A general survey of Japanese vegetation = Allgemeine Übersicht über die Vegetation Japans

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A general survey of Japanese Vegetation

Allgemeine Übersicht über die Vegetation Japans

by

A. MIYAWAKI

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1. NATURAL VEGETATION ON THE JAPANESE ISLANDS

The Japanese Archipelago, from Hokkaido in the north to the Ryukyu Islands in the south, extends in a 3000 km-long arc along the east coast of Eurosiberia. Thanks to the diversity of climates, soils, and topographic situations, over 6000 species of higher plants grow on the islands. Because of close ties with almost all continents and countries of the earth, more and more new species become established in Japan, temporarily or for longer periods, some known but perhaps more unknown. As a result, despite the small surface area of only 372,391 km^2, a great many different plant communities have arisen on the Japanese Islands.
If one looks at general vegetation patterns, the vegetation regions of Japan can be grouped into the following three main natural vegetation zones.

1.1. The evergreen broad-leaved region (Camellietea japonicae region)

Along the coasts of the Camellietea japonicae region, Castanopsis cuspidata var. sieboldii and Persea (Machilus) thunbergii are the dominant forest canopy species; the dominant canopy species inland are Quercus species such as Q. myrsinaefolia, Q. salicina, Q. glauca, Q. acuta, Q. sessilifolia, and Q. miyagii.
In the lower tree layer and in the shrub layer of these evergreen forests, the following occur: Camellia japonica, Neolitsea sericea, Aucuba japonica, Eurya japonica, Ligustrum japonicum, Ilex integra, plus other evergreen trees and shrubs. In the ground layer one finds Trachelospermum asiaticum var. intermedium, Ophiopogon japonicus, Cymbidium goeringii, Reineckea carnea; ferns such as Dryopteris erythrosora, Arachniodes pseudo-aristata, A. aristata, Dryopteris lacera; and other plants, all of which are evergreen. Using these and other species as diagnostic and character species, the natural forest vegetation is characterized as the class Camellietea japonicae (MIYAWAKI and OHBA 1963).
The entire warm-temperate area of Japan, from the Ryukyu Islands, Kyushu, and Shikoku to the southwestern part of the Kanto Plain (central Japan) and along the coasts to Tohoku (northern Honshu), was covered by evergreen broad-leaved forests in its original, natural condition. These

forests are named Camellietea japonicae, referring to the character species of these forests, Camellia japonica. This region, which still today could be covered with such evergreen broad-leaved forests if all human influences could be removed, is called the Camellietea japonicae region (MIYAWAKI 1967, 1977). This forest region reaches an elevation of 750 m a.s.l. in the Kanto region (around Tokyo and Yokohama).

This evergreen forest region is also the center of settlement of the Japanese population. The earliest settlements which have been found in Japan were mostly in Kyushu, Shikoku and Honshu. Rice cultivation

Fig. 1. In the rice-paddy region of the lowlands some evergreen broad-leaved forests have persisted the Polysticho-Perseetum thunbergii. The paddy in the foreground is shown just superior to the planting of the rice crop in the spring
(Katsuura 10 m a.s.l., Pref. Chiba)

Abb. 1. In den Reisfeldern des Tieflandes überdauerten einige immergrüne Laubwälder des Polysticho-Perseetum thunbergii. Das Reisfeld im Vordergrund ist kurz vor dem Auspflanzen des Reises im Frühling aufgenommen (Katsuura 10 m ü.M., Pref. Chiba)

(whether introduced from the Ryukyu Islands, Korea or China is still unclear and argued by the archeologists) and settlements in the vicinity of the Camellietea japonicae region about 2000 years ago have been verified. Rice (Oryza sativa L.) is, of course, a warm-climate tropical plant.

As a result of this, the Camellietea japonicae forests became the essential life-support base of the Japanese people, for their physical as well as spiritual development. Today there are more than 20 cities in Japan each with over 500,000 inhabitants. Except for Sapporo and Asahikawa on Hokkaido, where 100 years ago there were hardly 1000 inhabitants, all of these large cities lie in the Camellietea japonicae region (Fig. 3). As a result of several thousand years of settlement activities by the Japanese, the original natural vegetation of most of these Camellietea japonicae areas is today either greatly modified or completely gone. Through various human influences, the natural vegetation was replaced by corresponding substitute communities such as summergreen Quercus forests (Quercetum acutissimo-serratae), Miscanthus sinensis grasslands, plantations of Cryptomeria japonica, Chamaecyparis obtusa, Pinus densiflora, P. thunbergii, or field or rice-paddy ruderal communities. Natural or nearly natural Castanopsis cuspidata - Machilus thunbergii forests and various evergreen Quercus forests have survived up to the present day or have been created anew on steep slopes, ridges, and around Shinto shrines, Buddhist temples, and in native groves around houses, etc. Through such remnants of the natural and nearly natural vegetation, even in the largest cities (Tokyo, Yokohama, and others), we can still today determine the potential natural vegetation regions (TUEXEN 1956, MIYAWAKI 1967, MIYAWAKI et al. 1976).

The Camellietea japonicae evergreen broad-leaved forests are characterized, according to community structure and physiognomy as well as site environmental relations, by the following features:

1) Canopy tree layer: Castanopsis cuspidata var. sieboldii, Persea thunbergii, evergreen Quercus species such as Q. myrsinaefolia, Q. salicina, Q. acuta, and Q. miyagii as main tree species. On steep slopes and on other extreme sites one also finds Abies firma, Tsuga sieboldii, Torreya nucifera, and other coniferous species mixed in.
2) Lower tree layer: Camellia japonica, Ilex integra, Neolitsea sericea, Dendropanax trifidus, and other evergreen broad-leaved tree species are widely distributed.

3) Shrub layer: Aucuba japonica, Eurya japonica, Fatsia japonica, and other shade-tolerant evergreen shrubs grow over wide areas.

4) Herb layer: as a result of the low light levels in all four seasons the species composition of the herb layer remains rather monotonous, especially in the forests on dry summits and ridges. As important species of the herb layer we can mention Cymbidium goeringii, Liriope platyphylla, Ophiopogon japonicus, Ardisia japonica; the vines Trachelosperum asiaticum var. intermedium, Hedera rhombea, and Kadzura japonica; and ferns Dryopteris erythrosora, D. lacera, D. pacifica, and Arachniodes asiatica.

The characterizing feature of these natural forests is the fact that,

Fig. 2. Lindero umbellatae - Fagetum crenatae with the abundant understorey of Sasa kurilensis
(Mt. Kenashi-yama, 1020 m a.s.l., Pref. Okayama)

Abb. 2. Lindero umbellatae - Fagetum crenatae mit reichlichem Unterwuchs von Sasa kurilensis
(Mt. Kenashi-yama, 1020 m ü.M., Pref. Okayama)

from the higher tree layers to the shrub layer and vines, the forest is composed entirely of evergreen species.

The natural forests of the Camellietea japonicae region can be subdivided most generally into two groups: Castanopsis sieboldii - Persea thunbergii forests dominate along the coastal areas, while evergreen Quercus forests grow inland. In places, Abies firma and Tsuga sieboldii dominate near the upper limit of the Quercus species. On deep soils and mesic sites near the coast, Persea thunbergii dominates in the upper tree layer and evergreen ferns like Polystichum polyblepharum, Arachniodes aristata, and A. pseudo-aristata in the ground layer. In inland valleys, summergreen Zelkova serrata forests grow along the valley bottoms. On the west-Japanese alluvial areas near Osaka and Hiroshima, sum-

Fig. 3. Abietetum veitchio-mariesii on the Mt. Nagahei-yama, 2150 m a.s.l. (Pref. Nagano)

Abb. 3. Abietetum veitchio-mariesii am Berg Nagahei-yama, 2150 m ü.M. (Pref. Nagano)

mergreen tree species such as Aphananthe aspera and Celtis sinensis var. japonica occur on corresponding sites.

On the generally slightly drier ridges and upper slopes grow Castanopsis cuspidata var. sieboldii forests near the coast and evergreen Quercus forests inland, such as Quercetum myrsinaefoliae, Nandino-Quercetum glaucae, and Distylio-Quercetum salicinae (MIYAWAKI et al. 1978, 1984, FUJIWARA 1981). These diverse Japanese evergreen broad-leaved forests, along with the corresponding East Asian forests, were called Laurilignosa or "laurel forests" by RUEBEL (1930), in comparison with the European evergreen broad-leaved forests or Durilignosa, the sclerophyll forests of the Mediterranean region.

