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INTRODUCTION

The genus Asarum sensu lato* has historically received more attention from the Japanese than from Westerners. In recent times Japanese enthusiasm for Asarum has been most obvious in two ways: an ongoing effort to classify the many native species and understand the relationships among them, and a renewed enthusiasm for the collection and cultivation of selected clones of a few species, a practice which extends far back into Japanese history. This paper is an effort to record and examine the genus in Japan and the Japanese interest in it, and necessarily reflects the different ways that the Japanese have expressed their interest in the various species and cultivated variants.

Japanese interest in Asarum species is scientific and straightforward, and this interest can easily be

* Unless otherwise specified, all references to Asarum in this paper are sensu lato (Linnaeus) rather than sensu stricto (Fumio Maekawa and others).

expressed in terms of Western experience. Japanese interest in the cultivated selections, however, is enormously complex, leading the Western observer into dim regions scarcely illuminated by the horticultural literature of the West.

This paper thus has of necessity a sort of split personality, dealing first with the Japanese species, and afterward with Japanese Asarum cultivation as an example of a uniquely Japanese approach to the cultivation of plants which is scarcely known in the West. Either of these subjects is worthy of more attention than it can receive in a paper of this length, but they stand together here in what may occasionally seem to be uneasy alliance. The study of the genus in cultivation might be a practical independent project if the group were as familiar to gardeners as roses or iris. The author hopes that the reader will agree that his understanding of the genus in cultivation will be enhanced by an understanding of the richness of the genus in the wild.

The first half of this paper opens with a discussion of the characteristics and distribution of the genus as a whole, leading to a discussion of the characteristics and distribution of the genus in Japan, including a review of the controversy surrounding the question of the integrity of the genus. This section concludes with an enumeration of the Japanese species arranged in groups

which help to illustrate the species' relationships. It is not intended to be an original taxonomic review of the genus, but rather a convenient assemblage of information scattered throughout the Japanese literature presented in light of the author's personal experience with the species. Readers who require more technical information about the species than the text provides should refer to appendix 2, a key to the Japanese species; and appendix 3, a précis of species' descriptions.

The second half of this paper reviews the history of Japanese aesthetic interest in the genus by documenting and discussing the development and use of the Asarum family crest (kamon), followed by an account of the development of Asarum cultivation within the cult of koten engei ("classical plant" cultivation), proceeding to an enumeration of cultivar selections and the conventions associated with collecting, growing, and appreciating them within the context of koten engei. This section includes an extensive list of cultivars with descriptions in appendix 5, a discussion of how to grow Asarum in pots in the traditional manner in appendix 7, a look at the use of Asarum species (rather than cultivars) in Japanese gardens in appendix 8, and a discussion of their potential value for American gardens in appendix 9.

The author recognizes that different readers will

have different degrees of interest in various parts of this paper. Therefore, detailed and complicated collections of information are usually organized as tables or appendices in an effort to make the text more readable. Illustrations and tables are integrated with the text for ease of reference. In addition to the bibliographies of sources actually cited in the text, the reader will find a general bibliography presented as an aid to further research. Throughout the paper Japanese personal names are rendered in Western style, surname last.

PART I

THE GENUS ASARUM AND ITS
JAPANESE SPECIES

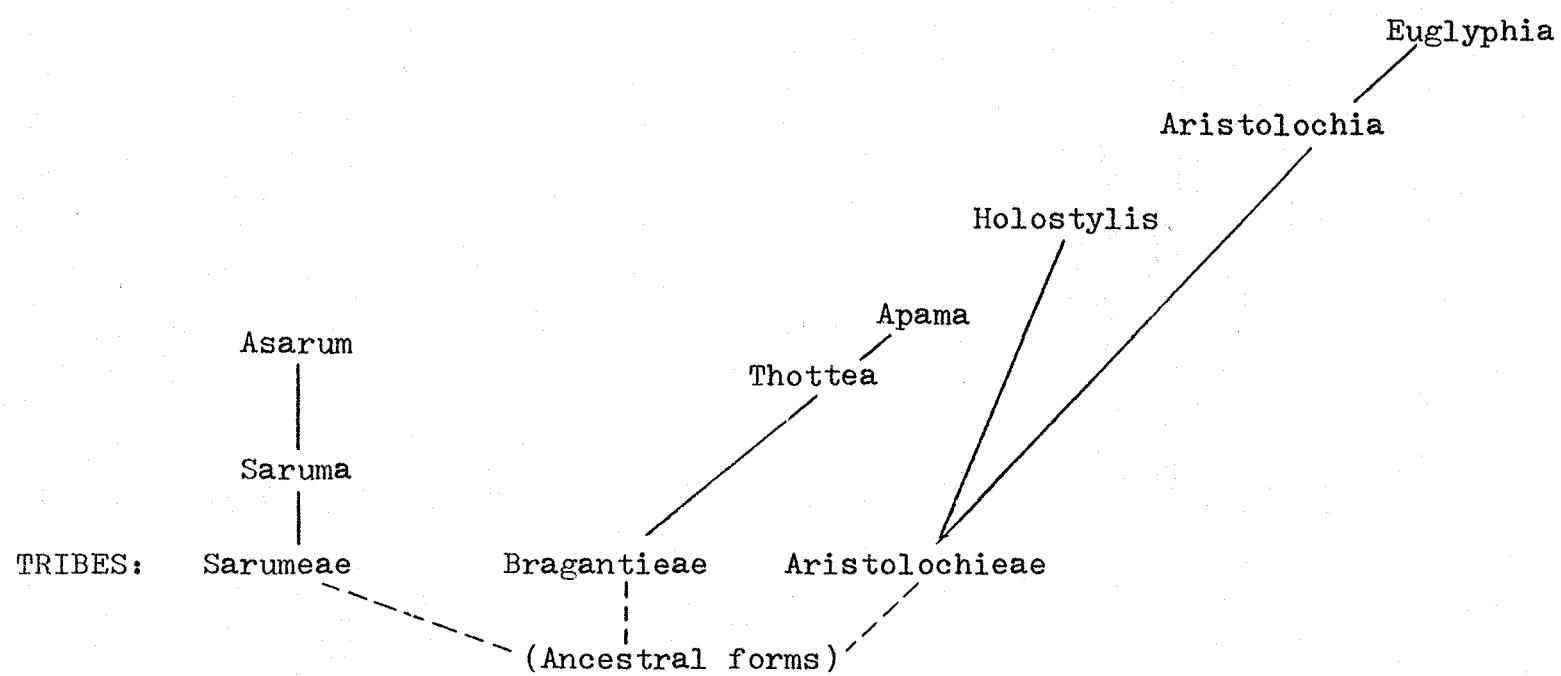
CHAPTER I

CHARACTERISTICS OF THE GENUS ASARUM

The genus Asarum is ordinarily included in the Aristolochiaceae, the birthwort family, a natural family which can be divided into three tribes and seven genera (see figure 1). Of these genera only Aristolochia and Asarum are widespread and include many species.¹ The family is thought to be derived from ancestral types in the Magnoliales, and is characterized by a peculiar mix of primitive and advanced traits. Cronquist points out that in Asarum such primitive traits as essential oil glands and primitive seed and pollen morphology coexist with such advanced traits as united carpels and an elaborate corolla-like calyx.²

Asarum and Aristolochia seem to have been developing along independent lines for a long time, and a

Figure 1. A diagrammatic representation of the Aristolochiaeae



SOURCE: M. Pfluge Gregory, "A Phyletic Rearrangement in the Aristolochiaceae," American Journal of Botany 43 (February 1956): 121.

diagrammatic representation of the family places them near opposite ends of the spectrum of development (see figure 1). The genus Saruma, an ancient monotypic genus from western China, has certain characteristics such as well-developed petals, a superior ovary, and distinct carpels which ripen into follicles which suggest a connection between the Aristolochiaceae and the Magnoliales.³ Other characters are so similar to Asarum that it can be viewed as an intermediate stage of development between Asarum and an unknown ancestral type.⁴ (see figure 2).

The genus Asarum is a complex assemblage of species inside and outside Japan, but all known species do have certain morphological features in common. All are perennial herbs with rhizomes (which grow at or near the soil surface) on which are borne long fleshy roots and both large foliar leaves held on petioles and tiny bract-like leaves which subtend the flowers. All parts of the plant, but especially the roots, contain volatile oils which impart a characteristic pungent odor to the plant. The flowers appear at or near the soil surface, with a three-lobed urceolate or campanulate corolloid calyx enclosing a multi-locular ovary with parietal placentation and two series of stamens. The ovary develops into a fleshy berry-like capsule which dehisces irregularly as it decomposes, releasing ellipsoidal seeds equipped with

Figure 2. Saruma henryi is a monotypic species from western China which is the closest living relative to Asarum. In Saruma the three petals are well-developed, but in Asarum the petals are absent or vestigial within the fused calyx. Saruma's twining habit is reflected in some primitive species of Asarum such as A. epigynum of Taiwan.

SOURCES: Institute Botanico Boreali-Occidentali Academiae Sinicae, Flora Tsinglingensis: Spermatophyta (Peking: Academiae Scientiarum Sinicum, 1974), p. 129.

M. Pfluge Gregory, "A Phyletic Rearrangement in the Aristolochiaceae," American Journal of Botany 43 (February 1956): 117.

Redrawn by Y. J. Chang.

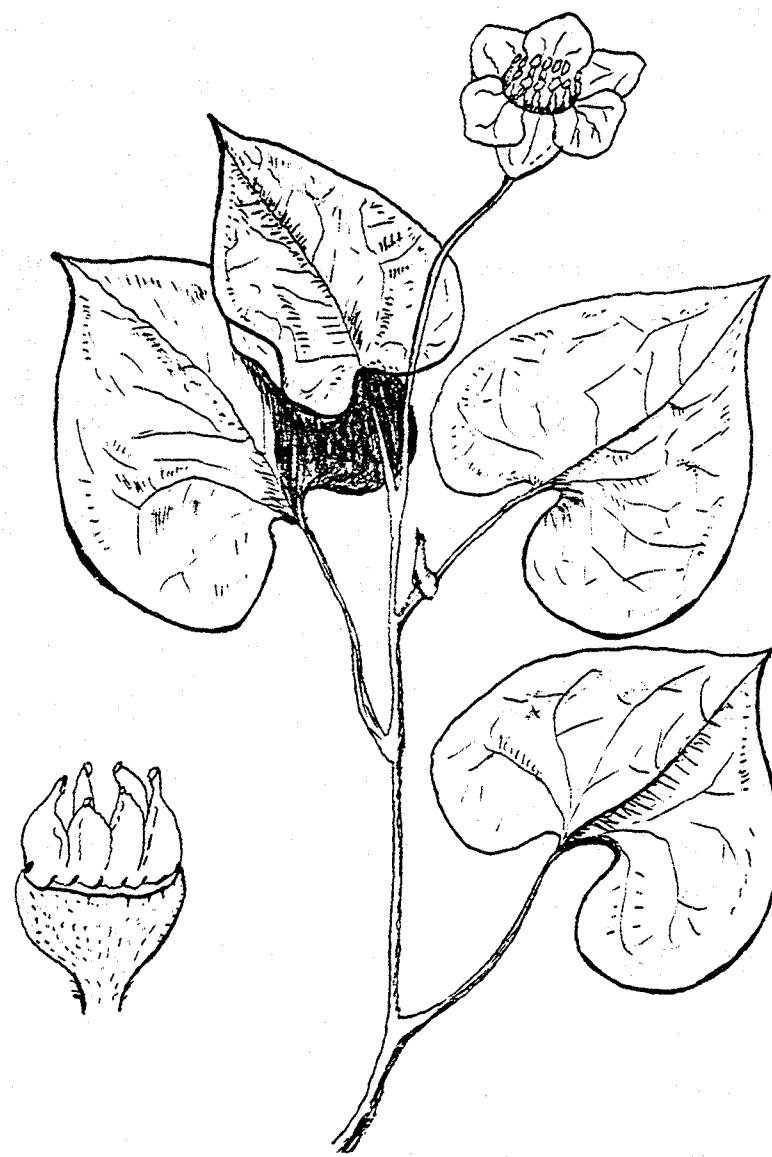


Figure 2

peculiar fleshy appendages (caruncles).⁵ Figure 3 illustrates the parts of the Asarum flower which will appear in discussions of the morphology of various species below.

Any further description of Asarum species as a group must include an almost endless list of qualifications, and even the few characters stated without equivocation above may require alteration in the case of abnormal individuals, and these are not especially rare within many species. Many of the morphological features found within the genus but not in every species are set down in table 1. These features can be further appreciated by consulting the numerous illustrations of Japanese species below, although the full range of variation cannot be seen because many interesting species from outside Japan are not discussed or illustrated in this paper.

In addition to those many characteristics which vary among different species, there are also some obvious characteristics which vary within a species. As a rule, the characteristics most conveniently observed are the least consistent within a species, and those which require the closest observation are the most consistent and reliable for identification. Thus in many species leaf characteristics (size, shape, color, markings) are often useless in determining a species, gross flower morphology is reliable

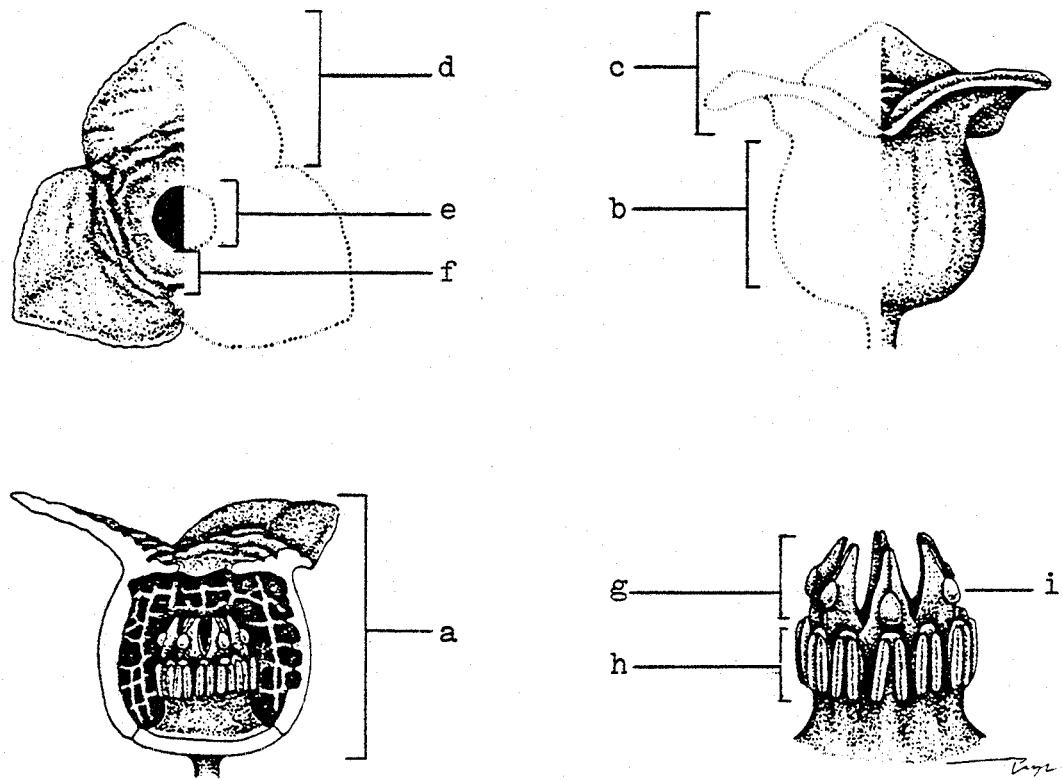


Figure 3. Some parts of the Asarum flower

- a. calyx (entire flower)
- b. calyx tube
- c. calyx limb
- d. calyx limb
- e. throat
- f. annulus or ring
- g. style
- h. stamen
- i. stigma

TABLE 1
MORPHOLOGICAL VARIATION AMONG ASARUM SPECIES

Rhizome

Short or elongated, as a result of differences in the length of the internodes.

Leaves

Borne singly or in pairs.

Leaf blades long-petioled or short-petioled.

Leaf blades cordate, orbicular, reniform, or hastate.

Summer-green deciduous or evergreen and persistent for one or two years.

Leaf color yellow-green to very dark green, purplish, or grey-green; of one color or with markings of various shades and sizes on the upper surface.

Leaf texture thin and membranous to thick and succulent, with a dull or glossy surface; glabrous or pubescent.

Lear veins indistinct to deeply impressed.

Flowers

Terminal or less often axillary.

Borne singly or less often in pairs.

Apetalous or less often with much-reduced petals inside the calyx tube.

TABLE 1-continued

Flowers-continued

Actinomorphic or slightly zygomorphic.

Calyx lobes divided only to the limb (forming a perfect tube below the limb) or divided to various degrees below the limb.

Calyx lobes not spread beyond the diameter of the tube, or spread beyond the tube, or reflexed to lie against the outside of the tube.

Calyx lobes rounded to acutely pointed, or with caudate appendages.

Limb of the calyx smooth or covered with ridges or tubercles surrounding the throat.

Limb of the calyx with or without a simple or elaborate annulus constricting the throat of the tube.

Calyx tube's inner surface scarcely to elaborately furnished with longitudinal ridges or raised reticulate patterns.

Calyx texture slightly fleshy to very thick and succulent, with a glabrous to very pubescent surface.

Calyx color some shade of purple, brown, or green; unmarked or marked with off-white, yellow, or orange. "Albinos" of many species occur in the wild.

Style number six, three, or rarely four or five.

Styles completely free above the ovary, partly fused, or completely fused up to the stigmas.

Styles entire, or variously hooked, winged, horned, grooved, or attenuated.

TABLE 1-continued

Flowers-continued

Ovary inferior, superior, or intermediate.

Stamen number variable up to twelve, usually six or twelve; in two series.

Stamens sessile on the ovary, subsessile, or stalked and free-standing.

Connective of stamen not extending beyond the anther, or extended to various degrees.

SOURCES: H. L. Blomquist, "A Revision of Hexastylis of North America," Brittonia 8 (9 January 1957): 255-81.

Hui-lin Li et al., eds., Flora of Taiwan, 6 vols. (Taipei, Taiwan: Epoch Publishing Co., 1976), 2:576-81.

Jisaburo Ohwi, Flora of Japan, ed. Frederick G. Meyer and Egbert H. Walker (Washington D.C.: Smithsonian Institution, 1965), pp. 397-401.

NOTE: Information used to compile this table was also extracted from many of the sources listed in the bibliography.

for placing a species in an affinity group, and details such as the shape of the extensions on the style and the number of ridges inside the calyx tube are likely to be decisive in species determination. This situation presents almost insurmountable problems for the botanist seeking to determine specimens using pressed material and descriptions in manuals: the definitive characteristics are likely to be obscured within the dried calyx tube, and most manuals do not mention crucial characters at all. Dried material can often be resurrected by dropping it into briskly boiling water for a few seconds, but a sketchy description in a manual is no substitute for drawings done carefully from fresh material in the determination of species.

Any close observer of Asarum flowers is drawn quickly to the conclusion that the bizarre structural developments associated with the flowers of many species must have adaptive value, especially since a species which shows a wide range of leaf variation is consistent in flower structure, however peculiar it might be.

The obvious conclusion is that the complex variations of interior structure must serve to facilitate pollinator relationships. The fact that all species are woodland plants, bearing their flowers among the litter on the forest floor, usually in the colder seasons, has led

several authors to speculate that various inhabitants of the forest floor such as slugs or ants seek shelter in the calyx tube and effect pollination. The suspicion that such carefully and variously crafted structures would not have evolved to serve as general shelter is supported by the observations of Vogel, who has concluded that Asarum produces "fungus-gnat deception flowers," a claim verified by a series of what must have been excruciatingly tedious in situ eye-to-gnat confrontations with pollinating fungus gnats. Vogel discovered that such gnats as Mycetophila fungora and M. lineola invade the flowers as they open (when the stigmas are most receptive) where the male gnats dash around in the center of the flower and the female gnats lay eggs on the inside surface of the tube with their backs touching the stigmas and anthers. Vogel notes the morphological similarity of the ridged interior of Asarum flowers to the patterns of ridges on mushrooms of the Boletaceae which normally serve as hosts for these gnats, as well as the fact that the inside surface of the Asarum flower is (like Boletus) both colder than air temperature and slightly moist. The flowers' geophilous habit, their habit of blooming just before the normal fungal hosts are most abundant, and a possible olfactory attraction may also be factors in the ruse. However, there is no obvious benefit for the gnats; the flowers

contain substances which poison the gnat larvae when they hatch and begin to feed.⁶

It is possible that the interior modifications of different species have evolved in conjunction with certain species or races of gnats, and have become adapted to their particular mating ritual. A. J. Cain notes that morphologically uniform populations of Drosophila gnats may consist of populations separated by mating behavior only, which do not normally interbreed.⁷ The fact that many species of Asarum will not set seed in cultivation without hand pollination seems to confirm the complexity of their pollinator relationships.

CHAPTER II

THE DISTRIBUTION AND PALEO-PHYTOGEOGRAPHY OF ASARUM

All known species of Asarum are found in the forested regions of the northern hemisphere within the confines of a circumboreal band between 25° and 50° north latitude, a band broken only by oceans and two large land areas which lack suitable woodland habitats. The greatest concentration of species is in East Asia where about eighty species occur in temperate and warm-temperate zones. A second concentration of species is in North America where about fifteen species occur, mostly in the piedmont and mountains of the southeastern United States. A single species crosses Europe from the British Isles to Siberia, separated from the species of northeastern Asia by the Mongolian desert.

In all of these areas Asarum species are found growing in much the same kind of ecological niche, as understory herbs in somewhat moist well-drained soil with

high humus content which does not remain very wet or very dry for long periods. Asarum species successfully endure the heaviest root competition and heavy shade, where they typically occupy a passive role among the components of the forest vegetation. Cronquist notes that they do not "...as a group occupy any important niche to the exclusion of other plants."⁸

Passive though it may be, Asarum is a very old and widespread genus of many species, but the history of its development and migration can only be reconstructed on circumstantial evidence. Like most herbaceous plants which grow in mountainous areas, there is no good fossil record of its history.⁹ However, using evidence based on the characteristics and distribution of living species, combined with our current knowledge of phytogeography and geography, it is possible to construct a partial picture of the history of the genus.

According to Maekawa, the prototype of Asarum, which he calls Protoasarum, developed on the Asian land mass in the mountainous region of angiosperm development which at that time lay near the equator (paleo-equator).¹⁰ This area is described by Takhtajan as the cool mountainous region which occupied the area between Assam and Fiji, the presumed "cradle of angiosperm development."¹¹ It is quite likely that during the Cretaceous,

TABLE 2

CHART OF GEOLOGICAL ERAS, PERIODS, AND EPOCHS

Eras	Periods	Epochs	Duration (millions of years ago)
Cenozoic	Quaternary	Pleistocene	0 to 3
		Pliocene	3 to 12
		Miocene	12 to 27
	Tertiary	Oligocene	27 to 37
		Eocene	37 to 55
		Paleocene	55 to 65
Mesozoic	Cretaceous		65 to 135
	Jurassic		135 to 195
	Triassic		195 to 235

SOURCE: Edwin H. Colbert, Wandering Lands and Animals (New York: E.P. Dutton and Co., 1973), p. 24.

Asarum, along with other primitive angiosperms which we know as relicts of that era (Illicium, Magnolia, Saururus, etc.) spread across what is now the northern latitudes of the northern hemisphere,¹² facilitated by the milder climate of those times and presumed consolidation of the northern land masses. The frequency of Asarum species throughout the hemisphere is still closely correlated with the abundance of other primitive and relict genera which probably followed the same paths of migration.

Up to the Eocene the boundary between the temperate vegetation (such as Asarum) and subtropical vegetation was far north of where it is today. The original latitudinal proliferation of Asarum after its migration west (now north) of the paleo-equator was probably in latitudes which now include Siberia and northern Canada,¹³ with a later migration southward, spurred by increasing cold in the Oligocene,¹⁴ with further latitudinal migration hampered by the gradual separation of the continental masses. Yet, even in the Miocene and early Pliocene, floras were practically uniform and widespread latitudinally.¹⁵

Pleistocene glaciation caused fundamental changes in the distribution and composition of the north temperate vegetation, disrupting the latitudinal uniformity of temperate species, leaving us with what Maekawa calls a

"Magnolian type distribution," in which relicts of the paleotropical distribution remain in unglaciated refuges (southwestern China, southern Japan, the Ryukyu Islands, Taiwan, etc.) or in areas where the north-south orientation of mountain ranges permitted the migration and survival of some species (eastern and western North America).¹⁶

Asarum species, occupying a non-competitive ecological role, could withstand changes in the composition of the flora better than many more competitive species, but were not equipped for rapid migration over long distances because of their slow growth and inefficient seed dispersal (Maekawa estimates the rate of spread as one thousand meters per ten thousand years).¹⁷ Thus, in the face of changing climate, migration up and down mountain valleys is, for Asarum, more easily accomplished than long-distance migration. This altitudinal migration has probably occurred many times, encouraging speciation in places such as western Japan, where closely related but distinct species are separated by rather slight altitudinal differences.¹⁸

Altitudinal migration would not have been a successful survival strategy in those areas that were thoroughly glaciated, and if fact only about four species*

* A. canadense in North America, A. europaeum in Europe, A. sieboldii across N. Asia, and A. heterotropoides in Sakhalin, Manchuria, and Hokkaido.

throughout the world have been able to reoccupy glaciated regions since the last Ice Age. Although rapid speciation appears to be continuing in some areas such as the southeastern United States and several parts of Japan, it is likely that many species of Asarum are similar to and occupy nearly the same range as their ancient relatives.

A thorough study of the phytogeography of Asarum is beyond the scope of this paper, but much of what is currently known is presented in figures 4 and 5. Figure 4 shows the paleo-equator superimposed on a reconstruction of Pangaea, which gives a picture of the presumed route of primary migration of Asarum from their original home in the mountains near the paleo-equator. Figure 5 illustrates a possible subsequent secondary route of migration from Asia to North America. Figure 11, which primarily illustrates the distribution of Asarum by chromosome number, can also be used to understand the modern distribution of the genus.

Figure 4. A reconstruction of the hypothetical consolidation of the continental masses as Pangaea in the Cretaceous, showing the possible routes of primary migration for Asarum.

a. Migration north of the paleo-equator into what is now North America.

b. Migration south of the paleo-equator into what is now southern Japan, southern China, Taiwan, and the Ryukyu Islands.

c. The presumed center of original distribution of Asarum and other primitive angiosperms.

SOURCES: Edwin H. Colbert, Wandering Lands and Animals (New York: E.P. Dutton and Co., 1973), p. 186.

Fumio Maekawa, "Floristic Relation of the Andes to Eastern Asia with Special Reference to the Trans-Paleo-Equatorial Distribution," Journal of the Faculty of Science, University of Tokyo 9 (20 March 1965): 186.

Figure 5. A possible subsequent route of migration of Asarum from Asia to North America.

The trans-Bering land bridge at the beginning of the Pliocene is a possible route of migration for hardy Asian plants into the northwestern United States. This may be the point of entry for A. hartwegii of the Pacific Northwest, which seems to be more closely related to the Korean endemic A. maculatum than any other North American species.

SOURCES: Colbert, Wandering Lands and Animals, p. 243.

Hiroshi Hara, Distribution Maps of Flowering Plants in Japan, 2 vols. (Tokyo: Inoue Book Co., 1958), 2:60.

Figure 4

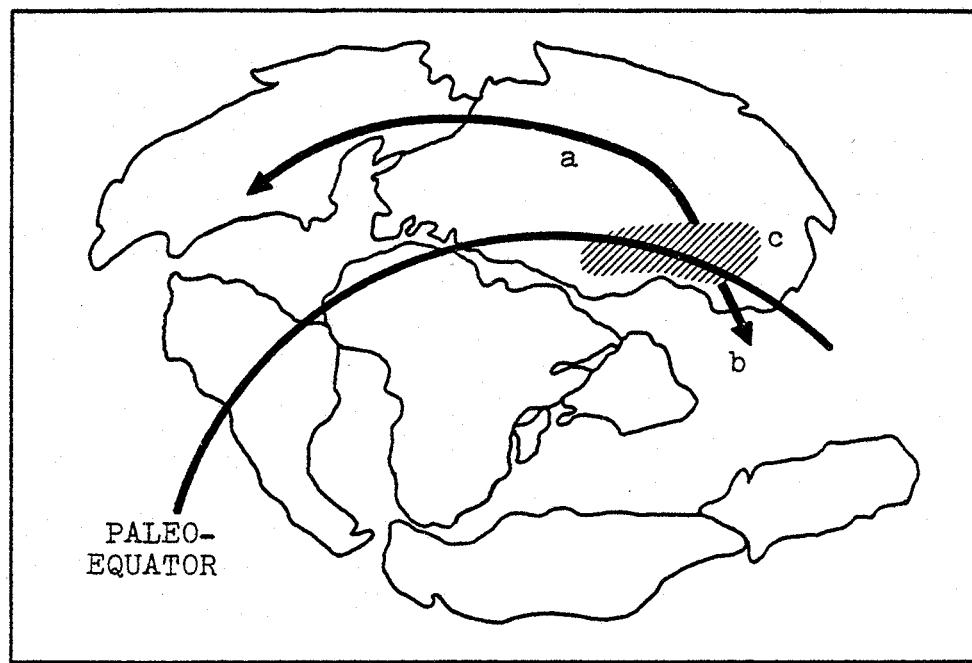
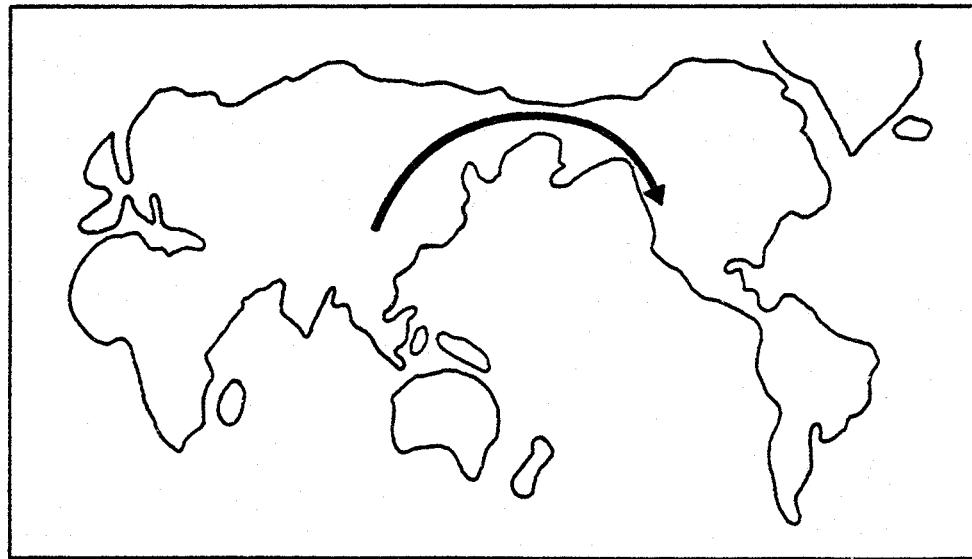


Figure 5



CHAPTER III

THE INTEGRITY OF THE GENUS ASARUM

The morphological variation within this genus has prompted some authors to split off several groups of species into other genera. In 1825 Rafinesque segregated Hexastylis from Linnaeus's Asarum, a move that was disregarded until its acceptance by Small in 1903, reiterated by Blomquist in 1957. In 1834 the Asian species were placed in the genus Heterotropa by Morren and Decaisne, but this too was ignored until 1933 when it was resurrected by Maekawa. In 1936 the genus Japonasarum was split from the remnants of Asarum by Nakai, and later the same year Maekawa established Asiasarum. Recently Maekawa has taken species from Heterotropa to form the genus Geotaenium, and he intimates that the discovery of peculiar species in Taiwan may raise the need for even more genera. Other authorities including Schmidt (1935),

Fernald (1950), Ohwi (1955), and Kitamura and Murata (1978) have maintained a single genus.¹⁹

The integrity of the genus will remain a controversial issue which will stir even more emotion as we become more familiar with the Chinese species. Aside from problems which arise because of different individual approaches to the interpretation of morphological characteristics and their relative importance, as well as personal tendencies to lump or split taxa, two situations have aggravated the controversy: (1) There is as yet no monographic review of the genus which includes the many species near the presumed center of origin in China. (2) The best modern work, that of Blomquist with the American Hexastylis, and the work of several Japanese botanists including Maekawa with the Japanese species, deals with species at opposite extremes of Asarum distribution without enough recognition of variation at the other extreme, or in the middle.

The most energetic support for splitting Asarum into several genera has come from Maekawa, who has been studying and naming the Japanese species for at least fifty years. He has set down what he believes are the critical points of difference among the five genera he recognizes in table 3. It is beyond the scope of this paper to try to resolve the controversy which surrounds the splitting

TABLE 3
MAEKAWA'S SEPARATION OF ASARUM SENSU LATO

Genus	Diploid number	Calyx tube fusion	Stamen movement	Style fusion	Position of ovary	World # species
<u>Asarum</u> <u>sensu stricto</u>	26	Only at base	yes	complete	inferior	10+
<u>Asiasarum</u>	26	To just below limb	yes	partial	superior	4
<u>Hexastylis</u>	26	To the limb	no	none	superior	10
<u>Geotaenium</u>	12*	To the limb	no	none	inferior*	3*
<u>Heterotropa</u>	24	To the limb	no	none	either	44+

*This is amended information based on an article published after the original publication of the table above. SOURCE: Fumio Maekawa, "Notes on Asarum and Heterotropa from Taiwan," Journal of Japanese Botany 53 (October 1978): 299.

SOURCE: Fumio Maekawa, "Kan-aoi," Sekai no Shokubutsu 67: 1584.

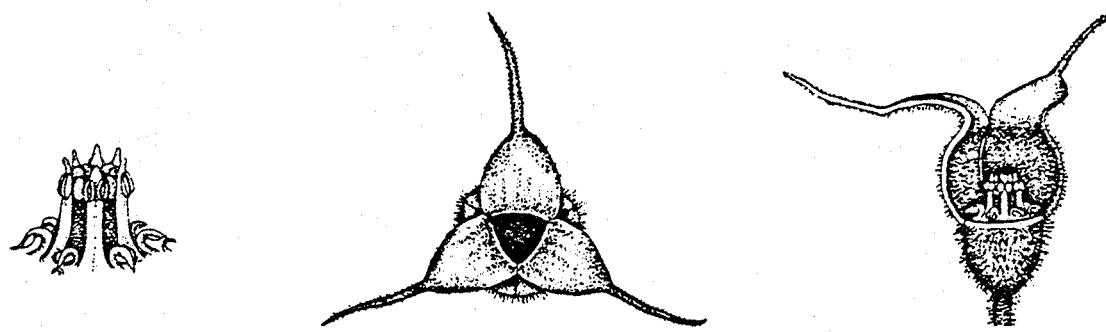
NOTE: One category which originally appeared in the table above, cotyledon number, has been omitted because Maekawa has since discarded it as a test for separating Geotaenium. It does not apply to the separation of other genera.

of the genus, and this discussion should not be construed as an effort to deny the worth of any authority's research and experience. Indeed, it would be more convenient to ignore the entire matter were it not that the controversy is thrust upon anyone who seeks information about this genus by using the Japanese literature. In the course of such research, this author has found complete acceptance of Maekawa's conclusions difficult for three reasons:

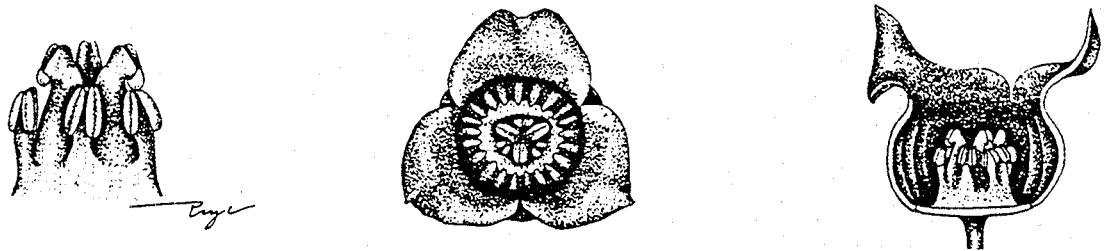
- (1) As species closer to the presumed center of distribution are studied, the distinctions illustrated here become less meaningful.
- (2) The divisions proposed by Maekawa allow far more diversity within one genus (Heterotropa) than he permits between other genera.
- (3) Maekawa's approach leaves the botanist no choice but to create more and more genera as more species near the center of distribution are described and studied.

As botanists have begun to focus on Asarum species south and west of Japan in the lower Ryukyu Islands, Taiwan, and continental China, species come to light which blur or erase the distinctions between the genera that Maekawa has supported. A. leptophyllum from Okinawa, Taiwan, and southern China fulfills the morphological qualifications for Asarum, sensu stricto (see figure 6), but carries the chromosome number $2n=24$.²⁰ Asarum albomaculatum (Heterotropa albomaculata) from Taiwan is,

Figure 6. Examples of flower structure which illustrate Maekawa's divisions of Asarum, sensu lato.

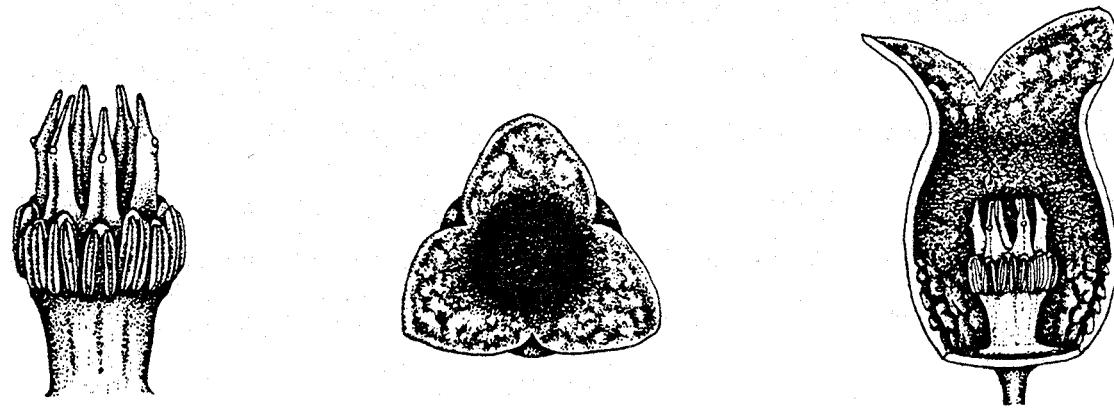


Asarum, sensu stricto. (*Asarum leptophyllum*)

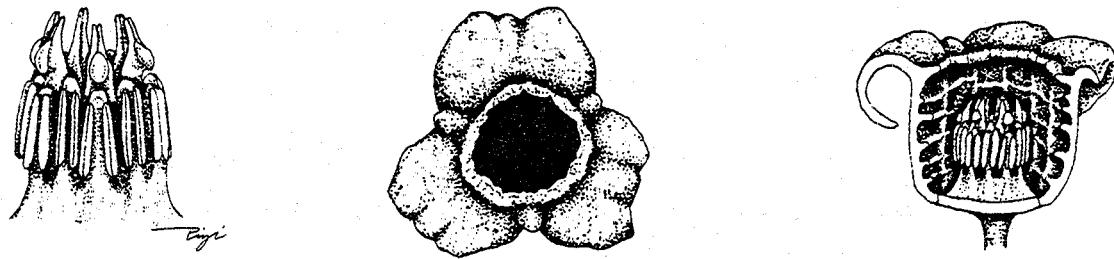


Asiasarum (*Asiasarum dimidianum*)

Figure 6-continued



Hexastylis (*Hexastylis shuttleworthii*)



Heterotropa (*Heterotropa nipponica*)

NOTE: Geotaenium is not illustrated here because it is now separated primarily on account of its different chromosome number. It is not morphologically distinct from Heterotropa.

Drawings from life by Eiji Yamahata.

from the exterior morphology of its flowers, at home with other members of Heterotropa, but a look inside the calyx tube reveals that in fact the styles are fused nearly to the base of the stigmas²¹ (see figure 7). In Asarum hypogynum (Heterotropa hypogyna) from Taiwan the styles are fully connate.²² In A. geophilum from southern China we see a fused column of styles indistinguishable from similar constructions in Asarum, sensu stricto, enclosed in a calyx which in its degree of fusion and other corolloid modifications (such as constriction at the throat) goes well beyond such modifications within many of the species included in Heterotropa²³ (see figure 8).

The kinds of exceptions pointed out above would be much less distressing were there more consistency within Heterotropa, the largest of the five segregate genera recognized by Maekawa. Figures 9 and 10 illustrate that there is far more similarity between two of the most common members of Hexastylis and Heterotropa than between two members of Heterotropa itself. The morphological variation embraced by Heterotropa already eclipses the differences between Hexastylis and Heterotropa as well as differences between Asarum, sensu stricto, and Asiasarum. With the essential differences between Heterotropa and Asarum, sensu stricto, blurred by more southern species such as those noted above, there emerges an obvious need

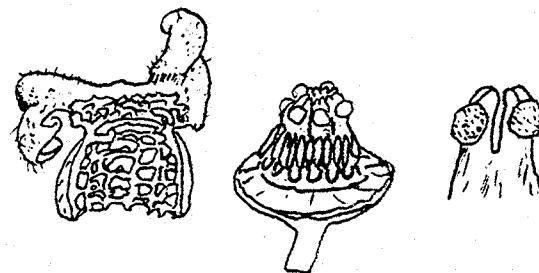


Figure 7. Asarum albomaculatum (Heterotropa albomaculata from Taiwan).

SOURCE: Fumio Maekawa, "Notes on Asarum and Heterotropa from Taiwan," Journal of Japanese Botany 53 (October 1978):298.

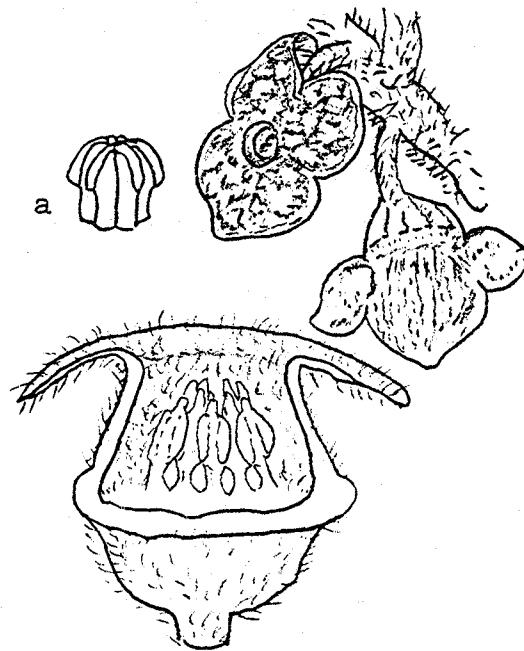
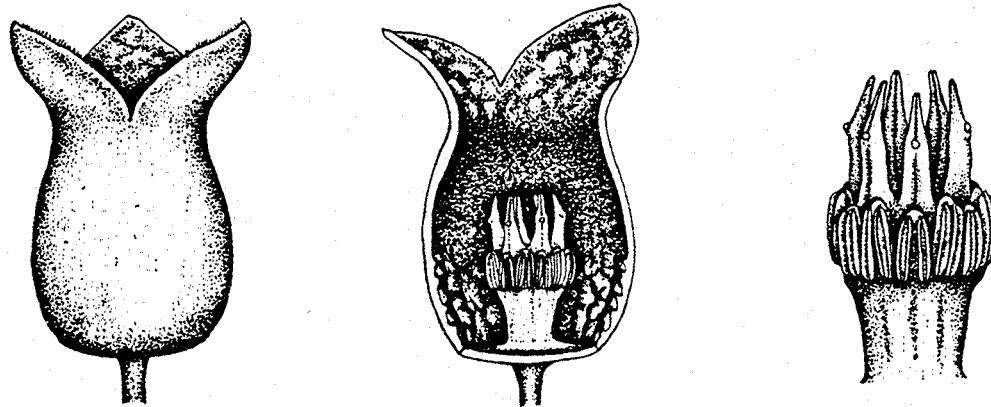


Figure 8. Asarum geophilum from southern China.

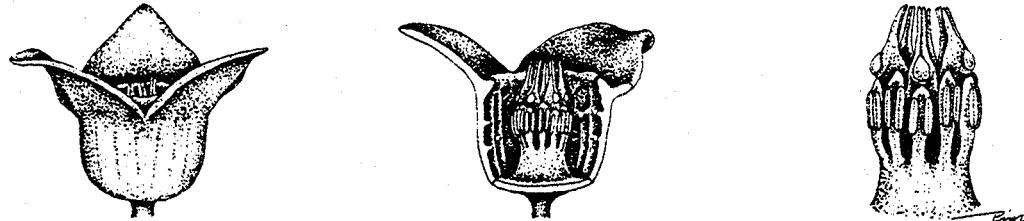
SOURCE: J. D. Hooker, "Asarum Geophilum," Curtis Botanical Magazine (1891): table 7168.

a. Column of fused styles with the stamens removed.

Figure 9. A comparison of Hexastylis shuttleworthii and Heterotropa takaoi.



Hexastylis shuttleworthii



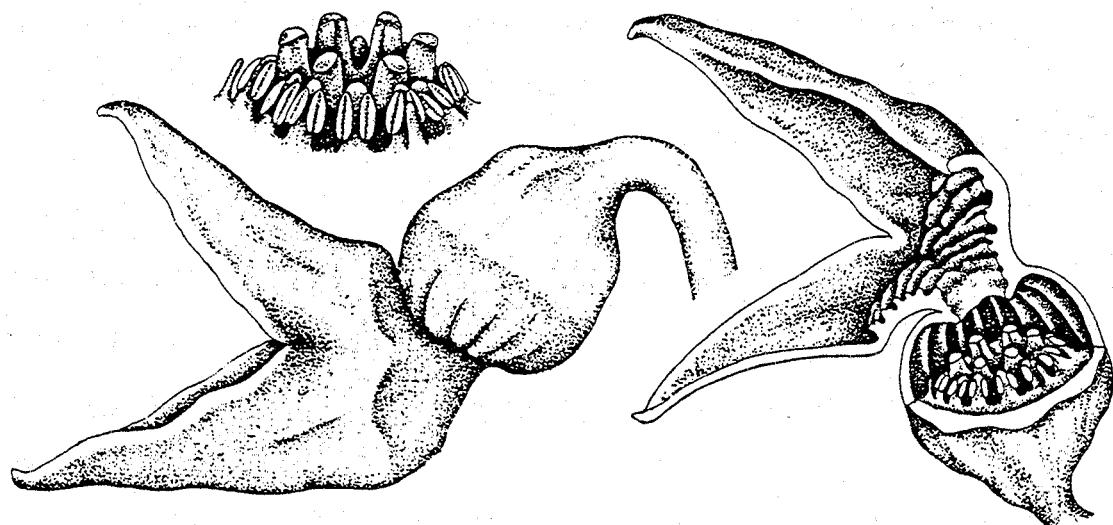
Heterotropa takaoi

Important differences are limited to features which are extremely variable within Heterotropa itself:

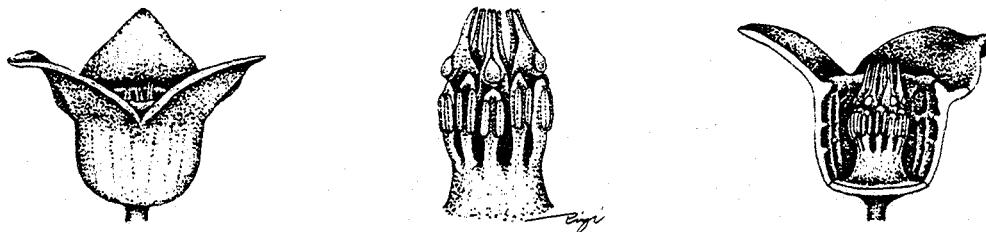
- (1) The ring at the throat of the tube. Some Heterotropa in the Bicornes section such as H. takaoi var. dilatata have no obvious ring.
- (2) The amount of reticulation within the tube. Members of the Sakawanae section of Heterotropa have no reticulate patterns inside the tube.
- (3) The length of the stamen filaments. This character is widely variable throughout Heterotropa.

