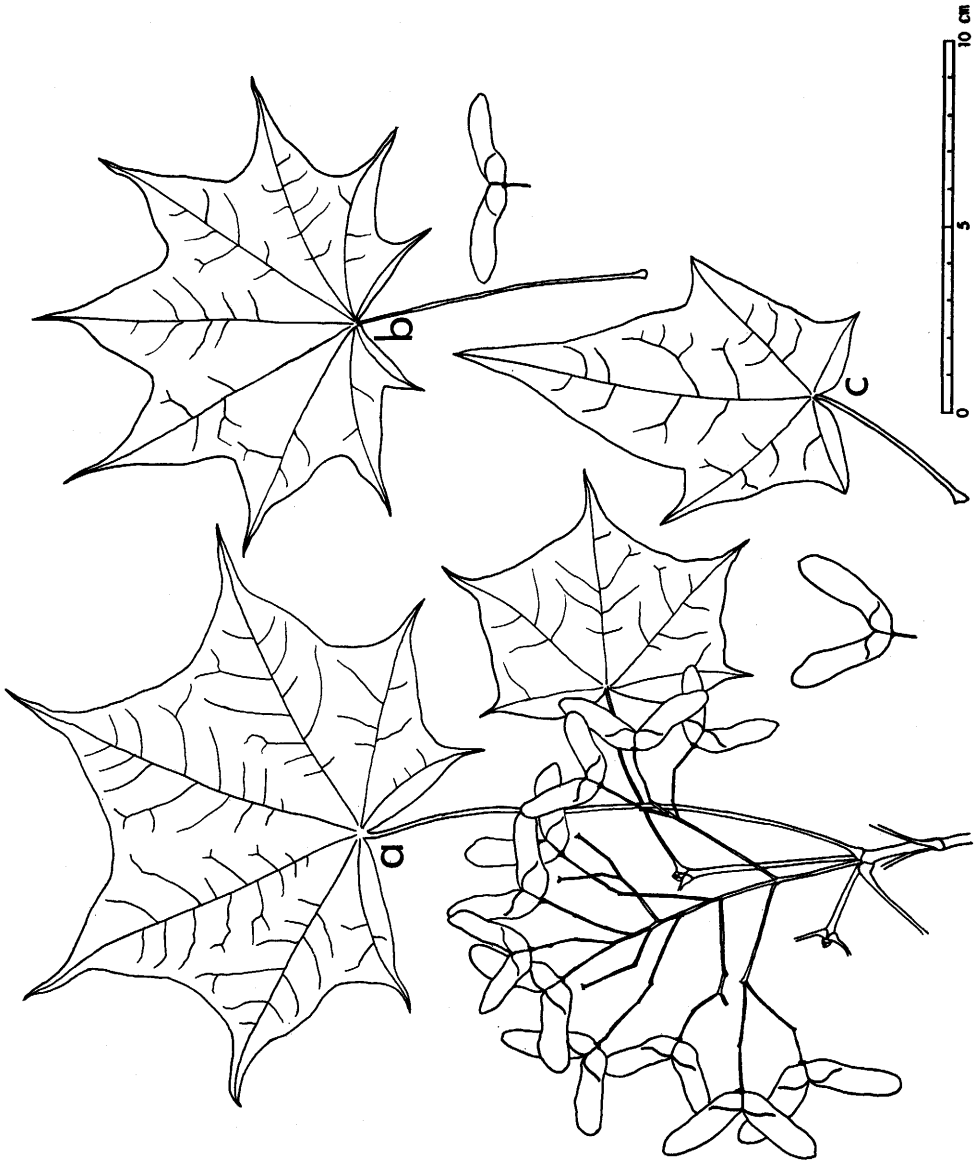


Figure 6

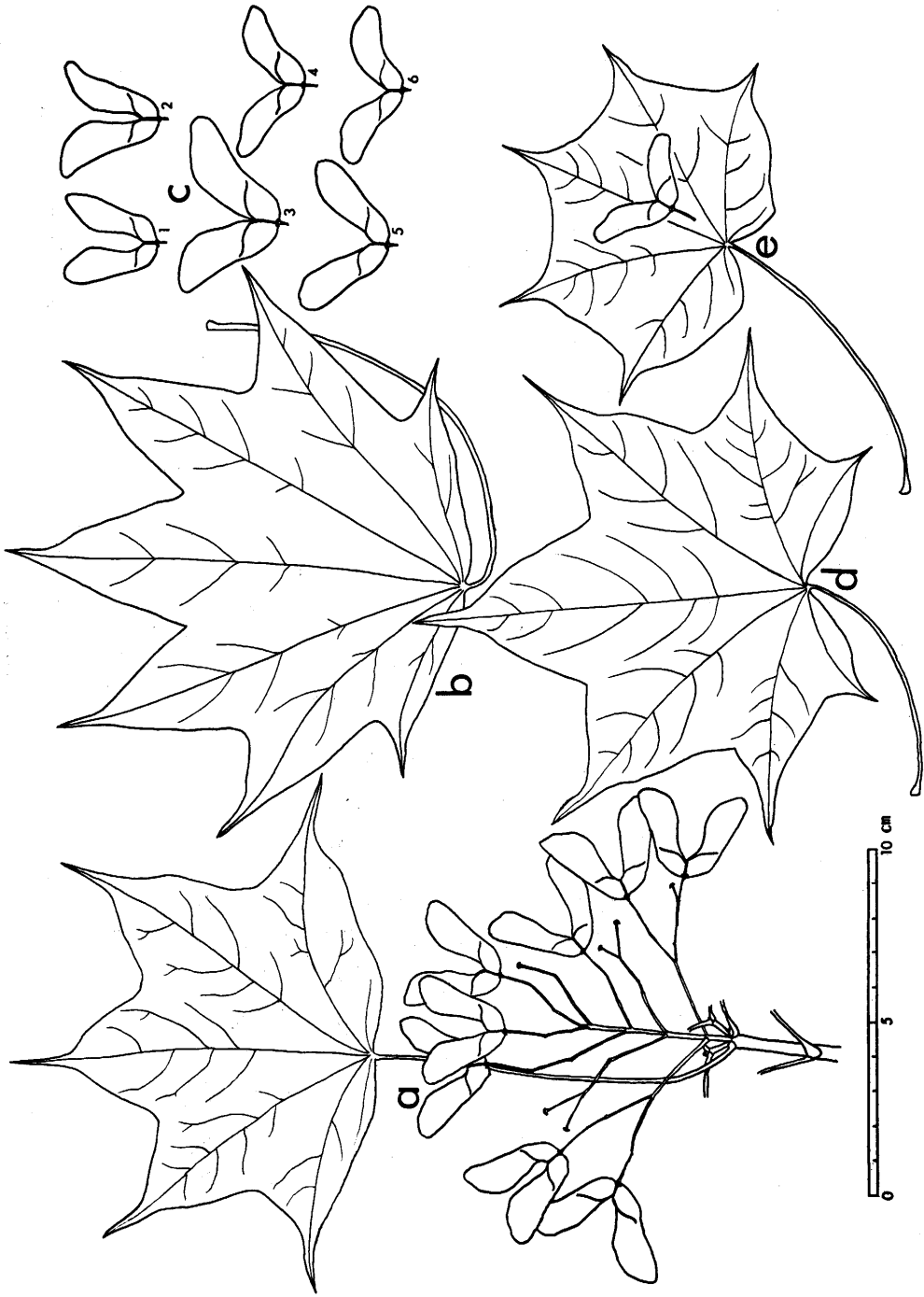


Figure 7

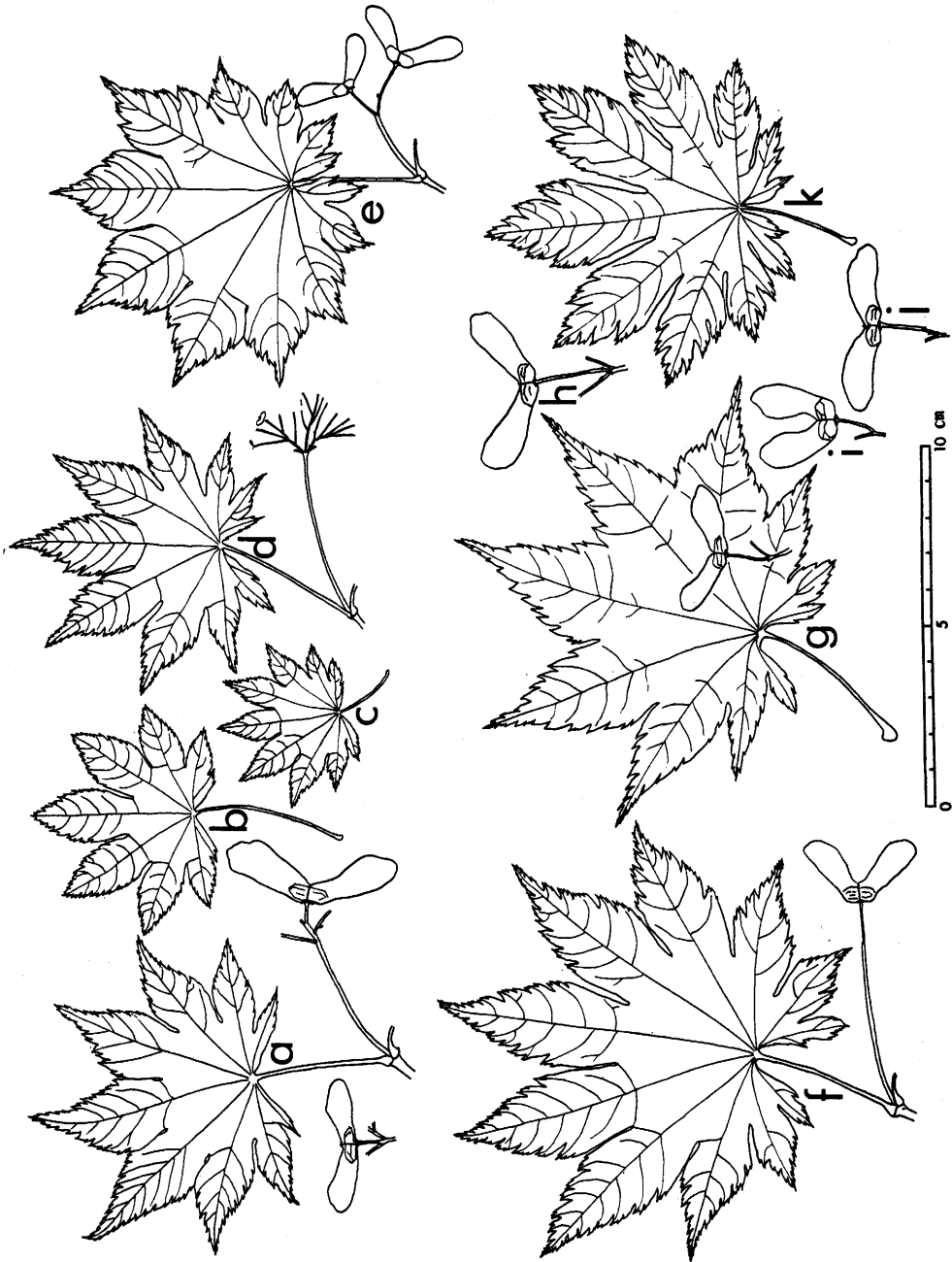


Figure 8

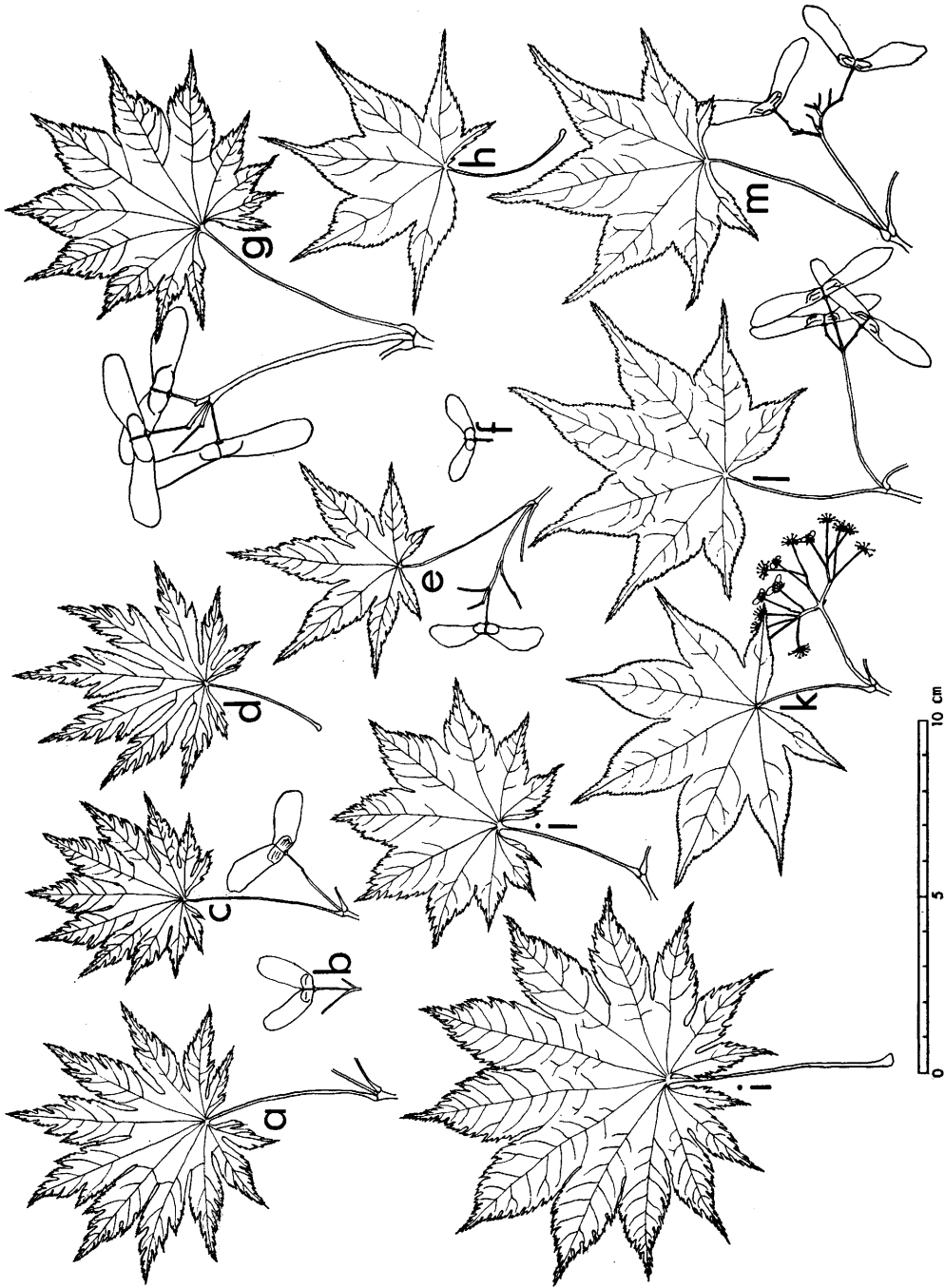


