

KAZIMIERZ BROWICZ

Distribution of Woody *Rosaceae* in W. Asia XIII

Amygdalus webbii Spach and closely related species

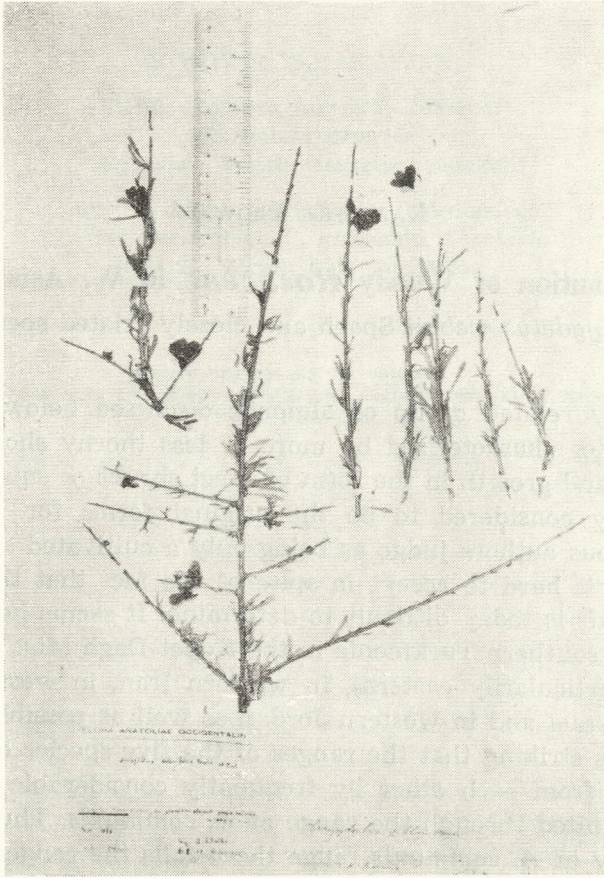
The closely related group of almonds discussed below represents a group of species characterized by more or less thorny shoots (exception *A. browiczii*) and growth in the form of erect shrubs or small trees. They are frequently considered to be the original forms for *A. communis*, which numerous authors judge as being only a cultivated species. However this view is hard to accept in spite of the fact that the true origin of *A. communis* is today difficult to determine. It seems however that it grows wild in southern Turkmenia in the Kopet-Dagh Mts., in major part of Turkey (particularly eastern), in western Iran, in western Syria, in Lebanon, in Israel and in western Jordan as well as possibly in southern Caucasus. It is striking that the ranges of the five species discussed here are separated from each other by frequently considerable distances yet they are all united through the range of *A. communis*. Thus at the western extremity of *A. communis* range there falls the range of *A. webbii*, at the southern the range of *A. korshinskyi*, at the northern the range of *A. fenzliana* and at the eastern the range of *A. haussknechtii* and *A. browiczii*.

1. *AMYGDALUS WEBBII* SPACH

Spach, Ann. Sci. Nat. Paris, 2 sér. 19 : 117 (1843)

Syn.: *A. salicifolia* Boiss. et Bal., in Boiss. Diagn. sér. 2 (6) : 71 (1859). *A. webbii* Spach var. *salicifolia* (Boiss. et Bal.) Boiss., Fl. Or. 2 : 642 (1872). *Prunus webbii* (Spach) Vierh. in Oesterr. Bot. Zeitschr. 65 : 21 (1915).

Though *A. webbii* is already known for 130 years, it has been quoted for a long time from only very few stands in Turkey, Crete and Greece (Fig. 1). Its systematic rank was unclear and it was frequently confused with other species. A more detailed study of it was done by Vierhapper (1915), who has compiled the stands of *A. webbii* in Europe on the basis of the available herbarium collections. This has permitted an insight into general range of the species. It turned out that it occurs in the region of the eastern Mediterranean, from southern Italy (Puglia) to west-



Phot. K. Jakusz

Fig. 1. A herbarium specimen of *Amygdalus webbii* collected in Turkey, region of Eskisehir (Botanisches Museum, Berlin-Dahlem)

ern Turkey. Vierhapper has included also Iran in this range though he had doubts about that. Under this interpretation the range of *A. webbii* would consist of two major parts separated by the whole of central and eastern Turkey. For this reason Turrill (1950) who has taken up the study of *A. webbii* 40 years after Vierhapper wrote that: "Most likely it will be found in other areas between these extremes".

After a detailed analysis of the herbarium collections of almond from that region it turned out that this opinion was erroneous, because *A. webbii* does not occur in Iran. The opinion has probably originated with Bornmüller who in 1905 has on the basis of the collections of Strauss from northern Iran described two new varieties of almonds and included them with *A. webbii*, namely — var. *reticulata* Bornm. and var. *pubescens* Bornm. In that very same year this error was corrected by Schneider (1906 - 1912) who has recognized the varie-

ties of Bornmüller as a new species, distinct from *A. webbii* — *A. haussknechtii*. In the supplements to the second volume of his work Schneider (page 973) writes that Bornmüller when studying the plants of Strauss did not know this new name yet. In spite of this a trace of this early opinion of Bornmüller has survived until recent times (Meikle, 1966).

Bornmüller mentions *A. webbii* in Iran once again in 1938 reporting it from that country under the name *A. salicifolia* (synonym of *A. webbii*). He refers to two herbarium specimens of Strauss: 20. 6. 1904 from Kohrud and Guba, from the slopes of Elburs near Keredj. The first of these specimens belongs undoubtedly to *A. haussknechtii* and the other to the probable hybrid *A. ×keredjensis* (Browicz, 1969).

In 1957 Nikolovski has published a point map of the whole range of *A. webbii*, however it has so important errors that it cannot be seriously considered. Thus for example in southern Italy he has shown several stands from Calabria and southern Puglia while in the paper or Vierhapper quoted by Nikolovski only stands from northern Puglia are mentioned. Then the range in Asia Minor includes a major part of the Central and South Anatolia as well as Cyprus, Lebanon and western Syria, from which regions this plant is completely unknown. On the other hand *A. webbii* is common on Crete, yet Nikolovski has not shown this on his map though he mentions Crete in his text.

The range of *A. webbii* in Turkey (Fig. 2) is limited primarily to the coastal regions, primarily in the vicinity of Izmir. Further inland the stands become more sparse. The eastern limit of occurrence passes through the environ of Ankara and Tosya. *A. webbii* usually occurs at lower elevations, in the west between 50 - 400 m and in the east up to 1200 m in exposed places, on rocky, stony, limestone or sandstone slopes, particularly in the valleys of rivers. Schwarz (1936) mentions that near Izmir it grows in devastated communities of phyrana together with such species as *Poterium spinosum*, *Asphodelus microcarpus*, *Dianthus glutinosus*, *Trifolium tomentosum*, *Andropogon hirtus*, *Hordeum asperum* and *H. distichum*, *Phlaeum graecum* and in sparse oak woods together with *Quercus cerris* var. *tournefortii*, *Q. pubescens* var. *anatolica*, *Q. coccifera*, *Cistus villosus*, *Rhamnus alaternus*, *Phillyrea media*, *Osyris alba*, *Paliurus spina-christi*. A map of distribution of the stands in Turkey has been published by Browicz (1972).

