

KRYSTYNA BORATYŃSKA

Chorology of the family *Ulmaceae* (*sensu stricto*)

Abstract

Boratyńska K., 1989. Chorology of the family *Ulmaceae*. *Arbor. Kórnickie* 34: 3-29.

The paper gives the present distribution of the family *Ulmaceae sensu stricto*. This family, which includes almost 50 species, contains the following genera: *Ulmus* L., *Holoptelea* Planch., *Phyllostylon* Capanema, *Planera* J. F. Gmel., *Hemiptelea* Planch. and *Zelkova* Spach. In general the range of the family covers the North Temperate Zone (*Ulmus*, *Zelkova*, *Hemiptelea*, *Planera*). Only genera *Holoptelea* and *Phyllostylon* have centers of their occurrence in the Tropical Zone. The southern limit of the family is attained in Asia by *Holoptelea integrifolia* (Roxb.) Planch., in Africa by *H. grandis* (Hutch.) Mildbr. and in South America by the representatives of the genus *Phyllostylon*. The northern limit is everywhere attained by elms.

Additional key words: chorology, *Ulmaceae sensu stricto*, world.

Address: K. Boratyńska, Institute of Dendrology, 62-035 Kórnik, Poland.

INTRODUCTION

Ulmaceae (*sensu lato*), together with *Urticaceae*, *Moraceae*, *Cannabaceae* and *Cecropiaceae* families, belong to the order *Urticales*. Mirbel (1815), who first described the elm family, distinguished two genera – *Ulmus* L. and *Celtis* L. From that time there have been various controversies concerning the division of the family. De Candolle in 1835 even included the genus *Ulmus* L. into *Betulaceae* family, and the remaining genera with the genus *Celtis* to the family *Celtidoideae*.

Planchon (1848), in the first monograph of the elm family, suggested its division into two subfamilies – *Ulmoideae* and *Celtidoideae*. The first of them included species characterized by winged or pulpos fruits without wings. The author included there the following genera: *Ulmus* L., *Holoptelea* Planch., *Hemiptelea* Planch., *Zelkova* Spach, *Planera* J. F. Gmel.

The second subfamily included species characterized by dry fruits without wings.

More recently Hutchinson (1967) introduced some order into the within family division of *Ulmaceae sensu lato*. He divided the family into two tribes: – the tribe *Ulmeae* with the genus *Ulmus* L., *Planera* J. F. Gmel., *Holoptelea* Planch., and *Phyllostylon* Capanema.

– the tribe *Celtideae* with other genera, among them the genus *Zelkova* Spach and *Hemiptelea* Planch. The latter two are intermediate in their characteristics and whence their classification is more than questionable. S w e i t z e r (1971), who considered the anatomical structure of the elm family, expressed a similar view. G r u d z i n s k a j a (1967), on the other hand has quite a different opinion on the matter. On the basis of morphological and anatomical analyses she demonstrated, that the genus *Zelkova* Spach and *Hemiptelea* Pl. are systematically closer to the genus *Ulmus* L. than to the genus *Celtis* L., and she returned to P l a n c h o n ' s conception. An extreme opinion about the systematic position of the genera *Zelkova* Spach and *Hemiptelea* Pl. was presented by N a k a i (1932), who even suggested placing them in a separate subfamily *Zelkovoideae*.

G r u d z i n s k a j a (1968) divided the family *Ulmaceae sensu lato* into two independent, separate families, differing, generally speaking, in the following characteristics:

– *Ulmaceae* Mirb. – fruit is nutlet, seed is without endosperm, the embryo is straight or almost straight, the pollen grain is 4-6-chambered with thick exine, flowers are most frequently monoecious, leaves with 1 main midrib, chromosome number $x = 14$. To this family belong the following genera:

- | | |
|--------------------------------|-----------------------------------|
| 1. <i>Ulmus</i> L., | 4. <i>Phyllostylon</i> Capanema., |
| 2. <i>Hemiptelea</i> Planch., | 5. <i>Holoptelea</i> Planch., |
| 3. <i>Planera</i> J. F. Gmel., | 6. <i>Zelkova</i> Spach. |

– *Celtidaceae* Link – fruits are drupes with hard endocarps and frequently a flushy mesocarp, seeds with an endosperm, embryo is curved, pollen grains is 2-3 or more chambered with thin exine, flowers are most frequently unisexual, leaves with 3 major veins, chromosome number is usually $x = 10, 11, \text{ or } 14$. To this family belong the following genera:

- | | |
|--------------------------------|---------------------------------|
| 7. <i>Celtis</i> L., | 12. <i>Parasponia</i> Miq., |
| 8. <i>Pteroceltis</i> Maxim., | 13. <i>Lozanella</i> Greenman, |
| 9. <i>Aphananthe</i> Pl., | 14. <i>Chaetacme</i> Pl., |
| 10. <i>Gironniera</i> Gaudich, | 15. <i>Ampelocera</i> Klotzsch. |
| 11. <i>Trema</i> Lour., | |

I adopt this subdivision in the present paper and in the continuation of my work I follow it, taking into consideration only the species and genera from the family *Ulmaceae sensu stricto*. Though T a c h t a g j a n (1987) does not agree however with this treatment, and is opposed to this division into two families.

1. GENUS *ULMUS* L.

The genus includes trees and rarely shrubs characterized by short-petioled, generally asymmetric at the base and pinnately nerved leaves. Flowers are bisexual, collected into racemes or clusters; perianth is shallow or divided up to

Table 1

Taxonomical division of the genus *Ulmus*

The subgenus <i>Ulmus</i>	The subgenus <i>Dryoptelea</i> (Spach) Planch.
1. The section <i>Ulmus</i>	1. The section <i>Madocarpus</i> Schneid.
1. <i>U. americana</i> L.	15. <i>U. bergmanniana</i> Schneid.
2. <i>U. laevis</i> Pall.	16. <i>U. glabra</i> Huds.
3. <i>U. uyematsui</i> Hayata	17. <i>U. macrophylla</i> Nakai
2. The section <i>Chaetoptelea</i> (Liebl.) Schneid.	18. <i>U. laciniata</i> (Trautv.) Mayer.
4. <i>U. alata</i> Michx.	19. <i>U. rubra</i> Mühlenb.
5. <i>U. villosa</i> Brandis ex Gamble	20. <i>U. szechuanica</i> Fang
6. <i>U. mexicana</i> (Liebl.) PL.	21. <i>U. wallichiana</i> Planch.
7. <i>U. elongata</i> L.K. Fu et E. S. Ding	22. <i>U. microcarpa</i> L. K. Fu
3. The section <i>Trichoptelea</i> Schneider	2. The section <i>Trichocarpa</i> Cheng
8. <i>U. thomasi</i> Sarg.	23. <i>U. macrocarpa</i> Hance
9. <i>U. serotina</i> Sarg.	24. <i>U. lamellosa</i> C. Wang et S. L. Chang
4. The section <i>Anisoptelea</i> Grudz.	25. <i>U. glaucescens</i> Franch
10. <i>U. crassifolia</i> Nutt.	3. The section <i>Foliaceae</i> (Schneid.) Grudz.
11. <i>U. monterreyensis</i> C. H. Muller	26. <i>U. minor</i> Miller
5. The section <i>Microptelea</i> (Spach.) Pl.	27. <i>U. davidiana</i> Pl.
12. <i>U. parvifolia</i> Jacq.	28. <i>U. castaneifolia</i> Hemsl.
13. <i>U. coreana</i> Nakai	29. <i>U. wilsoniana</i> Schneid.
6. The section <i>Lanceifoliae</i> (Schneid.) Grudz.	30. <i>U. chenmii</i> Cheng
14. <i>U. lanceifolia</i> Roxb.	31. <i>U. boissieri</i> Grudz.
	32. <i>U. pumila</i> L.
	33. <i>U. kunningensis</i> Cheng
	34. <i>U. chumlia</i> Melville.

the base; there are 5 free stamens. The fruit of the elm is a monospermous, flattend samara on a peduncle of various lenght; the wing is very thin, pergameneous, usually quite wide, and with the seed placed centrally or slightly towards the apex. Peduncles of the flowers and fruits consist of two parts – the apical part as a rule drops together with the fruit, and the basal one is persistent.

The systematics of the genus has been elaborated many times. Recently a number of papers concerning the taxonomy of genus *Ulmus* has been published by Grudzinska ja (1956, 1957, 1969, 1971, 1974, 1975, 1977, 1979, 1980) and Heybroek (1976, 1981). According to those authors, the genus includes 34-35 species, grouped into two subgenera, *Ulmus* and *Dryoptelea* (Spach) Planch. and into nine sections (tab. 1).

SECTION *ULMUS* L.

To this section two species belong, which are important from the point of view of forest economy – the European *U. laevis* Pall. and the North-American *U. americana* L., and one not so important species from Taiwan – *U. uyematsui* Hayata (fig. 1). Hence this section though poor in species, is characterized by a very widespread, American-Euro-Asiatic range. In North America *U. americana* occurs practically in the whole eastern United States and in southeastern Canada, reaching latitude 100-105° in the West. It is a species met frequently on all locations especially in the North. It prefers lowlands and in the Apallachian Mts. it grows up to an altitude of only 600–680 m (Sargent 1947, 1965, Fowells 1965, Elias 1970, Little 1971).

