

KAZIMIERZ BROWICZ

Chorology of *Populus euphratica* Olivier*

The chorology of *P. euphratica* is not less interesting than its systematics and morphology. Heterophylly of this most original and variable taxon within the genus *Populus* is striking, with the result that several forms were described and assigned various taxonomic rank, including the specific. The value of these taxons is even today not sufficiently clear and in this respect various authors differ substantially. Apart from the heterophylly another reason for this state of things lies in the insufficient knowledge of the geographic distribution of *P. euphratica*, lack of a description of its individual variability at various developmental stages (age), lack of full comparative herbarium materials from the whole range and also an overestimation of small differences occurring in isolated populations. In order to better understand all these facts it is necessary to study the history of the discovery of this species and the history of accumulation of data about its range of distribution.

P. euphratica has been found in Mesopotamia on the Euphrates river towards the end of XVIII c. by the French traveler G. A. Olivier during his trip to the Middle East in the years 1796 - 1797. It was first described, however, in the year 1807. Already at that time Olivier has noted the great differences in leaf shape of this poplar, which besides lanceolate or linear-lanceolate leaves with entire margins has also had ovate-rhombate ones with the dentate margin in the apical part. Between these extreme forms there occurred various intermediate ones (Fig 1).

While Oliver's diagnosis is from the taxonomic point of view the first fully qualified description of *P. euphratica*, informations about this poplar are much earlier and extend back by at least 2000 years. Fournier (1964) basing on the words of Ascherson (1872, Sitzungsbr. Naturf. Freunde, Berlin) and lately also those of Zohary (1966) report that *P. euphratica* has already been mentioned in the Bible. Fournier

* This work has been partially supported by grant No. FG-PO-303 from the US Department of Agriculture under PL-480.



Phot. K. Jakusz

Fig. 1. Variability of *Populus euphratica* leaves — a herbarium specimen collected in southern Anatolia

(l.c.) believes also that this species was known to Aristotele as well as to Teophrast. Presumably these informations concerned the same region of Middle East as Olivier's discovery. On the other hand from a completely different region, namely from northwestern China, there is a report about *P. euphratica* from the Vth c.A.D. made by Li Dawn-Yuan in his monumental 40 volume work „Commentaries on the Book of Rivers” (Wang, 1961). This information was, however, completely unknown in Europe and data about stands of *P. euphratica* in China started reaching Europe only in the XIX c.

In the year 1841, that is almost 45 years after Olivier's discovery the poplar was found by Schrenk in Dzungaria on lake Dschalanaschkul, that is in a completely new region located far to the northeast of Mesopotamia. Schrenk has described it in 1843 as a new species under the name *P. diversifolia*, stressing in the name the characteristic heterophylly of this taxon. *P. diversifolia* was to differ also from *P. euphratica* in having shorter glabrous peduncles of capsules (Fig. 2). This species was later recognized by Gombocz (1908) as a variety of *P. euphratica*. By some taxonomists it is considered as identical to *P. euphratica* and included in its synonymy (e.g. Neumann, 1969). As an independent taxon it is mentioned among others by Dode, 1905; Komarov, 1936;



Phot. K. Browicz

Fig. 2. Fruiting twig of *Populus euphratica* from southern Anatolia

Sokolov, 1951; Drobov, 1953; Poljakov, 1960; Poljakov, Kamelin, 1968; Usmanov, 1971.

Two years later Schrenk has described another species from Middle Asia closely related to *P. euphratica*, namely *P. pruinosa*. These two poplars have differed so much from all the species of poplars known at the time that in 1851 Bunge has proposed the recognition of a separate section — *Turanga*. The section name was taken from the Kirgiz language.

Thus in mid XIX c. it was known that *P. euphratica* or species closely related to it occur both in the Middle East and Middle and Central Asia. Thus it was a complete surprise when in 1852 *P. euphratica* was found in northwestern Africa by Krémer (1866), in Algeria near the frontier with Morocco. A detailed information about this discovery was published by Krémer (*l.c.*) as late as 13 years later, in which paper he has also published data on a find made in 1866 by dr. Warion in Morocco as well as about all the available data about the range of this taxon. While Krémer has correctly identified the discovered poplar with *P. euphratica* he has also given it a separate name (*P. mauritanica* — *nom. nud.*). He has also pointed to the variability of leaves of *P. euphratica* and has recognized three basic forms: f. *genuina* — with typical

(poplar like) leaves, f. *salicifolia* — with willow like leaves, and f. *diversifolia* — with leaves of various form. He has not attached to this division any great significance, however, since as he wrote he has found that young individuals have leaves of the type *salicifolia* and old ones of the type *genuina* while young trees were of the *diversifolia* type. This fact has not been noted by Wesmael (1868) who has probably known *P. euphratica* only from herbarium specimens. He has recognized 4 varieties in this species, namely — var. *orbicularis*, var. *ovata*, var. *lanceolata* and var. *hippophæfolia*.

Krémer's discovery was probably not the first one on the African continent. Fournier (1964) suspects that Pliny the Elder who in the XVIth volume of *Naturalis historia* reports three species of poplar, under the name *populus Libyca* probably understood *P. euphratica*. Should this be the case the poplar would have to be considered as being known to Europeans about 1800 years earlier.

A lot of confusion into the systematics of poplars from section *Turanga* has been introduced by the French monographer of the genus Dode (1905). He has described four new species basing the diagnoses primarily on the number of teeth on short-shoots leaves. Two of these species originated from northwest Africa — *P. mauritanica* and *P. bonnetiana*, and the remaining two from southwestern and Central Asia — *P. ariana* and *P. litwinowiana*. Their future treatment in descriptions of the genus *Populus* was diverse. They were not accepted by Gombocz (1908) who either ignored them or reduced them to the rank of form within *P. euphratica*. Gombocz recognized only two species from section *Turanga*, namely *P. euphratica* and *P. pruinosa*, and he has included in the first species as a variety the east African poplar *P. ilicifolia* (Engler) Rouleau which was not known to Dode. However this poplar fully deserves to be treated independently and even was separated out into a monospecific section *Tsavo* (Jarm.) Browicz by Browicz (1966).

The two north African species of Dode were thirty years later given the rank of varieties within *P. euphratica* by Maire (Jahandiez, Maire, 1932). The Asiatic species — *P. ariana*, *P. litwinowiana* and *P. diversifolia* are still considered as species by some Russian botanists. However, recently the two former ones are completely ignored by Kamelin (1973) who maintains only *P. diversifolia*.

After Dode's (1905) monograph of the genus *Populus* appeared two further species from the section *Turanga* were described, one from southwestern Europe and the other from the Caucasus. The first was discovered in 1907 by Traut in southeastern Spain, in the province of Alicante, near Elche (Fig. 3). Dode (1908) gave it the name *P. ilicitana*. He pointed out that this new species is more akin in its morphology to the Asiatic species (*P. ariana* and *P. litwinowiana*) than to the African ones (*P. mauritanica* and *P. bonnetiana*). The origin of *P. ilici-*

tana was not entirely clear to Dode, and the argument in favour of it being a natural stand used was that it grew in an exceptionally hot climate of this part of Spain and that there are difficulties in propagating "turanga". Several years later Hickel (1911) who has visited the vicinity of Elche reported that *P. illicitana* grows there on an edge.

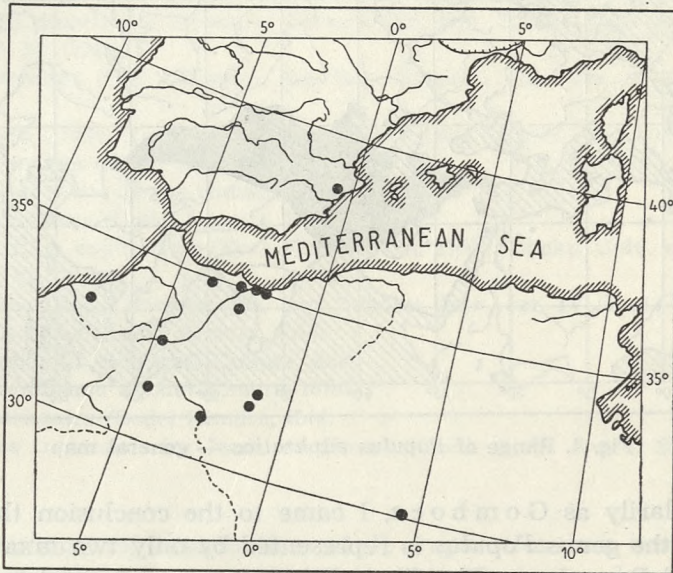


Fig. 3. Distribution of *Populus euphratica* in NW Africa and Europe

of dyke, and that the largest specimens measure 6-9 m in height and 40 cm in stem diameter. The trees were strongly injured, however, numerous young specimens assured the permanence of this unusual stand. Vicioso (1951) suspected that *P. illicitana* is identical to *P. euphratica* and a similar view is held by Franco (1964), who considered the indigenuity of *P. euphratica* in Europe as doubtful.

In the year 1946 Jarmolenko has described from the Caucasus the next species of "turanga" and gave it the name *P. transcaucasica*. It grows in that area primarily in the valley of river Arax and its tributaries as well as in a few isolated stands in Azerbaijan and Georgia. Also this species cannot be separated out from *P. euphratica* and the name *P. transcaucasica* was included into the synonymy of *P. euphratica* (according to Czerepanov, 1973). It was similarly treated by Neumann (1969).