Please compare this figure with figure 10.

Figure 10. A comparison of two species within the genus Heterotropa: H. takaoi and H. sakawana.



Heterotropa sakawana (*Asarum sakawanum*)



Heterotropa takaoi (*Asarum takaoi*)

Among the many points of difference, note the inferior ovary above and the superior ovary below; the entire styles with terminal stigmas above and the bifid styles with subterminal stigmas below; the somewhat zygomorphic flower above and the actinomorphic flower below; vestigial petals above and none below; and the lines inside the tube above and the reticulate pattern below.

for some basic restructuring. Surely if the knife which has divided Heterotropa and Hexastylis; or Asarum, sensu stricto, and Asiasarum; or Heterotropa and Geotaenium cut as cleanly within Heterotropa as it does without, this one genus would be transformed into at least five, without considering the even more diverse species in the Ryukyus, Taiwan, and China.

This brings us to the biggest practical problem with the division of these genera: It is making a very complex situation seem even more complex than it actually is. At our current level of understanding of Asarum we would do well to emphasize as much as possible the similarities within the group wherever in the world they occur. We have at hand the prospect of having a first-hand look at the Chinese species and determining the extent of variation within the genus; a moratorium on the establishment of new genera would make it simpler to determine, from the original center of speciation looking out, whether the various lines of development should be treated as genera, sub-genera, or series. There is, despite the complexity of the group, no real danger of confusing these plants with anything else, and the burden of proof at this point ought to rest very heavily on those who would split the genus.

CHAPTER IV

THE KARYOLOGY OF ASARUM

Analysis of the chromosomes of Asarum commenced in 1935 with Tamaka's analysis of twenty-five species.²⁴ Until recently he and other researchers have reported two sets of diploid numbers for all species, $2n=24$ and $2n=26$ (plus three tetraploids and one triploid*).²⁵ Maekawa has used these different numbers as one justification for the separation of Asarum into five genera²⁶ (see table 3). The existence of different diploid numbers within a single genus is not unusual in the plant world, but Maekawa attached special significance to the convergence of some morphological and karyological features. This clean separation has been somewhat confused by the recent work of Sugahara, who has found that A. leptophyllum, a species

* $2n=48$: A. megacalyx, A. rigescens, and A. subrigescens. A. rigescens contains both diploid and tetraploid cells in the same plant.

$2n=36$: A. fauriei 'Serpens' (var. serpens).

which Maekawa places in Asarum, sensu stricto, has the number $2n=24$, a number previously unique to Heterotropa.²⁷ Even more interesting is the recent discovery that some species from areas south and west of Japan, such as A. epigynum of Taiwan and A. gelasinum of Okinawa, have the number $2n=12$.²⁸ These species, although morphologically similar to Heterotropa, have been segregated by Maekawa as Geotaenium (see table 3). Continuing research among the species of the Ryukyus, Taiwan, and China (near the presumed ancestral home of Asarum) suggests that there are several examples there of confusing combinations of morphological and karyological features.²⁹

Before the discovery of species with the number $2n=12$, Maekawa postulated that the evergreen species with a completely fused calyx tube (below the limb) such as Heterotropa species ($2n=24$) were derived from more primitive ancestors similar to the species he places in Asarum, sensu stricto ($2n=26$), by the reduction of the smallest subterminal chromosome; with the group he calls Asiasarum ($2n=26$) as a transitional group.³⁰ But in 1981 Sugawara found that the $2n=24$ species could not have been derived through reduction as Maekawa speculated,³¹ a conclusion supported by the discovery of species with the number $2n=12$ near the original center of distribution. It now seems possible that $2n=24$ represents a fixed

doubling of original chromosome number and $2n=26$ represents the result of subsequent aneuploid increase.³²

This hypothesis seems even more likely when we arrange Asarum by chromosome number on a map of the modern world (see figure 11). All species in North America, the furthest distribution west (then north) of the paleo-equator, have the number $2n=26$, as do the species in northern Asia. This group includes the species in northern Japan which probably entered Japan from the north (see chapter 5). The species which migrated east (then south) of the paleo-equator carry the number $2n=24$, and in a few areas near the original center of distribution remain relict species with the ancestral number $2n=12$. The faithfulness of species to this pattern is remarkable: Asarum leptophyllum should have the number $2n=26$ based on its morphological relationships,³³ but it occurs in regions where most species have the number $2n=24$, and it does too.

It is also interesting to note that all of the species which have colonized areas laid bare by Pleistocene glaciation have the number $2n=26$. These species, such as the North American A. canadense, seem to be endowed with an "aggressive" nature which allows them to colonize vast areas more quickly than most species.

In this connection it is interesting to note that the related genus Aristolochia shows the number $2n=14$ for

Figure 11. Asarum arranged by chromosome number on a map of the modern world.

There are no known exceptions to the generalizations on the map in the areas marked $2n=26$. There is some penetration of $2n=26$ species into areas of China which are predominantly $2n=24$, but it is impossible to set a boundary properly there because of incomplete information. The areas marked $2n=12$ are not exclusively that number but contain species with that number along with $2n=24$ species.

SOURCES: Isamu Hiura and Ko Seto, "Nihon San Kan-aoi no Bunpu Kiroku," Shizenshi Kenkyu, Occasional Papers from the Osaka Museum of Natural History 1 (25 December 1968):8-45.

Yun-shik Kim et al., "Taxonomic Study on the Genus Asarum in Korea," Journal of Korean Plant Taxonomy 8 (September 1978):19-32.

Fumio Maekawa, "Notes of Asarum and Heterotropa from Taiwan," Japanese Journal of Botany 53 (October 1978): 289-99.

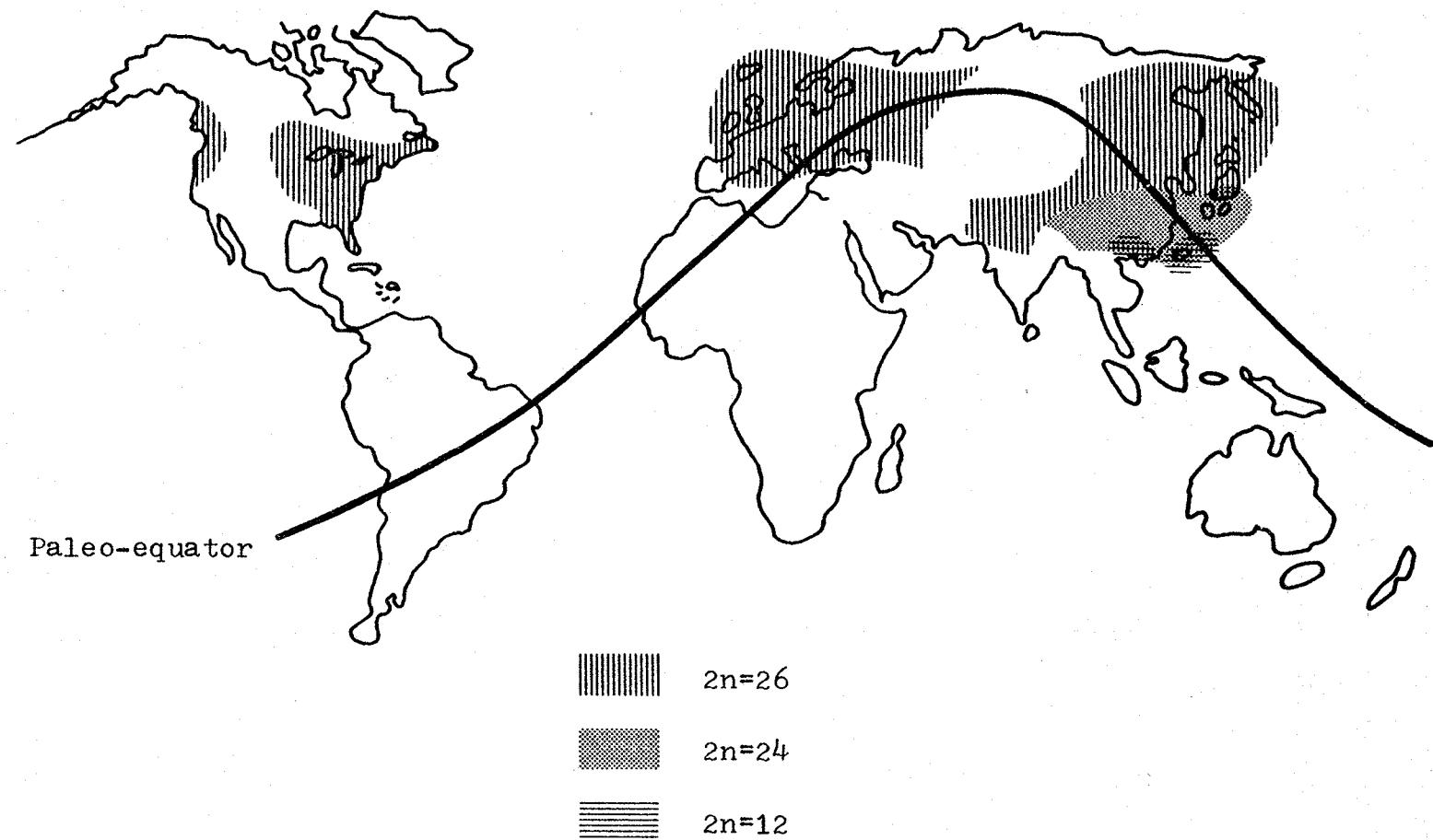
Fumio Maekawa and Miko Ono, "Karyotype Analysis in the Genus Hexastylis (Aristolochiaceae)," Journal of the Faculty of Science, University of Tokyo 9 (1965):151-59.

Mikio Ono, "Studies on Heterotropa and Its Related Genera with Special Reference to Their Karyo-morphology and Phylogeny," Journal of the Faculty of Science, University of Tokyo 7 (1960):473-99.

Tadanori Tanimura, "Kan-aoi Rui no Bunpu ni Cuite," Mine Hana, May 1978, pp. 1-5.

Additional information was extracted from many of the sources listed in the bibliography for part I, as well as from the author's observation of herbarium specimens at the Royal Botanical Gardens, Surrey, England (September 1982) and at the Department of Forestry, Seoul National University, Suwon, Korea (August 1982).

Figure 11



for all southern species (nearer the presumed center of distribution) and $2n=28$ for all northern species, most of these in glaciated regions.³⁴

CHAPTER V

MIGRATION AND SPECIATION OF JAPANESE ASARUM

The Japanese islands contain what is probably the largest number of Asarum species of any discrete geographical area. This proliferation of species is the result of secondary and tertiary waves of speciation, establishing different lines of development derived from ancestral species which invaded by several routes, perhaps as long ago as the early Tertiary³⁵ (see figure 12), when Japan was still connected to the Asian land mass. At that time Japan had a more uniform flora, which included many species identical to those then spread throughout Europe and North America.³⁶ The further elaboration of what we know as the characteristic components of the Japanese flora occurred after the Eocene.³⁷ Maekawa notes that the eastern-most representative of the genus in Japan today, A. tamaense of Mt. Chichibu, was established by the late Miocene, with

further differentiation into several modern species occurring during the Pliocene.³⁸

There appear to be three primary routes for the migration of Asarum into Japan. One route led into what is now Hokkaido and northern Honshu by way of a land bridge connected (up to the Pliocene) with what is now the island of Sakhalin.³⁹ This is confirmed by the presence of A. sieboldii throughout northeastern Asia and northern Japan, and the occurrence of A. heterotropoides in Manchuria, Sakhalin, Hokkaido, and northern Honshu.⁴⁰

A second route of migration was by way of a major connection between what is now the island of Honshu and the Korean peninsula. Remnants of this connection, which remained up to the Pliocene, remain as islands such as Tsushima.⁴¹ On the Korean mainland opposite Honshu only the very peculiar endemic A. maculatum has survived on unglaciated Wando (island) and Cheju Island;⁴² all other species seem to have been destroyed by glaciation and the harsher climate of the mainland during the ice ages.

A third connection, more ancient than the northern route, was between what is now the Ryukyu Islands and the southern China coast, islands separated from the rest of what is now Japan by the Tokara Strait since mid-Tertiary times.⁴³

Thus the species in northern Japan bear the closest

Figure 12. The probable routes of Asarum migration into Japan.

a. Asarum sieboldii and its related taxa probably entered Japan by way of a land bridge in the region where Sakhalin is today.

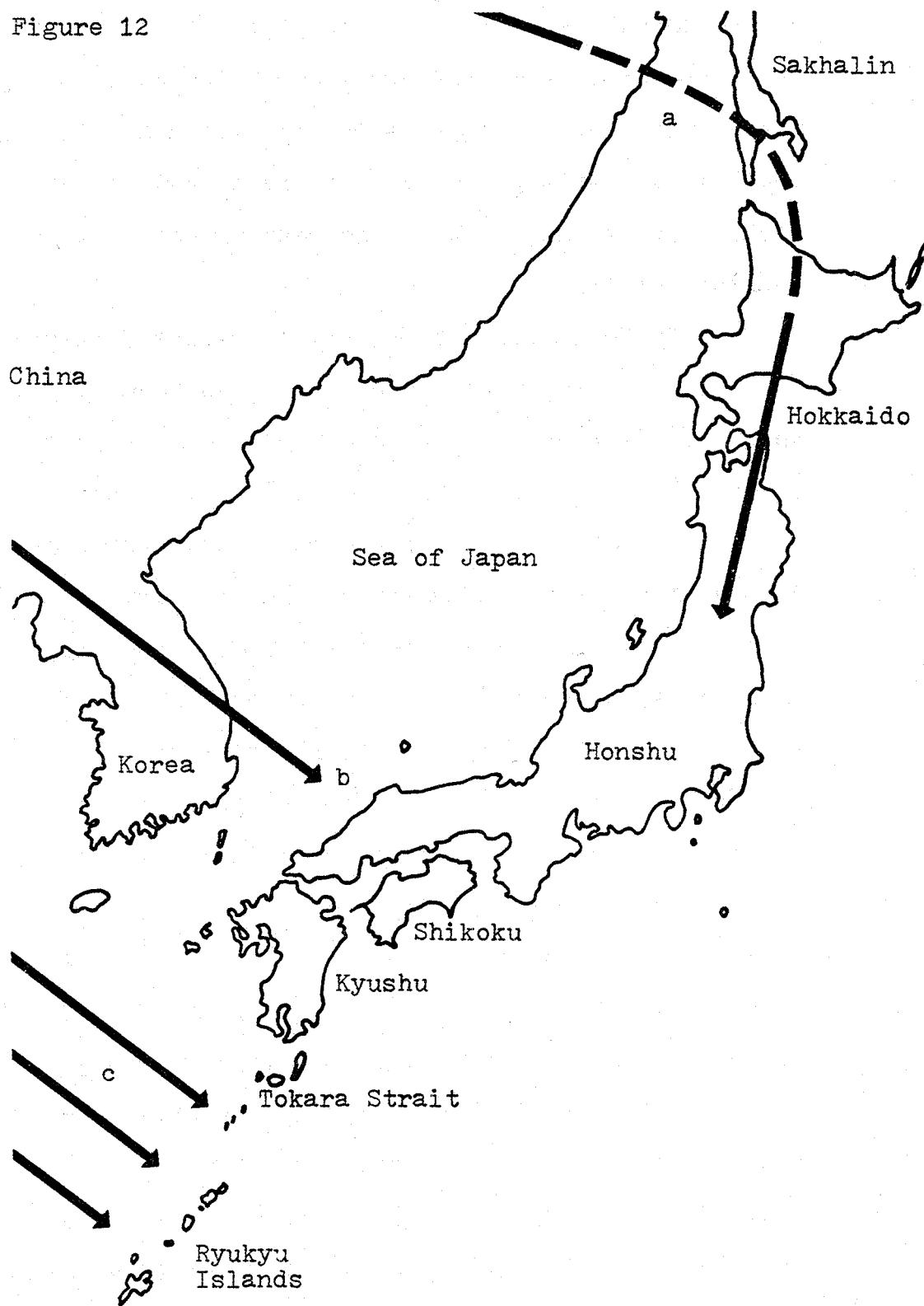
b. Many of the species in central and western Japan are probably derived from species which migrated by way of a land bridge between Japan and the Korean peninsula.

c. Asarum species became established in the Ryukyu Islands when the islands were mountaintops along the Asian land mass, and persisted when they were cut off from the mainland.

SOURCES: Hiroshi Hara, Distribution Maps of Flowering Plants in Japan, 2 vols. (Tokyo: Inoue Book Co., 1958), 2:84, 88-90.

Tadanori Tanimura, "Kan-aoi Rui no Bunpu ni Cuite," Mine Hana, May 1978, p. 4.

Figure 12



morphological resemblance to the species of northern Asia, the species in western Honshu, Shikoku, and Kyushu are related more closely to the species still living in southern and western China, and the Ryukyus contain relicts closely resembling some of the most primitive southern Chinese species.

It is impossible to know the exact mechanisms of speciation of ancestral species, but Maekawa has called Asarum speciation in Japan a classic example of speciation caused by geographical isolation,⁴⁴ a judgement supported by both casual observation and research. Any observer of the enormous inter and intra-population variation for morphological characteristics (extending in some cases to wide variation among individual plants of the same species growing in a single colony) is led quickly to the conclusion that this condition did not occur by chance nor is it without importance for an understanding of the genus.

This sort of polymorphism is often characteristic of species in mountainous areas and on oceanic islands,⁴⁵ where plants are distributed as a series of small populations.⁴⁶ This is certainly the case with Asarum in Japan, where species are typically distributed as series of populations often consisting of fewer than one hundred plants.⁴⁷ Their propensity for self-pollination,⁴⁸ coupled with the lack of an efficient means for

long-distance dispersal of pollen or seeds, strongly discourages distant outbreeding and encourages prolonged inbreeding within a small group of individuals. The shortness of rhizome internodes and the fact that it takes up to eight years to produce a sexually mature plant from seed limit the range of extension to one thousand meters in ten thousand years.⁴⁹

Under conditions such as these a phenomenon known as genetic drift may occur, in which chance mutations and variations are less likely to be suppressed by environmental factors and, in a deviation from what would be predicted statistically, there is a random spread of genes only weakly controlled by selection.⁵⁰ There is a proliferation of characteristics (often apparently non-adaptive characteristics) which may give rise to genetically distinct populations which have developed more through chance than selection,⁵¹ especially with plants such as Asarum which are rarely in direct competition with other plants.⁵²

In working with Japanese Asarum, Iwanaga and Momotani found that the varied distribution of peroxidase isozymes in certain populations could not be the result of natural selection and ascribed the variation to genetic drift, noting that (citing Grant, 1963) the following conditions, assumed by Grant to be necessary to establish

the existence of genetic drift, had been satisfied:

- (1) The effective population size is small enough.
- (2) The sub-populations are well-isolated.
- (3) The genes concerned control characters which are not strongly affected by environmental pressure.⁵³

It is likely that this mechanism has allowed the maddening proliferation of morphological characteristics which makes the classification of many species such a nightmare, and causes the Asarum specialist to concur in an observation of A. J. Cain, made in the course of a discussion of polymorphic speciation: "...if a closely related group of forms consists entirely of insular geographic representitives, the situation is desperate."⁵⁴

CHAPTER VI

THE JAPANESE SPECIES OF ASARUM

Introduction

There are, by liberal count, more than fifty species and fifteen botanical varieties of Asarum in Japan (from Hokkaido to the southern limit of the Ryukyu Islands). Even after making allowances for the Japanese enthusiasm for splitting taxa, there remains a bewildering array of species, and there are probably taxa in the Ryukyus which have not yet been documented. The simplest method for understanding these species is to consider them as members of a series of "species groups" which, in most cases, are "natural" to the extent that they reflect apparent relationships based on morphological similarities of flower structure, and the species within each group are presumed to be more closely related to one another than to any species outside the group in Japan. These same groups are artificial to the extent that they do not take into

account characteristics of species outside Japan, and the reader must not try to apply these divisions to species outside the range considered. The reader should also keep in mind that these divisions are not intended to constitute a taxonomic revision of the genus.

The divisions which will be considered below will be named as follows and presented in the order listed:

- (1) Caulescens-Sieboldii group
- (2) Sakawanum-Asperum group
- (3) Curvastigma group
- (4) Kiusianum group
- (5) Nipponicum group
- (6) Ryukyu Islands group

All the groups except the last bear the names of a distinctive species, or two species names if there is a further obvious division within the group. The last group, the Ryukyu Islands group, is purely a geographical category to accommodate all the species which occur in the region between the Tokara Strait in the north and the Senkaku Islands at the southern limit of the Ryukyus. This very complex group has only recently come under careful study and it is not yet possible to make confident statements about all of these species' affiliations, which seem at first glance to lie more with the (often relict) species of Taiwan and China than with the species

in the main islands of Japan. This last group is also disregarded in the key to the species in appendix 2.

The reader must accept that it is a unique combination of characters rather than any one single unique character which separates these groups. Inspiration for this arrangement came from Mr. Eiji Yamahata, and to a great extent it reflects his clear understanding of the similarities and differences among the Japanese species. It also reflects, in part, Maekawa's division of Asarum, sensu lato, into several genera and his further separation of Heterotropa into several sections.

The following discussion of species in the context of their affinity groups is general. The reader who requires more specific information should consult the precis of species' descriptions in appendix 3, or the extensive bibliographies. The reader should not be too distressed if some groups seem to resist unequivocal division into species. The study of Asarum requires humility in the face of the complexity of nature and great peace of mind.

The Sieboldii-Caulescens Group

Asarum caulescens
A. dimidianum
A. heterotropoides
A. sieboldii

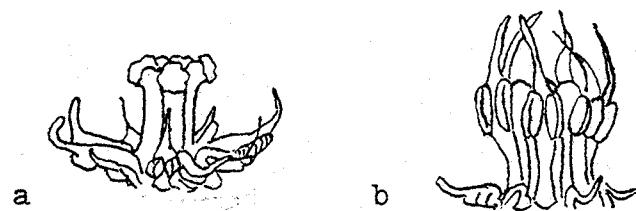
This group consists of four species, three of them

very closely related to one another, and the fourth closer to these than any other species in the main islands. These species are easily distinguished from other main island species by their winter-deciduous leaves, calyx division below the limb, and stamen movement as the flowers age (see figure 13). Maekawa has segregated these species in Asarum, sensu stricto, and Asiasarum.⁵⁵

The three closely related species--A. sieboldii, A. heterotropoides, and A. dimidianum--are extensions of the A. sieboldii species complex which extends from the Himalayas (A. himalaicum) across China and Korea (A. sieboldii) and into Japan (see figure 12). In Japan A. heterotropoides occupies the northern-most range, centered in Hokkaido (where it is the only species) and northern Honshu at altitudes above 1200 meters.⁵⁶ It is smaller in its parts than A. sieboldii and will not survive in regions with long hot summers.⁵⁷ It is also the sole host for a small rare butterfly, Luehdorfia puziloi; because the range of the butterfly has been more carefully documented than the range of this Asarum, those who would search for this species are better served by the insect manuals.⁵⁸

Asarum dimidianum is also very similar to A. sieboldii, but this species occupies a southern range (see figures 15, 16, and 17). It differs from

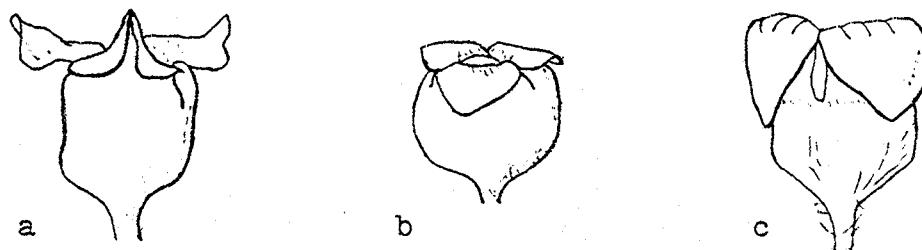
Figure 13. Stamen movement in the Sieboldii-
Caulescens group.



- a. At the time the calyx first opens; laid flat
- b. At the time of pollen release, several days later; standing

SOURCE: Fumio Maekawa, "Kan-aoi Zoku no Oboegaki (1)," Shokubutsu to Shizen 6 (1972):10.

Figure 14. A comparison of the flowers of
Asarum sieboldii, A. heterotropoides, and A. caulescens.



- a. Asarum sieboldii
- b. A. heterotropoides
- c. A. caulescens

SOURCES: Fumio Maekawa, "Kan-aoi Zoku no Oboegaki (2)," Shokubutsu to Shizen 6 (June 1972):6.

Fumio Maekawa, "Kan-aoi Zoku no Oboegaki (1)," Shokubutsu to Shizen (1972):8.

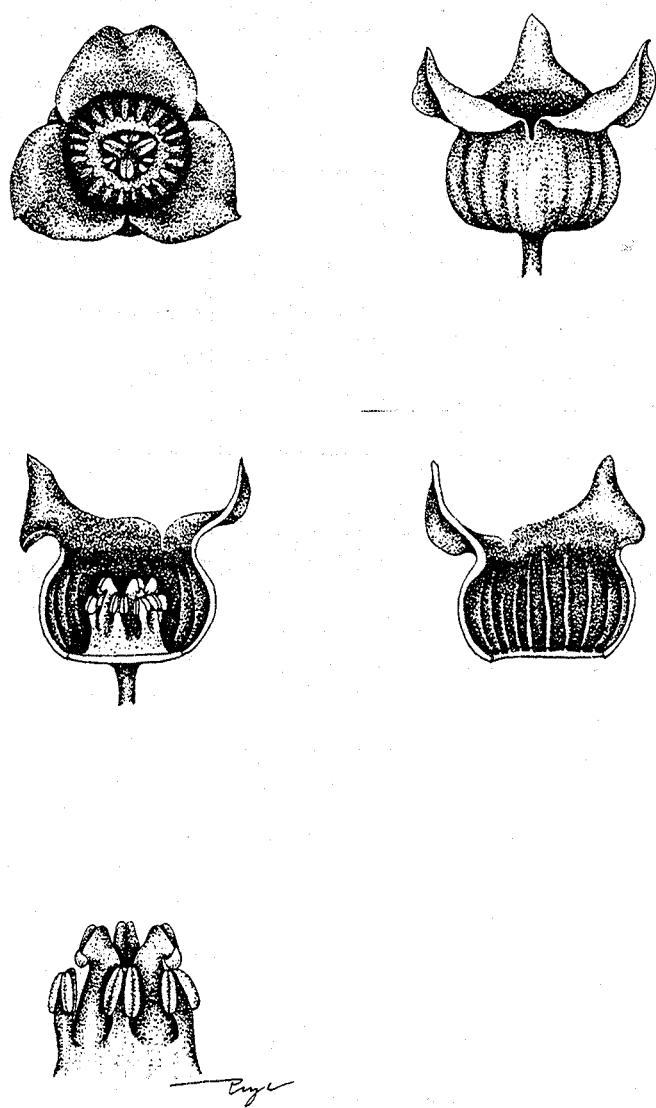


Figure 15. *Asarum dimidianum*

Drawing from life by Eiji Yamahata

a	b
c	d
e	f

Figure 16. *Asarum* species in the Sieboldii-Caulescens group (a and b) and the Sakawanum-Asperum group (c,d,e, and f)

Photographs by Eiji Yamahata

- a. *Asarum sieboldii*
- b. *A. dimidianum*
- c. *Asarum asperum*
- d. *A. hexalobum*
- e. *A. controversum*
- f. *A. crassum*

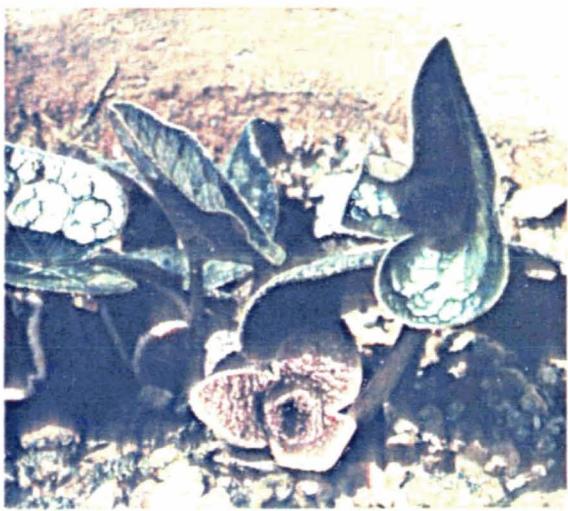


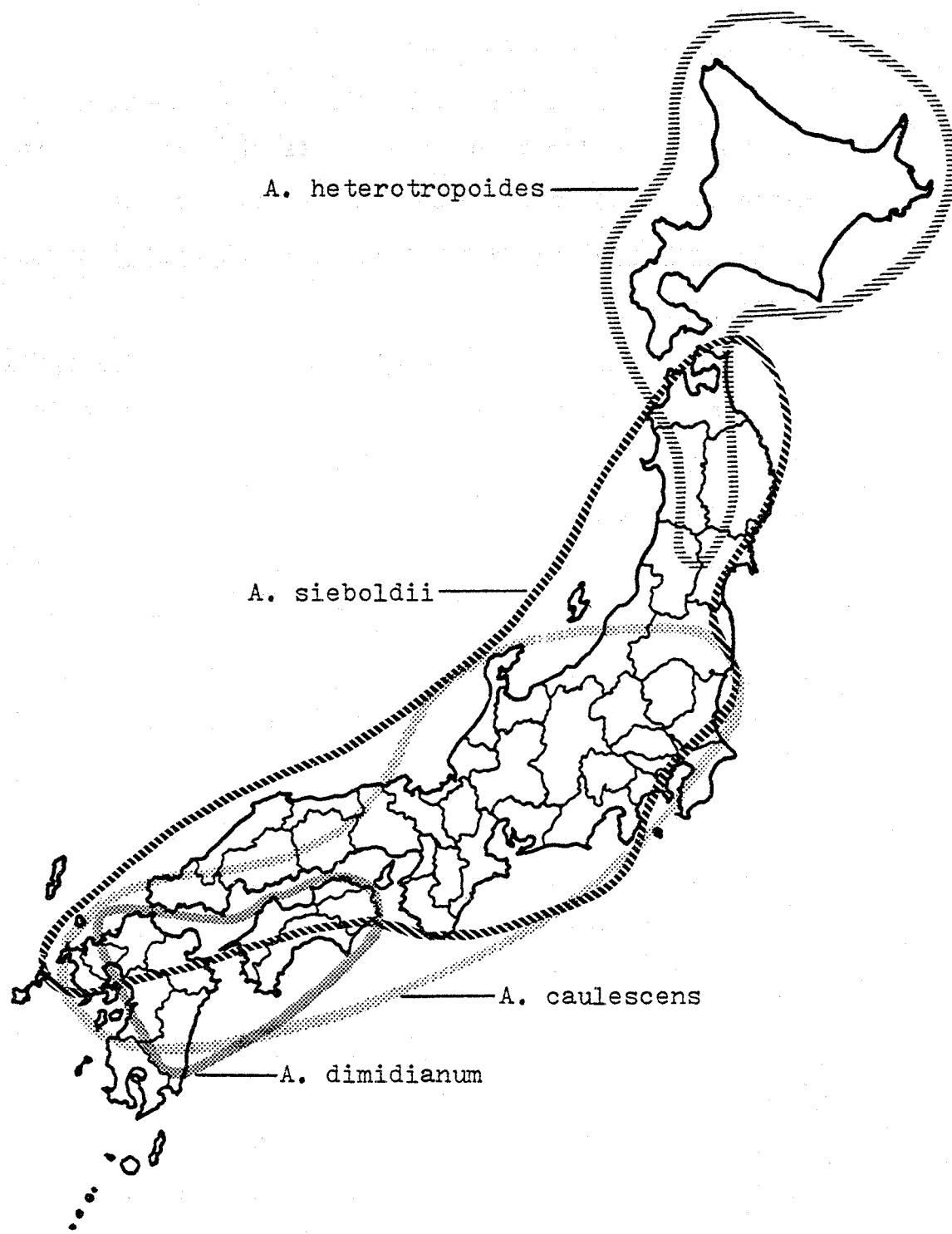
Figure 17. Distribution of Asarum heterotropoides, A. sieboldii, A. dimidianum, and A. caulescens.

NOTE: The names of the prefectures shown in outline on the map can be found in appendix 1.

SOURCE: Isamu Hiura and Ko Seto, "Nihon San Kan-aoi no Bunpu Kiroku," Shizenshi Kenkyu, Occasional Papers from the Osaka Museum of Natural History 1 (25 December 1968):8-45.

Many other sources listed in the bibliographies were consulted to confirm and supplement the primary source listed above.

Figure 17



Asarum sieboldii in the number of styles and stamens, with
with three styles and six stamens as opposed to
A. sieboldii's six and twelve.⁵⁹

Both A. heterotropoides and A. dimidianum seem to
be candidates for demotion to less than specific rank.
Recently Kitamura and Murata have proposed that
A. heterotropoides be reduced to A. sieboldii subsp.
heterotropoides.⁶⁰

Asarum caulescens is similar to A. sieboldii in
its general appearance, but has a deeply divided calyx
tube, an inferior rather than superior ovary, and
completely rather than partly fused styles⁶¹ (see figure
14). It is a part of a circumboreal belt of similar
species which includes A. europaeum in Eurasia and
A. canadense and A. caudatum in northeastern and north-
western North America. This species is the model for a
design (discussed in part II of this paper) which has
played an important role in the Shinto religion and in
Japanese aesthetics.

A unique feature of this group is stamen movement
after the flower opens. As the flower first opens and the
stigmas are most receptive, the stamens are recurved so
that the anthers rest against the bottom of the calyx tube.
After several days they straighten up, and when they are
fully erect the anther sacs open and release the

pollen (see figure 13). This process apparently serves to encourage cross-pollination.⁶²

None of the species in this group has achieved popularity as an ornamental inside or outside Japan, although Asarum caulescens is frequently cultivated at shrines for its medicinal and religious associations.⁶³ With their plain, green leaves which disappear in winter and small unshowy flowers, none can receive any special recommendation as an ornamental, although A. heterotropoides should be of interest to alpine gardeners as it is neither showy nor easy to cultivate. The others could serve as a deciduous ground cover in very cold regions where the evergreen species would not succeed.

The Sakawanum-Asperum Group

Distinct taxa

- Asarum asperum
- A. costatum
- A. crassum
- A. hexalobum
- A. hexalobum var. perfectum
- A. minamitanianum
- A. parviflorum
- A. sakawanum
- A. stellatum

Obscure taxa

- Asarum constrictum
- A. controversum
- A. minus
- A. oblongum

This second group contains at least eight species and one botanical variety, plus several taxa which have been described as species but which are probably conspecific with one of the listed distinct species. This group includes two of Maekawa's sections of genus Heterotropa, the Sakawanae and the Ascidasarae.⁶⁴

The species in this group are characterized by several traits: (1) The flower is extremely constricted at the throat, producing a "wasp-waist" effect, with the calyx above the throat skewed to give a "dutchman's-pipe" effect when viewed from the side. (2) The ovary is always inferior. (3) The styles are entire with terminal stigmatic pads or discs. (4) The flowers are often somewhat zygomorphic in front view. (5) The stamens are attached at the juncture of the inside wall of the calyx tube and the ovary, pointing in toward the styles, at as much as a 90° angle to them.

A few members of this group bear vestigial petals inside the calyx tube, and one species bears staminodia. In all species in this group the longitudinal lines inside the calyx are more prominent than the transverse lines, and in four species there are no transverse lines at all. Like all of the groups to follow, all species have evergreen leaves.

All the species in this group are distributed in

the milder parts of Japan--western Honshu, Shikoku, and Kyushu. (see figures 18 and 19). Four of these species--Asarum costatum, A. sakawanum, A. stellatum, and A. minamitanianum--are limited to the island of Shikoku and one small spot on adjacent Kyushu. They are more closely related to each other than to other species in this group, and among themselves they are most easily distinguished by the length and shape of the calyx lobes⁶⁵ (see figure 20). The presence of vestigial petals in A. sakawanum, A. stellatum, and A. minamitanianum and their absence in A. costatum suggests that this latter species may be derived from A. sakawanum or a similar plant. Asarum minamitanianum, only discovered in the 1950's, was probably a relict population near extinction when it was discovered. The extinction process has since been completed by collectors, although it survives in cultivation. The other three species in this subgroup are all rare with limited distribution in the wild.⁶⁶ The flowers of the above four species are illustrated in figures 21, 22, 23, and 24.

The other members of the Sakawanum-Asperum group somewhat resemble A. costatum in general appearance. Asarum asperum (see figure 16) ranges west and north of Kyoto and Nara, and its common name--Miyako aoi--evokes the classical name for Kyoto. In the wild it forms

Figure 18. Distribution of *Asarum costatum*,
A. sakawanum, *A. minamitanianum*, and *A. stellatum*.

SOURCE: Fumio Maekawa, "Nihon Koyū no Shokubutsu, Kan-aoi no Nakama-tachi," Kokudo to Kyōiku 25 (May 1974):32.

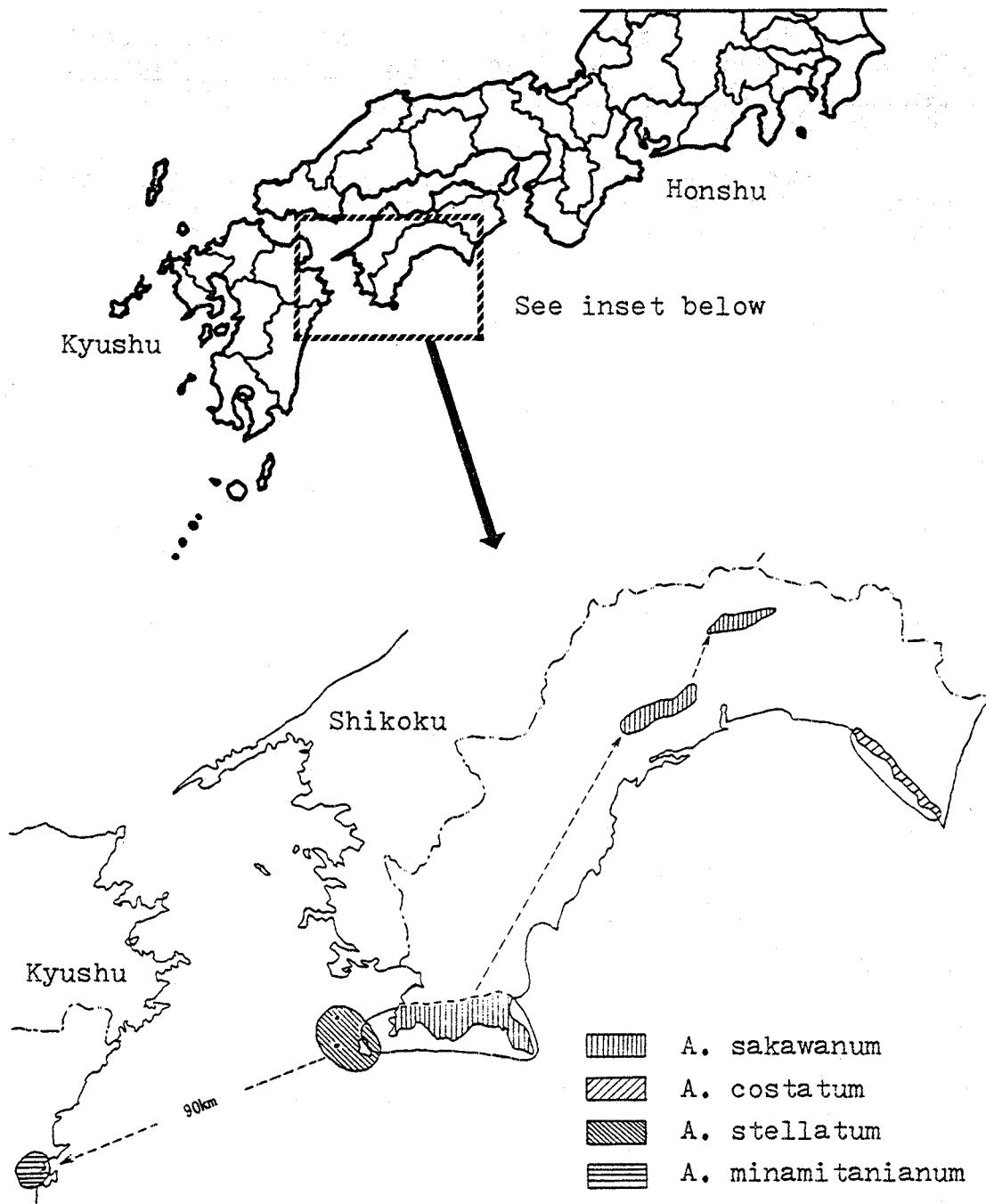


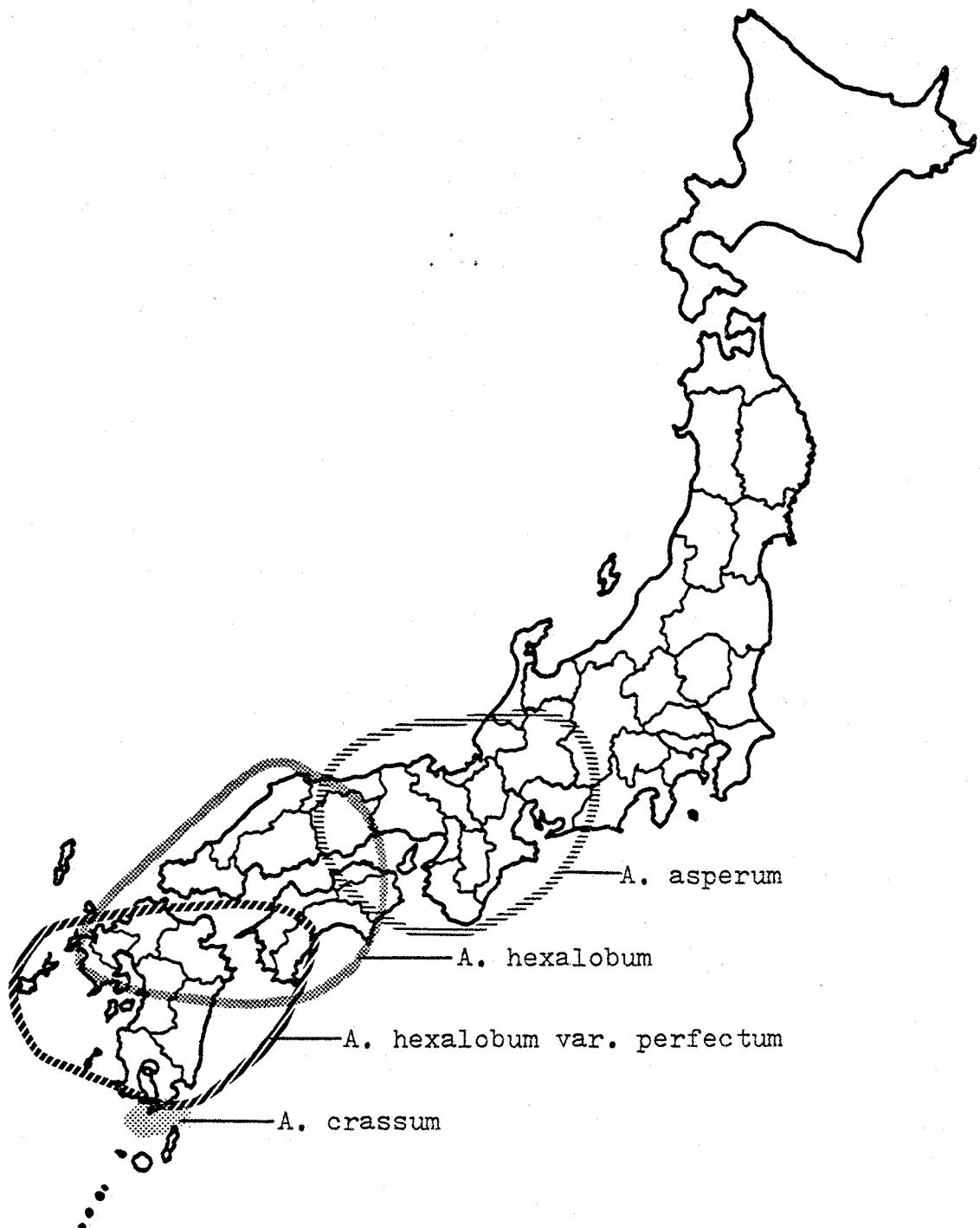
Figure 19. Distribution of Asarum asperum,
A. hexalobum, A. hexalobum var. perfectum, and A. crassum

NOTE: The names of the prefectures shown in outline on the map can be found in appendix 1.

SOURCE: Isamu Hiura and Ko Seto, "Nihon San Kan-aoi no Bunpu Kiroku," Shizenshi Kenkyu, Occasional Papers from the Osaka Museum of Natural History 1 (25 December 1968):8-45.

Many other sources listed in the bibliographies were consulted to confirm and supplement the primary source listed above.

Figure 19



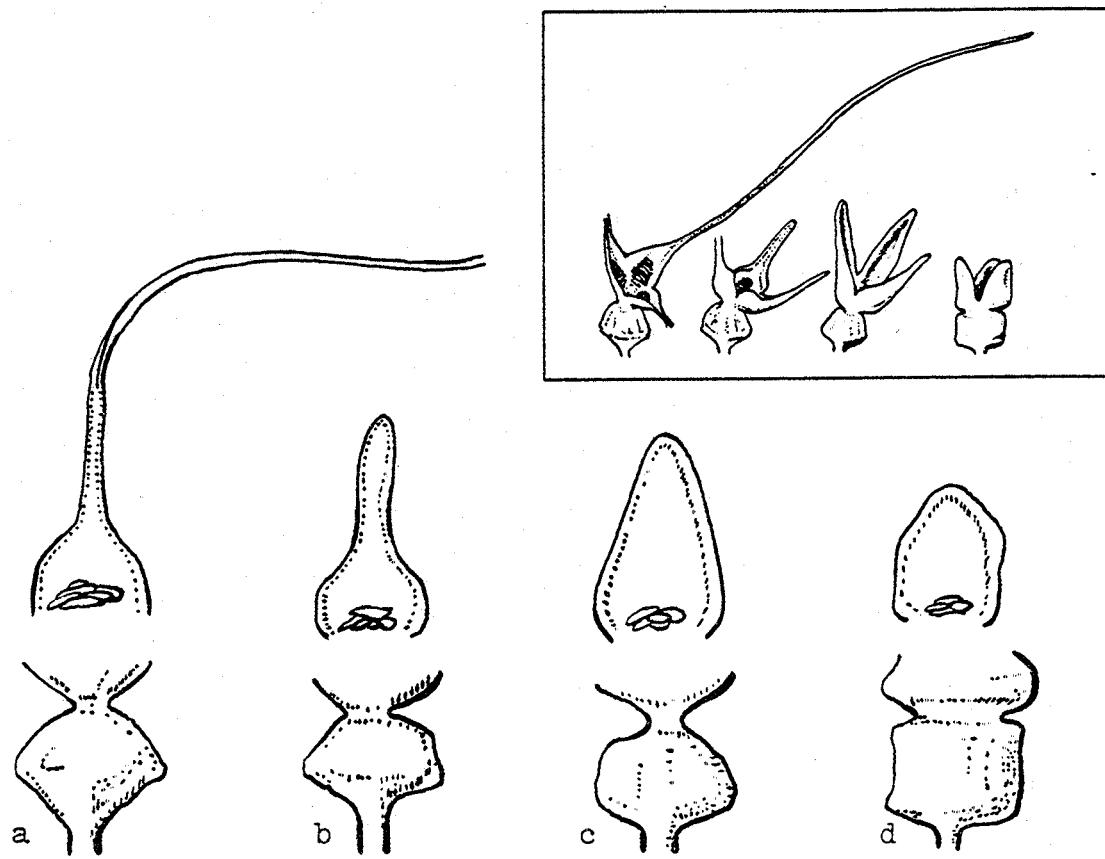


Figure 20. Comparison of calyx development
in Asarum minamitanianum, A. stellatum, A. sakawanum,
and A. costatum

- a. *Asarum minamitanianum*
- b. *A. stellatum*
- c. *A. sakawanum*
- d. *A. costatum*

SOURCE: Fumio Maekawa, "Nihon Koyū no
Shokubutsu, Kan-aoi no Nakama-tachi," Kokudo to Kyōiku 25
(May 1974):35.

