

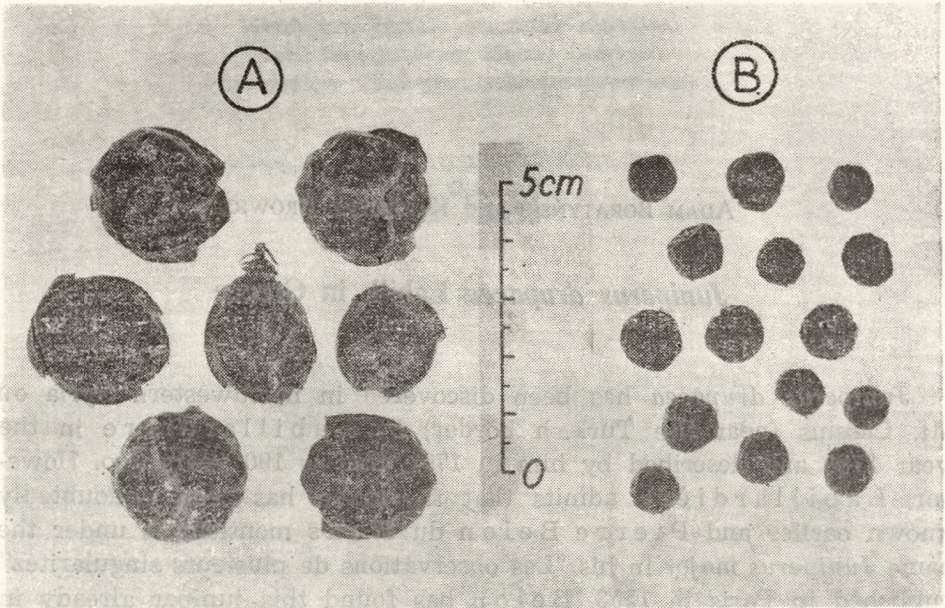
ADAM BORATYŃSKI and KAZIMIERZ BROWICZ

Juniperus drupacea Labill. in Greece

Juniperus drupacea has been discovered in northwestern Syria on Mt. Cassius (near the Turkish border) by Labillardière in the year 1788 and described by him in 1791, that is 190 years ago. However, Labillardière admits that the taxon has been undoubtedly known earlier and Pierre Belon du Mans mentions it under the name *Juniperus major* in his "Les observations de plusieurs singularitez" published in Paris in 1553. Belon has found this juniper already in 1547 during his eastern expedition to the Cilician Taurus Mts. (Pilger 1931). In later years, particularly thanks to the collections of Balansa, Heldreich, Kotschy and Haussknecht (Boissier 1881) it became apparent that *J. drupacea* occurs almost throughout the crescent of the Taurus Mts. in southern Anatolia, and besides also in the mountains of Lebanon where it reaches southermost to the Hermon massif, more or less to 33°30' Lat. N. The most northerly stand was found in Anatolia in province of Marash, at about 38° Lat. N. Further collections have only completed this information and filled in the general pattern of distribution of this interesting species. An accurate map of distribution of *J. drupacea* in Anatolia has been published by Pamay (1955), Code and Cullen (1965) and Eliçin (1974) and a point map for the whole range by Browicz (1978).

The exceptionally large berry-like cones, 20 - 25 mm in diameter, having nothing comparable in any other species of *Juniperus* (Fig. 1), as well as the strong, very wide and very prickly needles densely placed on the stems have led to the recognition of *J. drupacea* as a separate monotypic genus *Arceuthos* (Antoine, Kotschy 1854). This change did not meet with general approval, however, the name *Arceuthos drupacea* (Lab.) Ant. et Kotschy appears in some publications, even in more recent years (Eliçin 1974). None the less, leaving the species within genus *Juniperus*, it was necessary to create it a separate monotypic section (or a subgenus — Gausson 1968) *Caryocedrus* Endl. Recently

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Phot. K. Jakusz

Fig. 1. Cones: A — *Juniperus drupacea*, B — *Juniperus oxycedrus*

Hörster (1974) suggests on the basis of a chromatographic fraction of terpenes in *J. drupacea* and *J. oxycedrus* L. that *J. drupacea* should be included in section *Oxycedrus* Endl.