Having had the possibility of seeing over 800 herbarium specimens of the "turanga" poplars from throughout the range, originating from various European herbaria (particularly: BM, C.ISTO, JE.K.LE.P.W. WU.) and also the herbarium of the Ariamehr Botanic Garden in Iran and Smithsonian Institution in USA (photographs of herbarium speci-

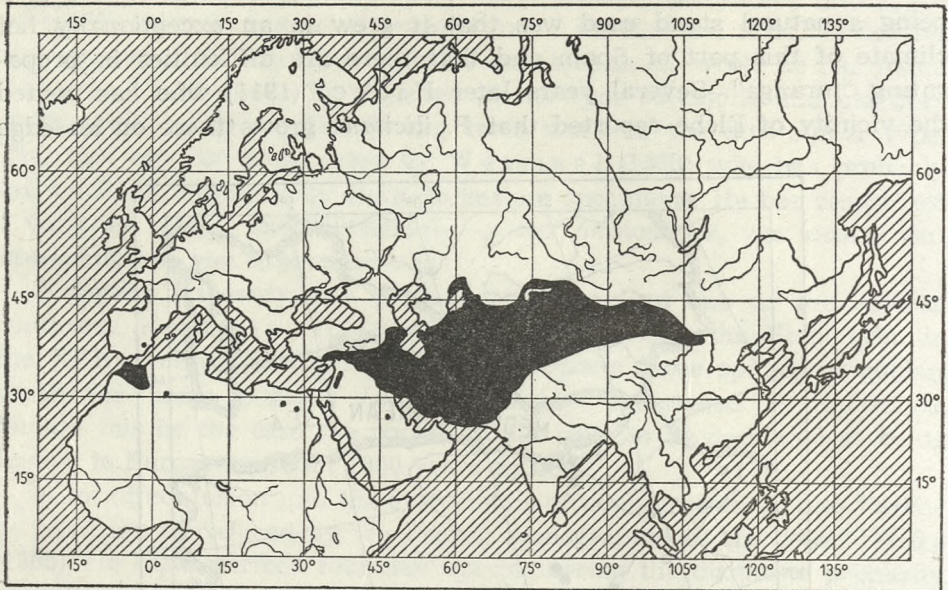


Fig. 4. Range of *Populus euphratica* — general map

mens), similarly as Gombocz, I came to the conclusion that section *Turanga* in the genus *Populus* is represented by only two taxa — *P. euphratica* and *P. pruinosa*. The first of these is characterized by an enormous range (Fig. 4), disrupted into several parts and with widely separated single isolated stands (Egypt, Arabian Peninsula) (Fig. 5). This species is characterized by a considerable morphological variability (shape and dimensions of leaves, pubescence). Differences which occur between various populations of this species are not great and permit at the most the recognition of a few forms or varieties which arose as a result of long lasting isolation. Accepting this view about the species the synonymy of *P. euphratica* is as follows:

P. euphratica Oliv., Voy. Emp. Othoman 6 : 319 (1807).

Syn: *P. diversifolia* Schrenk, Bull. Scient. Publ. Acad. Sci. Pétersb. 10 : 253 (1842).

P. euphratica Oliv. f. *genuina* Krémer, f. *salicifolia* Krémer, f. *diversifolia* Krémer, Description *P. euphratica* 3 (1866).

P. euphratica Oliv. var. *orbicularis* Wesmael, var. *ovata* Wesmael, var. *lan- ceolata* Wesmael, var. *hippohaëfolia* Wesmael, in DC, Prodr. 16, 2 : 327 (1868).

P. euphratica Oliv. var. *hirta* Litw., Spisok Rast. Gerb. Russk. Fl. Bot. Muz. Imp. Akad. Nauk. 4, 23 : 66 (1902).

P. euphratica Oliv. var. *glabra* Litw., *ibid.*

P. ariana Dode, Mém. Soc. Hist. Nat. Autun 18 : 174 (1905).

P. mauritanica Dode, *ibid.*

P. bonnetiana Dode, Mém. Soc. Hist. Nat. Autun 18 : 175 (1905).

P. litwinowiana Dode, *ibid.*

P. euphratica Oliv. var. *diversifolia* (Schrenk) Gombocz, Monogr. Gen. Populi 71 (1908).

- P. euphratica* Oliv. var. *typica* Gombocz, *ibid.*
P. euphratica Oliv. f. *bonnetiana* (Dode) Gombocz, Monogr. Gen. Populi 72 (1908).
P. ilicitana Dode, Bull. Soc. Dendr. France no. 8 : 166 (1908).
P. euphratica Oliv. var. *mauritanica* (Dode) Maire in Jahandiez, Maire, Cat. Maroc. 162 (1932).
P. euphratica Oliv. var. *bonnetiana* (Dode) Maire, *ibid.*
Turanga diversifolia (Schrenk) Kimura, Sci. Rep. Tohoku Univ. ser. IV (Biol.), 13 : 385, 387 (1938).
T. euphratica (Oliv.) Kimura, Sci. Rep. Tôhoku, Univ. ser. IV (Biol.) 13 : 386 (1938).
T. ariana (Dode) Kimura, Sci. Rep. Tôhoku Univ. ser. IV (Biol.) 13 : 387 (1938).
T. bonnetiana (Dode) Kimura, *ibid.*
T. litwinowiana (Dode) Kimura, *ibid.*
T. mauritanica (Dode) Kimura, *ibid.*
Balsamiflua euphratica (Oliv.) Kimura, Sci. Rep. Tôhoku Univ. ser. IV (Biol.) 14 : 191 (1939).
B. ariana (Dode) Kimura, Sci. Rep. Tôhoku Univ., ser. IV (Biol.) 14 : 192 (1939).
B. bonnetiana (Dode) Kimura, *ibid.*
B. diversifolia (Schrenk) Kimura, *ibid.*
B. litwinowiana (Dode) Kimura, *ibid.*
B. mauritanica (Dode) Kimura, *ibid.*
Populus transcaucasica Jarm. ex Grossh., Dokl. A. N. Azerb. SSR 11, 9 : 379 (1946).

A linear map of distribution of *P. euphratica* has been prepared several times (Gombocz, 1908; Roi, 1941; Schmucker, 1942), however, in view of the lack of full data about stands of this species, as well as small scale of these maps, the limits drawn were only very approximate. A point map of distribution of the stands on the Caucasus (*P. transcaucasica*) had been published by Grossheim (1945). Since that time further stands were discovered on the Caucasus and the map is therefore no longer satisfactory. Very general maps of the distribution of *P. ariana*, *P. diversifolia* and *P. litwinowiana* have been also published by Sokolov (1951), and a map of distribution of these poplars in Middle Asia by Usmanov (1971). These maps, however, are not very readable and do not show the specificity of the geographic distribution of *P. euphratica* nor do they permit to understand the ecology of the species. This can be obtained only after the preparation of point maps of the range, for the purpose of which it is necessary to have access to full data, both from the herbarium collections and from the literature. I have been collecting these data over the last 10 years. They have been spotted onto maps (Fig. 3-7) and as a result of this work a true picture of the range of *P. euphratica* was obtained.

From the maps referred to above it clearly appears that *P. euphratica* is a species associated with regions where a dry and hot climate prevails, and that there it occurs along all sorts of water runs—rivers, streams, lakes, oases and wadies. Thus it can be suspected that the di-

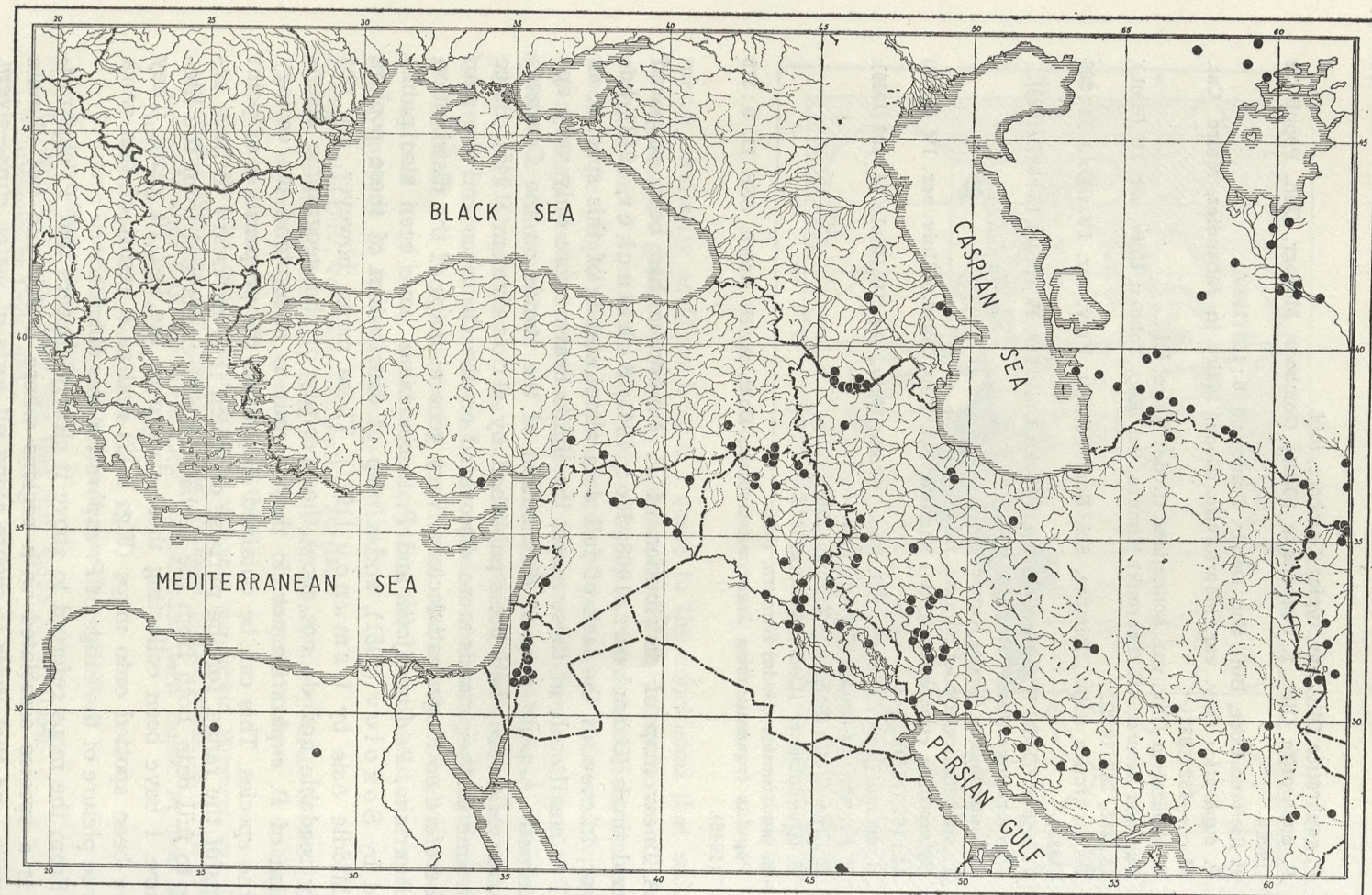


Fig. 5. Distribution of *Populus euphratica* — western part of the range

rupted range of the species is the results of its shrinking following the increase in dryness of the climate which has resulted in substantial changes of the environment — the disappearance of water runs and salting up of the soil. Such changes in the forests of *P. euphratica* in northwestern China, between Kachgar and Kourla have been discussed in detail by Vaillant (1909). These changes are probably responsible for the disruption of the continuity between *P. euphratica* stands in northwest Africa and the Middle East. This is supported by the presence of isolated stands of this species in some Egyptian oases (Fig. 5).