Fig. 4. Polysticho-Perseetum thunbergii as a protected forest around a Shinto shrine near the Sea of Japan
(Miyazu, 5 m a.s.l., Pref. Kyoto)

Abb. 4. Ein geschützter Stand von Polysticho-Perseetum thunbergii im Areal eines Shinto-Tempels in der Nähe des Japanmeeres
(Miyazu, 5 m ü.M., Pref. Kyoto)

Fig. 5. The many-storeyed forest structure inside the evergreen laurel forest of Ardisio-Castanopsietum sieboldii
(Kamkara, 20 m a.s.l., Pref. Kanagawa)

Abb. 5. Die vielschichtige Struktur von Ardisio-Castanopsietum sieboldii in einem immergrünen Lorbeerwald
(Kamkara, 20 m ü.M., Pref. Kanagawa)

The Japanese "laurel forests", based on our present-day phytosociological studies on almost all the Japanese islands, have been summarized into various associations or corresponding but as yet unranked groupings. The units from the Ogasawara Islands, the Ryukyu Islands, Kyushu, Shikoku, Honshu, and various small neighboring islands were united into six alliances and three orders, placed in the Camellietea japonicae (MIYAWAKI et al. 1980, 1981, 1982, 1983, 1984: Vegetation of Japan I-V, MIYAWAKI et al. 1971, 1978, 1984, FUJIWARA 1981).

In Japan as in other civilized countries, many substitute communities have arisen over long periods of time as a result of human activities in almost the entire Camellietea japonicae region, from the seacoasts to the upper limit in the lower montane belt. Corresponding to the type and intensity as well as the duration of the human influence, very different substitute communities have been formed from native and neophytic species: summergreen secondary forests with Daphno pseudo-mezerei - Quercetum serratae, Quercetum acutissimo-serratae; secondary grasslands like Miscanthetea sinensis with Miscanthion sinensis, Zoysion japonicae, Artemisietea principis and Plantaginetalia asiaticae, as well as field and rice-paddy communities of the Commelinetalia communis (Chenopodietea) and Oryzetea sativae. Also in the natural landscape, around ponds and lakes, there grow Alnetea japonicae and, along rivers, Salicetea sachalinensis with Salicion integrae, Salicion subfragilis, Phragmitetalia and other communities. Forest margins are bordered by various edge communities which are included in the class Rosetea multiflorae. Along the seacoast, before and on the dune systems, there grow Salsoletea komarovii, Glehnietea littoralis, Viticetea rotundifoliae, Euonymo - Pittosporetum tobirae, and Pittosporo - Quercetum phillyraeoidis with Pinus thunbergii in the upper tree storey.

1.2. Summergreen broad-leaved forest region

(Fagetea crenatae region)

Summergreen broad-leaved forests, i.e. Fagetea crenatae forests, are developed in central Japan in the elevational belt from 700 to 1600 meters. Their distribution dies out in the north, in the Tohoku region (northern Honshu), and on Hokkaido further to the north. In the south, the Fagetea crenatae area reaches higher and attains its lower limit on

Kirishima (1700 m) at around 1000 m. In the species composition, physiognomy, structure, and distribution, the Japanese beech forests, the Fagetea crenatae forests, indicate the general decrease in temperature towards the north with the snow depth (dependent on the winter monsoon effect), play a deciding role. The monsoonal high-pressure cell which develops over Siberia in winter forces moist air masses across the Japanese Sea and against the montainous backbone of the Japanese Islands. As a result, over 3 meters of snow fall in places along the western, windward slopes. Here the development of the Fagus crenata forests is luxurious, the germination potential of Fagus crenata is very high, and the size of the leaves is quite striking, compared with the leeward Pacific slopes.

The Fagus forests of the Japanese Sea side contain various distinguish-

Fig. 6. Torreyo radicantis - Zelkovetum serratae along the ravine (Hino- gun, 700 m a.s.l., Pref. Okayama)

Abb. 6. Torreyo radicantis - Zelkovetum serratae entlang einer Schlucht (Hino-gun, 700 m a.s.l., Pref. Okayama)

ing species such as Daphniphyllum macropodium var. humile, Cephalotaxus harringtonia var. nana, Aucuba japonica var. borealis, Sasa kurilensis, Ilex leucoclada, and Lindera umbellata var. membranacea in the Saso kurilensis - Fagion crenatae, with Aucubo-Fagetum crenatae, Lindero umbellatae - Fagetum crenatae, Hamamelido-Fagetum crenatae, and other associations.

On the other hand, the Fagus forests of the Pacific side of the mountains can be grouped together with the Corno-Fagetum crenatae, Sapio japonici - Fagetum crenatae, Fagetum crenato-japonicae and other associations into the Sasamorpho-Fagion crenatae. Both Fagion alliances are grouped with the Carici-Tsugetum sieboldii, Disantho-Chamaecyparidietum obtusae, and other montane, conifer-dominated associations of mountain ridges, drier slopes, and other somewhat drier or seasonally dry, more or less extreme sites into the order Saso-Fagetalia crenatae.

To the Fagetea crenatae belong the Fraxino-Ulmetalia with the Pterocaryion rhoifoliae and its associations Polysticho-Pterocaryetum, Dryopteridi-Fraxinetum spaethianae, Isopyro-Fraxinetum spaethianae and the Ulmion davidianae with the Ulmetum davidianae and the Syringo-Fraxinetum mandshuricae. Both alliances and their associations occur mostly on deeper, moister, more nutrient-rich soils. Important species of the Japanese Fraxino-Ulmetalia are the following: Ulmus japonica (davidiana), Arachniodes standishii, Laportea macrostachya, Pterocarya rhoifolia, Laportea bulbifera, Aesculus turbinata, Dryopteris crassirhizoma, Ulmus laciniata, Polystichum tripteron, Acer carpinifolium, Asperula odorata, Hydrangea macrophylla var. acuminata, Fraxinus spaethiana, Cercidiphyllum japonicum, Phyllitis scolopendrium, Alangium platanifolium, and others. In floodplains grow Salicetea sachalinensis with Toisuso-Populetum maximowiczii and Alno-Salicetalia serissaefoliae in various alliances and associations.

A special order of the Fagetea crenatae, the Quercetalia serrato-grosseserratae with Zelkovion serratae, Celtio-Aphananthion, Carpio-Quercion serratae and Pinion densiflorae, is distributed today more or less up to the Camellietea japonicae region. The Zelkovion, with the Torreyo radicantis - Zelkovetum serratae, Orixo-Zelkovetum serratae, and Hovenio dulcis - Zelkovetum serratae associations, the Parabenzoino praecocis - Zelkovetum, and other associations occur on river banks and at the foot of slopes along the rivers. On sites in this region which are too moist or too unstable for the Camellietea japonicae communities, there occur

most of the associations of the Zelkovion serratae as well as some of the associations of the Alnetea japonicae. These associations grow on saturated, poorly aerated fringes of various water bodies.
Some striking associations such as Quercetum acutissimo-serratae, Daphno pseudo-mezerei - Quercetum serratae, and Castaneo-Quercetum serratae to-