Fleshy sweetish cones of *J. drupacea* are used in Anatolia by the local population for the manufacture of jams, purées or drinks and also they are eaten fresh or in a dried condition. Their chemical composition has been studied by Selik and Zingler (1969). They have found that the cones contain much sugar (particularly glucose, fructose and sucrose), proteins and water soluble vitamins. *J. drupacea* has also been the object of other studies. Eliçin (1974) investigated the wood anatomy and Lemoine-Sebastian (1966, 1967) the structure of the flowers.

In 1853 *J. drupacea* has been discovered by Bayer also in Europe, in Greece on the Peloponnisos peninsula (Halácsy 1904, Rikli 1943). It was found on the slopes of Mt. Malevo (1835 m), the highest peak in the Parnon massif, at an elevation of 1100 - 1200 m, near Agios Ioannis. This discovery was very interesting, particularly since the Greek stand is much separated from the nearest stands of *J. drupacea* in central Taurus Mts. and the disjunction between these two stands in straight line is about 800 km.

The latter stand has been latter referred to by numerous authors, eg.: Boissier (1881), Halácsy (1904), Hayek (1927), Pilger (1931), Rikli (1943), Rothmaler (1944) and recently also by Franco

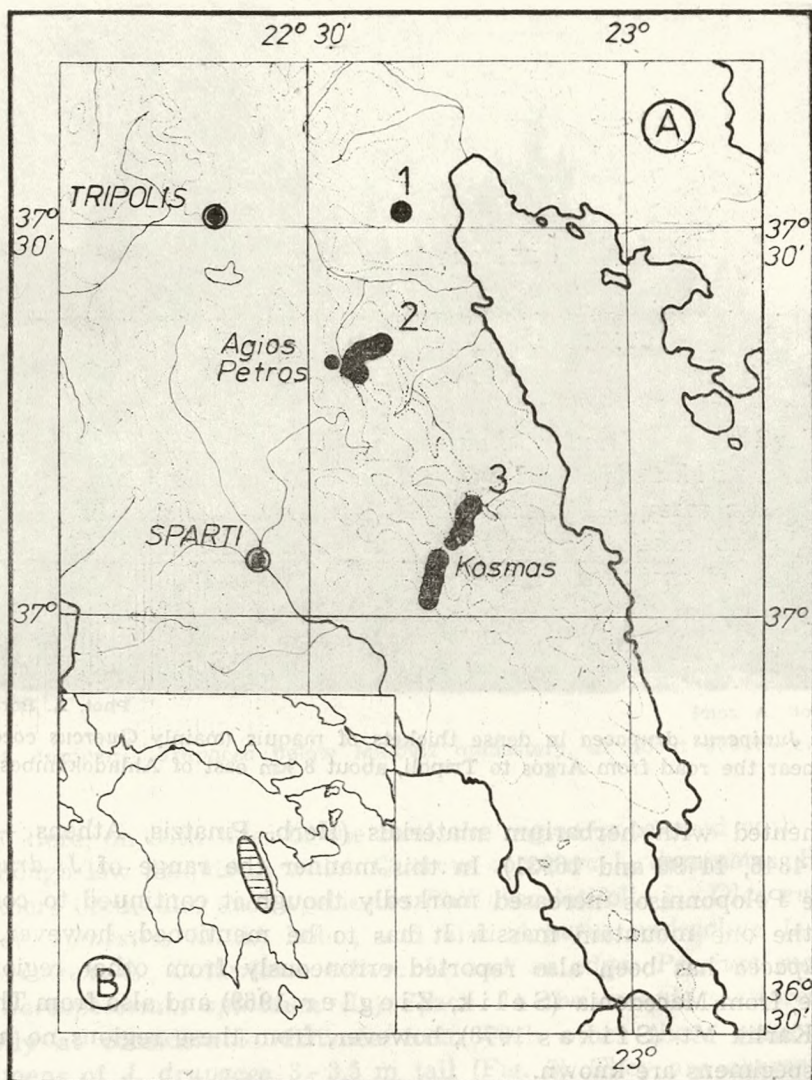


Fig. 2. Distribution of *Juniperus drupacea* on the Peloponnisos: A — detailed, B — general

(1964). It turned out, however, that even though the occurrence of *J. drupacea* is here restricted to the Parnon, the stand near Agios Ioannis on the northern extreme of the massif is not the only one there. L. Pinatzis has found this juniper in 1955 west of Agios Ioannis, near Agios Petros, and next in 1960 near Kosmas, on the southern extremity of Parnon, at an elevation of 1100 m. The distance between most northern and the latter southern stand is about 35 km. Besides Pinatzis reports also another stand "Malevo, loco Canales dicto", which, however, we were unable to localize accurately. All the finds of Pinatzis are