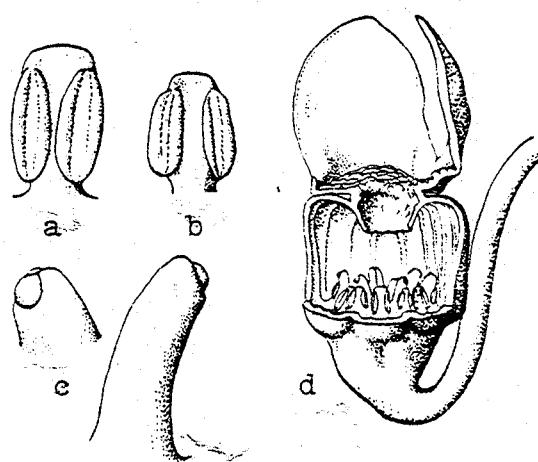


Figure 21. Flower structure of Asarum costatum

- a. Outer stamen x 8
- b. Inner stamen x 8
- c. Views of styles x 8
- d. Calyx tube x 1.5

SOURCE: Fumio Maekawa, "Japanese Asaraceae III,"
Journal of Japanese Botany 9 (25 July 1933):180.

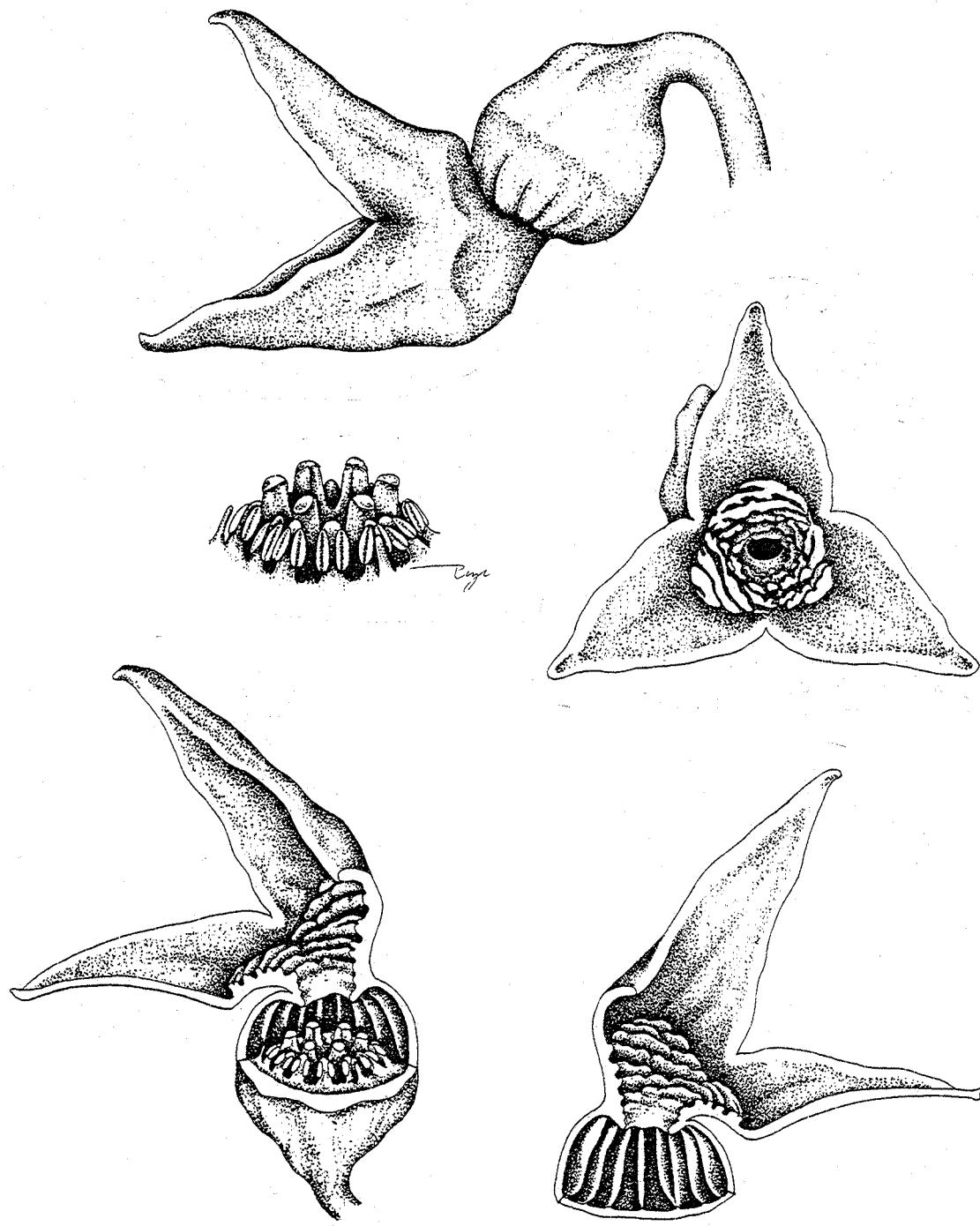


Figure 22. Flower structure of Asarum sakawanum.

Drawn from life by Eiji Yamahata.

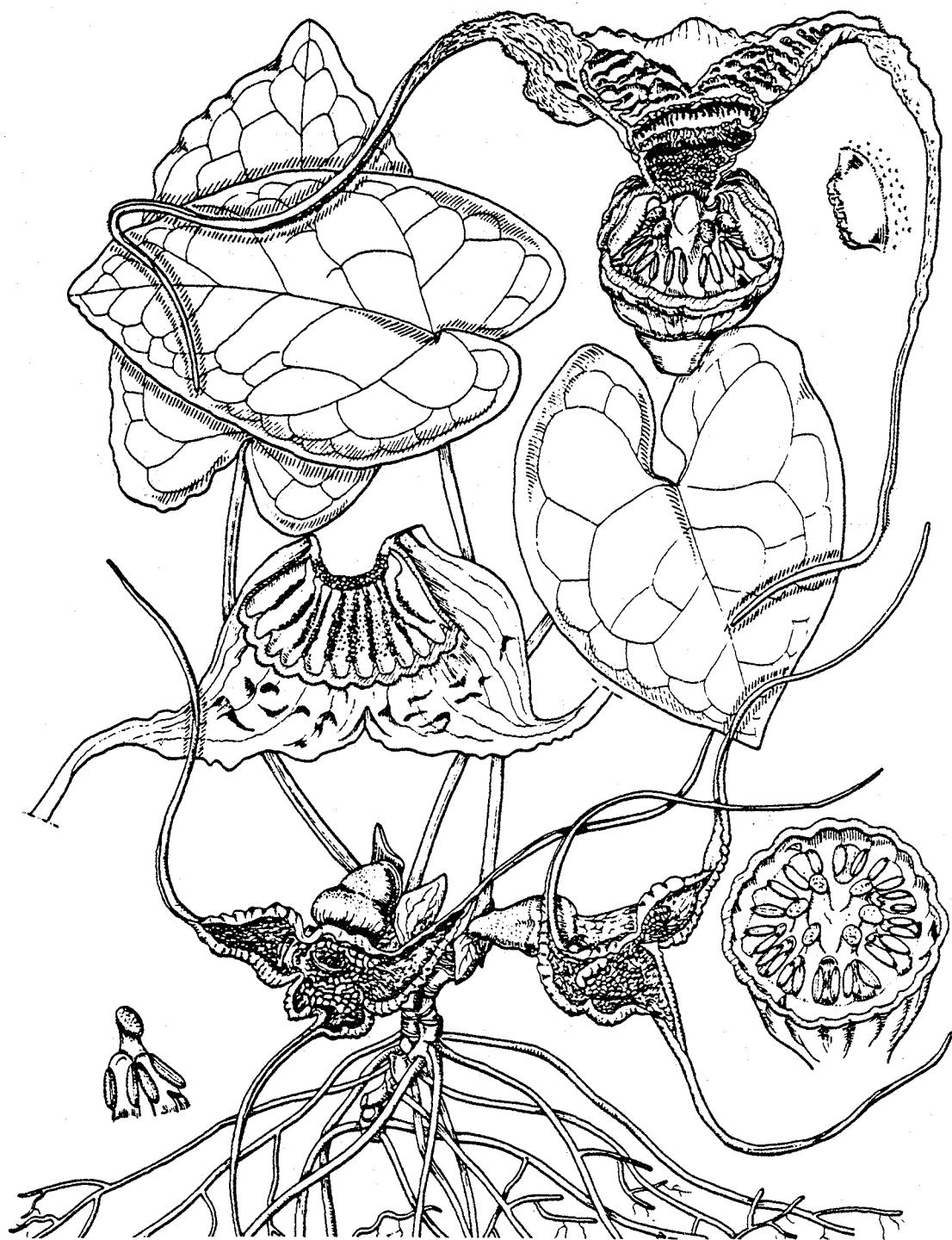


Figure 23. *Asarum minamitanianum*

SOURCE: Mine Hana Kai. Mine Hana 27 (1980):2.
(Drawing by Kazuo Inami).

a	b
c	d
e	f

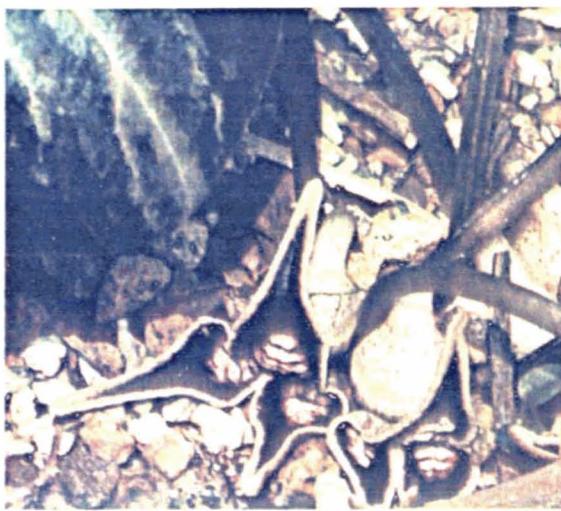
Figure 24. Photographs of *Asarum* species in the Sakawanum-Asperum group (a, b, c, and d) and the Kiusianum group (e and f)

Photographs by Eiji Yamahata

- a. *Asarum costatum*
- b. *A. sakawanum*
- c. *A. stellatum*
- d. *A. minamitanianum*

- e. *Asarum kumageanum*
- f. *A. kumageanum* var. *glabrum*

NOTE: The two species in the Kiusianum group have been placed here out of the necessity of consolidating color illustrations. No relationship with the species above is implied.



colonies of plants with various patterns of variegation on its leaves, often with plants of the woodland composite Ainsliaea cordifolia growing around and among the colony. Until it flowers the Ainsliaea is a perfect leaf mimic of the Asarum and might derive some protection from the close association; nearly all leaf-eating insects give Asarum a wide berth.

A similar species, A. hexalobum, has a more western and southern range (see figure 16). It is easily distinguished from A. asperum by counting the longitudinal ridges inside the calyx tube and by counting the stamens. In A. asperum there are fifteen longitudinal lines and twelve stamens. In A. hexalobum there are six lines and only six stamens; the other six have been transformed into staminodia which alternate with the stamens (see figure 25). Further south in Kyushu is found A. hexalobum var. perfectum, identical to A. hexalobum except that it is "perfect" in having twelve fertile stamens in functional condition and no staminodia.⁶⁷

Still further south in Kyushu is Asarum crassum with the largest leaves in this group, up to eighteen centimeters long; glossy, thick, and succulent⁶⁸ (see figures 26 and 27). Another species, A. parviflorum, is known only in cultivation. It has such small flowers that they are exceeded in length by the subtending bracts.⁶⁹

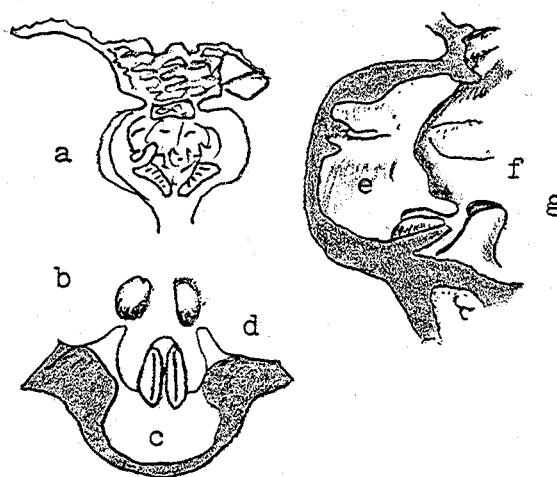


Figure 25. Flower structure of Asarum hexalobum

- a. Cross-section of calyx x 1.5
- b. Stigma (top view) x 5
- c. Fertile stamen (top view) x 5
- d. Staminodium (top view) x 5
- e. Fertile stamen (side view) x 5
- f. Staminodium (side view) x 5
- g. Style and stigma (side view) x 5

SOURCE: Fumio Maekawa, "Japanese Asaraceae V,"
Journal of Japanese Botany 9 (25 September 1933):283.

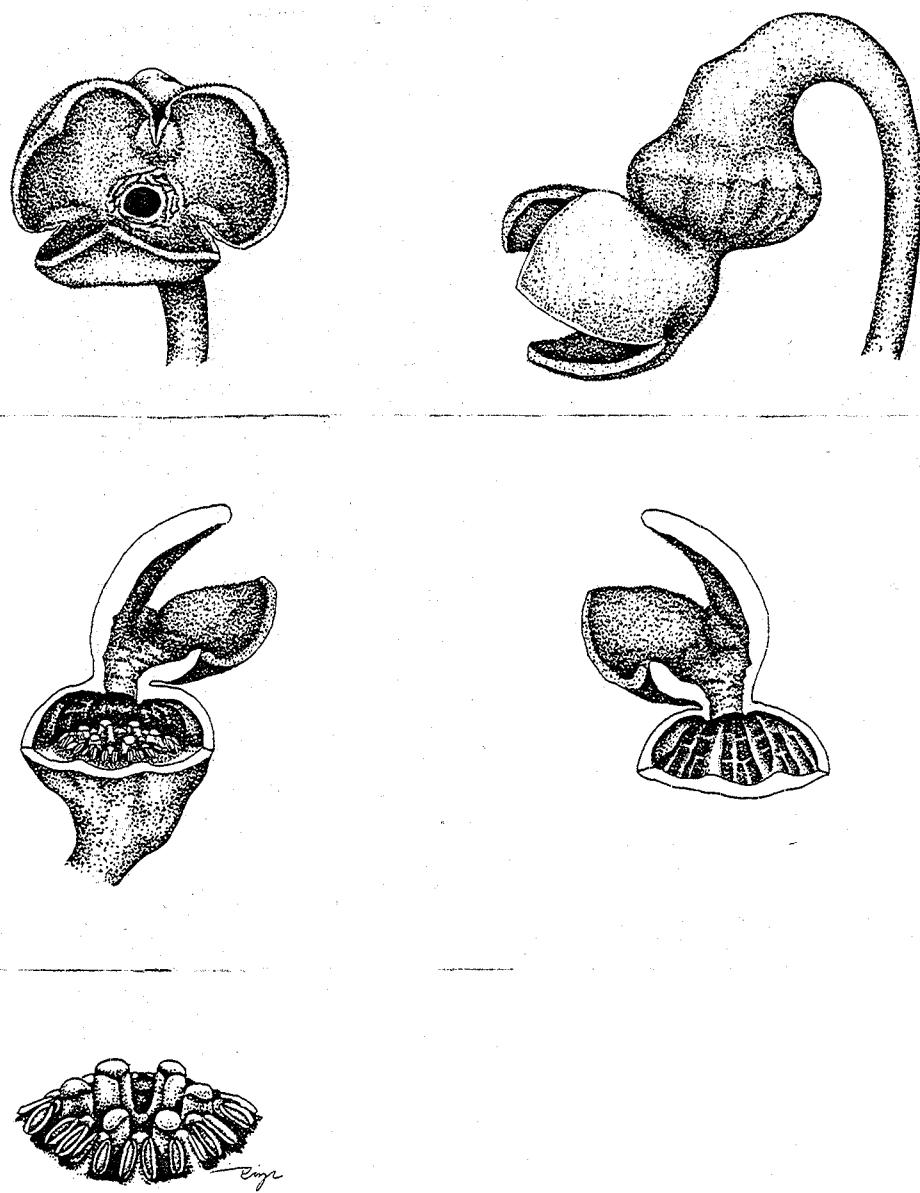


Figure 26. Flower structure of Asarum crassum

Drawn from life by Eiji Yamahata

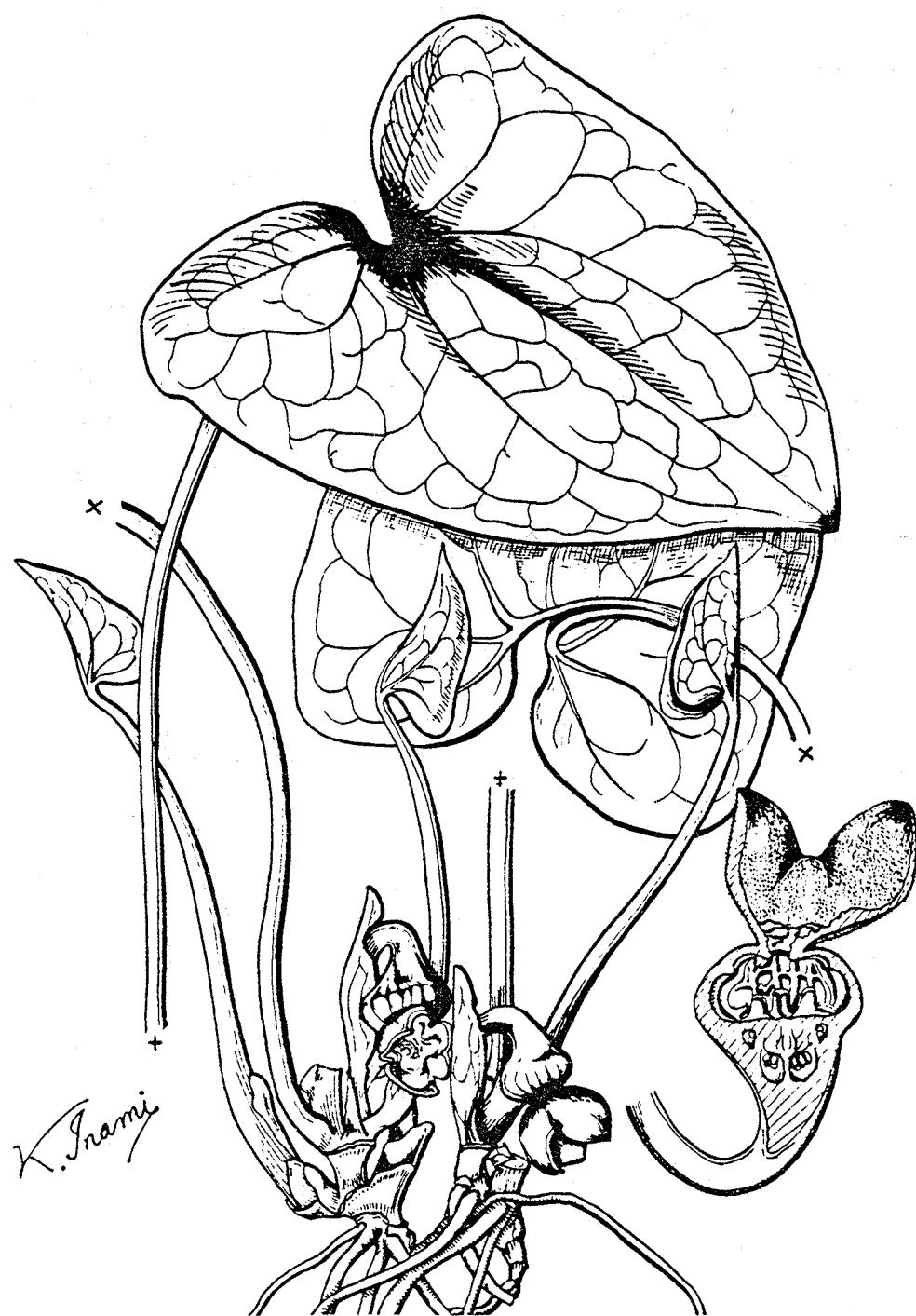


Figure 27. Asarum crassum

SOURCE: Mine Hana Kai, Mine Hana 27 (1980):4.
(Drawn by Kazuo Inami).

One thing which all the species in the Sakawanum-Asperum group have in common is beautiful ornamental foliage. Most of the species have leaves marked with extremely variable patterns of cloudy silver, white, or grey; Asarum asperum has a particularly wide range of ornamental patterns. A. crassum is not normally variegated, but its sturdy glossy leaves are an excellent foil for those with markings. In addition, the flowers of the plants in the Sakawanum subgroup have interesting and fairly showy flowers, purple with a prominent whitish margin. Of the entire group A. asperum is probably the best garden plant, and it has been hardy for several years in USDA hardiness zone 6 without special protection.

Three obscure species--A. minus, A. constrictum, and A. oblongum--have been separated from A. asperum on the basis of variations in foliage and calyx lobe construction, and A. controversum (see figure 16) has in the same way been separated from A. hexalobum. This author cannot discover any dependable way to separate them from the more widespread and variable species which they resemble, and hopes that they will not be treated as separate species until they can be more reliably identified.⁷⁰

The Curvastigma Group

Distinct taxa

Asarum asaroides
A. curvastigma
A. muramatsui
A. satsumense
A. tamaense
A. unzen

Obscure taxon

Asarum nomadakense

This third group contains six species and one obscure taxon. The recognizable species are equally distributed between eastern Honshu (A. curvastigma, A. tamaense, and A. muramatsui) and extreme western Honshu and Kyushu (A. asaroides, A. satsumense, and A. unzen)⁷¹ (see figure 28). This group is about equal to Maekawa's section Heterotropa (or Euheterotropa) of his genus Heterotropa.⁷²

As a group these species are distinguished by their squat, broad flowers with undulate lobes at least as broad as long, and a wide band of ridges or tubercles on the limb of the calyx surrounding the throat. The stigmas are terminal on styles which normally hook or curve down at the tip, entire or with wing-like appendages flaring from the sides⁷³ (see figures 29 and 30).

One species from the southern group, A. unzen, fits the morphological qualifications of this group only

Figure 28. Distribution of Asarum tamaense,
A. muramatsui, A. curvastigma, A. asaroides, A. unzen,
and A. satsumense

NOTE: The names of the prefectures shown in
outline on the map can be found in appendix 1.

SOURCES: Isamu Hiura and Ko Seto, "Nihon San
Kan-aoi no Bunpu Kiroku," Shizenshi Kenkyu, Occasional
Papers from the Osaka Museum of Natural History 1
(25 December 1968):8-45.

Fumio Maekawa, "Kan-aoi Rui no Oboegaki (2),"
Shizen to Shokubutsu 6 (June 1972):11.

Many other sources listed in the bibliographies
were consulted to confirm and supplement the primary
sources listed above.

Figure 28

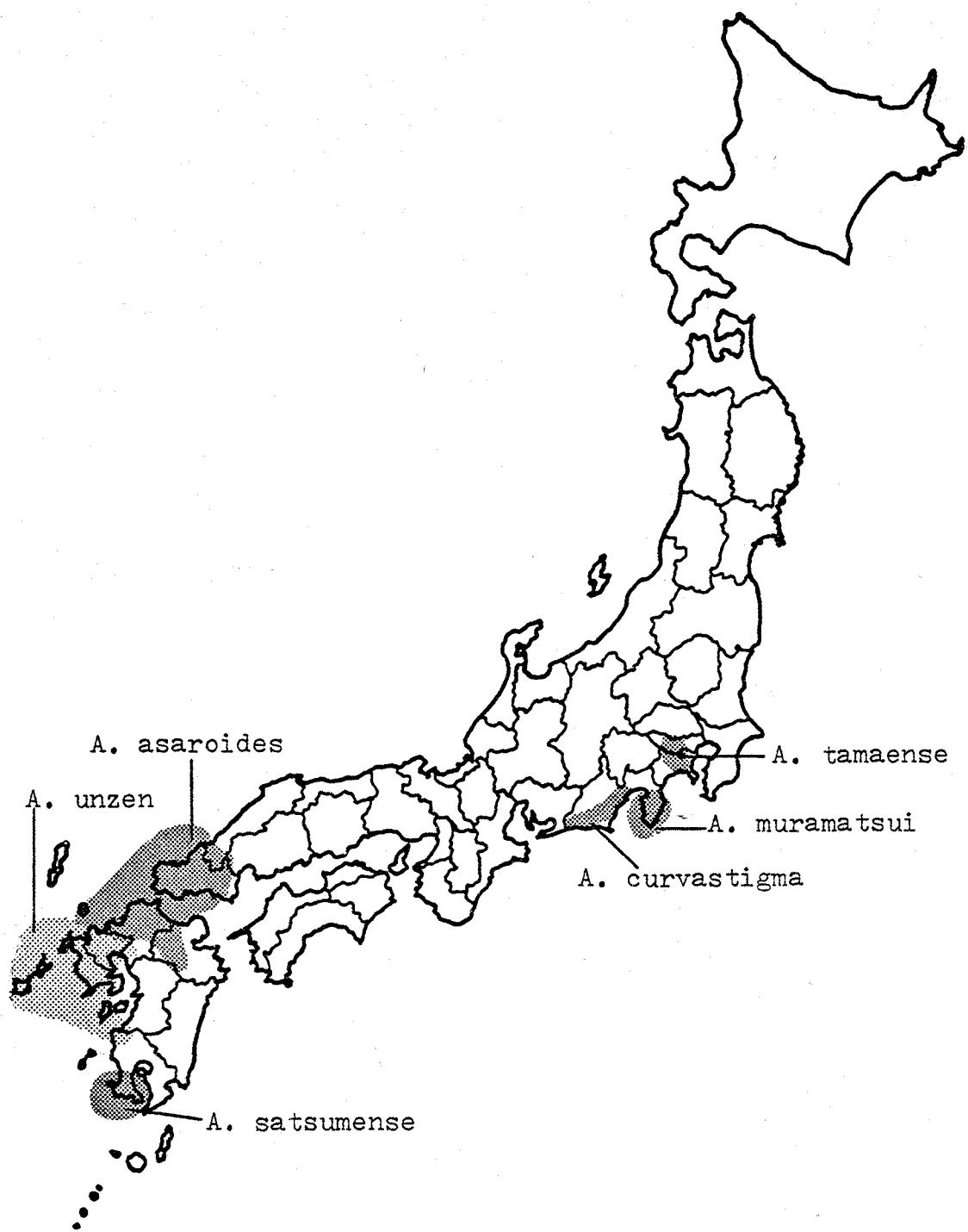
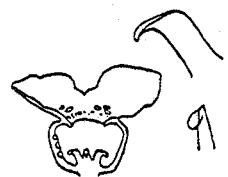


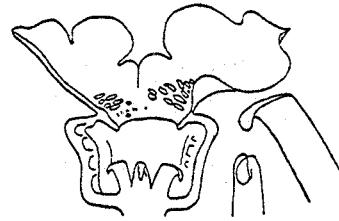
Figure 29. Diagrammatic comparison of the flowers of Asarum curvastigma, A. tamaense, A. satsumense, and A. asaroides

NOTE: Diagrams of calyces are drawn life size, with styles shown enlarged on the right.

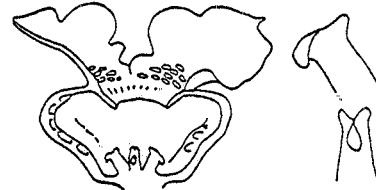
SOURCE: Fumio Maekawa, "Reduction in Chromosomes and Major Polyploidy: Their Bearing on Plant Evolution," Journal of the Faculty of Science, University of Tokyo 8 (1963):381.



A. curvastigma



A. tamaense



A. satsumense



A. asaroides

a	b
c	d
e	f

Figure 30. Photographs of Asarum species in
the Curvastigma group.

Photographs by Eiji Yamahata

- a. *Asarum curvastigma*
- b. *A. asaroides*
- c. *A. satsumense*
- d. *A. muramatsui*
- e. *A. tamaense*
- f. *A. unzen*



in its calyx characteristics. Its styles are two-horned with sub-terminal stigmas, thus making it almost perfectly intermediate between the Curvastigma group and the Kiusianum group, which follows.⁷⁴ All the other species in this group are more obviously very closely related, and if it were not for their distinct ranges there could be little justification for maintaining them all at specific rank.

Maekawa believes that the prototype of this group migrated into Japan by a southerly route, arriving in southern Japan near Kyushu in the Tertiary, then spreading east to establish the most eastern member, Asarum tamaense, on Mt. Chichibu before the late Miocene. In the Pliocene there was a further differentiation into the modern species.⁷⁵

Maekawa believes that A. curvastigma (see figures 30 and 31) is the most primitive of the group, basing his decision on the discovery that there appears to be an inverse relationship between flower complexity and quantity of chromosome material, which he has measured. Thus A. asarooides and A. satsumense with their larger and more elaborated calyces and stigmas are more advanced than A. curvastigma, A. tamaense, and A. muramatsui with their smaller, simpler flowers and unadorned styles⁷⁶ (see figure 29).

There is little difference between Asarum asaroides and A. satsumense except the size of the calyx (A. asaroides is larger) and the width of the wing or auricle on the style (wider in A. asaroides),⁷⁷ and some authorities consider them to be conspecific.⁷⁸ Likewise, A. tamaense and A. curvastigma differ mostly in flower size, the former about half again as large as the latter. The flower of A. muramatsui (see figure 30) is very similar to A. tamaense, but the leaves of the former have deeply impressed veins above and are borne on a green petiole; the latter has smooth leaves which are held on a purple petiole.⁷⁹

Asarum nomadakense is described by Hatsushima as having a longer and more narrow calyx tube and more open calyx lobes than A. tamaense. According to his original description it also has five styles and ten stamens, which would make it a very peculiar species.⁸⁰ The author can find no further references to this species.

All the species in the Curvastigma group have handsome, if somewhat coarse, foliage, usually marked with various cloudy silver or greyish patterns. The northern species in particular should be hardy enough to be of garden use in temperate climates. The flowers are very interesting at close range, but not at all showy from a distance.

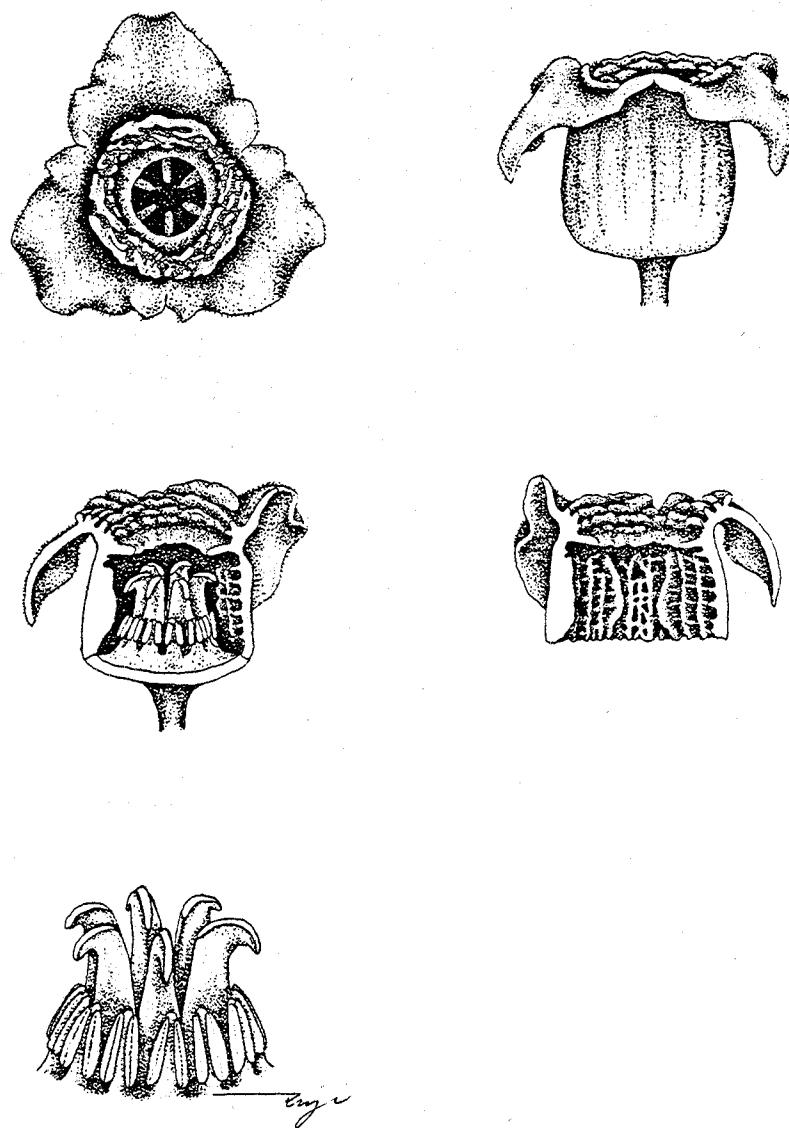


Figure 31. Flower structure of Asarum curvastigma

Drawn from life by Eiji Yamahata

The Kiusianum Group

Distinct taxa

- Asarum kiusianum var. kiusianum
- A. kiusianum var. melanosiphon
- A. kiusianum var. tubulosum
- A. kumageanum
- A. subglobosum
- A. trigynum
- A. yakusimense

Obscure taxa

- Asarum kinoshitai
- A. kumageanum var. satakeanum
- A. yakusimense var. glabrum
- A. yamashiroi

This fourth group is strictly of southern distribution, limited to Kyushu and perhaps a few spots in western Honshu (see figure 32). A number of species further south in the Ryukyu Islands appear to have close affiliations with some members of this group, and a few are almost identical. This group approximately equals Maekawa's section Annularia of his genus Heterotropa.⁸¹

The Kiusianum group is most similar to the group which follows in this paper, the Nipponicum group, and one species listed here, A. kumageanum, fits fairly comfortably in either group, at least in some of its forms. All the species in this group have bicornate (two-horned) styles with sub-terminal stigmas, a feature they share with the Nipponicum group, although the horns on the styles of the species in this latter group are usually proportionally longer and more attenuated. All members

Figure 32. Distribution of Asarum kiusianum var. kiusianum, A. kiusianum var. melanosiphon, A. kiusianum var. tubulosum, A. kumageanum, A. subglobosum, A. trigynum, and A. yakusimense

NOTE: The names of the prefectures shown in outline on the map can be found in appendix 1.

SOURCES: Sumihiko Hatsushima and H. Hamada, "Observation on the Species of the Genus Asarum from Kagoshima Prefecture, Kyushu (II)," Amatores Herbarii 23 (12 December 1962):1-5.

Sumihiko Hatsushima and H. Hamada, "Observations on the Species of the Genus Asarum from Kagoshima Prefecture, Kyushu (III)," Amatores Herbarii 23 (20 May 1963):2-3.

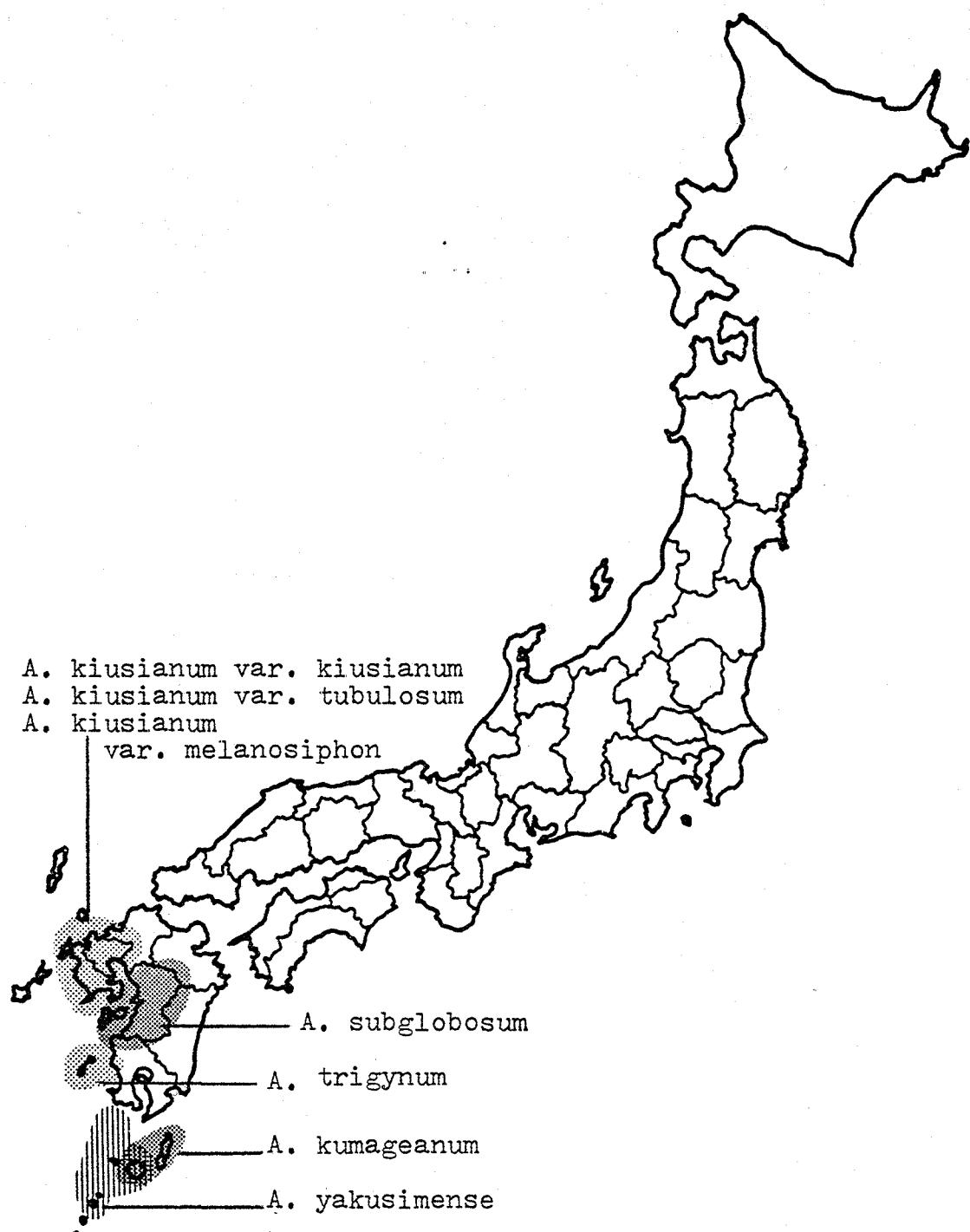
Sumihiko Hatsushima, "Five New Species of Asarum from Southern Kyushu and the Ryukyus," Journal of Japanese Botany 43 (November 1968):431.

Isamu Hiura and Ko Seto, "Nihon San Kan-aoi no Bunpu Kiraku," Shizenshi Kenkyu, Occasional Papers from the Osaka Museum of Natural History 1 (25 December 1968):8-45.

Hiroshi Yuasa and Fumio Maekawa, "Chromosomes of Asarum and Heterotropa (Aristolochiaceae) in the Ryukyu Islands," La Kromosomo 2 (30 April 1976):9.

Other sources listed in the bibliographies were consulted to confirm and supplement the sources listed above.

Figure 32



of the Kiusianum group have an annulus (ring) at the throat of the calyx which restricts the opening when it is seen in cross-section. Several species have calyx tubes which are noticeably longer than broad, and all have regular patterns of raised reticulations inside the tube. With the exception of Asarum kumageanum and A. yaku-simense, the calyx lobes of plants in this group are only slightly or not at all undulate. In most species the limb of the calyx surrounding the throat appears to have a cottony texture or is covered by a series of very shallow ripples as can be seen in figure 33.

Asarum kiusianum and its variants are the most common species in this group. Asarum kiusianum var. tubulosum and A. kiusianum var. melanosiphon are separated primarily on the basis of the color of the calyx tube: pale or dull purple in A. kiusianum var. kiusianum, dark purple in A. kiusianum var. melanosiphon, and white in A. kiusianum var. tubulosum. The last of these is probably the most beautiful Asarum species in flower, and is overall a very attractive ornamental. The botanical varieties based on calyx color share the same range as A. kiusianum var. kiusianum and should be reduced in rank to forma.⁸²

Asarum subglobosum is easily distinguished from its close relative A. kiusianum by its nearly globose

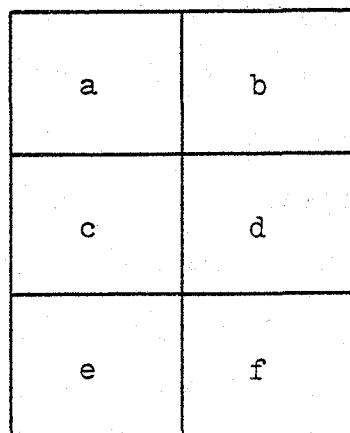


Figure 33. Photographs of Asarum species in the Kiusianum group.

Photographs by the author and Eiji Yamahata

- a. *Asarum yakusimense*
- b. *A. kumageanum* (foliage only)
- c. *A. kiusianum* var. *kiusianum*
- d. *A. kiusianum* var. *tubulosum*
- e. *A. subglobosum*
- f. *A. trigynum*

NOTE: See figure 24 (e and f) for photographs of *A. kumageanum* and *A. kumageanum* var. *glabrum*.



rather than long-tubular calyx tube (see figures 33 and 34) and fewer wrinkles on the limb. Asarum trigynum, which adjoins its range, has even fewer wrinkles and a pronounced cottony or mealy surface texture on the annulus (see figure 33). It is further distinct in having three styles and six stamens, half the number of the other species in this group.⁸³

Two obscure taxa listed above are related to

A. kiusianum. Asarum yamashiroi is found in Kyushu near the range of A. kiusianum and A. subglobosum. The upper third of the calyx tube is constricted in the same way as that of A. kinoshitai (see figure 35), but with six prominent longitudinal ridges or keels on the constricted section.⁸⁴ Its relationship with A. kiusianum requires more study. Even more interesting is A. kinoshitai itself because of its range: it is said to grow in Mie Prefecture, a place which is more than six hundred kilometers from the range of any other known member of this group. Like A. yamashiroi it has a constricted calyx tube but without keels, and appears to have a cottony-textured annulus.⁸⁵

Yakushima and a few small islands near it are the home of two species which are somewhat different from the species described above. Asarum kumageanum (see figures 24 and 36) is very difficult to place in a natural key because it is often very nearly intermediate between

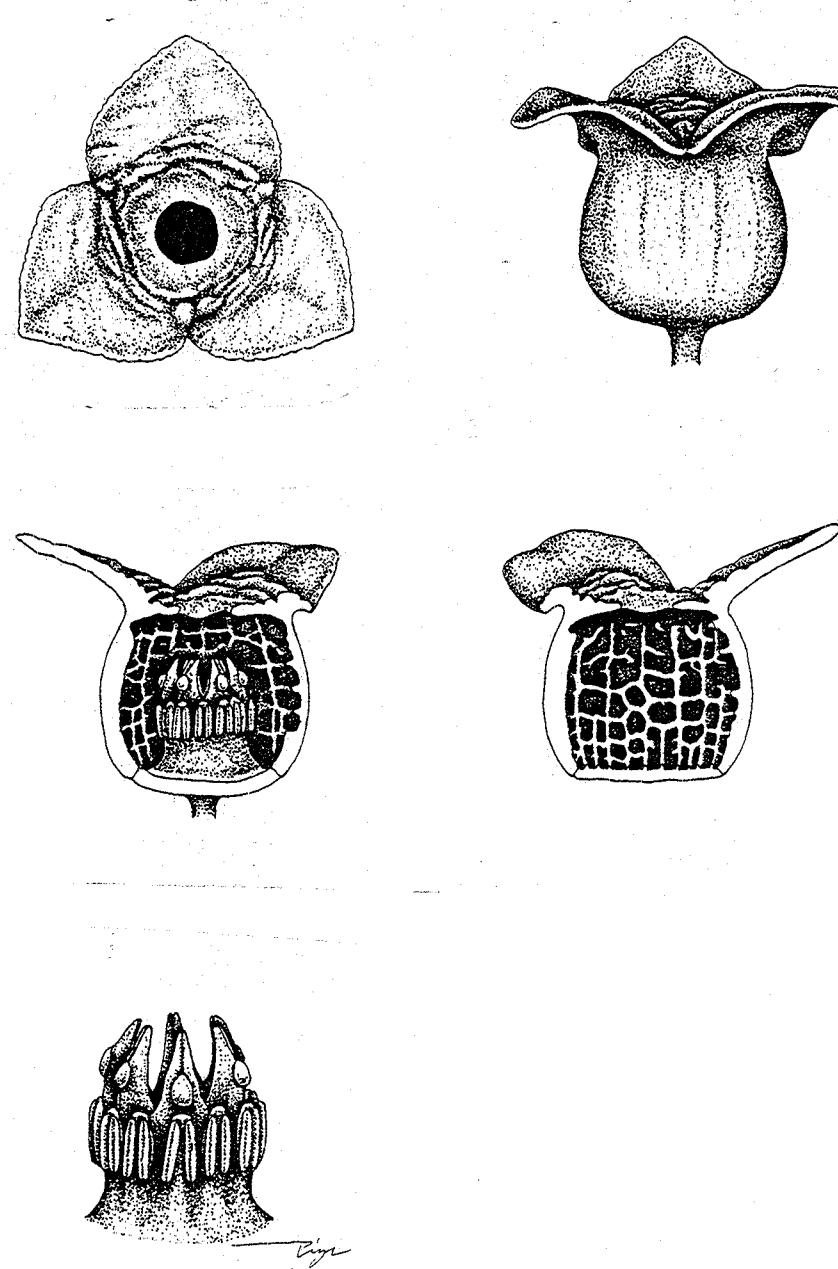


Figure 34. Flower structure of Asarum subglobosum

Drawing from life by Eiji Yamahata

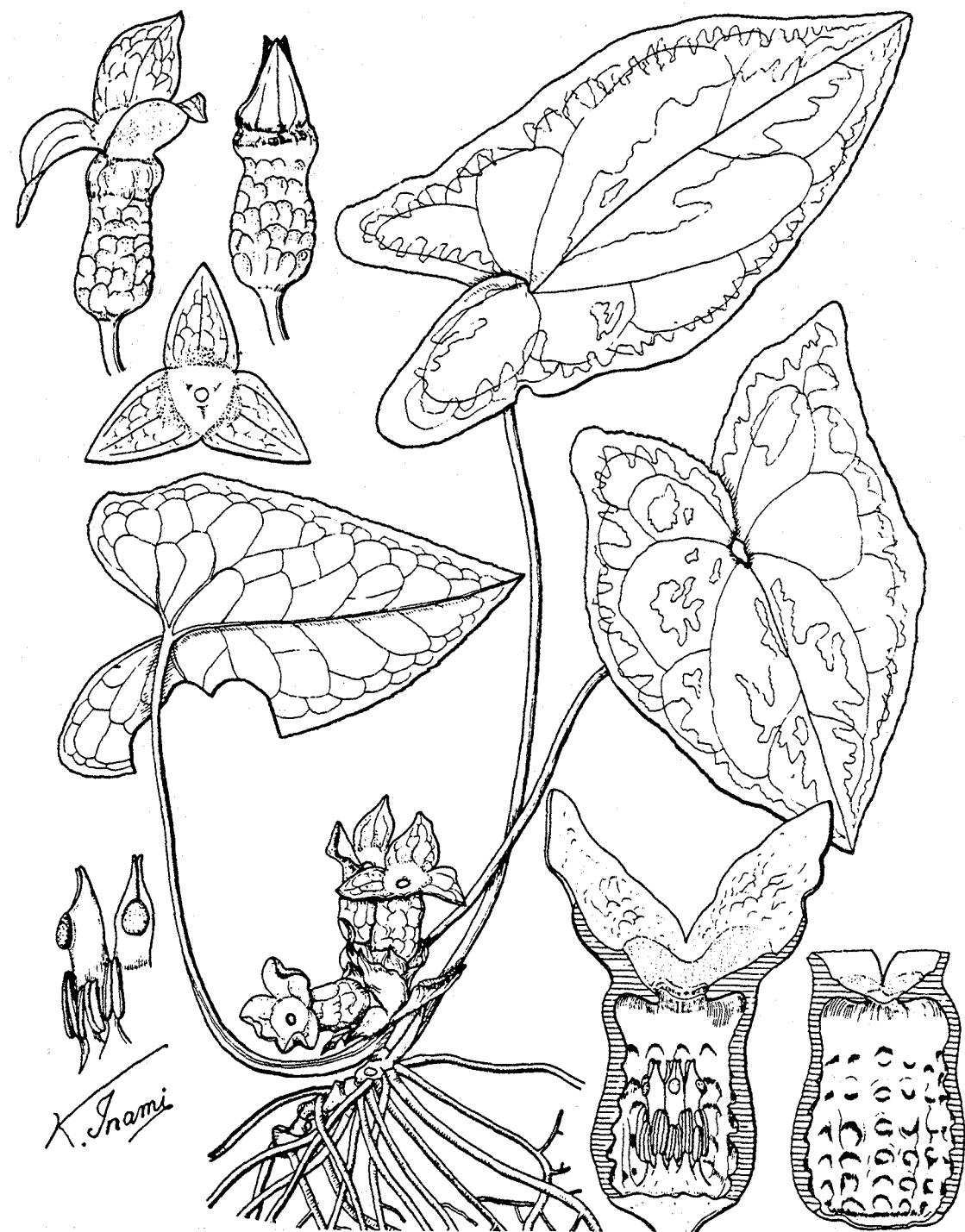


Figure 35. Asarum kinoshitai

SOURCE: Mine Hana Kai. Mine Hana 27 (1980):1.
(Drawn by Kazutake Inami).