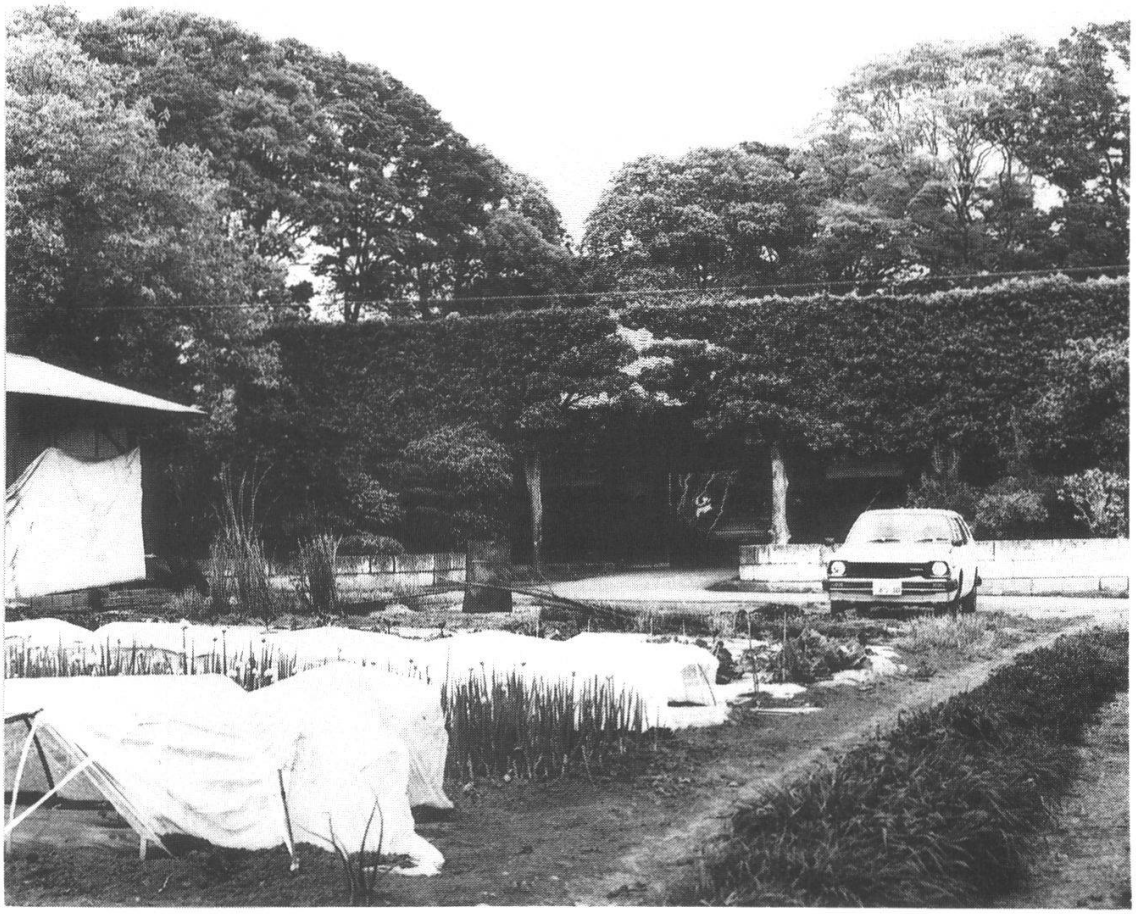

Fig. 7. An old farm-house woodlot in the evergreen broad-leaved forest region. Tall Quercus myrsinaefolia and Zelkova serrata trees on the homestead woodlot in the distance. Hedge trees like also Quercus myrsinaefolia surrounding the houses. The Quercetum myrsinaefoliae, subassoc. of Zelkova serrata forest indicates the potential natural vegetation.
(Tsukuba, 20 m a.s.l., Pref. Ibaraki)

Abb. 7. Eine alte Bauernhaus-Waldparzelle in der Region der immergrünen breitblättrigen Laubwälder. Im Hintergrund hohe Quercus myrsinaefolia- und Zelkova serrata-Bäume auf dem Grundstück. Heckenbäume wie u.a. Quercus myrsinaefolia umgeben die Häuser. Das Quercetum myrsinaefoliae, Subassoz. des Zelkova serrata-Waldes zeigt die potentielle natürliche Vegetation an.
(Tsukuba, 20 m ü.M., Pref. Ibaraki)

day extend far into the evergreen Camellietea japonicae region as typical secondary forests. They are maintained as permanent communities by the more or less regularly occuring clear-cutting every 15-25 years. These summergreen Carpino-Quercion serratae communities in the Kanto Plains near Tokyo and Yokohama and in other Camellietea japonicae regions were almost all regarded earlier as natural forests. But through comparative field studies of natural vegetation and the substitute vegetation arisen through human influences, the syndynamic position of these summergreen forests as secondary forests has been verified (MIYAWAKI 1967, 1977, 1978, MIYAWAKI et al. 1972, 1977, etc.).

In comparison with the Camellietea japonicae region, the vegetation of the Fagetea crenatae region was at first not so drastically and fundamentally destroyed by human influences. These summergreen areas were

Fig. 8. A well-developed stand of the Sapio-Fagetum crenatae, subassoc. of Sasa tsuboiana with an undergrowth of Sasa tsuboiana (Mt. Omogo, 1500 m a.s.l., Pref. Tokushima, Shikoku)

Abb. 8. Ein gutentwickelter Bestand des Sapio-Fagetum crenatae, Subassoz. von Sasa tsuboiana mit Sasa tsuboiana im Unterwuchs (Mt. Omogo, 1500 m ü.M., Pref. Tokushima, Shikoku)

used only in some places for pastures or as mowed meadows. In the last 100 years, however, settlement on the northernmost island Hokkaido has been extended considerably. Especially since World War II, the montane Fagetea crenatae region in most parts of Japan (Shikoku, Honshu and Hokkaido) has been greatly changed by extensive clear-cutting of natural forests, monotonous afforestation of coniferous species such as Larix leptolepis, Cryptomeria japonica, and Chamaecyparis obtusa, and through the construction of forest roads and new tourist facilities. The substitute communities of the Fagetea crenatae region, however, have not yet become stable, permanent communities, as in the Camellietea japonicae region or in the European Querco-Fagetea sylvaticae region. The most common substitute communities of the Fagetea crenatae region are the Castaneo-Quercetum crispulae, Rhododendro-Maletum, and Actinidio-Vition coignetiae, which are partly natural forests or typical edge communities.

Raised bogs with Oxycocco-Sphagnetea have also developed locally in the Fagetea crenatae and Vaccinio-Piceetea region. These include the Sphagnetalia fusci, the Eriophoro vaginati - Sphagnetalia papillosi, and the Sphagnetalia compacti, as well as the communities of the low, water-filled depressions (hollows), with various characteristic Japanese alliances and associations (TUEXEN et al. 1972).

1.3. Region of subalpine needle forests and alpine meadows and heaths

(Vaccinio-Piceetea and Pinus pumila scrub, plus alpine meadows and heaths)

Central Honshu, from 1600 to 2400 m, belongs to the Vaccinio-Piceetea region, with the important character species Vaccinium vitis-idaea, V. ovalifolium, V. smallii, Listera cordata, and Coptis trifolia, etc., and with the Abieti-Piceetalia, with the important distinguishing species Abies mariesii, A. veitchii, Larix leptolepis, Tsuga diversifolia, and Picea jezoensis var. hondoensis. Above 2400 meters, and also on unstable sites, occur the Vaccinio-Pinetalia with the Vaccinio-Pinion pumilae alliance, where the krummholz forms of Pinus pumila dominate. The elevation of this belt decreases steadily towards the north.

The Abieti-Piceetalia contains the Abietion mariesii and the Piceion jezoensis along with the Abietetum mariesii and the Abietetum veitchii,