Phot. A. Boratyński

Fig. 3. *Juniperus drupacea* in dense thickets of maquis (mainly *Quercus coccifera*) near the road from Argos to Tripoli, about 8 km east of Ahladokambos

documented with herbarium materials (Herb. Pinatzis, Athens — no. 4845, 4846, 11798 and 16931). In this manner the range of *J. drupacea* on the Peloponnisos increased markedly though it continued to concern only the one mountain massif. It has to be mentioned, however, that *J. drupacea* has been also reported erroneously from other regions of Greece, from Macedonia (Selik, Ziegler 1969) and also from Thrace, from Karlik Mt. (Sfikas 1978), however, from these regions no herbarium specimens are known.

It is surprising that the European part of the range of *J. drupacea* has not received a more detailed investigation and in fact beyond the names of the stands we know practically nothing about the occurrence of this juniper nor about the plant communities in which it participates. Only Halácsy (1904) mentions in a most general manner that *J. drupacea* forms small woods, and Pinatzis (in sched. 4845) writes that it occurs in fir forests. Thus during our sejour on the Peloponnisos in September 1980 we have tried to check all the stands of the species known to occur so far and to characterize them more accurately. Numbers of these stands are indicated on the enclosed map (Fig. 2).

1. We have found a new stand in the Peloponnisos in province Argolis, more or less 8 km east of Ahladokambos (along the Argos-Tripoli



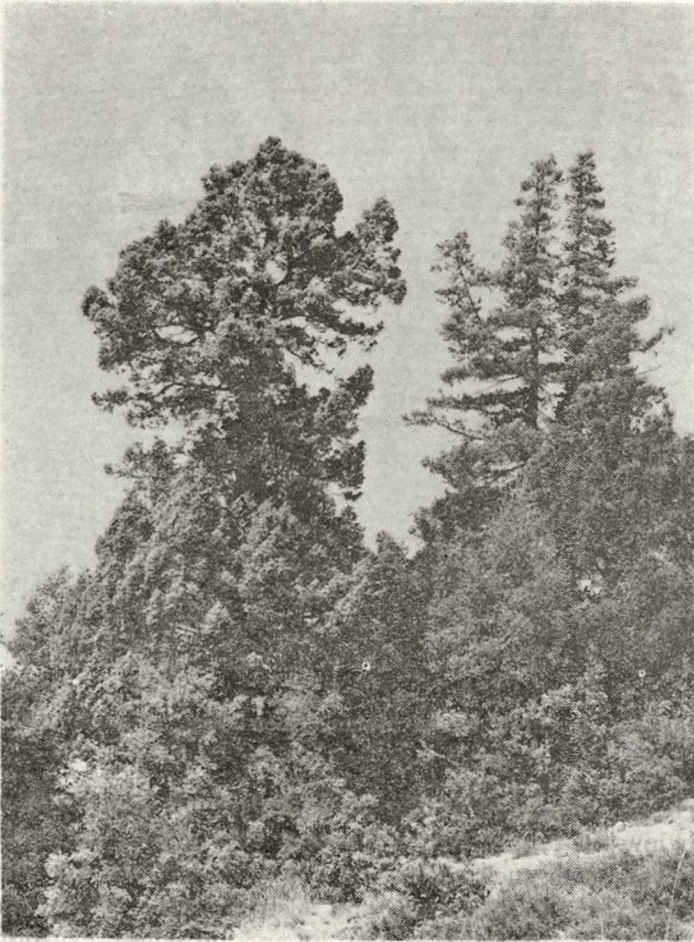
Phot. A. Boratyński

Fig. 4. *Juniperus drupacea* below Malevis monastery, at about 900 m elevation

road). Here, on both sides of the road, the region is covered with a dense, though low maquis in which *Quercus coccifera* L. dominates. Besides oak there occur also such species as *Phillyrea latifolia* L., *Olea europaea* L. var. *sylvestris* (Mill.) Lehr., and also *Arbutus andrachne* L., *Acer sempervirens* L., *Calicotome villosa* L., and on edges *Prasium majus* L. and *Sarcopoterium spinosum* (L.) Spach. In the maquis scattered, frequently at considerable distance from each other there occur single specimens of *J. drupacea* 3-3.5 m tall (Fig. 3). They are characterized by a compact narrowly cone-shaped habit, with dense crowns and some of them are fruiting. On the lower parts of the slope, below the road, even small groups of juniper trees can be seen, probably taller than those which could be observed near the road itself.