In Greece *A. webbii* is a common species on Crete and occurs also on the Peloponnesus, in Epirus and in Thessaly. Turcill (1950) has reported it also from Thrace, however so far I have not seen any herbarium collections from that region which would confirm this. Similarly as in Turkey *A. webbii* occurs in Greece at lower elevations, though Rechner (*in sched.* 21498) has found it in the mountains of Timphi in Epirus,

between 1200 and 1600 m elevation. So far this is the most elevated stand on which the species was found*.

In Yougoslavia stands of *A. webbii* are to be found in two regions, in Macedonia, for which a detailed map of distribution has been published recently by Nikolovski (1957) and Em (1963), and in the southwestern coastal part (Hercegovina and Montenegro). According to Nikolovski (l. c.), this almond grows in Macedonia on a dozen or so stands, usually at elevations of 80 to 250 m, though on lakes Ohrid and Prespa it can also be found between 720 and 850 m elevation. These stands are associated with the valley of river Vardar and its tributaries as well with the southwestern regions neighbouring on Albania. *A. webbii* belongs here to 3 associations from the alliance *Carpinion orientalis*, namely: *Juniperus excelsa*-*Amygdalus webbii*, *Quercetum cocciferum* and *Carpineto orientalis*-*Pistacietum terebinthi*. Nikolovski (l. c.) mentions the list of tree and shrub species which cohabit with *A. webbii* on these three stands.

1. Dedeli, 120 m	2. Demir Kapija, 100 m	3. Ohrid, 700 m
<i>Juniperus excelsa</i>	<i>Quercus lanuginosa</i>	<i>Juniperus foetidissima</i>
<i>Phillyrea media</i>	<i>Q. coccifera</i>	<i>J. oxycedrus</i>
<i>Pistacia terebinthus</i>	<i>Phillyrea media</i>	<i>Pistacia terebinthus</i>
<i>Ruscus aculeatus</i>	<i>Ficus carica</i>	<i>Quercus lanuginosa</i>
<i>Cistus villosus</i>	<i>Osyris alba</i>	<i>Phillyrea media</i>
<i>Celtis australis</i>	<i>Juniperus excelsa</i>	<i>Asparagus acutifolius</i>
<i>Quercus coccifera</i>	<i>Podocytisus carmanicus</i>	<i>Rhamnus rhodopea</i>
<i>Juniperus oxycedrus</i>	<i>Pistacia terebinthus</i>	<i>Carpinus orientalis</i>
<i>Asparagus acutifolius</i>	<i>Cistus villosus</i>	<i>Rhus coriaria</i>
<i>Rhamnus rhodopea</i>	<i>Juniperus oxycedrus</i>	<i>Ficus carica</i>
<i>Ephedra campylopoda</i>	<i>Colutea arborescens</i>	<i>Colutea arborescens</i>
<i>Quercus lanuginosa</i>	<i>Coronilla emeroides</i>	<i>Coronilla emeroides</i>
<i>Colutea arborescens</i>	<i>Celtis australis</i>	<i>Quercus macedonica</i>
		<i>Celtis australis</i>

In the neighbouring Bulgarian Macedonia *A. webbii* has been discovered only in 1964 (Delipavlov, 1966), there on one stand only near Petrich, near the Greek border. It occurs there together with such species as *Jasminum fruticans*, *Coronilla emerus*, *Paliurus spina-christi*, *Rhamnus saxatilis* and *Pyrus amygdaliformis*, being in some places even quite numerous. Both this stand as those in Yougoslavia distributed along the Vardar river suggest that perhaps *A. webbii* may eventually be found also in the adjacent regions of Greek Macedonia.

From Albania there is a complete lack of any kind of information on the subject and the only reference one can quote is that of Mitrusi

* The author is indebted to Mrs. Niki Goulandris for the kind sending of a list of herbarium specimens of *A. webbii* present in the herbarium of the Botanical Museum in Kifissia.