Apart from natural causes some role has also been played by man who by introducing agriculture into river valleys of these regions and by cutting down "turanga" trees for fuel has contributed to the destruction of its forests. This process is continuing today, for example in Tadzhikistan, where fertile regions of river valleys are being overtaken for the cultivation of cotton. However, even today in some regions forests of *P. euphratica* still exist, and testify well to the role this poplar can play in plant communities of hot and dry regions of Asia. Thus for example Wang (1961) mentions that in northwestern Alashan Desert on the Joshui river there occur millions of *P. euphratica* trees, forming a narrow belt of riverside forests, for no more than 1-3 km from the riverbanks, occurring either alone or together with *Elaeagnus angustifolia* and various *Tamarix* species.

According to Brandis (1874) in the second half of the XIX c. *P. euphratica* was a common tree in southern and central Pakistan, where in the river valleys it participated in compact thickets regenerating profusely from seed. Here, similarly as in China, it was accompanied by *Tamarix* species. In northern Pakistan *P. euphratica* is much more rare and does not attain larger dimensions (up to 6 m in height), while in the south of the country, in the valley of the Indus, it attains up to 15 m in height. In places where trees of "turanga" are subject to periodic flooding, in the lower parts of the stem there form adventitious roots similar to those in willows.

P. euphratica was to have occurred abundantly also in Afganistan, in the vicinity of Kandahar (Brandis, 1874), however, as Freitag (*in. litt.*) reports it was to a large extent destroyed there and is now very rare. The further one moves westwards the poorer are the stands of "turanga" and presumably the species becomes more abundantly represented only in southern Iraq, in the valleys of rivers Tigris and Euphrates (Handel-Mazzetti, 1912). According to Zohary (1951, 1966) *P. euphratica* forms riverside forests on the banks of Jordan along its lower run. It is the dominant tree there typical for a special association — *Populetum euphraticae*, which occupies regions closer to the water, while behind it a *Tamarix* association forms — *Tamaricetum jordanis*.



Fig. 6. Distribution of *Populus euphratica* — central part of the range

On the Caucasus, on the single stand in Georgia, in the Vashlovani reserve, *P. euphratica* grows on the bottom of a gorge together with species of a sparse Juniper forest (*Juniperus foetidissima*, *J. polycarpus*) as a narrow belt of thickets along the dry bed of a rivulet which fills up with water only during the rainy season (K e b a d z e, 1965). In spite of the difficult conditions trees attain a height of 5-8 m. Probably we are dealing here with the old relict stand, possibly dating back to the Tertiary era. On a different Caucasian stand in Azerbaijan, in the valley of river Dizavar-čaj in thickets of *P. euphratica* there occur *Tamarix hohenackeri* and also *Lycium ruthenicum*, *Rhamnus pallasii*, *Paliurus*

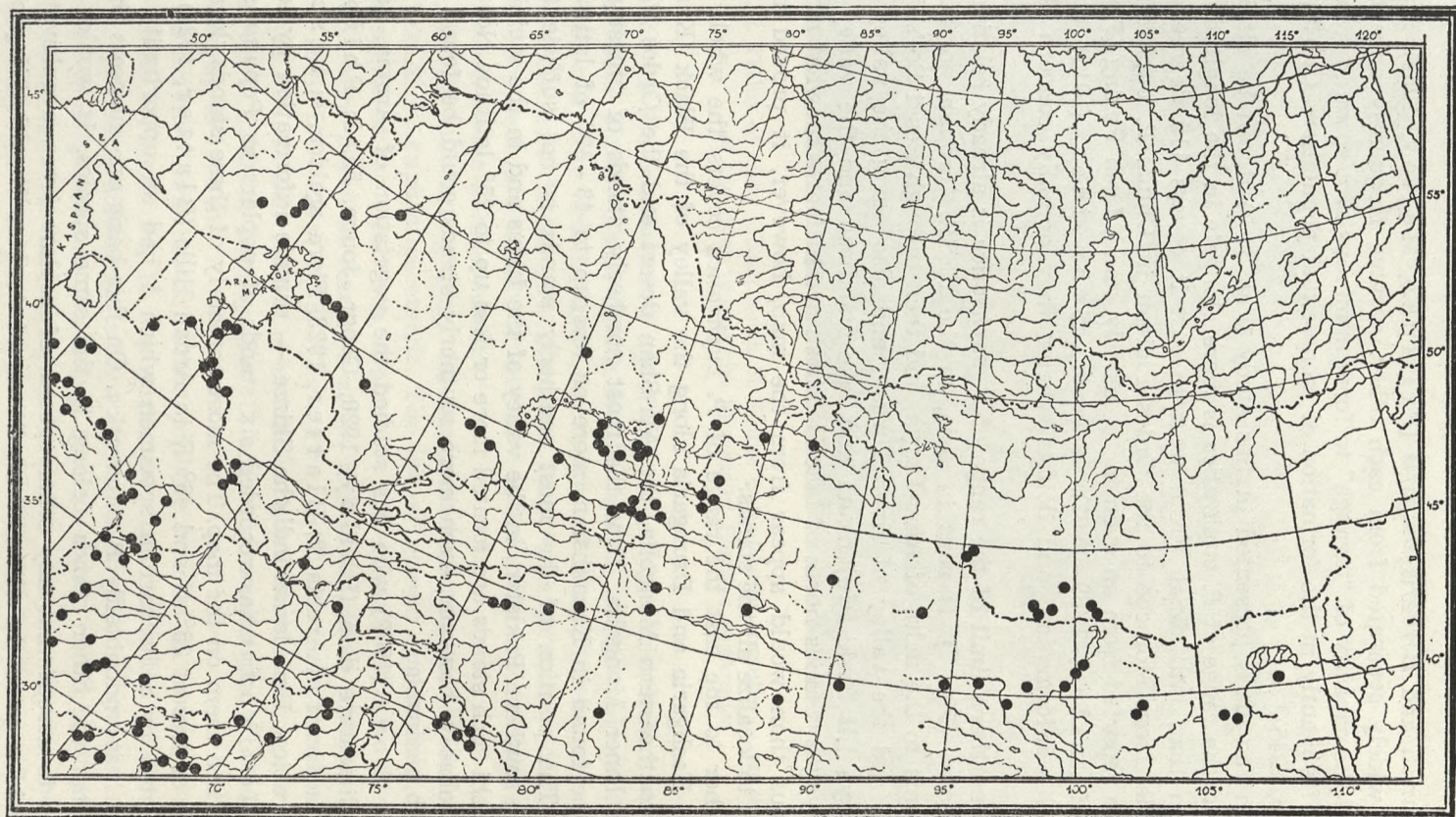


Fig. 7. Distribution of *Populus euphratica* — northern part of the range

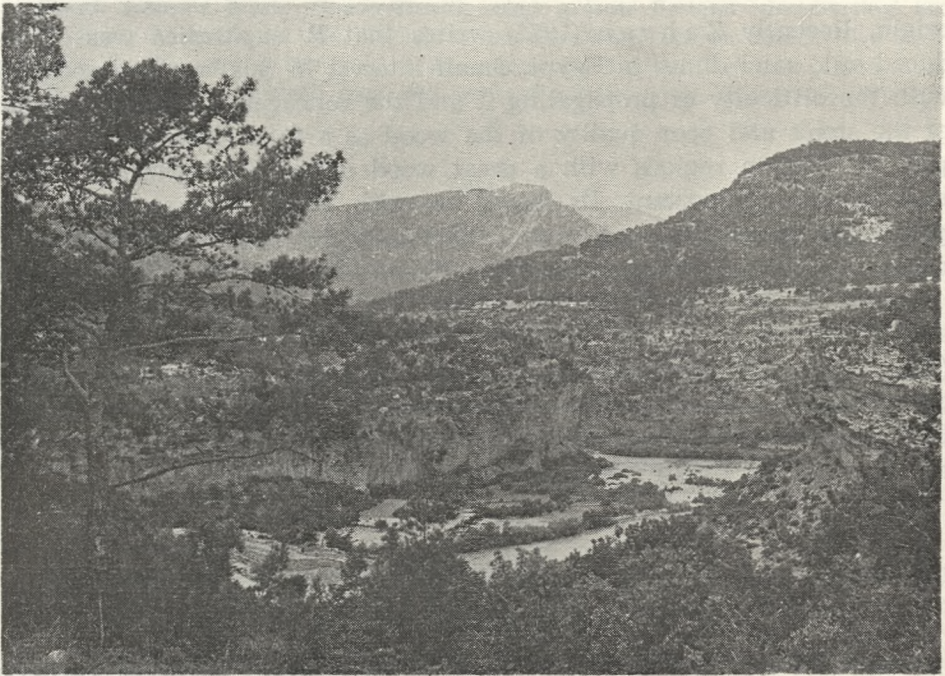
spina-christi and *Berberis vulgaris* (Prilipko, Mailov, 1963). Such stands, widely separated from each other, survive frequently only because of the capacity of "turanga" to form numerous root sprouts, resulting, not frequently in the formation of monosexual populations (Rodionenko, 1945).

From the maps presented in this study (Fig. 3-7) it can be clearly seen that the range of *P. euphratica* is more elongate in the longitudinal direction than latitudinal. From west to east it covers 115 degrees of longitude, from Morocco to the Ordos Plateau in China. *P. euphratica* was also reported from an even more easterly stand, from Peking (Forbes, Hemsley, 1889-1902), however, Schneider (1917) questions this information, and doubts whether they actually concern this poplar.