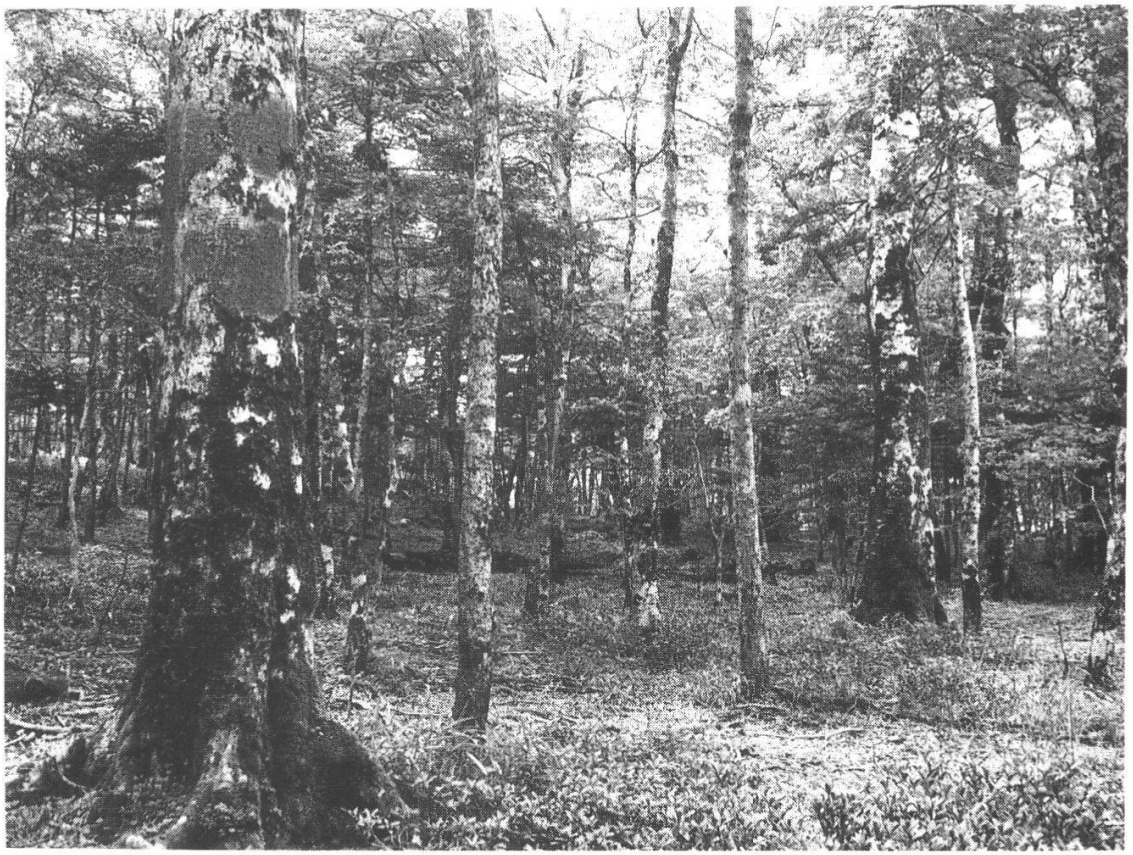

Fig. 9. The Abieti homolepidis - Fagetum crenatae stand with the typical overstorey and small openings caused by deer browse
(Mt. Odaigahara, 1610 m a.s.l., Pref. Nara)

Abb. 9. Der Abieti homolepidis - Fagetum crenatae-Bestand mit der typischen Oberschicht und kleinen, durch Hirsch-Aesung entstandenen Lichtungen
(Mt. Odaigahara, 1610 m ü.M., Pref. Nara)

Fig. 10 (p. 89, above). The Abietetum veitchio-mariesii with a thick moss carpet. (Mt. Norikura-dake, 2900 m a.s.l., Pref. Nagano)

Abb. 10 (S. 89, oben). Abietetum veitchio-mariesii mit dickem Moosteppich. (Mt. Norikura-dake, 2900 m ü.M., Pref. Nagano)

Fig. 11 (p. 89, below). The Vaccinio-Pinetum pumilae "Krummholz" association with the dense cover of Pinus pumila
(Mt. Komagatake, 2700 m a.s.l., Pref. Nagano)

Abb. 11 (S. 89, unten). Die Vaccinio-Pinetum pumilae "Krummholz"-Assoziation mit dichtem Bestand von Pinus pumila
(Mt. Komagatake, 2700 m ü.M., Pref. Nagano)

which both occur on Honshu. The Abietetum veitchii also occurs on Shikoku, and the Piceo-Abietetum sachalinensis and the Piceetum glehnii occur on Hokkaido. On ridges, steep slopes, and other extreme sites in the Fagetum crenatae region, but also in some lower boundary areas of the Vaccinio-Piceetea region, the Rhododendro-Thujion standishii occurs with Ilici-Thujetum standishii, Arachniodo muticae - Chamaecyparidetum obtusae, Patrino-Chamaecyparidetum obtusae, and others.

At elevations above 2400 m, with climatic conditions including deep snow and high winds, and with special chemical and physical characteristics such as ultra-basic parent materials, soil slumping, etc., there grow the corresponding alpine dwarf-shrub and natural meadow communities. These include Dicentro - Stellarietea nipponicae, Asplenietea rupestria, Carici rupestris - Kobresietea bellardii, Phyllodoco-Harrimanelletea, and other communities in numerous Japanese associations, which today are threatened with annihilation in many places by tourist facilities such as roads, hotels, and alpine shelters.

2. POTENTIAL NATURAL VEGETATION OF JAPAN

The potential natural vegetation (TUEXEN 1956) represents the theoretical natural vegetation. The map of the potential natural vegetation of Japan is the integrated vegetation-ecological expression of the current site conditions, assuming all of man's influences on the vegetation in the cultural landscape could be excluded. The map of Japanese potential natural vegetation reflects four general vegetation regions.

2.1. Camellietea japonicae region (Evergreen broad-leaved forest zone)

Central Honshu is covered, from the coasts to about 700 m above sea level, by evergreen broad-leaved forests. On ridges and other somewhat drier sites near the coast (to 10-15 km inland), especially on thin soils, Ardisio-Castanopsietum sieboldii and Symploco glaucae-Castanopsietum sieboldii grow, including the Psychotrio-Castanopsietum sieboldii with several Castanopsis sieboldii associations on the Ryukyu Islands.

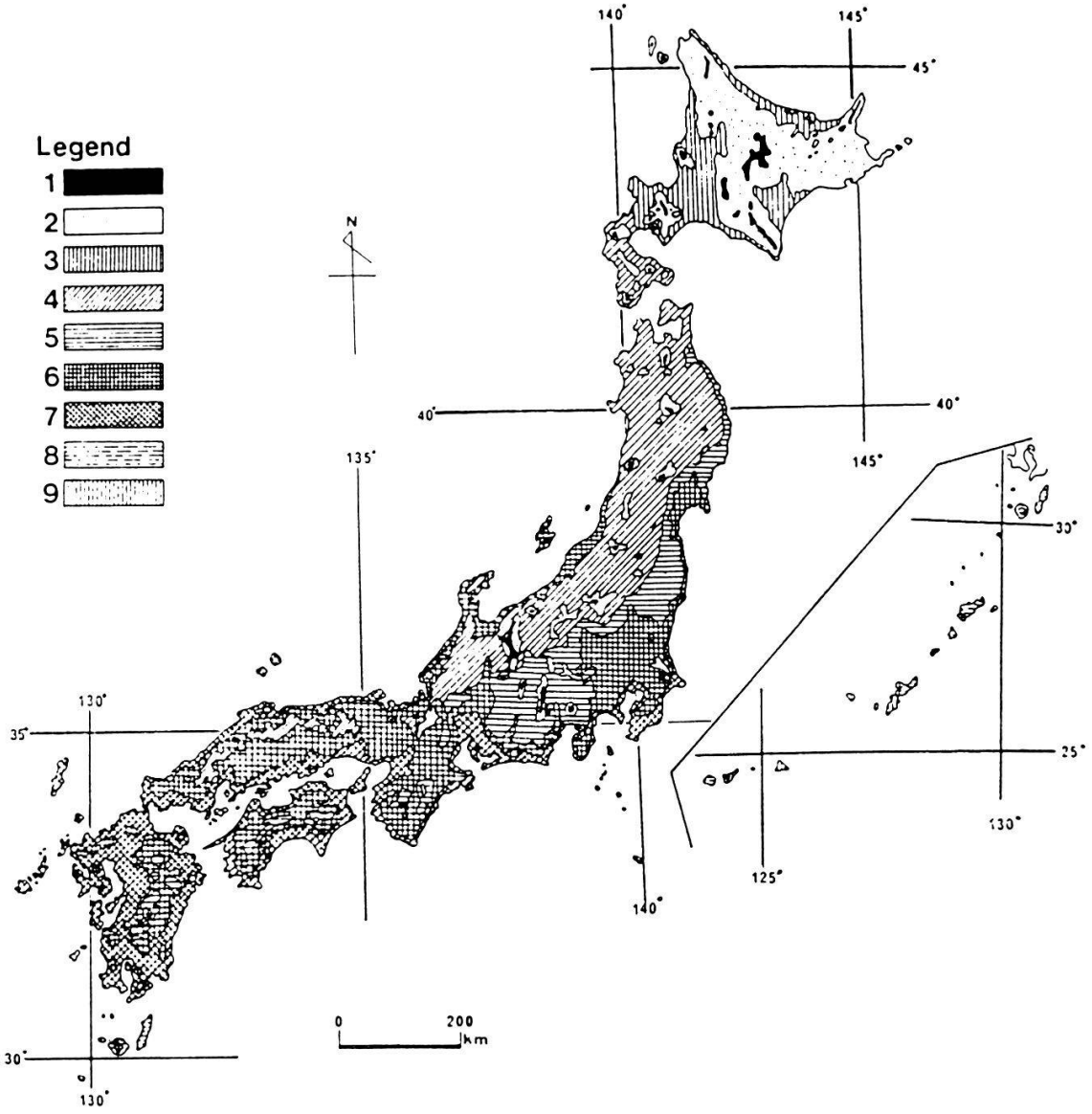

Fig. 12. Map of the potential natural vegetation of Japan
Abb. 12. Karte der potentiellen natürlichen Vegetation Japans