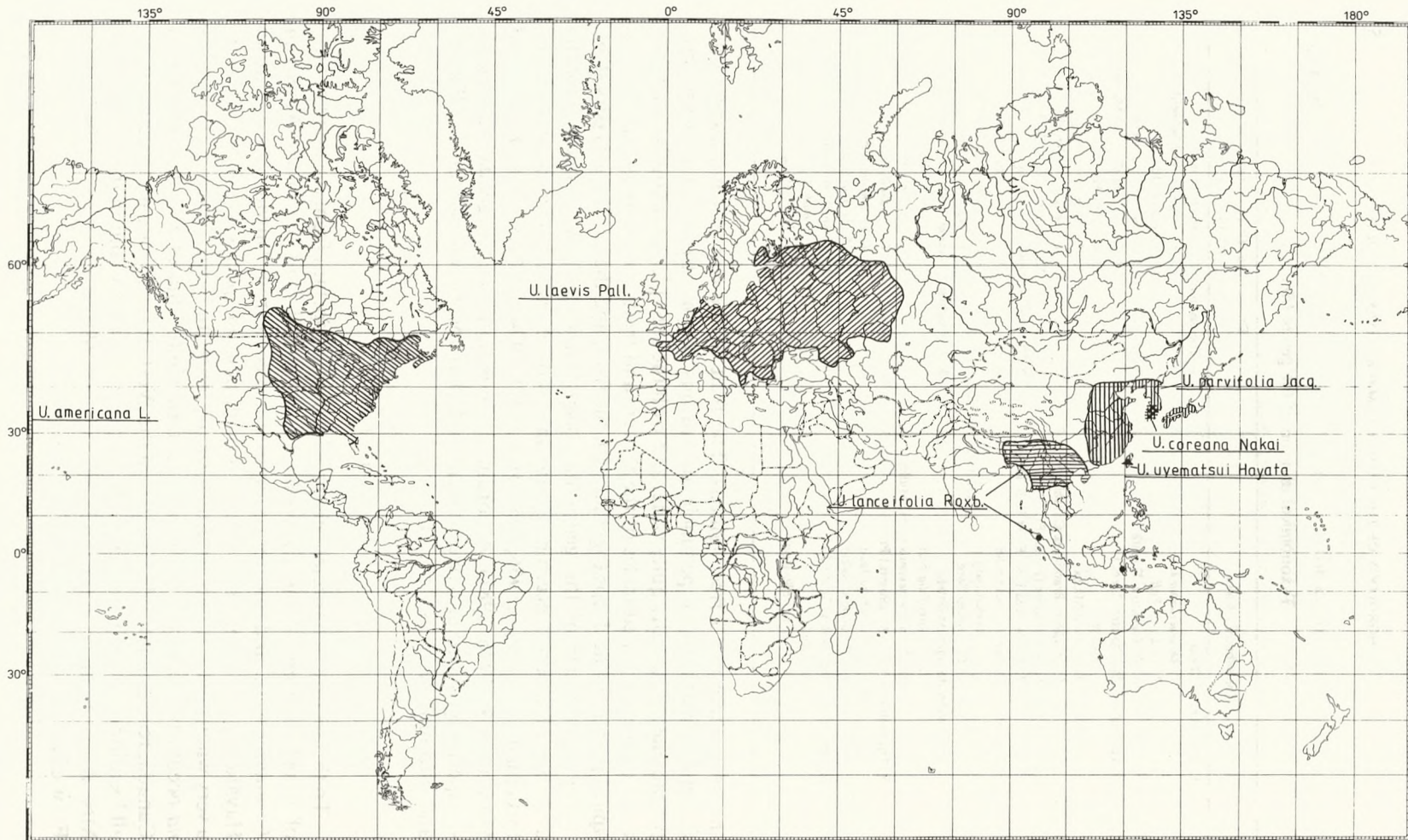


Fig. 1. Distribution of section *Ulmus*, *Lanceaefoliae* (Schneider) Grudz. and *Micropteleae* (Spach) Pl.

The European part of the section range is formed by *U. laevis*, which is distributed from southern Sweden in the north to Albania and Bulgaria in the south, probably extending also to Greece and Turkey. In western Europe it is considerably less common than in the eastern part of the continent. Generally, it grows in the lowlands and only sporadically in plateau zones of submontane areas (Hegi 1957, Hess and al. 1967, Grudzińska 1977a, Zieliński 1979).

The third species, a Taiwanese endemite, covers a small area in the central part of the island in the Alishan Mts., between an altitude of 1500 and 2500 m (Lee 1935).

SECTION *CHAETOPTOLEA* (LIEBL.) SCHNEID.

The distribution of the section is delimited by 4 species. The American *U. alata* Michx., occurs in the southeastern part of the United States, mostly in Alabama, Mississippi, Texas, Arkansas and Tennessee (fig. 2). It grows primarily in the lowlands and in mountain regions it reaches maximally an altitude of 700–800 m (Sargent 1947, 1965, Fowells 1965, Elias 1970, Little 1971).

The second American species, *U. mexicana* (Liebl.) Pl. extends generally over southern Mexico, and in the central part of the country it was reported only from the Sierra de Puebla Mts. Outside Mexico, it grows also in Costa Rica and in Panama. It is a mountain species, reaching up to an altitude of about 2000 m (Nevling 1960, Pesman 1962, Burger 1977).

The third species from the section, *U. villosa* Brandis ex Gamble grows in the Himalayan Mts., and its range covers northeastern Pakistan and northwestern India. It appears most numerous in the valleys of rivers Sutlej, Beask and Sindh, generally between an altitude of 1200 and 2700 m (Melville and Heybroek 1971, Zieliński 1979, Akhter 1985).

The fourth species – *U. elongata* L. K. Fu et E. S. Ding, is an endemite of the Chekiang province in China; it was recently described as occurring there, in Sui-chang and He-shanton (Fu et. al. 1979).

SECTION *TRICHOPTOLEA* SCHNEIDER

This section includes only two American species *U. thomasi* Sarg. and *U. serotina* Sarg. (fig. 3). Both of them occur in the eastern part of the United States, but the first is characterized by a significantly wider range, which covers first of all the states of New York, Indiana, Iowa, Minnesota, Wisconsin, Michigan, northern Ohio, northern Illinois, northern Missouri as well as southernmost parts of Quebec in Canada. In addition, *U. thomasi* occurs on an isolated locality in the central part of eastern United States, in the state of Tennessee and in adjacent areas. It usually grows singly or as groups within mixed forests, at elevations up to 700 m (Sargent 1947, 1965, Fowells 1965, Little 1971).

Localities of the second described species, *U. serotina*, are scattered, and its



Fig. 2. Distribution of section *Chaetoptelea* (Liebl.) Schneid.



Fig. 3. Distribution of section *Trichocarpa* Cheng and *Trichoptelea* Schneider.

larger centres are concentrated only in the states of Tennessee, Arkansas and Oklahoma. In addition this elm can be met sometimes in the states of Alabama, Kentucky, Mississippi, Illinois and Georgia (Sargent 1947, Little 1971).

SECTION *ANISOPTOLEA* GRUDZ.

This section is represented by only one American species – *U. crassifolia* Nutt., which grows in the United States, mostly in the states of Texas and Arkansas (Sargent 1947, Little 1971). Moreover a small species, *U. monterreyensis* C. H. Muller, described from Neuvo Leon in Mexico, probably belongs to this section (fig. 4).

SECTION *MICROPTOLEA* (SPACH) PL.

This section includes two East Asian species – *U. parvifolia* Jacq. and *U. coreana* Nakai (fig. 1). The range of this section is delimited mostly by the first of the mentioned elms. It occurs in eastern China, on the Korean Peninsula, in southern Japan and on Taiwan. It occupies lowland areas and lower parts of the mountains, maximally reaching up to 800 m (Chun 1921, Lee 1935, Li 1963, Ohwi 1965, Kurata 1968).

The second, rather critical species – *U. coreana* (sometimes included in *U. parvifolia*), has a much more limited range because it occurs only in Southern Korea, in the Keili, Zenhoku and Kainan provinces and on Querporet Island (Nakai 1932).

SECTION *LANCEIFOLIAE* (SCHNEIDER) GRUDZ.

It includes only one species – *U. lanceifolia* Roxb. (fig. 1), which grows in southern China, northeastern India, Bhutan, Burma and in Tonking in Vietnam. Besides isolated stands are known from Sumatra (Karo Plateau) and the southern parts of Celebes. This last locality is situated in the southern hemisphere, and it is also the southernmost locality within the whole genus. *U. lanceifolia* occurs in the lowlands and in the mountains, maximally in the Himalayas up to 2500 m (Gagnepain 1927-1928, Lee 1935, Touw and Steenis 1968, Melville and Heybroek 1971, Grierson and Long 1983).

SECTION *MADOCARPUS* SCHNEIDER

This section is rich in species, and it is characterized by a widespread range which covers a great part of North America, Europe and Asia (fig. 5). In America this section is represented by *U. rubra* Muhlenb., which occurs in all eastern states of the United States, is most numerous in its central, and most rare in its northeastern part. *U. rubra* is an important component of the lowland mixed forests, but it is rarely a dominating species there. In the Appalachian Mts. it only slightly exceeds an altitude of 600 m (Sargent 1947, Kurz and Godfrey 1962, Fowells 1965, Elias 1970).

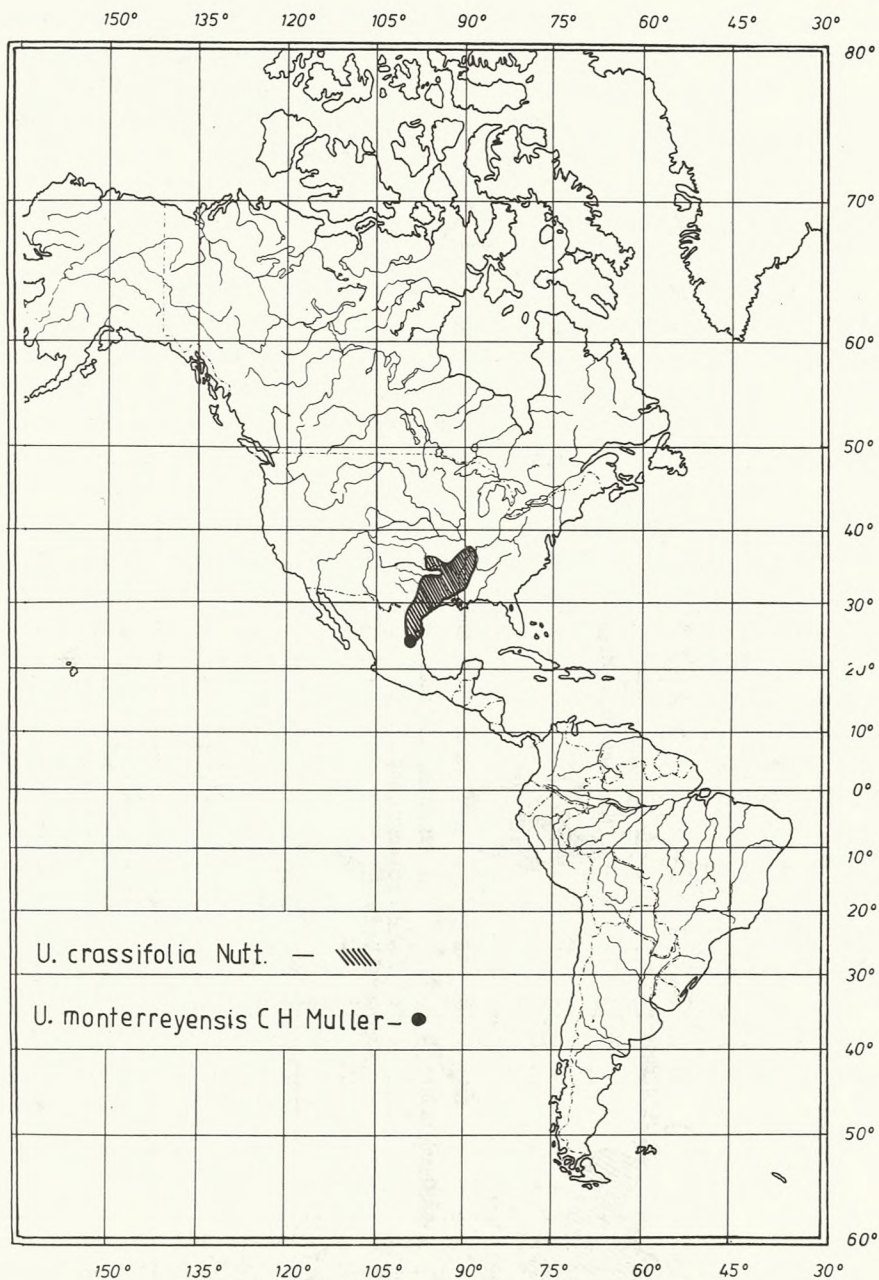


Fig. 4. Distribution of section *Anisoptelea* Grudz.