Figure 9



Figure 10

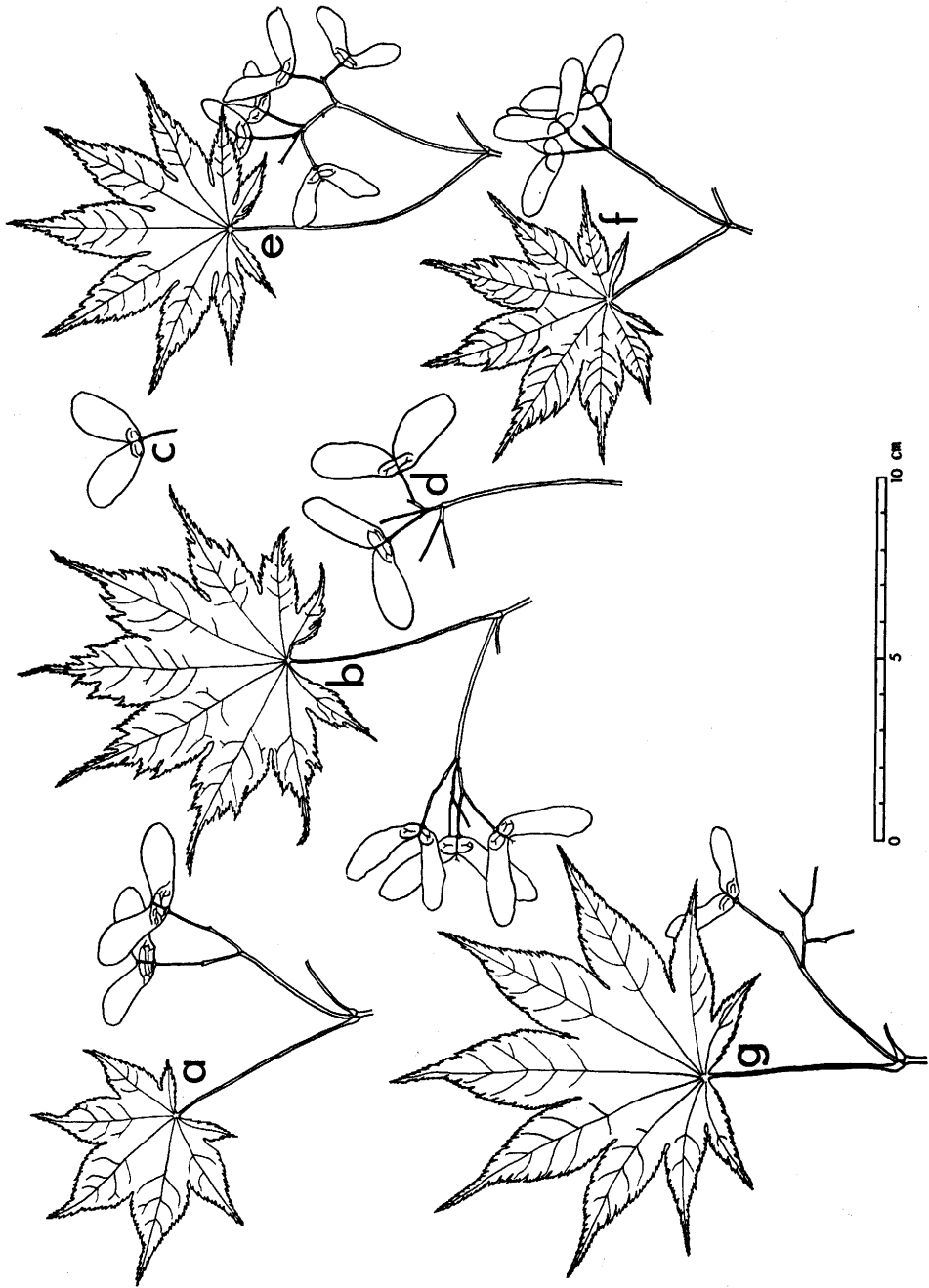


Figure 11

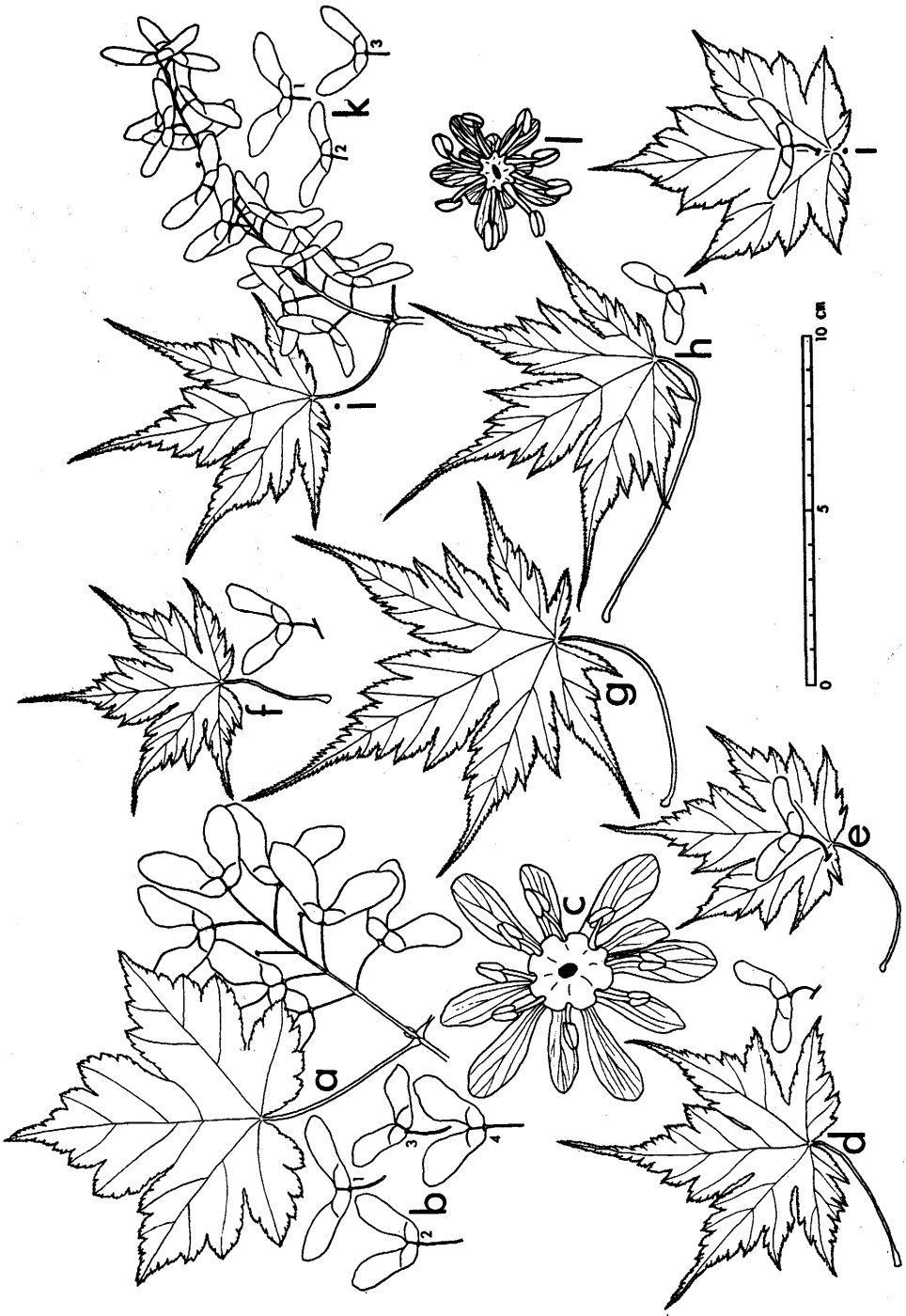
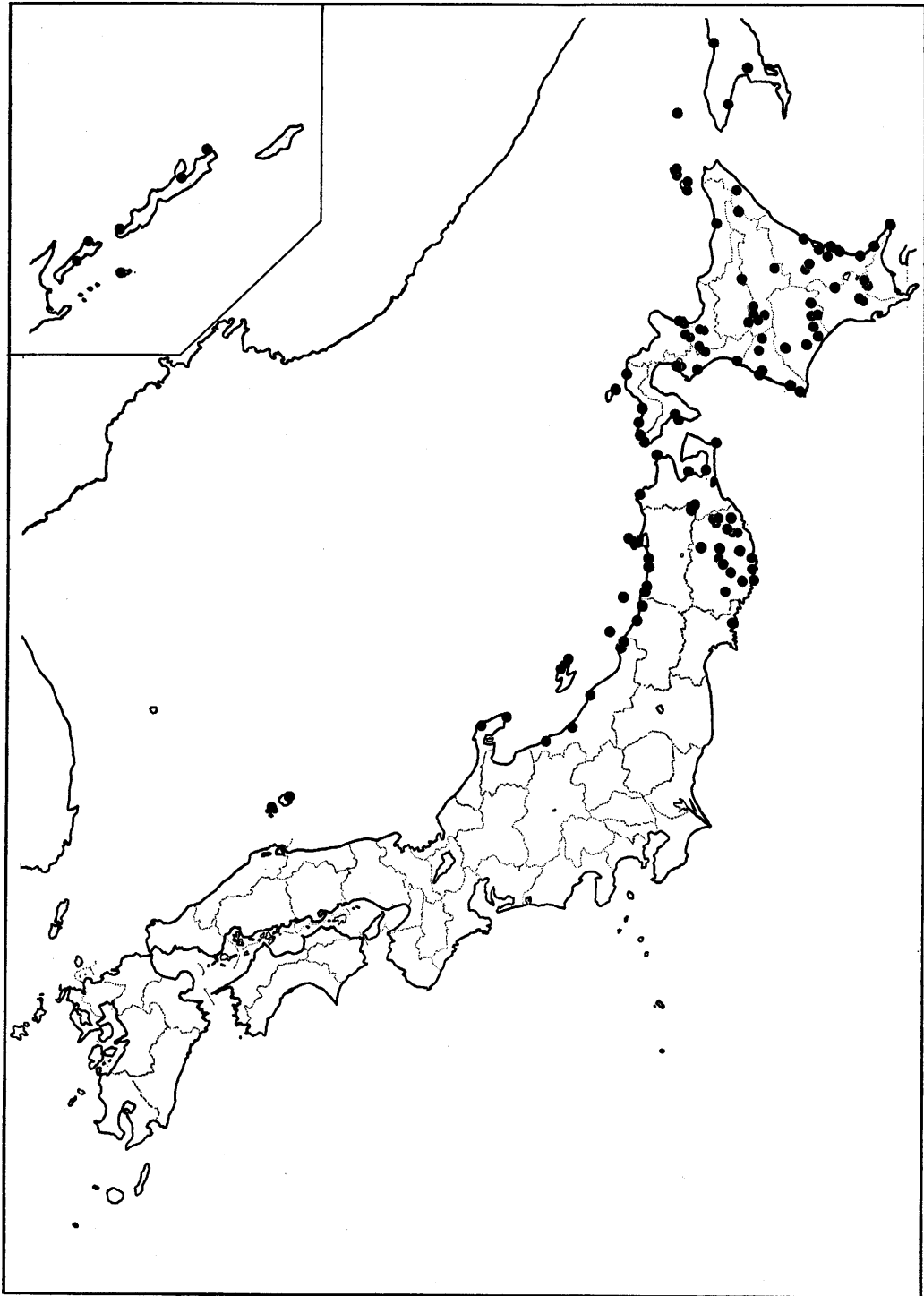
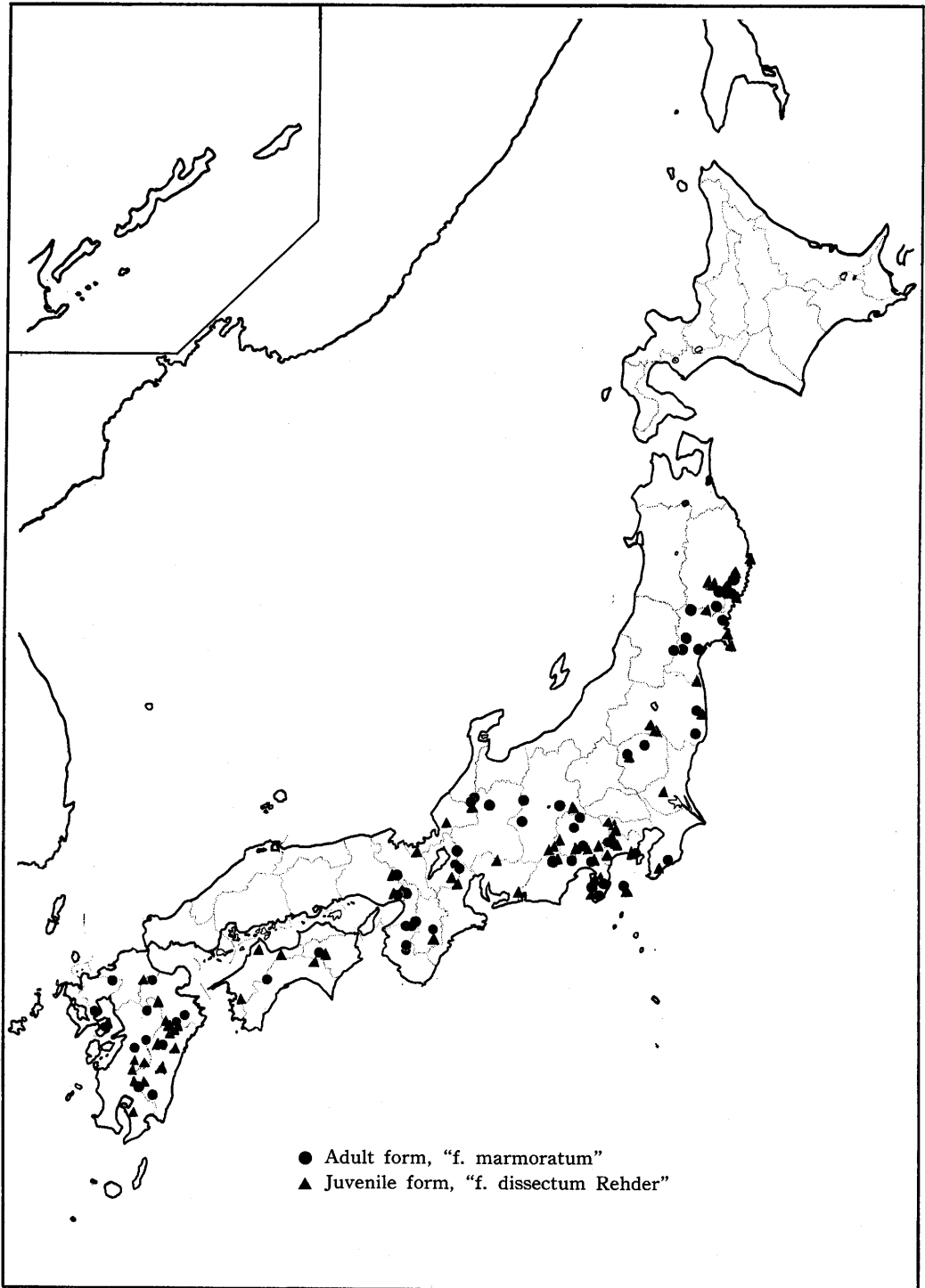