1 Vaccinio-Pinion pumilae, wind-exposed dwarf-shrub heath, grassland, etc. Vaccinio-Piceetea region (subalpine conifer forest zone)
2 Abieti-Piceion - Fagetea crenatae region (deciduous broad-leaved forest zone)
3 Saso-Fagion crenatae in Hokkaido (Quercus mongolica var. grosseserrata - Tilia maximowicziana - forest
4 Saso-Fagion crenatae in Honshu, Shikoku, and Kyushu (Fagus crenata - Fagus japonica - forest)
5 Sasamorpho-Fagion crenatae. Camellietea japonicae region (evergreen broad-leaved forest zone)
6 Quercion acuto - myrsinaefoliae
7 Maeso japonicae - Castanopsion sieboldii
8 Psychotrio-Castanopsion sieboldii
9 Psychotrio manillensis - Acerion oblongi
(partly changed from MIYAWAKI et al. 1977)

At the base of alluvial slopes and on other more mesic sites, usually with deeper soil, the Polysticho-Perseetum thunbergii, Arisaemato ringentis - Perseetum thunbergii, Arisaemato ringentis - Perseetum thunbergii, and other Persea thunbergii forests occur as the potential natural vegetation.

Evergreen Quercus (Cyclobalanopsis) forests cover extensive inland areas in the Camellietea japonicae region, including the Quercetum myrsinaefoliae in the Kanto Plains near Tokyo and Yokohama, and the Quercetum gilvae, Photinio-Castanopsietum cuspidatae, Distylio-Cyclobalanopsietum, Nandino-Quercetum glaucae, and Aucubo-Quercetum silicinae in western Honshu, Shikoku, and Kyushu.

Fig. 13. The early spring aspect of the Castaneo-Quercetum serratae coppice forest which is harvested every 15-20 years
(Shiobara, 600 m a.s.l., Pref. Tochigi)

Abb. 13. Der Castaneo-Quercetum serratae-Niederwald im Vorfrühling; er wird alle 15-20 Jahre geschlagen
(Shiobara, 600 m a.s.l., Pref. Tochigi)

On ridgecrests, steep slopes, and other, similarly extreme sites near the upper limit of the Camellietea japonicae region, where pure broad-leaved forests can no longer dominate, conifer-dominated forests occur in some places. These include Illicio-Abietetum firmae, Ilici-Tsugetum sieboldii, and Lindero-Cryptomerietum.

A schematic representation of the vertical distribution of the most important alliances and classes of the actual and potential natural vegetation in central Honshu is shown by MIYAWAKI (1979, Figs. 13, 14).

Fig. 14. An artificial plantation of Cryptomeria japonica with the rich understorey of its potential natural vegetation of Sapio-Fagetum crenatae
(Konkawa-son, 1350 m a.s.l., Pref. Kochi, Shikoku)

Abb. 14. Eine Pflanzung von Cryptomeria japonica mit einer reichhaltigen Unterschicht der potentiellen natürlichen Vegetation des Sapio-Fagetum crenatae
(Konkawa-son, 1350 m ü.M., Pref. Kochi, Shikoku)

2.2. **Fagetea crenatae region** (Summergreen broad-leaved forest zone)

The Fagetea crenatae region in central Honshu reaches from about 700 to about 1600 m above sea level. The horizontal width of this belt increases steadily to the north, toward northern Honshu and Hokkaido. To the south, in western Honshu and Kyushu, the potential Fagetea crenatae region climbs steadily to higher elevations.

An important summergreen forest grouping in the Fagetea crenatae region is the Saso-Fagetalia crenatae communities, the ground in which is almost always thickly covered by characteristic small Sasa species. Thanks to the climatic conditions, especially the abundant snow associated with the winter monsoon, Saso kurilensis - Fagion crenatae, with Aucubo-Fagetum crenatae, and other Fagus forests are widespread on the windward Japanese Sea side of Honshu. On the Pacific side, with less snow, grow Sasamorpho-Fagion crenatae communities, with Corno-Fagetum crenatae, Sapio japonicae - Fagetum crenatae, Fagetum crenato-japonicae, and other associations.

In the Fagetea crenatae region north of Kuromatsunai in southern Hokkaido, where Fagus species can no longer occur, there appear in place of the Fagetea crenatae such forests as Quercus mongolica var. grosseserrata - Quercus dentata forests and the Tilia maximowicziana -Quercus mongolica var. grosseserrata community. In wet places along streams or mires (Moor), Fraxino-Ulmetalia with Pterocaryon rhoifoliae and Ulmion davidianae are widespread.

2.3. **Vaccinio-Piceetea region** (subalpine and subarctic conifer forest zone)

In Honshu, the upper summergreen broad-leaved forest belt borders directly on the subalpine conifer-forest belt. On Honshu and Shikoku this is the Abietion mariesii, and on Hokkaido this is the Piceion jezoensis. In central Honshu (Japanese Alps) the Abietetum mariesii and Abietetum veitchio-mariesii occur above 1600 m. On the Kii peninsula and Shikoku, the Abietetum veitchii takes over this position above 1800 m on the mountains Ohmine (1915 m), Ishizuchi (1981 m) and Tsurugisan (1893 m).

On Hokkaido the Piceo-Abietetum sachalinensis, Piceetum glehnii, and other boreal or subarctic needle-forests grow on the mountain Daisetsu

(2290 m, in central Hokkaido) and on other mountains. In northern and eastern Hokkaido, however, the conifer stands sometimes descend almost to the seacoast or to the nearby mires.
The character of the subalpine and boreal conifer forests is rather monotonous physiognomically, due to the small number of dominant conifer species plus the only occasional admixture of Betula ermanii.
The natural vegetation of the Japanese subalpine and boreal conifer belt has been greatly altered recently through clear-cutting, road construction, and other human influences. This conifer vegetation is generally in better condition, though, for the most part, than the vegetation of the Camellietea japonicae and the Fagetea crenatae regions. Thus, the potential natural vegetation in this region is also easier to ascertain in the field than in the other, lower-lying regions.

2.4. Alpine vegetation belt

The central Japanese mountain ranges on Honshu are called the "Japanese Alps" and include more than 10 peaks above 3000 meters. On this highest of Japanese montane belts, above 2500 m and on the 1500 m high mountains of Hokkaido, grow various alpine heath and meadow communities mixed in among the shrub-like Vaccinio-Pinion pumilae krummholz communities, which belong still to the subalpine Vaccinio-Piceetea.
Strictly speaking, the areas of alpine vegetation in Japan simply are not large enough to be represented on the map. Instead, on the map of the potential natural vegetation of the Japanese Islands, the areas of the Vaccinio-Pinion pumilae communities and the micro-mosaic of alpine meadow and heath communities are combined as "alpine vegetation".

SUMMARY

The Japanese islands stretch over 3000 km from the subtropical climate in Okinawa to the partly subboreal climate of Hokkaido. They were once covered by natural forests with a rich flora. Although the area of the islands is 350,000 km^2 many plant communities could develop from the coast up to the 3000 m high mountains, thanks to the diverse geomorphology and sufficient rainfall.
According to our more than 30-year phytosociological research, the vege-

tation can be grouped into four main categories:

1. Evergreen broad-leaved forests (laurel forests in the sense of Rübel; Camellietea japonicae area). They grow in central Honshu from the coast up to 700 m a.s.l.
2. Deciduous broad-leaved forests (Fagetea crenatae area). They grow in Central Honshu between 700 m and 1600 m a.s.l. and also in North Honshu and parts of Hokkaido.
3. Subalpine and subboreal conifer forests (Vaccinio-Piceetea area). They grow in Central Honshu from 1600 m up to 2500 m a.s.l. and also in the mountains of North Honshu and Hokkaido.
4. Krummholz Pinus pumila communities and various alpine meadows. They grow in central Honshu above 1500 m and in North Honshu above 1400 m a.s.l.

The actual vegetation on the Japanese islands today has been altered by the long historical activities and above all by the great recent influence of man, in the course of which many substitute communities came into being.

This review shows the general spatial relationships of the natural vegetation of Japan with its potential distribution. The maps of the potential natural vegetation are to be found in the pocket at the back. A map of the actual vegetation of Japan is added for comparison.