The northern limit of the range of *P. euphratica* is already relatively well known (Fig. 7). It runs in Asia, in the USSR, through northern Turkmenia to the delta of Amu-Darya, and then through Peski Bol'shiye Barsuki and the valley of river Turgay, and also along the valley of Syr-Darya till Peski Mujunkum and lake Balkhash and the valley of river Ayaguz. Stands north of lake Balkhash are in fact somewhat more numerous than would appear from the map, however, it proved not possible to localize all the stands.

Further to the east the range of *P. euphratica* covers the whole of Chinese Kashgaria and Dzungaria along the valley of the Black (Kara) Irtysh, southeastern Mongolia, the Ala-Shan desert and the Ordos Plateau in Inner Mongolia. Thus the most northerly stands of "turanga" are to be found in Kazakhstan, more or less up to 48-49° of latitude North. The position of the most southerly stands is not sufficiently clear. In southern Pakistan, in the valley of the Indus and in the vicinity of Karachi such stands are located more or less up to 25° latitude North. Most probably, however, even more southerly stands could be found in the Arab peninsula.

Novikova (1972) who has studied the vegetation of Arabia, basing on literature data (Philby, 1920, Geogr. Journ. 55, 3; Philby, 1922, The Heart of Arabia, 2; Blatter, 1923, Flora arabica, 4; Lesch, 1930, Arabien. Eine landkundliche Skizze — private information by letter of Novikova) has recorded six stands of poplars as *Populus* sp. and marked them on the map. The most northerly of these stands, located more or less at 25° N and 46° E in Ardah Hills (Blatter, 1923) is documented by a herbarium specimen which I had an opportunity to see, and it is undoubtedly *P. euphratica*. On this basis one suspects therefore that the other stands belong to the same species. It would be difficult to accept that any other species of poplars (even a cultivated one) could survive the climatic conditions of Arabia. Should this prove true, the most southerly stands of *P. euphratica* would be growing in



Phot. K. Browicz

Fig. 8. Valley of river Göksu north of Silifke in southern Anatolia — on the banks of the river there grow thickets of *Populus euphratica*

Yemen, in the southwestern tip of the peninsula, somewhere around 15° of latitude North. These stands would tend to indicate also that there was an old close link between the ranges of *P. euphratica* and *P. ilicifolia* from east Africa (see the point map in Browicz, 1966), which was disrupted as a result of the drying trend in the climate and the formation of the Sahara desert.

No less interesting than the horizontal distribution is the vertical scatter of *P. euphratica* stands. The lowest stands can be found in the depression of the Dead Sea, around — 390 m, while the most elevated stands were found in Kashmir at an altitude of 4000 - 4500 m (Brandis, 1874; Hooker, 1890; Stewart, 1972). In various countries the vertical limit of distribution is as follows: northwest Africa up to 1300 m, Iraq up to 1100 m, Turkey (Fig. 8) and Afghanistan up to 1650 m and in Iran up to 1800 m.

As distinct from several other poplars, at least as can be judged on the basis of literature, *P. euphratica* was not cultivated to any extent. Aitchison (1888) reports that he has seen planted poplar trees on shrines in Afghanistan. According to Brandis (1874) they are common in the gardens and along roads in the Punjab. As was mentioned before only the European stand of "turanga" is probably of artificial

origin. Recently Zahran (1972) writes that *P. euphratica* was introduced onto sand dunes in Egypt. Small interest in this tree is associated with the difficulty of propagating it and the relatively small dimensions of the stems and poor quality of the wood as a fuel. However, in some part of Asia, in regions with a great wood deficit *P. euphratica* is somewhat more important. Its leaves are also being used as fodder for goats and camels (Aitchison, 1888) and the bark is used in folk medicine as an agent against worms (Brandis, 1874; Zohary, 1966).

Below a list is given of the stands of *P. euphratica* basing on the seen herbarium collections and literature. On this basis the point maps (Fig. 3-7) were prepared. In this list, however, I have omitted the exceptionally rich herbarium collections from the Middle Asia in the USSR held in the herbarium of Institute of Botany in Leningrad. These are so numerous that a listing of them would be too long.

LOCALITIES

EUROPE

Spain. Elche, in vicinitate urbis Ilices, in Tarraconense Hispaniae Provincia (Dode, 1908; Vicioso, 1951).

AFRICA

Morocco. Settat, Zaborsky (Maire, 1961); Mulunya, Vado Saf-Saf (rive oranaise), 12.10.1932, Mauricio 8933 (BM.W.); Haute Moulouya: Midelt, gorges schisteuses de l'oued Bou Adil, 1300 m, 1.5.1925, Johandiez 125 (B.M.E.); Sur la Moulouya à 80 km de Melilla (Dode, 1933); Meridja Tahtania, Géard (Maire, 1961); Chegguet el Velteni, bords de l'oued Mouissifer, 31.3.1866, Warion (P.); Saf-Saf, extrémité infer. or. l'oued Mouissifer près Figuig, 31.3.1866, Warion (K.); Bord d'un torrent (oued Ouzert) chez les Beni-Fachet, a 10 kil. Ne de Debdou, 850 m, Mouilleron (Maire, 1929); Oued Msoun, au-dessous de Kifane, Métro (Maire, 1961); Abandonnant dans la vallée du Ziz, d'Erfoud à Kasr-es-Souk, Emberger et Maire (Maire, 1929); Oued Som, 24.4.1888, Bonnet, Maury (P.).

Algeria. Secus torrentem O. Tralimet pt. Lalla-Mar'nia, 34°52' - 4°12', 1870, Warion 496 (BM.C.P.US); Abondant dans la ravine de l'oued el Hamman-el-Guelta, affluent de l'Oued Mouila, entre Nedroma et Lalla-Maghnia, 13.5.1856, Bourgeau 23 (BM.C.E.K.P.W.); In alveo Tralimet, sinistrorum inter Lalla-Maghnia et Sidi-Medjahed in amnem Tafta affluente, 22.6.1876 Warion 171 (E.K.P.); In alveo Oued El-Hammam-el-Guelta, sinistrorum inter Lalla-Maghnia et Nemours cum omne Mouilah confluenta, 20.3.1877, Warion 170 (E.K.P.); Lalla-Maghnia, ravin du Tralimet, 23.5.1869, Warion (K.P.); Ravin de l'Oued-el-Hammam-el Guelta, affluente de la Mouila, sur la route de Lalla-Maghnia à Nemours, 10.9.1876, Warion 1838 (K.P.W.W.U.); Entre Lalla-Maghnia et Nedroma, 10.1852, Krémer 92 (P.); Entre Nedroma et Lalla-Maghnia, 1856, Cosson, 18 (P.); Bou-Tala près de Bou-Aïech, Trabut (Maire, 1961); Sahara Oranaise, Herb. Ball (C.); Oued Mya, prope Inifel, loc. dict. „Safsaf”, 23.2.1904, Chevalier (JE.K.W.U.); Oued Meya, 17.12.1922, Gram 57 (C.); Prope El-Golea, 27.3.1904, Chevalier 635 (P.W.U.); El Golea, from Oued Miya, 1936, Chipp 164 (K.).

Egypt. Libische Wüste: Chassr-Baniti, zeiml. grosser Bestand (staucharting) am W Rand von Auenah, 11.4.1876, Ascherson 486 (K.P.W.U.); Libyan desert: Siva near Khanissa. In the sand at the edge of the marsh of Khanissa. Grows to about 15 ft and is abundant in one small area. Sea level or a little below, Cooper 14, 15 (BM.).

ASIA

Turkey. 3 km N. Mut, Strasserand, 290 m, 29. 5. 1973, Sorger 73-6-3 (Herb. Sorger); Mut yakini dere, 24.9.1965, Yaltirik (ISTO 4139); S of Degirmendere, between Silifke and Mut, valley of the river Göksu, near bridge, 14.5.1975, Browicz, Zielniński 189 (KOR.); Mündungsgebiet des Calycadnos. Sumpfe im Osten von Seleucia, 5.1910, Siehe 194 (BM.JE.W.); Silifke: Göksun, 12.7.1944, Kasapligil 7 (K.); In glareosis fl. Aksu, Marash, 1000, 1865, Haussknecht (JE.W.); Mesopotamia bor. Biredschik ad Euphratem, 22.8.1893, Bornmüller 654 (JE.); Siirt: Bohtan Çay, gorge 19 km from Siirt, by bridge, 1646 m, 19.5.1966, Davis 43281 (E. ISTO. K.); Mardin: Foot of Kasrik, gorge 9 km from Cizre, 350 m, by river, 7.5.1966, Davis 42670 (E.ISTO.K.); In der Schlucht des Bohtan, 650 m, unter Sert (Handel-Mazzetti, 1912); Am Tigris sehr spärlich im Durchbruchstal ober Dschesire (Handel-Mazzetti, 1912); Hakkari: Zap gorge beneath Çukurca, river banks, 700-750 m, 12.6.1966, Davis 44829 (E.K.).

Syria. Mesopotamia: ad Der-ez-Zor ad Euphratem, 14. 12. 1909, Nábělek 4412 (Nábělek, 1929); Der-es-Sor, (Handel-Mazzetti, 1912); Deir-ez-Zor, Delbès, Gombault; Bords de l'Euphrate et du Khabour. Abou Hareira, Mouterde; Raqqa, Pabot; Hassetché et plus au sud, Delbès, Pabot; Meyyadnie, Pabot; Baghouse, Du Mesnil du Buisson; Bords du Yarmouk vers Hammé, Pabot (Mouterde, 1966).