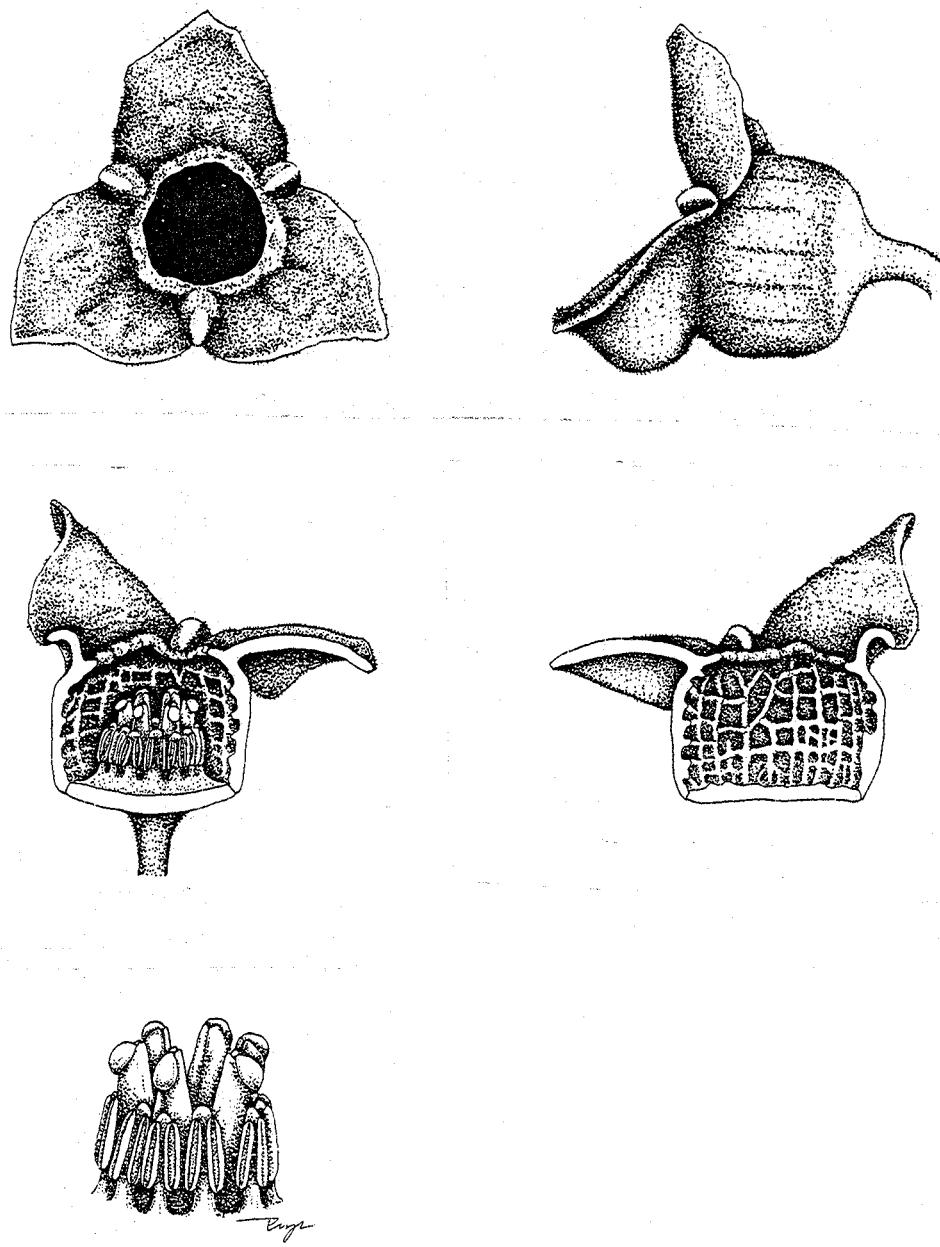


Figure 36. Flower structure of Asarum kumageanum

NOTE: This specimen has unusually short horns on the style.

Drawing from life by Eiji Yamahata

Kiusianum group types and Nipponicum group types, and because it is more variable than most species in flower structure, with variation in the width of the annulus and the length of the horns on the styles which can cause difficulty if only the flowers are seen. The foliage, however, is nearly unmistakeable once seen in fresh condition because of its improbably high gloss and the brightness of the silver and white patterns on the upper surface. No two individual plants are exactly alike in leaf shape and pattern (see figure 33). A. kumageanum var. satakeanum is said to grow on the neighboring island of Tanegashima, but the author cannot find a description of how it differs from the species.⁸⁶

Asarum yakusimense is as splendid in flower as the preceding species is in leaf. There is less chance here of mistaking its affiliation as its flowers have a well-developed annulus and distinctly horned styles. The large flowers are hairy and purple with bright yellow markings on the limb;⁸⁷ a pot of this species in flower stops every plant enthusiast in his tracks (see figure 33). The leaves are large and succulent and never bear markings.

Asarum yakusimense var. glabrum is said to have large leaves which are broader than long, and is said to grow on the small islands near Yakushima, including Kuroshima, Kuchinoshima, and Kuchinoerabu.⁸⁸ Asarum yakusimense

seems to be separated from Asarum kumageanum by altitude in the wild on Yakushima, growing in the mountains, with A. kumageanum in the lower hills nearer the ocean.

Asarum yakusimense is very similar to A. lutchuense of Amami Oshima (an island in the Ryukyus), and seems to differ only in size, with the latter being larger in all parts⁸⁹ (see figure 37).

All the species in this group are attractive, but two are outstanding. Asarum kiusianum var. tubulosum has attractive mottled leaves and very showy flowers. Its hardiness is not yet known. Asarum kumageanum is, in the author's opinion, the most attractive evergreen herbaceous foliage plant hardy in a temperate climate. It is perfectly hardy in USDA hardiness zone 7 and probably further north.

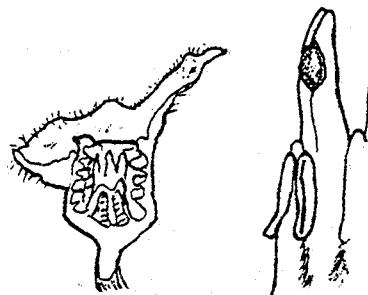
The Nipponicum Group

Distinct taxa

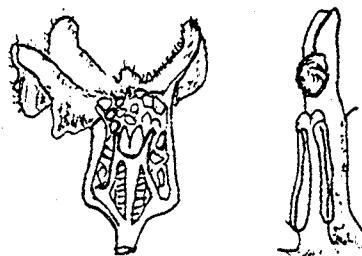
- Asarum blumei
- A. fauriei
- A. fauriei var. nakaianum
- A. nipponicum var. brachypodion
- A. nipponicum var. kooyanum
- A. nipponicum var. nankaiense
- A. nipponicum var. nipponicum
- A. nipponicum var. rigescens
- A. megacalyx
- A. savatieri
- A. takaoi

Figure 37. A comparison of the flowers of
Asarum kumageanum, A. yakusimense, and A. lutchuense

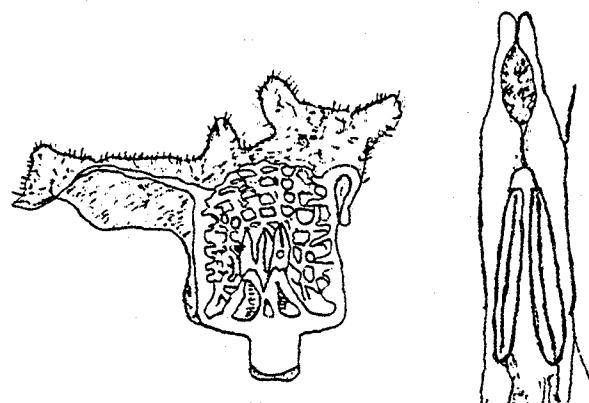
SOURCE: Sumihiko Hatsushima and H. Hamada,
"Observation on the Species of the Genus Asarum from
Kagoshima Prefecture, Kyushu (II)," Amatores Herbarii 23
(12 December 1962):2-3.



Asarum kumageanum from Yakushima (calyx x 1,
style and stamen x 5)



Asarum yakusimense from Yakushima (calyx x 1,
style and stamen x 5)



Asarum lutchuense from Amami Oshima, Ryukyu
Islands (calyx x 1, style and stamen x 5)

Obscure taxa

- Asarum ikegamii*
- A. kurosawai*
- A. pseudosavatieri*
- A. subrigescens*
- A. takaoi* var. *dilatum*
- A. takaoi* var. *hisachii*
- A. variegatum*
- A. viridiflorum*
- A. yoshikawae*

This fifth group is as characteristically northern as the previous group is southern. It is the most complex species group, and the various taxa are very similar in general appearance. This makes it a simple matter to place them in the correct group, but it makes it quite difficult to distinguish among some taxa. The problem is complicated by the fact that there are intergrades between various major taxa which often seem intermediate in character. In addition, a few species in this group were first described and named from atypical specimens in cultivation, and the nomenclature of this group often seems almost impossible to interpret with certainty.

A look at the distribution maps (figures 38, 39, and 40) shows that this group is the most widespread of the evergreen species groups. If the ranges of all the taxa are superimposed on one map, the result is an enormous concentration of forms in eastern Honshu just south and west of Tokyo, and this area can be assumed to be the center of speciation and distribution of this group.

Figure 38. Distribution of Asarum nipponicum var. nipponicum, A. nipponicum var. kooyanum, A. nipponicum var. brachypodium, A. nipponicum var. nankaiense, A. savatieri, and A. blumei.

NOTE: The names of the prefectures shown in outline on the map can be found in appendix 1.

SOURCES: Isamu Hiura and Ko Seto, "Nihon San Kan-aoi no Bunpu Kiroku," Shizenshi Kenkyu, Occasional Papers from the Osaka Museum of Natural History 1 (25 December 1968):8-45.

Siro Kitamura and Gen Murata, Colored Illustrations of Herbaceous Plants of Japan, 3 vols. (Osaka, Japan: Hoikusha Publishing Co., 1978), 2:323-24.

Fumio Maekawa, "Alabastra Diversa I," The Botanical Magazine 66 (20 September 1932):570-73, 577, 581.

Jisaburo Ohwi, Flora of Japan, ed. Frederick G. Meyer and Egbert H. Walker (Washington D.C.: Smithsonian Institution, 1965), pp. 399-401.

T. Uchikawa, "Niigata Ken Kan-aoi no Bunpu ni Cuite," Mine Hana 23 (1976):5-8.

Other sources listed in the bibliographies were consulted to confirm and supplement the sources listed above.

Figure 38

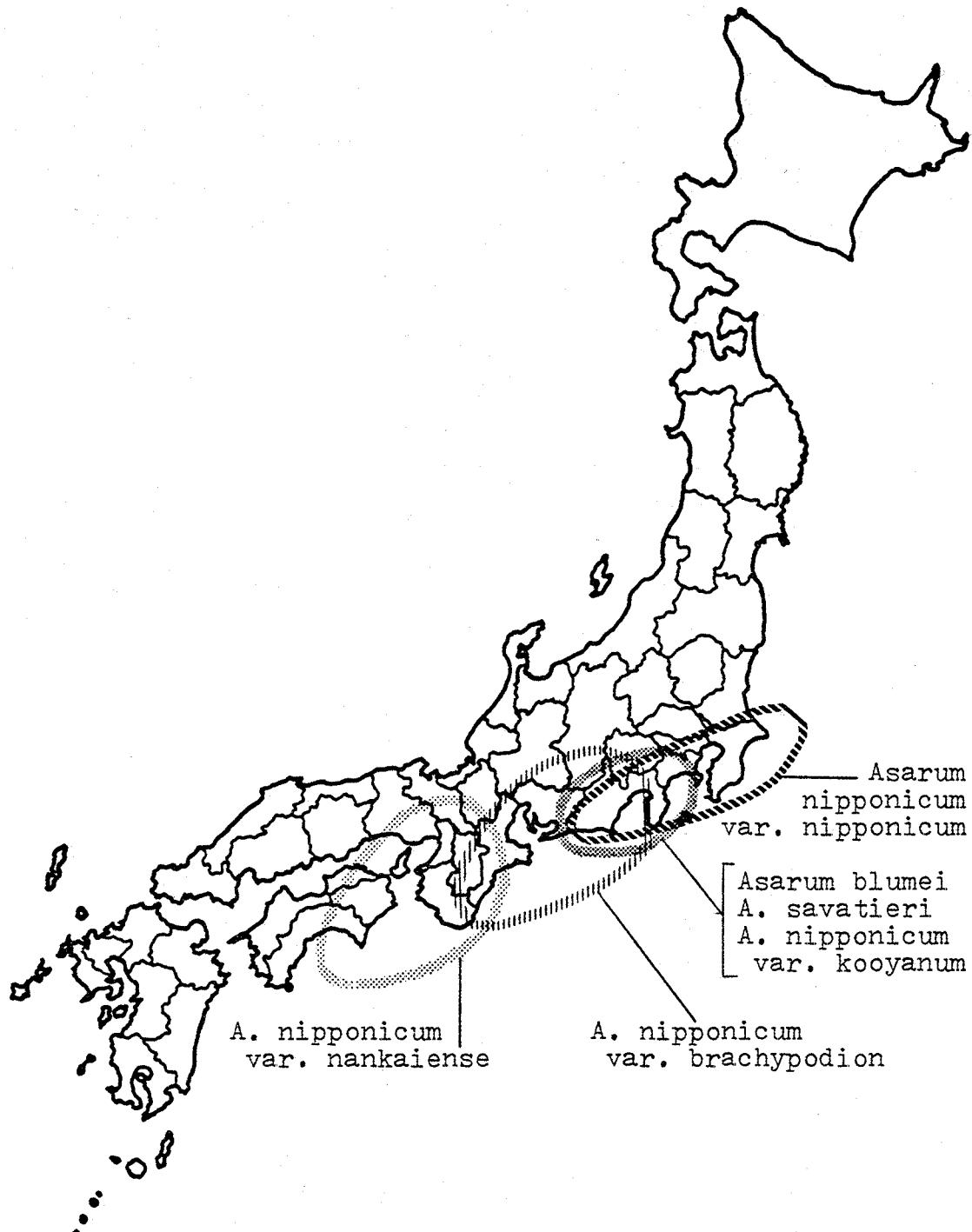


Figure 39. Distribution of Asarum nipponicum var.
rigescens and A. megacalyx

Notes and sources as for figure 38, p. 101

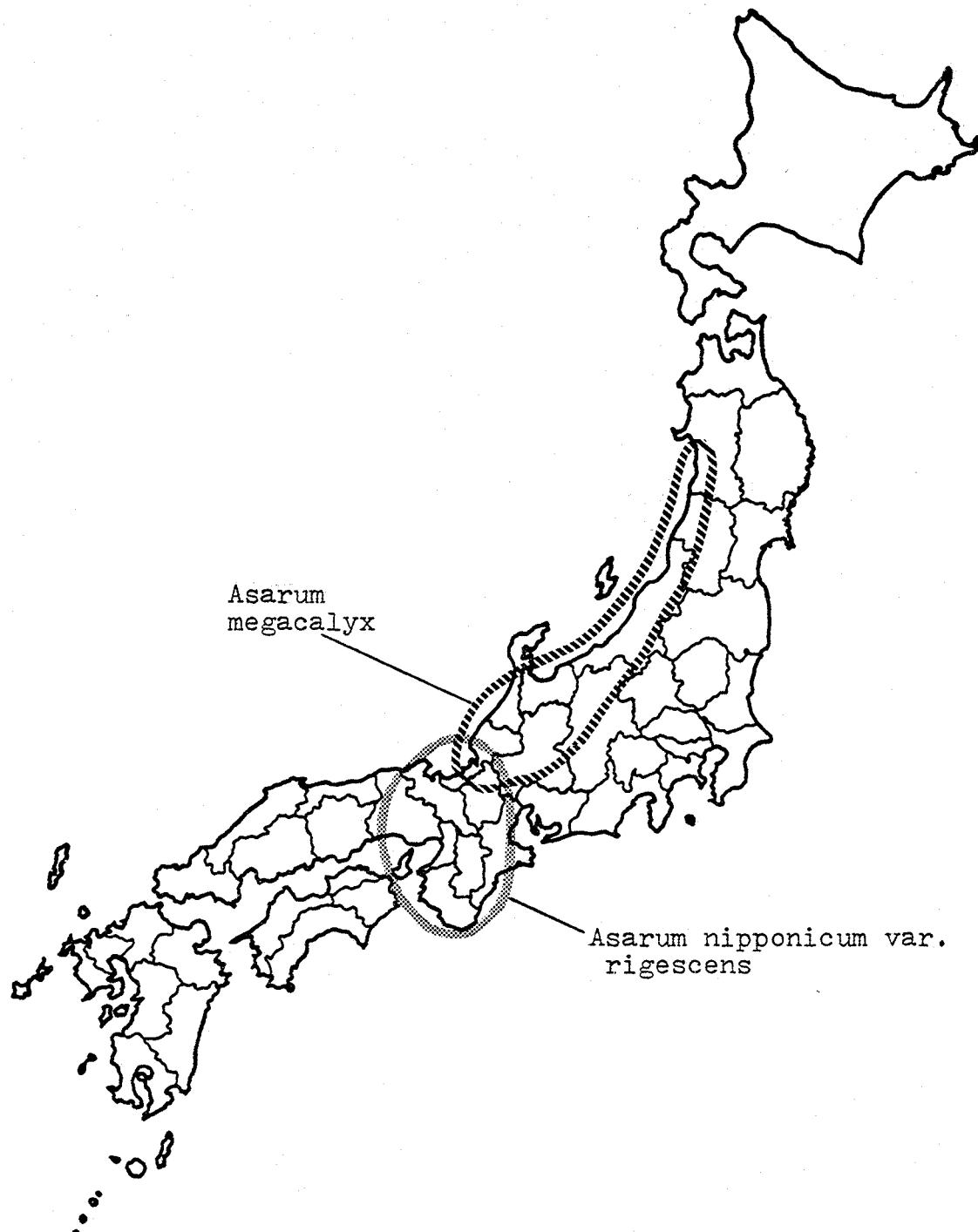
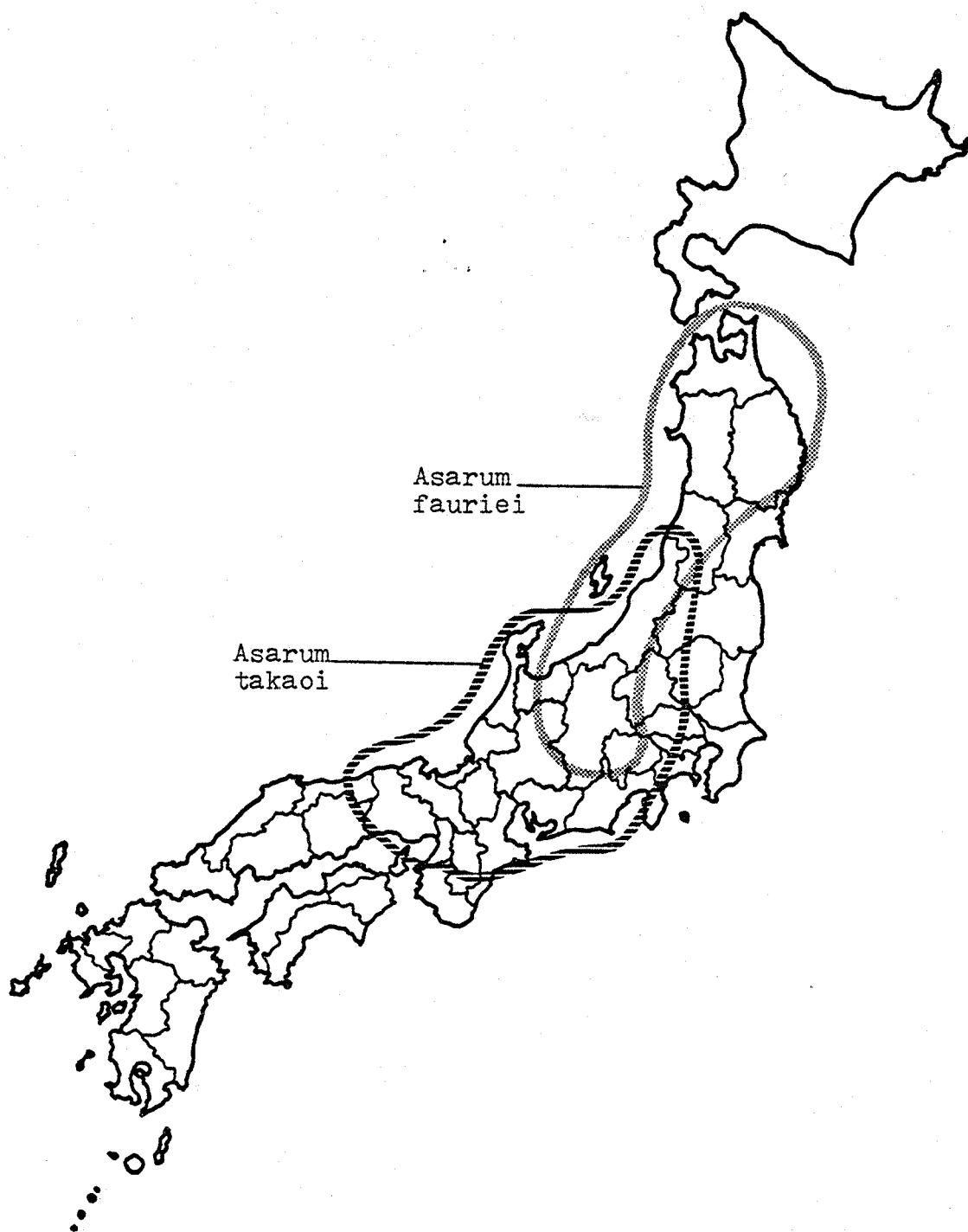


Figure 40. Distribution of Asarum fauriei and A. takaoi

Notes and sources as for figure 38, p. 101



This group is roughly equivalent to Maekawa's section Bicornes of the genus Heterotropa.⁹⁰

It is possible to make a rough division of this group into three parts: The largest group is centered in east central Honshu, all diploid species with leaves and flowers of intermediate and uniform size (see figure 38). A second group is dispersed in west central Honshu and at low altitudes on the Japan Sea side of the same island in areas with very deep winter snow; these species are usually tetraploid with somewhat larger and more succulent leaves and flowers (see figure 39). The third group is found almost throughout the Nipponicum group's entire range, usually at higher altitudes; these species have smaller leaves and flowers than the two preceding groups (see figure 40).

Whatever their distribution, all the taxa in this group (except one--Asarum blumei) are very similar in flower structure. The calyx tube is approximately campanulate, usually as broad as long, with a regular pattern of square or rectangular reticulations inside. The styles are always distinctly two-horned (bicornate), with subterminal stigmas. There is no prominent constricting annulus at the throat of the calyx and no striking markings or patterns on the limb except a narrow raised ring surrounding the throat. This ring is

inconspicuous or absent in some taxa, but never elaborated as in some groups already considered. Asarum nipponicum var. nipponicum is a typical example of the flower structure which characterizes this group (see figure 41). The one exception to this generalized description of flower structure is A. blumei, which has a more or less narrowly constricted throat, but otherwise conforms to the group morphology⁹¹ (see figure 42).

The largest concentration of species in this group is distributed from the Tokyo area south to Shikoku, along the Pacific coast side of Honshu. Asarum nipponicum var. nipponicum is most common in the Tokyo area, with flat, smooth, mottled leaves, winter-blooming flowers with calyx lobes of about the same length as the tube, and about nine rows of reticulations inside.⁹² Slightly to the south is A. savatieri, a summer-blooming species with slightly smaller flowers with fifteen to twenty-one rows of reticulations (see figure 43). It shares its range with the narrow-throated A. blumei, mentioned above.⁹³ Here too is found A. nipponicum var. kooyanum, with calyx lobes half the length of the tube (see figure 42), and A. nipponicum var. brachypodion with lobes longer than the tube and leaves with impressed veinlets above⁹⁴ (see figure 44). This variety merges with the most southern representative of the group,

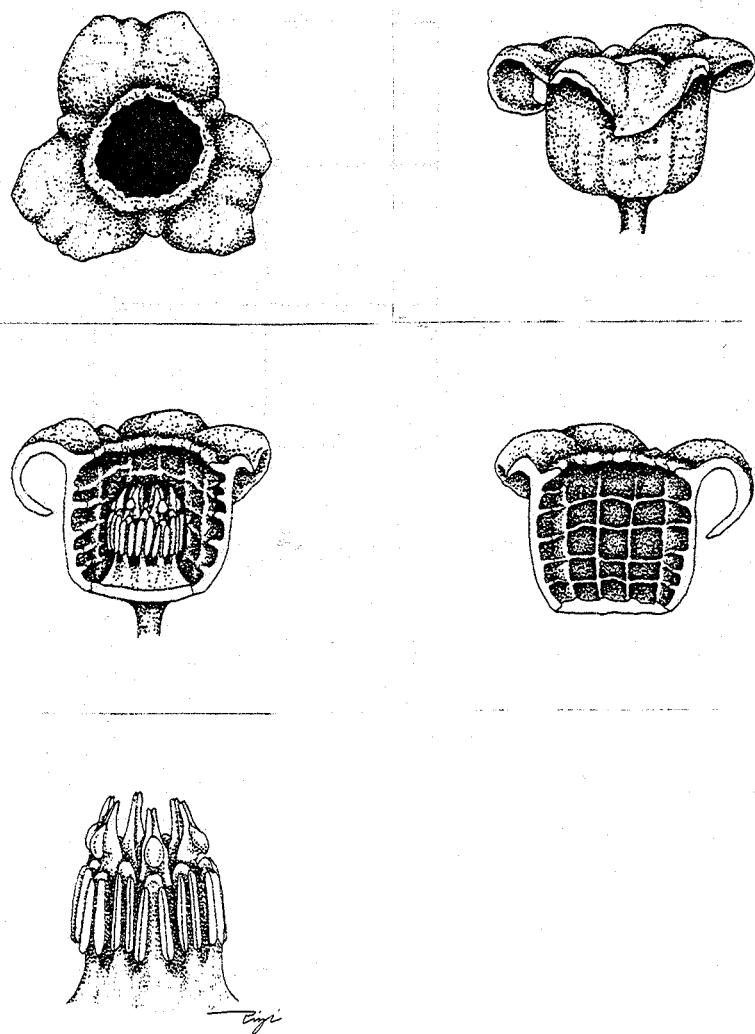


Figure 41. Flower structure of Asarum
nipponicum var. nipponicum

Drawing from life by Eiji Yamahata

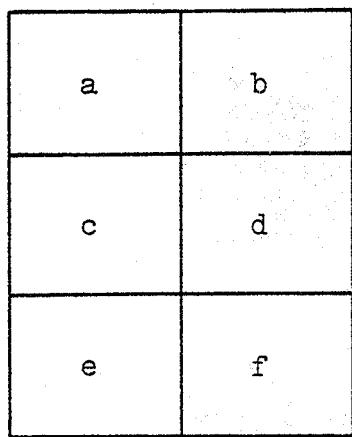


Figure 42. Photographs of Asarum species in the
Nipponicum group

Photographs by Eiji Yamahata

- a. *Asarum blumei*
- b. *A. nipponicum* var. *rigescens*
- c. *A. nipponicum* var. *kooyanum*
- d. *A. megacalyx*
- e. *A. takaoi*
- f. *A. takaoi* var. *hisauchii*

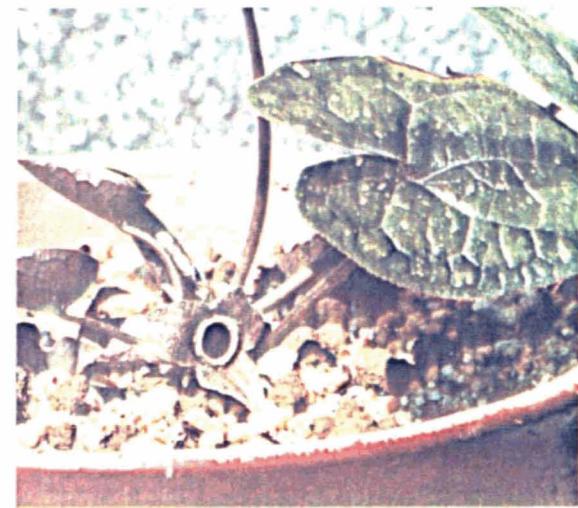
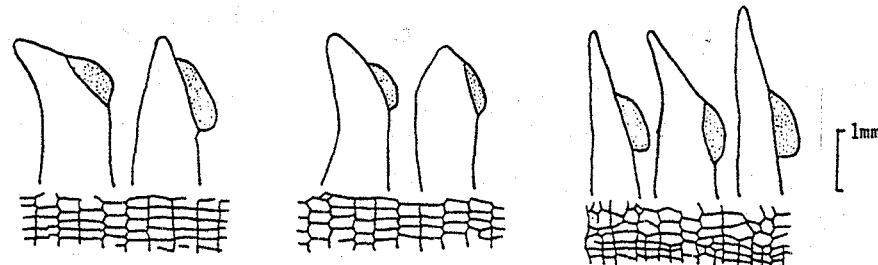
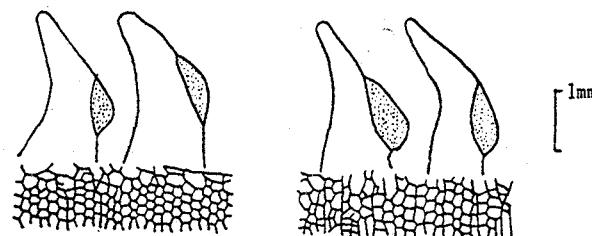


Figure 43. Style shapes and reticulation patterns of three Nipponicum group Asarum species

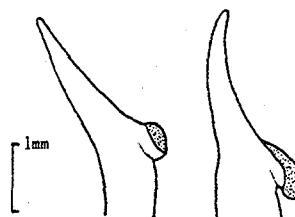
SOURCE: Kunihiro Sei, "Kan-aoi Zoku Heterotropa no Bunpu (2)," Shokubutsu to Shizen 6 (July 1972):20.



Styles and calyx reticulations of three populations of *A. nipponicum* var. *nipponicum* showing about nine rows of reticulations per flower.



Styles and calyx reticulations of two populations of *A. savatieri* showing about twenty-five rows of reticulations per flower.



Styles of *A. takaoi*. No reticulations are shown, but this species would normally have about eighteen rows per flower.

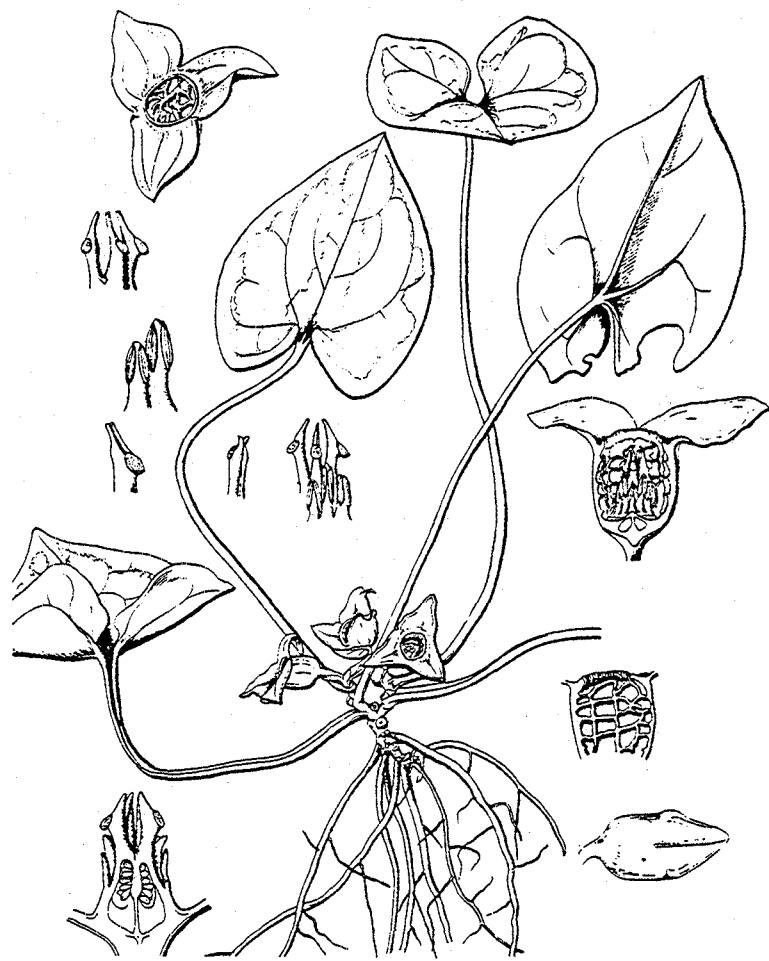


Figure 44. *Asarum nipponicum* var. *brachypodium*

SOURCE: Kazuo Inami, "Saishin no Tsukurikata,"
in the Garden Life edition Koten Engei Shokubutsu
(Tokyo: Seibundo Shinkosha, 1977), p. 173.

Asarum nipponicum var. nankaiense, which spills over from Honshu into eastern Shikoku. This variety has a more broadly campanulate calyx tube and three distinct dimples on the flower bud⁹⁵ (see figure 45).

One variety of A. nipponicum, variety rigescens, reaches across from the Pacific coast of Japan to the Japan Sea side (see figure 39). Its flower is very similar to A. nipponicum var. nipponicum except that it has glabrous rather than heavily ciliate calyx lobes. The leaves, however, are distinctly different; in A. nipponicum var. rigescens the leaves are thick and cartilaginous with deeply impressed veins.⁹⁶ It also has some peculiar karyological features such as the presence of diploid and tetraploid cells in the same plant.⁹⁷ Both it and A. megacalyx are distributed in areas covered with very deep snow in the winter.

The range of A. megacalyx somewhat overlaps that of A. nipponicum var. rigescens (see figure 39), and continues up the Japan Sea coast where it grows at low elevations, giving way to A. takaoi and A. fauriei in the mountains.⁹⁸ Its flowers are half again as large as those of A. nipponicum var. nipponicum and of much heavier substance, with about fifteen rows of reticulations inside.⁹⁹ It is always tetraploid.¹⁰⁰

Two vigorous and variable species, A. takaoi and

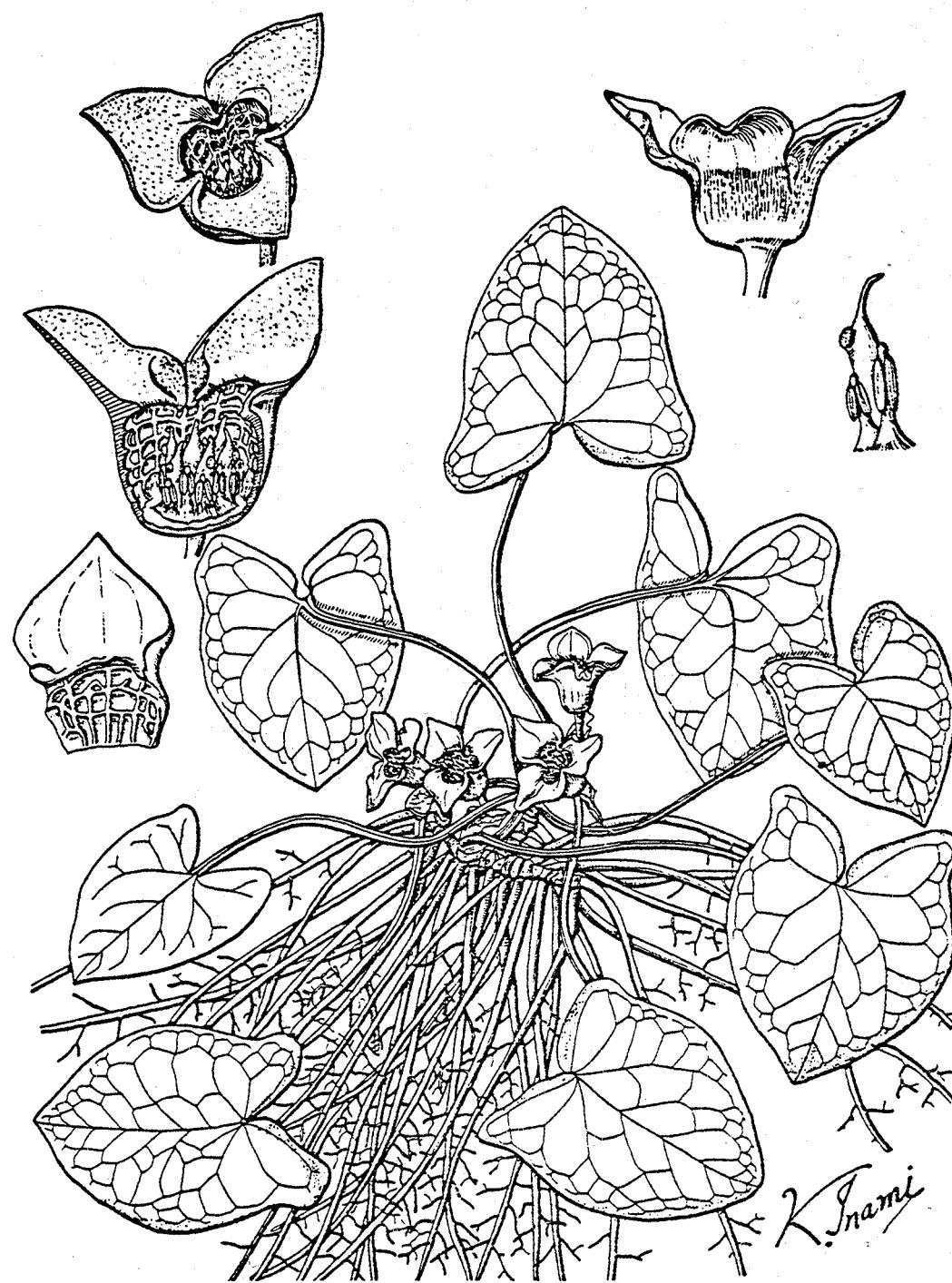


Figure 45. *Asarum nipponicum* var. *nankaiense*

SOURCE: Mine Hana Kai, Mine Hana 23 (1976):4.

Asarum fauriei, occur in most of the range covered by all the species mentioned above, and extend the Nipponicum group's range to almost twice the area it would otherwise be (see figure 40). Both species are generally smaller in leaf and flower than the A. nipponicum varieties, with more rounded leaves; in A. takaoi ovate-orbicular to ovate, and A. fauriei orbicular. Asarum fauriei has the smallest leaves in the group, about three centimeters across, and also differs in having flowers with exserted styles. The leaves are not variegated, but are lustrous green in the species and dull green in the variety nakaianum.¹⁰¹ The very stoloniferous A. takaoi 'Serpens' is a triploid garden form.¹⁰²

The leaves of A. takaoi are longer than those of A. fauriei (about five to eight centimeters), and may be variegated. The styles are shorter than the tube. The varieties hisachii and dilatatum are listed, but are very difficult to distinguish. Asarum takaoi var. hisachii, like A. fauriei, is said to have exserted styles¹⁰³ (see figure 46).

Also difficult to describe are two cultivated taxa which have been described as species, A. variegatum and A. viridiflorum. The former is very similar to A. takaoi, but with no distinct limit between the limb of the calyx and the throat. The latter species probably belongs in

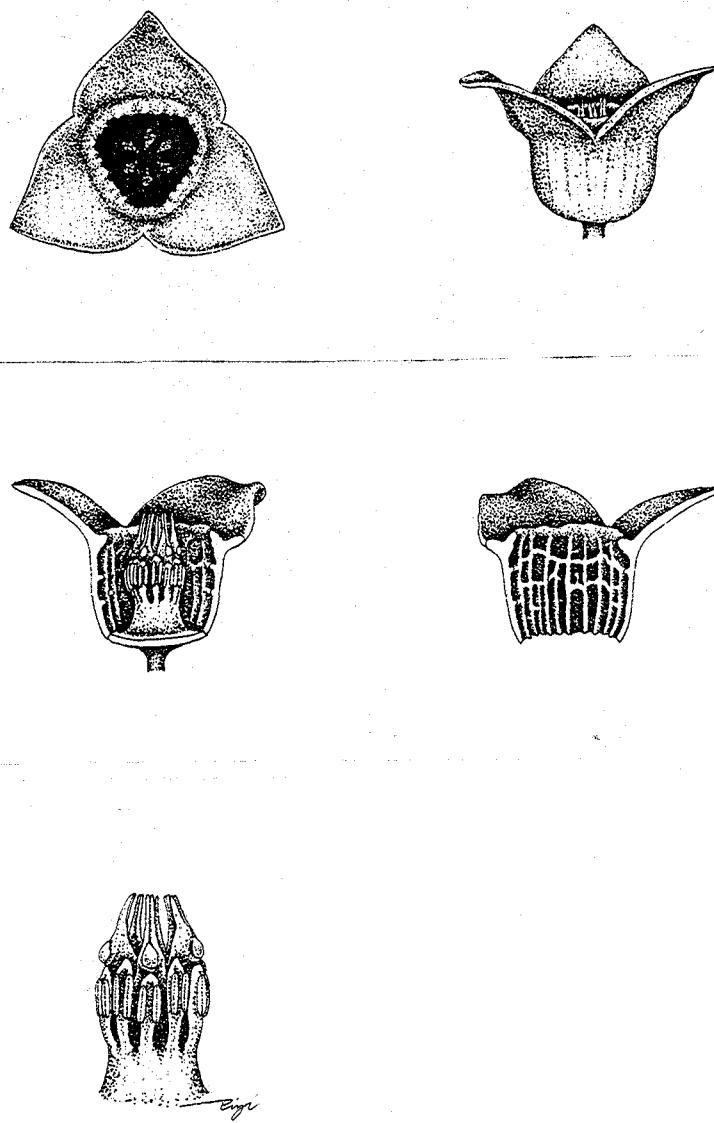


Figure 46. Flower structure of Asarum takaoi var. hisauchii
Drawing from life by Eiji Yamahata

the same company, but has pale green flowers.¹⁰⁴

Other obscure taxa in the Nipponicum group include Asarum subrigescens, a tetraploid which is probably conspecific with A. nipponicum var. rigescens;¹⁰⁵ A. pseudosavatieri, which appears to be the same as A. savatieri;¹⁰⁶ A. ikegamii and A. kurosawai, which are very similar to A. takaoi;¹⁰⁷ and A. yoshikawae,¹⁰⁸ for which the author can find no description.

There are many fine ornamental plants in this group, and selections of these have been cultivated by the Japanese for centuries. The classical cultivars which are the subject of the second part of this paper are of this group, and plants in this group more than any other are grown as ordinary garden plants in Japan.

Asarum nipponicum var. rigescens is, in the author's opinion, the most beautiful foliage plant in the genus next to A. kumageanum, and all the varieties of A. nipponicum have great value in the garden for their hardiness as well as their beauty. Asarum takaoi and its relatives show promise as ground covers because of their rapid growth and tolerance for rather dry soil.¹⁰⁹

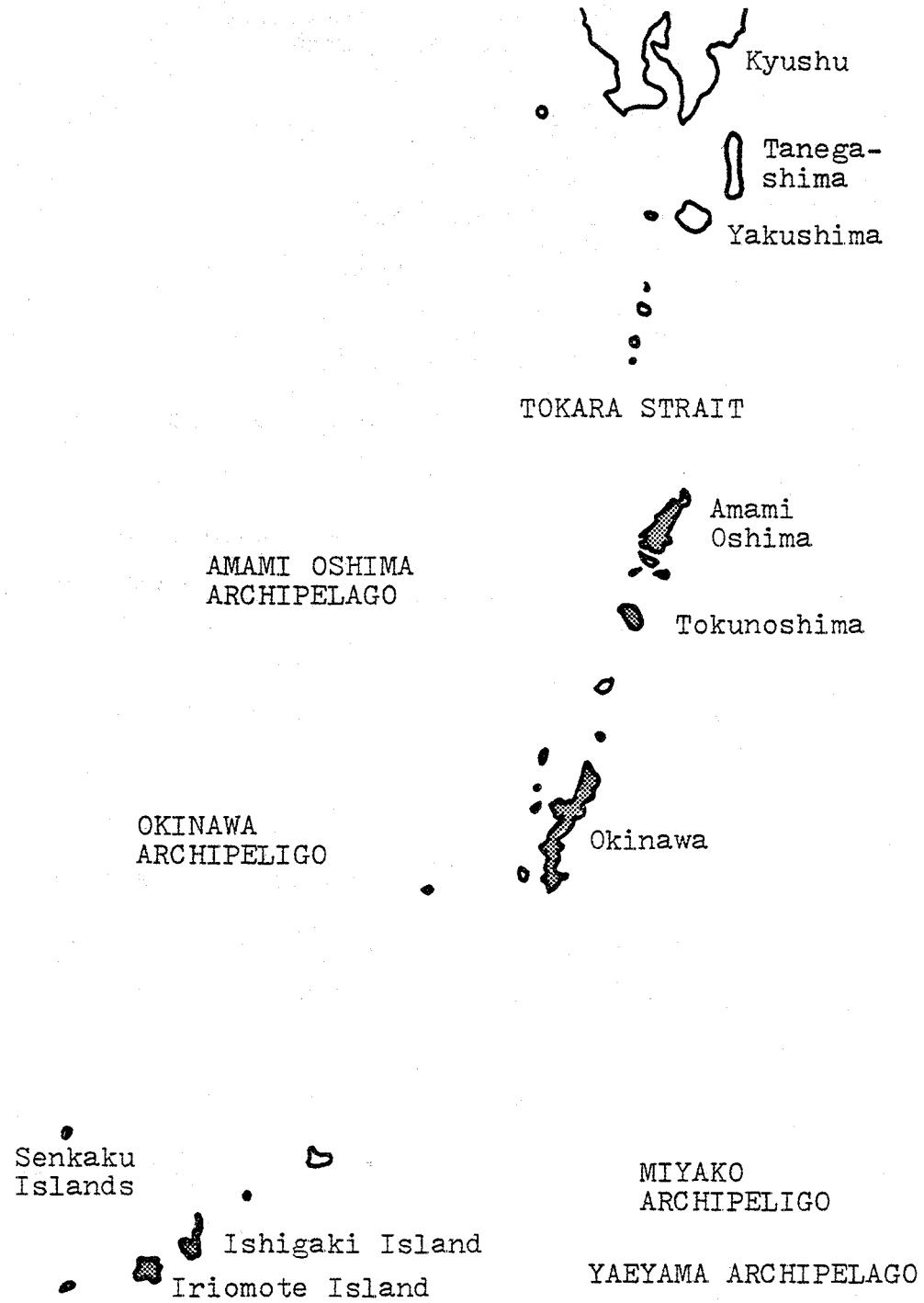
The Ryukyu Islands Group

- Asarum celsum
- A. dissitum
- A. fudsinoi
- A. fudsinoi var. giganteum
- A. fudsinoi var. yanma
- A. gelasinum
- A. hatsushima
- A. hayatanum
- A. leptophyllum
- A. lutchuense
- A. monodoraeflorum
- A. okinawense
- A. senkaku-insulare
- A. similis
- A. turbinatum
- A. yaeyamense

This sixth and final group is a geographical assemblage of all the species which have been described from the islands between the Tokara Strait, south of Yakushima, and Taiwan. Six of these islands are known to have native populations of Asarum¹¹⁰ (see figure 47). In the Ryukyus, which are subtropical, all species of Asarum occur at altitudes over 280 meters, which reaffirms their evolutionary origins as temperate climate plants.¹¹¹ Most of the species in these islands have only recently come under study, and it is likely that the number of species listed for the Ryukyus will change as new taxa are described and others are consolidated. Obvious relationships between species will be mentioned below, but there will be no effort to address species' relationships in detail.