In Europe, section *Madocarpus* is represented by *U. glabra* Huds. Its far-reaching area of distribution spreads from central Norway and Sweden in the north down to Spain, Italy and the Balkan Peninsula in the south. Moreover this elm grows in western Siberia, in the Caucasus Mts., in Anatolia (Asiatic Turkey),



Fig. 5. Distribution of section *Madocarpus* Schneid.

Syria and in northern Iran. It is usually met singly in broadleaved woods as an admixture. In the mountains of Europe it extends maximally up to an altitude of 1600 m in the Alps, and in Asia up to 1800 m in the mountains of Anatolia and to 2000 m in the Caucasus (Lozina-Lozinskaja 1951, Hegi 1957, Šilič 1973, Fenaroli and Gambi 1976, Jalas and Suominen 1976, Grudzinskaja 1977a, Browicz 1982).

Asiatic species from the section include *U. laciniata* (Trautv.) Mayer, *U. wallichiana* Planch., *U. bergmanniana* Schneid., and a few other small taxons. The first of the species mentioned above occurs in the Soviet Far East, on Sakhalin, in Japan, on the Korean Peninsula and in northeastern China. It is a frequent component of mixed and broadleaved forests. It reaches a maximum altitude of 1830 m in the mountains of China. (Chun 1921, Nakai 1932, Kurata 1964, Ohwi 1965, Numata 1974, Grudzinskaja 1977a).

Closely related to *U. laciniata* is a Korean endemite – *U. macrophylla* Nakai, reported from the Kogen province (Nakai 1932). The next species – *U. bergmanniana* Schneid., grows only in China, in the Hupeh and Szechuan provinces, at a maximum altitude of 2400 m in the Washan Mts. (Schneider 1917, Lee 1935). *U. wallichiana* Planch. grows in eastern Pakistan, in northern Afganistan, in the Indian Himalayas and in Nepal. It belongs there to common species in the lower parts of the mountains, up to 800 m. In more elevated places it is significantly rarer, but it reaches as high as 2950 m in the Liddar Valley in Kashmir. This species is very polymorphic and frequently divided into two subspecies: western subsp. *xanthoderma* Melville et Heybroek and eastern subsp. *wallichiana*. Moreover in Pakistan there exists a natural hybrid between *U. wallichiana* and *U. chumlia*, described under the name of *U. × brandisiana* (Akhter 1985, Melville, Heybroek 1971), and in China *U. wallichiana* hybridises with *U. bergmanniana* var. *lasiophylla* Schneider (Grudzinskaja 1980).

Also the Tibetan species – *U. microcarpa* L. K. Fu, closely related to *U. wallichiana*, probably belongs to this section (Fu et al. 1979). Similar is the case of *U. szechuanica* Fang, an elm described from the Szechuan province in China, but the very limited data concerning this species permits only to speculate about its relation to the section.

SECTION *TRICHOCARPA* CHENG

The range of the section is formed by East Asian species of elms – *U. macrocarpa* Hance, *U. glaucescens* Franch and *U. lamellosa* C. Wang et S. L. Chang (fig. 3).

The first of the species mentioned above occurs in southeastern Siberia, eastern Mongolia, northeastern China and in the northern parts of the Korean Peninsula. It grows there mostly in the mountains along rivers and streams and reaches up to an elevation of 1200 m. Along with the typical variety another one is reported from, China *U. macrocarpa* var. *nana* Liou et Li., which is low variety,

1-2 m in height with significantly greater samaras and more rounded wings (Schneider 1917, Nakai 1932, Lee 1935, Liou 1955, Grudzinskaja 1977a).

The second species – *U. glaucescens* is known from the Hopeh, Shansi, Kansu and Inner Mongolia provinces of China, from altitudes between 1200 and 2000 m. The third species – *U. lamellosa*, is known from only one stand in the Liaoning province in northeastern China (Schneider 1917, Fu et al. 1979).

SECTION *FOLIACEAE* (SCHNEID.) GRUDZ.

This section is characterized by an Eurasian range (fig. 6). In Europe the section range is formed by *U. minor* Miller, which occurs from Denmark and southernmost parts of Sweden in the north to the islands on the Mediterranean Sea in the south, and it reaches the upper course of Oka river and the Lower Volga in the east. Besides that, *U. minor* grows in North Africa, where it was reported as *U. campestris* subsp. *procera* Salisb. (Maire) and in Southeastern Asia. Most frequently it can be met singly or in small groups in mixed forests along rivers and streams and in the lower parts of mountains, where it appears maximally up to an elevation of 1420 m in Europe (Berner Oberland in the Alps) and 2100 m in Asia in the Elburs Mts. (Hegi 1957, Melville 1957, Maire 1961, Janjić 1975, 1981, Grudzinskaja 1977a, Zieliński 1979, Browicz 1982).

In eastern Asia the range of the section is delimited by *U. castaneifolia* Hemsl., *U. davidiana* Planch., *U. wilsoniana* Schneid. and *U. pumila* L., as well as a few other, small species. *U. davidiana* is characterized by a far-reaching range, which covers eastern China, Japan, the Korean Peninsula, the Soviet Far East, and the eastern Siberia and northeastern Mongolia. This elm generally grows singly or as groups within mixed forests. Sometimes, this species also forms monospecific stands, as for example on the islands of Hokkaido and Hondo in Japan, where it forms its own association – *Ulmelum davidianae*. Altitudinally it reaches maximum at 2700 m in the mountains of China (Schneider 1917, Nakai 1932, Lee 1935, Grubov 1955, 1982, Kurata 1964, Ohwi 1965, Numata 1974, Grudzinskaja 1975).

The next two elms from this section – *U. wilsoniana* and *U. castaneifolia* occur only in China, the first of them in the Hupeh, Szechuan and Yunnan provinces and the second only in Hupeh and Szechuan (Schneider 1917, Lee 1935, Fu et al. 1979).

U. pumila grows in China and on the Korean Peninsula, in eastern Mongolia, the Soviet Far East and in eastern Siberia. Besides, that elm is also sometimes met on isolated localities in eastern Turkmenia and Kazakhstan, western Mongolia, Kashmir and in Tibet. It grows in various habitats, in steppe and forest-steppe regions, for example in central Mongolia, and it does not avoid deserts as for example the Alashan Gobi desert, where it is the only tree species. *U. pumila* L. is a very important economic species in the forests of the Soviet Far East,

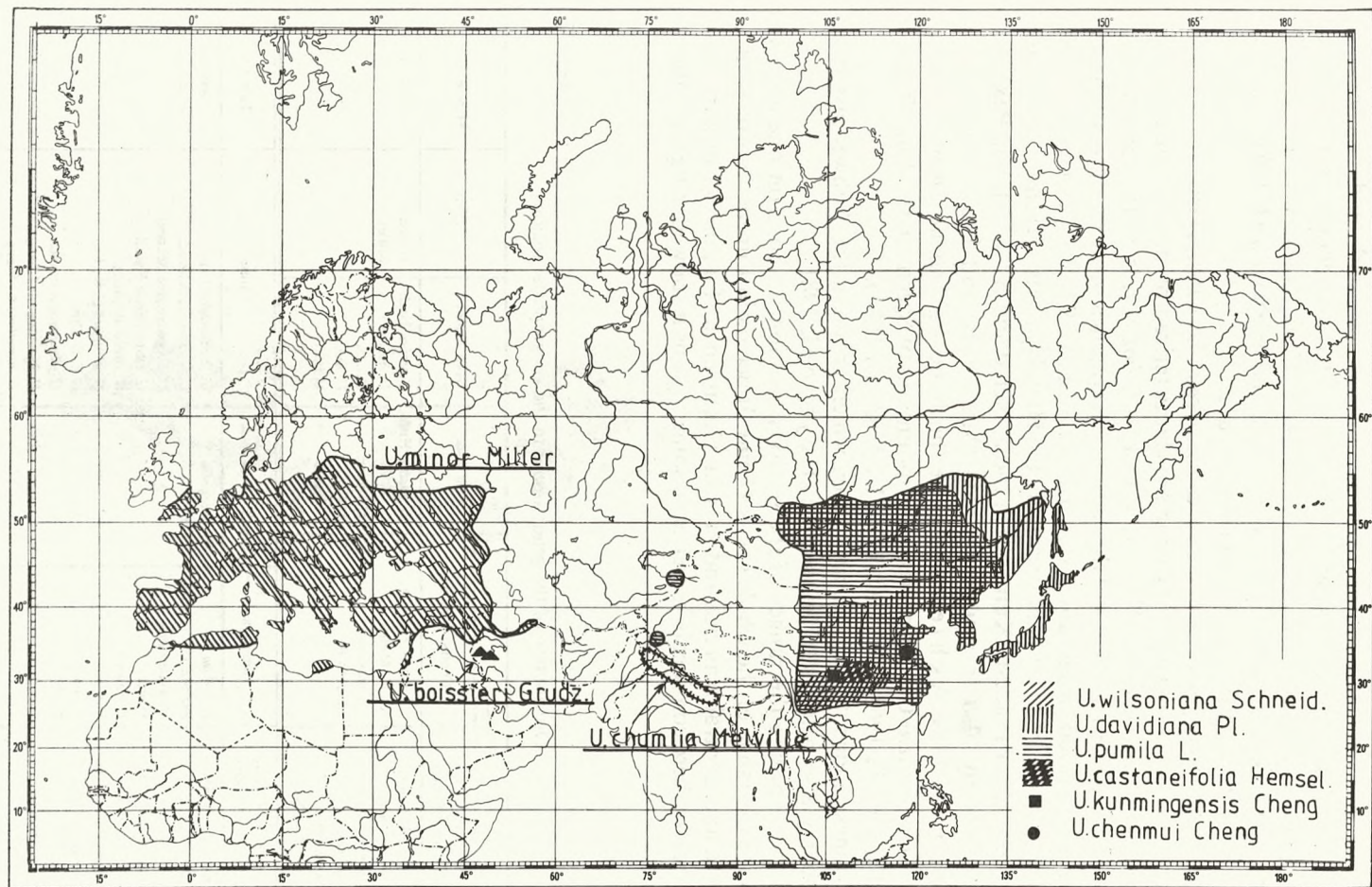


Fig. 6. Distribution of section *Foliaceae* (Schneid.) Grudz.

northeastern China and Kazakhstan. Its maximally elevated stands reaches up to an altitude of 1560-1600 m along the banks of the Orchona river in central Mongolia (Nakai 1932, Lauskashikin 1940, Grubov, 1955, 1982, Grudzinskaja 1961, 1977a, Melville and Heybroek 1971, Zieliński 1979, Lindeman 1981, Hilbig 1987).