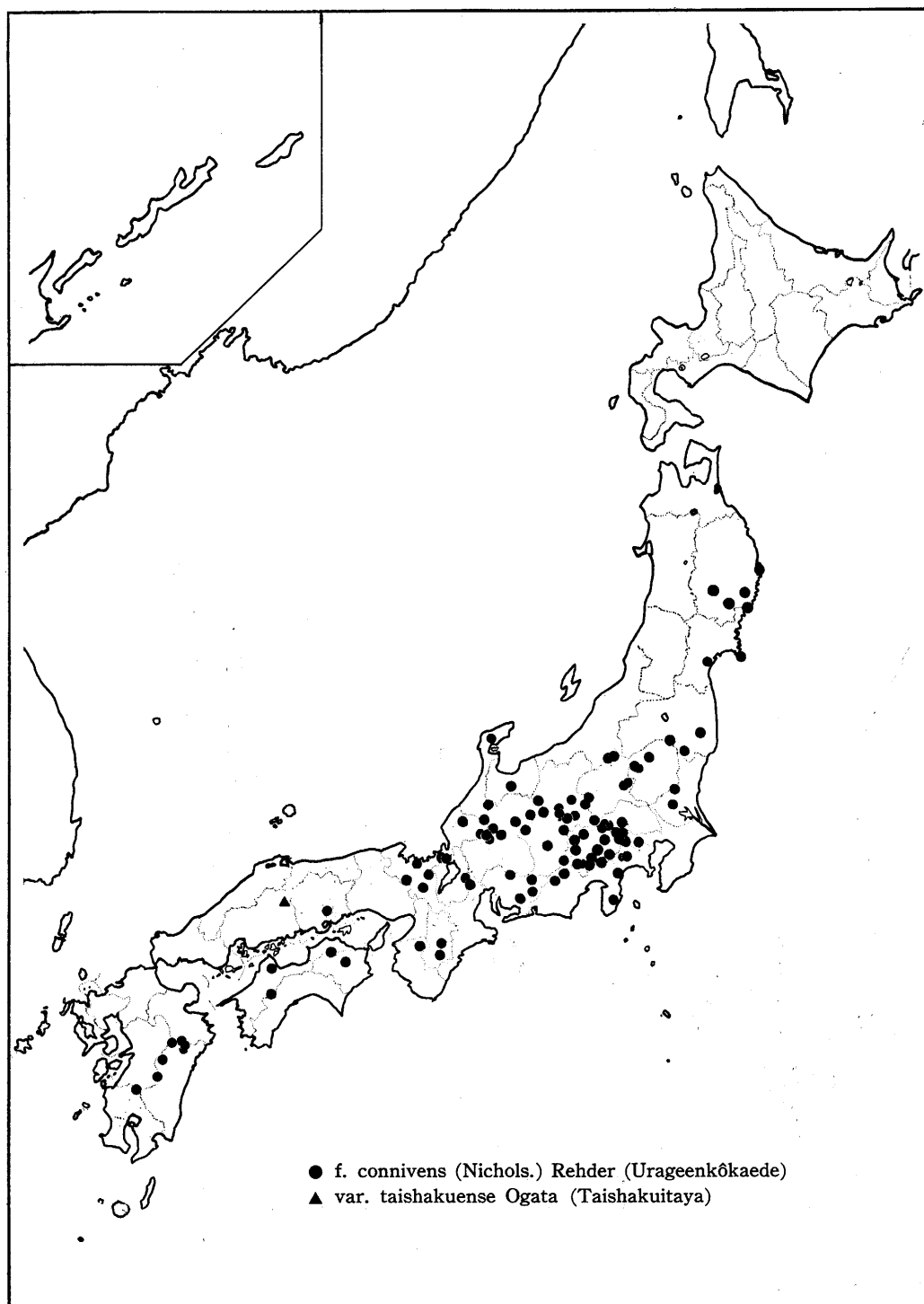
Figure 12



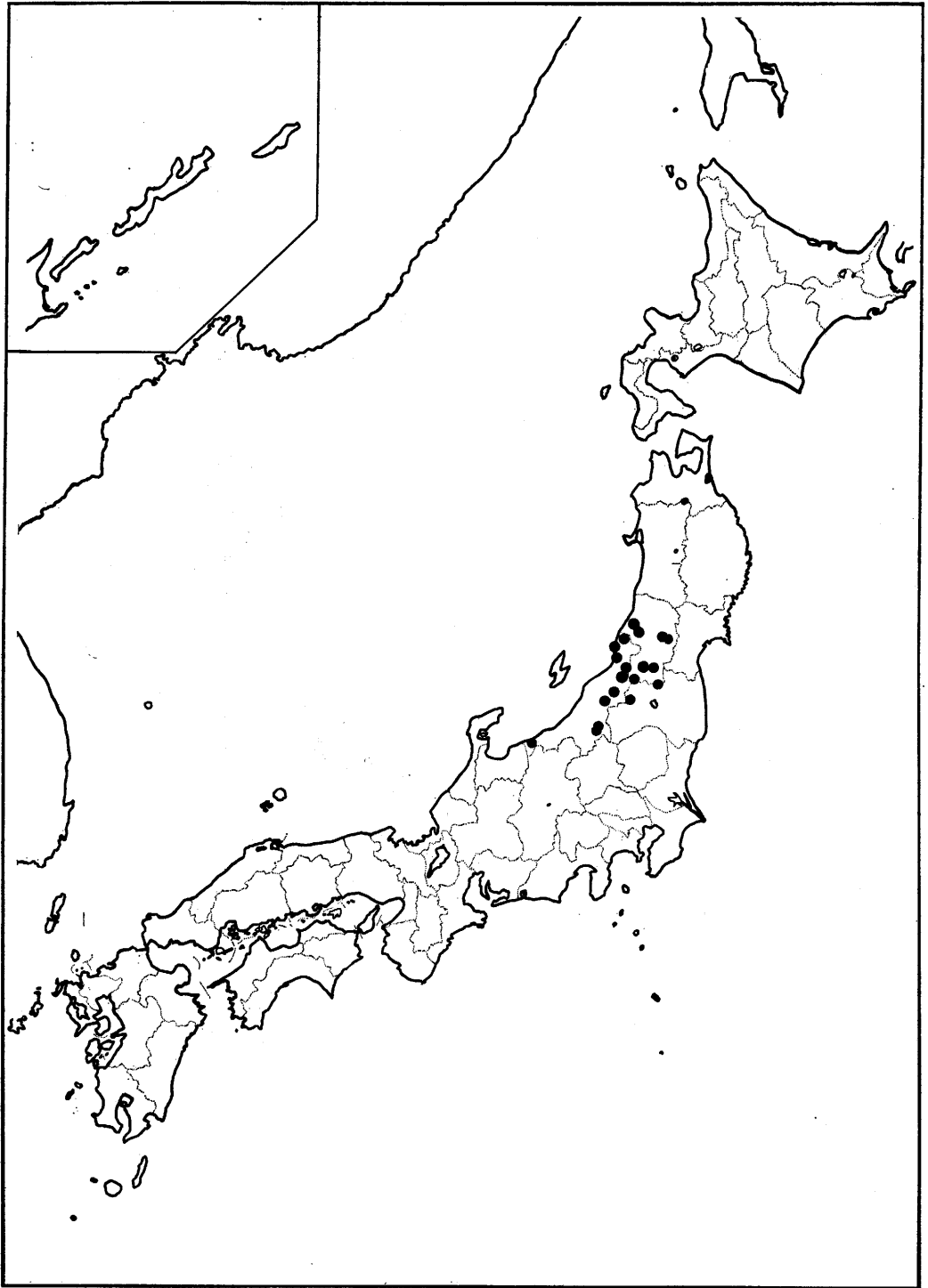
Map 1 *Acer Mono Maxim. var. glabrum* (Lév. et Vnt.) Hara (Ezoitaya)



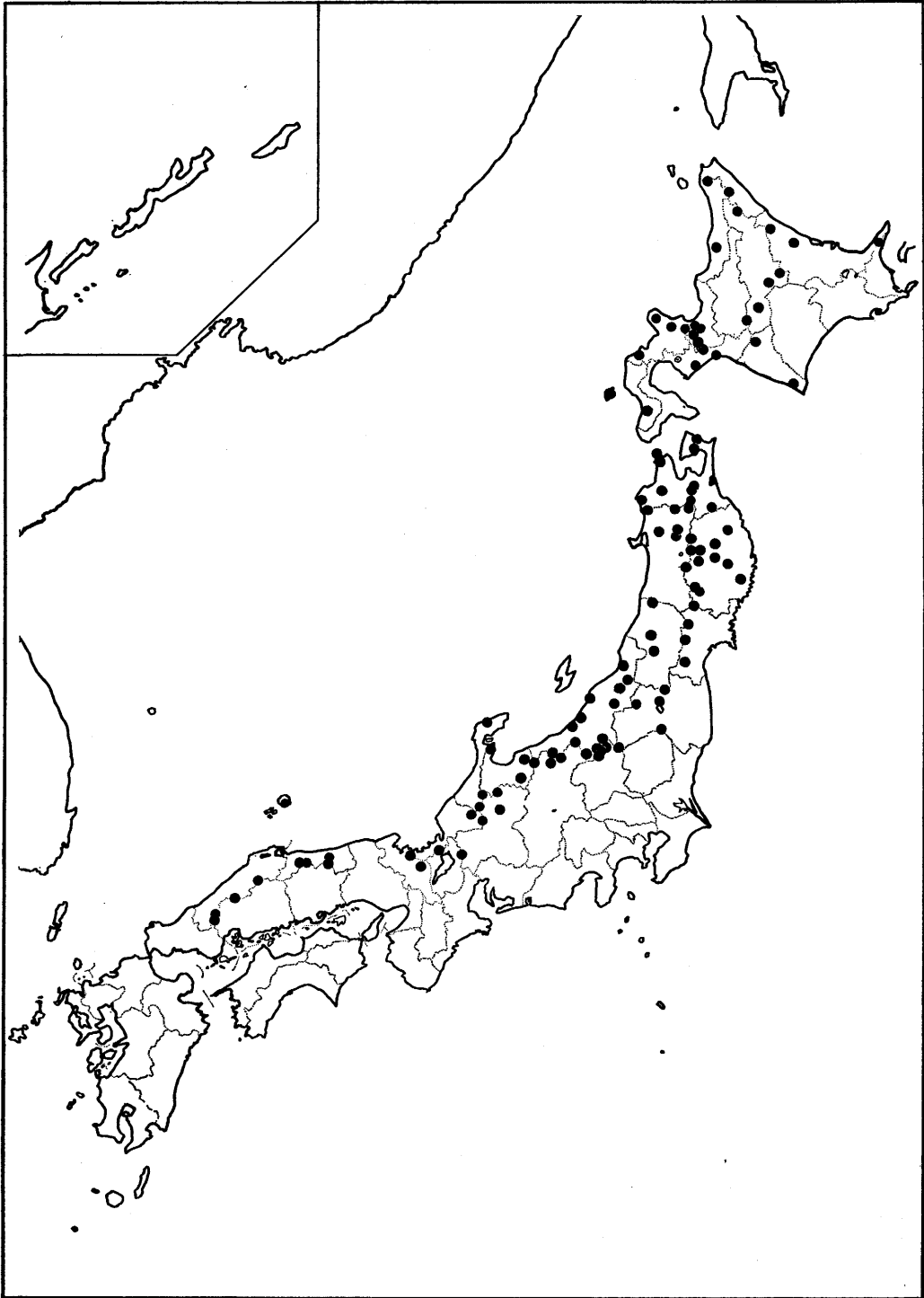
Map 2 *Acer Mono* Maxim. var. *marmoratum* (Nichols.) Hara (Enkōkaede)



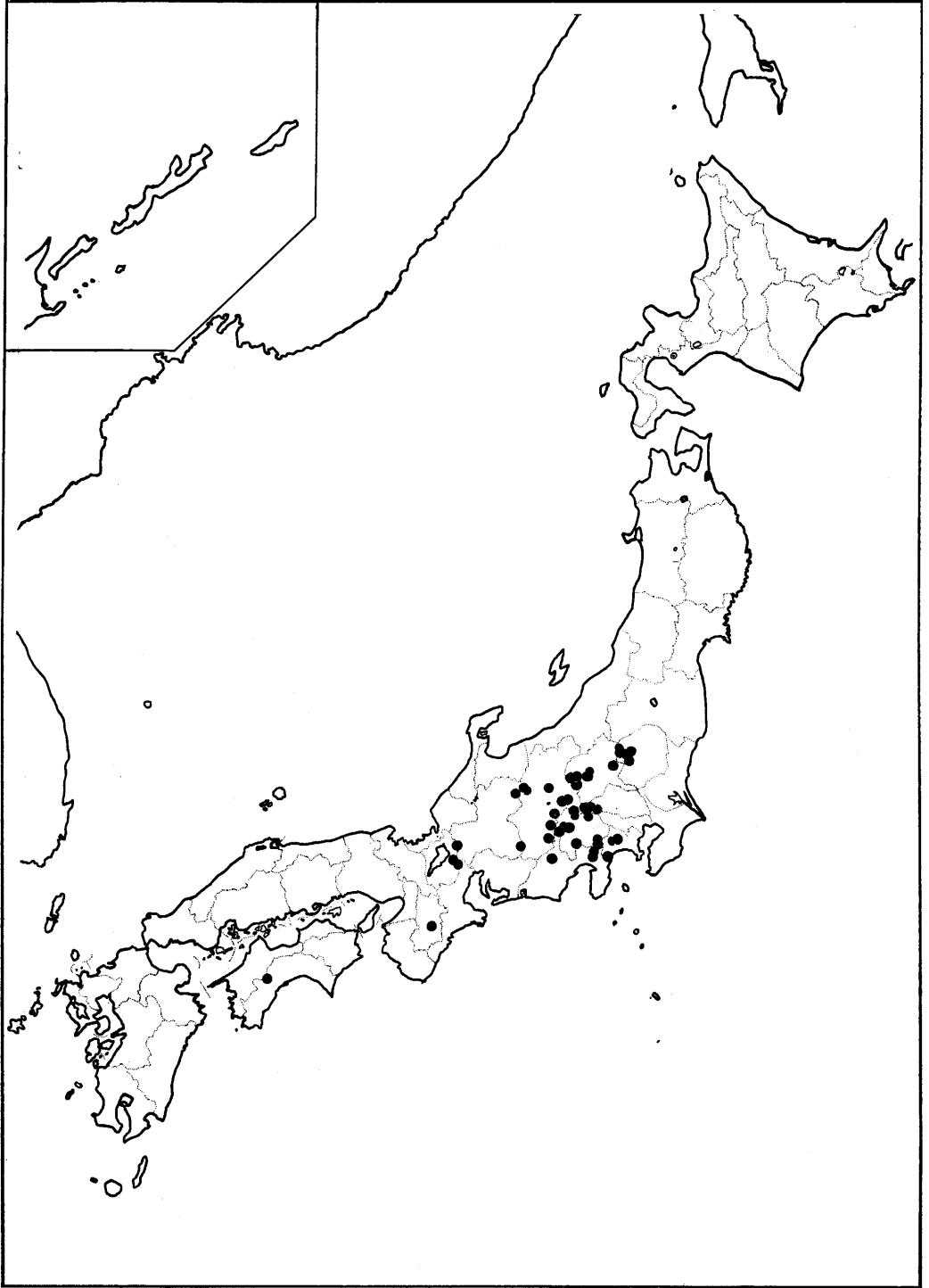
Map 3 *Acer Mono* Maxim. var. *marmoratum* f. *connivens* (Nichols.) Rehder
Acer Mono Maxim. var. *taishakuense* Ogata



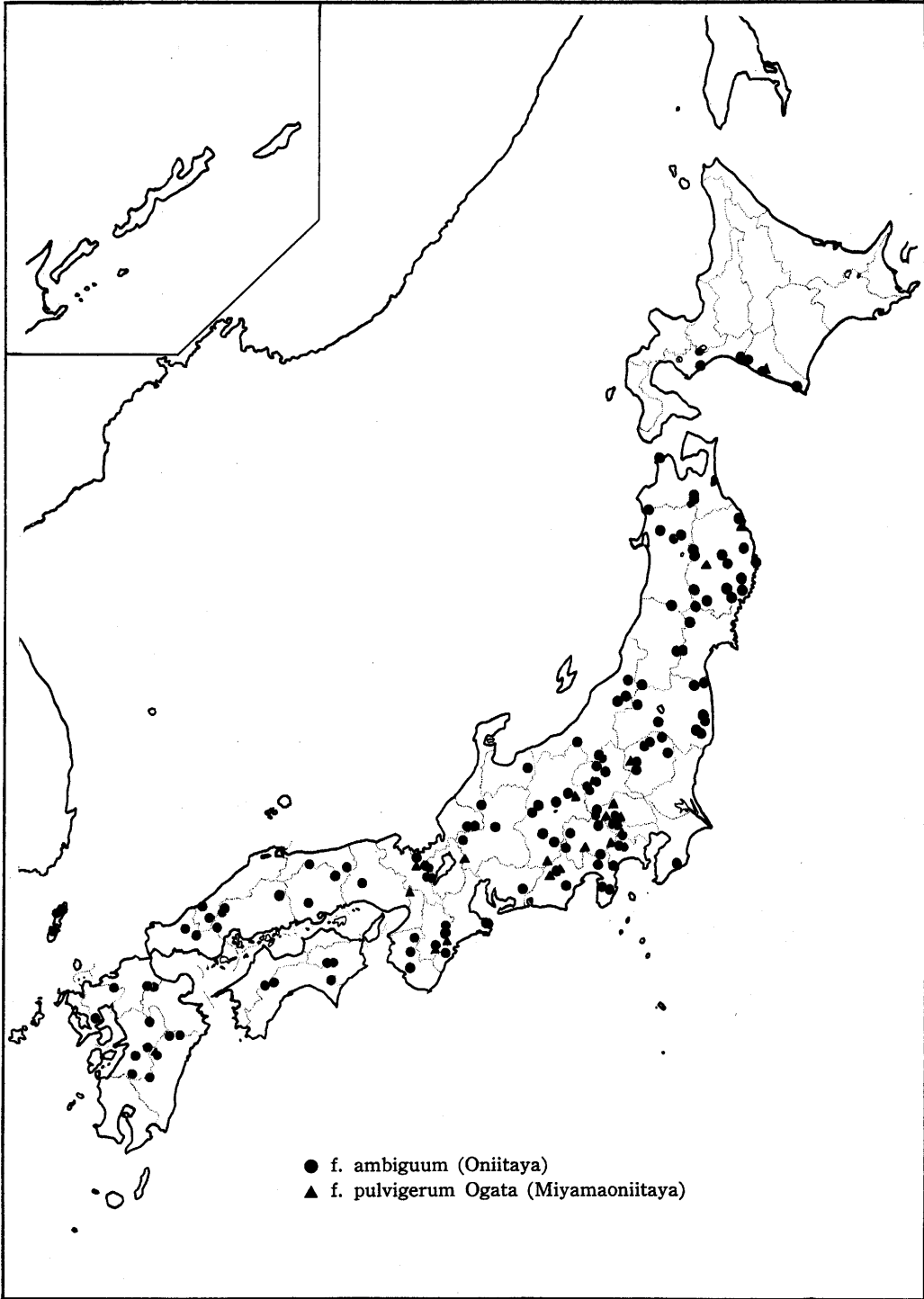
Map 4 *Acer Mono Maxim. var. glaucum* (Koidz.) Sugimoto (Urajiroitaya)



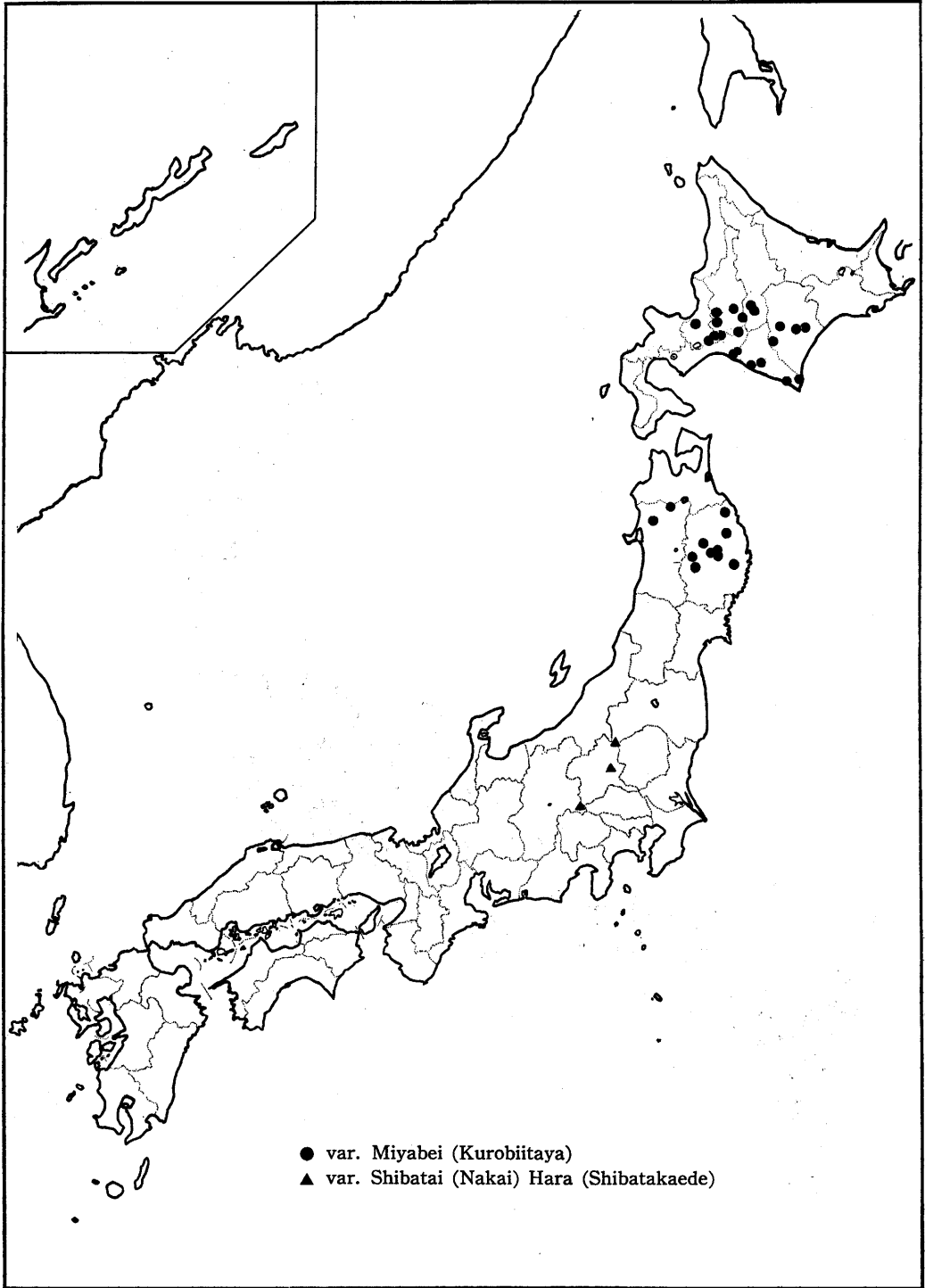
Map 5 *Acer Mono Maxim. var. Mayrii* (Schw.) Sugimoto (Akaitaya)