Figure 47. Asarum distribution in the Ryukyu Islands. The islands named on the map are known to have native populations of Asarum.

SOURCE: Eiji Yamahata, unpublished notes, 1978.



As a group the Ryukyu Islands' Asarum seem to have closer affiliation with species from Taiwan and China than the modern species from the main islands of Japan. Two species from the Ryukyus, A. leptophyllum and A. hayatanum, are also found in Taiwan,¹¹² but no Japanese main island species is found in its same form in the Ryukyus. This probably reflects the movement of Asian species to the Ryukyus while the islands were part of the Asian land mass. The Tokara Strait has served as an effective barrier to north-south plant migration since at least Tertiary times,¹¹³ and it is unlikely that Asarum species, with their poorly developed systems for seed dispersal, could have overcome such great distances at sea.

Amami Oshima, just south of the Tokara Strait, has a fascinating relict flora, including five taxa of native Asarum: A. celsum, A. fudsinoi, A. fudsinoi var. giganteum, A. fudsinoi var. yanma, and A. lutchuense.¹¹⁴ As noted above, A. lutchuense is nearly identical to A. yakusimense, except that it is larger in all its parts¹¹⁵ (see figure 37). The other species are not well understood, although some of them seem to be affiliated with the Kiusianum group, which shares their southern Chinese origins. Asarum celsum and A. fudsinoi are illustrated in figures 48 and 49.

The next island to the south with native Asarum

Figure 48. Styles and stamens of six Ryukyu Islands Asarum species

a. Asarum fudsinoi (calyx x 1, style and stamen x 5)

SOURCE: Sumihiko Hatsushima and H. Hamada, "Observation on the Species of the Genus Asarum from Kagoshima Prefecture, Kyushu (IV)," Amatores Herbarii 26 (25 September 1963):3.

b. Asarum celsum (style and stamen x 5)

SOURCE: Ibid., p. 2.

c. Asarum yaeyamense (style and stamen x 5)

SOURCE: Sumihiko Hatsushima, "Five New Species of Asarum from Southern Kyushu and the Ryukyus," Journal of Japanese Botany 43 (November 1968):433.

d. Asarum hatsushimaiae (calyx x 1.5, style and stamen x 5)

SOURCE: Sumihiko Hatsushima and H. Hamada, "Observation on the Species of the Genus Asarum from Kagoshima Prefecture, Kyushu (III)," Amatores Herbarii 23 (20 May 1963);2.

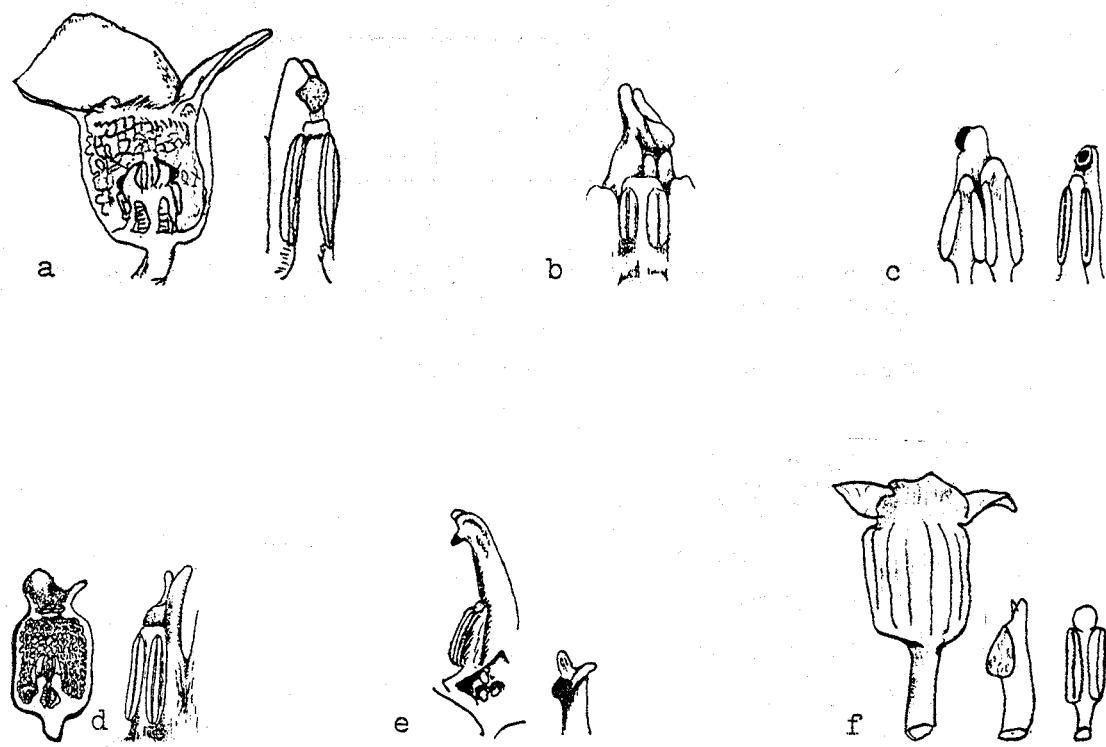
e. Asarum okinawense (style and stamen x 5)

SOURCE: S. Hatsushima, "Five New Species of Asarum from Southern Kyushu and the Ryukyus," p. 433.

f. Asarum senkaku-insulare (calyx x 1.5, style and stamen x 6)

SOURCE: Sumihiko Hatsushima, "A New Species of Asarum from the Ryukyus," Journal of Geobotany 24 (October 1976):39.

Figure 48



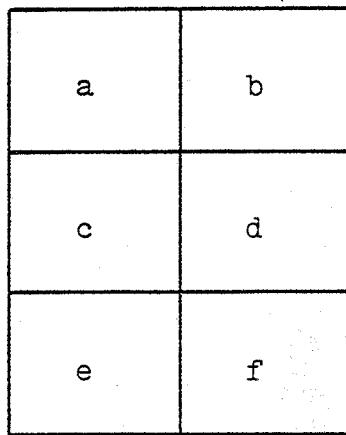
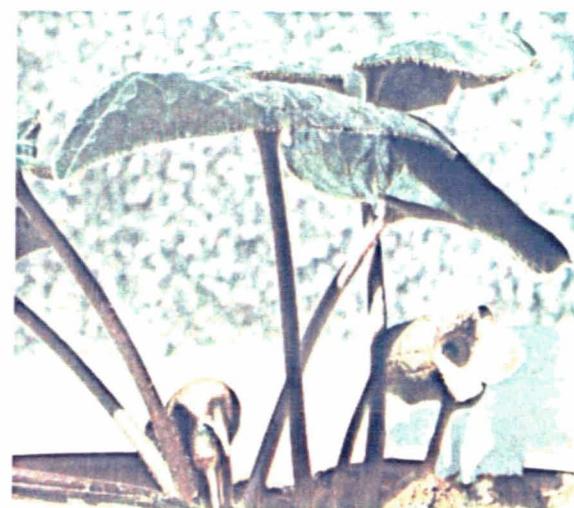


Figure 49. Photographs of Asarum species in the Ryukyu Islands group

Photographs by Eiji Yamahata

- a. *Asarum fudsinoi*
- b. *A. turbinatum*
- c. *A. okinawense*
- d. *A. hatsushima*
- e. *A. celsum*
- f. *A. hayatanum*



is Tokunoshima with three interrelated species: Asarum hatsushima (see figures 48 and 49), A. similis, and A. turbinatum (see figure 49). These species seem to be closely related to some of the Amami Oshima species such as A. fudsinoi.¹¹⁶

Next is the largest island in the Ryukyus, Okinawa, for which two species are listed: A. leptophyllum, also found in Taiwan and southern China (see figure 50), and A. okinawense, a very distinct species¹¹⁷ (see figures 48 and 49).

Much further south, just north of Taiwan, are the twin islands Ishigaki and Iriomote. The most primitive and peculiar species in the Ryukyus are found here. Ishigaki has one species, A. dissitum, which is also found on Iriomote. It has three styles and six stamens plus a combination of structural features which resist easy classification¹¹⁸ (see figure 51).

Iriomote has four other species. One is A. hayatanum (see figure 49), which is also found in Taiwan,¹¹⁹ and another, A. yaeyamense (see figure 48), may be conspecific with it.¹²⁰ Asarum gelasinum is very primitive, with the chromosome number $2n=12$,¹²¹ as is A. monodoraeflorum, which resembles the primitive species A. geophilum from China¹²² (see figure 8).

The most remotely located species in the Ryukyus

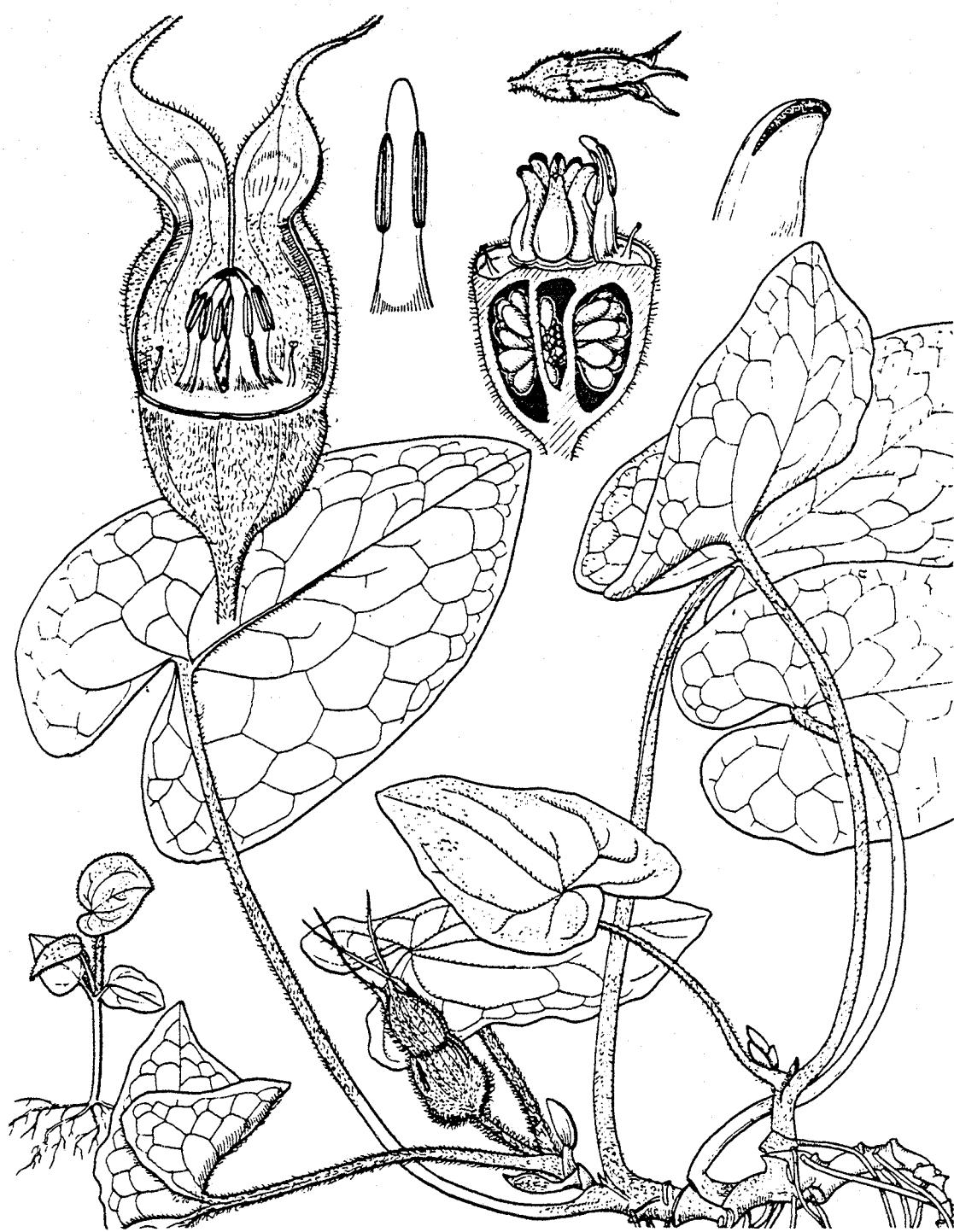


Figure 50. *Asarum leptophyllum*

SOURCE: Mine Hana Kai, Mine Hana 27 (1980):3
(Drawing by Kazuo Inami).

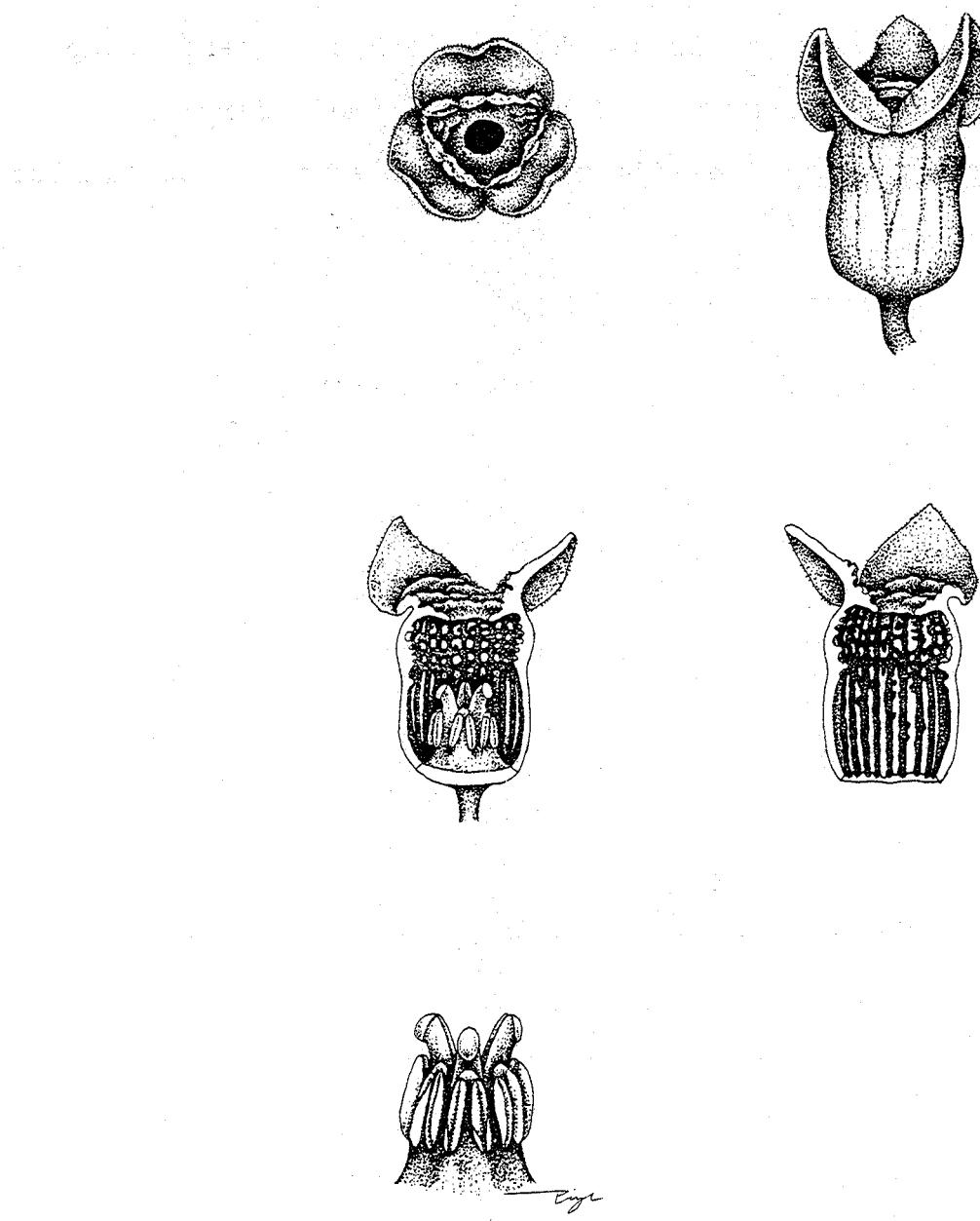


Figure 51. Flower structure of Asarum dissitum

Drawing from life by Eiji Yamahata

is found on Uotsuri Island in the Senkaku Island group northwest of Iriomote. It has been named Asarum senkaku-insulare (see figure 48), and seems to be similar to A. dissitum.¹²³

PART I

FOOTNOTES

¹M. Pfluge Gregory, "A Phyletic Rearrangement in the Aristolochiaceae," American Journal of Botany 43 (February 1956):120-21.

²Arthur Cronquist, The Evolution and Classification of Flowering Plants (Boston: Houghton Mifflin, 1968), pp. 146-47.

³Ibid.

⁴Gregory, "Rearrangement in Aristolochiaceae," pp. 146-47.

⁵Jisaburo Ohwi, Flora of Japan, ed. Frederick G. Meyer and Egbert H. Walker (Washington D.C.: Smithsonian Institution, 1965), p. 397.

⁶Stefan Vogel, "Fungus Gnat Flowers and Fungus Mimesis," Pollination and Dispersal (1973):13-18.

⁷A. J. Cain, Animal Species and Their Evolution, (London: Hutchinson and Co., 1954; reprint ed. New York: Harper and Brothers, 1960), p. 161.

⁸Cronquist, Flowering Plants, p. 147.

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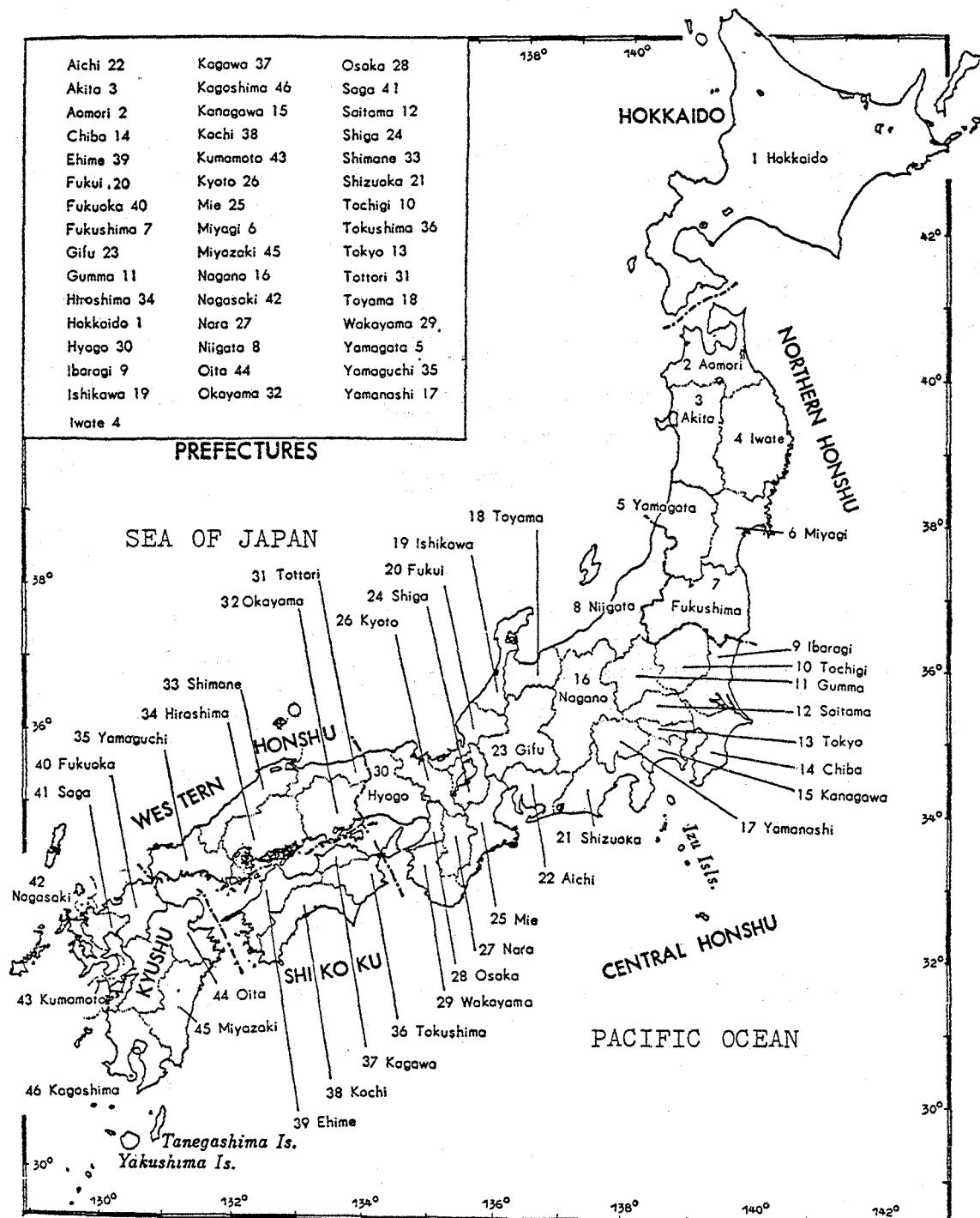
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APPENDIX 1

MAP OF JAPAN



SOURCE: Jisaburo Ohwi, *Flora of Japan*, ed. Frederick G. Meyer and Egbert H. Walker (Washington D. C.: Smithsonian Institution, 1965), p. 930.

APPENDIX 2

A KEY TO THE ASARUM SPECIES OF THE JAPANESE ISLANDS FROM HOKKAIDO TO THE TOKARA STRAIT

This key consists of five separate keys. The division of the genus into five species groups will prepare the reader for the five keys which are divided in the same way. Five simple keys are considerably easier to use than one enormous key so long as the reader places the species in the correct group in the beginning. Keys constructed this way are also more natural; that is, more faithful to what appear to be natural relationships among the species. These divisions do not work for species outside the area covered by this key.

To use this key: (1) Try to be certain that the plant you are trying to determine is native to the area covered by the key. (2) Have at hand, at the minimum, a flower in good condition. A living plant in flower is easiest to determine. Leaves are not essential for most taxa, but are sometimes useful for substantiating

decisions based on floral structure, if they are not actually required for determination in the key.

(3) Read the text of the paper through and study the illustrations before you try to use the key. By the time you have read this far you should have a good general impression of the structural features of each group.

Refer back to the figure mentioned with the group description in the key to see representative examples of the species group's characteristics. (4) Cut the flower in half lengthwise with a sharp razor blade.

Try to make a median longitudinal cut through the ovary. Use a hand lens to see details of structure. Dried flowers should be reconstituted by dropping them into boiling water until they are rehydrated.

(5) Do not be distressed if your determination is equivocal, especially when dealing with Nipponicum group members, or material from cultivation. Even the experts have trouble there.

Two species have been left out of this key.

Asarum unzen is perfectly intermediate between the Curvastigma group and the Kiusianum group (see page 78 and figure 30). Asarum blumei fits the characteristics of the Nipponicum group, but has a much greater degree of constriction at the throat of the calyx tube (see page 105 and figure 42).

Another species, A. kumageanum, is keyed with

the Nipponicum group, although its affiliation is probably with the Kiusianum group. There is virtually no chance that it would be placed in the proper group by anyone not familiar with the species, so it has been placed with the species it most resembles (see figures 24 and 36).

This key is based in part on the key found on page 398 in Ohwi's Flora of Japan (Washington D.C.: Smithsonian Institution, 1965) and the key on pages 320-21 of Kitamura and Murata's Colored Illustrations of Herbaceous Plants of Japan (Osaka: Hoikusha, 1978). It also reflects the experience of Mr. Eiji Yamahata.

The Sieboldii-Caulescens Group

Group Characteristics

Deciduous leaves. Calyx divided below the limb. Styles partially or completely joined into a column. (See figures 13, 14, and 50)

Key to the Species

- 1A. Calyx segments divided nearly to the receptacle. Stamen connectives extended well beyond the anther sacs. Styles completely fused into a column, up to the stigmas. A. CAULESCENS
- 1B. Calyx segments divided below the limb, but less than halfway to the receptacle. Connectives scarcely extended beyond the anther sacs. Styles partly fused but not to the stigmas.
 - 2A. Styles 3, stamens 6. A. DIMIDIANUM
 - 2B. Styles 6, stamens 12.

- 3A. Calyx lobes partly recurved, rolled at the margin. Leaves 6 to 10 cm. across.
A. SIEBOLDII
- 3B. Calyx lobes flat, recurved to lie against the calyx tube. Leaves 3 to 6 cm. across.
A. HETEROTROPOIDES

The Sakawanum-Asperum Group

Group Characteristics

Evergreen leaves. Calyx fused into a tube below the limb. Throat of the tube severely constricted below the limb, the limb skewed so that in cross-section the flower has a "dutchman's pipe" configuration. Styles separate and entire, with disc-like stigmas which are terminal on the styles. Ovary inferior. (See figure 22)

Key to the Species

- 1A. Prominent longitudinal ridges inside the tube and no transverse lines.
- 2A. No reduced petals inside the tube; the tube square in cross-section. A. COSTATUM
- 2B. Reduced petals inside tube; tube trapezoidal in cross-section.
- 3A. Calyx lobes 2 to 2.5 cm. long, oblong-ovate. A. SAKAWANUM
- 3B. Calyx lobes 2 to 2.5 cm. long, 1.5 cm. wide at the base, abruptly narrowed so that the upper two-thirds of the lobe is .5 cm. wide. A. STELLATUM
- 3C. Calyx lobes greatly elongated, several times longer than the flower, forming thread-like caudate appendages.
A. MINAMITANIANUM
- 1B. Longitudinal and transverse ridges within the tube.
- 4A. Flowers shorter than the subtending bracts.
A. PARVIFLORUM
- 4B. Flowers longer than the subtending bracts.

- 5A. About 15 longitudinal ridges inside the tube. A. ASPERUM
- 5B. About 6 prominent longitudinal ridges inside the tube.
- 6A. Leaves 5 to 10 cm. long, not succulent; veins not impressed above.
 - 7A. 6 styles, 6 stamens, and 6 staminodia. A. HEXALOBUM
 - 7B. 6 styles, 12 stamens, and no staminodia. A. HEXALOBUM VAR. PERFECTUM
- 6B. Leaves 11 to 18 cm. long, very thick and succulent; veins impressed above.
 - A. CRASSUM

The Curvastigma Group

Group Characteristics

Evergreen leaves. Calyx fused below the limb into a broad, relatively short tube. Calyx lobes broad and relatively short with distinctly undulate margins. The throat of the tube surrounded by a prominent ring of ridges and tubercles. Styles longitudinally grooved inside, entire or winged (not two-horned), with terminal stigmas. (See figures 29 and 31)

Key to the Species

- 1A. Styles hooked at the tip but not winged.
 - 2A. Calyx 2 cm. across. Leaf veins impressed above.
 - A. CURVASTIGMA
 - 2B. Calyx at least 2.5 to 3.5 cm. across. Leaf veins not impressed above.
 - 3A. Styles less than half the length of the calyx tube. Leaves pilose above.
 - A. TAMAENSE
 - 3B. Styles more than half as long as the tube. Leaves almost glabrous above.
 - A. MURAMATSUI

- 1B. Styles hooked and prominently winged at the tip.
- 4A. Styles arching down, with a pair of broad (3 to 4 mm.) wings at the tip of each.
A. ASAROIDES
- 4B. Styles erect with narrow (about 2 mm.) wings at the tip of each. A. SATSUMENSE

The Kiusianum Group

Group Characteristics

Evergreen leaves. Calyx united into a tube below the limb, with no exterior constriction of the throat, but the throat greatly narrowed by a ring (annulus). The limb usually flat, with a series of shallow transverse wrinkles, or with a mealy surface texture. Interior of the tube covered with a pattern of raised reticulations. Styles two-horned, with sub-terminal stigmas. (See figure 34)

Key to the Species

- 1A. Calyx tube very hairy outside. A. YAKUSIMENSE
- 1B. Calyx tube glabrous outside.
- 2A. Styles 3, stamens 6. A. TRIGYNUM
- 2B. Styles 6, stamens 12.
- 3A. Calyx tube globose. A. SUBGLOBOSUM
- 3B. Calyx tube cylindrical, longer than broad.
- 4A. Limb and outside of tube pale dull purple. A. KIUSIANUM VAR. KIUSIANUM
- 4B. Limb white; outside of tube white with purple veins.
A. KIUSIANUM VAR. TUBULOSUM
- 4C. Outside of tube dark purple; limb pale or whitish.
A. KIUSIANUM VAR. MELANOSIPHON

The Nipponicum Group

Group Characteristics

Evergreen leaves. Calyx united into a tube below the limb with no significantly constricting annulus at the throat. Limb bearing a narrow raised ring surrounding the throat, or none. The limb rather flat and usually smooth. Styles two-horned with sub-terminal stigmas. (See figures 41 and 46)

Key to the Species

1A. Flower at least 2.5 cm. across.

2A. Calyx tube pubescent outside with prominent folds of tissue in the sinuses of the lobes.
A. KUMAGEANUM

2B. Calyx tube glabrous outside with no folds of tissue in the sinuses of the calyx lobes.
A. MEGACALYX

1B. Flower less than 2 cm. across.

3A. Flower bud with three prominent indentations.
A. NIPPONICUM VAR. NANKAIENSE

3B. Flower bud without indentations.

4A. Leaves more or less ovate, distinctly longer than broad (a difference of at least 1 cm.).

5A. Calyx lobes twice the length of the tube. A. NIPPONICUM VAR. BRACHYPODION

5B. Calyx lobes half the length of the tube. A. NIPPONICUM VAR. KOYANUM

5C. Calyx lobes about the same length as the tube.

6A. Leaves smooth above. Calyx lobes heavily ciliate.
A. NIPPONICUM VAR. NIPPONICUM

6B. Leaves with veins deeply impressed above. Calyx lobes glabrous.
A. NIPPONICUM VAR. RIGESCENS

- 4B. Leaves more or less round with little difference between length and width.
- 7A. Blooming in summer. A. SAVATIERI
- 7B. Blooming October through May.
- 8A. Styles exserted from tube.
- 9A. Leaves shiny. A. FAURIEI
- 9B. Leaves dull.
A. FAURIEI VAR. NAKAIANUM
- 8B. Styles shorter than the tube.
- 10A. Leaves usually solitary. No raised ring of tissue on the limb surrounding the throat.
A. VARIEGATUM
- 10B. Leaves usually paired. The limb bearing a narrow raised ring of tissue surrounding the throat.
- 11A. Leaves 3 to 6 cm. long.
Blooming in March.
A. TAKAOI VAR. HISUCHII
- 11B. Leaves 5 to 8 cm. long.
Three shallow wrinkles at the throat on the limb.
Blooming in October.
A. TAKAOI VAR. DILATATUM
- 11C. Leaves 5 to 8 cm. long.
No wrinkles on limb.
Blooming in March.
A. TAKAOI

APPENDIX 3
PRÈCIS OF DESCRIPTIONS OF ASARUM SPECIES
REPORTED FROM JAPAN

The species of Japanese Asarum are described below in more detail than has been possible in the text. Some of the frequently encountered synonyms of botanical names used in the text as well as Japanese vernacular names are also listed. Refer back to the range maps in the text for distribution. The primary sources consulted for each species are shown by number at the end of each entry. These numbers identify the primary sources in the bibliography for this appendix, which follows.

Asarum asahiniae F. Maekawa

Nomen nudum? No description available. (24)

A. asaroides (Morr. & Decne.) Makino Tairin Aoi

Heterotropa asaroides Morr. & Decne.

A. thunbergii A. Braun

A. japonicum Hort.

A. virginicum Thunberg

Leaves broadly ovate to nearly deltoid-ovate; 8 to 12 cm. long and 5 to 10 cm. wide; short-pubescent on nerves above and glabrous beneath; long-petioled; usually mottled.

Flower short-pedicelled and large (2 to 2.5 cm. long); glabrous; tube depressed and pyriform, prominently constricted below the limb, with fine reticulation inside; lobes spreading, undulate on margin, 1 to 1.5 cm. long. Ovary semi-superior. Styles 6, erect, 2 to 2.5 mm. long, with broad auriculate wings at the tip; stamens 12, subsessile. Blooming April to June. (11, 17, 20, 25)

A. asperum F. Maekawa

Miyako Aoi

Heterotropa aspera (F.M) F. Maekawa

Leaves solitary; ovate-orbicular, 6 to 8 cm. long; subhastate at base; dull above and glabrous beneath with various patterns of white or gray markings above. Petiole dark purplish-green.

Flower tube trapezoidal in lateral view, prominently constricted below the limb, 6 mm. long and 9 mm. across; with 15 longitudinal ridges and 2 or 3 less prominent transverse lines inside; calyx lobes spreading, 8 to 10 mm. long. Styles 6, 2.2 mm. long, with terminal stigmas; stamens 12, inserted on the inferior ovary. Blooming in March and April. (11, 20)

A. blumei Duchartre

Ranyō Aoi

A. albivenium RegelHeterotropa blumei (Duch.) F. MaekawaA. leucodictyon Miq.

Leaves solitary, broadly hastate-ovate to broadly ovate, 6 to 10 cm. long and 4 to 8 cm. wide; short pilose on both sides, especially on the nerves and margin, often with white markings following the veins above; long-petioled.

Flowers distinctly pedicelled, glabrous, 1.2 cm. long and wide, slightly constricted below the limb;

net-veined inside with matching depressed lines somewhat apparent outside. Blooming March to May. (11, 20, 25)

A. caulescens Maxim.

Futaba Aoi

Japonasarum caulescens (Maxim.) F. Maekawa

Rhizomes elongated with internodes 5 to 15 mm. long.

Leaves membranous and deciduous, usually paired; cordate, 6 to 15 cm. wide, loosely pilose on both sides and margin; long-petioled; without markings.

Flowers solitary and terminal; pedicels longer than the flowers, loosely pubescent; calyx segments ovate and slightly united at the base to form a false tube, reflexed above the limb; ovary inferior. Blooming March to May. (20)

A. celsum F. Maekawa

Miyabi Kan-aoi

Leaves 5 to 9 cm. long and 3 to 7 cm. wide, hairy at first but becoming smooth, retaining hairs on edge of leaf; not glossy, with cloud-like markings above. Petiole 7 to 15 cm. long, dark purple.

Flower tube diameter 1 cm., length 8 mm., with reticulate veins inside; styles 6, 3 to 4 mm. long; stamens 12 in 2 series, 2 mm. or 1.6 mm. long. Blooming in March. (6, 30)

Very similar to A. hatsushima and A. kiusianum. (18)

A. constrictum F. Maekawa

Tsukubane Aoi

Heterotropa constricta (F.M.) F. Maekawa

Differs from A. asperum in minor foliage and calyx lobe characteristics, and probably conspecific with it. Possibly only cultivated. (7, 11, 20)

A. controversum F. Maekawa

Shijiki Kan-aoi

Similar to, and probably conspecific with, A. hexalobum. (29)

A. costatum (F.M.) F. Maekawa

Tosa-no-Aoi

Heterotropa costata F. Maekawa

A. geaster F. Maekawa

Leaves ovate-elliptic or sub-hastate, 10 to 15 cm. long and 6.5 to 10 cm. wide; scattered hairy on both sides and ciliate; mottled above and pale beneath. Petiole 13 to 24 cm. long.

Flowers with abruptly recurved pedicels 3 to 5 cm. long; tube glabrous, six-angled, constricted below the limb, with obtuse, ascending calyx lobes. Vestigial petals absent. Styles ascending, entire, with terminal stigmas 2.5 to 3 mm. long; stamens 12, the other 6 about 2 mm. long, the inner 6 about 2.5 mm. long. Ovary inferior. Blooming in May. (12, 20)

A. crassum F. Maekawa

Nangoku Aoi

Heterotropa crassa (F.M.) F. Maekawa

Leaves broadly ovate or ovate-cordate, 18 cm. long and 15 cm. wide, lustrous and glabrous, not mottled, very thick and succulent with deeply impressed veinlets above. Petiole thick and purple.

Flower similar to A. hexalobum var. perfectum, densely white-puberulent; calyx lobes obliquely spreading. Blooming in February.

Most easily distinguished from similar species by its distinctive foliage. (11, 20)

A. curvastigma F. Maekawa

Kagigata Aoi

Heterotropa curvastigma (F.M.) F. Maekawa

Leaves ovate to ovate-elliptic, base deeply cordate; 5 to 11 cm. long and 4.5 to 7.5 cm. wide; veinlets slightly impressed above, smooth and glabrous beneath. Petiole purple.

Flowers borne on short (10 to 13 mm.) glabrous pedicels; tube broadly campanulate-urceolate, slightly constricted below the limb, 7 to 13 mm. long and 10 to 13 mm. across; inside of the tube covered with 15 to 18

longitudinal lines and several transverse lines, short pubescent; calyx lobes spreading, 10 to 13 mm. long. Styles 6 with terminal stigmas recurved into hooks; stamens 12. Ovary semi-superior. Blooming September and October. (11, 17, 20)

A. dilatatum F. Maekawa

Suehiro Aoi

No description available. (24)

A. dimidianum F. Maekawa

Kurofune Saishin

Asiasarum dimidianum (F.M.) F. Maekawa

Leaves resemble A. sieboldii, but thicker, 4 to 6 cm. long.

Flowers also similar to A. sieboldii, but with 3 styles and 6 stamens. Blooming in April and May. (20)

A. dissitum F. Maekawa

Omoro Kan-aoi

Leaves and flowers similar to A. senkaku-insulare. Leaves small and rounded, not glossy. Flowers greenish-brown outside, with 3 styles and 6 stamens. (18, 21, 30)

A. draconis Sugimoto

Nomen nudum? No description available. Allied to A. nipponicum. (7)

A. fauriei Franch.

Michinoku Saishin

Heterotropa fauriei (Franch.) F. Maekawa

Rhizome elongated with long internodes.

Leaves solitary or in twos or threes; rounded to reniform-orbicular, deep green and lustrous above, not mottled; about 3 cm. long and wide.

Flowers typical of A. nipponicum allies; small (1 to 1.5 cm. wide) with a short tube; styles exserted from tube. Blooming in April and May. (20)

A. fauriei var. nakaianum (F.M.) Ohwi Miyama Aoi

Differs from A. fauriei in its very short, cup-shaped tube and dull leaves. (20)

A. fauriei 'Serpens' Tsurudashi Aoi, Sonofu Saishin

A. fauriei var. serpens F. Maekawa

A. stoloniferum F. Maekawa

A triploid garden form with long, running rhizomes and dull, gray-green leaves with pale variegation. (7, 20)

A. fudsinoi T. Ito Fujino Kan-aoi

Heterotropa fudsinoi (T. Ito) F. Maekawa

Plant robust, nearly glabrous all over. Leaves solitary or in twos and threes, ovate or cordate; leaf blade 20 cm. long and 13 cm. wide, subcoriaceous, attenuate at apex, margin slightly undulate.

Flowers extremely variable in size, yellow-green outside and red-green inside, borne on short pedicels subtended by three ovate bracts. Perianth almost equally three-lobed, lobes 1.5 cm. long. Inside of tube covered with raised reticulations; ovary broad and slightly superior. Styles 6, prominently two-lobed; stamens 12 and of uniform size. Blooming in March.

This species is closely related to A. maximum Hemsley and A. macranthum Hook. fil. of China. (6, 8, 9, 30)

Two varieties, A. fudsinoi var. giganteum and A. fudsinoi var. yanma have been named by F. Maekawa, but no descriptions are available. (30)

A. gelasinum F. Maekawa Ekubo Saishin

Geotaenium gelasinum F. Maekawa

All parts of the plant, and especially the flower, are very hairy. Calyx tube 1 cm. long, with no

annulus; styles 3.

Closely related to A. geophilum of China. (18, 30)

A. gusk F. Maekawa

Gusuku Kan-aoi

An obscure species from Amami Oshima. No description available. (30)

A. hatsushima F. Maekawa

Hatsushima Kan-aoi

Leaves ovate-cordate, 7 to 12 cm. long and 5 to 8 cm. wide; dark green with cloudy markings above, dark green and covered with soft hairs below. Petiole 6 to 11 cm. long, dark purple.

Flowers borne on a dark purple pedicel 1.5 to 2 cm. long. Calyx tube cylindrical, 2 cm. long and 1.5 cm. wide, heavily reticulate inside. Styles 6, each with 2 horn-like lobes, 3 to 4 mm. long; stamens 12, sessile on the styles, 3 mm. long. (5, 18, 30)

A. hayatanum F. Maekawa

Ō Kan-aoi

A. grandiflorum Hayata

Plant glabrous all over. Leaves ovate-cordate, 9 to 15 cm. long, acute at apex with rounded basal lobes, 5 to 7 nerves at base. Petiole 20 cm. long.

Flowers sub-axillary on 13 mm. long pedicels. Calyx tube greenish outside, 12 mm. long and 15 mm. wide, glabrous, truncate at base. Styles 6; stamens 12, oblong and subsessile.

Similar to A. yaeyamense. (27)

A. heterotropoides Fr. Schmidt

Oku-ezo Saishin

A. sieboldii subsp. heterotropoides (Fr. Schmidt)
Kitamura

Similar to A. sieboldii, but with yellow-green obtuse leaves 4 to 6 cm. wide. Perianth lobes fleshy and recurved to lie against the outside of the tube. Blooming in May and June. (10, 16, 20)

A. hexalobum F. Maekawa

Sanyō Aoi

Heterotropa hexaloba (F.M.) F. Maekawa

Leaves ovate with a deeply cordate base, 5 to 10 cm. long and 4 to 8 cm. wide, glabrous beneath; long-petioled.

Flowers glabrous, borne on short pedicels; tube depressed globose, prominently constricted below the limb, with six bulges on the outside of the tube below the limb. Inside of tube bearing 6 longitudinal inflations and 6 longitudinal lines, accompanied by inconspicuous transverse lines. Surface of the calyx lobes above the limb covered with shallow transverse ridges. Styles 6, 1.5 to 1.8 mm. long, atop an inferior ovary. Stamens 6, 2 mm. long, alternating with 6 staminodia, 1 mm. long. Blooming in April and May. (11, 14, 20)

A. hexalobum var. perfectum F. Maekawa

Kinchaku Aoi

A. perfectum F. Maekawa

Heterotropa hexaloba var. perfecta (F.M.) Maekawa

Similar to A. hexalobum. Leaves oblong, 11 to 18 cm. long and 9 to 13 cm. wide. Flowers short pilose inside with 12 stamens and no staminodia. Blooming January and February. (3, 11, 20)

A. ikegamii F. Maekawa

Yukiguni Kan-aoi

Nomen nudum? No description available.
Similar to A. takaoi and A. nipponicum var. brachypodion.
(21, 26)

A. kinkiense F. Maekawa

Nomen nudum? Obscure; no description available.

A. kiusianum var. kiusianum F. Maekawa

Tsukushi Aoi

A. kiusianum F. Maekawa

Heterotropa kiusiana (F. M.) F. Maekawa

A. blumei (non Duchartre) Miquel

Leaves oblong, 6 to 10 cm. long, deeply cordate or hastate-cordate at base, glabrous and slightly lustrous above with cloudy markings; leaf margin entire.

Flowers held erect on rather long pedicels, pale or dull purple outside, tubular, 10 to 15 mm. long. Tube constricted at the throat by an annulus which bears transverse wrinkles. Inside of tube covered with about 15 longitudinal ribs and transverse lines. Ovary almost superior; styles 6 with bifurcate tips and subterminal stigmas; stamens 12, sessile. Blooming in April. (11, 20)

A. kiusianum var. melanosiphon (F.M.) Maekawa Kikyō
Kan-aoi

A. melanosiphon F. Maekawa

Similar to A. kiusianum var. kiusianum, but with a dark purple calyx tube and a thinner limb. (20)

A. kiusianum var. tubulosum (F.M.) Maekawa Akebono Aoi

A. tubulosum F. Maekawa

Similar to A. kiusianum var. kiusianum, but with minute crenulations on the leaf margin, a slightly longer calyx tube, and white calyx lobes. (11, 20)

A. kumageanum Masamune Kuwa-iba Kan-aoi

Heterotropa kumageana (Masam.) F. Maekawa

Leaves cordate-oblong, thick and very lustrous, appressed-pilose only on nerves above, and usually variegated above; held on long petioles. Leaf blade 10 to 15 cm. long and 8 to 11 cm. wide.

Flowers pedicelled, slightly pubescent; tube obconical, 1.5 cm. long; calyx lobes deltoid-orbicular, 1 cm. long and wide. Tube reticulate inside. Ovary partly superior; styles 6, 3 to 4 mm. long; stamens 12, in 2 ranks of 6, of unequal length. Blooming January through March. (4, 20)

There is considerable confusion in the Japanese literature between this species and A. yakusimense, caused less by their similarity than by the fact that both have been known by the vernacular name Yakushima Kan-aoi.

Two varieties of this species (*A. kumageanum* var. *glabrum* and *A. kumageanum* var. *satakeanum*) are listed, but no descriptions are available. (30)

A. kurosawai Sugimoto

Iwata Kan-aoi

A relative of *A. nipponicum*; no description is available. (23)

A. leptophyllum Hayata Onaga Saishin, Katsudake Kan-aoi

Leaves evergreen, pubescent; leaf blade broadly cordate, 7 to 12 cm. long and 5 to 12 cm. wide. Basal lobes rounded at base. Petiole 7 to 15 cm. long.

Flowers 1 cm. long, pale green. Both flower and pedicel hirsute. Perianth lobes triangular with caudate appendages up to 3 mm. long. Ovary 5 mm. long. (27)

A. liukiuense Hatushima

Hina Kan-aoi

A synonym for *A. okinawense*. (30)

A. lutchuense T. Ito

Oba Kan-aoi

A. itoanum Hatushima

Heterotropa lutchuensis (T. Ito) Honda

Leaves 10 to 19 cm. long and 6 to 15 cm. wide, ovate-cordate. Petiole 8 to 30 cm. long, hairy at first but becoming smooth.

Flower the same as *A. yakusimense*, but larger in all parts. Blooming in January and February. (4, 11, 30)

A. megacalyx F. Maekawa

Koshino Kan-aoi

Heterotropa megacalyx (F.M.) F. Maekawa

Leaves 9 to 12 cm. long and 6.5 to 8 cm. wide, ovate-hastate or hastate, lustrous above and glabrous beneath.

Flower about 2.5 cm. long and wide, tubular-globose, sub-truncate at base; lobes broadly ovate, spreading, 12 mm. long and 14 mm. wide. Inside of tube covered with 15 longitudinal ribs and transverse veinlets. Blooming in April and May. (8, 20, 21)

A. minamitanianum Hatsushima Onaga Kan-aoi

Heterotropa minamitanianum (Hatsu.) F. Maekawa

Similar to A. sakawanum but with elongate caudate appendages on the calyx lobes several times longer than the flower itself. (16)

A. monodoraeflorum F. Maekawa Monodora Kan-aoi

Large primitive flowers. No description available. (30)

A. muramatsui Makino Amagi Kan-aoi

Heterotropa muramatsui (Mak.) F. Maekawa

A. tamaense var. muramatsui (Mak.) Sugimoto

Leaves similar to A. tamaense but with prominently impressed veinlets above; nearly glabrous and strongly lustrous. Petiole green.