The next three species from the series *Foliaceae* – *U.boissieri* Grudz., *U.chumlia* Melville and *U.kunmingensis* Cheng are characterized by much more restricted areas of their occurrence. The first of them – *U.boissieri* is an Iranian endemite from the southern provinces of the country – Kermanshan and Kermam, where it goes up to 1900 m elevation (Grudzinskaja 1977b, Zieliński 1979). *U.chumlia*, on the other hand, occurs in the Himalaya Mts. (Kashmir, Himachal Pradesh, Uttar Pradesh, Kumaun) in India, Nepal and Baluchistan in Pakistan, and probably also in southern China (Melville and Heybroek 1971, Zieliński 1979, Akhter 1985). The third one – *U.kunmingensis* (*U. changi* var. *kunmingensis* Cheng) grows in the mountains of Szechuan in China (Tou and Steenis 1968, Fu et al. 1979, Li 1963, Yi 1983).

Chinese endemite *U. chenmui* Cheng, which grows in the Anhwei province, probably also belongs to this section (Heybroek 1981).

Superimposing the ranges of the sections mentioned above on one map we receive the range of the whole genus *Ulmus*. It occurs in Europe, North Africa, North and Central America and in Asia. Occurrence of a number of particular species on these continents as well as in some regions is showed in figure 7 and in table 2.

Distribution of the genus *Ulmus* in the geographical regions

Table 2

America		East Asia	Asia Minor	Africa	Middle Asia
North America (E United States)	Central America				
<i>U. rubra</i> Mühlent. <i>U. serotina</i> Sarg. <i>U. thomasi</i> Sarg. <i>U. americana</i> L. <i>U. alata</i> Michx. <i>U. crassifolia</i> Nutt.	<i>U. monterreyensis</i> C. H. Muller <i>U. mexicana</i> (Liebl.) Pl.	<i>U. glabra</i> Huds. <i>U. minor</i> Miller. <i>U. laevis</i> Pall.	<i>U. glabra</i> Huds. <i>U. boissieri</i> Grudz. <i>U. minor</i> Miller	<i>U. minor</i> Miller	<i>U. pumila</i> L.
East Asia (without endemites of China)	Himalayas	South – East Asia	China	Taiwan	
<i>U. macrocarpa</i> Hance <i>U. pumila</i> L. <i>U. parvifolia</i> Jacq. <i>U. lanceifolia</i> Roxb. <i>U. coreana</i> Nakai <i>U. macrophylla</i> Nakai <i>U. davidiana</i> Planch. <i>U. laciniata</i> (Trautv.) Mayer	<i>U. villosa</i> Brandis ex Gamble <i>U. wallichiana</i> Planch. <i>U. chumlia</i> Melville. <i>U. lanceifolia</i> Roxb.	<i>U. lanceifolia</i> Roxb.	<i>U. szechuanica</i> Fang <i>U. wilsoniana</i> Schneid. <i>U. bergmanniana</i> Schneid. <i>U. castaneifolia</i> Hemsl. <i>U. chenmui</i> Cheng <i>U. elongata</i> L. K. Fu et E. S. Ding <i>U. glaucescens</i> Franch <i>U. kunmingensis</i> Cheng <i>U. lanellosa</i> C. Wang et S. L. Chang <i>U. microcarpa</i> L. K. Fu	<i>U. uyematsui</i> Hayata	

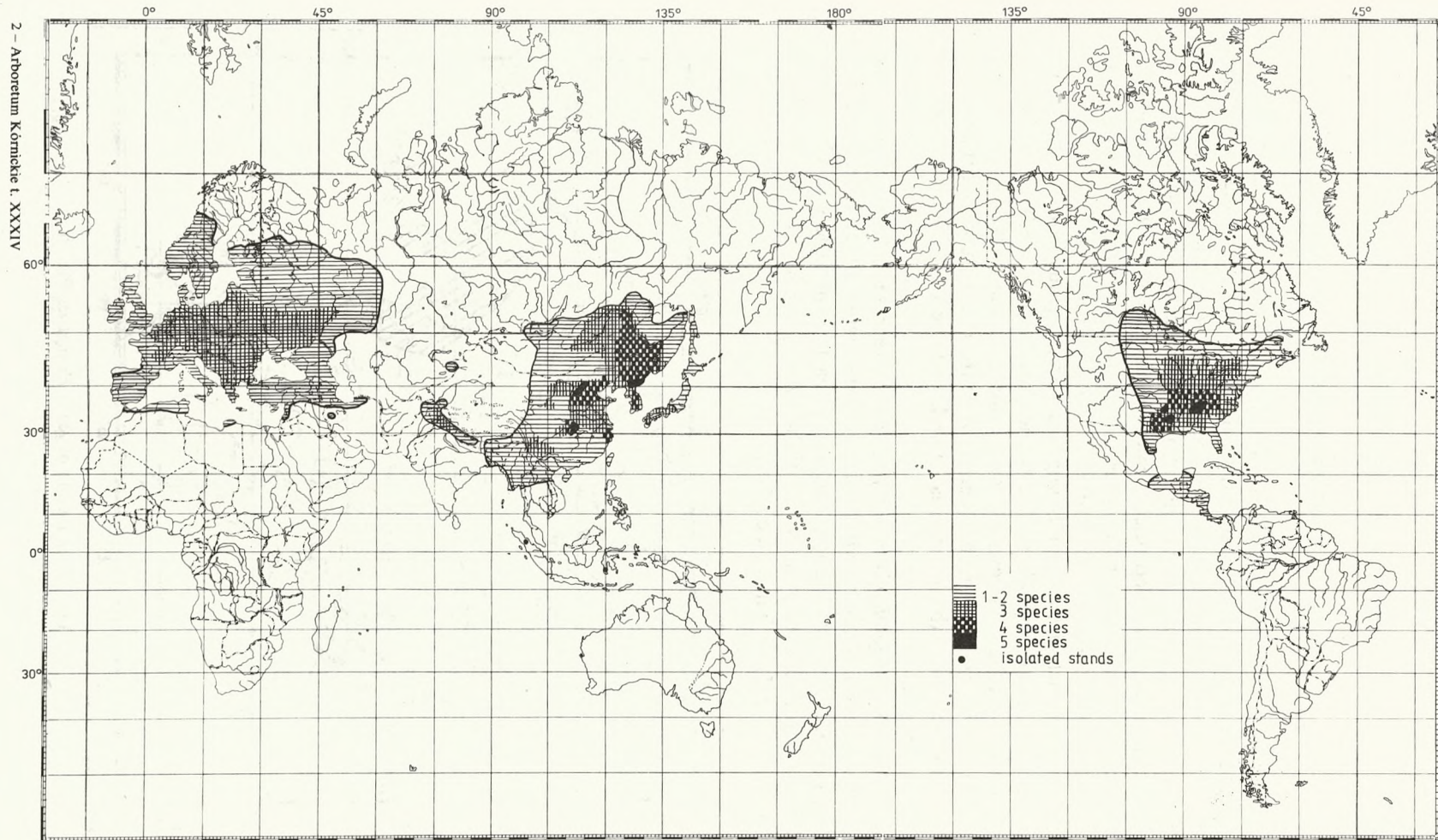


Fig. 7. Density of overlapping ranges of species from genus *Ulmus*

2. GENUS *HEMIPTOLEA* PLANCH.

As a rule the genus *Hemiptelea* comprises not too large trees characterized by crenate leaves and a small, asymmetric nutlet, fitted with a wingy appendix. At first this genus was included within genus *Zelkova* Spach, but as early as 1848 Planchon, taking into consideration the characteristics mentioned above, gave it the rank of an independent genus. To place the genus *Hemiptelea* into the family *Ulmaceae sensu stricto* (which was questioned), impress its detailed anatomico-morphological structure (Grudzinska 1976). In spite of a few characteristics which associate *Hemiptelea* with the genus *Celtis* L., the described genus is much more closely related to the elms, because the fruit of *Hemiptelea* is a nutlet with the seed devoid of any endosperm, the embryo is quite straight, and the pollen grain is 4-6 chambered, while the *Celtis* fruit is a drupe, the seed has an endosperm, the embryo is curved, and the *Celtis* pollen grain is only 2-3-chambered.

The genus *Hemiptelea* is monotypic (fig. 8), represented by an eastern Asian species *H. davidii* Planch., whose range covers first of all the Korean Peninsula and northeastern (Mukden, Chi-Lin) and eastern provinces of China, up to Chekiang and Kiangsi in the south of the country (Schneider 1917, Nakai 1932, Lee 1935, Schmucker 1942).

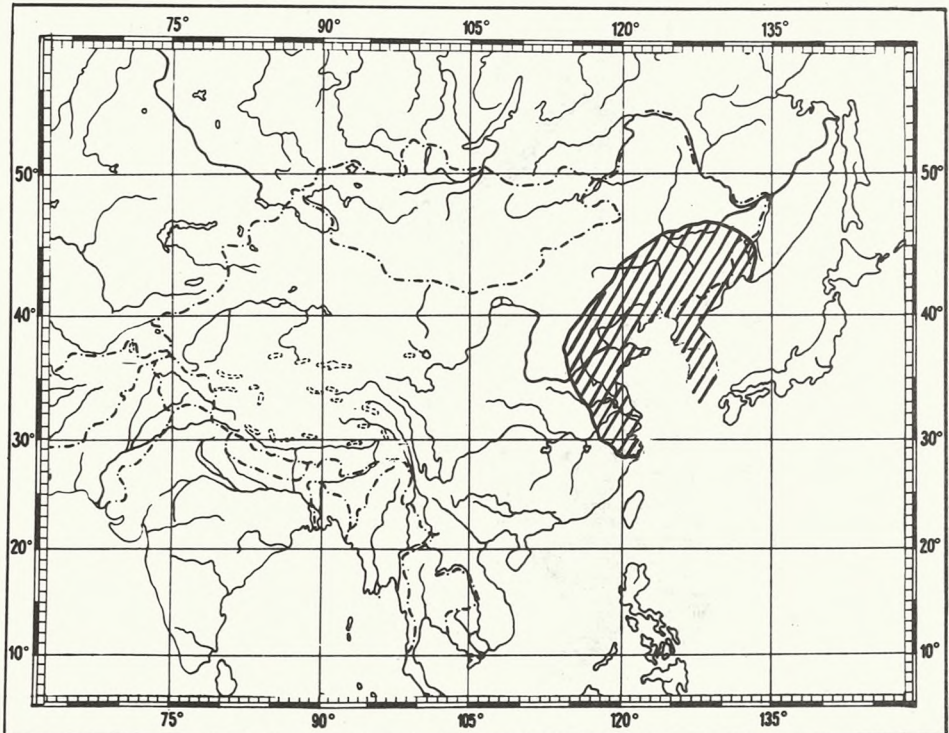


Fig.8. Distribution of genus *Hemiptelea* Planch.