Israel/Jordan. Beth-Shean Valley (env. of Maoz) (Zohary, 1951); Jordan bridge, 23.2.1911, Meyers, Dinsmore 3461 (K.); Jordan river, — 380 m, 27.3.1905, Meyers, Dinsmore, 2539 (K.); Ad ripas fluminis Jordani, 3.4.1855, Kotschy 660 (P.W.); Bord du Jourdain, Bové (P.W.); Jordain, 4.1889, Jouannet-Maire (W.); Ad ripas Jordani, 4.1846, Boissier 51 (JE.P.W.); Ar ripas Jordani in planitie Hierochuntica, 5.1881, Letourenux (C.); Ad fl. Jordanum, 1868, Neugoord (C.); Allenby bridge, 4.7.1941, Davis 3788B (E.ISTO.K.); Lower Jordan Valley, banks of the Jordan River near the Allenby Bridge, 19.3.1932, Eig, Ambursky 311 (BM.C.E.K.P.US.W.); Ad ripas Jordani, haud procul a Jericho, 28.5.1881, Letourneux 359 (K.P.US.W.); Ad Jericho, ad fluv. Jordan, — 300 m, 31.3.1897, Bornmüller 1465 (JE.K.P.W.); Près du Pont de Jéricho, 30.3.1906, Aaronshon (E.); In valle Jordanis dit. Jericho, ca — 350 m, frequens, 18.3 et 15.4.1909, Nábělek 4411, 4415 (Nábělek, 1929); Jordan, Tel el Hammam, 26.4.1886, Post (BM.); Jordan Valley, Wady Hamrah, 1.4.1928, Gabrieliith 32 (K.); Jordan. Wadi Mujib, 18.4.1955, Hunting Aero Survey 142 (E.); South Dead Sea, Aheimir (?), 26.12.1934, Grazowsky 6 (K.); Pl. Palest. Moabiticae: Wadi Saliki, 500 m, 1.5.1911, Meyers, Dinsmore 539 (K.); Kerak dist., Wadi Kerak. Sea level in Wadi Bottom, 8.3.1966, Kasapligil 2080 (Kasapligil, 1956); Salt distr. Allenby Bridge, near Jordan River, ca. 390 m, 13.4.1955, Kasapligil 2568 (Kasapligil, 1956); Ghor es Safi, the south-eastern part of the Dead Sea (Zohary, 1951); Ghor-es-Safieh, Dead Sea, 1883, Hart 84 (BM.); Damp places (Moris Mortui), south end, -390 m, 22.5.1917, Meyers, Dinsmore 539 (K.); In vallibus Moabitici et Arabiae Petraeae ad rivos, Seil ed-Dra inter Madaba et El-Kerak, 15.6.1909, Nábělek 4416 (Nábělek, 1929); Wadi el Am-az, 15.3.1904; Aarnoshon 1549; Jebel Usdum, 15.3.1908, Aarnoshon 1554 (Oppenheimer, Evenari, 1940).

Saudi Arabia. Central Arabia: Aradh Hills, Pelly (K.)

Iraq. Ad ripas fl. Tigris, p. Mosul, 6.1867, Haussknecht (BM.JE.W.); Pr. Mosul, Kotschy 456 (BM.W.); Environs de Mossul, Botta (P.); Country surrounding Mosul, 12.1927, Thompson (BM.); Häufig um Mossul in den Auen (Handel-Mazzetti, 1912);

Gemein an den Ufern Tigris und Euphratis, 1851, Noë (K.P.); Niniveh, 220 m, 15.5.1967, Anders 1334 (W.); Sarsing, 1100 m, 27.3.1947, Chapman 9319 (K.); Qara Dagħ Mts., 1000 m, 23.4.1947, Chapman 7904 (K.); Ad fluvium Zab, prope Amadia, 13.8.1841, Kotschy, 401, 478 (BM.E.JE.K.P.W.); Distr. Erbil: ad radices montis Baradost, inter Shanidar et Cavernam, ca. 800 m, 24.4.1957, Erdtman, Goedemans — Re-chinger 15661 (W.); Kurdistan: Jindian nr. Rowanduz, 2500', 12.10.1931, Guest 1549 (K.); Eski Kellek (on Great Zab), 300 m, 23.3.1947, Chapman 8395 (K.); Lesser Zab, flood plain, common, 1959, ? S. 1031 (K.); Karadagh, 3500', road from Suleimanijali, 15.6.1957, Wheeler Haines (E.); Mesopotamia: DIALA, 9.1917, Sutherland 315 (BM.); Banks of the Masharrah Canal, Amara, 17.3.1918, Evans M/301 (E.); Khanakin, banks of the river, 1953, Regel 44 (W.); On the banks of the Diyala river, Baqubah, 1920, Graham (K.); Muka Tu, near Mandli, 130 m, 31.3.1950, Rawi 12655, 12656 (K.); Rustam, thickets on banks of Diyala river, 4.3.1931, Lazar 1494 (E.K.); Baghdad: Rustam, 1929, Rogers 0368 (BM.E.K.); Rustam Farm near Baghdad, 25.4.1933, Lazar 223 (BM.P.); Rustam, 1929, Cowan, Darlington 91 (E.); Baghdad: Hafidh al Kadi Estate 19.4.1957, Re-chinger 15915 (W.); Karradach, 17.3.1920, Graham (K.); Baghdad, 12.1873, Colvill (K.); Tigris Bank, Baghdad, near Royal Hospital, small grove, Wheeler Haines (E.); Unterhalb Baghdad, geschlossene Auwälder bildend (Handel-Mazzetti, 1912); Silty banks of Tigris River, the experimental station Zafraniya in Baghdad Liwa, 22.3.1957 Polunin, Erdtman 128 (BM.E.JE.K.W.); Karabala, 26.4.1956 and 27.4.1957, Rawi 15762, 12865 (E.K.); Prope vicum Kwerish (Babylon) ad Euphratem, ca. 100 m, 17.4. 1910, Handel-Mazzetti 889 (W.WU.); Babylon, 18.4.1910, Nábélek 4413 (Nábélek, 1929); Kut-al-Imara, abundant, 16.3.1947, Gillett 6566 (K.); 26 km NE of Al-Nasiriya, 3 m, 15.4.1958, Rawi 26045 (K.); Loamy soil of garden in Zerbatea City, Kut Liwa, 6.4.1964, Abbas, Barkley 7635 (K.W.); Mesopotamia, Radadi, 3.1918, Graham 261 (BM.); Samarra (Handel-Mazzetti, 1912); Amadia, by a stream, 2500', 31.3.1931, Guest 1331 (K.).

Iran. Azerbaijan: Tabriz, Gill.-Sm. 1373, 1645 (Neumann, 1969); Inter Rescht et Kaswin, prope Mendschil ad fluv. Schahrud, 400 m, 11.5.1902, Bornmüller 8249 (BM.K.P.W.); Am Schahrud in Gehölzen, auch bei der Mineralquelle ufern Mendschil, 3.1848, Buhse (Neumann, 1969); In silvulis ad fluvium Schahrud ad Patschenar, 1882, Polak (WU.); Gilan, Michaux (Neumann, 1969); à Damghan (Parsa, 1950); Prov. Khorasan. Inter Tappeh-ye-Moraveh et Bonjurd, Gauba 1924a (W.); Sarakhs: Jahanbani forest, 250 m, 22.5.1972, Foroughi 8387 (ARIAMEHR); Tehran: Varamine, 8.6.1949, Manoutcheri (Esfandiari, 1967); Tehran: entre Kashan et Natanz, Shadan, 29.10.1965, Sabeti (Esfandiari, 1967); Kordestan: Sanandaj (34°59' — 46°54'), 1500 - 1600 m, in valleys, 26.5.1963, Jacobs 6694 (E.K.W.); Inter Sihua et Kermanshah, 8.1867, Haussknecht (BM.JE.K.P.W.); Kurdistan. In valle Gavaron, 1500 m, Gauba, Esfandiari 1922 (W.); Kermanshah, Cowan (Neumann, 1969); Kermanshah, in valle Dschannasu, 13.5.1904, Strauss (JE.); Hamadan, Strauss; Esfandiari (Neumann, 1969); Kuh-e-Sofeh, Deicke (Neumann, 1969); Khorramabad: Tangeh Malavi, beside river, 850 m, 3.5.1973, Riazii 9574 (ARIAMEHR); Kermanshah: Mehran, Halat, Tcheshmeh-Palk, 27.3.1948, Behboudi (Esfandiari, 1967); 20 miles S Khorramabad, in cult. field, 4.5.1961, Stutz 1021 (W.); 50 miles S Khorramabad, 3.5.1961, Stutz 1010 (W.); Luristan: Dorud, along river, 15.3 and 4.4.1941, Koelz 17143, 17173 (W.); Luristan: Bisheh, 50 km a Khorramabad orientem versus, ca. 1200 m, 14 - 16.7.1948, Re-chinger 5773 (W.); Najiu, 1700 m, 13.5.1937, Koeie 573 (C.W.); Lorestan: Sepid-dasht, 16.7. 1950, Sabeti (Esfandiari, 1967); Distr. Khuzestan, 16 km of Andimeshk, inter Sush et Andimeshk, besides stream, 26.4.1960, Bent, Wright 426 - 401 (W.); 120 km N of Ahwaz. Hillside-canyon, 3.5.1961, Stutz 1005 (W.); In ripis fluv. Kercha ad ruinas Susorum, 22.3.1910, Nábélek 4414 (Nábélek, 1929); 77 km N. of Ahwaz, 30 m, irrigation ditch, 30.6.1964, Grant 15921 (W.); Masjid-i-Sulaimen (ca. 200 km NE of Abadan), 350 m, hillside by west channel for water bank. Also noted south of Masjid-