Flower similar to A. tamaense, but with styles more than half the length of the tube. Blooming in May. (17, 20, 28)

A. nipponicum var. brachypodium F. Maekawa Suzuka Kan-aoi

A. kooyanum var. brachypodium (F.M.) Kitamura

Similar to A. nipponicum var. nipponicum, but with leaves with impressed veinlets above and flowers with calyx lobes which are much longer than the tube. (20)

A. nipponicum var. kooyanum (Mak.) F. Maekawa Koya Kan-aoi

A. kooyanum Makino

A. kooyanum var. kooyanum Kitamura

Similar to A. nipponicum var. nipponicum, but with calyx lobes about half the length of the tube. (20)

A. nipponicum var. nipponicum F. Maekawa Kanto Kan-aoi
Azuma Kan-aoi

Heterotropa nipponicum (F.M.) Maekawa

A. nipponicum F. Maekawa

A. kooyanum var. nipponicum (F.M.) Kitamura

Leaves flat, ovate, 6 to 10 cm. long and 4 to 7 cm. wide, with whitish veins or spots above; surface not glossy, glabrous beneath.

Flowers short-pedicelled or sub-sessile; tube campanulate, 2 cm. long and wide, not constricted at throat. Calyx lobes spreading, densely ciliate, about the same length as the tube. About 9 (rarely 12) longitudinal ribs inside the tube, with 3 or 4 lateral veinlets. Ovary superior. Blooming October to February. (8, 10, 11, 20)

A. nipponicum var. nankaiense (F.M.) Maekawa Nankai Aoi

A. nankaiense F. Maekawa

Heterotropa nankaiensis (F.M.) F. Maekawa

Leaves resemble A. nipponicum var. nipponicum, ovate-hastate to 7.5 cm. long. Petioles 6 to 11 cm. long.

Flowers resemble A. nipponicum var. nipponicum, but the flowers in bud bear three indentations which remain as deep folds in the sinuses of the calyx lobes after the flower opens. Tube broadly campanulate, about 7 mm. long. (10, 20)

A. nipponicum var. rigescens (F.M.) Maekawa Atsumi Kan-aoi

A. rigescens F. Maekawa

A. kooyanum var. rigescens (F.M.) Kitamura

Similar to A. nipponicum var. nipponicum, but with thick cartilaginous leaves with deeply impressed veins above, and flowers with glabrous rather than ciliate purple calyx lobes. (10, 20)

A. nomadakense Hatsushima Nomadake Kan-aoi

Similar to A. tamaense, but with 5 styles and 10 stamens rather than 6 and 12, and a slightly longer and more narrow calyx tube. (5)

A. oblongum F. Maekawa Kotsuba Aoi

A. minus (non Ashe) F. Maekawa

Heterotropa oblonga (F.M.) F. Maekawa

Described from cultivated material; probably the same as A. asperum. (8, 15, 29)

A. okinawense Hatsushima Hina Kan-aoi

A. okinawensis (Hatsu.) F. Maekawa

Leaves evergreen, ovate-cordate, 5 to 6 cm. long and wide; dark green with white spots above, glabrous beneath, ciliate.

Flower 1 cm. wide, calyx tube 7 mm. long, pale yellow-green and glabrous. Calyx lobes 5 mm. long and 6 mm. across at the base, margins slightly ciliate. Faint reticulations inside the calyx tube. Stamens 12, 2 mm. long; styles 6, 3.5 mm. long, with slightly recurved two-lobed apices. (2, 30)

A. parviflorum (Hooker) Regel Kobana Kan-aoi

Heterotropa parviflora Hooker

A. elegans Duchartre

Known only in cultivation. Differs from A. asperum in having small flowers shorter than the subtending bracts.

A. sakawanum Makino Sakawa Saishin

Heterotropa sakawana (Mak.) F. Maekawa

Leaves thick, long-petioled, ovate, 6 to 10 cm. long and 4 to 7 cm. wide; deeply cordate at the base with a ciliate margin.

Flowers glabrous; perianth tube globose, about 12 mm. long, deeply constricted at the throat. Calyx lobes obtuse and much longer than the tube, with a pale reverse and pale border on the darker limb. Transverse ridges on the limb, but only longitudinal ridges inside the tube. Ovary inferior, with ascending, simple, slightly incurved styles (6) 2.5 mm. long, which only slightly exceed the stamens. Vestigial petals 3, inside the calyx tube. Blooming April and May. (10, 12, 20)

A. satsumense F. Maekawa

Satsuma Aoi

Heterotropa satsumensis (F.M.) F. Maekawa

Similar to A. asaroides, but with narrow auriculate wings on the styles rather than broad reflexed appendages, and with smaller flowers. Blooming in May. (17, 20)

A. savatieri Franchet

Otome Aoi

Heterotropa savatieri (Franchet) F. Maekawa

Leaves broadly ovate to ovate-orbicular, 5 to 7 cm. long.

Flowers about 1.5 cm. across; calyx tube tubular-globose, about 1 cm. long, with about 15 to 21 rows of delicate reticulations inside. Calyx lobes deltoid-ovate, glabrous. Styles 6, bifid, with extensions beyond the stigmas which are longer than the styles. Blooming in July and August. (11, 13, 20)

A. senkaku-insulare Hatsushima

Senkaku Kan-aoi

Heterotropa senkaku-insularis (Hatsu.) F. Maekawa

Leaves ovate-cordate, coriaceous, 9 cm. long and wide, dark green and usually not variegated; veins impressed above.

Flower greenish-purple, borne on a glabrous pedicel 1 to 1.7 cm. long. Calyx tube 1.5 cm. long and 1 cm. wide, glabrous, with 15 longitudinal striations outside and reticulations inside. Calyx lobes ovate, 1 cm. long, with a tuberculate annulus surrounding the throat.

Stamens 12, 3 mm. long; styles 6, two-horned.

Related to A. dissitum, which has 3 styles and 6 stamens. (1)

A. sieboldii Miquel

Usuba Saishin

Asiasarum sieboldii (Miq.) F. Maekawa

Leaves deciduous, usually in pairs, cordate or reniform-cordate, 5 to 10 cm. wide; scattered short pilose on both sides.

Flowers solitary, glabrous, borne on short pedicels; calyx tube depressed-globose, slightly divided below the limb. Calyx lobes deltoid-ovate, often with recurved margins. Styles 6, united nearly to the base of the stigmas, with two-lobed apices. Stamens 12, with no extension of the connective beyond the anther sac. Blooming March and April. (20)

A. similis F. Maekawa

Tokunoshima Kan-aoi

No description available. Similar to A. turbinate. (30)

A. stellatum (F.M.) F. Maekawa Hoshizaki Sakawa Saishin

Heterotropa stellata F. Maekawa

Similar to A. sakawanum, but with calyx lobes abruptly narrowed into caudate appendages for two-thirds of their length. (16)

A. subglobosum F. Maekawa

Marumi Kan-aoi

Heterotropa subglobosa F. Maekawa

Similar to A. kiusianum, but with an almost globose calyx tube and a flat, nearly smooth limb. (20)

A. subrigescens F. Maekawa

Hokuriku Kan-aoi

A tetraploid species virtually the same as A. nipponicum var. rigescens. (21)

A. takaoi F. Maekawa

Hime Kan-aoi

Heterotropa takaoi (F.M.) F. Maekawa

Leaves often paired, ovate to ovate-orbicular, 5 to 8 cm. long and 4 to 7 cm. wide; subcoriaceous and clear green above, rarely with white spots. Petiole 6 to 9 cm. long.

Flowers slightly nodding; calyx tube broadly campanulate, 1.5 cm. wide and 6 to 8 mm. long; calyx lobes ovate and nearly spreading. Inside of tube covered with 18 rows of longitudinal ribs and accompanying veinlets. Styles 6, bifid, just shorter than the calyx tube; ovary nearly superior. Stamens 12, 2.5 mm. long, with a short appendage on the connective. Blooming February and March. (11, 20)

A. takaoi var. dilatatum (F.M.) F. Maekawa Suehiro Aoi

Differs from A. takaoi in having an inflated, deeply cup-shaped flower with three shallow wrinkles at the base of the limb at the throat, and in blooming in October. (8, 20)

A. takaoi var. hisachii (F.M.) F. Maekawa Zeniba Saishin

Kinki Kan-aoi

A. hisachii F. Maekawa

Kisoji Kan-aoi

Leaves orbicular, 3.5 to 4.5 cm. wide, unspotted. Petiole 3 to 5.5 cm. long.

Flower globose-campanulate, 6.5 to 7.5 mm. long and 7 to 8.5 mm. wide, with a very narrow and often incomplete ring of raised tissue surrounding the throat. Styles and stamens longer than and exserted from the tube. Blooming in March. (11, 20)

A. tamaense Makino

Tama-no-Kan-aoi

Heterotropa tamaensis (Makino) F. Maekawa

Leaves solitary, broadly ovate or ovate-orbicular, 5 to 10 cm. long, lustrous above with deeply impressed veins and glabrous beneath.

Flower borne on a short pedicel, glabrous; calyx tube short, 2.5 to 3.5 cm. wide, slightly constricted at the throat, densely pubescent inside. Calyx lobes cordate-orbicular, spreading. Blooming in April. (8, 17, 20)

A. trigynum (F.M.) Araki

Sanko Kan-aoi

Heterotropa trigyna F. Maekawa

Leaves ovate-cordate, 7 to 10 cm. long and 5 to 8 cm. wide, with areas of greenish-white variegation above; glabrous beneath. Petiole 8 to 19 cm. long.

Flower resembles A. kiusianum; calyx tube 1.5 to 2 cm. long and 1.5 to 2 cm. wide, with heavy reticulation inside. Calyx lobes 5 to 7 mm. long and 5 to 10 mm. wide. Styles 3, divided into horn-like lobes at the apex; stamens 6, 2 to 2.5 mm. long. Blooming in April. (5, 20)

A. turbinata Hatsushima

Tokunoshima Kan-aoi

No description available. Resembles A. fudsinoi and A. hatsushimae. (16)

A. unzen F. Maekawa

Unzen Kan-aoi

Intermediate between A. asaroides and A. kiusianum with a calyx like the former and styles like the latter. (8, 20, 29)

A. variegatum A. Braun & Bouche

Kobano Kan-aoi

Heterotropa variegata (A.B. & B.) F. Maekawa

Leaves solitary, flat, dull, reniform-orbicular, about 3 cm. wide.

Flowers resemble A. takaoi but with no ridge of tissue delimiting the limb and throat. Probably a cultivated selection. (20)

A. viridiflorum Regel

Moegi Kan-aoi

Heterotropa viridiflora (Regel) F. Maekawa

Leaves orbicular, thin, and flat; about 5 cm. wide; blue-green above. Calyx tube finely reticulate inside. Flowers resemble A. takaoi, but pale green in color. Blooming March to April. Known only in cultivation. (20)

A. yaeyamense Hatsushima

Yaeyama Kan-aoi

Heterotropa yaeyamensis (Hatsu.) F. Maekawa

Leaves ovate-cordate, apex acuminate or acute, base deeply cordate; leaf blade 10 to 20 cm. long and 8 to 13 cm. wide. Upper leaf surface dark green and smooth without variegation. Petiole 15 to 17 cm. long, purplish.

Flowers campanulate, truncate at base. Calyx tube 1 to 1.3 cm. across, narrowing at the top; purple-green, pilose, and reticulate inside. Calyx lobes broadly ovate, spreading, with undulate margins. Annulus 2.5 mm. wide, surrounding the throat. Styles 6, 3.5 mm. long, entire and slightly recurved; stamens 12, 2.5 mm. long. (2)

A. yakusimense Masamune

Yakushima Aoi, Oni Kan-aoi

Heterotropa yakusimensis (Masam.) F. Maekawa

A. hirsutipetalum Hatsushima

Leaves ovate-cordate, 10 to 15 cm. long and 7 to 10 cm. wide, not variegated above; thinly pubescent beneath and on petioles. Petioles purplish-green, 10 to 15 cm. long.

Flowers nearly sessile, 4.5 cm. across, calyx tube 1.5 cm. across and 1 cm. long, pubescent outside and reticulate inside. Calyx lobes yellow-white and densely covered by purple hairs, broadly ovate, 1.6 to 2.3 cm. long and 1.8 to 2 cm. wide, with revolute margins. Styles 6, about 6 mm. long, two-lobed at apex. Stamens 12, 3 mm. long. Blooming November to February. (2, 4, 19, 20)

A. yakusimense var. glabrum Hatsushima

Tokara Aoi

Said to have broader leaves (10 to 15 cm. long and 10 to 17 cm. wide) than the species. (4)

A. yamashiroi Hatsushima

Higo Kan-soi

Similar to A. kiusianum, but leaves 7 to 8 cm. long and 4 to 5.5 cm. wide. The upper third of the calyx tube somewhat constricted, with 6 longitudinal keels outside. (2)

A. yoshikawai F. Maekawa Kurohime Kan-aoi, Kubiki Kan-aoi

No description available, but very similar to A. takaoi. (21, 26)

APPENDIX 3

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PART II

JAPANESE ASARUM CULTIVARS AND THE HISTORY OF THEIR CULTIVATION

CHAPTER VII

INTRODUCTION

Since the opening of Japan to the West in the 1860's, hundreds of books and articles have appeared in English which discuss Japanese horticultural aesthetics and practice. Nearly all of these works describe the Japanese garden, or more precisely, the gardens of noble and wealthy Japanese or the great shrines and temples. These works are often successful in illustrating and interpreting the development of the gardens of the privileged, but they fail to address with conviction the heart and soul of Japanese ornamental horticulture: plants. These same books often acknowledge that the Japanese are unsurpassed in their devotion to selecting and acquiring a vast range of plant species and variants of species, while at the same time pointing out the contradictory

fact that few kinds of plants, and much the same kinds, are grown in the gardens they discuss, often fewer than twenty kinds even in a large garden. But except for the tentative observation that other kinds of plants are grown apart from such gardens, they beg the obvious question: What exactly do the Japanese do with all those other plants? The answers to that question are at the heart of Japanese ornamental horticulture.

Ironically, the famous gardens of Japan have not been an immediate part of the ordinary Japanese citizen's horticultural experience. Until this century few of them were ever open to the ordinary citizen, and even now many of the best are much more accessible to the foreign tourist than to the average Japanese. Furthermore, the typical family today, even more than in the past, is fortunate to have even a few square meters of garden space, and many have no garden at all. The common alternatives are odd spaces at curbside and in alleyways, between and on top of houses, and on balconies and fire escapes. The observant visitor to Japanese residential neighborhoods is often impressed by the Japanese ability to maintain exciting plants in cramped and seemingly inhospitable surroundings. The author recalls being surprised and delighted by tubs of blooming Japanese iris grouped on a grimy curb, pots of Cypripedium macranthum

and Menziesia ciliicalyx var. purpurea arranged at the foot of a vending machine on a busy street, and an impressive array of Japanese maple cultivars displayed on the roof of a store. So great is the variety of plants grown and the uses to which they are put that most observers, like the author, are at first overwhelmed to the point of dispairing of finding the starting point for understanding. But just as we might try to understand the complexities of the pre-industrial Japanese economic system by focusing on the cultivation of the rice plant, or understand the development of uniquely Japanese handi-crafts by studying the history of the use of bamboo, we can gain insight into some of the unique qualities of Japanese ornamental horticulture by following the odyssey of such an apparently insignificant plant as Asarum through centuries of Japanese aesthetic history and horticultural experience.

CHAPTER VIII

THE ASARUM MON

The clearest evidence of the long history of Japanese aesthetic interest in Asarum is found by studying the development and use of designs known as mon or kamon (decorative marks or family crests) throughout Japanese history. These stylized and infinitely varied designs, mostly depicting plants or flowers, have been a familiar feature of Japanese life throughout most of Japanese history (see figure 52). By tracing their evolution and development we can perceive a pattern of events which has recurred throughout the history of Japanese aesthetics: the uncritical borrowing of an intact aesthetic system and its gradual transformation into something uniquely Japanese through a process of distillation and simplification, accompanied by the establishment of a series of conventions to guide variation along fixed paths within fixed limits. This transformation is evident in several familiar areas of aesthetics such as bonsai cultivation,

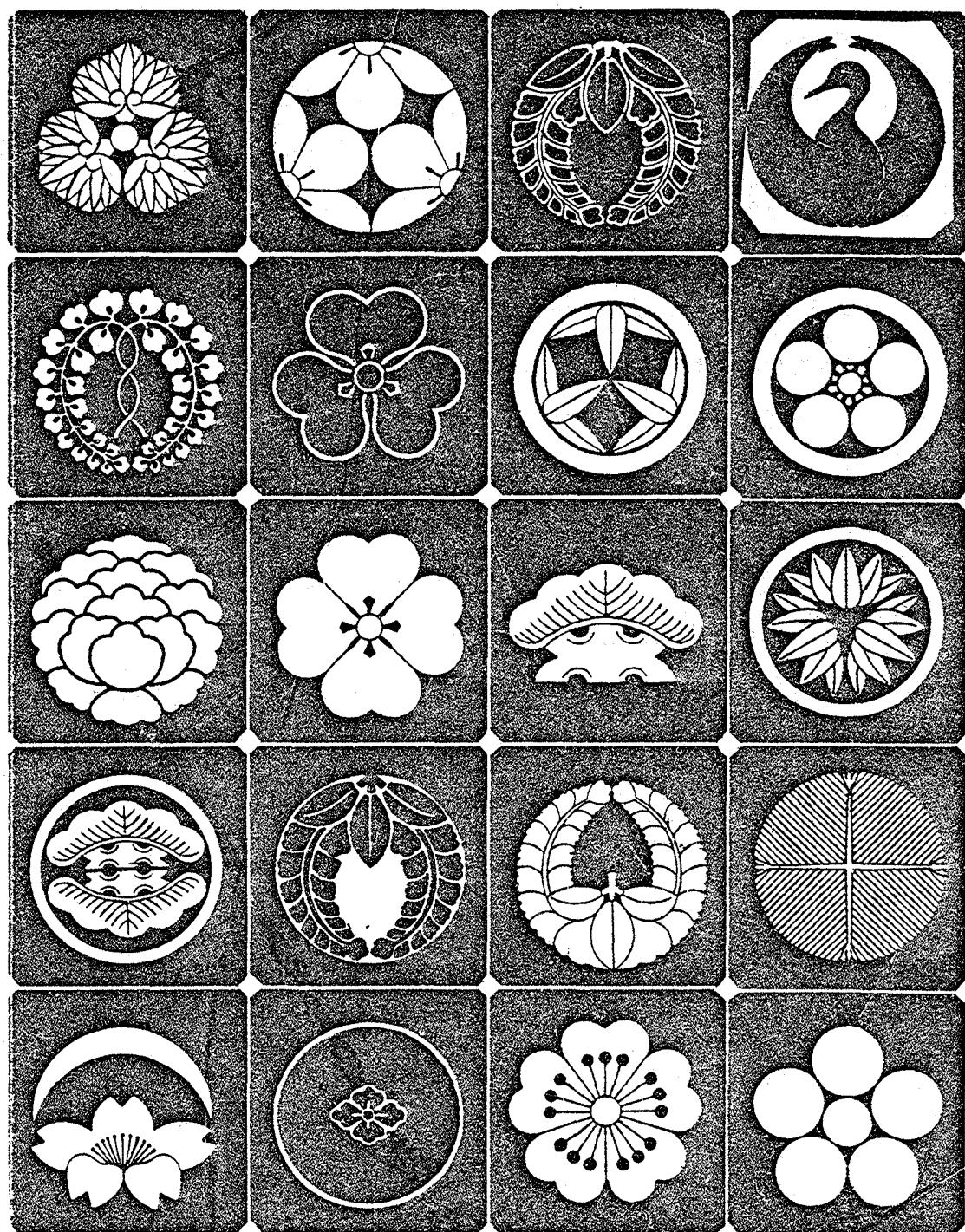


Figure 52. A variety of typical Japanese kamon used as decoration on a piece of wrapping paper from the Parco Department Store in Osaka, Japan. An Asarum motif is in the upper left corner.

garden design, and landscape painting. It is also prominent in the development of koten engei, the cult of "classical plant" cultivation, of which the cultivation of selections of Asarum is a typical example.

The use of mon with an Asarum motif is ancient, and along with other similarly conceived designs, can be traced back to the establishment of the Japanese capitol at Heian-kyo (modern Kyoto) in the eighth century.¹²⁴

The Asarum design is particularly familiar to Japanese because of its long association with the Tokugawa family shoguns who dominated Japan from 1600 to 1868 A.D., and it is thus difficult to overstate the impact of the Asarum crest (kamon) in Japan before the Meiji Restoration retired the Tokugawa family from power. Several years ago the author viewed a swashbuckling samurai epic on Japanese television, set in the Tokugawa era, in which a band of samurai had invaded the courtyard of a nobleman's house, and had set themselves to the task of enthusiastically dismembering the startled occupants. In the midst of the carnage a fragile unarmed old man shuffled through the courtyard gate, and without speaking, held out a small case on which was emblazoned the Asarum family crest. In an instant the invaders had dropped their swords and flung themselves to the ground, foreheads pressed to the dust. Even today, with Tokugawa hegemony only a distant memory,

the effect lingers: In Japan cucumbers are not sliced transversely as we normally slice them, but only in longitudinal strips. The transverse slice of a cucumber bears a pattern which resembles the design of the Tokugawa Asarum kamon, and for three centuries of Japanese history it would have been a foolhardy act to be seen munching that symbol of supreme power.¹²⁵

During the course of Japanese recorded history the use of designs such as the Asarum crest has come full circle from pure decoration to a formal system for family identification and back to pure decoration. Historical accounts of decorative use go back to such early chronicles as the Nihongi, which describe their use by the emperor Mommu in 701 A.D. They were originally used to decorate fabrics, as is suggested by the Chinese character for the word "mon" (綾文), which can be separated into two parts, one meaning "thread" (綾) and the other "mark" (文). The early designs were purely Chinese, copies of designs on imported Chinese fabrics which were popular in the early Heian court, which along with most of the other aesthetic trappings of early Heian court life, were taken directly and without interpretation from Tang dynasty China. These early designs depict such recognizably Chinese motifs as the sun, the moon, a blue dragon, and a white tiger.¹²⁶

During the Heian period (794 to 1185 A.D.) there

was a gradual turn from copied Chinese designs to expressions of native imagery for the first time since prehistoric Yayoi culture. During the Heian period several familiar motifs emerged: depictions of foliage, grasses, plum and cherry blossoms, and pine branches; natural images which even today express the essence of the native Japanese aesthetic spirit.¹²⁷ We can assume that during this period the Asarum motif was also used, at least in its simplest forms, by studying the Hata family's crest and its suggestion of another quite different foreign influence on Asarum kamon development: the Korean shamanistic religious tradition.

The Hata family is a very old family which came to Japan from Korea, and occupied much of the land on which the capitol at Kyoto was built when it was moved from Nara in 794 A.D.¹²⁸ This family used a simple Asarum crest which was also used by the Shinto shrine established in Kyoto by the family, the Matsuo Shrine.¹²⁹ It is likely that their choice of Asarum was a carry-over from Korean shamanistic tradition in which certain medicinal plants such as Asarum were used as religious ornamentation. An ancient Korean poem with a shamanistic theme describes a mountain spirit:

...Clad in creepers, with a belt of mistletoe,
...Driving red leopards, followed by striped civets,
Chariots of magnolia, banners of cassia wood,
Clad in stone orchid, with a belt of Asarum...¹³⁰

Records of the use of Asarum at the Kamo Shrine in Kyoto go back to the beginning of Japanese recorded history, and priests at this shrine and others still use sprigs of Asarum to decorate their costumes during the yearly Asarum festival (aoi matsuri).¹³¹ During the Heian period the leaves of Asarum were thought to deter thunder and earthquakes, and the plants were hung under the eaves of buildings as protection.¹³² Carved Asarum designs were eventually substituted for the actual plants, and these designs can still be seen in Kyoto on the beams of old buildings.¹³³

Early Asarum designs such as those used by the Matsuo and Kamo shrines are relatively unsophisticated straightforward renderings of the Japanese A. caulescens (see figures 53 and 54), remarkably similar to medieval European drawings of A. europaeum found in old herbals (see figure 55). The Matsuo Shrine still offers charms bearing the early Asarum designs for the relief of a wide range of disorders, including those caused by excessive drinking.¹³⁴ The Tokugawa family's Asarum crest is derived from the sacred mark of the Kamo Shrine, but in its earliest form is altered so that three leaves are arranged with petioles facing out and curved counter-clockwise, forming an "Asarum whirlpool" (aoi tomoe), adding a dash of forcefulness appropriate for a

Figure 53. Two designs of Asarum caulescens used by the Hata family shrine, the Matsuo Shrine in Kyoto.

Redrawn from designs on talismans sold by the shrine by Yong-jun Chang.

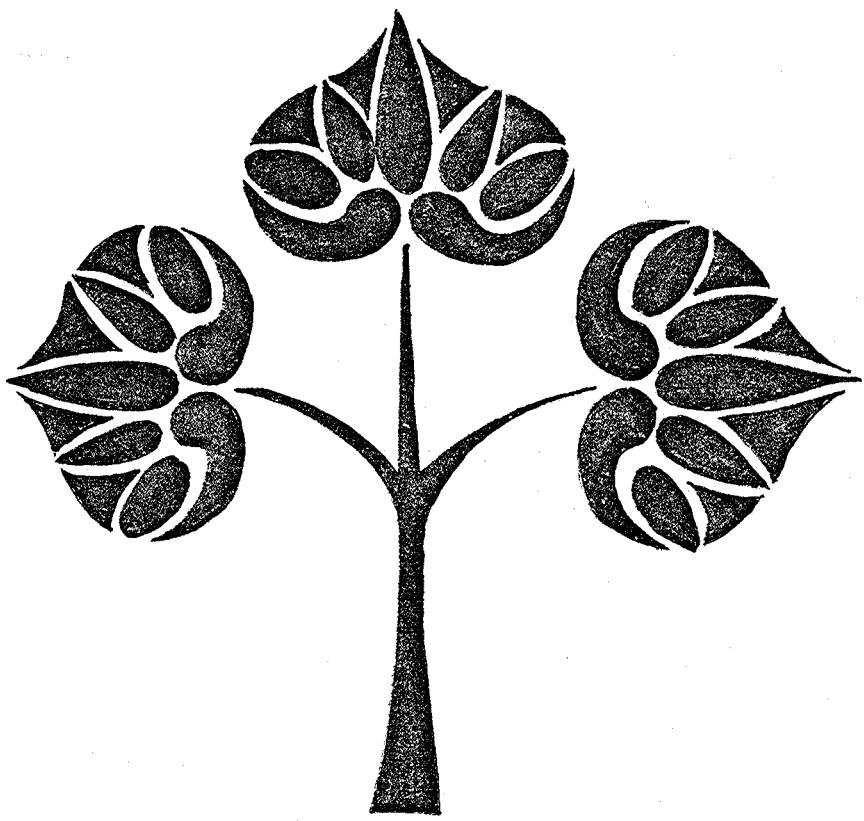
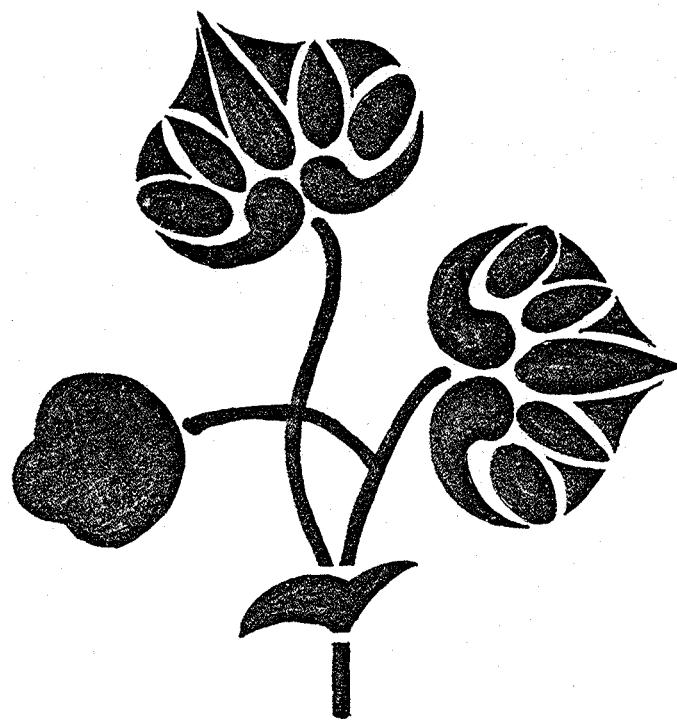
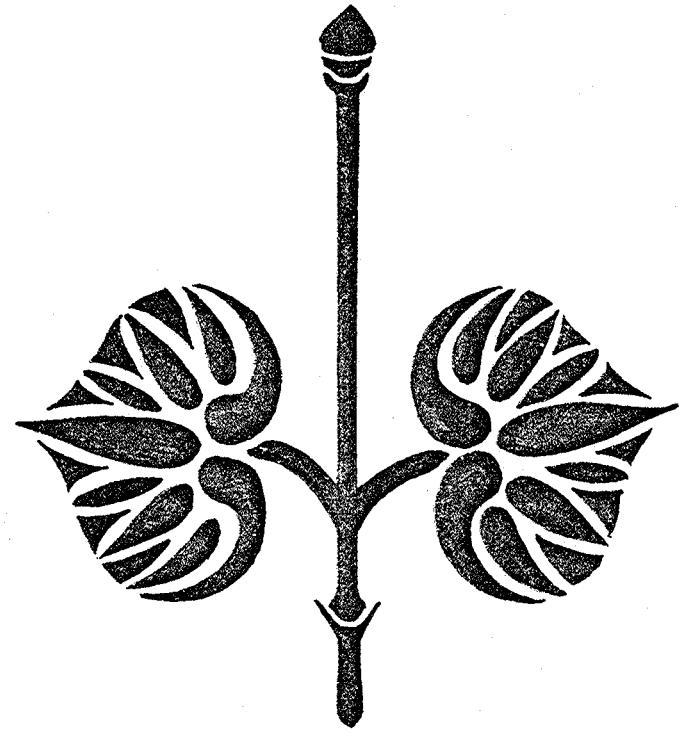
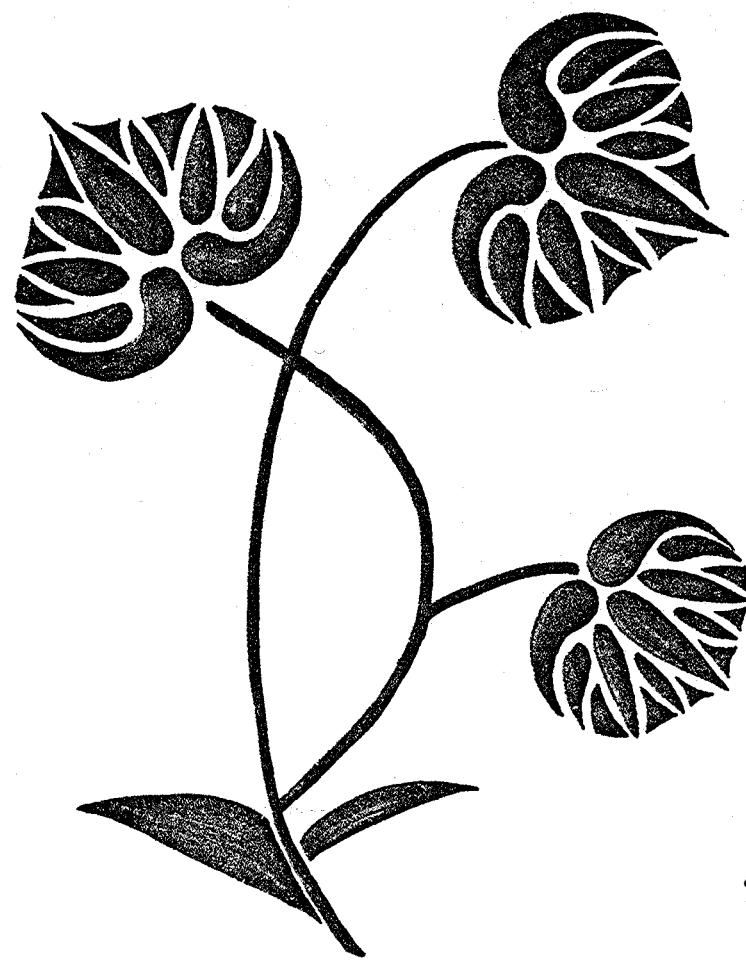


Figure 54. Two designs of Asarum caulescens used by the Kamigamo Shrine in Kyoto.

Redrawn from designs on talismans sold by the shrine by Yong-jun Chang.



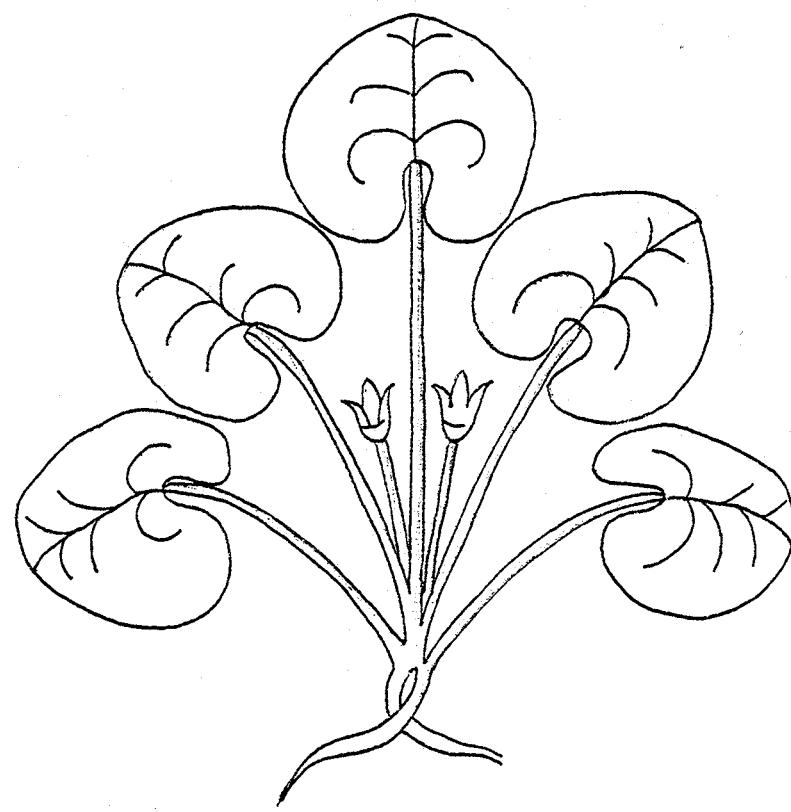


Figure 55. A drawing of Asarum europaeum from the German Latin Herbarius, reprinted in Arnoldia 39 (July-August 1979):251.

Redrawn by Yong-jun Chang.

militarily powerful family to the spiritual protection already implied.¹³⁵

In addition to a shift in focus from Chinese to native subjects, there was a simultaneous change in the use to which mon were put. By the eleventh century the association of certain designs with certain families was becoming apparent, not only because of family pride, but also for a very practical reason: traffic jams in Kyoto. During the festivals and public spectacles hundreds of carriages jammed the narrow streets, and identifying crests came to be emblazoned on banners held above the vehicles for easy identification. Lists of carriage emblems from the late Heian period show that these symbols were often the same as the crests formally adopted thereafter by the various noble families.¹³⁶

The transformation from mon (decorative mark) to kamon (family crest) was completed during the centuries of strife which followed the peace of the Heian period. The need for quick and accurate identification on the battlefield and pride in family lineage among samurai warriors led to the display of banners bearing the family crest in battle, and the use of the mark to adorn the clothing and implements of battle. These marks became so well-known that by the thirteenth century those who chronicled the many battles could simply list the crests

which appeared on the field and be certain that the reader would know which families were represented. The emperor Godaigo used this custom to great advantage when, finding himself vastly outnumbered for an impending battle, he deployed banners of powerful families of the region without the soldiers to back them, and frightened off the enemy.¹³⁷

The Asarum crest in many forms became a popular design during the medieval period, and it unquestionably flew over many battlefields. By the beginning of the sixteenth century it was flown by a host of powerful daimyo families, including the Matsudaira, Honda, Ii, Ina, and Shimada.¹³⁸ In their drive for power the Tokugawa family, a provincial family of no particular standing, defeated the Matsudaira and assumed the use of the Asarum crest as one of the spoils of battle.¹³⁹ The great popularity of the Asarum crest among powerful families, as well as the shrines mentioned above, suggests a hearty respect for the plant which is no doubt derived from the mystical Shinto regard for its powers.

The splintering and reforming of clans through the vagaries of battle and the proliferation of subclans of successful families, boosted by the laws of primogeniture, led to the development of derivative family crests.

By the seventeenth century one large family, the Minamoto, consisted of four subclans, twenty-seven main lines, and five hundred sixty-nine surnames.¹⁴⁰ Conventionalized guidelines for the modification of crests came into being, governing such devices as the use of enclosures, the introduction of new elements, and the alteration of the perspective of a design. The Asarum crest underwent countless changes and elaborations during the course of Tokugawa rule as the family prospered and spread.¹⁴¹ The early forms seen above evolved into more stylized designs which seem to resemble the elegant cultivars of evergreen Asarum species which by this time had become popular cultivated ornamental plants (see figure 56).

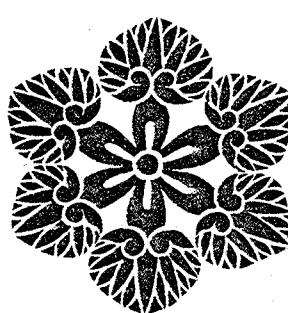
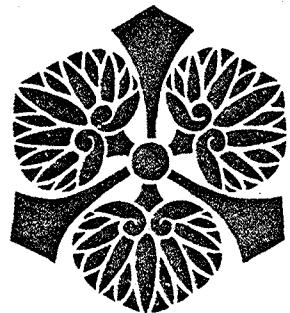
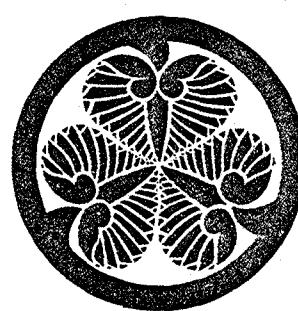
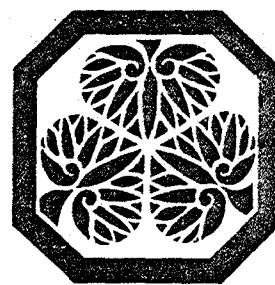
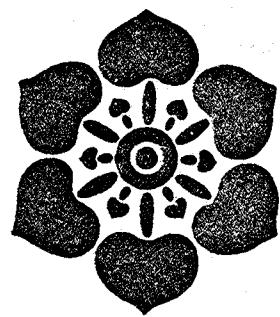
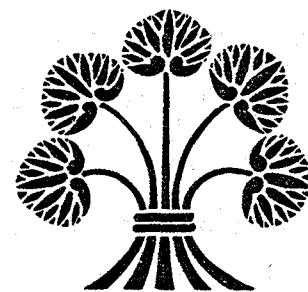
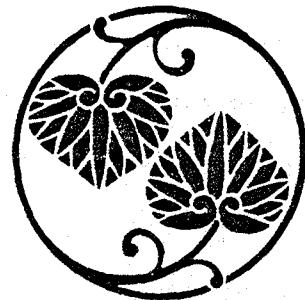
The Tokugawa family moved the center of government from Kyoto to Edo (modern Tokyo) in 1603 in an effort to consolidate its power apart from the intrigues of court society in Kyoto, and further decreed that all daimyo families take up residence in Edo for half of each year. The resulting concentration of idle samurai and well-heeled daimyo stimulated the development of a thriving and luxurious entertainment district, the "floating world" (ukiyo) of leisure, to provide suitable evening entertainment. Amid this burst of lush and decadent activity the Noh and Kabuki theaters flourished, and the actors, along with the male and female courtesans who attended the

Figure 56. Derivative Asarum crests (kamon). A series of conventions evolved for the personalizing of the Asarum crest for the many branches of the Tokugawa family. Conventions of size and shape served the needs of weavers and dyers, but others, such as changes in perspective and the adding or dropping of elements, were purely aesthetic. These designs were proliferating along lines restricted by convention at the same time that cultivars of Asarum were proliferating with their own set of conventions. The design shown in the third row down, right, is the classic "aoi tomoe" (Asarum whirlpool) mentioned above in the text.

SOURCE: John W. Dower, The Elements of Japanese Design (New York and Tokyo: Weatherhill, 1971), p. 59.

Some designs were redrawn from other sources listed in the bibliography.

All designs redrawn by Donald Emminger.



samurai, began to decorate their clothing with family crests, with or without the permission of the owners. Gradually the family associations with the crests became blurred, and by the Meiji restoration in 1867 crests were being used freely by people other than their original owners. Today a wide variety of crests can be seen adorning everything from airplanes to packaged food, regardless of past associations.¹⁴²

CHAPTER IX

THE DEVELOPMENT OF KOTEN ENGEI

A discussion of the organized cultivation of Asarum selections as ornamental plants must begin with a study of koten engei, the practice of growing numerous cultivars of certain plants in pots according to certain rules and conventions. The cultivation of selections of certain Asarum species is a typical example of this practice. Koten engei, like the kamon, is an example of a Chinese model which has been gradually transformed and elaborated in the process of becoming distinctly Japanese.

The idea of growing selections of ornamental plants in decorative pots is an ancient feature of Chinese garden art. Keswick notes that:

In every large, elegantly designed garden herbaceous plants and dwarf trees would be grown in pots, in a specially enclosed area protected by a wall or wattled fence. When in bloom the best ones were taken out to be displayed on tables and flower-stands in each of the gardens' halls and studios.¹⁴³

Plants with gorgeous flowers, such as chrysanthemums,

were cultivated in many forms, but the object of selection of cultivars of such plants was primarily the development of flowers of new form or color.¹⁴⁴

An example of pot-plant culture in China which most closely resembles Japanese koten engei is the ancient practice of growing selections of Cymbidium orchid species which, in part, are still grown within the system of koten engei in Japan. In China as in Japan competition was keen to own the choicest cultivars. Keswick reports a case in which a gentleman named Shen Fu inherited a Cymbidium "...of the lotus type, with broad white centers, perfectly even 'shoulders' and very slender stems." It thrived in his care, and he "...treasured its perfection like a piece of ancient jade." One day it died without warning, and he later discovered that a rival hobbyist who had been denied a division "...had poured a pan of boiling water into the pot in a calculated act of assassination."¹⁴⁵

Cultivars of several Cymbidium species are still popular in both China and Japan, but the Chinese enthusiasm for selection apparently focused on floral effect, while the Japanese have mostly selected cultivars which exhibit a wide range of subtle foliage variations.¹⁴⁶ But before we discuss these variations in detail it is necessary to discuss the broader development of

koten engei in the context of the overall evolution of Japanese aesthetic principles, particularly as they apply to plant appreciation.

In the early Heian period the Japanese approach to aesthetics can be summarized by the term "miyabi," which can be defined as "refinement and sophistication," from the point of view of a court society which found refuge from the ignorant masses in the sumptuous culture of contemporary China.¹⁴⁷ Tsunoda notes that "Miyabi was in a sense a negation of the simple values, the plain sincerity...which poets centuries later were to rediscover."¹⁴⁸ As the peace of the Heian age gave way to the warfare and chaos of medieval Japan, aesthetic standards began to change. During the period from 1100 to 1600 A.D. Japan endured nearly uninterrupted internal strife, and from the horrors of war and social disorder emerged an approach to aesthetics summarized by the term "yūgen." Tsunoda explains that yūgen was used "...to describe the profound, the remote and mysterious, those things which cannot easily be grasped or explained in words."¹⁴⁹ It is "...expressed in bare and simple terms, as if to keep the mind from dwelling too long on the beauty of the form presented." To achieve this quality "...art had sometimes to be stripped of its color and glitter lest these externals distract..."¹⁵⁰ The concept of "sabi" also

becomes an important part of Japanese aesthetics during this period, coming to mean finding pleasure "...in that which is old, faded, or lonely."¹⁵¹

This approach to aesthetics, with its rejection of the glitter and splendor of early Heian aesthetics, came to be expressed throughout medieval Japanese culture, particularly in garden art and ornamental horticulture. One of the most important expressions of this approach, one which greatly influenced the development of koten engei, is the development of the tea ceremony and the character of its structures, gardens, and implements.

The tea ceremony developed as a peaceful refuge for men overwhelmed by the violence of their lives and times, an effort which led them to find satisfaction in simple surroundings and rustic materials. The tea garden and its plants, along with a stark, quiet style of floral decoration inside the tea house, are an important element in the movement toward the kinds of plants which came to be the focus of koten engei. There occurred in the tea garden a marriage of interest in the sorts of humble (often medicinal) herbs which had previously been grown for practical and religious reasons around the dwellings of common people and Shinto shrines with the aesthetic sophistication of the educated and powerful, an aesthetic sophistication which now rejected the glittering

complexity of the Heian court. In An Account of My Hut (1212 A.D.), a long and moving account of a gentleman's withdrawal from the horrors of civilized society in the twelfth century, Kamo no Chomei describes his retreat into the mountains near Kyoto, where he built a rustic hut ten feet square of the simplest natural materials, gathered his food in the fields and forests, and cultivated a variety of herbs at the north side of his hut.¹⁵² The physical and emotional elements of this kind of actual experience were embraced by the cult of tea where, exaggerated and stylized, they became in time a series of conventions which transmitted emotional and symbolic messages. In the tea garden, through which guests pass as they approach the tea house, only inconspicuous plants with flowers of subdued colors are planted, both to establish a peaceful mood and to symbolize humility.¹⁵³ Nearly all of the species of plants which have enjoyed extended popularity as examples of koten engei are suitable in their wild forms for the tea garden, and this was surely one way in which they came to the attention of the educated and powerful, and claimed the degree of interest once reserved for the peony and chrysanthemum.

In 1603 Ieyasu Tokugawa assumed the title of shōgun and ruled a newly united Japan from Edo (Tokyo). The development of koten engei was greatly stimulated by

his interest, and subsequently reached its highest development during the course of the Tokugawa shogunate (1603 to 1867).

The impact of the Tokugawa rulers on the development of koten engei was both direct and indirect. The first shōgun Ieyasu was himself a keen collector of plants while he was living at Suruga in Shizuoka Prefecture. He was fond of medicinal plants, having been inspired by Honzō Kōmoku, an illustrated Chinese book of medicinal plants, including Asarum.¹⁵⁴ His interest stimulated the collection of such plants from the wild and their cultivation; some of these species, including Asarum, came to be part of koten engei.¹⁵⁵

Ieyasu retired in 1605 to make way for Hidetada Tokugawa, the second shōgun, who was also an avid collector of ornamental plants, and he encouraged officials throughout Japan to bring him unusual specimens. This practice was quickly recognized as a chance for the shōgun's favor with no potentially lethal side effects, and the custom of presenting unusual plants to the shōgun spread quickly throughout the ranks of the samurai and the powerful citizens.¹⁵⁶ This custom must have given a special boost to Asarum selection and cultivation: What could be more appropriate a gift than a rare mutation of the plant used by the Tokugawas as their family crest?