ZUSAMMENFASSUNG

Die japanischen Inseln erstrecken sich über 3000 km vom suptropischen Klima in Okinawa bis zum teilweise subborealen Klima von Hokkaido. Sie wurden einst von natürlichen Wäldern mit einer reichen Flora bedeckt. Obwohl die Fläche der Inseln 350'000 km^2 beträgt, konnten sich dank der vielseitigen Geomorphologie und genügender Niederschläge viele Pflanzengesellschaften von der Meeresküste bis ins über 3000 m hohe Gebirge entwickeln.

Nach unserer über 30-jährigen pflanzensoziologischen Forschung können die Vegetationen in vier Hauptgruppen zusammengefasst werden:

1. Immergrüne Laubwälder (Lorbeerwälder im Sinne von Rübel; Camellietea japonicae-Gebiet). Sie wachsen in Mittel-Honshu von der Meeresküste bis 700 m ü.M.
2. Sommergrüne Laubwälder (Fagetea crenatae-Gebiet). Sie wachsen in Mittel-Honshu zwischen 700 m und 1600 m ü.M. und besiedeln auch Nord-Honshu und Teile von Hokkaido.
3. Subalpine oder subboreale Nadelwälder (Vaccinio-Piceetea-Gebiet). Sie wachsen in Mittel-Honshu von 1600 m bis 2500 m ü.M. und besiedeln auch Gebirge von Nord-Honshu und Hokkaido.
4. Krummholzartige Pinus pumila-Gesellschaften und verschiedene alpine Wiesen. Sie wachsen in Mittel-Honshu oberhalb 2500 m, in Nord-Honshu oberhalb 1400 m.

Die heutige aktuelle Vegetation auf den japanischen Inseln ist durch die lange historische Aktivität und vor allem auch durch die gewaltigen rezenten Einwirkungen des Menschen umgewandelt worden, wobei verschiedene Ersatzgesellschaften entstanden.

Die vorliegende Uebersicht zeigt die grossräumliche Ordnung der natürlichen Vegetation Japans mit ihrer potentiellen Verbreitung. Die Karten der potentiellen natürlichen Vegetation befinden sich hinten in der Tasche. Vergleichsweise ist eine Karte der aktuellen Vegetation Japans beigefügt.

REFERENCES

FUJIWARA K., 1981: Phytosociological investigations of the evregreen broad-leaved forest of Japan. (In Japan.). Bull.Inst.Environ.Techn., Yokohama Nat. Univ. **7(1)**, 67-133.

MIYAWAKI A., 1960: Pflanzensoziologische Untersuchungen auf den Japanischen Inseln mit vergleichender Betrachtung Mitteleuropas. Vegetatio **9**, 345-402.

MIYAWAKI A., 1964: Trittgesellschaften auf den Japanischen Inseln. Bot. Mag.Tokyo **17(916)**, 365-374.

MIYAWAKI A., 1965: Das Reisfeld als Biozönose. In: TUEXEN R. (ed.), Biosoziologie, Ber.Int.Symp. Stolzenau/Weser, 1960. Junk, The Hague. 267-276.

MIYAWAKI A. (ed.), 1967: Vegetation of Japan compared with other regions of the world. (In Japan.). Gakken, Tokyo. 535 pp.

MIYAWAKI A., 1969: Systematik der Ackerlandkrautgesellschaften Japans. Vegetatio **19**, 47-49.

MIYAWAKI A., 1977: Klimabedingte Unterschiede und Gemeinsamkeiten der Vegetation an der Japanischen und der Pazifischen Meerseiote Japans. Vegetation und Klima. Ber.Int.Symp.IVV. Cramer, Vaduz. 235-247.

MIYAWAKI A., 1978: Sigmassoziationen in Mittel und Süd-Japan. Ber.Int. Symp.IVV, Assoziationskomplexe. Cramer, Vaduz. 241-265.

MIYAWAKI A., 1979: Vegetation und Vegetationskarten auf den Japanischen Inseln. Bull.Yokohama Phytosoc. (Festschrift R. Tüxen) **16**, 49-70.

MIYAWAKI A. (ed.), 1980: Vegetation of Japan. Yakushima. (In Japan.). Shibundo, Tokyo. **1**. 376 pp.

MIYAWAKI A. (ed.), 1981: Vegetation of Japan. Kyushu. (In Japan.). Shibundo, Tokyo. **2**. 484 pp.

MIYAWAKI A. (ed.), 1982: Vegetation of Japan. Shikoku. (In Japan.). Shibundo, Tokyo. **3**. 539 pp.

MIYAWAKI A. (ed.), 1983: Vegetation of Japan. Chugoku. (In Japan.). Shibundo, Tokyo. **4**. 540 pp.

MIYAWAKI A. (ed.), 1984: Vegetation of Japan. Kinki. (In Japan.). Shibundo, Tokyo. **5**. 596 pp.

MIYAWAKI A. and FUJIWARA K., 1968: Pflanzensoziologische Studien im "Neugestaltungsbezirk" westlich Fujisawa bei Yokohama. (In Japan.). City of Fujisawa. 44 pp.

MIYAWAKI A. and FUJIWARA K., 1970: Vegetationskundliche Untersuchungen im Ozegahara-Moor, Mittel-Japan. (In Japan.). National Park Assoc. of Japan, Tokyo. 152 pp.

MIYAWAKI A. and FUJIWARA K., 1968: Pflanzensoziologische Studien im "Neugestaltungsbezirk" westlich Fujisawa bei Yokohama. (In Japan.). Fujisawa. 44 pp.

MIYAWAKI A. and FUJIWARA K., 1975: Ein versuch zur Katierung des Natürlichkeitgrades der Vegetation und Anwendungsmöglichkeit dieser Karte für den Umwelt- und Naturschutz am beispiel der Stadt Fujisawa. Phytocoenologia **2(2/4)**, 430-437.

MIYAWAKI A., FUJIWARA K. et al., 1971: Vegetationskundliche Untersuchungen in der Stadt Zshi bei Yokohama. Besondere Betrachtung mit Camellietea japonica-Wald (immergrüner Laubwald) Japans. (In Japan.). Education Board of Zushi City. 151 pp.

MIYAWAKI A. and ITOW S., 1966: Phytosociological approach to the conservation of nature and natural resources in Japan. Proc. 11th Pacific Science Congr., Tykoyo. 1-5.