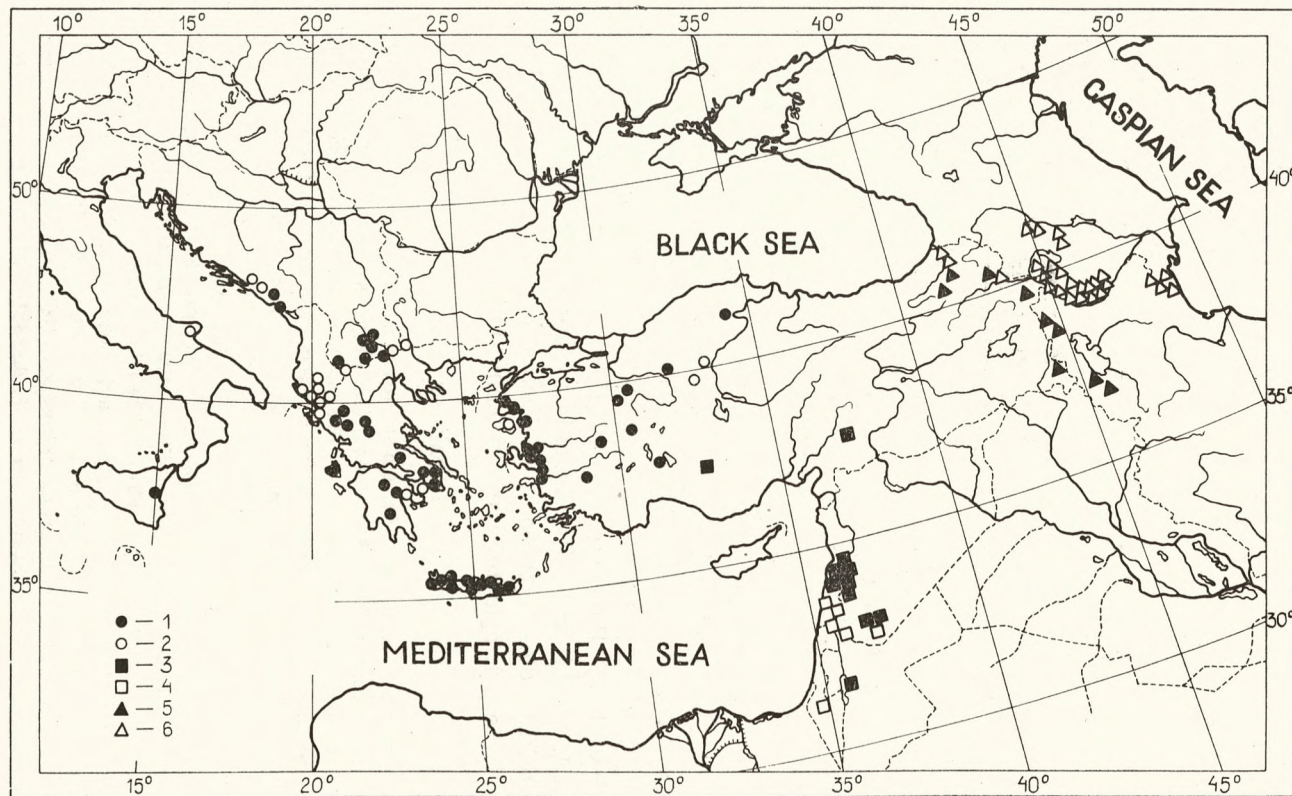


Fig. 2. Distribution of *Amygdalus webbii* (1 — herbarium specimens, 2 — literature), *A. korshinskyi* (3 — herbarium specimens, 4 — literature), and *A. fenzliana* (5 — herbarium specimens, 6 — literature)

(1955) who has prepared a list of stands. From this list it appears that *A. webbii* is known in Albania only from its southern part. However considering the existence of stands in southwestern Yugoslavia it is possible that this almond occurs also in northern Albania.

The data from Italy is equally scanty, and they come from an old publication by Vierhapper (1915). He based his information on the herbarium collections of Porta and Rigo and he reports *A. webbii* from Puglia. I was not able to trace any more recent information on the subject. However beyond the Appenine peninsula *A. webbii* grows also on Sicily, from where it was first reported by Bornmüller (1940). He has found it there at an elevation of 800 - 900 m on the slopes of Etna. It is also possible that one should include in this species the plant referred to by Korshinsky (1901) under the name *A. fenziiana*: "Sicilia: in apricis maritimis l'Agnom, 2. 1831, Dr. Philippi". Sicily is also mentioned later by Turrill (1950), however it has not been mentioned by Webb (1968) in "Flora Europaea". The preserved herbarium specimen collected by Bornmüller from Etna is beyond any doubt *A. webbii*.

As can be judged on the basis of the available herbarium materials *A. webbii* is not a very variable species, and its variability is expressed primarily in the length and width of the leaf blade. For this reason one variety — var. *salicifolia* (Boiss. et Bal.) Boiss., had been described, however it has little systematic value. Differences in the size of the leaves are probably caused by site factors (smaller and more narrow leaves occur on more dry sites). Bornmüller (1940) mentions also a hybrid *A. orientalis* × *A. webbii* from Paphlagonia in Turkey; herbarium specimens of this hybrid fit closely those of *A. × balansae* Boiss. which is also a hybrid but between *A. orientalis* and *A. communis*.

Localities

Turkey. Herbarium specimens: Smyrne, sur les coteaux pierreux situés derrière la quarantaine, 3. 1894, B. Balansa (G.); Smyrna: Bayrakli in collibus rupes-tribus graminosis solo quarcitico, ca 100 - 400 m. 2. 6. 1933 c. fr., Schwarz 664 (B.); Izmir, 3 km von Örnekköyü bei Karasiyaka am Westfuss des Yamanlar Dag, 13. 2. 1969 c. fl., Fitz, Spitzenberger 40 (W.); Smyrna: in pascuis ad Camkoy supra Burnova, ca. 3 - 400 m, 5. 5. 1933 c. juv. fr., Schwarz 536 (B.); Ouchak (Phrygie) à 910 m, haies, 31. 7. 1857 c. fr., B. Balansa 1290 (G. JE. K. LE.); Afyon, 1. 5. 1963, Yaltirik 2128 (E); Near Afyon, on the hills, 11. 4. 1965 c. fl., Baytop 7890 (E); Phrygia: ad Afion — Karahissar, 1100 m, 8. 6. 1899, Bornmüller 4473 (G. JE. W.); Izmir, at the foot of Yamanlar dagi, 22. 3. 1967 c. fl., Baytop 10.729 (E.); Aydin: Pirene, 50 m. Rocky limestone slopes. 9. 4. 1965 c. fl. et juv. fr., Davis 40844 (E.); Prov. Izmir: Torbali — Ephesus, 50 m. On rock, 22. 3. 1956 c. fl., Davis, Polunin 25151 (E. K.); Eskisehir: Karacahisar, in planitie elevati prope ruinas, ca. 1000 m, 6. 5. 1932 c. fl., Scheibe 1053 (B.); Thymbara, in valle Scamandri fl., 1. 4. 1883 c. fl., Sintensis 31 (E. G. JE. K. LE. S. WU.); Asia Minor — Agro Trojano, Aucher-Eloy 1426 ex parte (G. — Syntypus); Paphlagonia: Tossia: Derinoss, 24. 5. 1892, Sintensis 3980 (JE.); Denizli, Pamukkale, Bereich der Sinterterassen, 400 m, 21. 5. 1966, Sorger 66 - 6 - 63 (Herb. Sorger); Kuru-Tepe, Bergsteppe ca. 1200 m, 14. 6. 1966 c. fr., Sorger 66 - 44 - 20

(Herb. Sorger); Pergamum, scattered along banks of gullies on stone slope above the Asclepion, 7. 4. 1969 c. fl., Townsend 69/106 (K.); Between Eskisehir and Kutachya, Rocks, eastern slope, 16. 7. 1962, M. et D. Zohary 451, 455 (H.U.J.); Ankara: NW of Beypazari, nr. Karakoy, Kühne 590 (E.); Izmir, Kusadasi, *Medit. Vegetation* 100 m, 11. 6. 1964, Sorger 64 - 59 - 17 (Herb. Sorger).

Literature: Lichter Eichwald am Nordfusse des Yamanlardag, oberhalb Emir-Alem, 300 m; am Hermos-Durchbruch, öst. von Emir-Alem, 150 m (Schwarz, 1936); In collibus ad basim borealem montis Yamanlardagh inter Deirmendere et Emir-Alem, 2 - 300 m, 8. 5. 1906, c.fr., Bornmüller 9457 (Bornmüller, 1908); Galatia: Ad Ankara (Angora), in valle Kawakli-dere, 900 m., 5. 1929, Bornmüller 1344; In monte Kirkkys-dagh prope Kalecik, in rupestribus subalpinis 1000 - 1100 m, vere spont., 10. 7. 1929, Bornmüller 13440 (Bornmüller, 1940); Ager trojanus, ad radices collium Bonarbaschi dictos, prope Kirk Ghios, Webb — syntypus (Spach, 1843); Distr. Ankara: Hacikadin, c. 950 m (Birand, 1952).