The third shōgun Iemitsu Tokugawa (1623-51) was an even more avid plantsman than his predecessors. A book, Hyakuchinshū, listing one hundred cultivars of camellias, was published during his rule, and a Pinus parviflora bonsai of his is still growing at the Imperial Palace.¹⁵⁷ A more important effect of his rule was the establishment of the system of alternate residence (sankin kotai), mentioned above in the discussion of the development of the kamon, under which local lords were required to maintain a residence in Edo and spend half of each year there. Iemitsu suggested that these vassal daimyo bring interesting plant mutations to him from the provinces and assemble in Edo to discuss them, a suggestion which no doubt stimulated attentive interest in plants even among those who would have otherwise not been involved.¹⁵⁸

The most important effect of this system of alternate residence was the stimulation of the development of a class of educated and moneyed commoners on the fringes of an unprecedented concentration of idle noblemen and their many retainers. The subsequent development of the "floating world" (ukiyo) to provide for their entertainment, in which nobles and commoners of means mingled freely, stimulated the democratization of many forms of art and entertainment. Kabuki theater, haiku poetry, and woodblock printing (ukiyo-e) are examples of

artistic developments which owe the strength of their popularity to the interest of this new class of urban commoners.¹⁵⁹

In the realm of garden art and ornamental horticulture two developments of this period stand out: the evolution of the courtyard garden (tsuboniwa) and the development of maniacal interest in collecting variations and mutations of all sorts of ornamental plants. Urban commoners lacked the spacious estates of the noblemen, but they found a way to make effective use of the tiny spaces at the back and sides of their houses by developing a conventionalized garden derived from the tea garden: the tsuboniwa. This garden retained in a small space the most emotional symbols of the tea garden: the stone lantern to light the path, the stepping stones to provide an unsoiled path, and a water basin to clean the hands and mouth. This derived garden might be almost bare of plants or might include at most a few evergreen shrubs and simple herbs with subdued flowers.¹⁶⁰

The desire for a simple, emotionally evocative garden was in direct contradiction to the simultaneous development of interest in the bizarre mutations of a very wide variety of ornamental plants. Because these plants did not in any way fit into the popular concept of a garden, they were grown in areas apart from it. Perhaps

because of these constraints of space it became customary to grow these mutants only in pots so that a great many kinds of plants could be cultivated and displayed in a small area (see figures 57 and 58).

It is very important to remember that although Tokugawa society was rigidly stratified and government positions were held by those of the samurai class, the percentage of educated commoners among the population was remarkably high. Hall points out that by the end of Tokugawa rule the literacy rate among male commoners was forty to fifty percent, a figure which compares favorably with England in the same period.¹⁶¹ Thus the development of koten engei, for example, could develop among commoners at an educated level, and with a freshness and fervor it otherwise might have lacked:

And it was characteristic of bourgeois culture, produced as it was by a stratum within Tokugawa society which was less tied to the necessity of keeping up a noble, and at times artificial, tradition that its content dealt largely with matters of the moment and of the heart.¹⁶²

Words cannot adequately describe the exuberance which characterized ornamental horticulture during the Genroku period (1688 to 1704) and much of the eighteenth and nineteenth centuries. In the Genroku period a book (Kasen Kaede Shū), naming one hundred mutants of Acer by referring to classical poems, was published. In the early eighteenth century exhibitions of Chrysanthemum

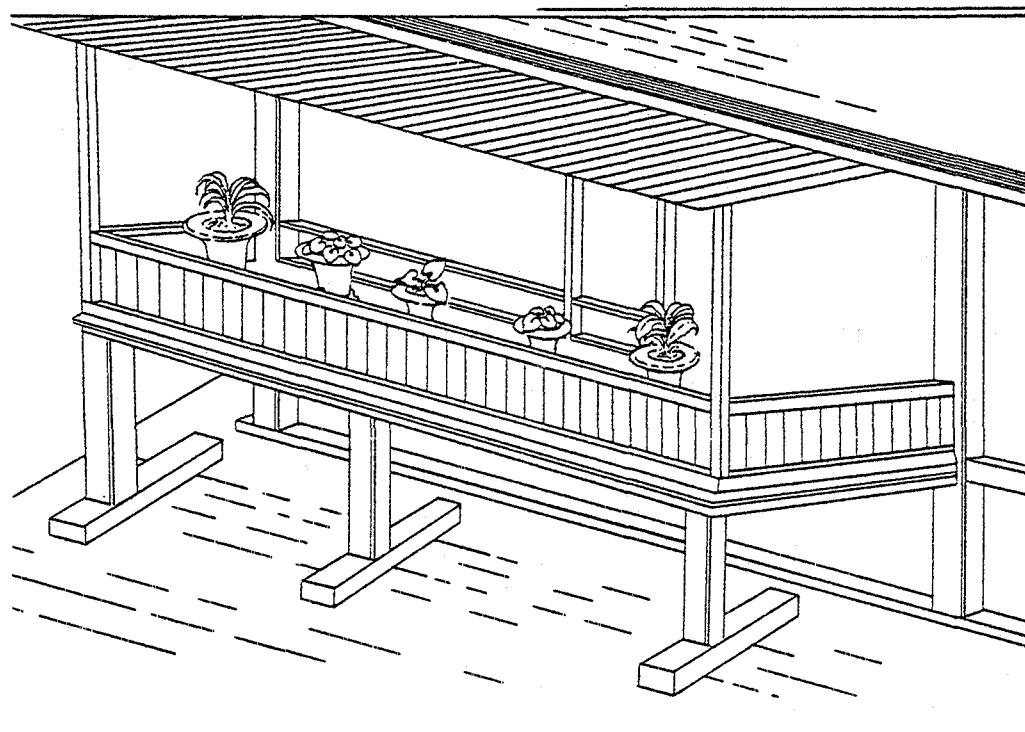


Figure 57. A structure for the display of
koten engei plants.

Note the wide roof to protect the plants from
the afternoon sun.

SOURCE: Ryōji Iwasa, "Edo no Engei," in the explanation volume accompanying the facsimile reprint of the classic Sō Moku Ki Hin Kagami (Tokyo: Seiseido, 1976), p. 12.

Redrawn by Donald Emminger.

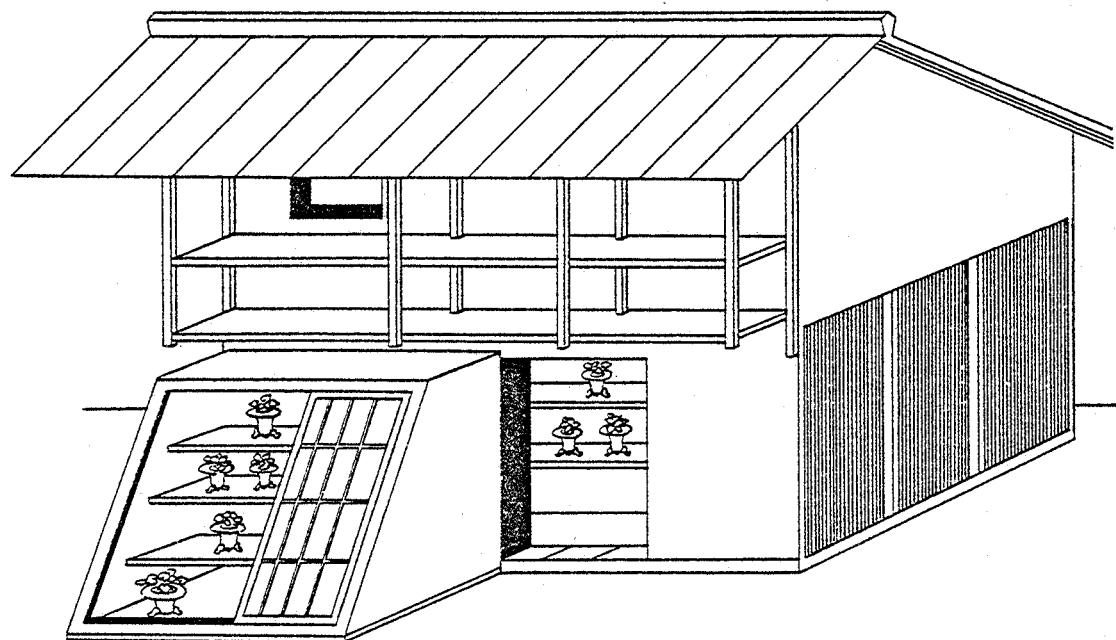


Figure 58. A structure for the storage and display of koten engei plants.

This structure has compartments below for the winter storage of potted plants. The wide roof on the display section protects the plants from the afternoon sun.

SOURCE: Ryōji Iwasa, "Edo no Engei," in the explanation volume accompanying the facsimile reprint of the classic Sō Moku Ki Hin Kagami (Tokyo: Seiseido, 1976), p. 12.

Redrawn by Donald Emminger.

mutations became popular, and cultivars of Adonis, Hepatica, Fritillaria, Passiflora, and variegated plants of all sorts achieved special popularity. By the early nineteenth century interest in mutations with variegated or twisted leaves, or contorted or fasciated stems, reached the level of a national mania, culminating in the publication of Sōmoku Kinyōshū in 1829, in which famous painters illustrated more than one thousand cultivars of plants with variegated leaves. In the nineteenth century collectors became more and more interested in collecting variations of a single species, with famous hobbyists developing specialized collections of mutations of such plants as hybrid morning glories, Rohdea, Dendrobium, Primula, Psilotum, Goodyera, Dianthus, Hepatica, Lilium, Iris ensata, and many others. By 1830 various specialized interests had stimulated the publication of Kinsei Jufu Betsuroku, a three-volume work which attempted to explain the various kinds of pots, methods of cultivation, and techniques of propagation which applied to many of the popular groups of plants.¹⁶³

It is impossible to say at exactly what point unrestrained collecting of plant mutations came to be so governed by convention that what we know as koten engei could be recognized as a distinct horticultural movement. We, like the scholars who tried to define the movement in

the nineteenth century, can only consider the question in hindsight; the men in the seventeenth and eighteenth centuries who collected plant mutations according to rules which became conventions dictating the points of their cultivation and selection probably did not suspect that they were in the vanguard of a persistent horticultural movement. There is no known chronicle of the ideas or emotions of the hobbyists involved in the early stages of koten engei development. The best way to decide exactly which characteristics set these plants apart from others is to look at those groups of plants which have persisted to the present as koten engei plants and consider their common characteristics, taking into consideration the opinions of Japanese scholars who have studied the question.

The following species are the original forms which have produced the groups of mutations which are most commonly grown as koten engei in Japan today:

- Cymbidium goeringii (Shunran)
- Neofinetia falcata (Fuki-ran)
- Dendrobium moniliforme (Chōsei-ran)
- Rhipis excelsa (Kannon Chiku)
- Nandina domestica (Nanten)
- Rohdea japonica (Omoto)
- Selaginella tamariscina (Iwa-hiba)
- Psilotum nudum (Matsuba-ran)
- Ardisia japonica (Yabukōji)

Asarum spp. (Saishin)

These groups have a number of features in common:

(1) All of the species which have undergone selection are traditional Japanese garden plants which in their original forms were not showy, and all are Japanese natives (Rhipis only as far north as Yakushima).

(2) The variants of the species which are cultivated are selections (aberrant forms) rather than hybrids.

Except in Cymbidium and Neofinetia the variants are selected for characteristics other than flower form and color, and even with these two genera most selections are for leaf form and color; the flowers are not very showy in any case. The vast majority of selections throughout koten engei is for variation in leaf form and color; many of these variations would be considered inconsequential by Western horticultural standards.

(3) The selection of variants of these species is not haphazard. The various degrees and kinds of variation have been classified and given names, and certain kinds of variation have been judged to be more desirable than others. As a rule, those aberrations which weaken a plant's constitution and increase its dependence on its owner's horticultural skill are most desirable. In this respect the concept of beauty among koten engei plants is similar to the Victorian concept of feminine allure,

in which beauty is enhanced by at least the illusion of a delicate constitution.

(4) The plants are always grown in pots, not in the garden. The traditional pot is raku ware, a thin, porous container fired at low temperature, with rough surface and a shiny black glaze. The proportions of the pots vary for different species.

(5) The cultivars are assigned names which are typically metaphorical and are sometimes allusions to places or events in classical Chinese history and literature. The names are nearly always written in Chinese characters rather than the native Japanese phonetic script (kana). Cultivar names frequently reappear in different species groups.

(6) The cultivars are evaluated and ranked by societies, and the results of the evaluation are published periodically on a chart called a "meikan" which resembles the traditional scoreboard (banzuke) of sumō wrestling tournaments. Each society deals with the variants of only one species.

(7) Interest in the different groups is cyclical and has historically been accompanied by waves of intense financial speculation.¹⁶⁴

All of the characteristics listed above will receive more elaboration below in the discussion of

Asarum as koten engei. The reader will find examples of several koten engei species in figures 59 and 60.

Figure 59. Three examples of typical koten engei plants.

- a. *Nandina domestica*
- b. *Dendrobium moniliforme*
- c. *Rohdea japonica*

SOURCE: Kujiko Kamisaki, ed., Engei Guide Bessatsu 1
Shūmi no Koten Shokubutsu (Tokyo: Shufu no Yusha, 1975),
pp. 9, 84, 94.

Redrawn by Donald Emminger.

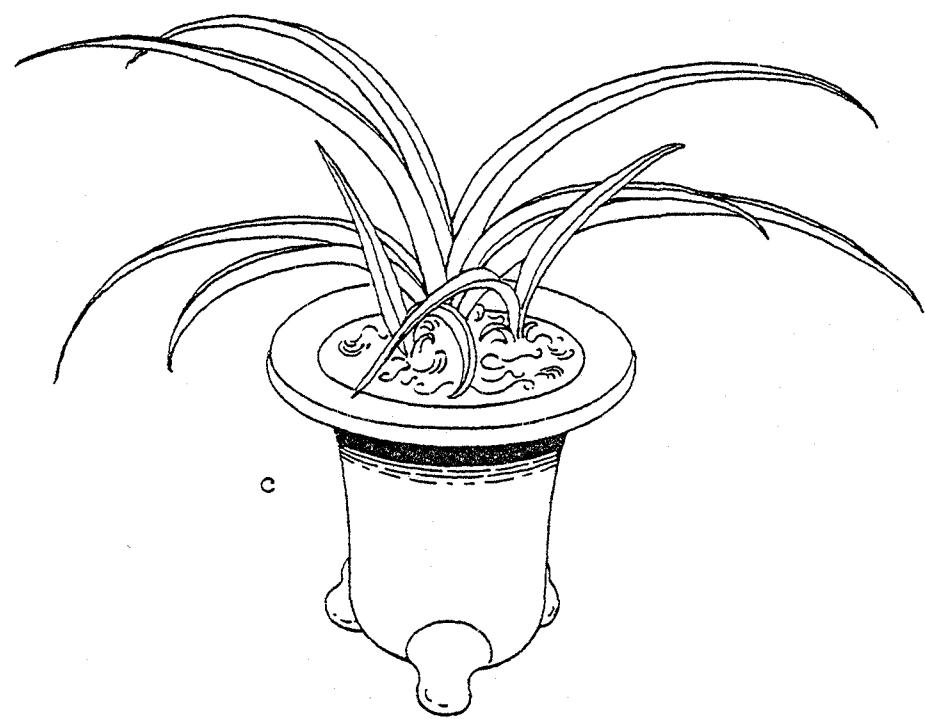
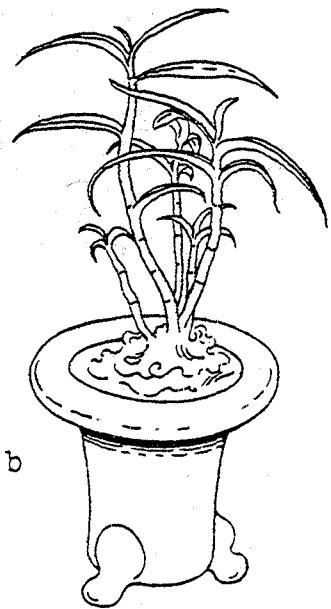
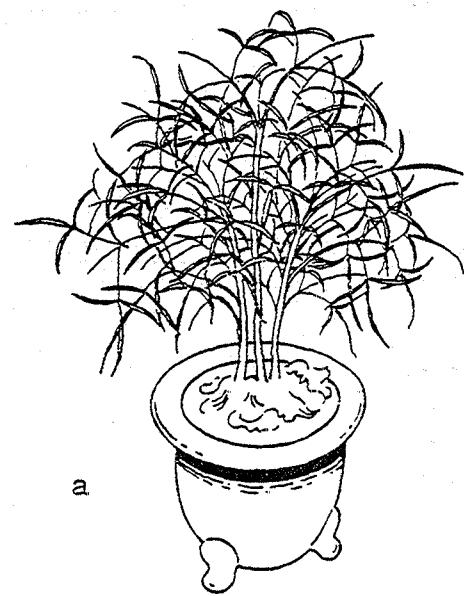
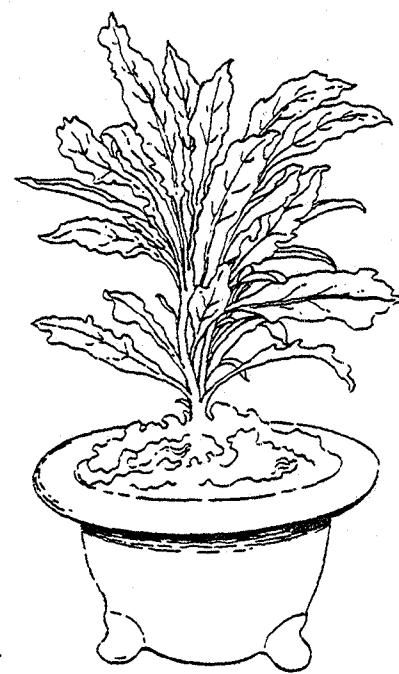


Figure 60. Three examples of typical koten engei plants.

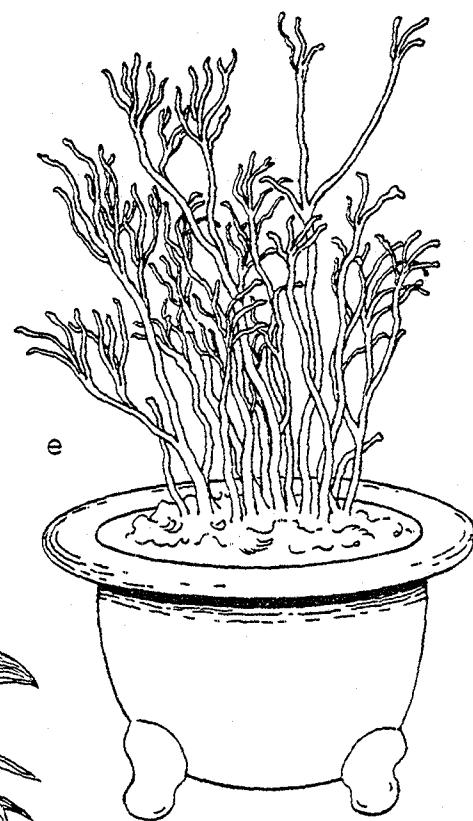
- d. *Ardisia japonica*
- e. *Psilotum nudum*
- f. *Rhapis excelsa*

SOURCE: Kujiko Kamisaki, ed., Engei Guide Bessatsu 1
Shūmi no Koten Shokubutsu (Tokyo: Shufu no Yūsha, 1975),
pp. 65, 92, 97.

Redrawn by Donald Emminger.



d



e



f

CHAPTER X

ASARUM CULTIVATION AS A PART OF KOTEN ENGEI

The cultivation of Asarum predates the development of koten engei by several centuries, and the association of Asarum with Shinto shrines has been discussed along with the development of the Asarum kamon. The presence of carved Asarum designs on ancient buildings and the records of the Kamo Shrine festival's use of Asarum dating back to the sixth century suggest that awareness of Asarum, and probably its cultivation, go back to the beginning of Japanese history.¹⁶⁵ Plantings of Asarum are still a fairly common sight in shrine and temple gardens. Asarum takaoi, one of the evergreen species from which many of the cultivars seem to have arisen, grows in profusion at the entrance of the grand shrine at Ise, the most revered of Shinto shrines.¹⁶⁶ Its religious importance is intimately tied to its medicinal properties, which have been recognized in every region where Asarum

is native, and by a variety of diverse cultures.

It is probably impossible to know the exact method of Asarum's transition from a venerated medicinal herb to a treasured ornamental plant, but surely the coincidence of its status as the Tokugawa family crest, the shōgun Iemitsu's interest in medicinal herbs, and the illustrations of Asarum in his favorite Chinese book of medicinal herbs, Honzō Kōmoku, presents a persuasive scenario.¹⁶⁷ The fact that the shōgun's country home in Suruga lies near the center of distribution of the Nipponicum species group from which the cultivated forms have been selected makes it certain that a convenient source of variants was close at hand.

The historical change in attitude toward Asarum is suggested by the common names by which they were known. The earliest name, "saishin," is the Japanese reading of the name used in Chinese pharmacology, meaning thin and bitter. This name disregards any ornamental feature of the plant in favor of a description of the roots which would be most useful to an herbalist. In 1709 Ekken Kaibara wrote that saishin should be used for the deciduous species, and the names "tokō" and "kan-aoi" should be used for the evergreen species.¹⁶⁸ Kan-aoi (winter hibiscus) in particular refers to the ornamental evergreen leaves, which somewhat resemble hibiscus leaves in shape.¹⁶⁹

The first mention of Asarum in horticultural literature was in 1695 in Kadan Chikin-shō, followed by illustrations in Kusabana-e-zenshū in 1699.¹⁷⁰ Both of these works were produced by Ihei Itō, a nurseryman who was on such good terms with the shōgun that he was granted the right to have a surname even though he was a commoner. In 1735 sixty-seven cultivars of Asarum were recorded in Sōmoku-rōha-shū.¹⁷¹ From these references it seems clear that the practice of selecting cultivars of Asarum was well established among hobbyists by the end of the seventeenth century, and must have begun some time before.

Like most koten engei cultivars, the selections of Asarum are variant forms of native Asarum species. Unlike other koten engei groups, there is considerable confusion over just which species have been used. Various authorities have different opinions on this matter, but they seem to be of the unanimous opinion that most are selections from what has been referred to in the first part of this paper as the Nipponicum group.¹⁷² The center of distribution of this group lies between Tokyo and Nagoya, and most of the selections of Asarum have traditionally been made in these two cities.¹⁷³ Mr. Tadanori Tanimura, an Asarum specialist in Kyoto, has examined the flowers of more than fifty cultivars, and has found that four species are represented. Forty-three cultivars seem to be

Asarum nipponicum var. nipponicum, seven seem to be A. takaoi, and one each A. asaroides and A. asperum (these last two species are not in the Nipponicum group).¹⁷⁴ The author agrees with Mr. Tanimura that the great majority of cultivars can be assigned to the first two species mentioned above. Because flower characteristics are not considered in the selection of Asarum cultivars it is not surprising that different species with similar foliage might become part of the cultivar group.

The single fundamental way in which koten engei selections of Asarum differ from most of their wild relatives is that all cultivars have pale green leaf petioles (aojiku) and flowers. Most normal individuals of species in the wild have red pigment in their tissues which imparts a purplish cast to the petiole and the calyx.¹⁷⁵ Albino plants (those without red pigmentation) occur among populations of all species in the wild as about one percent of the population.¹⁷⁶

The ideal Asarum cultivar also has a good balance of leaf length and petiole length, and a rounded leaf with overlapping basal lobes. The leaf surface should be glossy and brilliant with a pleasing surface texture. If the leaves are not mottled the foliage should be dense and somewhat crowded. If the leaf is variegated, the markings should be clear and of variable size. No single

cultivar has all of the desirable qualities.¹⁷⁷

In addition to these general qualities there are a number of specific categories of leaf shape and pattern which are used to classify and describe cultivars.

Several of these are illustrated in figure 61, and many more are listed in appendix 5.

In addition to the overlap of the basal lobes mentioned above, there are two other variations of leaf conformation which are important: a pattern of deeply sunken veins and convex interveinal spaces (uchi dashi), and a tucked-under leaf tip (biri o otsu).¹⁷⁸

There are also several important classifications based on leaf color patterns. One of the most striking is the "valley" (tani) and "butterfly" (chō). The former is a sharply contrasting line which bisects the leaf lengthwise, and the latter is a splash of contrasting color at the sinus of the basal lobes. These patterns usually but not always occur together. A pattern of contrasting lines which follow the veins of the leaf is known as the "tortoise shell pattern" (kikkō). Two distinct elongated blotches on either side of the midrib is known as the "hanging wisteria pattern" (sagari fuji), and a large central blotch of color is known as "jewel variegation" (tamafu). There are many kinds of smaller variegation patterns, such as "sesame seed variegation" (gomafu) for

a	b	c
d	e	f
g	h	i

Figure 61. Leaf characteristics (gei) of Asarum cultivars.

- a. uchidashi, biri o otsu
- b. tamafu
- c. tani and chō
- d. sagari fuji
- e. kikkō
- f. nagarefu
- g. eriawase
- h. zu
- i. gomafu

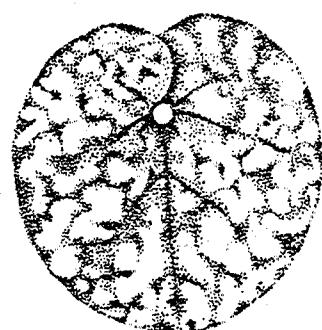
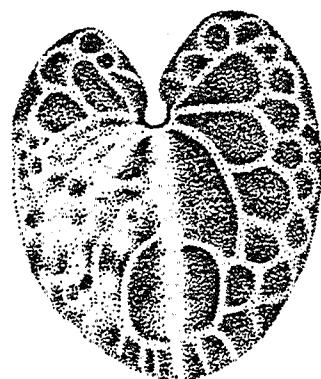
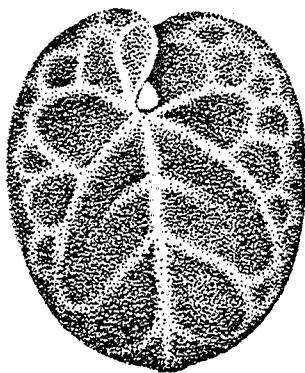
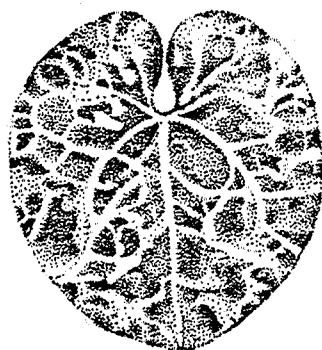
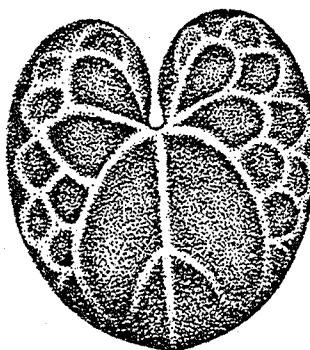
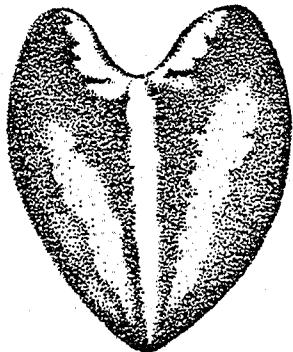
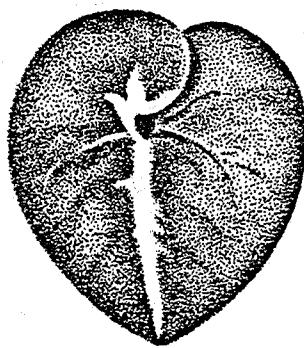
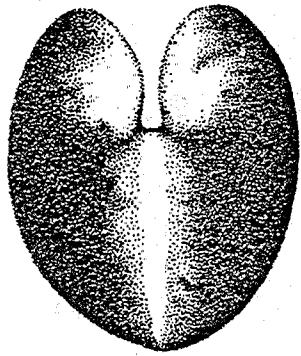
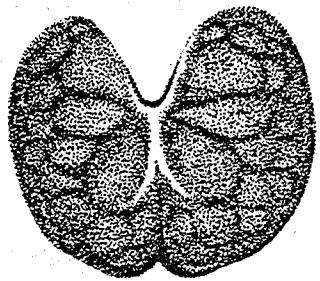
These terms and others are defined in appendix 4.

SOURCE: "Saishin no Gei," in the Garden Life edition Koten Engei Shokubutsu (Tokyo: Seibundo Shinkosha, 1977), p. 47.

Redrawn by Donald Emminger.

Longwood Program

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a pattern of nearly uniform, small, clear spots; and "running variegation" (nagarefu) for irregular spots of various sizes and degrees of clearness. The least desirable pattern (tokō) consists of unclear blotches on both sides of the midrib; this pattern is common on wild plants. The most peculiar and highly prized pattern is called "map variegation" (zu), consisting of an irregular asymmetrical patch of white or yellow markings; the leaf margin is often distorted or torn at the variegated section.¹⁷⁹

The cultivars with the highest rankings (and the highest prices) are those which are weakest and slowest to propagate. They are often cultivars with a minimum of chlorophyll and those bearing the "map" pattern.

The various leaf patterns are also used to create general categories for the classification of cultivars. The major categories are as follows:

- (1) Kommujimono: Dark blue-green ground with no pattern.
- (2) Kikkōmono: Predominant tortoise shell pattern.
- (3) Tanichōmono: Prominent "valley and butterfly" pattern.
- (4) Hadaremono: Prominent patterns of assorted variegation patterns; also known as madaramono.
- (5) Tamafumono: Prominent central variegation.¹⁸⁰

Some hobbyists also recognize broad categories based on the texture of the leaf surface:

(1) Kebamono: Pubescent leaf surface.

(2) Terihamono: Shining leaf surface.

(3) Kobamono: Pasty (matte) leaf surface.¹⁸¹

A cultivar is assigned to a category on the basis of its most prominent ornamental feature, and this can be confusing because many exhibit several patterns with none obviously dominant. However, this is not a serious problem, as this classification is not a formal and inflexible system but rather a convenient way of trying to express a cultivar's ornamental impact.

Asarum cultivars, like other plants grown as koten engei, are usually grown in pots produced by the raku process. They have very thin, porous walls glazed black outside but not perfectly smooth. There are three styles, based on the amount of decoration which overlays the black glaze: those with a simple gold rim and feet are known as fuchikin; those which also have a pattern of waves and birds near the base are known as nami-nishiki (see figure 62); and those with elaborate patterns of flowers or fantastic animals (such as dragons) are known as nishiki (brocade) pots.¹⁸² The most elaborately decorated pots are reserved for the most elegant cultivars. The pots, like koten engei itself, are an expression of

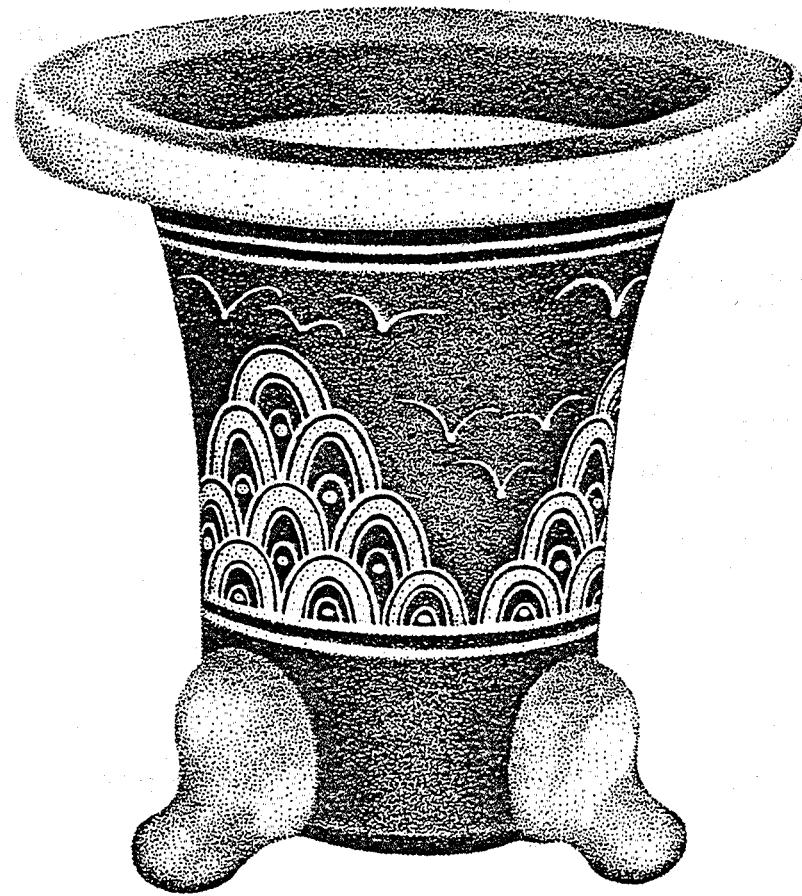


Figure 62. A traditional Asarum pot of the naminishiki (wave brocade) design.

Drawn by Donald Emminger using a pot belonging to the author as a model.

a marriage of classical Chinese models (seen in the pots' shape and design motifs) and Japanese native aesthetic sensibilities (seen in the rough black glaze and the use of soft, low-fired clay rather than smooth, high-fired porcelain).

The names of Asarum cultivars, like other koten engei plants, are almost always written in Chinese characters rather than Japanese native script. The characters often have tricky readings or meanings so that even a Japanese uninitiated in the special vocabulary of koten engei would have considerable difficulty reading them or appreciating the message which is sometimes hidden in the name. The names may be at one or more of three levels of complexity. The simplest are those which are strictly descriptive, such as 'Chiyoda Fu': "Chiyoda" is a place name, and "fu" means "variegated." Most names are not so simple.

The second level of complexity is the most common. Here the names are metaphors which may or may not offer clues to the plant's appearance. 'Kurobotan' (black peony) gives a fairly accurate mental picture of the plant's leaf, as does 'Kikkō Ararefu' (tortoise shell with hail variegation) or 'Dai Koku Ten' (great dark sky). 'Haku Raku Ten' (innocent optimism), on the other hand, gives no important visual clue. Many of these names reappear within

different koten engei groups: 'Akebono' (dawn), 'Mangetsu' (full moon), 'Maizuru' (dancing crane), 'Kotobuki' (long life), and many more. A number of words which are parts of cultivar names reappear frequently: nishiki (brocade), hōō (phoenix), sakura (flowering cherry), gyoku (jewel), and many more; images drawn from the aesthetic vocabularies of both classical China and early Japan.

The highest level of complexity includes names which are allusions to places or events in classical Chinese history or poetry. 'Rokka Sen', for instance, is an allusion to the six most famous classical Chinese poets. Such allusions are unfamiliar to many Japanese, and more so to foreigners, and seem to have been declining in popularity.

The reader can more fully appreciate the variety and richness of the images evoked by cultivar names by consulting appendix 6, where about one hundred and forty cultivars are listed and described, with the Japanese names translated. Eighteen cultivars of Asarum are shown in figures 63, 64, and 65.

One of the most distinctive features of koten engei is the periodic ranking of cultivars by members of societies who publish the results on a chart called a "meikan," which resembles the traditional ranking board (banzuke) used in sumō wrestling tournaments. The fancy

a	b
c	d
e	f

Figure 63. Six cultivars of Asarum.

Kommunjimono: Dark ground and no pattern.

a. 'Kuro Botan'

Tanichōmono: Valley and butterfly types.

b. 'Sekkyō'

c. 'Nishiki Tanchō'

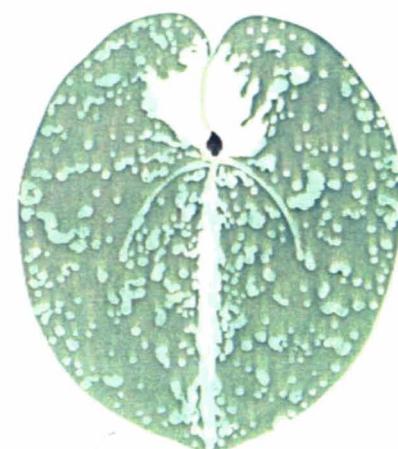
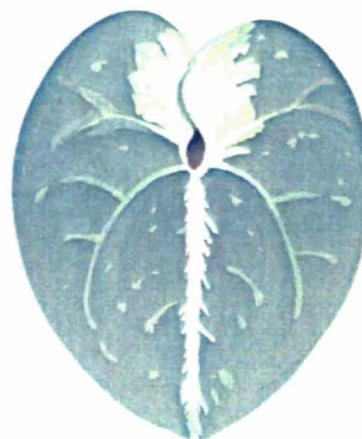
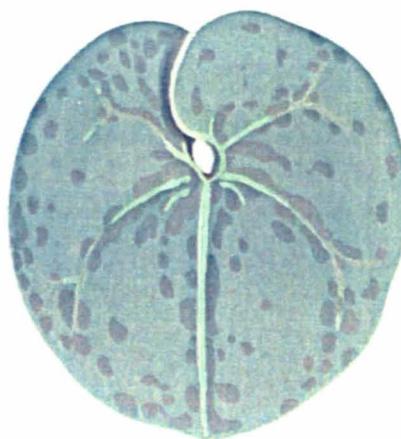
d. 'Haku Raku Ten' (variegation also present)

e. 'Taiheiden' (sagari fuji also present)

f. 'Ōkan' (tamafu also present)

Japanese technical terms are defined in appendix 4.

Drawn by Donald Emminger.



a	b
c	d
e	f

Figure 64. Six cultivars of Asarum.

Hadaremono: Variegated types.

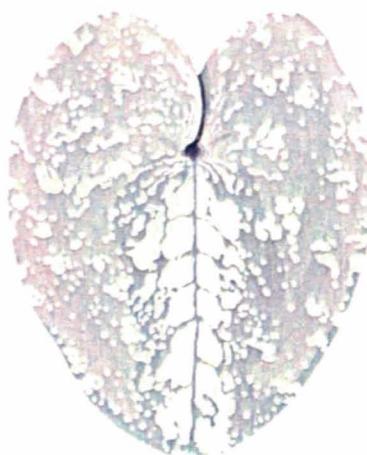
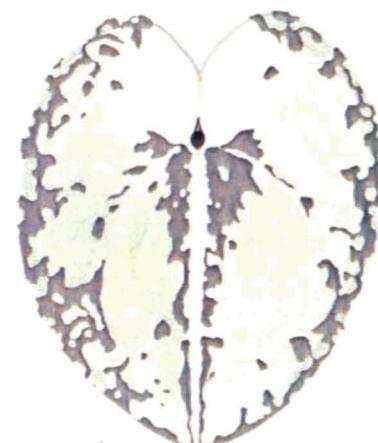
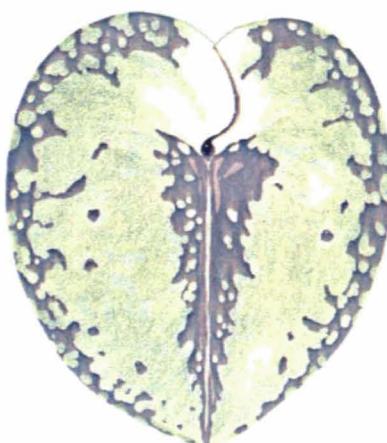
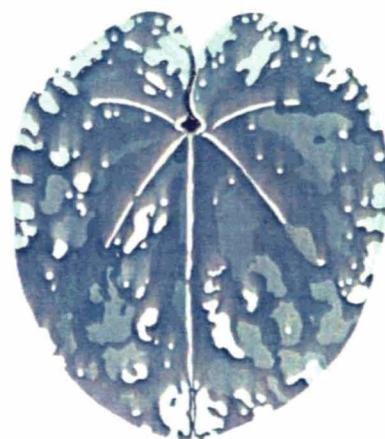
- a. 'Hazakura'
- b. 'Miho-no-Matsu' (tani and chō also present)
- c. 'Nichi Getsu' (sagari fuji and chō also present)
- d. 'Mikasa' (tani and chō also present)
- e. 'Tanchō' (tani and chō also present)

Tamafumono: Type with large central variegation.

- f. 'Tama Kujaku'

Japanese technical terms are defined in appendix 4.

Drawn by Donald Emminger.



a	b
c	d
e	f

Figure 65. Six cultivars of Asarum.

Kikkōmono: Types with a tortoise shell pattern.

- a. 'Tanimi Kikkō' (tani and chō also present)
- b. 'Oi-no-Tomo'
- c. 'Oiraku'
- d. 'Rokka Sen'

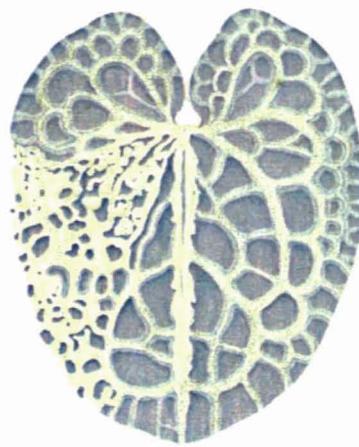
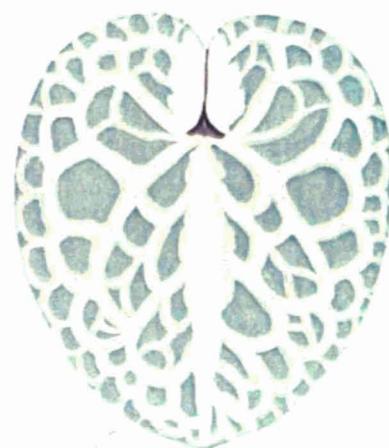
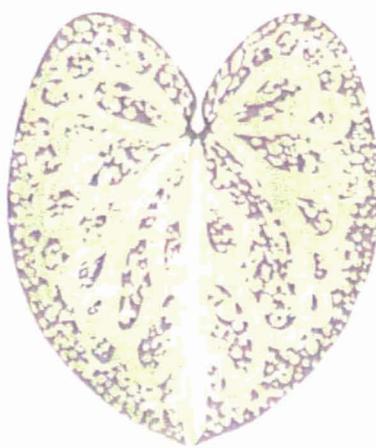
Zu: Types with "map" variegation.

- e. 'Kinseikō-no-Zu'
- f. 'Rokka Sen-no-Zu'

Japanese technical terms are defined in appendix 4.

Drawn by Donald Emminger.

NOTE: The arrangement of cultivars in the various categories above is only for the purpose of illustrating the characteristics of the categories. The author realizes that some authorities may classify some cultivars differently.



stage names of the wrestlers are posted on separate plaques which can be moved to different positions on the board depending on the wrestlers' success. Like the cultivar names, the wrestlers' names are written in Chinese characters and some of the names themselves are similar to the cultivar names.

The cultivars of Asarum, like other koten engei selections, are ranked under a highly subjective system in which the members of the society judge new and old cultivars on the basis of their elegance, rarity, and popularity. Of these, elegance is the most subjective evaluation. Rarity can be the result of a cultivar being relatively unattractive and therefore seldom grown, or because it is so weak (and probably elegant) that it is very slow to grow and propagate. Popularity is a measure of demand, and is usually directly and positively correlated with price. The judgements of koten engei groups such as the Asarum society are often very heavily colored by the opinions of the strongest member of the group who is usually a nurseryman specializing in growing the kind of plant being evaluated. Because of this, and because the meikan has traditionally served as a sort of catalog as well as a listing and ranking of cultivars, it is easy to suspect that commercial self-interest sometimes overcomes objectivity, particularly when a group of plants is not

at peak popularity and the number of people offering opinions is small. When the number of people involved increases, the Japanese impulse to seek consensus probably assures a balanced opinion.¹⁸³

Because the categories listed on the meikan as well as the positions of the cultivars on the chart are subject to change from year to year, it is difficult to make absolute statements about meikan categories. A typical modern example is reproduced and interpreted in figure 66 and appendix 6.

There are six general categories on the meikan reproduced below, listed here in descending order of prestige:

- (1) "Most rare and noble"
- (2) "Popular, new, and noble"
- (3) "Popular, rare, and noble" (with "other rare and noble")
- (4) "Popular and noble"
- (5) "Popular"
- (6) "Noble"

The diagrammatic key to figure 66 shows the sequence in which the names are read, and appendix 6 shows the names of those cultivars in romanized form. Inspection of this meikan (1976) shows that two "map" (zu) cultivars, 'Rasha Maru-no-Zu' and 'Kinseikō-no-Zu', share the

Figure 66. The Japanese Asarum Society (Nihon Saishin Rengō Kai) meikan: the order of rankings of one hundred cultivars in 1976.

Numbers in the key below show the order of ranking, and the letters identify the categories:

- | | |
|-----------------------------|----------------------|
| A. Most rare and noble | E. Popular and noble |
| B. Popular, new, and noble | F. Popular |
| C. Popular, rare, and noble | G. Noble |
| D. Other rare and noble | |

See appendix 6 for the transliterated names which correspond to the numbers in the key below.

春新年一十五和昭

金鑑 金名 年 紹

號五拾六第

(品貴進新盛全)

(品貴進新盛全)

(品貴盛全)

雪橋

(品貴盛全)

羅紗丸之圖

葉國三保松光

神代

泰山雪
鳳凰陽殿娘錦頂斑

日月山

露老殘黃空橘

谷間雪

舞鶴

(品貴盛全)

書此惠福

御代蝶

曙

太平樂

(品貴盛全)

福星光

君鳳玉羅紗

集光

朝日錦

(品貴盛全)

天黑大櫻夜

都玉歌華

敷島

太平樂

(品貴盛全)

三笠

自覺覺

全城冠

朝日錦

(品貴盛全)

天冠

黑壯丹

舞鶴

天黑大櫻夜

(品貴盛全)

白樂天

瑞錦松

六歌華

天黑大櫻夜

(品貴盛全)

福壯冉

高常盤

長盛殿

天黑大櫻夜

(品貴盛全)

白樂天

平和光貴

極壽善

天黑大櫻夜

(品貴盛全)

福壯冉

五十發

常盤

天黑大櫻夜

(品貴盛全)

天黑大櫻夜

太苗切班

太苗切班

天黑大櫻夜

(品貴盛全)

天黑大櫻夜

太苗切班

太苗切班

天黑大櫻夜

(品貴盛全)

天黑大櫻夜

太苗切班

太苗切班

關東文部省

茨城縣稻敷郡牛久町

禁販売(是れに洩れたりは後編)出寸

中根番外四番地の五。

highest category, with the latter in first place. Down in the far left corner of the bottom row of small blocks is 'Ōta Kirifu' in last place, suffering from "poor basal lobe overlap"¹⁸⁴ and other problems.¹⁸⁵ In comparing the 1976 meikan with one published in 1979 we find that the "most rare and noble" category has been deleted, and that the two 1976 champions have been demoted to "other rare and noble." This rather sudden drop suggests oversupply or dropping demand, and therefore dropping price. As "map" cultivars their essential elegance is unassailable. 'Ōta Kirifu' remains in the bottom slot.¹⁸⁶

All koten engei plants are subject to periodic cycles of interest which historically have been connected with waves of financial speculation. Dr. Ryōji Iwasa believes that interest in both bonsai and koten engei plants have been maintained by speculation, and that more cultivars would have disappeared if there were not the prospect of periods of very high interest in the plants and consequent financial gain.¹⁸⁷ Other authorities believe that cycles of speculation are most effective when plants are slow to propagate, and that an important difference between Asarum cultivars and Chrysanthemum cultivars, for example, is that the latter are so quick and easy to propagate that speculation is thwarted.¹⁸⁸

Most Asarum cultivars are slow to propagate, and

even in times of low popularity are rather expensive. In 1978, not a time of especially high demand, the price of cultivars at Mr. Yoshida's nursery ranged from \$2.00 per leaf to \$60.00 per leaf, with most costing about \$35.00 per leaf. Each leaf after the first is half the price of the first. During periods of intense speculation prices are much higher.¹⁸⁹ Some cultivars of Rhapis excelsa, a koten engei group enjoying special popularity now, sell for more than \$5000.00 for a small division.

After about forty years of neglect, Asarum cultivars are increasing in popularity again. According to Mr. Yoshida, the Asarum society had only fifteen members in 1978, but more than three hundred before World War II.¹⁹⁰ An increase in interest is likely to bring out into commerce some cultivars which are thought to be lost, along with more interesting historical data about their cultivation. We can also expect to see the resurrection of public shows and competitions which are commonly held by societies when their plants are enjoying popularity.

The patterns of speculation which are part of koten engei, along with the proliferation of cultivars in the various groups, have led to comparisons between it and certain European plant fixations such as the Dutch tulip craze and the English fascination with selections

of Auricula Primulas. Such European fads probably match events in the history of koten engei in intensity of short-term interest and in fineness of distinctions between cultivars, but none of the European episodes has repeated itself as koten engei has over the course of nearly three centuries.

One of the reasons for this difference might be that in the West many seem to view the kind of horticultural experience which the Japanese call koten engei as a kind of social aberration involving plant aberrations. We still harbor a strong prejudice against plants which lack "garden value;" novices and sophisticated gardeners alike dismiss such plants without a second thought. The European and American groups which breed and document forms of garden plants such as roses, daylilies, and dahlias often exhibit the same obsessive enthusiasm that characterizes Japanese Asarum hobbyists, but without the discipline of conventions: Can we imagine the American Daylily Society rejecting on principle all selections containing red pigmentation because they are, by definition, insufficiently elegant to be considered?