MIYAWAKI A. and OHBA T., 1963: Castanopsis sieboldii-Wälder auf den Ana-

mi-Inseln. (In Japan.). Sci.Rep.Yokohama Nat.Univ.Sec.II, **9**, 31-48.
MIYAWAKI A. and OHBA T., 1965a: Studien über Strandsalzwiesengesellschaften auf Ost-Hokkaido (Japan). (In Japan.). Sci.Rep.Yokohama Nat. Univ. Sec.II, **12**, 1-15.
MIYAWAKI A. and OHBA T., 1965b: Studien über Strandsalzwiesengesellschaften auf Honshu, Shikoku und Kyushu (Japan). (In Japan.). Sci. Rep. Yokohama Nat.Univ. Sec.II, **11**, 1-23.
MIYAWAKI A., OHBA T. and MURASE N., 1964: Pflanzensoziologische Studien über die Vegetation im Tanzawa-Gebirge, Provinz Kanagawa. (In Japan.). Ber.natw.Untersuchungen über das Tanzawa Gebirge, Ohyama. Yokohama. 54-102.
MIYAWAKI A. and OKUDA S., 1972: Pflanzensoziologische Untersuchungen über die Auen-Vegetation des Flusses Tama bei Tokyo, mit einer vergleichenden Betrachtung über die Vegetation des Flusses Tone. Vegetatio **24(4-6)**, 229-311.
MIYAWAKI A. and OKUDA S., 1976: Potentielle natürliche Vegetation des Umkreises der Hauptstadt "Shutoken". (In Japan.). Bull.Inst.Environ. Sci.Techn., Yokohama Nat. Univ., **2(1)**, 95-114.
MIYAWAKI A. and OKUDA S., 1977: Diagnose und Vorschläge aufgrund der Vegetationskunde für künftige Massnahmen für den Umweltschutz für die Umgebung von Tokyo. In: MIYAWAKI A. and RUEXEN R. (eds.), Vegetation science and environmental protection. Proc.Int.Symp., Protection of the environment and excursion on vegetation science through Japan. Maruzen, Tokyo. 361-367.
MIYAWAKI A., OKUDA S. et al., 1968: Pflanzensoziologische Studien über die Vegetation der Umgebung von Echigo-Sanza und Okutadami (Niigata- und Fukushima-Präfektur). (In Japan.). Sci.Rep.Echigo-Sanzan Okutadami and its vicinity, Niigata and Fukushima Prefecture. 57-152.
MIYAWAKI A., OKUDA S. and MOCHIZUKI R., 1978: Handbook of Japanese vegetation. (In Japan.). Shibundo, Tokyo. 850 pp.
MIYAWAKI A., OKUDA S. and SUZUKI K., 1975: Vegetation in der Umgebung der Bucht von Tokyo. (In Japan.). Port Assoc. of Japan, Yokohama. 119 pp.
MIYAWAKI A. and SUZUKI K., 1974: Die Vegetation der Stadt Chiba. Eine pflanzensoziologische Studie zur Erhaltung und zur Schaffung einer vegetationsreichen Stadt. (In Japan.). 92 pp.
MIYAWAKI A. (ed.), 1972: Reale Vegetation der Präfektur Kanagawa. (In Japan.). Education Board of Kanagawa Prefecture, Yokohama. 789 pp.
MIYAWAKI A. et al., 1973: Vegetation der Stadt Kamakura. Eine vegetationskundliche Studie um eine pflanzenreiche Umwelt zu schaffen und die historische Landschaft der alten japanischen Hauptstadt Kamakura zu erhalten. (In Japan.). City of Kamakura. 114 pp.
MIYAWAKI A. et al., 1976: Die potentielle natürliche Vegetation in der Präfektur Kanagawa. (In Japan.). City of Yokohama. 407 pp.
MIYAWAKI A. et al., 1977a: Vegetation der Präfektur Toyama. (In Japan.). Toyama Prefecture. 289 pp.
MIYAWAKI A. et al., 1977b: Vegetation der Präfektur Yamanashi. (In Japan.). Yamanashi Precture, Kofu. 237 pp.
MIYAWAKI A., SUZUKI K. and FUJIWARA K., 1977: Human impact upon forest vegetation in Japan. Naturalist Canad. (Quebec) **104**, 97-107.
MIYAWAKI A., TOHMA H. and SUZUKI K., 1979: Pflanzensoziologische Untersuchung der Shinto-Schrein und Buddhistischen Tempelwälder in der Präfektur Kanagawa (Hauptstadt Yokohama). (In Japan.). Education Board of Kanagawa Prefecture, Yokohama. 180 pp.
RUEBEL E., 1930: Pflanzengesellschaften der Erde. Bern/Berlin. 409 pp.
SCHMITHUESEN J., 1968: Allgemeine Vegetationsgeographie. Berlin. 463 pp.

TUEXEN R., 1956a: Die heutige potentielle natürliche Vegetation als Gegenstand der Vegetationskartierung. Angew.Pflanzensoziol. 13, 5-43.

TUEXEN R., 1956b: Die heutige potentielle natürliche Vegetation als Gegenstand der Vegetationskartierung. Ber.Deutsch.Landeskunde **19(2)**, 200-246.

TUEXEN R., MIYAWAKI A. and FUJIWARA K., 1972: Eine erweiterte Gliederung der Oxycocco-Sphagnetea. Grundfragen und Methoden in der Pflanzensoziologie. Ber.Int.Symp.IVV. Junk, The Hague. 500-520.

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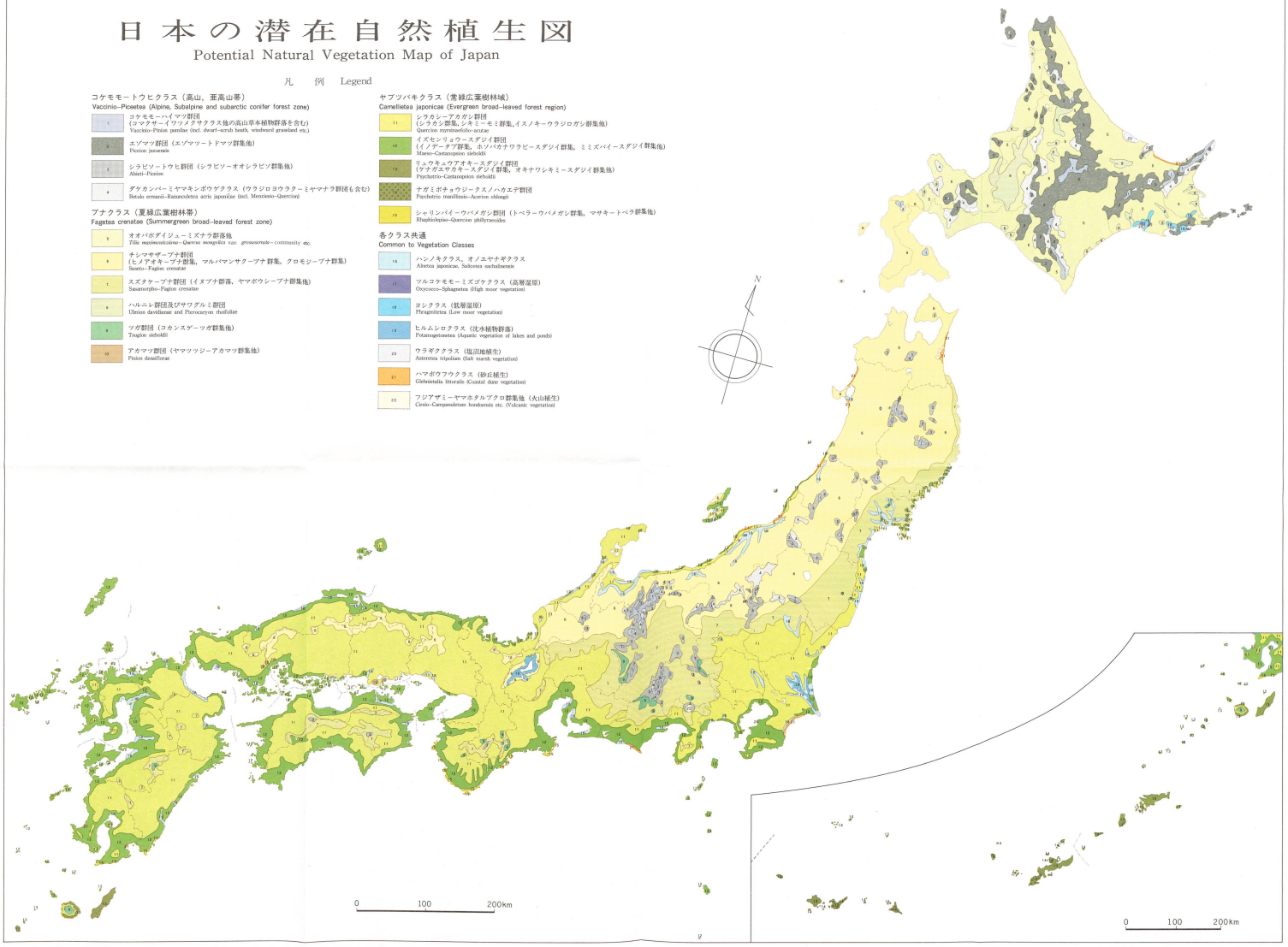
日本の潜在自然植生図

Potential Natural Vegetation Map of Japan



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潜在自然植生図(potential natural vegetation map)とは……