-i-Sulaimen in Ahwaz road, ca. 180 m, 27.6.1958, Guest, Belchtlar 25419 (K.); Route entre Ahwaz et El-Badji, 31.1.1967, Tregubov 207 (W.); Ahwaz, 22.4.1940, Koelz 14867 (W.); Ahwaz, cult. Gauba 1921 (W.); Mohammera ad Satt-el-Arab, 4.3.1910, Nábélek 4410 (Nábélek, 1929); Behbahan to Aghajari, Abmikhak, 200 m, 4.3.1972, Foroughi 3405 (ARIAMEHR); Shapur, 900 m, 15.3.1937, Koeie 1725 (W.); Tang-i-Tschirkun b. Shapur, 12.5.1885, Stapf 901 (WU); Prope pagum Gere, inter Abuschir et Schiras, 3.1842, Kotschy 223 (BM.P.W.); Ebene v. Schiras, 21.6.1885, Stapf 902 (WU.); Prov. Fars, 14,5 miles SE of Qiro, 1700'. Banks of river. Locally common, 4.3.1971, Grey-Wilson, Hewer 83 (E.K.); Prov. Faristan, inter Raunis et Servistan 1500 m, 9.10.1892, Bornmüller 4525 (WU); Mountains S of Niris (Anon. Linn. Soc. Jour. Bot. 30.1893); Darab, Kakhom river, 680 m, 27.3.1972, Riazi 8391 (ARIAMEHR); Prov. Kerman, ad Cheirabad, distr. Sirdschan, 1800 m, 30.9.1892, Bornmüller 4523 (K.); Kerman: Chasmeh-ye Nakhila, 700 m, Gabr. 143; Ab-e Konji, 900 m, Gabr. 123; (Neumann, 1969); Prov. Kerman: Hadjiabad, inter Kerman et Bender Abbas, 860 m, Sabeti 1923 (W.); Hadjiabad prope Tarum, ca. 900 m, 29.4.1948, Rechinger 3498 (W.); Inter Saidabad et Bender Abbas, Sabeti 1924 (W.); Hijiabad, 3000', 11.4.1951, Popov 51/96 (BM.); Kerman: 15 km N. of Kahgom (200 km N. of Bender Abbas), semi-desert, about 500 m, 14.12.1963, Grant 15152 (W.); Giroft, 750 m, 3.4.1972, Riazi 8384 (ARIAMEHR); Prov. Kerman: Semi-desert. Along stream, 11 km NW of Abariq, 148 km SE of Kerman, 1800 m, 24.3.1964, Grant 15301 (W.); Nosratabad, Annandale 14 (Neumen, 1969); Baluchistan, Stocks (Neumann, 1969); Makran: Iranshahr, 29.2.1949, Sharif 266-E (W.); Pers. Baluchistan: Sar-i-Sorang, 40 m, NW of Sib, about 4100', 19.10.1916 (Blatter, Hallberg, 1918); Zabul (Seistan), 3.1936, 3.1936, Daly 532 (K.); Sistan, salt marsh, 11.1964 - 3.1965, Henderson 40 (E.); Prov. Yezd, inter Agda et Tschefta, ca. 1300 m, 29.3.1892, Bornmüller 4528 (P.K.W.WU.); Prov. Yezd, ad Hodschenabad, 1200 m, 30.3.1892, Bornmüller 4526 (JE.BM.K.P.W.WU.); Jazd: Hajjiabad, Bornmüller 4527 (Neumann, 1969); Inter Mesched et Herat, 8.1858, Bunge (P.); E of Haftapeh, bois de *Populus*, près de la rivière Dez, 10.3.1959, Pabot 123 (G.); 46 km W Fahlian, bord de rivière, 750 m, 11.5.1960, Pabot 1028 (G.); entre Hadjiabad et Bander-Abbas, 8 km S of Hadjiabad, bord de rivière, 3.6.1960, Dadashzadeh 130 (G.); 9,8 km S Hajjiabad, bois de *Populus euphratica*, ruisseau, 820 m, 5.5.1961, Pabot 6718 (G.); Près de Farahabad, environs de Kerman, terres includes sèches, 21.5.1960, Dadashzadeh 129 (G.).

Caucasus. Armenia, ad Alindshi-tschai, 9. 6. 1871, Radde 33 (LE.); Prov. Erivan, distr. Nachičevan. Vallis fl. Araxis ad Castellum limitaneum Karčevan, 21.5.1914, Woronow 14168, 14169 (LE.); Prope statio militar. Koczevan, ad ripas fl. Araxes, 5.4.1910, Koenig (WU.); Distr. Nachitshevan, inter Ordubad et Megry, 29.5.1928, Grossheim (LE.); *ibid.*, in fauce fl. Araks, 25.6.1929, Schelkovnikov et Kara-Murza (LE.); St. Megri, bank of Araks, 1.5.1948, Mulkidjanian (LE.); Distr. Megry, bord of Araks, single trees, 26.4.1966, Mordak (LE.); Inter Megry et Alidara, ad fl. Araks, 23.9.1932, Karatian (LE.); *ibid.*, 25.7.1939, Jaroszenko (LE.); *ibid.*, 18.5.1934, Karjagin (LE.); Distr. Zangelan, pr. pag. Bartaz, ad ripam fl. Arax, 20.7.1933, Karjagin (LE.WU.); Bartas-Nuwdaz, 17.5.1890, ? 304 (LE.); Distr. Zangelan, int. Achbent et Garas, In valle fl. Araxis, 26.7.1932, Karjagin (LE.); Distr. Apzheron, near village Dshalgan, in valley of Gilgin-čaj, 7.1937, Karjagin (LE.); Near Dzhulfa; distr. Khanlar, Zulatepe; Distr. Sumgait, valley of the river Dizavar-čaj, right affluent of the river Tug-čaj (Prilipko, Mailov, 1963); Vashlovani reservation in the Shiraki tableland in East Georgia (Kebadze, 1965).

Afghanistan. Hari-rud valey, 11. 4. 1885 (Aitchison, 1888); Tirphul, Aitchison (Neumann, 1969); In the Badghis 19.3.1885, Aitchison (Aitchison, 1888); Bala Murghab, Aitchison (Neumann, 1969); Shin-Dand, 1000 m, 10.4.1949, Koeie 4089 (C.W.); Farah — Shin Dand, 1000 m, 6.3.1949, Koeie 3453 (C.W.); Farah, 700 m, 9.4.1949, Koeie 4088 (C.); Farah, 27.2.1953, Volk 2914-a (W.); Farah, riverain forest at the Farah-Rud, at

the Anardar-bridge, Freitag 4377 (Herb. Freitag); Inter Farah et Girishk, 23.2.1953, Volk 2914 (W.); Kash-Rud, about 70 km SW of Delaram, a few old trees at the border of a wadi of the river (Freitag, in observ.); Marja, SW Qala Bist, 20.5.1967, Rechinger 34719 (E.W.); In alveo fluvii Helmand prope Qala Bist, 31°28' — 64°21', 800 m, 21.5.1967, Rechinger 34725, 34727 (W.); Dasht-e-Margo, roadside tree between Marja and Lashkargah, in the new irrigation area, along a ditch, Freitag 751 (Herb. Freitag); Lashkargah, riverside forest at the Hilmand opposite the town, the most important tree there (Freitag, in observ.); Lashkargah Bazar, 1000 m, Frumkin 58 (Neumann, 1969); Kandahar: Argandhab near Kandahar, Shingle, 1400 m, 20.4.1969, Hedge, Ekberg W 7183 (E.); Bei Kabul, Tang-i-Gharu, Schutthalde am linken Kabulufer, 1650 m, Gilli 2445 (W.); Badahsan: Faizabad, 10.4.1949, Ferdinand (C.); Afghanistan 4493 (P.W.).

Pakistan. Makran, Gaz. 340; Shah Bilaweel, Stocks; Awaran, Hotson M. 280; Saravan, H.-B.20704; Kharan, H.-B.23160; Bela: Prope Kotiro, H.-B.18482 (Neumann, 1969); Karachi and Sind, common (Stewart, 1972); Common in the forest of Sind along the Indus, particularly in upper and middle Sind (Brandis, 1921); Larkana, Sind, Shah Laman 19 (RAW.) Inter Khuzdar et Wad, Stocks (Neumann, 1969); Baluchistan: Kalat: 10 km S Khuzdar, 27°49' — 66°39', 2.4.1965, Rechinger 27396 (W.); Upper Sind: Bahun, 12.1849, Ritchie 690 (K.); Shahdadzi, 72 miles S of Kalat, 5300' (Blatter, Hallberg, McCann 1919); Kalat: Jhalowan, H.-B. 18348 (Neumann, 1969); Below Bhani, 131 miles SSW of Kalat, ca. 4000' (Blatter, Hallberg Mc. Cann, 1919); Baluchistan: Baghak, 18.3.1888, Lace 3657 (E.); Sibi, Lace, Gaz 330 (Neumann, 1969); In the neighbourhood of Sibi (Hemsley, 1891); Kahan, 2000', 30.7.1952, Crookshank (K.); Quetta, Lace 3409, 3448 (E.); Peshkin, 5200', 5.3.1889, Lace 3446 (E.); Nasirabad, Gaz. 330 (Neuman, 1969); In the Thal-Chotiali distr. along the banks of the Narechi river (Hemsley, 1891); At Nushki, cultivated trees (Aitchison, 1888); Kohlu, H.-B. 1949; Loralai, Gaz. 19, 28; Qila Saifullah, Zhob Gaz. 326 (Neumann, 1969); Suliman range on small feeders of the Indus, up to 3000'; On the lower course of the Sutlej river (Brandis, 1921); forming thicket along the Sutlej, Griffith 1324 (K.); Ft. Sandeman, Zhob Gaz. 326 (Neumann, 1969); Punjab, Muzaffargarh, Mohd. Atiqullah 1104 (RAW.); Pendshab: about Multan (Brandis, 1874); S. Waziristan: Palosina (Neumann, 1969; Stewart, 1972); Between Dehra Ismail Khand and Attok (Brandis, 1874); Sohan River (Stewart, 1972); Dhok Pathan, Attock Distr., by the river (Stewart, 1957); Jhelum Distr., cultivated, rare (Aitchison, 1865); Peshwar: Dhok Pathan prope Campbellpore, Siddiqui, Saffar Ali 3748 (Neumann, 1969); Indus, Stocks (K.); Lahore, bank of Ravi, Shahdara, 26.2.1933, Parker 3261 (E.K.); Walton near Lahore, prob. planted, 24.11.1934, Stewart 14721 (US.); 20 km S of Husabah, 150 m, 31.3.1962, Khatib, Alizzi 31801 (K.).

Kashmir. Between Parkutee and Tolti, 4. 1848, ? (K.); Baltistan: Opposite Kam-puk, Koelz 9829 (RAW.); Baltistan: Shyok Valley (Stewart, 1972); Ladak: Shyok Valley, Kharu, 10.7.1928, Ludlow 531 (E.BM.); Nubra-Shyok, 9900', 10.7.1928, Ludlow 506 (BM.); Nubra, 11.000', Hooker, Thomson (BM.C.E.K.); Aghan, near Sobula (Ladag), 13,000', 7.10.1955, Abros 4569 (CAL.).