3. GENUS *PLANERA* J. F. GMEL.

The monotypic genus represented by medium-sized trees with crenate (crenation frequently does not exist at the basal part of the leaf), 5-6 cm long leaves; wingless nutlets, but with characteristic, soft appendices.

Planera aquatica (Walt.) J. F. Gmel, the only representative of the genus, covers a rather small area in the southeastern part of the United States, from Cape Fear River in Northern Carolina in the north down to northern Florida in

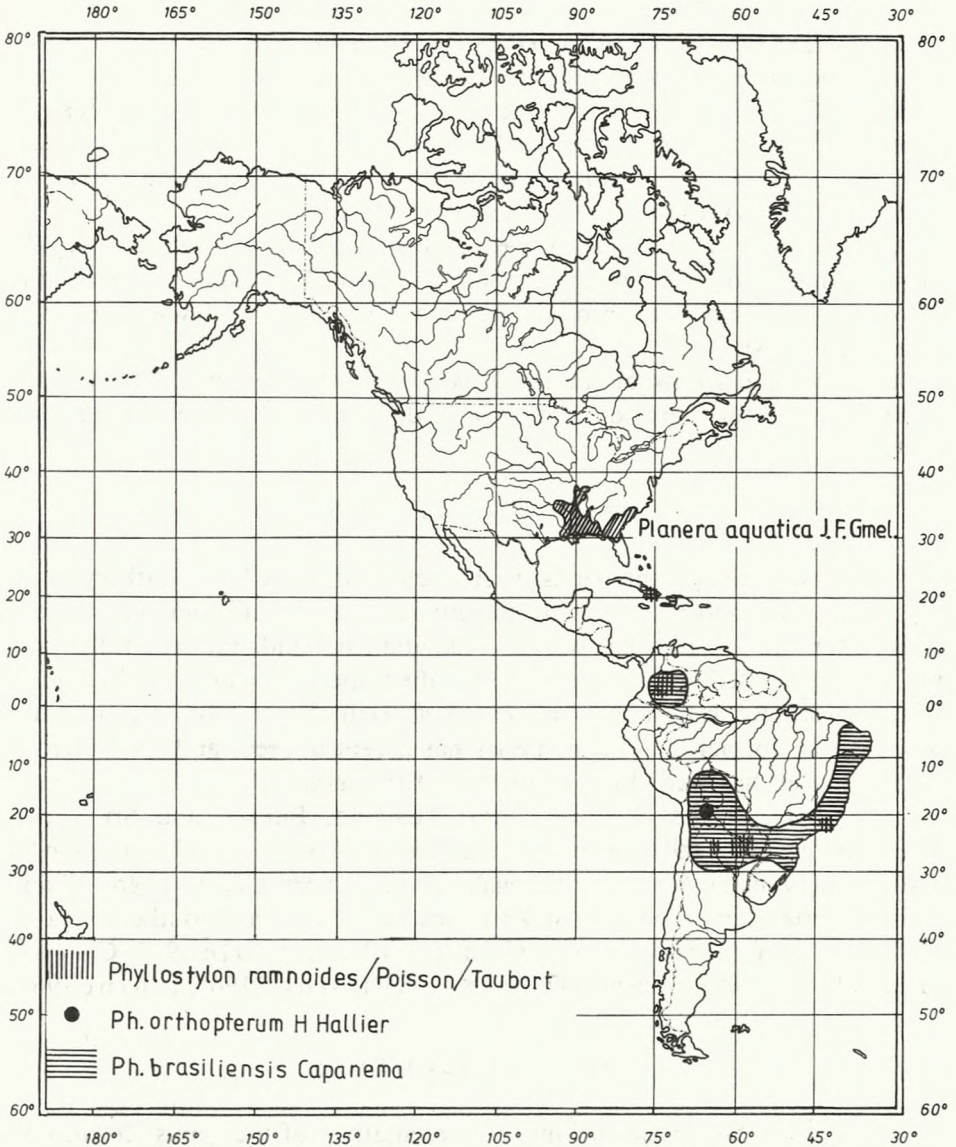


Fig. 9. Distribution of genera *Planera* J. G. Gmel. and *Phyllostylon* Capanema

the south and up to Trinity River in Texas, Louisiana and southern Arkansas (fig. 9). In the latter two states it occurs most frequently and reaches largest dimensions (Sargent 1947, Elias 1970, Sweitzer 1971, Little 1977, 1978).

4. GENUS *PHYLLOSTYLON* CAPANEMA

Two or three species belong to the genus. They are characterized by leaves which are crenate mostly in their apical parts (rarely entire), have nutlets with two wings, and one of them is sometimes several times larger.

The range of the genus is delimited by *Ph.brasiliensis* Capanemae × Benth et J. D. Hooker and *Ph.rhamnoides* (Poisson) Taubort. Both these species occur in tropical Central and South America (fig. 9). The first of them grows mostly in eastern and southeastern Brasil, in Argentina, Bolivia, Paraguay, Cuba, and Haiti, and probably also in Colombia, too (Alain 1951, Carauta 1968, 1974, Hallier 1915, Sweitzer 1971, Černik 1980).

Ph.rhamnoides, with very little leaves, covers a significantly smaller area. This species is reported from few localities in northern Argentina, eastern Brasil, Colombia and from Oriente province in Cuba (Černik 1980, Sweitzer 1971, Carauta 1974).

The taxonomical rank of the third species, *Ph.ortopterum* H. Hallier from Santa Cruz and the Sierra de Charaqua in Bolivia, is still unclear (Carauta 1974).

5. GENUS *HOLOPTELEA* PLANCH.

The representatives of this genus are characterized by the large, leathery, entire leaves (on young sprouts leaves are sometimes crenate), and roundish, flat and short-peduncled samaras; the wing is wide and surrounds the seed fully. Only two, closely related and frequently identified species belong to this genus: *H.integrifolia* (Roxb.) Planch. and *H.grandis* (Hutch.) Mildbr. (fig. 10). It is assumed that former, an Asian species has a central seed, and the latter, an African species has seed closer to the top of the samara.

H.integrifolia occurs in India, Laos, Thailand, Burma, and Sri Lanka. *H.grandis*, one of the tallest trees often reaching up to 50 m in height, grows in the western and central Africa, in Senegal, Guinea, Ivory Coast, Togo, Ghana, Benin, Nigeria, Cameroon, Congo, Zaire, southern Sudan and southern Uganda (Brandis 1906, Hooker 1890, Gamble 1922, Rendle 1917, Gagnepain 1927-1928, Hauman 1942, Riley 1963, Polhill 1965, Irvine 1961).

6. GENUS *ZELKOVA* SPACH

To this genus 5-6 species belong. Representatives of the genus *Zelkova* are trees with short-petioled, crenate leaves and single-seed, dry, greenish, subglobu-

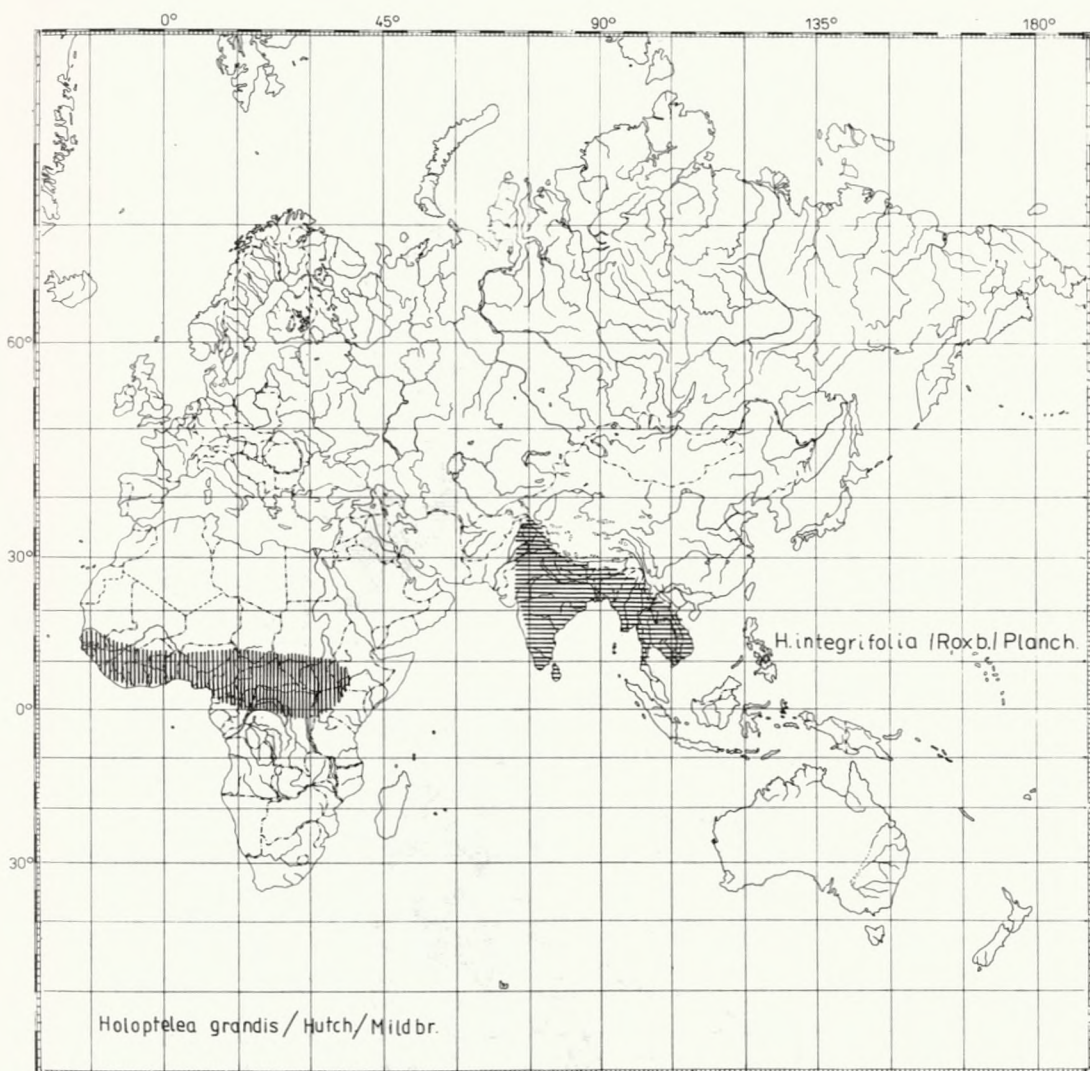


Fig. 10. Distribution of genus *Holoptelea* Planch.

lar, wingless nutlets. The range of the genus is distinctly disjunctive, composed of two parts: Euro-West-Asian one and East-Asian one (fig. 11).