裸の大地を被っている，生きている緑の皮膜が植生と呼ばれる。植生(vegetation)とは生物共同体(biocoenose)の植物から成り立っている部分の総称である。植生を時間的に見るとき，現に存在している植生を現存植生(actual vegetation)という。かつて人間が他の生物とは異なった本格的影響を自然に与える直前，または与えはじめた時の植生を，原(始)植生(original vegetation)と呼ぶ。ところが，日本をはじめ世界の文明国のように，長い時間の流れの間に植生やその生育地に様々な人為的干渉が加えられている地域の現在の植生は，その大部分が様々な人間活動の影響下に変形ないしはおきかえられた代償植生(substitutional vegetation)である。このような長い時間の経過の間に，さらには最近の大都市，産業立地のように大規模な人間の干渉下に立地条件まで変えられたようなところで，第3の植生概念としてR. Tüxen教授によって，1956年に提案されたのが潜在自然植生である。潜在自然植生(potential natural vegetation; Potentielle natürliche vegetation)とは，文化景観域で今一切の人為的干渉を停止したら，その立地がどのような自然植生を支え得る潜在能力をもっているかという，理論的に考察し得る立地固有の自然植生をいう。したがって，自然植生域では現存植生は，そのままその立地の現在の潜在自然植生および原植生に一致する。植生の具体的配分を地図上に示したものを植生図(vegetaton map)と呼ばれる。自然環境の診断，緑の復元にも今日広く使用されている植生図には，対象とする植生によって，現存植生図，原植生復元図，潜在自然植生図などのちがいがある。日本の潜在自然植生図は，日本列島各地の潜在自然植生の具体的配分図で，日本の自然保護，適正な国土計画，地域計画，さらには緑豊かな環境創造の処方箋の役割りを果す。我々は生涯の仕事として，地球的視野に立って，まず日本の植生と，その植生の研究に取り組んでいる。これらの現存および潜在自然植生図にはまだ不充分な点も多いが，第一次試案として日本の現存および潜在自然植生図の輪郭を示し内外諸賢の批判を仰ぎたい。

日 本 の 現 存 植 生 図

Actual Vegetation Map of Japan

凡　例　Legend

自然植生
Natural vegetation

森林植生　Forest vegetation

高山植生域
Alpine vegetation region

1 コケモモ－ハイマツ群団(高山低木群落)，高山ハイデ，風衝草原
Vaccinio-Pinion pumilae, dwarf-scrub heath, windward grassland etc.

コケモモートウヒクラス域(亜高山性針葉樹林帯)
Vaccinio-Piceetea region (Subalpine and subarctic conifer forest zone)

2 エゾマツ群団(エゾマツ－トドマツ群集他)
Picetea jezoensis

3 オオシラビソ群団(シラビソ－オオシラビソ群集他)
Abietion mariesii

4 ダケカンバ－ミヤマキンポウゲクラス，ササ－ダケカンバ群落
Betulo ermanii-Ranunculetea acris japonicae and Sasa spp.*-Betulae ermanii* community

ブナクラス域(夏緑広葉樹林帯)
Fagetea crenatae region (Summergreen broad-leaved forest zone)

5 チシマザサ－ブナ群団(ヒメアオキ－ブナ群集，マルバマンサク－ブナ群集他)
Sino-Fagion crenatae (Aucubo-Fagetum crenatae etc.)

6 チシマザサ－ブナ群団(クロモジ－ブナ群集)
Sino-Fagion crenatae (Lindero umbellatae-Fagetum crenatae)

7 スズタケ－ブナ群団(ヤマボウシ－ブナ群集，イヌブナ－ブナ群集他)
Sasamorpho-Fagion crenatae (Corno-Fagetum crenatae etc.)

8 スズタケ－ブナ群団(シラキ－ブナ群集)
Sasamorpho-Fagion crenatae (Sapio japonici-Fagetum crenatae)

9 オオバボダイジュ－ミズナラ群落，エゾイタヤ－シナノキ群落他
Tilia maximowicziana-Quercus mongolica var. *grosseserrata* community,
Acer mono var. *glabrum-Tilia japonica* community etc.

10 ハルニレ群落，ハンノキ群落
Ulmus japonica community and *Alnus japonica* community

11 ヒメヤシャブシ－タニウツギ群落
Alnus pendula-Weigela hortensis community

12 ツガ群団(コカンスゲ－ツガ群集他)
Tsugion sieboldii

ヤブツバキクラス域(常緑広葉樹林帯)
Camellietea japonicae region (Evergreen broad-leaved forest zone)

13 アカガシ－シラカシ群団(シキミ－モミ群集，
イスノキ－ウラジロガシ群集他南葉林含む)
Quercion acuto-myrsinaefoliae forest region

14 イヌセンリョウ－スダジイ群団(カツバカナワラビ－スダジイ群集，
イノデ－タブノキ群集他南葉林含む)
Maeso japonicae-Castanopsion sieboldii forest region

15 ボチョウジ－スダジイ群団
(ボチョウジカ－スダジイ群集，ヤクシマアジサイ－スダジイ群集他)
Psychotrio-Castanopsion sieboldii

16 ナガミボチョウジ－クスノハカエデ群団
(オオイワヒトデ－アカギ群集，ガジュマル－クロヨナ群集他)
Psychotrio manillensis-Acerion oblongi

17 トベラ群団(トベラ－ウバメガシ群集，マサキ－トベラ群集他)
Pittosporion tobirae forest region

18 ソテツ群落
Cycas revoluta community

草本植生(各クラス域共通)　Herbaceous vegetation

19 ツルコケモモ－ミズゴケクラス(高層湿原)
Oxycocco-Sphagnetea (High moor vegetation)

20 ヨシクラス(低層湿原)
Phragmitetea (Low moor vegetation)

21 ヒルムシロクラス(沈水植物群落)
Potamogetonetea (Aquatic vegetation of lakes and ponds)

22 ウラギククラス(塩沼地植生)
Asteretea tripolium (Salt marsh vegetation)

23 ハマボウフクラス他(砂丘植生)
Glehnietea littoralis etc. (Coastal dune vegetation)

24 フジアザミ－ヤマホタルブクロ群集他(火山植生)
Cirsio-Campanuletum hondoensis etc. (Volcanic vegetation)

代償植生
Substitutional vegetation

25 コナラ・ミズナラ群落
Quercus serrata - Quercus mongolica var. *grosseserrata* community

26 シラカンバ群落
Betula tauschii community

27 コバノミツバツツジ－アカマツ群集他
Rhododendro reticulati-Pinetum densiflorae etc.

28 クロマツ植林
Pinus thunbergii plantation

29 スギ・ヒノキ植林
Cryptomeria japonica - Chamaecyparis obtusa plantation

30 カラマツ植林
Larix kaempferi plantation

31 トドマツ植林
Abies sachalinensis plantation

32 リュウキュウマツ植林
Pinus luchuensis plantation

33 クマイザサ・ネシマザサ草原
Sasa senanensis - Sasa kurilensis grassland

34 ススキ・ネザサ草原
Miscanthus sinensis - Arundinaria chino grassland

35 ヤナギラン群落，ダンドボロギク群落(伐採跡地群落)
Epilobium angustifolium community, *Erechtites hieracifolia* community
(Plant communities in clear cut area)

36 ナガハグサ群落(人工採草地)
Poa pratensis community (Artificial meadow)

37 シロザクラス(畑地雑草群落)
Chenopodietea (Field weed community)

38 イネクラス(水田雑草群落)
Oryzetea sativae (Paddy-field community)

その他
Others

39 市街地
Urban district

0　100　200km

0　100　200km

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現存植生図 (actual vegetation map) とは……

我々が現地で直接眼で見，手で触れることのできる植生が，現存植生(actual vegetation)と呼ばれる。大地を被い，一見無秩序に生育しているように見える植物の集り ——植生——に単位性をもたせるときに，それを植物群落(plant community)という。植物社会学的には種の組み合わせ(species combination)を基礎として群落単位が決定される。群集(association)を基礎単位として，群団(alliance)，オーダー(order)，クラス(class)へと順次上級単位にまとめられる。現地における数多くの植生調査資料を群落組成表の比較検討によって，科学一般に用いられる抽象化の手続をふんで得られた群落単位を地図上に描いたものが植生図と呼ばれる。

現存植生の具体的な配分を地図上に描いた現存植生図 (actual vegetation map) は，現在における植物群落の具体的な配分図である。したがって，現時点における植生とその配分，分布の科学的な document であるばかりでなく，植生を指標とした，生命集団の側からの総合的な環境，すなわち環境質 (quality of environment) や，その変化の具体的な現状診断図の役割も果す。

日本列島のように古くから文化が発達しており，さらに最近国土開発や産業開発，都市化の進んでいるところでは，現存植生は，自然環境に様々な人為的影響が加わって，一部の残されている自然植生から種々の代償植生まできわめて複雑に錯綜している。したがって，小縮尺の現存植生図化は，きわめて困難であった。

この〝日本の現存植生図〟は，現地で得られた各植生単位をできるだけまとめて，上級単位や複合単位として描かれた。現時点における日本の国土の緑の現状が，植生の質の違いを通して具体的に提示された資料である。同時に〝日本の潜在自然植生図〟と比較・考察することによって，現代における日本の植物的自然の変貌の実態が概観できるはずである。