Greece. *Herbarium specimens:* Kriti: In dumetis ad Karaso Pedhiadhia, 29. 6. 1899, Baldacci 40 (W.U.); Ad sepes prope H. Marina et Galata, distr. Khaniotika, 1893, c. fr., Baldacci (W.U.); Distr. Kissamos: Penins. Korykos ad versuras saxosas prope pagum Neo Choria, ca. 200 m, 19. 4. 1942 c.fr., Rechinger 12009 (W.); Distr. Temenos: Knossos, inter ruinas, 24. 6. 1942 c.fr., Rechinger 13971 (S.W.); Südküste: Phaestos bei Tybaki; Hagia Triada bei Tybaki, 13. 4. 1914, Wettstein (W.U.); Distr. Kaenurio: Montes Psiloriti (Ida) in collibus prope Saros, ca. 400 m, 4. 7. 1942 c.fr., Rechinger 14184 (W.); Distr. Chania, Penins. Akrotiri. In saxosis calc. montis Korakies, ca. 200 m, 25. 5. 1942 c.fr., Rechinger 13292 (W.); Canea spont., Sieber (PR.). Entre Malaxas et Stilon, 24. 2. 1953, Goulimis 19139 (Herb. Goulandris); Rock wall south of Theriss (South of Chaniá) 4. 1972, Stjernholck (Herb. KORNİK).

Insula Kephallonia. In montis "Aenos" regione infima, supra Valsama, 500 m, 17. 5. 1926, Bornmüller 591 (JE.) Peloponesus: Achaia, prope pagum "Kalavryta", in decliv. aridis ad fl. Vereikos, 700 m, 13. 6. 1926 c.fr., Bornmüller 592, 593 (JE. S.W.); *ibid.*, Mattfeld (S.); Attica: Athenae, in vineis pr. Phalerum, 20. 5. 1885 c.fr., Haussknecht (JE.); Attica, in sepibus ad vias pr. Liosia, spont., 29. 3. 1874, Heldreich (W.U.); Supra Eleusia, 4. 1885 c.fr., Haussknecht (JE.); In planitie Eleusina, ad radices m. Corydali, 27. 3. 1884 c.fl., Heldreich (PR.); Epirus: Montes Timphi, in declivibus meridionalibus supra pagum Skamneli, circa 1200 - 1600 m, 17. 7. 1958 c.fr., Rechinger 21498 (W.); Pindus Tympphaeus, Klinovo, 24. 6. 1885, Haussknecht (JE.); Epirus: In saxosis calc. 20 km S. Joannina, 12. 5. 1961 c.juv.fr., Rechinger 23268 (W.); Argolis: Infra Arachnaeon, in saxonis calcareis, 1. 5. 1964 c.fr., Rechinger 24555 (W.); Thessalia: Kalampaka, inter Murgani Chan et Wutades, 1. 6. 1896 c.fr., Sintenis 499, 499b (JE.PR.PRC.); Mon. Agia Paraskivi in Epiro, 8. 1894, Formanek (PR.); Distr. Beotie, village Distomon, 450 - 500 m, 25. 3. 1972, Stamatiadou 14235A (Herb. Goulandris); Peloponese, distr. Laconia, près de Sparta, 25. 3. 1953, Goulimis 19940 (Herb. Goulandris); Distr. Trikala, Thessalie, Ghefira Mourganas, 22. 5. 1957, Goulimis 19941 (Herb. Goulandris).

Literature: Kriti: Murnies, Malaxa, Pervolitza; Kissamos: Polyrrhenia; Rethymno: Ida bei Arkadi; Amari: M. Ida bei Platania; Malevyzi: Mt. Ida bei Daphnas, Krusonas und Prinias; Amargiano, Angarathe; Lassithi: Krystallenia; Merabello: Elunta — acc. to Gandoger; Hag. Vasilis: Melabes 380 m; Apheni-Pass 600 - 900 m — acc. to Rikli, Rübél (Rechinger, 1943a); Malevyzi: zwischen Gorgolaino und Hag. Varvara; Messara (Rechinger 1943b).

Mytilene: Oxa Petra, Melissorachto (Rechinger, 1943a); Argolis: Bei Mykenae. An Zäunen — acc. Halacsy, Hayek; Attika: Ad sepes Phalerum versus — acc. to Heldreich; Insel Aegina, auf Äckern — acc. to Friedrichsthal 339 (Vierhapper, 1915).

Yugoslavia. *Herbarium specimens:* In reg. infer. m. Galičitza, solo. calc., 7. 1908 c.fr., Dimonie (W.U.); Vardarschlucht bei Demirkapia, 1. 7. 1936 c.fr., Behr

(JE.); Demir-kapu, in rupestribus 1 - 200 m, 24. 4. 1918 c.fl., Bornmüller 3991 (JE.PRC.); ibidem, 4. 6. 1918 c.fr., Bornmüller 3994 (JE.PRC.); Cattaro, 6. 1905 c.fr., Sagorski (JE.); Felsen oberhalb Kotor, am Reitweg nach Montenegro, ca. 100 - 250 m, Kalk, 25. 7. 1929, Ginzberger (WU.); Cattaro, Kastelburg, 20. 5. 1911 c.fr., Bornmüller s.n. (JE.); Innerhalb der Festung Sv. Ivan bei Kotor, 12. 5. 1930 c.fr., Berger (WU.); Cattaro: an Wegen im alten Kastell, 100 m, 18. 5. 1897 c.fr., Baenitz (W.); Hercegovina centralis: Trebinje, 7. 1891, Vandas (PR.); Macedonia: In declivibus saxosis ad orientem lacus Ohrid prope Pistani, 17 km a Sveti Naum, septentrionem versus, 29 - 31. 5. 1958, Rechinger 19720 (W.); Veles, 4. 1918 c.fl., Burgeff 898 (JE.); Veles, in faucibus fluvii Tobolka, 1 - 200 m, 2. 5. 1918, Bornmüller 3989 (JE.); Macedonia centr., Drenovo, in declivibus rupestr. "Kersura" 2 - 300 (-500) m, 11 - 14. 5. 1918 c.fr., Bornmüller 3981, 3982 (JE.); Macedonia: supra Rabrovo (distr. Doiran), 300 m, in rupibus, 21. 4. 1918, Bornmüller 3995 (JE.PRC.).