In the western part of *Zelkova* range there occur two, geographically isolated species. On Crete there grows the Cretean endemite – *Z. abelicea* (Lamm.) Boissier, a tree with leathery, small, crenate and tomentose on the lower side leaves (Browicz 1982). The second species – *Z. carpinifolia* (Pallas) C. Koch occurs in the Caucasus Mts., in eastern Anatolia and in northeastern Iran. This species is particularly frequent along the Caspian Sea shores, where it even forms its own association – *Zelkovetum*, or appears as an abundant component in the deciduous broadleaved, mostly oak-hornbeam forests. Altitudinally it reaches up to 1550 m in the mountains of Anatolia (Browicz 1982).

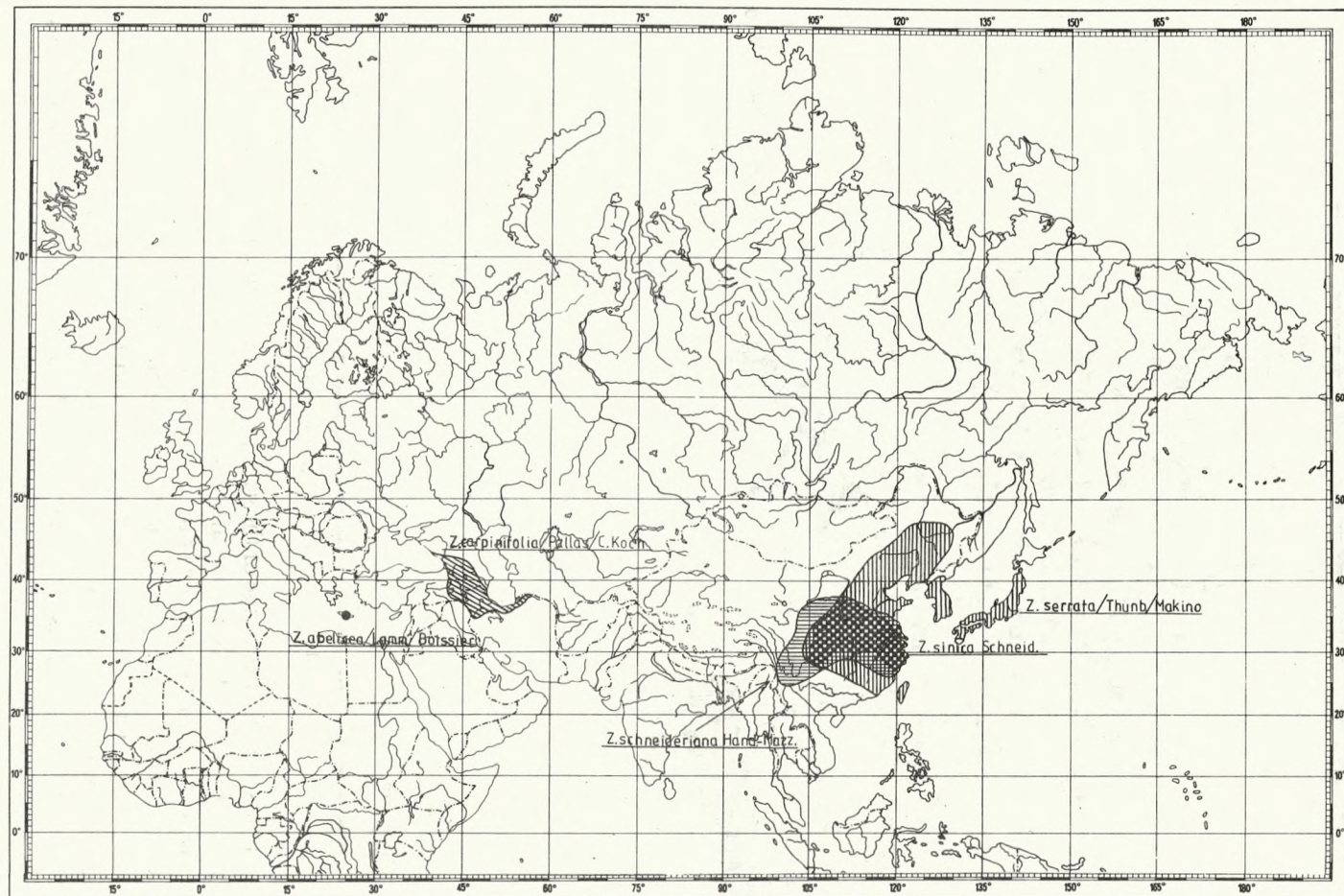


Fig. 11. Distribution of genus *Zelkova* Spach
<http://rcin.org.pl>

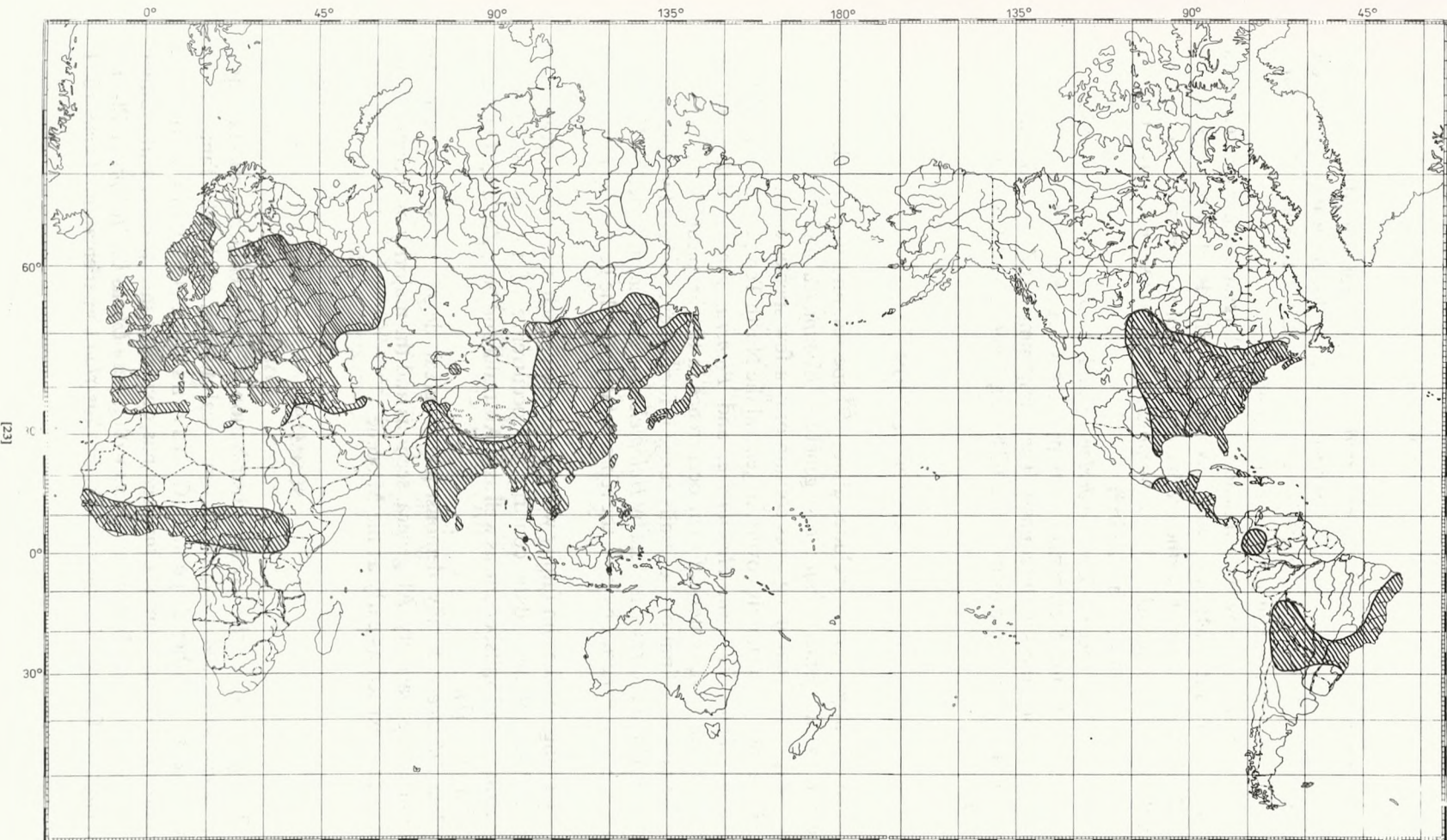


Fig. 12. Distribution of family *Ulmaceae* Mirb. (sensu stricto)

Sometimes a third species is reported from the Caucasus Mts., *Z. hyrcana* Grossh. et Jarm., which is characterized by slightly longer leaves and petioles than those of the typical *Z. carpinifolia* (Lozina-Lozinskaja 1951), but its value as an independent taxon is rather doubtful.

The other species grow only in eastern Asia. The largest range in this region has *Z. serrata* (Thunb.) Makino, which covers the islands of Japan (except for Hokkaido), provinces of northeastern China, the Korean Peninsula and Taiwan (in the last mentioned islands as *Z. formosana* Hayata) (Nakai 1932, Li 1963, Kurata et al. 1964, Ohwi 1965).

The next two species, *Z. schneideriana* Hand.-Mazz. and *Z. sinica* Schneid. occur only in China, their ranges overlapping to a large extent and cover western and central provinces of the country. The southernmost is *Z. schneideriana* which reaches as far as Yunnan province (Cheng 1939, Lee 1935, Čerepanov 1957).

RECAPITULATION

The *Ulmaceae* family includes almost 50 species, and most of them (70%) belong to the genus *Ulmus*; two genera – *Hemiptelea* and *Phyllostylon* are monotypic, the remaining ones contain only a few species each.

The range of the family covers, in general the North Temperate zone, with the genera *Ulmus*, *Zelkova*, *Hemiptelea*, and *Planera*; genera *Holoptelea* and *Phyllostylon* have centers of their occurrence in the Tropical Zone.

The northern limit of the family range is formed everywhere by elms and the southern limit is formed in Asia by *Holoptelea integrifolia*, in Africa by *H. grandis* and in South America by both the representatives of the genus *Phyllostylon* (fig. 12).

The range of the elm family was considerably much more widespread in the past. Paleobotanical data confirm the occurrence of the genus *Ulmus* in Greenland and Spitsbergen, as well as in Australia and New Zealand (Grudzinskaja 1967).

The *Ulmaceae* family demonstrates a great degree of stabilization and considerable plasticity. All genera, sections and the majority of species existing nowadays existed as early as the Miocene.

SUMMARY

The paper gives the present distribution of representatives of the family *Ulmaceae* Mirb. *sensu stricto*. Taxonomical division of the elm family in the broad sense is rather disputable. Grudzinskaja (1968), in a taxonomical monograph of the family *Ulmaceae* has divided it into two separate families – family *Ulmaceae* Mirb. *sensu stricto* with genera *Ulmus* L., *Holoptelea* Planch., *Hemiptelea* Planch., *Zelkova* Spach, *Phyllostylon* Capanema and *Planera* J. F.