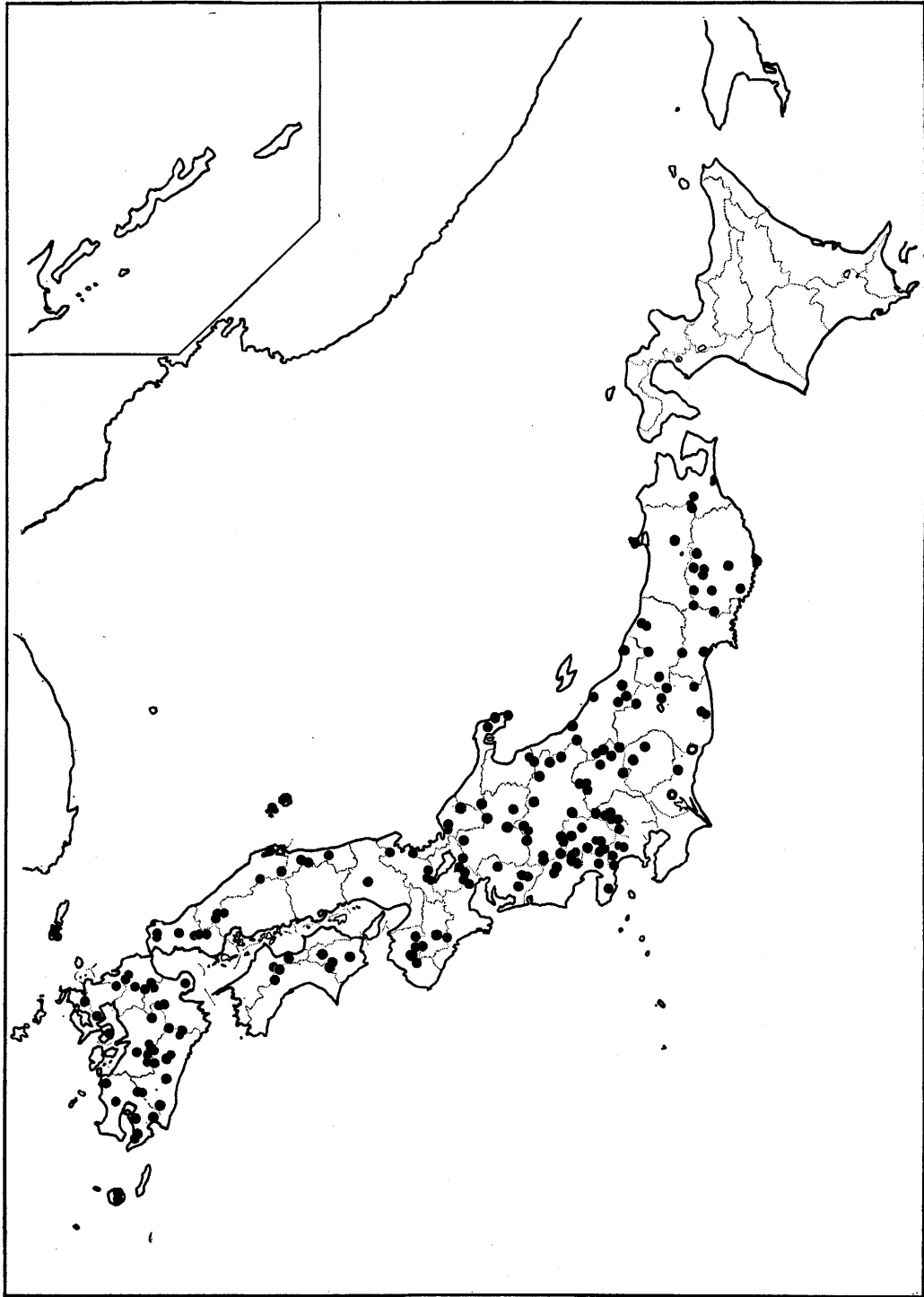


Map 6 *Acer Mono* Maxim. var. *trichobasis* Nakai (Itomakiitaya)

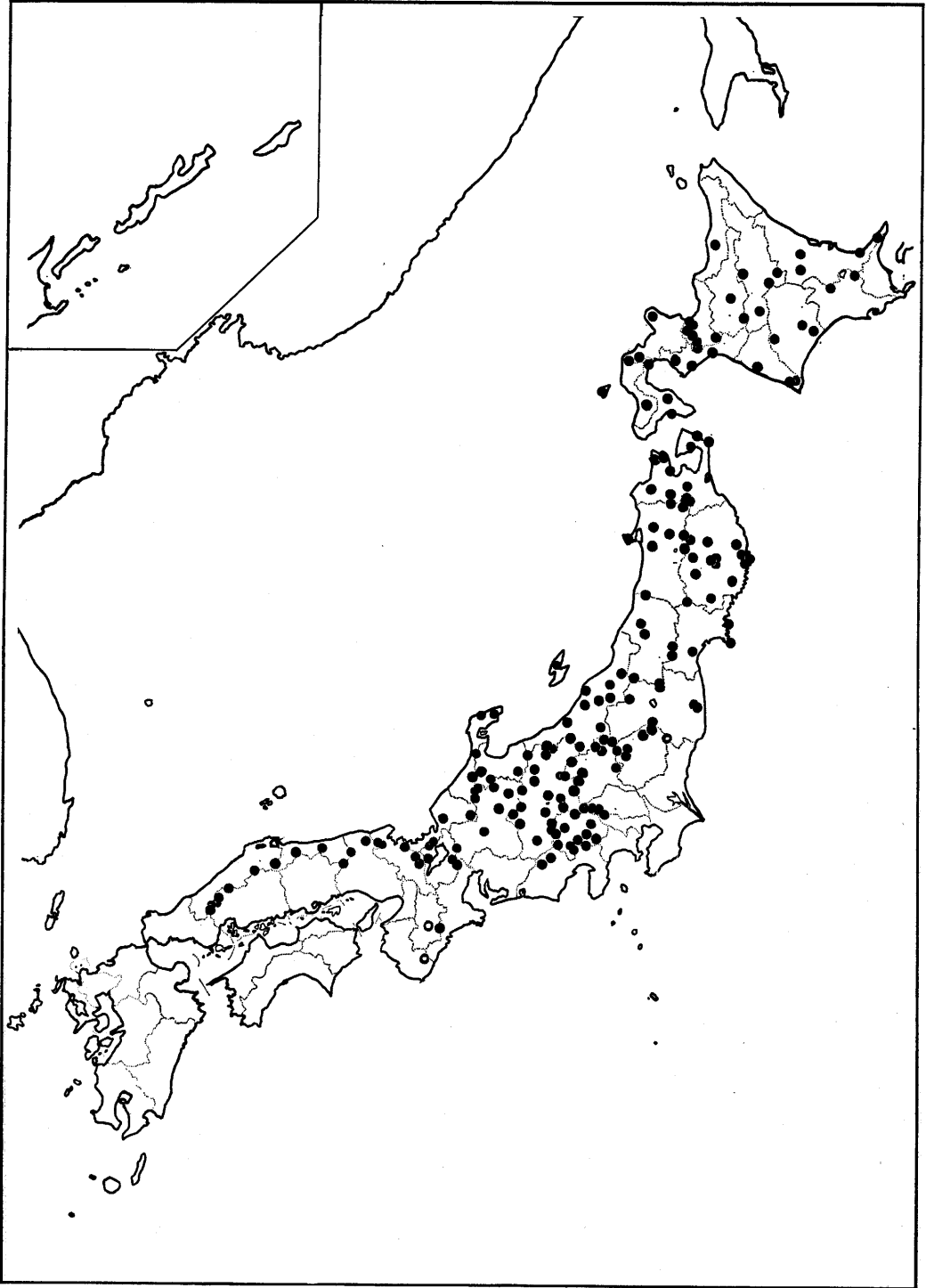


Map 7 *Acer Mono Maxim. var. ambiguum* (Pax) Rehder

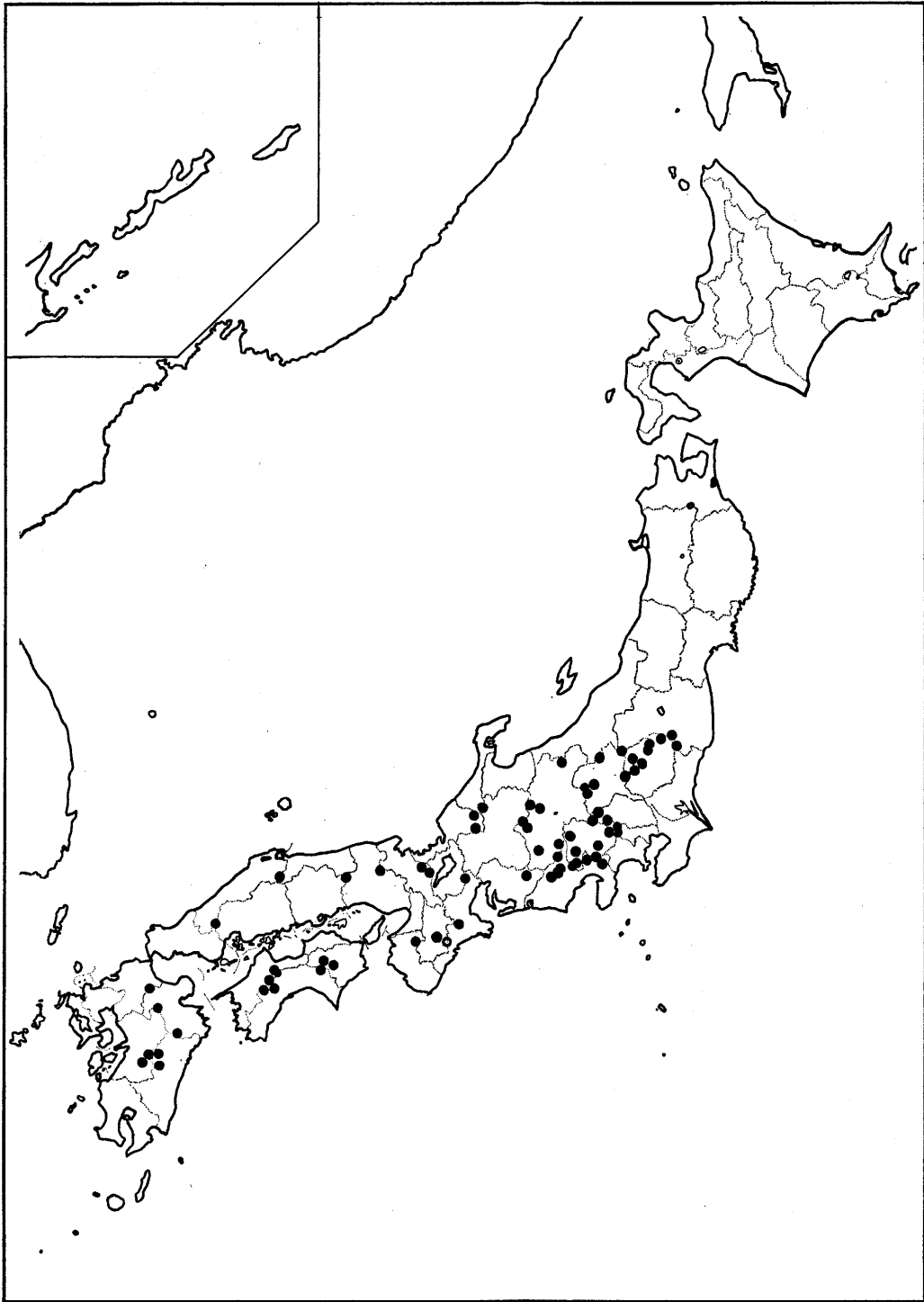
Map 8 *Acer Miyabei* Maxim.



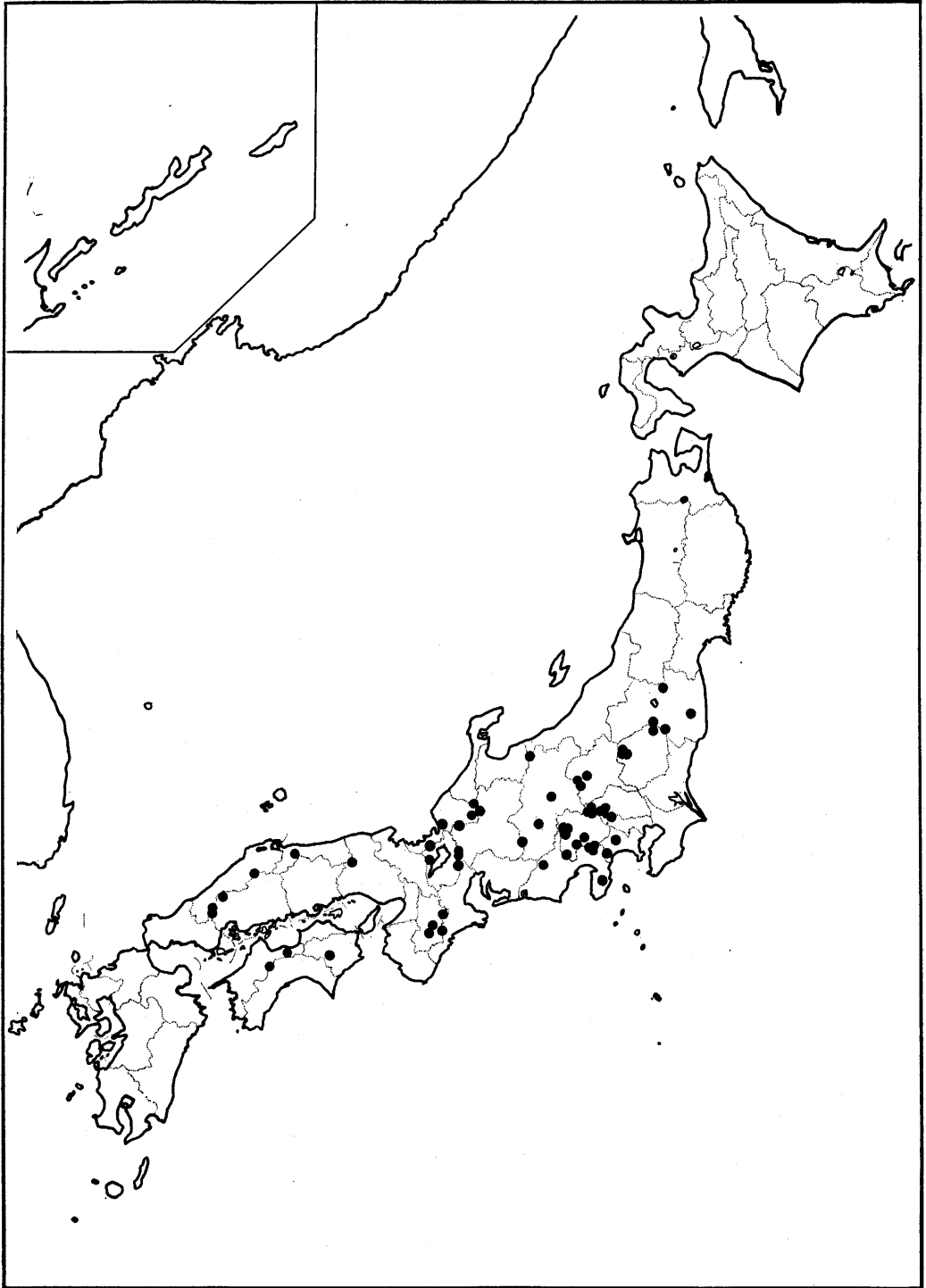
Map 9 *Acer Sieboldianum* Miq. (Itayameigetsu)