Literature: Hercegovina: Prope Gabela; in agro Popovo polje; prope Ravno; supra Gabela; prope Fatnica et juxta Trebinje (Beck v. Mannagetta, 1927); Labunište 720 - 750 m. near lake Ohrid; Kališta, 720 - 750 m. near lake Ohrid; Studenčišta, 720 - 780 m; near lake Ohrid; Sir Chan-Stenie, 820 - 850 m, near lake Presna; Stari Dojran, 120 m, near lake Dojran; Belotino, river Vodoča, 280 m; Strumica, river Strumica 220 - 250 m; Between Valandovo-Rabrovo-Dedeli; Pešti river Babuna, 160 - 200 m (Nikolovski, 1957).

Bulgaria.

Literature: Macedonia, an den Osthängen des Gipfels Malak Koschuh bei Petritsch (Delipavlov, 1966).

Albania

Literature: Konispol; Delvinë; Himarë; Vlorë; Tepelenë; Përmet; Leskovik; Skrapar (Mitrushi, 1955).

Italy. Herbarium specimens: Sicily, M. Aetna, in decliv. merid. (solo vulcanico) prope Nikolosi, 8 - 900 m, in coll. "mont Rossi", 20. 5. 1933, Bornmüller 288 (S.).

Literature: Apulien: Tavoliere pr. S. Severo, Apricena etc. s. calc. 30 - 50', acc. Porta et Rigo (Vierhapper, 1915).

2. *AMYGDALUS FENZLIANA* (FRITSCH) LIPSKY

Lipsky, Acta Hort. Petropol. 14 : 263 (1897)

Syn.: *Prunus fenzliana* Fritsch, Sitz.-Ber. Akad. Wiss. Wien 101 : 632 (1892).

A. divaricata Fenzl, nom. nud., vide Fritsch, op. cit.

This is a species described from cultivation on the basis of specimens growing in the Vienna botanical garden. Its seeds have been brought there probably by Hohenacker and Fischer, and were collected in western Caucasus, in the province Karabagh. Fritsch (1892) has pointed out the significant features of this almond, which differ it distinctly from *A. communis*, namely shrubby habit, strong thorns, reddish shoots even in shade, poor foliage cover and early flowering (always before leaf flushing). However Fritsch knew nothing about its distribution except for the general information that it originated from the Caucasus (Fig. 3).

A few years later this newly described species was studied in greater detail by Lipsky (1897) who has found further specimens in the Lenin-



Phot. K. Jakusz

Fig. 3. A herbarium specimen of *Amygdalus fenzliana* collected in Caucasus, S. Armenia (Institute of Dendrology and Kórnik Arboretum)

grad herbarium collected by Szovits in 1828, and originally labelled as *A. communis*. According to Lipsky *A. fenzliana* differs not only from *A. communis* but also from the closely related species *A. webbii*.

Next to study *A. fenzliana* was Korshinsky (1901) while subjecting to a critical analysis the species *A. communis* and closely related species. In the first part of his work (page 88) he considers *A. webbii* and *A. fenzliana* as distinct species, while on page 90 he writes: "Within the Mediterranean region west of Sicily there occurs only one species, namely *A. fenzliana*". Its range was to include according to Korshinsky the Transcaucasus, Crete, Greece and Sicily. This would therefore be, similarly as in the case of the older erroneous views about *A. webbii* a disjunctive range. Probably under the influence of this view Kowalev and Kostina (1935) have drawn the range of *A. fenzliana* covering the whole of Turkey and Caucasus (but without Europe).

It turned out eventually that *A. fenzliana* is a relatively common species of almond in the southern and western Transcaucasus in the USSR — in Armenia, Nakhichevan and Azerbaijan (primarily the southern part). A point map of distribution of stands in that region has been published by Grossheim (1952), who has also indicated 4 stands in northeastern Turkey. *A. fenzliana* grows here on dry, rocky, stony and gravelly mountain slopes, and is a component of the phrygana, shibliak and sparse Juniper communities reaching in the mountains an elevation of up to 1600 m (Sachokia, 1965).

From the same region in 1935 - 1937 several other species have been described, very similar to *A. fenzliana*. It is possible that they are only minor forms of it, or varieties. The first three: *A. urartu* S. Tamamsch., *A. gjarnyensis* S. Tamamsch. and *A. grossheimii* S. Tamamsch., have already been included into the synonymy of *A. fenzliana* by Linczevski and Fedorov (1941). The two other, *A. zangezura* Fed. et Takht. and *A. pseudopersica* S. Tamamsch. require further critical studies.

Beyond the Caucasus numerous stands of *A. fenzliana* have been discovered in north-western Turkey, between 700 and 1800 m elevation (Browicz 1972, map 10) and in western Iran where the species attains 1590 m (Fig. 2). One can suspect that it occurs also in northwestern Iran along the valley of river Arax and on the western slopes of the Talysh Mts.

Localities

Turkey. Herbarium specimens: Erzurum: 25 km N of Tortum Gol, in gorge c. 700 m Rocky slope. 31. 7. 1966 c.fr., Davis 47652 (E.). About 50 km South of Kars. Stony ground *Rhamnetum*. 1540 m, 22. 6. 1954 c.fr., Zohary, Plitman 2267 - 33, 2267 - 49 (HUJ.); Kars: NE slope of Agri Dag below Serdar Bulak, 1600 m. Rocky igneous ravine. 22. 5. 1966 c. juv. fr., Davis 43735 (E.); Hakkari: Bajirge. 1700 - 1800 m, Dry stony slopes. 18. 6. 1966, Davis 45271 (E.).

Literature: see mape 168 in Grossheim, (l. c.).

Iran. Herbarium specimens: Azerbaidjan: Khoi-Shaphur, 15. 10. 1948 Behboudi 5712-E; Sabeti 370 (W.); In valle fluvii Qotur W Khvoy versus fines Turcicas, 11. 6. 1971, Rechinger 41746 (W.); Rezaieh, 24 km SW Naghadeh, 1590 m, Pabot 12979-E (W.); Kordestan, 62,5 km S Mahabad, 1550 m, 16. 10. 1960, Pabot 12980-E (W.).

Literature: Ad pagum Temer prope lacum Ormiach (Urmia) in rupibus, 23. 4. 1828 c. juv. fr., Szovits; Inter pagum Almasari et Seidchodsha in distr. Choj, Aderbejdshan, 17. 3. 1828 c.fl., Szovits (Korshinsky, 1901).

3. *AMYGDALUS HAUSSKNECHTII* (C. K. SCHNEIDER) BORNM.

Bornmüller, Beih. Bot. Centrbl. 28, 2 : 226 (1911)

Syn.: *Prunus haussknechtii* C. K. Schneider, Ill. Handb. Laubholz. 1 : 592 (1905).