The stand is located at an elevation of 400 - 450 m and so far belongs to the most northern on the Peloponnisis at about 37°30' Lat.N., about 15 - 20 km in straight line from the nearest stands in the Parnon Mts.

2. Agios Petros — Agios Ioannis. The first specimens of *J. drupacea*, very old ones at that, occur already from the eastern end of Agios Petros. Moving up the road in the northeasterly direction to Agios Ioannis the number of specimens of this juniper gradually increases so that in the vicinity of the Malevis monastery there occur dense, pure or



Phot. A. Boratyński

Fig. 5. Fragment of *Juniperus drupacea* forest near Malevis monastery, at about 900 m elevation

mixed communities extending both above and below the road and then further in the northerly direction. Near Agios Ioannis there occurs a considerable thinning of these communities. A short penetration of the region in the southerly direction, along the road to Kastanitsa (which leads off the main road near Agios Petros), has shown that *J. drupacea* is scattered here also, however, lacking time we were unable to find out how far south it reaches along this road.

On the region in question we can distinguish as it were three types of communities with the participation of *J. drupacea*. At higher elevations, above 1100 m, and particularly above the monastery these are fir forests in which besides *J. drupacea* there occur also woody specimens of *Juniperus oxycedrus* L. With increase in elevation the propor-

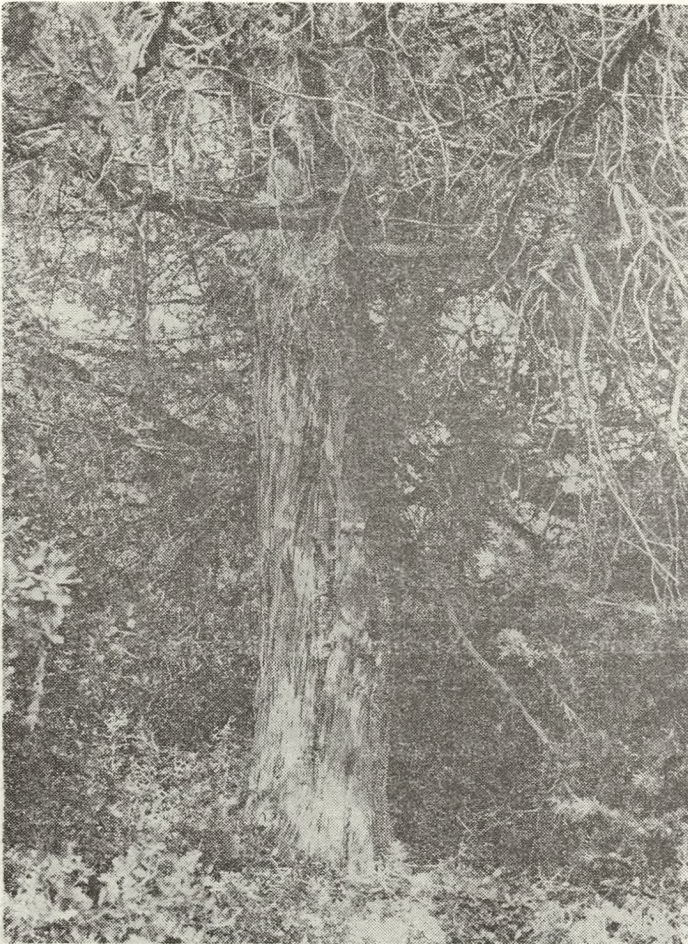


Phot. A. Boratynski

Fig. 6. One of the tallest specimens of *Juniperus drupacea*, below the Malevis monastery, 22-23 m tall and having a stem girth of 182 cm

tion of *Abies cephalonica* Loudon clearly increases and above 1250 m pure fir forests occur. Below the road the slope is covered with more or less dense thickets or forests of juniper, either pure or with the participations of *Quercus coccifera* L. Specimens of *J. drupacea* are substantially differentiated here as regards the heights attained (from 2 to 15 m or even taller) and habit. The tallest specimen we have seen here was about 22-23 m tall and had a girth of 182 cm. In the lower parts of the slope the thickets turn into pastures and arable land (Figs. 4-7).