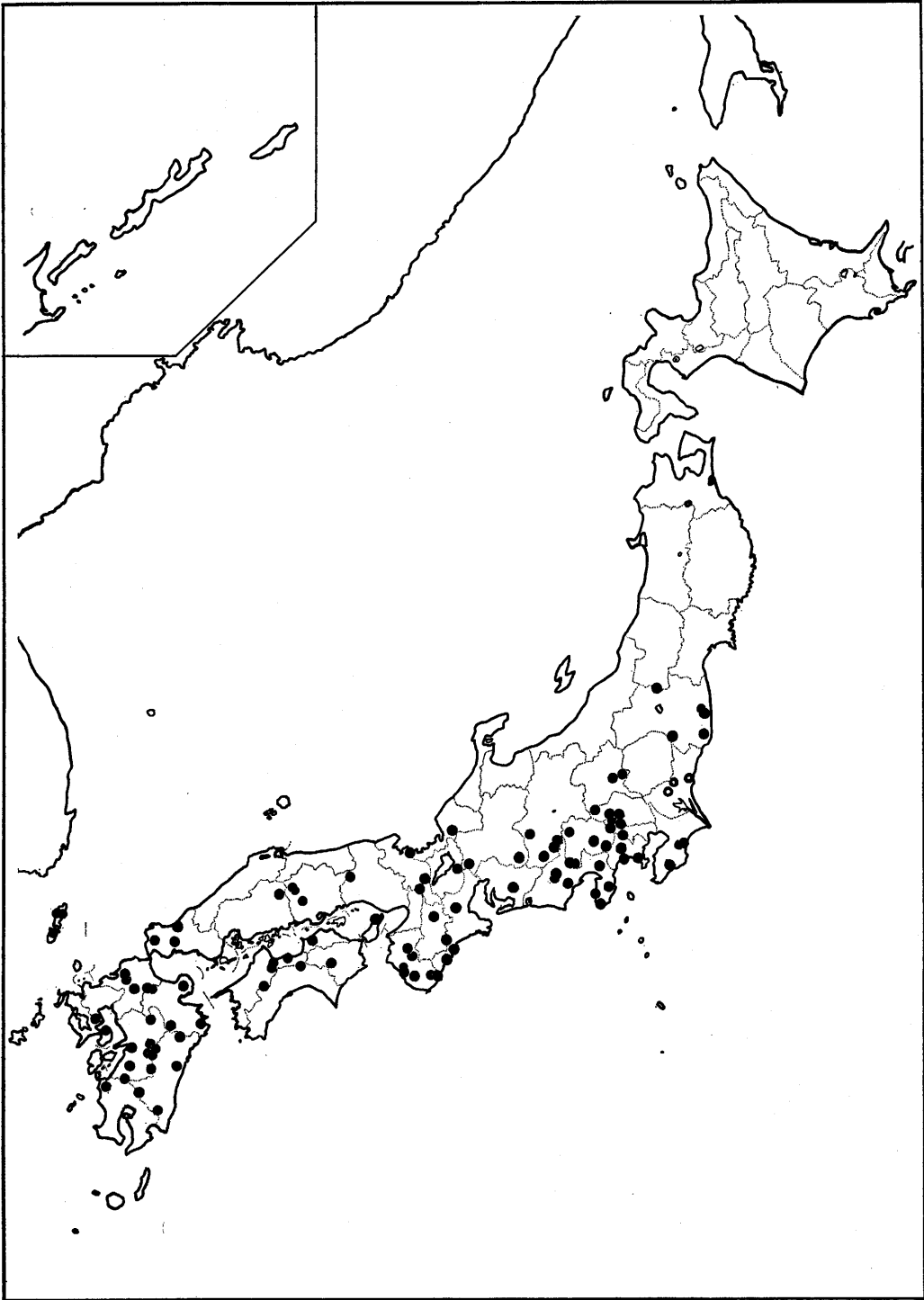
Map 10 *Acer japonicum* Thunb. (Hauchiwakaede)



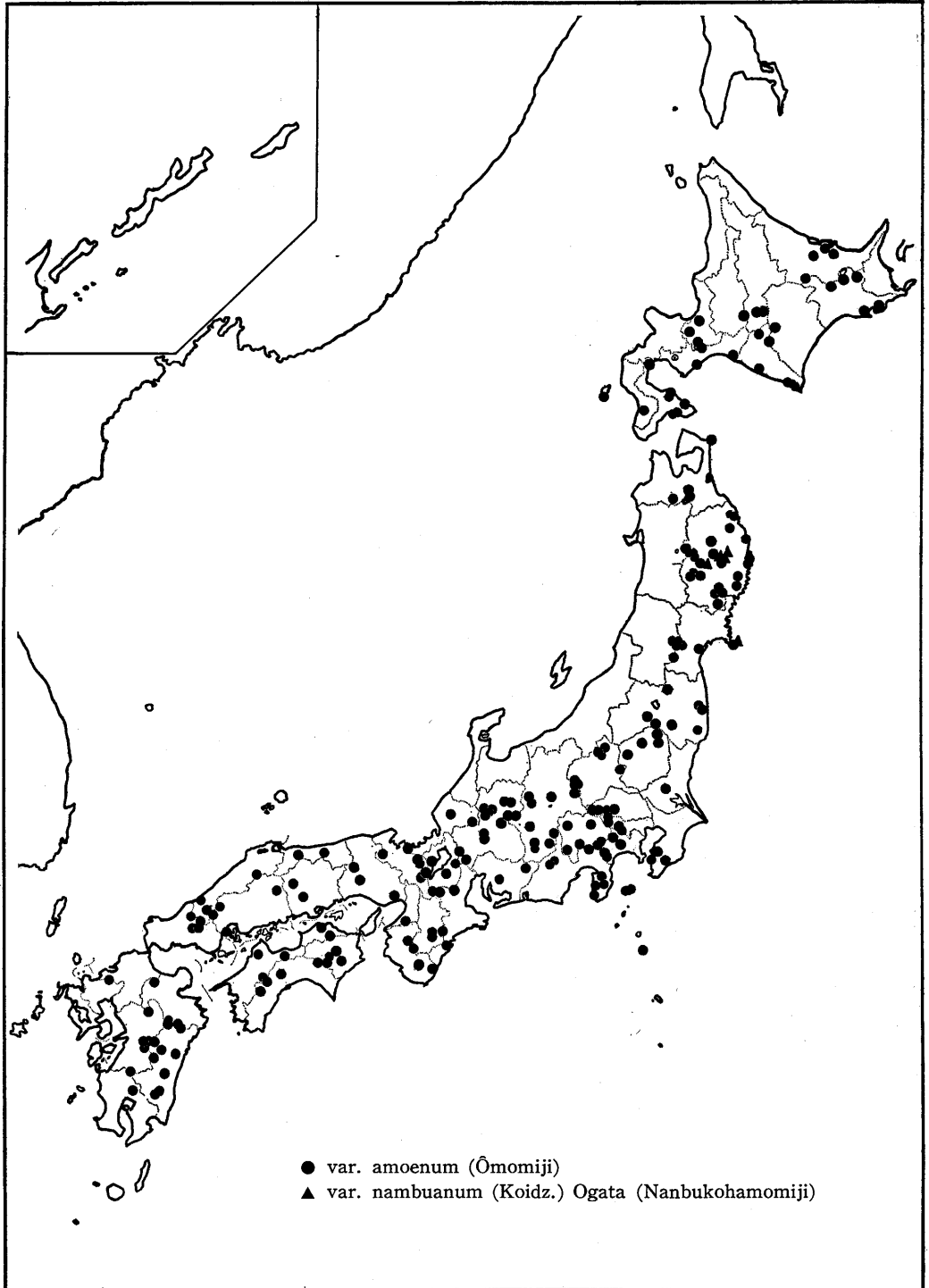
Map 11 *Acer tenuifolium* (Koidz.) Koidzumi (Hinauchiwakaede)

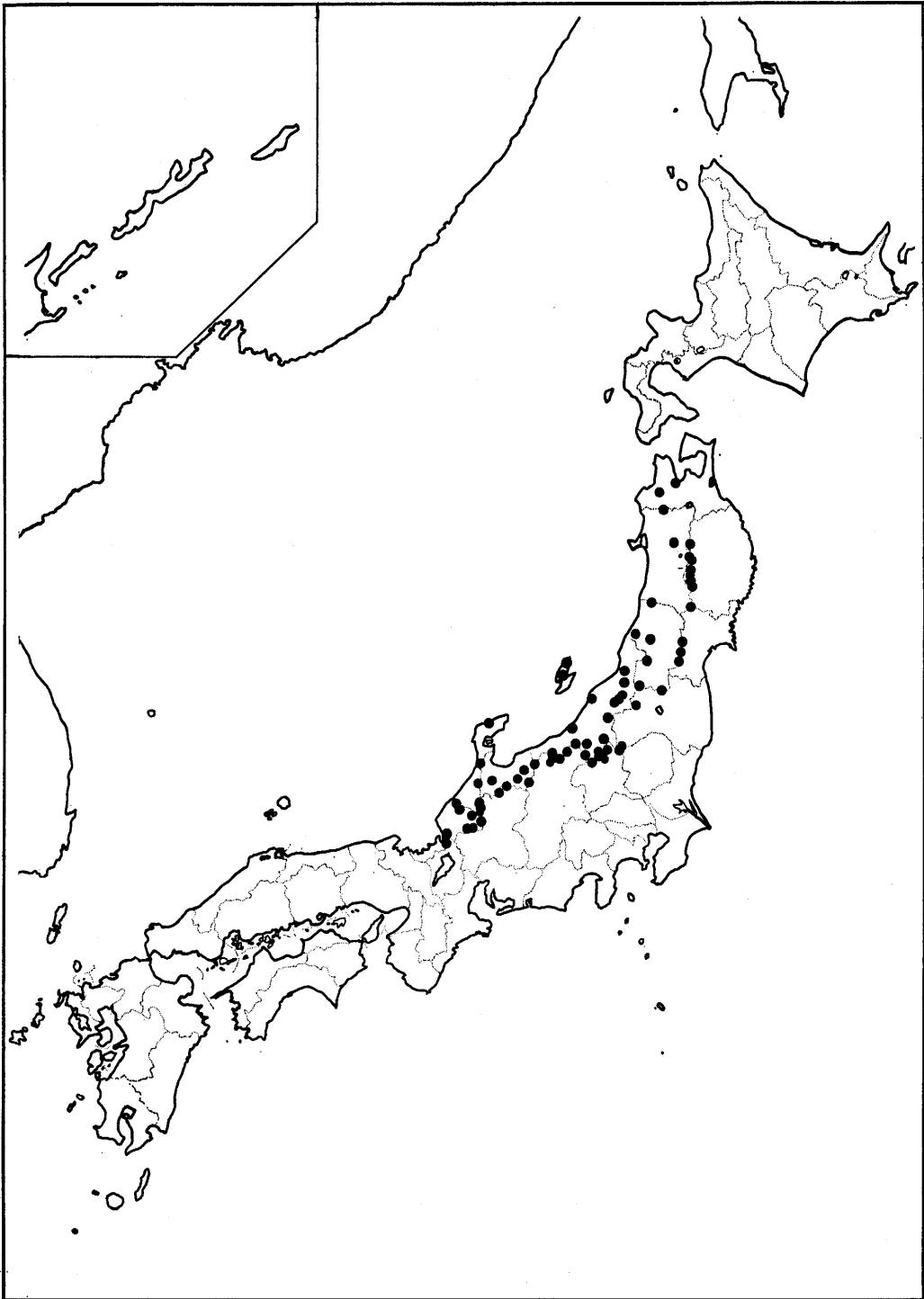


Map 12 *Acer Shirasawanum* Koidzumi (Ôitayameigetsu)

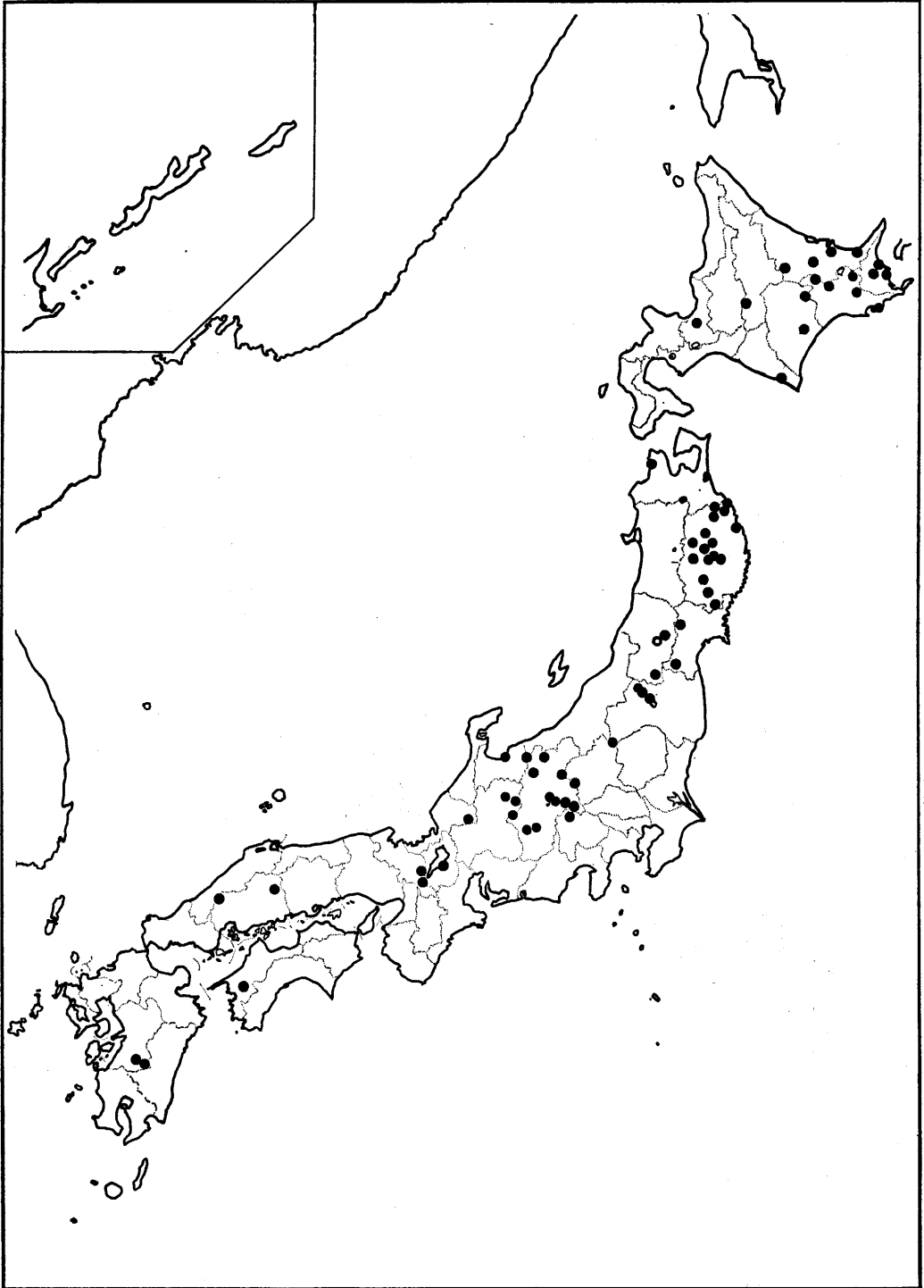


Map 13 *Acer palmatum* Thunb. (Irohamomiji)

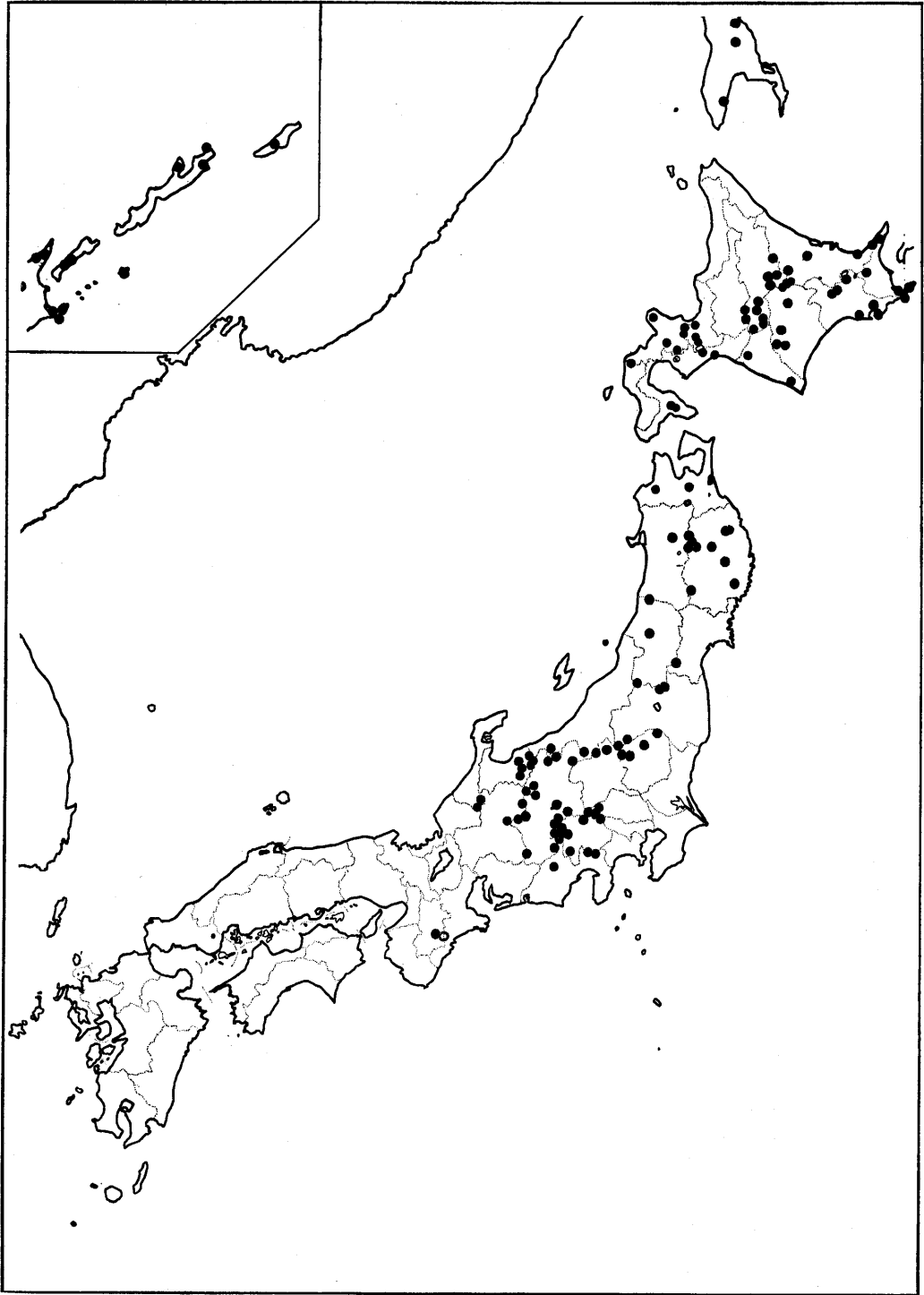
Map 14 *Acer amoenum* Carr.