China. Kashgar, Bellew (K.); Bei Mara-Bashi und westwärts gegen Kashgar, 1902, Merzbacher 7, 14 (LE.); Maralbashi, 19.6.1904, Divnogorskaja (LE.); Kashgaria, 18.8.1898, Klementz 102 (LE.). Kashgaria: river Karasu, 5.6.1890, Gromczewski (LE.); In desert near Kashgar, 23.10.1910, Meyer 666 (K.); Kashgaria; 9.9.1895, Roborowski (LE.); Kuen-Lun, 28.8.1898, Roborowski (LE.); Keria, ? (P.); Tarim, Voyage de M. Bonvalot et du Prince d'Orleans (P.); Ullugh-köl, lower Tarim, 878 m, 20.5.1900, Hedin (C.); Vallée de la riv. Koutchar, Mission Pelliot-Vaillant 433 (P.). Foret avant d'arriere a Kourla, 1000 m, 11.9.1907, Mission Pelliot-Vaillant 515 (P.); Near Kara Kuldja, 14.2.1911, Meyer 672 (US.); Kuldja: Takiyanfi, 8.1878, Regel (LE.); Chorgos, NW of Kuldja, 1886, Krasnow (K.); Kuldja: Dschinho, 1000', Regel (LE.); Kul-

dja: river Kejtyn, 1874, Larionov (LE.); Dzungaria: Sy-czuan-uza, near lake Ebi-nor, 16.10.1929, Popov (LE.); Dzungaria: S submountains of the Dshair ridge: oasis Turangy-Bastau 1 in ravine Tuz-Agny, 630 m, 9.1951, Moisseenko (LE.); On the right side of Kara Irtish, near village Kady, 19.8.1906, Sapožnikov (LE.); Kara-Irtish, on the left side of the river, W of Čerekstas, 10.6.1914, Schishkin (LE.); Am fl. Algoi NW of Turfan, 14.9.1879, Regel (LE.); Lob, 1885, Prewalski (P.); Sandy hills between Dusidusi-hu and Hondču, N of Hami, 12.8.1898, Klementz 95 (LE.); N. of Hami, 18.8.1898, Klementz (LE.); Prov. Kansu, Čžanie, 70 km NW of Dunhuan, 31.7.1958, Petrov (LE.); Prov. Kansu: Čžanie, 15 km SE of Aňsi, in the valley of river Sulehe, 26.7.1958, Petrov (LE.); Desert Alashan, Čžanie, 35 km N of the village Izinta, near Čžanczatak 26.7.1958, Petrov (LE.US.); River Tsien-fen-teng, 1000 m, Kan-Gen, pref. Chutchene, 15.4. and 22.4.1908, Mission Pelliot-Vaillant 629, 635 (P.); Kansu: Son Tcheou, 14.6.1931, Reymond 54 (W.); Between Su-choow and An-si, 1875, Pjasetzky (LE.); Western Alashan Desert: Joshui region, an inland river, originated from the snow fields of the Kilien-Shan (Nan-Shan). Range on the border of the Sitsang Plateau, along the river from Tingshin (Miaomu) on the Kansu border to Tsongol near the north end of the river (Wang Chi-Wu, 1961); Kansu: beyond the Great Wall, Pjasetzky (Forbes, Hemsley, 1889 - 1902; Schneider, 1917); Kansu: 30 km SE of Mincin, near village Sivušan, Alashan, 3.7.1958, Petrov (LE.); Desert Alashan: Baian-Hoto, Sands of Tengery, 4.8.1958, Petrov (LE.); Inner Mongolia: Ho Lan Shan Mts., Ta Shui Kou, 1275 - 1450 m, 17.4.1923, Ching 23 (P.US.); Terra Ordos, 1871, Przewalski (LE.); Ordos meridionaux, 10.7.1919, Licent 5518 (K.P.W.); Ordos SE, vers Pai tch'engze, 2.7.1932, Licent 10229 (W.); Tien-schan orientalis, 1877, Potanin (LE.W.); Northern slopes of Altyn Tag, between 9-7000', (Hemsley, 1901 - 1904); Desert of Sinkiang, near Yak-Kukuk (Wang Chi-Wu, 1961).

Mongolia. Ajmak S. Gobi, somon Nojen, 14. 8. 1948, Grubov 5112 (LE); somon Nojen, near frontier with China, N of Gashun-Nur, 14.8.1948, Grubov 5110, 5113 (LE.); somon Nojen, Chubdu-chudak S of mt. Tostu, 28.7.1943, Junatov 13897, 13906 (LE.); Ajmak Bajan-Hongor, somon Bajan-Undzr, Mts. Cagan-Bogdo, place Cagan-Burgucun, 5.10.1927, Simukov 17087 (LE.); somon Bajan-Undzr, place Czonoïn-basz, 18.8.1948, Grubov 6851 - 6855 (LE.); somon Bajan-Gobi, place Szar-Chulusun, oasis, 9.8.1943, Dondogin Cebigmid 17686, 17688, 17691, 17692 (LE.); somon Bajan-Undzr, Transaltaj Gobi, 23.8.1948, Grubov 6630 (LE.); Ajmak Gobi-Altaj, somon Altaj, SW Aji-Bogdo, 4.8.1947, Junatov 12644 - 45, 12547 - 48, 12469 (LE.); Bajan-chongor: Oase Dzun-mod, lockerer Hain ctwa 120 Exemplaren am Rand eines zumindest zeitweilig wasserführenden Tälchens; beobachtet noch in Echin-gol, zwischen Charsilijn-nuru und Echin-gol. 12 bzw. 60 km östl. Cagan-bulag und auch in der Oase Šargelyn (Štidgobi) (Hanelt, Davazmac, 1965).

Institute of Dendrology
Kórnik nr. Poznań

LITERATURE

1. Aitchison J. E. T. — 1865. Flora of the Jhelum District of the Punjab. Journ. Linn. Soc. Bot. London 8 : 55 - 75.
2. Aitchison J. E. T. — 1888. The Botany of the Afghan Delimitation Commission. Trans. Linn. Soc. Bot. London 3, 1 : 1 - 139.
3. Blatter E. — 1923. Flora Arabica, 4. Calcutta.
4. Blatter E., Hallberg F. — 1918. Contribution towards a Flora of Persian Baluchistan and Makran. Journ. Bombay Nat. Hist. Soc. 25 : 723 - 739.
5. Blatter E., Hallberg F., McCann C. — 1919. Contributions towards a Flora of Baluchistan. Journ. Ind. Bot. Soc. 1.

6. Brandis D. — 1874. The Forest Flora of North-Western and Central India. London.
7. Brandis D. — 1921. Indian trees 4th edit. London.
8. Browicz K. — 1966. *Populus ilicifolia* (Engler) Rouleau and its taxonomic position. Acta Soc. Bot. Poloniae 35, 2 : 325 - 335.
9. Czerepanov S. K. — 1973. Additamenta et corrigenda ad „Floram URSS” (tomi I - XXX). Leningrad.
10. Dode L. A. — 1905. Extraits d'une monographie inédite du genre *Populus*. Bull. Soc. Hist. Nat. Autun, 18 : 161 - 231.
11. Dode L. A. — 1908. Sur un peuplier européen du sous-génre *Turanga*. Bull. Soc. Déndr. France No. 8 : 163 - 166.
12. Dode L. A. — 1933. Une nouvelle station de *Populus mauritanica* Dode. Bull. Soc. Déndr. France No. 86 : 49.
13. Drobov V. P. — 1953. *Populus* L. In: Fl. Uzbekist. 2, Tashkent.
14. Esfandiari E. — 1967. Une première liste des plantes de l'Herbier du Ministère de l'Agriculture de l'Iran. Tehran (Evine).
15. Fournier P. — 1954. Histoire de *Populus euphratica* Oliv. Bull. Soc. Bot. France 101 : 6 - 8.
16. Gombocz E. — 1908. Monographia Generis Populis. Budapest.
17. Grossheim A. A. — 1945. Flora Kavkaza, 3. Baku.
18. Handel-Mazzetti H. — 1912. *Pteridophyta* und *Anthophyta* aus Mesopotamien und Kuridstan sowie Syrien und Prinkipo. Annal. Naturhist. Hofmus. Wien, 26 : 120 - 154.
19. Hanelt P., Davazmac S. — 1965. Beitrag zur Kenntnıs der Flora der Mongolischen Volksrepublik, insbesondere des Gobi-Altai, der Transaltai- und Alasan-Gobi-Bezirks. Feddes Repert. 70, 1 - 3 : 7 - 68.
20. Hemsley W. B. — 1891. A sketch of the vegetation of British Baluchistan, with descriptions of new species. Journ. Linn. Soc. Bot. London 28 : 288 - 327.
21. Hemsley W. B. — 1901 - 1904. The Flora of Tibet or High Asia. Journ. Linn. Soc. Bot. London 35 : 124 - 265.
22. Hickel R. — 1911. Itinéraire dendrologique en Espagne. Bull. Soc. Déndr. France No. 21 : 207 - 215.
23. Hooker J. D. — 1890. The Flora of British India, 5. London.
24. Jahandiez E., Maire R. — 1932. Catalogue des Plants du Maroc, 2. Alger.
25. Kamelin R. V. — 1973. Florogenetičeskij analiz estestvennoj flory gornoj Srdenej Azii. Leningrad.
26. Kasapligil B. — 1956. Plants of Jordan with notes on their ecology and economic uses. Forestry Dep., Amman.
27. Keadze E. G. — 1965. Roša tretičnogo relikta turangi (*Populus transcaucasica* Jarm.) v Vašlovanskom zapovednika. Bull. Acad. Sc. Georgian SSR, 37, 3 : 669 - 672.
28. Komarov V. L. — 1936. *Populus* L. in Fl. URSS 5 : 216 - 242. Moskva—Leningrad.
29. Krémer J. P. — 1866. Description du *Populus euphratica*. Metz.
30. Maire R. — 1929. Contributions à l'étude de la flore de l'Afrique du Nord. Bull. Soc. Hist. Nat. Afrique Nord 20 : 12 - 42.
31. Maire R. — 1961. Flore de l'Afrique du Nord, 7. Paris.
32. Mouterde P. — 1966. Nouvelle Flore du Liban et de la Syrie, 1. Beyrouth.
33. Nábělek Fr. — 1929. Iter Turcico-Persicum, 4. Publ. Faculté. Sc. Univ. Masaryk, Brno.
34. Neumann A. — 1969. *Populus* in K. H. Rechinger „Flora Iranica” 65 : 1 - 12. Graz.