This species is little known and in fact from the time it was first described it was mentioned in the literature only few times, primarily by Bornmüller. Parsa (1948) had included it in his second volume

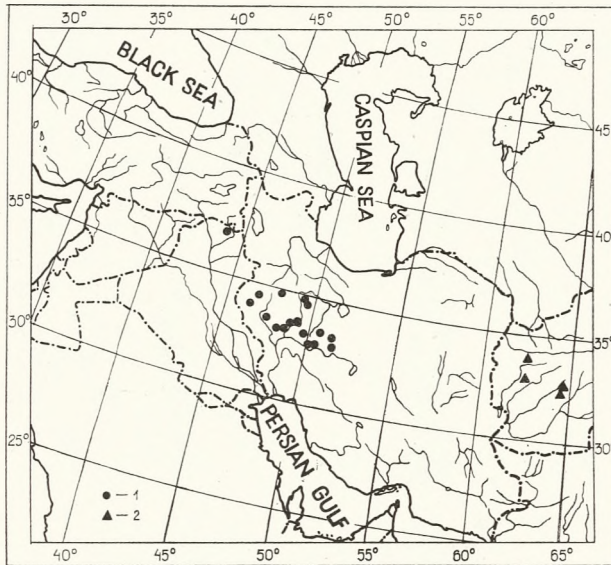


Fig. 4. Distribution of *Amygdalus haussknechtii* and *A. browiczii* (herbarium specimens)

of the Flora of Iran, mentioning only one stand, while another he has included with *A. webbii* which as was discussed above does not occur in Iran. I have prepared a full list of stands in 1969 (Browicz, 1969) and thus I am not quoting them presently, particularly since that time no new collection of this species have been made in Iran. I considered it as being an endemic species for Iran, however it turned out that it occurs also in north-western Iraq, from where I have seen lately one herbarium specimen (Kani Masi Sherin. Edges of *Quercus libani* forest, 6. 1961 c.fr., Agnew, Hadač, Haines (E.). It is not unlikely that the specimens from Avroman Mts. mentioned by Meikle (1966) as *A. webbii* could be included with *A. haussknechtii* (Fig. 4).

In contrast to *A. fenzliana*, *A. haussknechtii* occurs as a rule at much higher elevations, from 1200 to 3600 m. We lack any detailed information about the conditions under which it grows and only Furse has written on the herbarium label of the specimen collected on Kuh-e Darbashah above Damaneh at an elevation of 2850 m (*in sched.* 1444): "...deep moist earth among rocks and large stones, close of snow patches". Most probably it is a dense thorny shrub growing 120 - 180 cm tall, or else a small tree.

Two varieties can be recognized within it:

A) VAR. *HAUSSKNECHTII*

Syn.: *A. webbii* Spach. var. *reticulata* Bornm., Beih. Bot. Centrbl. 19 : 251 (1905).

Leaves glabrous on both sides.



Phot. K. Jakusz

Fig. 5. A herbarium specimen of *Amygdalus korshinskyi* collected in Lebanon (Naturhistoriska Riksmuseum, Stockholm)

B) VAR. *PUBESCENS* (BORNM.) BORNM.
Beih. Bot. Centrbl. 28, 2 : 226 (1911)

Syn.: *A. webbii* Spach. var. *pubescens* Bornm., Beih. Bot. Centrbl. 19 : 251 (1905).
Leaves more or less pubescent.

4. *AMYGDALUS KORSHINSKYI* (HAND.-MAZZ.) BORNM.
Bornmüller, Beih. Bot. Centrbl. 31, 2 : 212 (1914)

Syn.: *A. communis* L. var. *microphylla* Post., Fl. Syria, Palest., Sinai 302 (1896).
Prunus korshinskyi Hand.-Mazz., Ann. Naturhist. Hofmus. Wien 27 : 71 (1913). *A. microphylla* (Post.) Browicz in K. H. Rechinger Fl. Iran. 66 : 176 (1969) non H. B. et K.

One of the species of almond described rather late, was originally considered to be only a small leaf variety of *A. communis* or else as its

sub-alpine form (Zohary, 1951). It occurs (Fig. 2) primarily in the mountains of Lebanon between 1500 and 1800 m elevation (Fig. 5), and in southwestern Syria, particularly on Djebel Drouze at 1250 m elevation. It has also been found far south of this region in Jordan, where it has been mentioned by Post (1896) and Nábělek (1923); these latter stands from the region of Moab and the stand from the central Negev in Israel (Zohary, 1973) are probably the most southerly stands in the Arabic peninsula for the whole genus *Amygdalus*. According to Zohary (1973): "In the Upper Galilee mountains, especially on their eastern aspects, it (*A. korshinskyi*) forms open steppe-forest together with *Pistacia atlantica*".

North of Lebanon two stands have been discovered in southern Turkey (Fig. 2).

Within *A. korshinskyi* two varieties can be recognized:

A) VAR KORSHINSKYI

Leaves sparsely pubescent at first, becoming glabrous.

Localities

Turkey. Herbarium specimens: Achyrdagh supra Marsh, 7. 1867, Haussknecht (JE.W.); Konya, 1 km N. Sille, Strauchvegetation am Rand einer Steppe, 10. 6. 1966, Sorger 66 - 38 - 27 (Herb. Sorger).

Lebanon. Herbarium specimens: In monte „Hermon”, frequens regionemque efformat arboribus, 5600', 6. 1855, c.fr., Kotschy 580 (W. — syntypus); Anjar in valle Leontis, 1858, Unger (W. — syntypus). Montium Libani borealis, in declivitatibus orientalibus silvaticis inter Der-el-Ahmar bei Aineta, 15 - 1800 m, 27 - 28. 5. 1910 J. et F. Bornmüller 11756 (G. JE. LE. W. — syntypus); Montium Libani in declivitatibus occidentalibus in cedreto supra Ain Zahalta, 1700 - 1800, 13 - 19. 6. 1910, J. et F. Bornmüller 11748 (G. — syntypus); Baalbek in steppis, 1100 m, 29. 5. 1932, Wall (S.); Ainata, ca. 1700 m, 30. 5. 1932, Wall (S.); Beitmeri, 25. 3. 1892, Peyron (G.); Beitmeri, ad Ain Bachras, in silvaticis, 30. 7. 1882, Peyron (G.).

Literature: Col entre Jezzine et Machghara, au-dessous de Ma'asser-Pabot; Col de Zahlé-Pabot; Ammiq, Hazreta-Napoléon; au-dessous de Kefraya-Pabot; Ouadi Fou'ara-Mouterde; Au-dessous de Rachaya-Thiebaut, Mouterde (Mouterde, 1970).

Syria. Herbarium specimens: Damas, Labillardière (G.); Circa Zebdani, pr. Damas, 11. 6. 1855, Kotschy 92. 93 (PR.); Djebel Druz, Sueda, 15. 5. 1931, Zohary 306 (HUJ.); Djebel Drouze, Env. of Souweida, 1250 m, *Quercetum*, basalt soil, 20. 6. 1932 c.fr., Eig. Zohary 307, 308 (HUJ.).