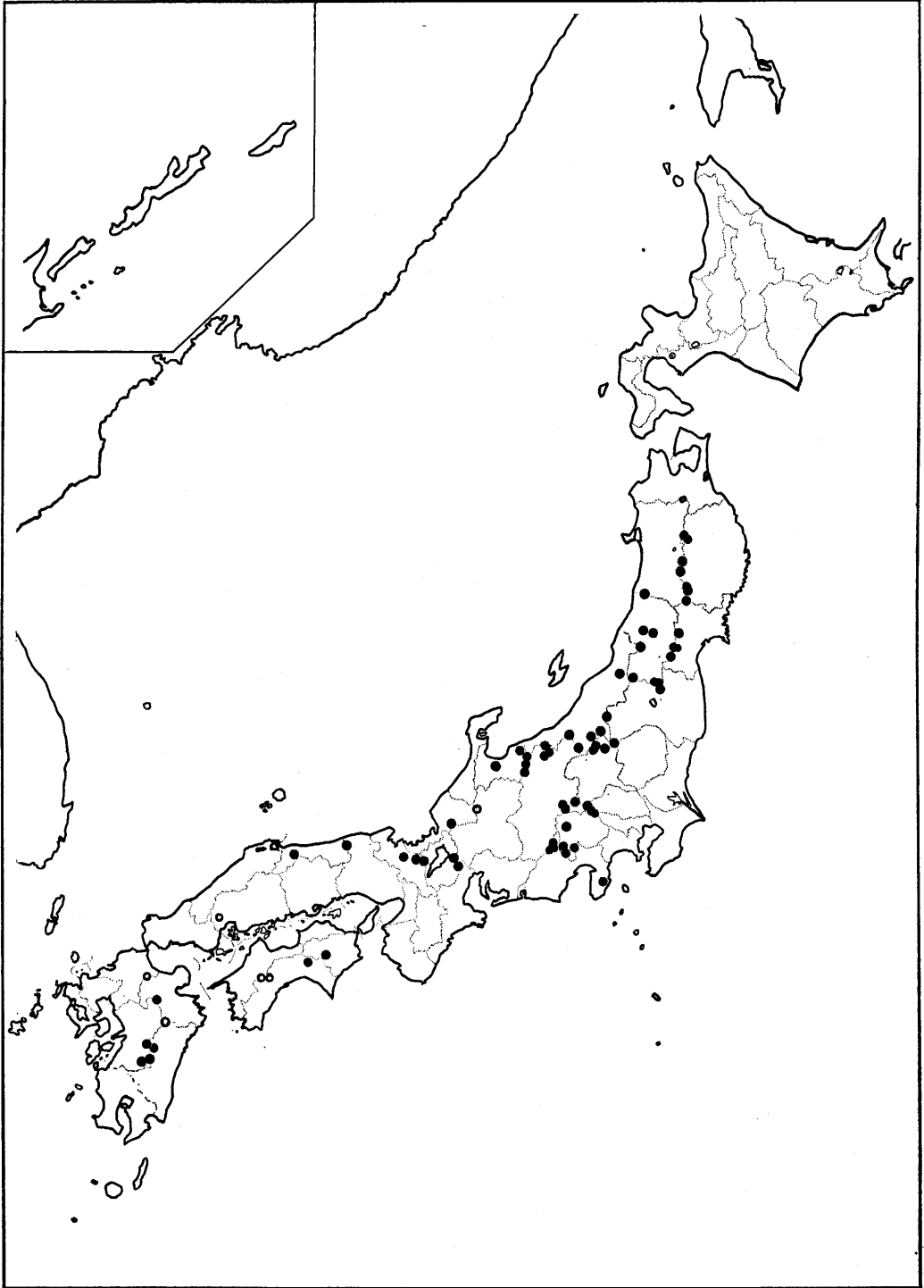
Map 15 *Acer amoenum* Carr. var. *Matsumurae* (Koidz.) Ogata (Yamamomiji)



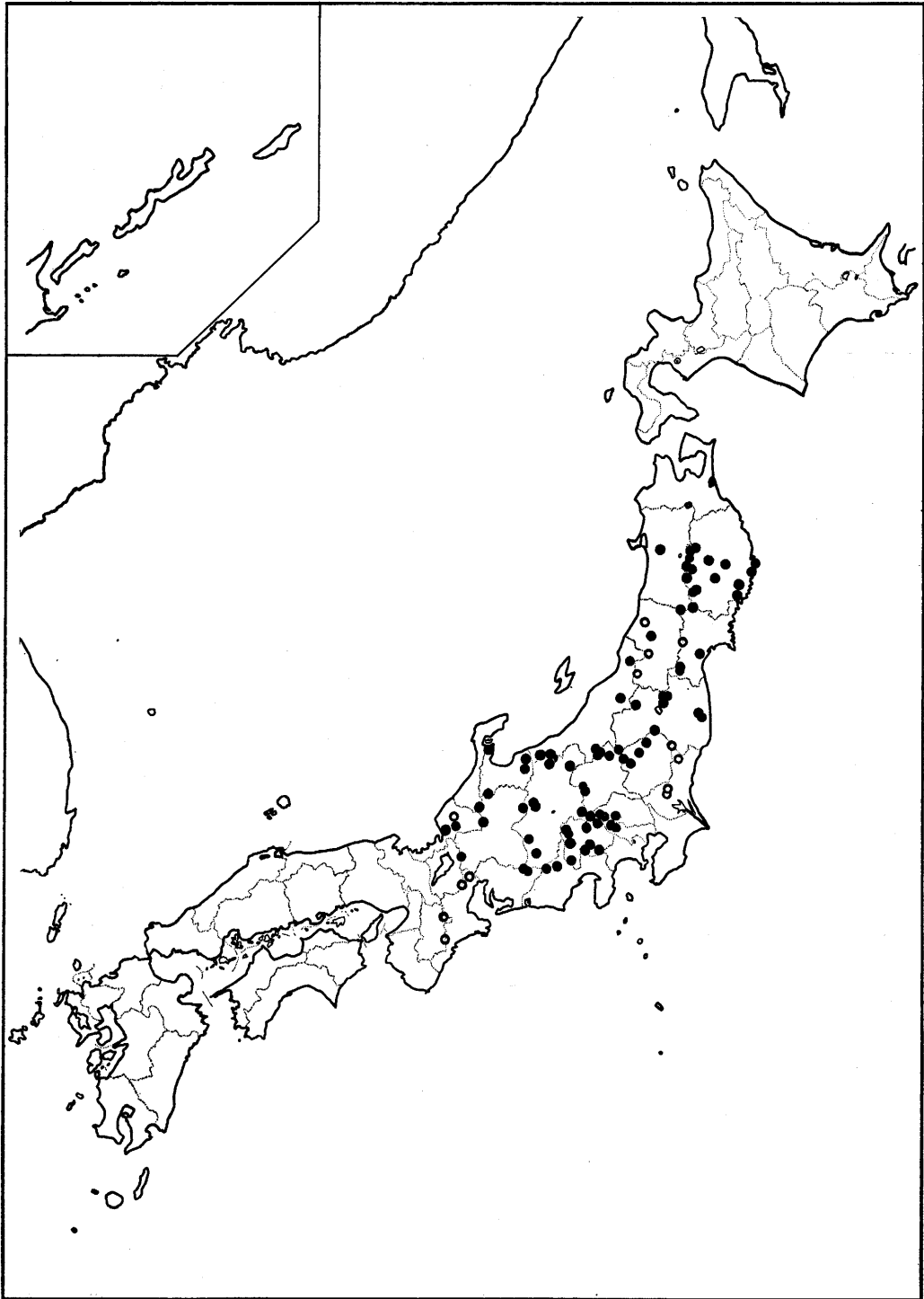
Map 16 *Acer Ginnala* Maxim. var. *aidzuense* (Franch.) Ogata (Karakogikaede)



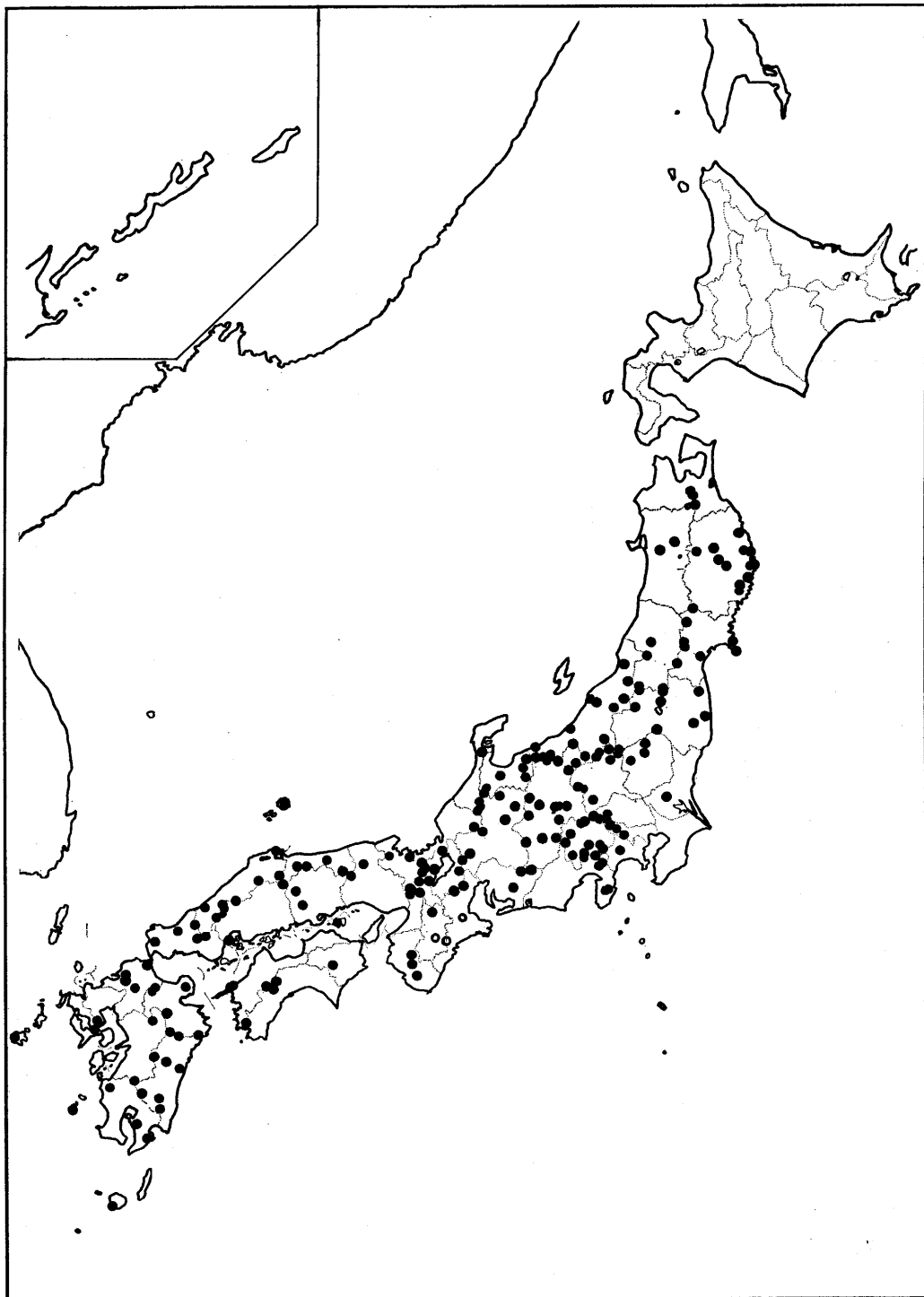
Map 17 *Acer ukurunduense* Trautv. et Mey. (Ogarabana)



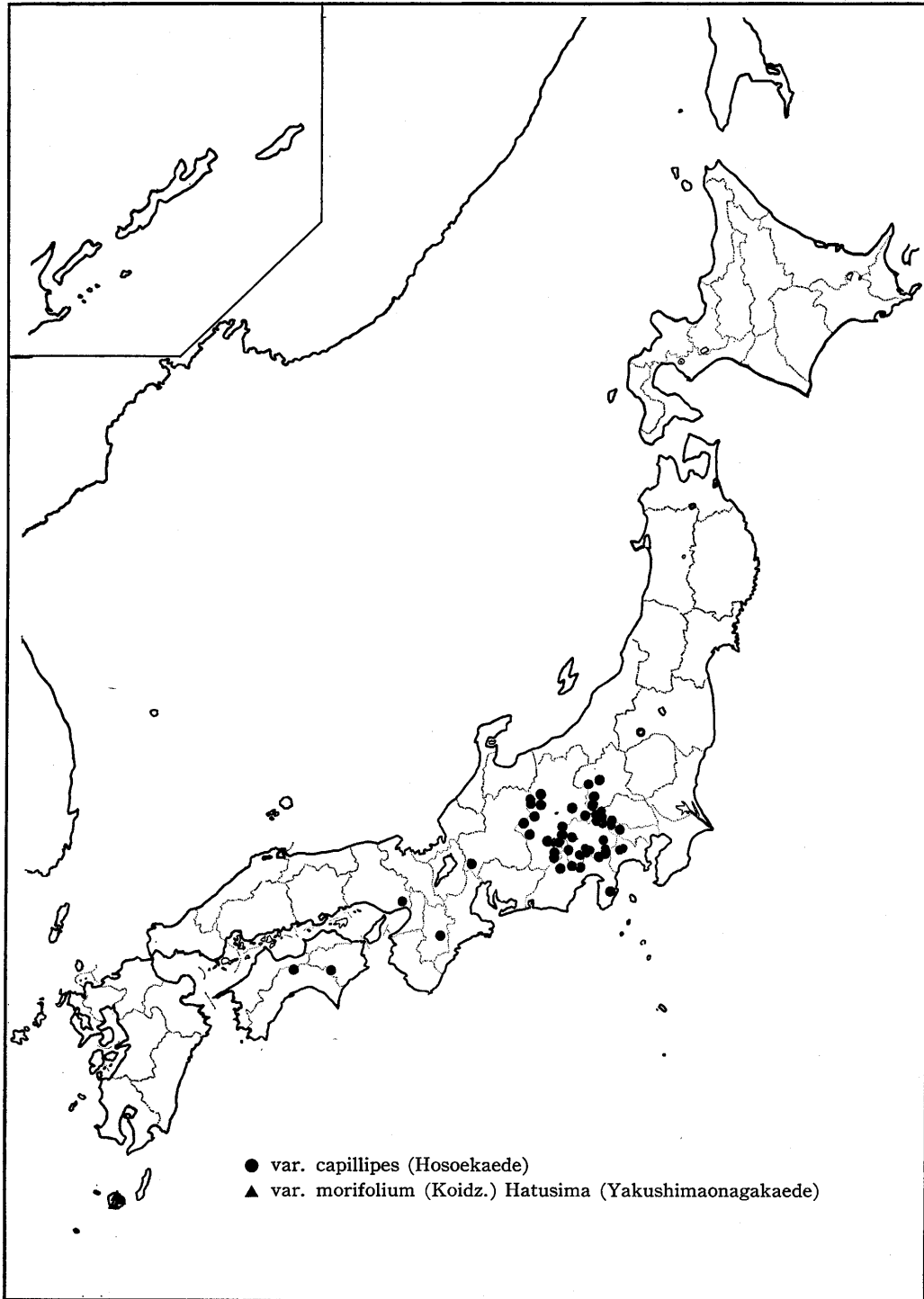
Map 18 *Acer nipponicum* Hara (Tetsukaede)