The Japanese do not see koten engei as an aberration at all but rather as a symbol of the maturation of society. Figure 67, redrawn from a Japanese horticultural magazine, illustrates this point. It shows a child

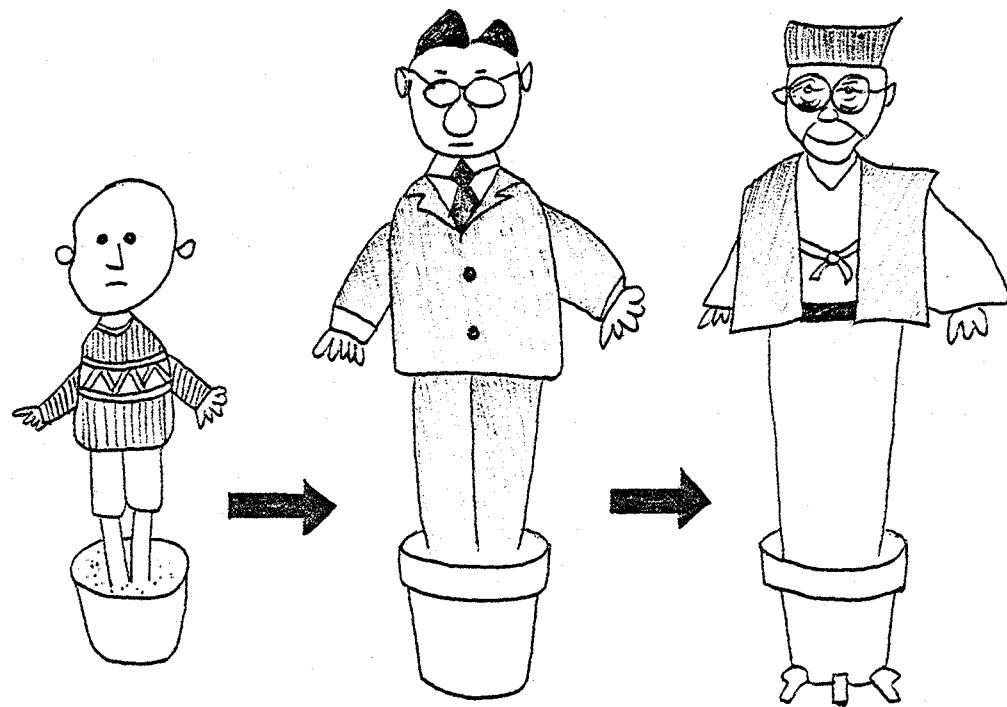


Figure 67. A cartoonist's representation of the maturation of plant interest in Japan.

SOURCE: Tadanori Tanimura, "Kan-aoi no Nakama," Nōkō to Engei 27 (March 1975):231.

Redrawn by Yong-Jun Chang.

"growing" in a pot of the type which Japanese use in nursery beds for young, common plants; a middle-aged man in the sort of ordinary but permanent pot that would be sold with a typical ornamental plant; and the distinguished patriarch in a pot of the style which is typically used for koten engei plants.

There are several ways in which the development of koten engei can be seen as evidence of the maturation of Japanese society. One is as a fundamental synthesis of imported Chinese aesthetic values and the native aesthetic spirit of the Japanese. This point has been prominent throughout the discussion of koten engei above. Somewhat less obvious is the fact that koten engei represents an example of the importance of "commoners," those not of the nobility, in the development of Japanese aesthetics, and if it did not actually help to break down class barriers (this author believes it did), it at the very least foretold the official recognition that class distinctions had outlived their usefulness. Most of all, the interest in koten engei is a symbol of the extension of discipline (convention, ritual) into the industrial society that Japan has become, and it still stands as an example of how the Japanese relish variety with fixed (often arbitrary) limits. It is tempting to carry the metaphor too far, but it may be possible to explain much

of Japanese personal and national behavior in terms of
this theme.

CHAPTER XI

CONCLUSION

The cultivation of koten engei plants such as Asarum is perhaps an extreme expression of Japanese horticultural tradition, but it is extreme only in degree. It does summarize many of the characteristics of ornamental horticulture as practiced by the ordinary citizen: the imaginative adaptation of plant culture to cramped urban spaces; an interest in plants which require the degree of close inspection which diverts the eye from the plants' surroundings; and a preference for plants which are more than normally dependent on the skill of the person who cares for them. All of these have the effect of creating a focused, intense gardening experience in what most Westerners would consider impossibly inhospitable gardening conditions.

The long-predicted and still elusive cultural synthesis between East and West still awaits our full awakening to the fact that the frontiers are gone, and

that "free" is not inevitably a synonym for "undisciplined." There is a place in American society (or any industrial urban society) for the degree of man-plant interdependence which characterizes much of traditional Japanese ornamental horticulture, including the cultivation of Asarum selections.

Some current trends in American gardening seem to point in this direction. There is heightened interest in urban gardening and the imaginative use of small urban spaces, including balconies and rooftops, and a growing market for plants which require a serious personal commitment from the owner. Bonsai cultivation appears to be enjoying sustained popularity, and specialty nurseries in some areas are limiting themselves to Japanese cultivars of some popular woody plants such as pines and maples.

In California there is at least one nursery which limits itself to a single koten engei group--Rhipis excelsa, and a book has recently appeared which explains in detail the Japanese approach to their cultivation. It is still possible that American urban gardeners will reject the idea of practicing suburban gardening in microcosm, and turn with enthusiasm to the Japanese model for finding larger rewards in a much smaller experience.

PART II
FOOTNOTES

¹²⁴ John W. Dower, The Elements of Japanese Design (New York and Tokyo: Walker/Weatherhill, 1971), p. 3.

¹²⁵ T. Okada, Shigaraki Restaurant, Kyoto, interview with the author, January 1978.

¹²⁶ Dower, The Elements of Japanese Design, p. 3.

¹²⁷ Ibid., p. 4.

¹²⁸ Kinsaku Nakane, Kyoto Gardens (Osaka: Hoikusha, 1965), pp. 103-104.

¹²⁹ Haruo Kawada, ed., Matsuo Taisha Ryakki (Kyoto: n.p., 1975), pp. 18-19, 24.

¹³⁰ Jon Carter Covell, "Mountain Spirit...2000-Plus Years Ago," Korea Times, 17 June 1981, p. 2.

¹³¹ Tadanori Tanimura, "Kosho ni Miru Kan-aoi Rui," Mine Hana 27 (1980): 62-4.

Hideo Haga and G. Warner, Japanese Festivals (Osaka: Hoikusha, 1968), pp. 41-3.

¹³² Ibid.

¹³³ Tanimura, "Kosho ni Miru Kan-aoi Rui," p. 64.

¹³⁴ Kawada, Matsuo Taisha Ryakki, p. 24.

¹³⁵ Hiroyuki Watanabe, "Two Illustrious Mons, 'Botan' and 'Aoi'," pamphlet.

¹³⁶ Dower, The Elements of Japanese Design, p. 4.

¹³⁷ Ibid., p. 11.

¹³⁸ "Nanki' to wa Honji Atate Ji no Kumiawase,"
Shokubutsu Kenkyu Zasshi 6 (10 February 1929): 216-19.

¹³⁹ Ibid.

¹⁴⁰ Dower, The Elements of Japanese Design, p. 9.

¹⁴¹ Ibid., p. 11.

¹⁴² Ibid., pp. 11-14, 16-24.

¹⁴³ Maggie Keswick, The Chinese Garden (New York: Rizzoli, 1978), p. 186.

¹⁴⁴ Ibid., pp. 186-87.

¹⁴⁵ Ibid., p. 187.

¹⁴⁶ Kujiko Kamisaki, ed., Engei Guide Bessatsu 1: Shumi no Koten Shokubutsu (Tokyo: Shufu no Yusha, 1975), pp. 32-37.

¹⁴⁷ Ryusaku Tsunoda, Wm. Theodore de Bary, and Donald Keene, eds., Sources of Japanese Tradition, 2 vols. (New York and London: Columbia Univ. Press, 1958), 1:174.

¹⁴⁸ Ibid., p. 175.

¹⁴⁹ Ibid., p. 278.

¹⁵⁰ Ibid., p. 280.

¹⁵¹ Ibid.

¹⁵² Donald Keene, ed., Anthology of Japanese Literature (New York: Grove Press, 1955), p. 197.

¹⁵³ Josiah Conder, Landscape Gardening in Japan (New York: Dover, 1964), p. 126.

¹⁵⁴ Ryōji Iwasa, "Edo no Engei," in the explanation volume accompanying the facsimile reprint of Sō Moku Ki Hin Kagami (Tokyo: Seiseido, 1976), p. 6.

- 154 Kazuo Inami, "Koten ni Miru Saishin Kangae," Mine Hana 27 (1980):59-61.
- 155 Iwasa, "Edo no Engei," pp. 6-8.
- 156 Ibid.
- 157 Ibid.
- 158 Ibid., p. 7.
- 159 Tsunoda, de Bary, and Keene, Sources of Japanese Tradition, pp. 434-37.
- 160 Teiji Itoh, Space and Illusion in the Japanese Garden (New York, Tokyo, and Kyoto: Weatherhill/Tankosha, 1973), pp. 80-92.
- 161 John Whitney Hall, Japan from Prehistory to Modern Times (New York: Dell, 1970), p. 219.
- 162 Ibid., p. 214.
- 163 Iwasa, "Edo no Engei," pp. 7-12.
- 164 Matoshi Yoshida, Hōka En Nursery, Nagoya, Japan, interview with the author, January 1978.
- 165 Tanimura, "Koshō ni Miru Kan-aoi Rui," p. 64.
- 166 Tadanori Tanimura, Kyoto, Japan, interview with the author, January 1978.
- 167 Iwasa, "Edo no Engei," p. 6.
- 168 Kazuo Inami, "Saishin no Yūrai to Saibai no Ryakushi," Garden Life 12 (1972): 40-41.
- 169 Ibid.
- 170 Ibid.
- Kaname Kato, "Chōsei-ran, Saishin, Tachibana no Hensen," Garden Life 10 (1976):40-2.
- 171 Ibid.
- 172 Tanimura, interview, January 1978.
- 173 Yoshida, interview, January 1978.

- 174 Tadanori Tanimura, "Saishin (Kan-aoi) Engei Shū no Tokuchō," Mine Hana 27 (1980):85-9.
- 175 Yoshida, interview, January 1978.
- 176 Eiji Yamahata, Kawauchinagano, Osaka, Japan, interview with the author, June 1978.
- 177 Yoshida, interview, January 1978.
- 178 Matoshi Yoshida, "Saishin," in Engei Guide Bessatsu 1: Shumi no Koten Shokubutsu, Kujiko Kamisaki, ed. (Tokyo: Shufu no Yūsha, 1975), p. 126.
- 179 Ibid.
- Kazuo Inami, "Saishin no Hinshu to Kaisetsu," in the Garden Life edition Koten Engei Shokubutsu (Tokyo: Seibundo Shinkosha, 1977), pp. 178-80.
- 180 Yoshida, "Saishin," pp. 256-59.
- 181 Ibid.
- 182 Yoshihiro Okita and J. Leland Hollenberg, The Miniature Palms of Japan (New York and Tokyo: Weatherhill, 1981), pp. 61-2.
- "Koten Shokubutsu no Hachi," in Engei Guide Bessatsu 1: Shumi no Koten Shokubutsu, Kujiko Kamisaki, ed. (Tokyo: Shufu no Yūsha, 1975), pp. 128-31.
- 183 Yoshida, interview, January 1978.
- 184 Tanimura, "Saishin (Kan-aoi) Engei Shū no Tokuchō," p. 85.
- 185 Nihon Saishin Rengō Kai, "Saishin Meikan," Asarum rankings chart, 1976.
- 186 Nihon Saishin Rengō Kai, "Saishin Meikan," Asarum rankings chart, Mine Hana 27 (1980):84.
- 187 Ryōji Iwasa, "Edo Jidai no Engei," in Engei Guide Bessatsu 1: Shumi no Koten Shokubutsu, Kujiko Kamisaki, ed. (Tokyo: Shufu no Yūsha, 1975), pp. 140-47.

- ¹⁸⁸Toshio Ando, Chiba University, Matsudo City,
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- ¹⁸⁹Hōka En Nursery, Nagoya, Japan, catalog.
- ¹⁹⁰Yoshida, interview, January 1978.

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APPENDIX 4
A SELECTED GLOSSARY OF THE
CHARACTERISTICS (GEI)
OF ASARUM CULTIVARS

Aojiku (green stalk): Pale green, rather than purplish, leaf petiole.

Ararefu (hail variegation): Scattered spots of irregular size.

Asafu (pale variegation): Variegated with a color almost the same as the ground color; resembles a textured pattern.

Chirifu (scattered variegation): The same as ararefu.

Chō (butterfly): A splash of white, yellow, or paler contrasting green in the sinus of the basal lobes; usually occurs with tani.

Chuya (morning and evening): Upper and lower surface of leaves of contrasting color. Also known as hiruyoru.

Dorojiku (muddy stalk): Leaf petiole purplish; an undesirable characteristic.

Eriawase (joined lapels): Overlap of basal lobes; also written chōgasane.

Fukurin (ornamental border): Marginal variegation.

Gomafu (sesame variegation): Small clear spots.

Ichimonji (beeline): Same as tani.

Kaerifu (fading variegation): Mixture of light and dark variegation.

Keba (hairy leaf): Pubescent foliage. Also read mōyō.

Kikkō (tortoise shell): Lines of color which contrast with the ground color and follow the main veins.

Nagarefu (running variegation): Light and dark variegation running along the veins.

Nori: Very fine striping, as if made by a half-dry paintbrush.

Rashaji (woolen cloth): Thick succulent leaves with a velvety surface texture.

Sagari Fuji (hanging wisteria): Two distinct elongated blotches of color, paler than the ground color, on each side of the midrib. Usually white, yellow, or silver.

Shimofu (frost variegation): A salt and pepper variegated effect.

Tamafu (jewel variegation): A large round spot of color in the center of the leaf, contrasting with the ground color. Usually yellow, white, or silver.

Tani (valley): A contrasting line of color following the midrib. Usually yellow, white, or silver.

Torafu (tiger variegation): Large and small spots of variable size. Usually yellow, white or silver.

Uchidashi (beaten out): Deeply sunken veins and convex interveinal spaces.

Zu (map): Irregular, assymetrical yellow or white patches, often accompanied by a torn or distorted leaf margin.

APPENDIX 4

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APPENDIX 5

DESCRIPTIONS OF KOTEN ENGEI

ASARUM CULTIVARS

The following cultivars have been listed in publications since 1946, and most of them are still in cultivation. The source number which follows each description is the primary source for that cultivar, but other sources have been used in some cases to verify and elaborate descriptions. The style of romanizing the Japanese names is my own; it is intended to make the names as intelligible as possible for those who do not read Japanese. Refer to the preceding appendix for the meaning of the special terms used in the descriptions.

Aikoku-no-Hana 愛國の花 (flower of my beloved country)

A mutation of 'Mezamashi', and similar to it; tani changing to spots at the end of the leaf. (3)

Akebono 曙 (dawn)

Pointed, tapered leaf; dark leaf resembling 'Chiyo-no-Kotobuki', with cho and variegation. (3)

Asahi Nishiki 朝日錦 (rising sun brocade)

Rounded leaf with tani; kikkō with spots and variegation. Named in 1940. (1)

Asahi Zuru 朝日雀鶴 (morning sun and crane)

Pale, rounded leaf; tani and chō. (3)

Asama Kirifu 滅間切斑 (variegated, with pale spaces)

Round glittering leaf with snow-white ararefu. (3)

Chikyu Hō 地球宝 (earth's treasure)

Scattered bright variegation, not quite nagarefu. Resembles 'Miho-no-Matsu'. (3)

Chiyodafu 千代田斑 (Chiyoda variegated)

Mutation of 'Mezamashi'. Small, oval, blue leaf with silver nori, tamafu, and broad white tani. (3)

Chiyoda-no-Matsu 千代田の松 (pine of Chiyoda)

Chō and sagari fuji; extremely good basal overlap. Resembles 'Mikasa' without tani. (3)

Chiyo-no-Kotobuki 千代の寿 (1000 generations of long life)

Large and small white variegation on green leaf; beautiful in winter. Good eriawase; sometimes has chō. Good for breeding. (1)

Chōraku Nishiki 長樂錦 (extended happiness brocade)

Mutant of 'Tanimono-Yuki' with chō and tani. (3)

Chōseiden 長生殿 (palace of long life)

Small, glistening blue leaf with kikkō and sagari fuji. (3)

Chōyō 朝洋 (morning sea)

Egg-shaped, fleshy leaf with kikkō and nagarefu. (4)

Chōyō 朝陽 (morning sun)

Large fleshy leaf with good eriawase, kikkō, large and small variegation, and silver ararefu. Resembles 'Taiyo', of which it is a seedling variation. (1)

Dai Koku Ten 大黒天 (great dark sky)

Medium size, succulent leaf with good eriawase; strong blue-green ground color and yellow-tinged kikkō. Lower part of leaf is constricted so that it is wider at the apex. A mutation of 'Kuro Botan'. (1)

Fuku Botan 福牡丹 (lucky peony)

Sparkling leaf with distinct yellow kikkō; small variegation in tani. Resembles 'Fuku Ebisu'. Derived from 'Dai Koku Ten'. (4)

Fuku Ebisu 福恵比寿 (god of wealth)

Large round leaf; dark blue-green with pale yellow kikkō. Excellent eriawase; glistening silky leaf surface. Elegant cultivar. (1)

Fuku Hime 福姫 (lucky princess)

Small rounded leaf; good eriawase. Dark blue-green ground with pale ashen silver sagari fuji; tani and chō small and clear. Beautiful in winter. Elegant cultivar. Sometimes listed as 'Hime Fuku'. (1)

Ginsekai 銀世界 (silver world)

Oval leaf with nagarefu; edge of leaf rolled under. (3)

Gokuki Kotobuki 極黄寿 (extremely yellow long life)

Oval leaf with large patterns of variegation. (3)

Gosho Zakura 御所桜 (old imperial palace cherry)

Superior form of 'Tōyō Den'. (3)

Gyoku Kan 玉冠 (jeweled crown)

Round leaf with good eriawase; large chō and silver tani, and silver-white tamafu. Elegant cultivar. (1)

Gyokutō 玉通 (jewelled road)

Similar to 'Gyokuto', but with tani. (3)

Gyokuto 玉兔 (jewel rabbit)

Large, egg-shaped, succulent leaf with pale green ground and large white tamafu. Also known as 'Tama Usagi'. (2)

Hakuchō 白虫葉 (white butterfly)

Small round leaf, lustrous and pale green; large tamafu. (4)

Haku Raku Ten 白楽天 (innocent optimism)

Small round leaf; thick and pubescent with excellent eriawase. Silver chō and tani with gomafu overall. Elegant, old, and beautiful cultivar; somewhat weak. (1)

Haku Un 白雲 (white cloud)

Similar to 'Haku Raku Ten', but with strongly blue ground color. (3)

Haku Unryū 白雲竜 (white dragon cloud)

Glistening leaf with indistinct variegation and sagari fuji. (3)

Haru Kasumi 春かすみ (misty spring)

Silky leaves with ararefu on edges. (3)

Hazakura

葉桜

(cherry leaf)

Round, fleshy, glistening leaf with good eriawase and snow-white variegation. Flower somewhat purplish. (1)

Heiwa-no-Hikari

平和光

(light of the Heiwa era)

Oval leaf with green ground color; strong and thick tani and small variegation all over. (3)

Hindode

日の出

(sunrise)

Round, pale green leaf with snow-white kikkō and nagarefu. (1)

Hō Juraku

豊楽

(gift of abundant happiness)

Oval, succulent, strongly blue leaf with good eriawase, broad snow-white tani, silver tamafu, and white hairs on both sides of the tamafu. (3)

Hō Ō Nishiki

鳳凰錦

(phoenix brocade)

Somewhat rounded leaf; dark blue-green ground with yellow kikkō and cho. (1)

Hōseiden

宝生殿

(living jewel palace)

Rashaji with white variegation. Long oval blue leaf with kikkō. Originated at Hōka En (nursery). (3)

Hōsei Nishiki

宝生錦

(living jewel brocade)

Round leaf with strong green ground color and good eriawase. Tani and cho with large distinct variegation all over. (3)

Hoshi-no-Homare

星の耀

(pride of the stars)

Variegated leaf with sagari fuji. (3)

Ichimonji Kotobuki 一文字寿 (beeline; long life)

Leaf with a "straght line" tani. (3)

Ise Nukusumi 伊勢擗墨 (Ise Shrine; select charcoal)

Thin oval leaf without a pattern; strong dark blue-green ground color. (3)

Ishibashi 石橋 (stone bridge)

Dark green ground color with white chō and tani. (2)

Isosuzu 五十金 (fifty bells)

Same as 'Sankō Nishiki'.

Jindai 神代 (age of the gods)

Large round leaf with pale bluish-green ground color; silver-white gomafu and pale yellow kikkō. (1)

Kikkō Ararefu 龜甲霰斑 (hail-marked tortoise shell)

Leaves patterned with kikkō and ararefu. Old cultivar. (4)

Kimigaya 君代 (your generation)

Oval leaf with kikkō, nori, and tamafu; good eriawase. (3)

Kinbotan 金牡丹 (golden peony)

Oval, dark green leaf with thick tani and pure white kikkō. (3)

Kinjōkan 金城冠 (impregnable castle's crown)

Rather round, pubescent, strongly blue leaf with distinct yellow lines. (3)

Kinjōkan-no-Fu 金城冠文班 (variegated Kinjōkan)

Strong dark blue-green ground color; strong, distinct white variegation on a yellow brocade pattern.
Elegant cultivar. (4)

Kinkaku 金閣 (gilded structure)

Large leaf with white tani; resembles 'Kinpu'. (3)

Kinpō 錦鳳 (brocade phoenix)

Somewhat large leaf, oval and black-green, with wide yellow tani. Elegant cultivar. (1)

Kinpō Nishiki 金鳳錦 (golden phoenix brocade)

Oval leaf with strong dark blue-green ground color and silver-white tani. (4)

Kinpū Nishiki 金風錦 (autumn breeze brocade)

Long, oval, pubescent leaf; strong blue ground color and silver-white tani. (3)

Kinryū Hō 金龍寶 (golden dragon treasure)

Round leaf; green ground color with tani and chō; tani becomes somewhat rounded. (3)

Kinsei 錦星 (brocade star)

Good leaf shape with strong blue color and small yellow variegation. (3)

Kinseikō 錦星光 (light from Venus)

Thick, pubescent, green leaf with greenish-white kikkō. New leaf has yellow-green zu which later darkens. Very elegant cultivar. (1)

Kinseikō-no-Zu 錦星光之図 (map of Venus's light)

Similar to 'Kinseikō', but with a zu which ruptures in an elegant manner. Very expensive. (4)

Kintancho 錦丹頂 (red summit brocade)

Round, medium-size leaf with strong blue-green color; succulent and glossy with good eriawase. Edge of leaf slightly rolled under. Elegant cultivar. Also listed as 'Nishiki Tancho'. (1)

Kiōden 貴王殿 (elegant palace)

Large leaf with good eriawase and small variegation scattered over the leaf and a narrow silver-white tamafu. Easy to cultivate and propagate. (1)

Kirishima 霧島 (misty mountain)

Round leaf with strong dark blue ground color and extremely good eriawase. Rough, snow-white gossamer-like brocade variegation. (3)

Kōa-no-Hikari 銀葉の光 (light of Asian development)

Oval leaf with silver kikkō. Developed in 1945. (4)

Koganebashi 黄金橋 (golden bridge)

Medium size, pubescent, strongly dark blue-green leaf; yellow-white tani. (4)

Koganemaru 古金丸 (old coin)

Round, pale rashaji leaf with small variegation. (3)

Kōki 光輝 (splendor)

Thick leaf with blue ground color and rough variegation. Resembles 'Chiyo-no-Kotobuki'. (3)

Kokujō 黒城

(dark castle)

Round unpatterned leaf with poor eriawase. (3)

Koku Ōden 国王殿

(king's palace)

Resembles 'Ōden', but eriawase is not good. Light blue-green ground with tamafu. (4)

Kōmeiden 晃明殿

(palace on a clear morning)

Leaf sharply pointed with kikkō and tani. (3)

Koryūmaru 小竜丸

(small rounded dragon)

Resembles 'Ryūto' but with small leaves. (3)

Kōyō 皇陽

(emperor)

Rounded leaf with very good eriawase. Color resembles 'Oi-no-Tomo'. Kikkō and nagarefu present. (4)

Kuro Botan 黒牡丹

(black peony)

Succulent, medium size leaf with good eriawase. Nearly black, bluish-green unpatterned leaf with a polished surface. Irregular uchidashi over leaf surface. Old, strong cultivar. (1)

Kuro Botan Ararefu 黑牡丹露珠 (black peony with ararefu)

Similar to 'Kuro Botan' but with pale blue-green ararefu. Elegant cultivar. (1)

Kuro Botan Shirotora 黑牡丹白虎

(black peony, white tiger)

Similar to 'Kuro Botan' but with white torafu. (3)

Maizuru 舞鶴

(dancing crane)

Medium size, oval leaf with good eriawase and small snow-white variegation scattered all over. Sometimes other patterns of variegation appear. (1)

Manazuru 東鶴

(crane of purity)

Thin, rounded, pubescent leaf with strongly dark blue-green ground color and white kikkō. (4)

Mangetsu 満月

(full moon)

Not described, but related to 'Taizan Setsu'. (3)

Mezamashi 目覚

(awakening)

Elongated leaf with an "oasis"-like kikkō pattern. (4)

Miho-no-Matsu 三保の松

(thrice-enduring pine)

Small, rounded leaf with good eriawase; dark green with silver-white tani and chō and silvery areas of various sizes scattered over the leaf. An old, elegant cultivar. (1)

Mikasa 三笠

(three bamboo hats)

Rounded leaf with good eriawase. Two kinds of chō may be present on one plant. Hairs may be present in tani area. Small variegation and nori all over leaf, with a large, cloudy area in the center. Elegant cultivar. (1)

Miyako-no-Chō 蜀^フの蝶

(Kyoto butterfly)

Yellow-green leaf with a pale "cloud mark" (indistinct silvery patch). (3)

Miyo Nishiki 御錦

(brocade of the realm)

Similar to 'Miho-no-Matsu' but without chō. (3)

Murasame 村雨 (passing shower)
Egg-shaped leaf with the edge rolled under. Very narrow tani; cho and variegation present. Resembles 'Yozakura' and 'Miho-no-Matsu'. (4)

Myōjō 明星 (morning star)
Lustrous leaf with snow-white variegation. (3)

Nagara Nishiki 長良錦 (Nagara River brocade)
Dark blue-green leaf; tani and cho with small hairs. Mutant of 'Tanimono-Yuki'. Elegant cultivar which appeared in 1945. (1)

Nichi Getsu 日月 (sun and moon)
Long leaf with cho, sagari fuji, and small variegation. (3)

Nishiki Matsu 錦松 (pine brocade)
Egg-shaped leaf with blue ground color on which variegation appears. (3)

Nishiki Tanchō 鯉丹頂 (red peak brocade)
"Domed leaf" cultivar of great elegance. (3)

Obusa Kikkō 結房亀甲 (tasseled cord tortoise shell)
Kikkō above, underside of leaf red-purple. Old cultivar, also listed as 'Shobō Kikkō', which is probably a distinct cultivar. (4)

Oi-no-Tomo 老友 (old friend)
Round, dark blue-green leaf with snow-white kikkō and silver-white ararefu all over the leaf. Very expensive and elegant cultivar. (1)

Oiraku 老樂

(past pleasures)

Long, egg-shaped leaf with rough texture. Good eriawase and kikkō. (3)

Ōkan 玉冠

(jewelled crown)

Round leaf with good eriawase; silver-white tani, chō, and tamafu. Elegant cultivar. (4)

Otafuku ち多福

(moon-faced woman)

Fleshy, pubescent leaf; strong dark blue-green ground color. Tani, chō, and white tamafu; some light blue-green color present. Resembles 'Kinsei-no-Fu'. Rare. (4)

Ōta Kirifu 大田切狂

(Ōta variegated)

Round tamafu and inferior eriawase. (3)

Ōtori 鳳

(male phoenix)

Green leaf with good eriawase; long basal lobes with slight variegation. (3)

Rasha Maru 罗紗丸

(round woolen cloth)

Oval leaf; rashaji with scant variegation. (3)

Rasha Maru-no-Zu 罗紗丸の図 (round woolen cloth map)

Egg-shaped, blue-green leaf; velvety and succulent. Scattered variegation and yellowish-white zu. Extremely elegant cultivar. (1)

Rashaō 罗紗王

(royal woolen cloth)

Leaf tapering to a sharp, narrow from the middle to the tip. Rashaji with little variegation. (3)

Rokka Ka 六歌華 (six poem flower)

Similar to 'Rokka Sen', but with a twisted leaf. (3)

Rokka Sen 六歌仙 (six great poets)

Large oval leaf with good eriawase. Clear beautiful tani and chō; silver kikkō and strong gomafu. Named in 1912. (1)

Rokka Sen-no-Fu 六歌仙之斑 (variegated Rokka Sen)

Oval leaf with pasty surface; distinct silver kikkō large snow-white tamafu. Very expensive cultivar. (4)

Ryūtō 龍頭 (dragon's head)

Round leaf with good eriawase; thick yellow kikkō. Said to have a "brooding" appearance. (3)

Sagari Fuji 下(フ)藤 (hanging wisteria)

Strong blue-green ground on an oval leaf with good eriawase. Silver-white sagari fuji and small variegation in chō area. (3)

Saigo Nishiki 西緑錦 (west country brocade)

Similar to 'Tama Arare', but with torafu. (3)

Sankō Nishiki 三光錦 (three lights brocade)

Snow-white and yellow variegation on a pale yellow-green ground. (3)

Seikai 青海 (blue sea)

Ordinary leaf, with kikkō. (3)

Seiun 星雲

(nebula)

Small, thick leaf with large white tamafu and small variegation scattered at the perimeter of the leaf. (1)

Seki-no-Tō 関の戸

(gateway)

Very large, broad, somewhat twisted leaf, strongly dark green and lustrous. "Beaten under" margin at basal lobes and white chō. (4)

Sekkyō 雪木橋

(snow bridge)

Medium size pubescent leaf with good eriawase. Dark blue-green with white tani and chō. Old, elegant cultivar. (1)

Setsu Gekka 雪月花

(snow, moon, and flowers)

Thin leaf with tamafu and strong and pale large variegated designs. (3)

Shachi 魚虎

(killer whale)

Similar to 'Tatsuta-no-Hikari', but with pale leaves. (3)

Shichi Fukuju 七福寿

(7 prosperities and long life)

Strongly blue ground color; lustrous. Produces zu pattern. Mutant of 'Fuku Botan'. (3)

Shikishima 萩

(an old name for Japan)

Round, dark green leaf with small variegation which resembles 'Miho-no-Matsu'. (4)

Shiro Botan 白牡丹

(white peony)

Small, thick, succulent leaf with good eriawase; broad tani and chō of snow-white color. (4)

Shobō Kikkō 絡房亀甲 (tassel thread tortoise shell)

Kikkō and variegation above, underside purple. (3)

Shōkō Nishiki 蜀光錦 (bright brocade caterpillar)

Small, round, textured, pale blue-green leaf with snow-white torafu. Underside of leaf purple. Rare and elegant. (1)

Showa Nishiki 昭和錦 (Showa era brocade)

Round leaf with good eriawase, lustrous. Strong blue ground color with white kikkō. Elegant. (3)

Surusumi 插墨 (ink print)

Large, long, oval leaf, velvety and succulent. Dark blue-green ground with pale yellow tanī. Weak. One-hundred-year-old cultivar perhaps extinct. (1)

Taiheiden 太平殿 (tranquil palace)

Heart-shaped leaf with no eriawase. Blue ground color with broad white tanī and chō which look like refined sugar. Pale yellow-white sagari fuji. Beautiful, elegant cultivar. (1)

Taiheiraku 太平樂 (gossip)

Egg-shaped pubescent leaf with the edge folded under and good eriawase; small tanī and chō. Similar to 'Haku Raku Ten' but larger with less basal overlap. (4)

Taikasen-no-Fu 大歌仙王 (a great poet; variegated)

Round leaf with good eriawase and silver kikkō, tanī, and chō. (3)

Taiyō 太陽 (tranquil sun)

Egg-shaped, fleshy leaf; pale blue-green ground color with white kikkō and chō with a little silver-white nori all over. Elegant, but also robust and easy to grow. (1)

Taizansetsu 泰山雪 (snow on Mt. Taizan, China)

Round, pubescent leaf with good eriawase; strong dark blue-green ground color with rough snow-white variegation. (4)

Takara Nishiki 宝錦 (treasure brocade)

Round leaf with good eriawase, and ararefu. Graceful and refined cultivar. (4)

Tama Arare 玉霰 (hailstones)

Round, medium size leaf with ararefu. (3)

Tama Kogane 玉黄金 (gold coin)

Round leaf with excellent eriawase; plus tani and clear tamafu. Mutant of 'Kiōden'. (3)

Tama Kujaku 玉孔雀 (jewel peacock)

Egg-shaped, undulate, succulent leaf; dark green ground color with white, teardrop-shaped tamafu pointing away from the base. Elegant cultivar. (1)

Tama Rasha 玉羅紗 (jewelled woolen robe)

Round, green leaf; rashaji with small variegation. (3)

Tanchō 丹頂 (red summit)

Medium size, oval, glittering, succulent leaf with average to good eriawase; dark green with green tani and chō. Clear, beautiful design. (1)

Tanima Kikkō 谷間亀甲 (valley tortoise shell)

Medium size, elongated leaf with silver-white tani, chō, and kikkō. Old cultivar. (1)

Tanima-no-Chō 谷間の虫葉 (valley butterfly)

Sparkling leaf with tani, chō, and sagari fuji. (3)

Tatsuta-no-Hikari 立田の光 (light of Tatsuta)

Large leaf with snow-white sagari fuji. (3)

Teikan 帝冠 (emperor's crown)

Small round leaf with pale yellow torafu which vanishes as the leaf ages. (3)

Tenkō Nishiki 天光錦 (heaven's light brocade)

Leaf texture like 'Kuro Botan'; kikkō pattern like 'Dai Koku Ten'. A seedling of the latter. (3)

Tensuzuden 天金殿 (heavenly bell palace)

Round leaf with good eriawase, plus chō, tamafu, and white spots. Seedling of 'Gyoku Kan'. (4)

Togetsukyō 渡月橋 (Togetsu bridge)

Small, oval leaf with gomafu and tani. Resembles 'Haku Raku Ten', but without chō. (3)

Tokiwa 常磐 (eternity)

Round, pubescent leaf, sharply pointed at apex with good eriawase. Strong blue ground color with white tani and chō; hairs in tani area. (3)

Tōyōden 東洋殿 (oriental palace)

Bright, sharply-pointed leaf with strong blue ground color, and nagarefu. (3)

Tsukasa Botan 司牡丹 (official peony)

Glittering, medium size leaf; strong blue ground color with chō. (4)

Tsuyū-no-Chō 露の蝶 (dewy butterfly)

Round, medium size, pubescent, strongly dark blue leaf with chō. (4)

Tsuzura Nishiki ツツラ錦 (Tsuzura brocade)

Glistening leaf with sagari fuji. (3)

Yakō 夜光 (foxfire)

Underside of leaf reddish-purple, with some color in petiole; eriawase not good. (3)

Yakō-no-Fu 夜光の王 (foxfire; variegated)

Round leaf with pale, cloudy variegation; leaf reverse purple. (3)

Yoshino Zakura 吉野桜 (Japanese cherry blossom)

A superior selection of 'Yozakura'. (3)

Yozakura 夜桜 (evening cherry blossom)

Large, oval leaf with green ground color; dark green and ashen silver variegation, plus tani and chō. Old, beautiful, superior cultivar; elegant. (1)

Zansetsu 猫雪 (lingering snow)

Round, pubescent leaf with strong blue ground color and faded flecks of snow-white variegation. (3)

Zuigyokuhō 瑞玉宝 (elegant jewelled crown)

Oval leaf with snow-white tamafu. (3)

APPENDIX 5

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APPENDIX 6

ASARUM MEIKAN RANKINGS (1976)

Below are listed the names of one hundred Asarum cultivars in the order in which they were ranked by the Japanese Asarum society (Saishin Rengō Kai) in 1976. They are numbered to match the key to figure 66, found on page 235.

- | | |
|---------------------|------------------------|
| 1. Kinseikō-no-Zu | 16. Hō Ō Nishiki |
| 2. Rasha Maru-no-Zu | 17. Gyokuto |
| 3. Kōa-no-Hikari | 18. Taizansetsu |
| 4. Kinjōkan-no-Fu | 19. Fuku Ebisu |
| 5. Miho-no-Matsu | 20. Tama Kujaku |
| 6. Tanchō | 21. Shōkō Nishiki |
| 7. Otafuku | 22. Yozakura |
| 8. Nagara Nishiki | 23. Kuro Botan Ararefu |
| 9. Kinpō | 24. Dai Koku Ten |
| 10. Fuku Musume | 25. Gyoku Kan |
| 11. Kokuōden | 26. Haku Raku Ten |
| 12. Tensuzuden | 27. Benten |
| 13. Hazakura | 28. Fuku Botan |
| 14. Kōyō | 29. Horai-no-Hana |
| 15. Kiōden | 30. Seiun |

- | | |
|-----------------------|--------------------------|
| 31. Shichi Fukuju | 64. Heiwa-no-Hikari |
| 32. Kinseikō | 65. Kinryū Hō |
| 33. Fuku Hime | 66. Chōmeiraku |
| 34. Mikasa | 67. Ginsekai |
| 35. Jindai | 68. Kuro Botan Shirotora |
| 36. Sekkyō | 69. Sankō Nishiki |
| 37. Rasha Maru | 70. Mezamashi |
| 38. Hinode | 71. Koganebashi |
| 39. Chōyō | 72. Nishiki Matsu |
| 40. Tanimura Kikkō | 73. Zansetsu |
| 41. Oi-no-Tomo | 74. Zuigyokuuhō |
| 42. Rokka Sen | 75. Oiraku |
| 43. Akebono | 76. Takara Nishiki |
| 44. Taiheiraku | 77. Tsuyu-no-Chō |
| 45. Togetsukyō | 78. Seki-no-Tō |
| 46. Kinpō Nishiki | 79. Setsu Gekka |
| 47. Tanimura-no-Yuki | 80. Chōseiden |
| 48. Maizuru | 81. Tama Arare |
| 49. Shikishima | 82. Gokuki Kotobuki |
| 50. Chujo-no-Kotobuki | 83. Koganemaru |
| 51. Kinjōkan | 84. Rokka Ka |
| 52. Asahi Nishiki | 85. Kishō |
| 53. Asahi Zuru | 86. Gyoku Tō |
| 54. Murasame | 87. Tenkō Nishiki |
| 55. Nichi Getsu | 88. Miyako-no-Chō |
| 56. Taiyō | 89. Tōyōden |
| 57. Hakuchō | 90. Kinsei |
| 58. Tokiwa | 91. Tama Rasha |
| 59. Miyo Nishiki | 92. Kuro Botan |
| 60. Takasago | 93. Ōtori |
| 61. Tsukasa Botan | 94. Ichimonji Kotobuki |
| 62. Isosuzu | 95. Kimigaya |
| 63. Chikyu Hō | 96. Yakō-no-Fu |

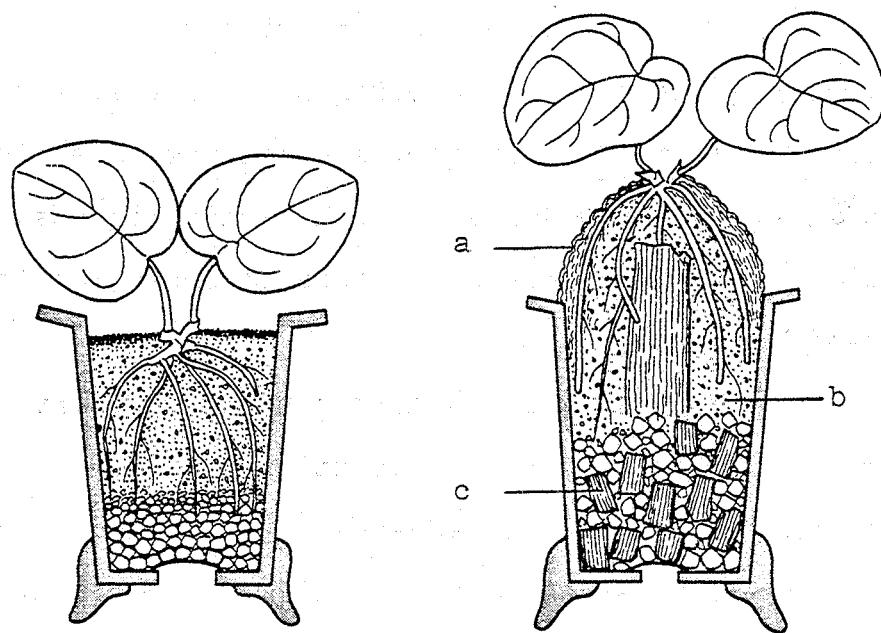
97. Manazuru
98. Myōjō
99. Ryūtō
100. Ōta Kirifu

APPENDIX 7

TECHNIQUES OF ASARUM CULTIVATION

Whether or not traditional rakuyaki pots are used to grow Asarum, the pot selected should be much deeper than wide. Porous clay pots are much better than plastic or glazed ceramic. Maintenance of perfect drainage is an essential point, so there should be several drainage holes at the bottom or a single large hole which can be covered with screen.

Asarum are not unusually choosy about soil as long as the mixture is not alkiline, drains well, and contains some organic matter. A good mixture consists of two-thirds coarse, sharp river sand, and one-third screened compost. The sand should be washed to remove the finest particles, and bits of charcoal should be added to the mix. The figure in this appendix shows two methods of potting. In both examples the plant is set so that the buds and rhizome are just at the soil level. As the illustration shows, the plants may be set below the rim of the pot,



Two methods for potting Asarum

- a. Live sphagnum moss covering and holding the soil
- b. Potting mixture of coarse, sharp sand and screened compost
- c. Chunks of charcoal

SOURCE: Garden Life edition Koten Engei Shokubutsu
(Tokyo: Seibundo Shinkosha, 1977), p. 46.

or upon a mound above the rim, with sphagnum moss covering the soil and holding it in place. In this case, large chunks of charcoal are sometimes added in the center. The mounded style of planting is used for plants which will be displayed because it shows the leaves to best advantage.

Repotting is usually done in February, just before the new leaves emerge. Repotting is sometimes done in autumn, but this will adversely affect the winter appearance of the leaves (which is distinctive in some cultivars) and encourage fungus infection of damaged roots. The old leaves can be cut off if the repotting is done in early spring. Plants are divided by cutting the rhizome and gently untangling the roots. Newly potted plants must be drenched with benlate solution to prevent fungal infections of the roots and leaves. Treatment with benlate solution is often continued throughout the growing season, especially for valuable and weak-growing clones.

Asarum require little nitrogen, and prefer a small but constant supply. Timed-release fertilizer with a low nitrogen ratio can be added to the soil mix, or a weak solution of a low-nitrogen water-soluble fertilizer can be applied during seasons of active growth.

Pots of Asarum should be kept in a bright area exposed to the morning sun but sheltered from the direct

rays of the afternoon sun. Strong light will produce compact plants of good color while too much direct sun fades colors or burns the leaves. The growing medium should not be allowed to become completely dry, but the pots must always drain perfectly. Watering must be carefully attended to in hot dry weather. Pots may be plunged in sharp sand if they dry out too quickly. The plants must be kept cool in the winter, but the pots must not freeze. An unheated greenhouse is ideal for winter storage in most climates if the pots are plunged in sand over the winter.

Asarum are not subject to many insect or disease problems, and in fact the leaves are toxic to most insects. The most serious problem is root rot caused by poor drainage or heavy soil. Snails and slugs are fond of Asarum and must be carefully controlled with poison baits. Plants are sometimes infected with scale insects which can be controlled by removing all the old leaves in early spring and then spraying with systemic insecticides. Strict sanitation will prevent most serious disease and insect problems from becoming well-established. The author believes that the zu (map) pattern of some cultivars is the result of a virus infection which can be transmitted to other plants. Collectors who do not wish to find such distortions of leaves throughout their collections should

isolate such clones.

Propagation of cultivars has always been done by division. Leaf petioles with the blade attached root fairly easily, but bud initiation is very slow and might not occur at all. Meristem culture might be a suitable method for rapid increase in the future. New cultivars are produced by removal and propagation of bud sports and by planting seeds taken from cultivated plants. Experienced hobbyists know which pattern crosses are most likely to produce desirable offspring, but this information is usually closely guarded.

Hand crossing of Asarum is tedious but not very difficult. Just as a flower bud is about to open, the calyx tube is removed above the point of union with the ovary by cutting around the tube with a razor blade. The stigmas are receptive just at the opening of the flower. The stamens are removed from the flower which will be fertilized to prevent self-pollination, and pollen from another flower is applied with a fine brush. The anthers release their pollen several days after the opening of the flower. The fertilized flower is covered with a small envelope of foil or plastic film to keep out excess moisture.

The seeds are removed from the disintegrating capsule and planted at once without drying. Even a short

period of drying greatly reduces germination. Seedlings emerge the following spring, and take three to seven years to reach sexual maturity, depending on the vigor of the clone.

Care of Asarum in the garden is simple if the proper site is selected. A deep, well-drained soil is essential, as is protection from the afternoon sun. All species will tolerate the deepest shade, but slugs and snails are often a serious problem in dark, moist spots. Once established, Asarum send their roots deep into the soil and do not require much surface moisture. A light mulch and occasional deep watering suit them well. Plants outdoors can be divided about every three years, in spring, to increase the planting, but division does not have to be done for the plants' sake.

APPENDIX 7
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APPENDIX 8

ASARUM SPECIES IN JAPANESE GARDENS

Japanese Asarum species are sometimes grown in the garden by the Japanese, but not as part of the conventionalized system of koten engei. Collecting species of Asarum is enjoying a wave of popularity in Japan in the context of the Japanese fascination with obscure native plants in general. The garden use of the species is limited to evergreen species, mostly those of the Nipponicum species group, and especially A. takaoi, which is sometimes used in shaded corners of the garden to soften the transition from rock to soil line. Most collectors of species grow them in ordinary pots arranged in whatever odd spaces are available. If they are grown for display they may be grown in rustic containers, sometimes in combination with other simple native herbaceous plants for seasonal indoor decoration. Many other native herbaceous plants are grown and displayed in this way. The collecting of wild plants for this purpose

by hobbyists and nurserymen has already resulted in the extinction of Asarum minamitanianum in the wild, and seriously threatens the existence of several other species.

APPENDIX 9

JAPANESE ASARUM IN AMERICAN GARDENS

Japanese Asarum species deserve a place in American gardens. There are many species with good ornamental qualities as is noted in the discussion of species in the first part of this paper, and the genus provides an abundance of opportunities for hybridization and selection. All the species are tolerant of shade and severe root competition, and most of them require very little attention if they are sited properly and tended carefully until they are established. Beauty of foliage and flowers, rapidness of spread and increase, and tolerance of stress are widely variable within the genus, and there seem to be few barriers to interspecific hybridization. Most species seem to be much hardier than their provenance would indicate, and there several very hardy species. A selection of the finest ornamental and cultural features within the genus, combined in a series of hybrid selections, would provide interesting evergreen ground cover for

some shaded garden sites. Asarum takaoi, with its beautiful variable foliage, tolerance of dryness, and rapid increase and spread, is a natural choice for selection and hybridization. Many of the species, as well as the cultivars, would be useful as unusual pot plants for the cool greenhouse or porch.

Americans are becoming increasingly selective and sophisticated in their choice of plants for their gardens, prompted at least in part by the need to garden in smaller spaces, as well as the overuse of a limited array of the more sturdy ornamentals. As suburban gardens mature there develops more need for plants which will thrive in the shade, especially those which can endure root competition. Asarum seem to be well-adapted to the changing needs of American gardening.

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