Literature: Djebel Druze: Tell Qouleib — Mouterde, Pabot; Tell Ahmar, Tell Chihane — Mouterde (Mouterde, 1970); Golan (Zohary, 1973).

Jordan: Herbarium specimens: Wadi-el Bire, Moab, inter Madaba et el-Kerak, ca. 700 m, 12. 6. 1912 c.fr., Nábělek 1883 (BAV.).

Literature: Near 'Uyun Musa, Moab (Post, 1896).

Israel.

Literature: Upper Galilee; central Negev (Zohary, 1973).

B) VAR *BORNMÜLLERII* BROWICZ, VAR. NOVA*Folia utrinque tomentosa*

Typus: In Libani borealis declivitatibus orientalibus silvaticis inter Der-el-Ahmar et Aineta, 1600-1800 m, 27-28.5.1910. J. et F. Bornmüller 11758 (JE. — holo., W. — iso.).

This variety was found on the same day and in the same locality as the typical variety (No. 11756). It was identified erroneously by Bornmüller as *Amygdalus kotschyi* Boiss. et Hohen., which species was supposed to have been: "Neu für die Flora Syriens" (Bornmüller, 1914). It differs from *A. kotschyi* not only in the type of pubescence but also in the size and shape of leaves.

5. *AMYGDALUS BROWICZII* FREITAG

Freitag, Bot. Jahrb. 91,4: 470 (1972)

This species of almond, described only two years ago, occurs in western and southwestern Afghanistan between 1300 and 2900 m elevation (usually between 1600 and 2700 m). In these regions of central and upper parts of the mountains it is besides *Pistacia atlantica* the most important tree species (it attains 5 m). It is closely related to *A. communis* (shoots are unarmed) and to *A. korshinskyi* (small leaves). A list of its stands on the basis of his own herbarium collections and a point map of distribution have been published by Freitag (1972). Since the number of stands has not increased since that time, I am not quoting the list here (Fig. 4).

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Amygdalus webbii Spach i gatunki blisko spokrewnione

Streszczenie

Autor omawia szczegółowo zasięgi pięciu blisko z sobą spokrewnionych gatunków migdałów, które często uważane są za formy wyjściowe powszechnie uprawianego w zachodniej Azji *A. communis* L. Dla każdego z nich podaje punktowe mapki zasięgu.

A. communis, jak się wydaje, występuje w tym rejonie również w stanie dzikim, jednak ściśle wyznaczenie granic jego zasięgu w związku z wielowiekową uprawą jest już dzisiaj prawie że niemożliwe. Przypuszczalnie w warunkach naturalnych rośnie w południowej Turkmenii (góry Kopet-Dagh), w znacznej części Turcji, zwłaszcza wschodniej, w zachodnim Iranie, w zachodniej Syrii, w Libanie, Izraelu i w zachodniej Jordanii, a także być może w południowym Kaukazie. Jest rzeczą charakterystyczną, że zasięgi wymienionych poniżej pięciu gatunków, oddzielone od siebie nieraz znacznymi przestrzeniami, powiązane są ze sobą w jedną całość właśnie zasięgiem *A. communis*. I tak na zachodnim krańcu *A. communis* rozciąga się zasięg *A. webbii* Spach, na południowym — zasięg *A. korshinskyi* (Hand.-Mazz.) Bornm., na północnym — zasięg *A. fenzliana* (Fritsch) Lipsky, a na wschodnim zasięgi *A. haussknechtii* (C.K. Schneid.) Bornm. i *A. browiczii* Freitag.

A. webbii charakteryzuje się największym spośród tych pięciu gatunków zasięgiem. Występuje on na Sycylii, w południowych Włoszech (prawdopodobnie tylko w Apulii), w południowej Jugosławii (południowo-zachodnia Hercegowina, Montenegro oraz Macedonia), w Albanii, na jednym stanowisku w południowo-zachodniej Bułgarii, w zachodniej i południowej Grecji, na Krecie oraz w zachodniej azjatyckiej części Turcji. Rośnie w ciepłolubnych zaroślach i w widnych lasach, przeważnie na niższych wysokościach, głównie między 50 - 400 m n.p.m. Najwyższe stanowiska notowane są w Turcji — 1200 m n.p.m. i z gór Epiru w Grecji — 1200 - 1600 m n.p.m.

Zasięg drugiego gatunku, *A. fenzliana*, przypada głównie na Kaukaz (do 1600 m n.p.m.). Jego nieliczne stanowiska wymieniane są także z północno-zachodniej Turcji (do 1800 m n.p.m.) oraz z zachodniego Iranu (do 1590 m n.p.m.).

A. haussknechtii znany jest niemal wyłącznie z zachodniego Iranu, dla którego to obszaru pełny wykaz stanowisk został zestawiony we „*Flora Iranica*” (Browicz, 1969). Ostatnio stwierdzono jego występowanie również w północno-wschodnim Iraku. W odróżnieniu od *A. fenzliana* rośnie on na znacznie wyższych wysokościach, od 1200 - 3600 m n.p.m. Reprezentowany jest przez dwie odmiany — var. *haussknechtii* i var. *pubescens* (Bornm.) Bornm.

Czwarty gatunek, *A. korshinskyi*, uważany był dawniej jedynie za drobniolistną odmianę *A. communis*. Jego zasięg ograniczony jest do gór Libanu (1500 - 1800 m n.p.m.), zachodniej Syrii, Izraela i Jordanii, a na północ od tego rejonu dwa stanowiska zostały odkryte także w południowej Turcji. Autor wyróżnił u *A. korshinskyi* nową odmianę — var. *bornmuellerii* o liściach obustronnie owłosionych (Liban).

Ostatni wreszcie gatunek, *A. browiczii*, został opisany zaledwie przed dwoma laty i wiadomości o nim są bardzo skąpe, a wykaz jego stanowisk opublikował Freitag (1972). Występuje w zachodnim i południowo-zachodnim Afganistanie, między 1300 - 2900 m n.p.m. Obok *Pistacia atlantica* jest on tutaj najważniejszym gatunkiem drzewa; dorasta do wysokości 5 m.

КАЗИМЕЖ БРОВИЧ

Amygdalus webbii Spach и близкородственные виды

Резюме

Автор детально рассматривает ареалы пяти близкородственных видов миндаля, которые часто принимаются за исходные формы *A. communis*, культивируемого повсеместно в Западной Азии. Для каждого из них приводятся точечные карты ареалов.