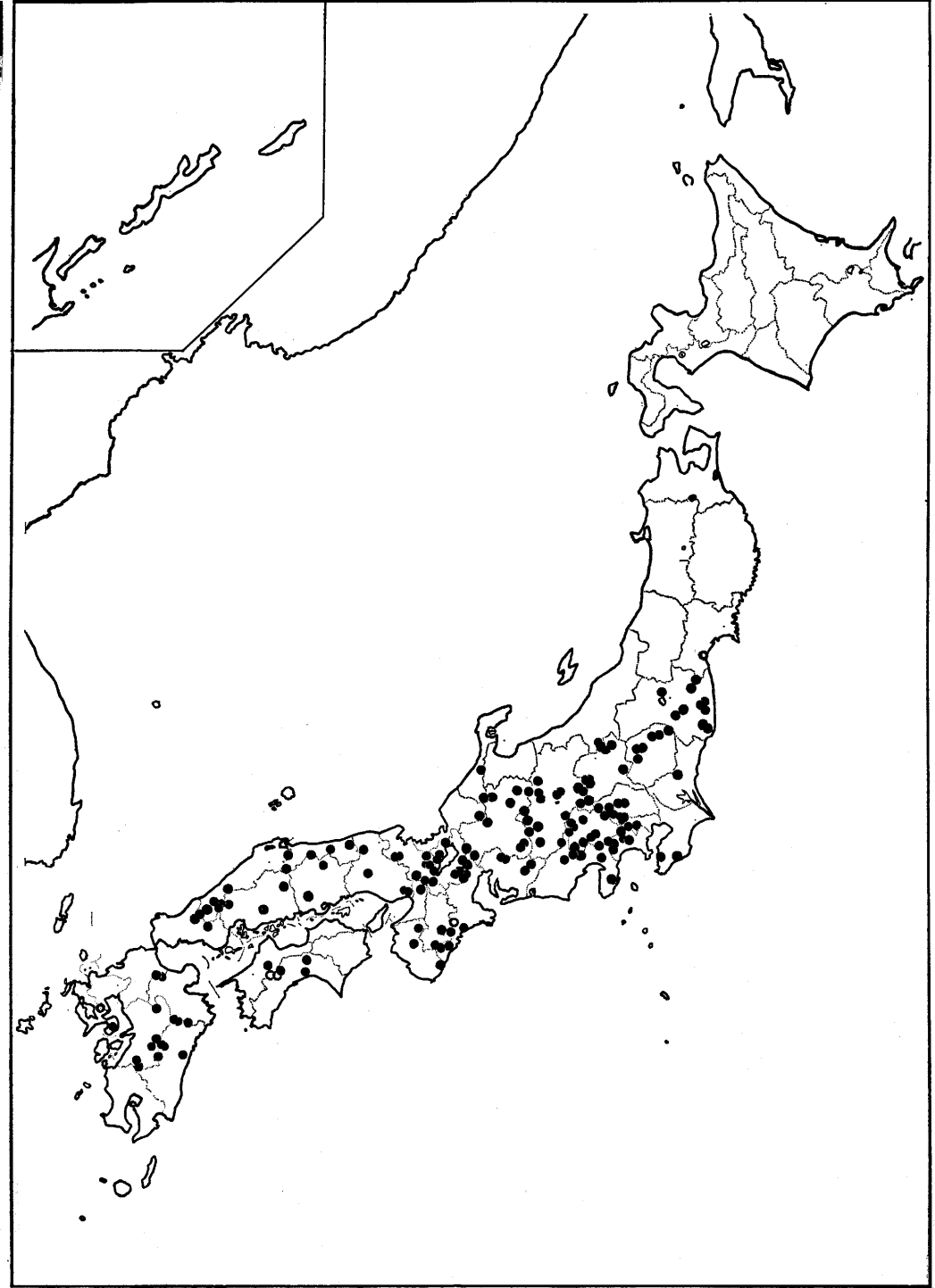


Map 19 *Acer distylum* Sieb. et Zucc. (Marubakaede)

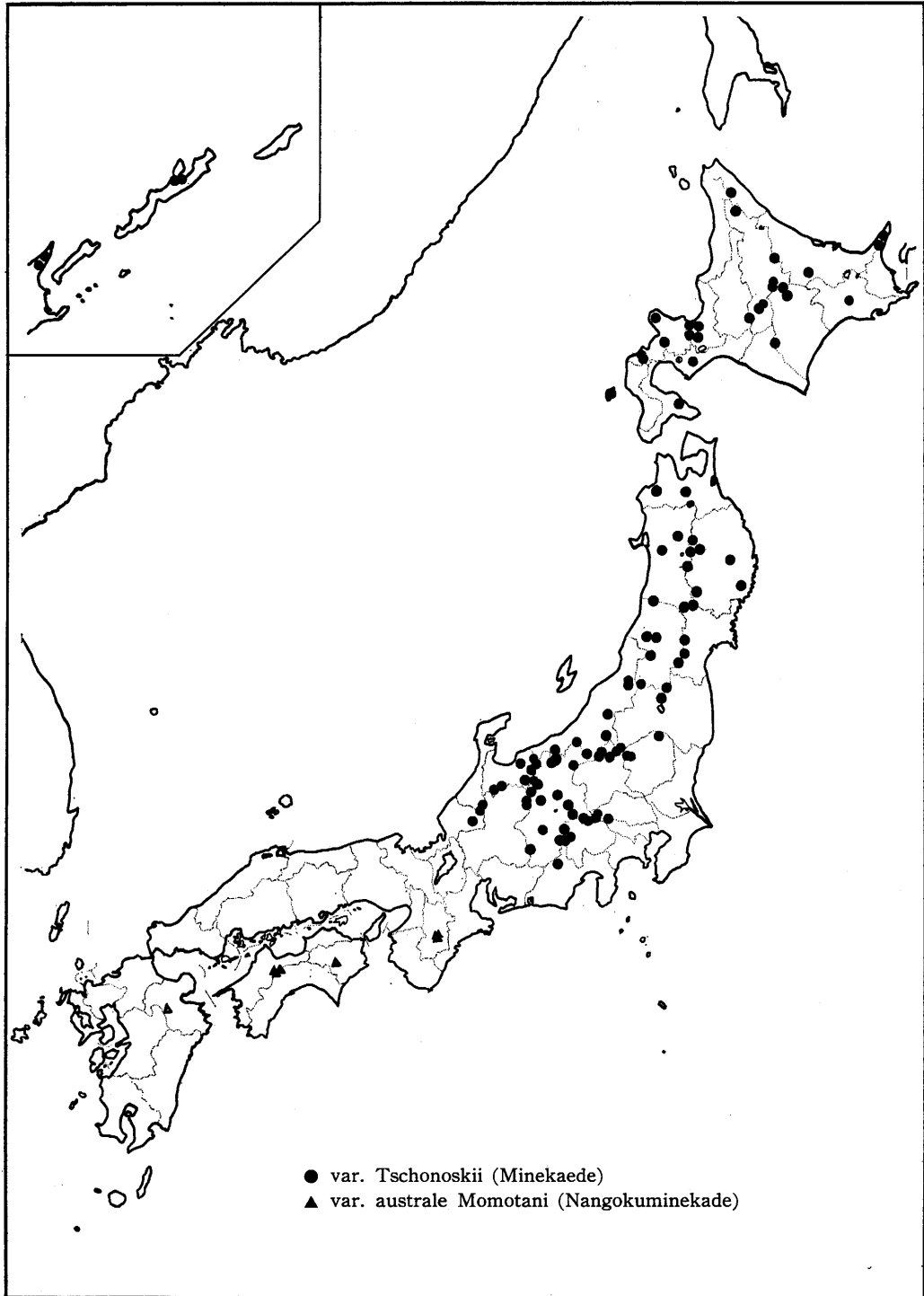


Map 20 *Acer rufinerve* Sieb. et Zucc. (Urihadakaede)

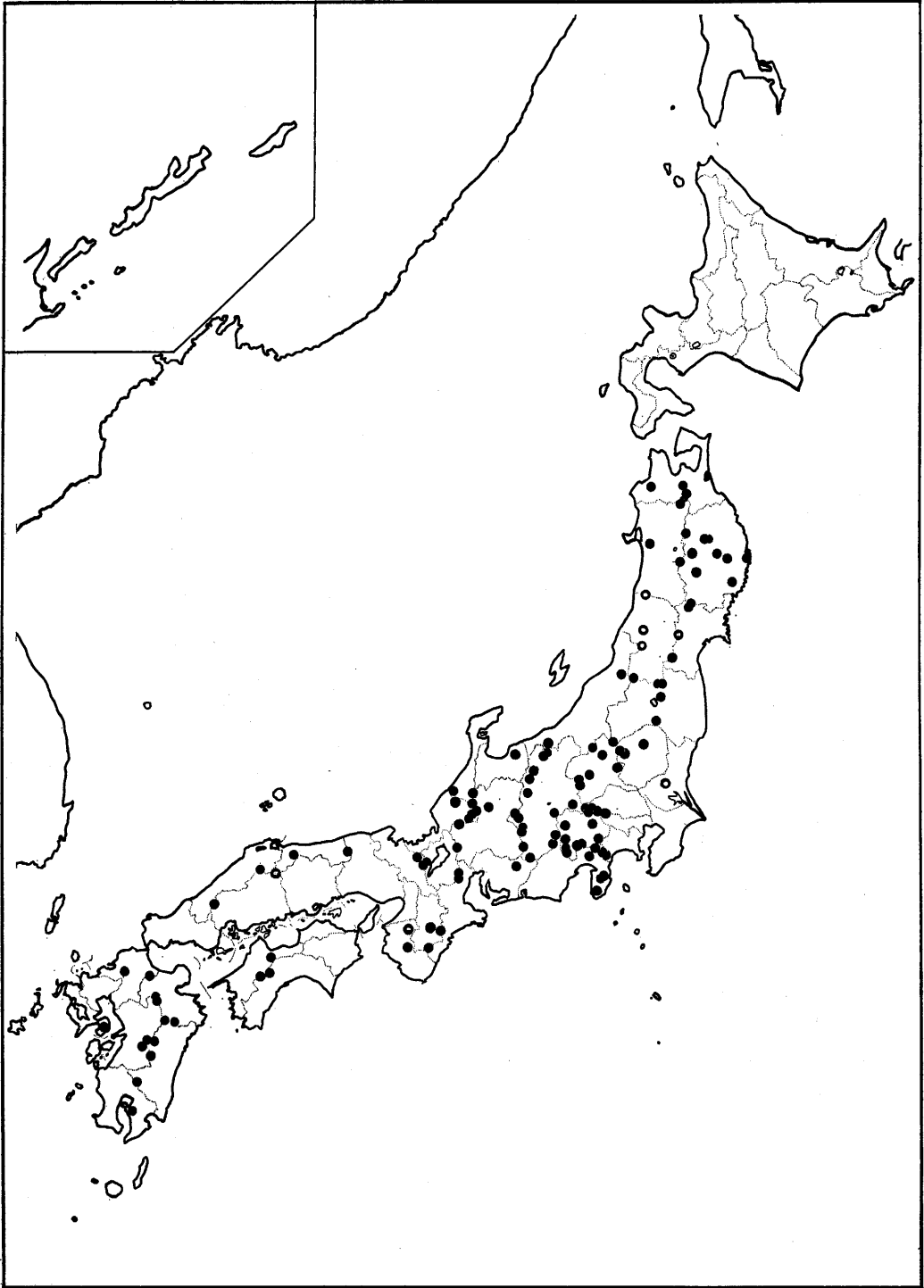
Map 21 *Acer capillipes* Maxim.



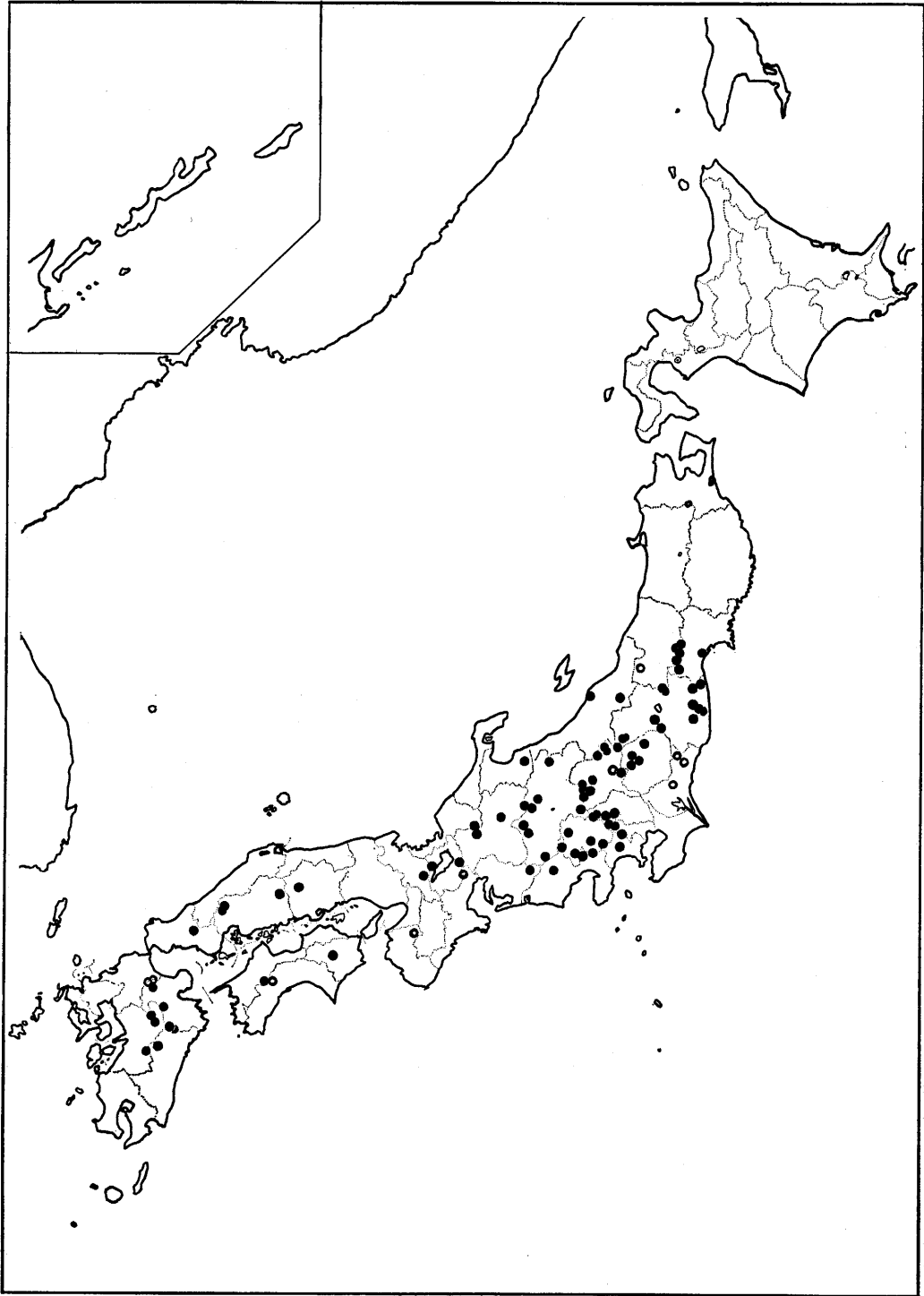
Map 22 *Acer crataegifolium* Sieb. et Zucc. (Meurinoki)



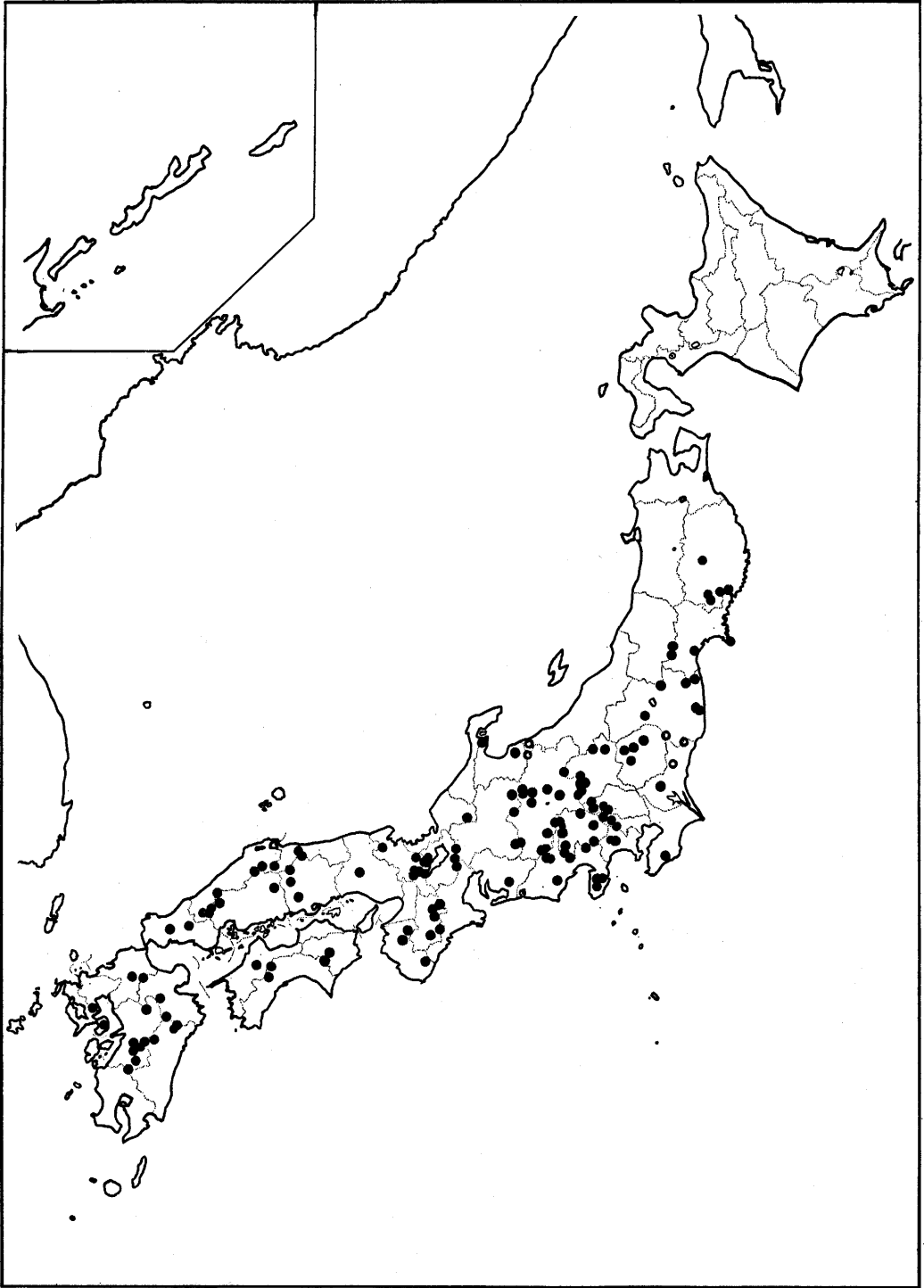
Map 23 Acer Tschonoskii Maxim.