Gmel., and family *Celtidaceae* Link with other genera. Those opinion was accepted by the author of this paper, and following it distribution of all species from the family *Ulmaceae sensu stricto*, from the above mentioned genera, has been described.

The genus *Ulmus* includes 34-35 species classified into 9 sections (tab. 1). The first of them, section *Ulmus* has 3 species and its range covers first of all North America and Europe (fig. 1). Only one of the species belonging to this section, *Ulmus uyematsui* Hayata is a Taiwanese endemite. Range of the second section – *Chaetoptelea* (Liebl.) Schneid. is delimited by two Asiatic species, one from the Himalayas and one from China (fig. 2). Two sections – *Trichoptelea* Schneid. and *Anisoptelea* Grudz. each have only two American species (fig. 3 and 4). Section *Microptelea* (Spach) Pl. also includes two species, but range of them covers East Asia. Section *Lanceaefoliae* (Schneid.) Grudz. is monotypical. The only representative of this section, *U.lanceaefolia* Roxb., grows on the isolated stands on Sumatra and Celebes islands, where it crosses the Equator (fig. 1); those stands are the southernmost for the whole genus. The next section – *Trichocarpa* Cheng includes only 3 species, the ranges of which cover East Asia (fig. 3). The last two sections of genus *Ulmus* – *Madocarpus* Schneid. and *Foliaceae* (Schneid.) Grudz. are represented by numerous species and characterized by widespread ranges. Range of the former covers North America, Asia and nearly the whole of Europe, while the latter covers Asia, Europe and North Africa (fig. 5 and 6).

Superimposing ranges of the sections mentioned above on one map we receive the range of the whole genus *Ulmus* (fig. 7 and tab. 2)

The next genus – *Zelkova* Spach includes only 5-6 species. Range of them is divided into two parts, western, covering southeastern Asia and Crete in Europe and eastern, located in East Asia. In the former region there occur two geographically isolated species *Z.abelicea* and *Z.carpinifolia*. Other species from the genus grow only in East Asia (fig. 11).

The genus *Holoptelea* Planch. is represented by two species (fig. 10). One of them grows in Asia (*H.integrifolia* (Roxb.) Planch.) and the other in Africa (*H.grandis* (Hutch.) Mildbr.). The genus *Phyllostylon* Capanema includes two or three species, which occur in tropics of the Central and Southern America (fig. 9).

The last two genera from the family *Ulmaceae*, *Hemiptelea* Planch. and *Planera* J. F. Gmel. are monotypica. To the first belongs *H.davidii* Planch. from East Asia (fig. 8), and to the second *P.aquatica* (Walt.) J. F. Gmel. from North America (fig. 9).

The range of the family covers, in general, the North Temperate Zone; only genera *Holoptelea* and *Phyllostylon* have centers of their occurrence in the Tropical Zone (fig. 12).

LITERATURE

1. Akhter R., 1985. *Ulmaceae*, in Flora of Pakistan (edit. Nasir Ali S. L.), 170. Islamabad.
2. Alain H. L., 1951. Flora de Cuba, 2. La Habana.
3. Brandis D., 1906. Indian trees. Dehra.

4. Browicz K., 1982. Chorology of trees and shrubs in south-west Asia and adjacent regions, 1. Warszawa-Poznań.
5. Burger W., 1977. *Ulmaceae*, in Flora Costaricensis, Fieldiana Bot., 40: 80-93.
6. Carauta J. P. P., 1968. Catalogo des generos de *Ulmaceae* de Brasil. Selowia 20, 27-29.
7. Carauta J. P. P., 1974. Indice das especies de *Ulmaceae* de Brasil. Rodriquesia 27, 39: 99-134.
8. Cheng W. C., 1939. Les Forests du Sze-tchouan et du Si-kang oriental. Toulouse.
9. Chun W. Y., 1921. Chinese economic trees. Shang-hai.
10. Čerepanov S. K., 1957. Obzor vidov rodov *Zelkova* Spach i *Hemiptelea* Pl., Bot. mat. gerb, 18: 57-72.
11. Černik V. V., 1980. Osobennosti stroenija i razvitija perikarpa u predstavitelej semejstvi *Ulmaceae* i *Celtidaceae*. Bot. Žurn. 65, 4: 521-531.
12. Elias T. S., 1970. The genera of *Ulmaceae* in the United States. J. Arnold Arboretum, 51: 18-40.
13. Fenaroli L., Gambi G., 1976. Alberi baume arbres drevesa. Trento.
14. Fowells H. A., 1965. Silvics of forest trees of the United States. Washington.
15. Fu L. K., Chen Ch.-J., Tang Y.-Ch., 1979. Materiale ad floram *Ulmacearum sinensium*. Acta phytotax. sinica, 17: 45-48.
16. Gagnepain F. J. 1927-1928. Flora Indo-Chine 5,6-7. Paris
17. Gamble J. S., 1922. A manual of Indian timbers (reprint 1972). Dehra.
18. Grierson A. J. C., Long D. C., 1983. Flora of Bhutan, 1. Edinburgh.
19. Grubov V. I., 1955. Konspekt flory Mongolskoj Narodnoj Respubliki. Moskwa-Leningrad.
20. Grubov V. I., 1982. Opredelitel sosudistych rastenij Mongolii. Leningrad.
21. Grudzinskaja I. A., 1956. K sistematike nekotorych vidov *Ulmus*. Bot. Žurn. 41, 1: 97-104.
22. Grudzinskaja I. A., 1957. K sistematice roda *Ulmus* (sec. *Blepharocarpus* Dumort.). Bot. mat. gerb., 18: 51-57.
23. Grudzinskaja I. A., 1961. Zametki ob *Ulmus pumila* L. Bot. mat. gerb. 21: 114-121.
24. Grudzinskaja I. A., 1967. *Ulmaceae* i obosnovanie vydelenija *Celtidoideae* v samostojatelnoe semejstvo *Celtidaceae* Link. Bot. Žurn. 52, 12: 1723-1749.
25. Grudzinskaja I. A., 1968. Charakteristika sem. *Ulmaceae* Mirb. i *Celtidaceae* Link. Novosti sist. vysš. rast., 95-98.
26. Grudzinskaja I. A., 1969. Ilmovyje Dalnevo Vostoka. Voprosy bot. na Daln. Vastoke, 37-61.
27. Grudzinskaja I. A., 1971. O zabytom gimalajskom vide *Ulmus* L. Novosti sist. vysš. rast. 8: 131-134.
28. Grudzinskaja I. A., 1974. O sistematičeskom položenii sekciji *Chaetoptelea* Schneider roda *Ulmus*. Bot. Žurn. 59, 1: 61-66.
29. Grudzinskaja I. A., 1975. O proischoždenju amerikanskich vidov *Ulmus*. Bot. Žurn. 50 2: 61-65.
30. Grudzinskaja I. A., 1976. O sistematičeskom položenii roda *Hemiptelea* Pl. Novosti sist. vysš. rast., 13: 69-73.
31. Grudzinskaja I. A., 1977a. Arealy derevev i kustarnikov SSSR, 1. Leningrad.
32. Grudzinskaja I. A., 1977b. Novyj vid ilma *U.boissieri* Grudz. iz Irana. Bot. Žurn., 62, 6: 856.
33. Grudzinskaja I. A., 1979. K sistematike ilmov severnoj Afryki. novosti sist. vysš. rast. 15: 97-9.
34. Grudzinskaja I. A., 1980. Semejstvo *Ulmaceae* Mirb. Dissertacija. Leningrad.
35. Hallier H., 1915. Djevon Th. Herzog aut seiner zweiten Reise durch Bolivien in der Jahren 1910-1011 gesammelten Pflanzen, 2. Meddeel. von S. Rijks Herb. Leiden, h 27: 1-90.
36. Hauman L., 1942. Note sur les *Ulmacees* du Congo Belge. Bull. Jard. Bot. de etat Bruxelles, 26, 4.

37. Hegi G., 1957. *Illustrierte Flora von Mittel-Europa*, 3, 1. Munchen.
38. Hess H. E., Landoit E., Hirzel R., 1967. *Flora der Schweiz*, 1. Basel u. Stuttgart.
39. Heybroek H. M., 1976. Systematic en nomenclatuur von het geslacht *Ulmus*. Rijksinstituut voor onderzoek in de bos-en landschapsbouw „De Dorschkamp”, 32, 8: 237-240. Wageningen.
40. Heybroek H. M., 1981. The Japanese elm species and their value for the dutch elm breeding programme, in: *Proceeding of the dutch elm disease symposium and workshop* (edit. E. S. Kondo, Y. Hiratsuka, W. B. Denyer). Manitoba.
41. Hilbig W., 1987. Zur Problematik der Ursprunglichen Wald-verbretung in der Mongolischen Volksrepublik Flora, 179: 1-15.
42. Hooker I. D., 1890. *Flora of British India*, 5. Delhi.
43. Hutchinson I., 1967. *The genera of flowering plants*, 2. Kew.
44. Iruine F. R., 1961. *Woody Plantae Ghana*. Oxford.
45. Jalas J., Suominen J., 1976. *Atlas florae europaeae*. 3. Helsinki.
46. Janjić N., 1975. *Sistematica poljskih brestova u Bosni i Hercegovini*. Godisnjak Bioloskog instituta Univerziteta u Sarajevu, 28.
47. Janjić N., 1981. Rasirenosti i varijabilitet poljskog bresta u Bosni i Hercegovini. *Rodovi*, 26: 1-2. Sarajevo.
48. Kurata S., 1964. *Illustrated important forest trees of Japan*, 2. Tokyo.
49. Kurata S., 1968. *Illustrated important forest trees of Japan*, 2. Tokyo.
50. Kurz H., Godfrey R., 1962. *Trees of Northern Florida*. Gainesville.
51. Laukashikin A. S., 1940. The small-leaved elm of North Manchuria. *The China Journal Publ. Comp. Limited*, 32, 4: 153-157.
52. Lee S.-Ch., 1935. *Forest Botany of China*. Shanghai.
53. Li H.-L., 1963. *Woody flora of Taiwan*. Narberth, Pennsylvania.
54. Lindeman G. V., 1981. *Estestvenno rastuszczij vjaz melkolistnyj*. Moskva.
55. Liou T., 1955. *Trees and shrubs in North China*. Mukden.
56. Little E., 1971. *Conifers and Important Hardwoods*. Atlas of U. S. Trees, 1. Washington.
57. Little E., 1977. *Minor Eastern Hardwoods*. Atlas of U. S. Trees, 4. Washington.
58. Little E., 1978. *Florida*. Atlas of U. S. Trees, 5. Washington.
59. Lozina-Lozinskaja A. S., 1951. *Ulmaceae* Mirb. in: *Derevja i kustarniki SSSR*, 2. Moskva-Leningrad.
60. Maire R., 1961. *Flore de l’Afrique du Nord*, 7. Paris.
61. Melville R., 1957. *U.canescens* an eastern mediterranean elms. *Kew. Bull.*, 3: 499-502.
62. Melville R., Heybroek H. M., 1971. The elms of the Himalaya. *Kew Bull.*, 26, 1: 3-28.
63. Mirbel C. F. B., 1815. *Elements de physiologie vegetale et de botanique* Magimel. Paris.
64. Nakai T., 1932. *Flora sylvatica Koreana*, 19. Chosen.
65. Nevling L.I., 1960. *Fl. of Panama*. *Ann. Missouri Bot. Gard.*, 47: 105-106.
66. Numata M., 1974. *The flora and vegetation of Japan*. Tokyo.
67. Ohwi J., 1965. *Flora of Japan*. Washington.
68. Pesman W., 1962. *Meet flora Mexicana*. Arisona.
69. Planchon M. J.-E., 1848. *Sur des Ulmacees*. *Ann. Sciences Naturelles, ser. 3. Bot.*, 10. Paris.
70. Polhill R. M., 1965. Enumeration of the *Ulmaceae* in Africae South of the Sahara. *Kew. Bull.*, 19, 1: 139-145.
71. Rendle A. B., 1917. *Ulmaceae*, in: *Flora of tropical Africa*, 73 (edit. D. Prain).
72. Riley H. P., 1963. *Families of flowering plants of southern Africa*. Kentucky.
73. Sargent Ch. S., 1947. *Silva of North America*, 7. New York.
74. Sargent Ch. S., 1965. *Trees of North America*, 1. New York.
75. Schmucker Th., 1942. *Distribution des especes arborescentes*. *Silvae Orbis*, 4.
76. Schneider C. K., 1917. *Plantae Wilsonianae*, 3. Cambridge.
77. Sweitzer E. M., 1971. Comparative anatomy of *Ulmaceae*. *J. Arnold Arb.*, 52, 4: 523-585.
78. Šilić C., 1973. *Atlas dreveca i grmlja*. Sarajevo.