35. Novikova N. M. — 1972. Opyt sostavlenija predvaritelnoj karty rastitelnosti Aravii. Geobotaničeskoe Kartografirovane (1971): 61 - 71.
36. Oppenheimer H. R., Evenari M. — 1940. Florula Cisiordanica. Bull. Soc. Bot. Genève 31: 1 - 423.
37. Parsa A. — 1950. Flore de l'Iran, 5. Teheran.
38. Poljakov P. P. — 1960. *Populus* L. in Fl. Kazachst. 3: 38 - 52. Alma-Ata.
39. Poljakov P. P., Kamelin R. V. — 1968. *Populus* L. in Fl. Tadshikist. 3: 96 - 114. Leningrad.
40. Prilipko L. I., Mailov A. I. — 1963. O novom mestonachoždeni relikto-vogo topolja-turangi zakavkazskogo v Azerbajdžane. Izv. Akad. Nauk. Azerbaj. SSR, ser. biol. medic. nauk, no. 6: 3 - 14.
41. Rodionenko G. J. — 1945. Biologičeskie osobennosti turangi — *Populus diversifolia* Schrenk. Sovetskaja Botanika 13, 6: 35 - 40.
42. Roi J. — 1941. Phytogeography of Central Asia. Bull. Fan Mem. Inst. Biol. Ser. 11, 1 - 35.
43. Schmucker Th. — 1942. La distribution des espèces arborescentes de la zone septentrionale tempérée. Silvae Orbis, 4, C. I. S. Berlin.
44. Schneider C. K. — 1917. *Salicaceae* in Ch. S. Sargent „Plantae Wilsonianae”, 3: 16 - 179. Cambridge.
45. Sokolov S. J. — 1951. *Populus* L. in Derevia i Kustarniki SSSR 2: 174 - 217. Moskva—Leningrad.
46. Stewart R. R. — 1957. The Flora of Rawalpindi District (Reprinted from Pakistan Journ. Forest). Rawalpindi.
47. Stewart R. R. — 1972. An annotated catalogue of the vascular plants of West Pakistan and Kashmir, Karachi.
48. Usmanov A. U. — 1971. Topol in Dendrologija Uzbekistana 3. Tashkent.
49. Vaillant L. — 1909. Remarques sur la dispartion des forets entre Kachgar et Kourlac (Turkestan Chinois). Bull. Mus. Nat. Hist. Natur. Paris 15: 206 - 207.
50. Vicioso C. — 1951. Salicáceas de Espana. Inst. Forest. de Investig. y Experiencia. Boletín num. 57. Madrid.
51. Wang Chi-Wu — 1961. The forests of China. Maria Moors Cabot Foundation, publ. 5. Cambridge.
52. Wesmael A. A. — 1868. *Populus* in A. P. de Candolle. Prodrum 16, 2: 323 - 331.
53. Zahran M. A. — 1972. On the ecology of Siwa Oasis. Egypt Journ. Bot. 15, 2: 223 - 242.
54. Zohary M. — 1951. The arboreal flora of Israel and Transjordan and its ecological and phytogeographical significance. Imper. Forest. Inst. Univ. Oxford.
55. Zohary M. — 1966. Flora Palaestina 1. Jerusalem.

KAZIMIERZ BROWICZ

Chorologia Populus euphratica Olivier

Streszczenie

Autor omawia historię odkrycia, systematykę i geograficzne rozmieszczenie *P. euphratica*, jednego z najbardziej oryginalnych i zmiennych gatunków w rodzaju *Populus*. Został on opisany w 1807 r., lecz pierwsze wiadomości o nim są co najmniej o 2 tysiące lat wcześniejsze. Wymieniany jest już w biblii, a przypuszczalnie znany był Arystotelesowi, Teofrastowi i Pliniuszowi Starszemu. Pierwsze dane o je-

go występowaniu w północno-zachodnich Chinach pochodzą z piątego wieku naszej ery — topola ta jest bowiem wymieniana w 40-tomowym dziele Li-Dawna-Yuana „Commentaries on the Book of Rivers”.

Zmienność liści (heterofilia) *P. euphratica* spowodowała, że z różnych obszarów jej zasięgu opisano kilka blisko ze sobą spokrewnionych gatunków, co do wartości których brak jest zgodności wśród systematyków. Różnią się one między sobą w sposób nieznaczny, zwłaszcza liczbą ząbków na liściach krótkopędów oraz owłosieniem kwiatostanów. Są to następujące gatunki: *P. diversifolia* Schrenk, *P. ariana* Dode, *P. mauritanica* Dode, *P. bonnetiana* Dode, *P. litwinowiana* Dode, *P. illicitana* Dode i *P. transcaucasica* Jarm. Autor uważa, że powyższe nazwy należy włączyć do synonimiki *P. euphratica* i że drobne różnice morfologiczne, jakie między nimi zachodzą są przeceniane. Tak więc do sekcji *Turanga* rodzaju *Populus* autor zalicza tylko dwa gatunki: *P. euphratica* Oliv. i *P. pruinoso* Schrenk.

Na podstawie przejranych okazów zielnikowych (ponad 800 arkuszy), pochodzących z licznych zielników oraz danych z literatury zbieranych w ciągu ostatnich 10 lat, autor opracował dokładne, punktowe mapy zasięgu *P. euphratica*. Topola ta występuje począwszy od Maroka w północno-zachodniej Afryce na zachodzie, po Wyżynę Ordos w Chinach na wschodzie i od Kazachstanu na północy po południowy Pakistan, południowy Iran i południowy Irak na południu. Na Półwyspie Arabskim, najdalej wysunięte stanowisko znajduje się w Arabii Saudyjskiej pod około 25° szer. geogr. pół., jednak przypuszczalnie *P. euphratica* sięga znacznie dalej, aż do Jemenu, po 15°; dane o tych ostatnich stanowiskach są jednak niepewne.

W rozmieszczeniu pionowym *P. euphratica* występuje najniżej na terenach depresyjnych Morza Martwego — około 390 m, a najwyższej w górach Kaszmiru, po 4-4,5 tys. m n.p.m. Jest to gatunek suchego i gorącego klimatu, przywiązany jednak do różnego rodzaju cieków wodnych. Porozrywany zasięg i izolowane stanowiska są wynikiem pogłębiania się suchości klimatu, co doprowadziło do wysychania źródeł wody i do zasolenia gleby.

Na zakończenie autor podaje wykaz stanowisk *P. euphratica*. W zestawieniu tym pominięto okazy zielnikowe z terenu środkowej Azji przechowywane w zielniku Instytutu Botaniki w Leningradzie. Są one bardzo bogate, w związku z czym lista stanowisk wzrosłaby prawie dwukrotnie.

КАЗИМЕЖ БРОВИЧ

Хорология Populus euphratica Olivier

Резюме

Автор обсуждает историю открытия, систематику и географическое распространение *P. euphratica* одного из наиболее оригинальных и изменчивых видов рода *Populus*. Он был описан в 1807 году, но первые сообщения о нем известны по крайней мере на 2000 лет раньше. Он упоминается уже в Библии, и, вероятно, был известен Аристотелю, Теофрасту и Плинию Старшему. Первые сведения об его нахождении в северо-западном Китае относятся к V веку нашей эры — он упоминается в 40-томном труде Ли и Дон-юаня „Комментарии к книге рек”.

На основании изменчивости листьев (гетерофиллии) *P. euphratica* в разных частях его ареала описано несколько близкородственных видов, относительно реальности которых среди систематиков нет единогласия. Отличаются они друг от друга незначительно, прежде всего числом зубцов на листьях коротких побегов, а также опушением соцветий. Виды эти следующие: *P. diversifolia* Schrenk, *P. ariana* Dode, *P. bonnetiana* Dode, *P. litwinowiana* Dode, *P. illicitana* Dode, *P. transcaucasica* Jarm.

Автор считает, что все эти названия надо отнести к синонимам *P. euphratica* и что мелкие морфологические различия, существующие между ними, переоцениваются. Поэтому к секции *Turanga* автор относит только два вида: *P. euphratica* Oliv., *P. pruinosa* Schrenk.

На основе просмотра гербарных материалов (свыше 800 листов), хранящихся в различных гербариях, а также в результате изучения литературных данных, чем автор занимался в течение последних 10 лет, им составлены детальные точечные карты ареала *P. euphratica*. Тополь этот распространен от Марокко в северо-западной Африке на западе до плато Ордос в Китае на востоке, и от Казахстана на севере до южного Пакистана, южного Ирана и южного Ирака на юге. На Аравийском полуострове наиболее южное местонахождение находится в Саудовской Аравии — около 25° с.ш. однако вид этот, вероятно, спускается ещё южнее, до 15° с.ш. в Йемене; все же указания на местонахождение вида здесь нуждаются в уточнении.

Если говорить о вертикальном распространении вида, то самые низкие местонахождения *P. euphratica* расположены в депрессивных районах Мертвого моря — около 390 м ниже ур. м., а выше всего он поднимается в горах Кашмира — до 4000 - 4500 м над ур. м. Этот вид сухого и горячего климата, привязанный, однако, к различным проточным водам. Разорванность ареала и наличие изолированных местонахождений вызваны возрастающей сухостью климата, что привело к высыханию ряд водных источников и засолению почвы.

В заключение автор приводит список местонахождений *P. euphratica*. В этот список не включены гербарные экземпляры из Средней Азии, хранящиеся в гербарии Ботанического института в Ленинграде. Они очень многочисленны, в связи с чем перечень местонахождений вырос бы почти вдвое.