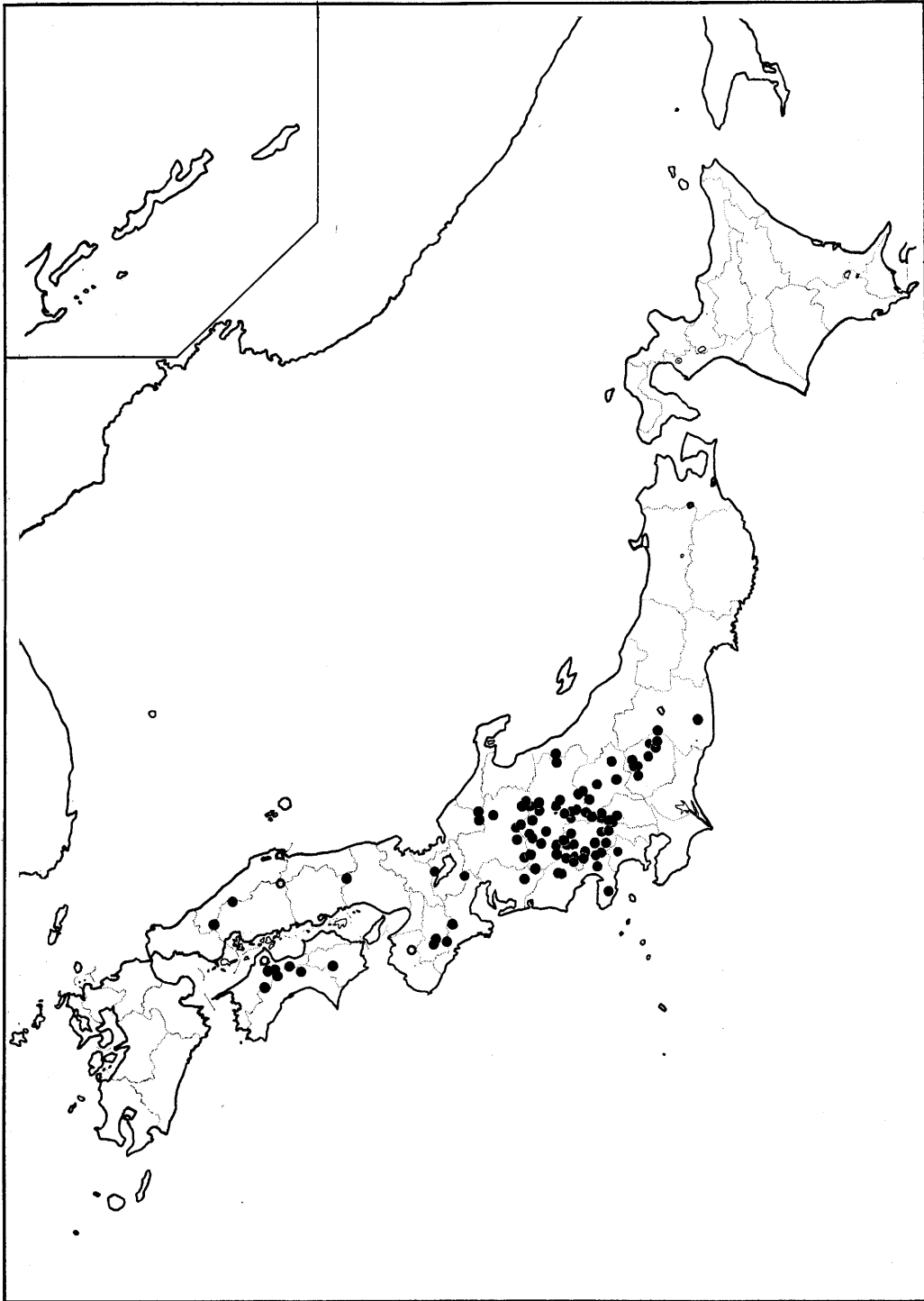
Map 24 *Acer micranthum* Sieb. et Zucc. (Koinekaede)



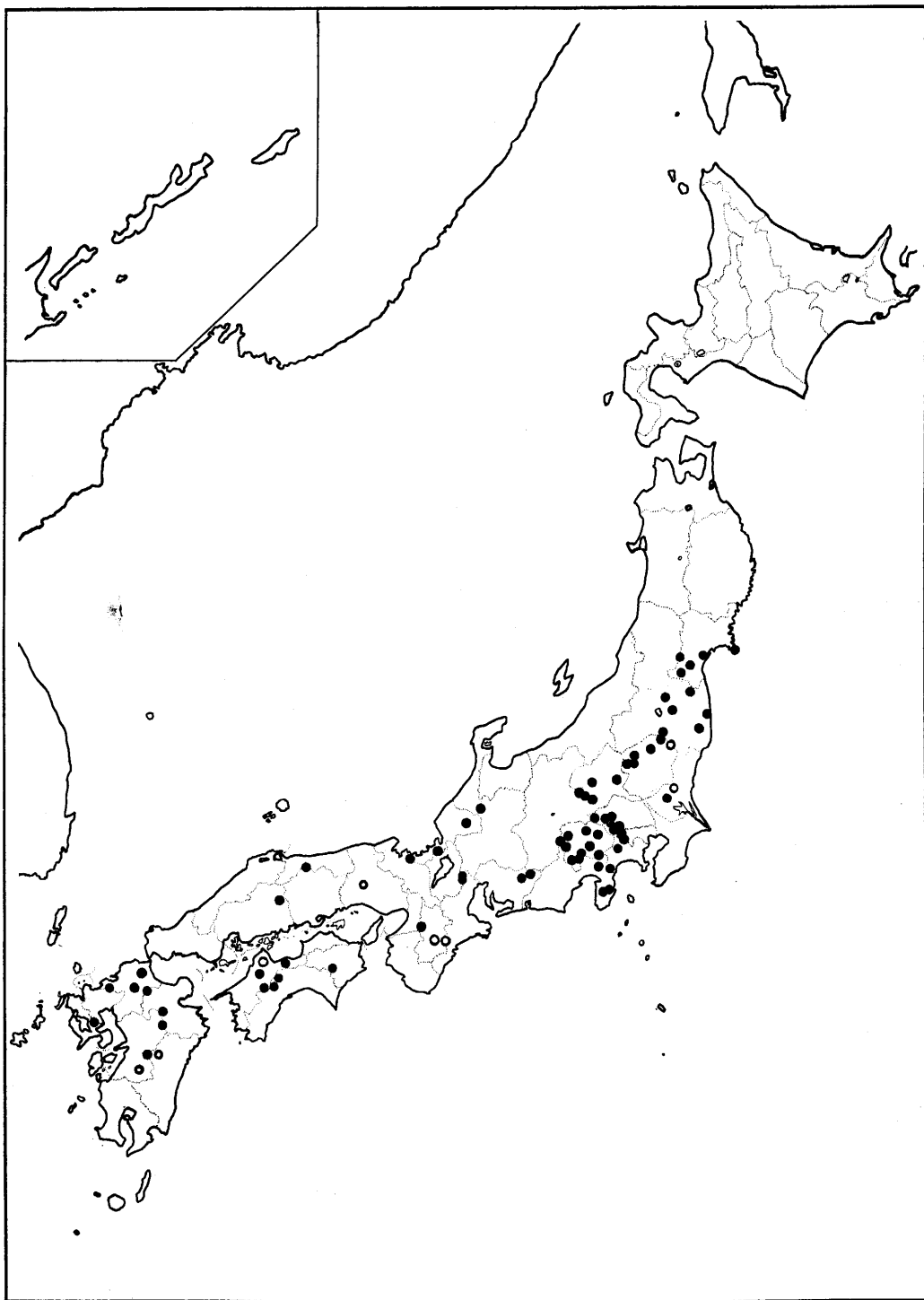
Map 25 *Acer nikoense* Maxim. (Megusurinoki)



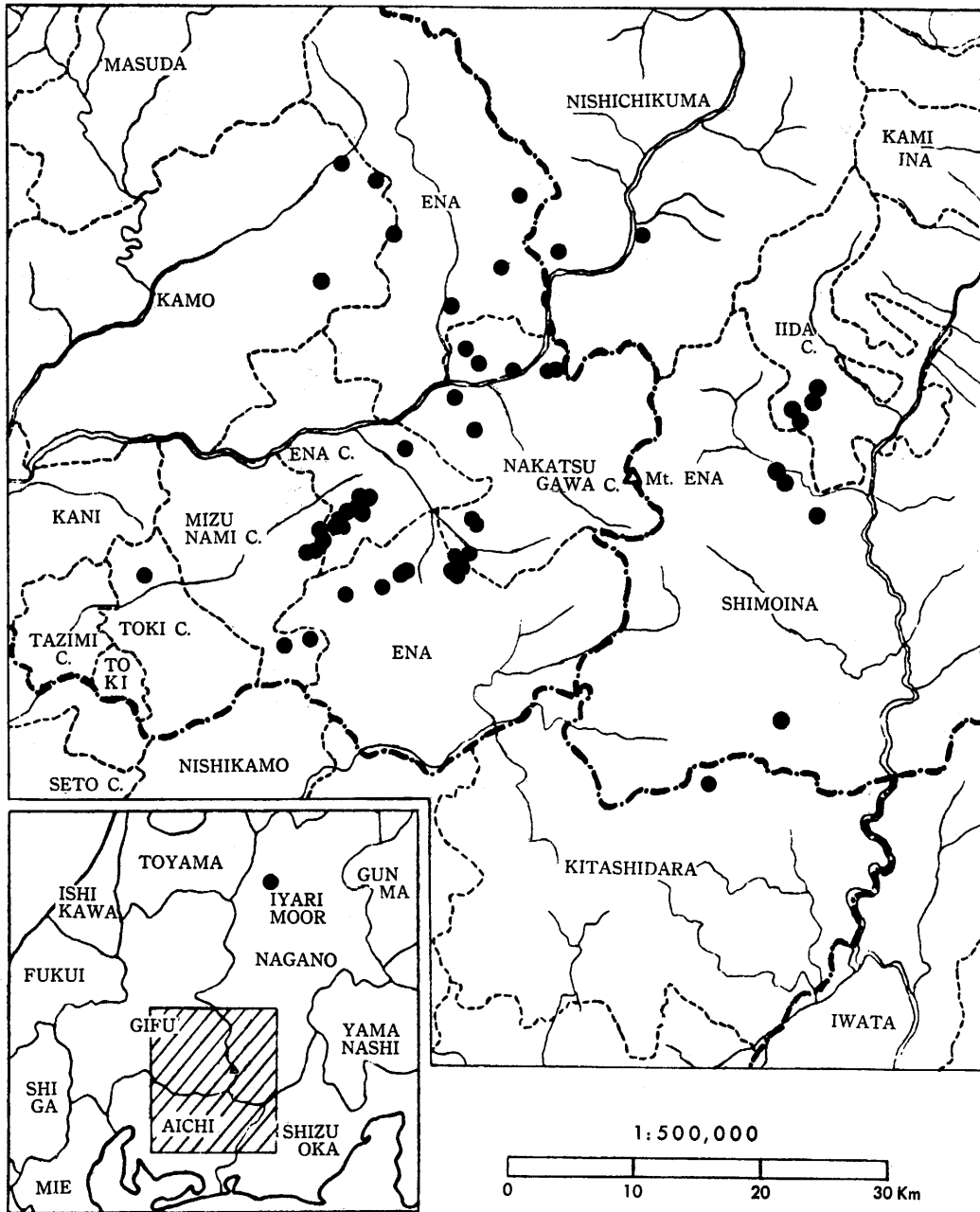
Map 26 *Acer carpinifolium* Sieb. et Zucc. (Chidorinoki)



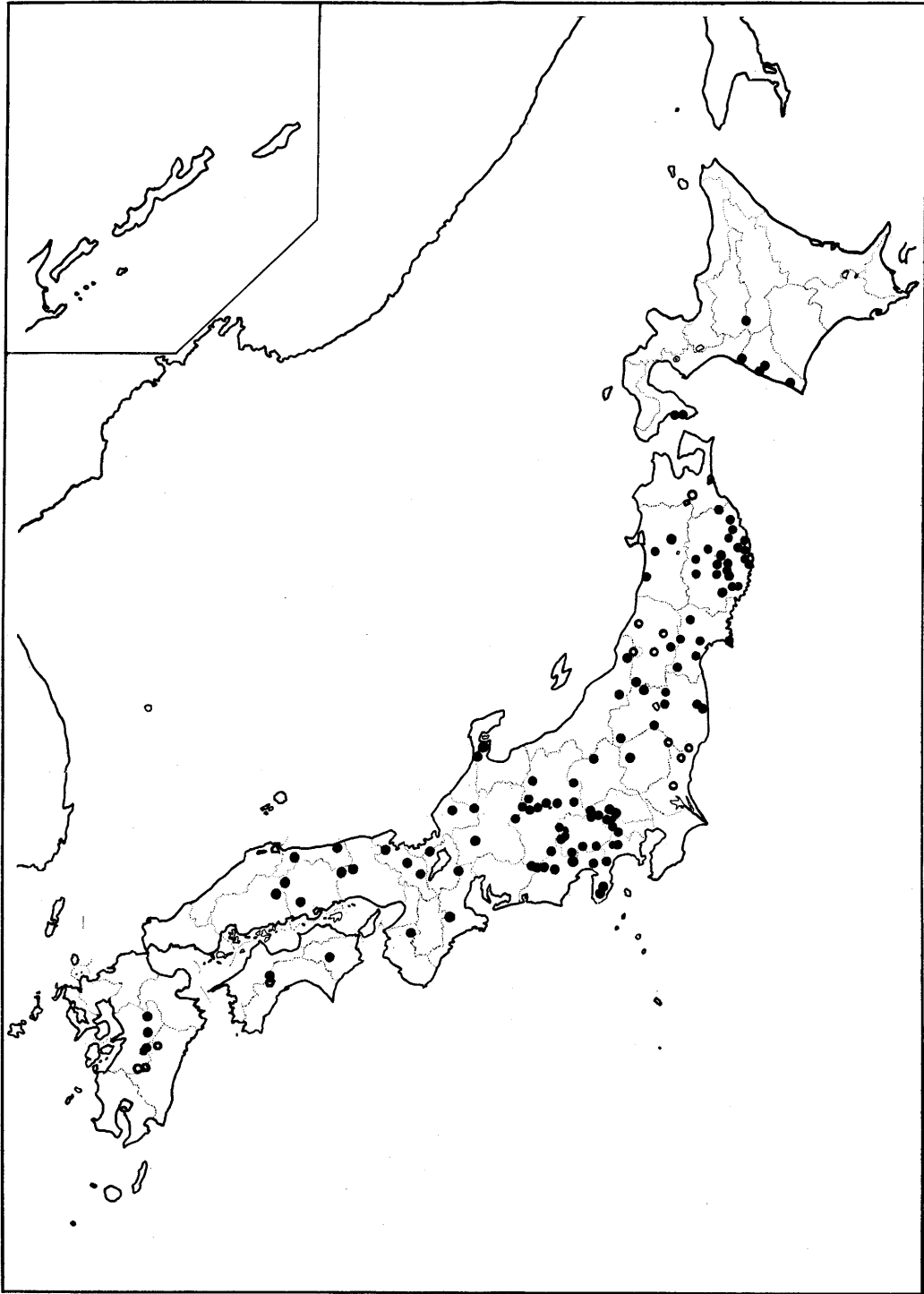
Map 27 *Acer argutum* Maxim. (Asanohakaede)



Map 28 *Acer diabolicum* Bl. (Onimomiji)



Map 29 *Acer pycnanthum* K. Koch (Hananoki) (C.=City)



Map 30 *Acer cissifolium* (Sieb. et Zucc.) K. Koch (Mitsudekaede)