79. Tachtagjan A., 1987. Sistema magnoliofitov. Leningrad.
 80. Touw A., Steenis C. G. G. J., 1968. Note on *Ulmus* in Malasia. Blumea, 16: 84.
 81. Yi T.-P., 1983. A new variety of *Ulmus kunmingensis* Cheng. Acta phytotaxonomica sinica, 8: 318.
 82. Zieliński J., 1979. *Ulmaceae*, in: Fl. Iranica (edit. R. H. Rechinger), 142. Wien.

Chorologia rodziny *Ulmaceae* (*sensu stricto*)

Streszczenie

Praca dotyczy rozmieszczenia rodziny *Ulmaceae* Mirb. *sensu stricto*. Systematyka wiązowatych oraz jej podział na niższe jednostki systematyczne, samodzielne rodziny i podrodziny przedstawiane są różnie. W niniejszej pracy przyjęto za Grudzińską (1968) podział rodziny wiązowatych w szerokim sensie na dwie samodzielne rodziny – rodzinę *Ulmaceae* Mirb. *sensu stricto* obejmującą rodzaje *Ulmus* L., *Holoptelea* Planch., *Hemiptelea* Planch., *Planera* J. G. Gmel., *Phyllostylon* Capanema i *Zelkova* Spach. oraz rodzinę *Celtidaceae* Link., do której należą pozostałe rodzaje. Przedstawiono na kilkunastu mapach rozmieszczenie wszystkich gatunków wspomnianych wyżej 6 rodzajów należących do tak pojmowanej rodziny.

Rodzaj *Ulmus* L., najliczniejszy, obejmuje 34-35 gatunków zaliczanych do 9 sekcji (tab. 1). I tak sekcja *Ulmus* liczy 3 gatunki; jej zasięg przypada przede wszystkim na Amerykę Północną i Europę; jeden drobny endemit rośnie na Tajwanie (ryc. 1). Zasięg drugiej sekcji, *Chaetoptelea* (Liebl.) Schneid. wyznaczają dwa amerykańskie gatunki, jeden z Himalajów i jeden z Chin (ryc. 2). Dwie dalsze sekcje *Trichoptelea* Schneider i *Anisoptelea* Grudz. liczą tylko po dwa amerykańskie gatunki (ryc. 3 i 4), a sekcja *Micropetelea* (Spach.) Pl. jest również dwugatunkowa, z tym że zasięg jej przypada na wschodnią Azję (ryc. 1).

Monotypową sekcją jest wschodnioazjatycka sekcja *Lanceifoliae* (Schneider) Grudz. (ryc. 1). Jej przedstawiciel *U.lanceifolia* Roxb. na izolowanych stanowiskach na wyspach Sumatra i Celebes przekracza równik; są to jednocześnie najbardziej na południe wysunięte stanowiska całego rodzaju *Ulmus*. Kolejna sekcja *Trichocarpa* Cheng liczy 3 gatunki, a jej zasięg ograniczony jest także do wschodniej Azji (ryc. 3).

Dwie ostatnie sekcje *Madocarpus* Schneider i *Foliaceae* (Schneider) Grudz., najliczniejsze gatunkowo, charakteryzują się dużo bardziej rozległymi zasięgami. I tak pierwsza występuje na znacznym obszarze Ameryki Północnej i Azji oraz prawie w całej Europie. Druga natomiast ma swoich przedstawicieli w Azji, w Europie i na północnych krańcach Afryki (ryc. 5 i 6).

Nakładając zasięgi wszystkich sekcji na jedną mapę uzyskano obraz rozmieszczenia całego rodzaju *Ulmus* (ryc. 7 i tab. 2).

Rodzaj *Zelkova* obejmuje 5-6 gatunków, których zasięgi przypadają na południowo-wschodnią Azję i Kretę, gdzie rosną *Z.carpinifolia* (Pallas) C. Koch. i *Z.abelicea* (Lamm.) Boissier oraz na wschodnią Azję, gdzie występują pozostałe gatunki (ryc. 11).

Rodzaj *Holoptelea* Planch. reprezentowany jest przez dwa gatunki, z których jeden rośnie w Azji – *H.integrifolia* (Roxb.) Planch., a drugi w Afryce – *H.grandis* (Hutch.) Mildbr. (ryc. 10).

Rodzaj *Phyllostylon* Capanema obejmuje 2-3 gatunki, których zasięgi przypadają na tropikalną Amerykę Centralną i Południową (ryc. 9).

Dwa ostatnie rodzaje są monotypowe. Pierwszy z nich – *Hemiptelea* Planch. jest we wschodniej Azji reprezentowany przez *H.davidii* Planch. (ryc. 8), a drugi – *Planera* J. F. Gmel. w Ameryce Północnej przez *P.aquatica* (Walt.) J. F. Gmel. (ryc. 9).

Zasięg całej rodziny generalnie biorąc przypada na strefę umiarkowaną, gdzie występuje większość przedstawicieli rodzaju *Ulmus*, *Zelkova*, *Hemiptelea* i *Planera*; tylko dwa rodzaje *Holoptelea* i *Phyllostylon* mają swoich przedstawicieli i centra występowania w strefie tropikalnej (ryc. 12).

Хорология семейства *Ulmaceae* (*sensu stricto*)*

Резюме

Работа относится к размещению семейства *Ulmaceae* Mirb. *sensu stricto*. Систематика семейства ильмовых, а также его разделение на более низкие систематические единицы, подсемейства и самостоятельные роды представляют по-разному. В данной работе принято по Грудзинской (1968) разделение всего семейства ильмовых на два самостоятельных семейства – семейство *Ulmaceae* Mirb. *sensu stricto* включающее роды *Ulmus* L., *Holoptelea* Planch., *Hemiptelea* Planch., *Planera* J. G. Gmel., *Phyllostylon* Саранета и *Zelkova* Spach., а также семейство *Celtidaceae* Link., к которому принадлежат остальные роды. На нескольких картах представлено размещение всех видов вышеуказанных 6 родов принадлежащих к так понимаемому семейству.

Род *Ulmus* L., самый многочисленный, охватывает 34-35 видов относимых к 9 секциям (таблица 1). Таким образом секция *Ulmus* насчитывает 3 вида; ее ареал находится прежде всего в Северной Америке и Европе; один небольшой эндемик растет на Тайване (рис. 1). Ареал другой секции *Chaetoptelea* (Liebl.) Schneid. определяют два американских вида, один из Гималаев и один из Китая (рис. 2). Две следующие секции *Trichoptelea* Schneider и *Anisoptelea* Grudz. насчитывают только по два американских вида (рис. 3 и 4), а секция *Microptelea* (Spach.) Pl. также состоит из двух видов, с тем что ее ареал приходится на восточную Азию (рис. 1). Одновидовой секцией является восточно-азиатская секция *Lanceifoliae* (Schneider) Grudz. (рис. 1). Ее представитель *U. lanceifolia* Roxb. на изолированных местообитаниях на островах Суматра и Сулавеси пересекает экватор; это наиболее выдвинутые на юг местообитания ильмов. Следующая секция *Trichocarpa* Cheng насчитывает три вида и ее ареал ограничен также восточной Азией (рис. 3). Две последние секции *Madocarpus* Schneider и *Foliaceae* (Schneider) Grudz. самые многочисленные по видам, характеризуются значительно более широкими ареалами. И так, первая растет на значительной поверхности Северной Америки и Азии, а также почти во всей Европе Вторая, в свою очередь, имеет своих представителей в Азии, в Европе и в северных частях Африки (рис. 5 и 6). Накладывая ареалы этих секций на одну карту получена размещения всего рода *Ulmus* (рис. 7 и таблица 2).

Род *Zelkova* насчитывает 5-6 видов, ареалы которых находятся как в северо – восточной Азии и на Крите, где растут *Z. carpinifolia* (Pallas) C. Koch. и *Z. abelicea* (Lamm.) Boissier, так и в восточной Азии, где растут остальные виды (рис. 11).

Род *Holoptelea* Planch. представлен двумя видами, из которых один растет в Азии – *H. integrifolia* (Roxb.) Planch., а другой в Африке – *H. grandis* (Hutch.) Mildbr. (рис. 10). Следующий род *Phyllostylon* Саранета охватывает 2-3 вида, ареалы которых приходятся на тропическую Центральную и Южную Америку (рис. 9). И наконец два оставшиеся рода имеют по одному виду *Hemiptelea* Planch. и *Planera* J. F. Gmel. – первый в восточной Азии представлен *H. davidii* Planch. (рис. 8), а другой растет в Северной Америке *P. aquatica* (Walt.) J. F. Gmel. (рис. 9).

Ареал всего семейства в общем приходится на умеренный пояс, где растет большинство представителей рода *Ulmus*, *Zelkova*, *Hemiptelea* и *Planera*; только два рода *Holoptelea* и *Phyllostylon* имеют своих представителей в тропическом поясе (рис. 12).

*Автор: К. Боратыньска