A. communis, по-видимому, встречается в этом районе и как дикорастущий, однако точное обозначение границ его ареала представляется практически невозможным в связи с многовековой культурой вида. Предположительно, в естественных условиях он произрастает в южной Туркмении (горы Копет-Даг), в значительной части Турции (особенности на востоке), в западном Иране, западной Сирии, в Ливане, Израиле и в западной Иордании, а также, быть может, на южном Кавказе. Заслуживает внимание тот факт, что ареалы перечисленных ниже пяти видов, разделённые иногда значительными пространствами, связываются в единое целое как раз ареалом *A. communis*. Так, на западной окраине ареала *A. communis* расположен ареал *A. webbii* Spach, на южной — ареал *A. korshinskyi* (Hand.-Mazz.) Bornm., на северной — ареал *A. fenzliana* (Fritsch) Lipsky, а на восточной — ареал *A. haussknechtii* (C. K. Schneid.) Bornm. и *A. browiczii* Freitag.

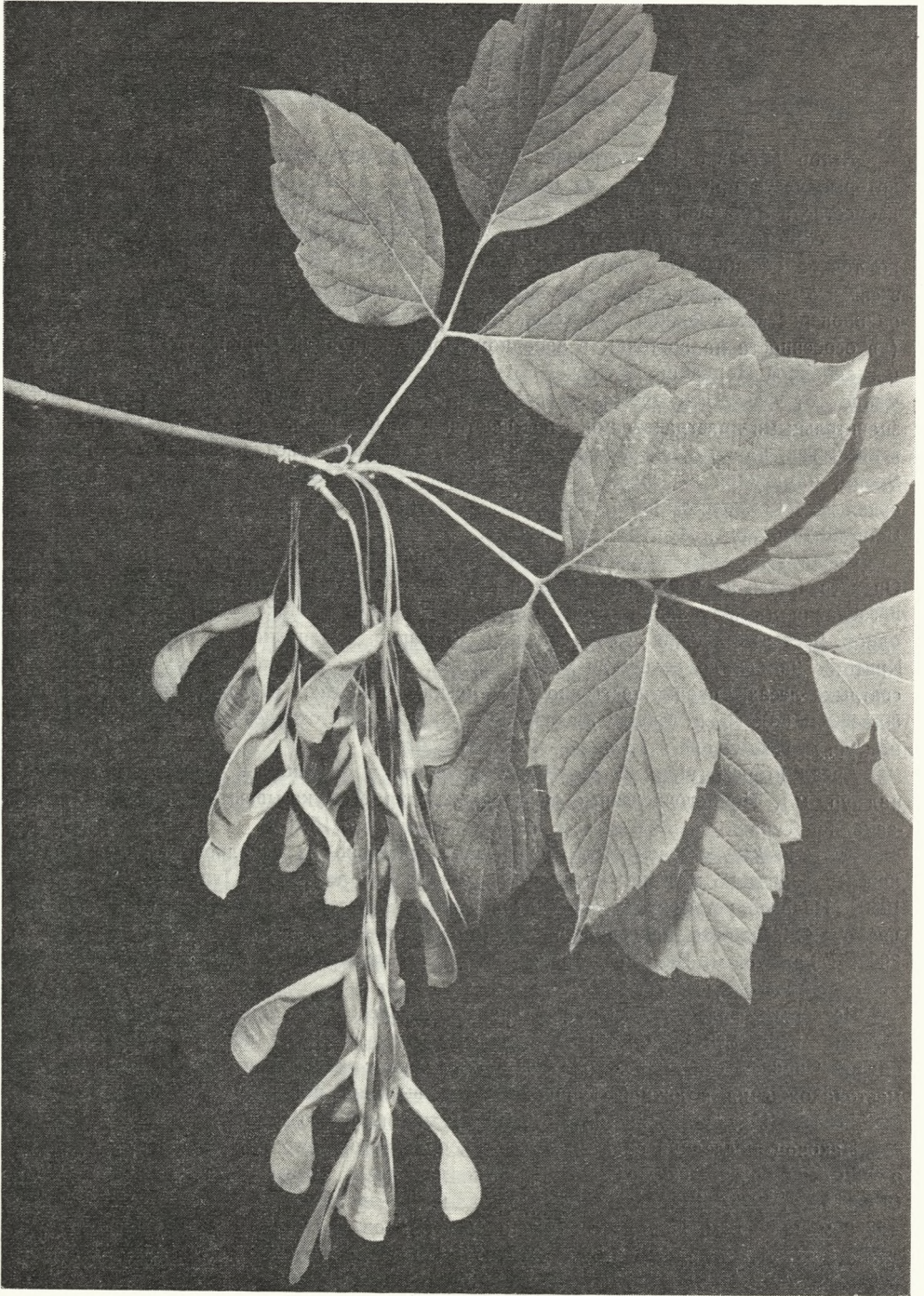
Среди этих пяти видов *A. webbii* характеризуется наиболее обширным ареалом. Он встречается на Сицилии, в южной Италии (вероятно, только в Апулии), в южной Югославии (юго-западная Герцеговина, Черногория и Македония), в Албании, на одном местонахождении в юго-западной Болгарии, в западной и южной Греции, на Крите и на западе азиатской части Турции. Растёт в теплолюбивых зарослях и в светлых лесах, преимущественно на низких высотах, главным образом между 50 - 400 м над ур. м. Самые высокие местонахождения отмечены в Турции — 1200 м над ур. м. и на Эпире в Греции — 1200 - 1600 м.

Ареал второго вида *A. fenzliana* приурочен в основном к Кавказу (до 1600 м над ур. м.). Немногочисленные местонахождения его указываются также в северо-западной Турции (до 1800 м) и в западном Иране (до 1590 м).

A. haussknechtii известен почти исключительно из западного Ирана. Полный перечень здешних местонахождений вида приведен во „Flora Iranica” (Browicz, 1969). Недавно установлено его наличие также и в северо-восточном Ираке. В отличие от *A. fenzliana* произрастает он на значительно больших высотах, от 1200 до 3600 м над ур. м. Вид представлен двумя разновидностями: 1) var. *haussknechtii*, 2) var. *pubescens* (Bornm.) Bornm.

Четвёртый вид, *A. korshinskyi*, ранее считался всего лишь узколистной формой *A. communis*. Его ареал ограничен горами Ливана (1500 - 1800 м над ур. м.), западной Сирии, Израиля и Иордании, а к северу от этой территории обнаружены два местонахождения в южной Турции. Автор выделил новую разновидность — var. *bornmuellerii* с двусторонне опущенными листьями (Ливан).

Накопец, последний вид, *A. browiczii*, описанный всего два года назад. Сведения о нём ещё очень скудны, но перечень известных местонахождений опубликован (Freitag, 1972). Встречается в западном и юго-западном Афганистане, между 1300 - 2900 м над ур. м. Наряду с *Pistacia atlantica* он является здесь наиболее важным в хозяйственном отношении древесным видом; достигает он 5 м высоты.



Acer negundo L. — klon jesionolistny

Fot. K. Jakusz