Near Agios Ioannis itself, on a flat, or slightly sloped terrain the forests of *J. drupacea* disappear (they were probably destroyed) and their earlier presence is indicated by the single remnant trees 12-15 m tall and 2-2.5 m in girth. This region is a pasture constantly under utilisation, divided by loose, stone walls into irregular meadows. Near the



Phot. A. Boratyński

Fig. 7. Lower part of a *Juniperus drupacea* stem (specimen from fig. 6)

walls and near the road itself there grow these old specimens. They are characterized by having low set crowns, about 2 - 3 m from the ground, dense and compact, cone-shaped or rounded. They look picturesque and give an idea about the dimensions of this species of juniper can attain provided it is not being destroyed (Figs. 8 - 9). Grazing makes natural regeneration of the juniper very difficult, however, single seedlings of various ages can be found with conical crowns to the ground, and with exceptionally long and sharp, bristling needles, protecting the seedlings from grazing. Besides junipers it is possible to find here single individuals of such trees and shrubs as *Pyrus spinosa* Forssk., *Quercus cocci-fera* L., *Acer sempervirens* L., *Crataegus heldreichii* Boiss., *Prunus co-comilia* Ten., *Rosa canina* L. and *Lonicera etrusca* Santi.

In its vertical distribution, *J. drupacea* on the region under discussion

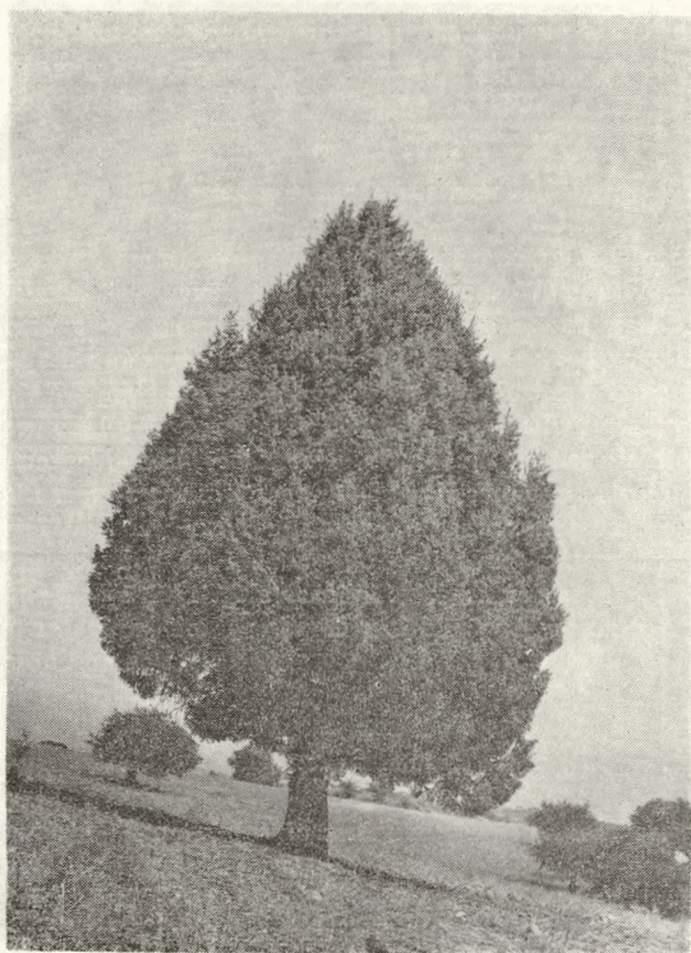


Phot. A. Boratyński

Fig. 8. A single *Juniperus drupacea* tree with a rounded crown, about 13 tall and having a stem diameter of 80 cm, on roadside near Agios Ioannis

occurs from about 900 to 1250 m, though it appears to be moving even much further down as single specimens along streams or valleys. The Malevis monastery deserve to be placed under protection as a special reserve for *J. drupacea* and single large specimens of this species should be proclaimed monuments of nature.

3. Kosmas, province Arkadia. Similarly as before *J. drupacea* is not restricted here to a single definite stand but grows on several stands, linked together forming a common whole. The first individuals of the juniper appears at the southern feet of Parnon somewhat north of the village Geraki (Jerakion), in thickets of a dried stream, flowing parallel to the Geraki-Kosmas road, already at 300 - 400 m elevation. Initially these are single, weak, frequently injured seedlings, however, further to

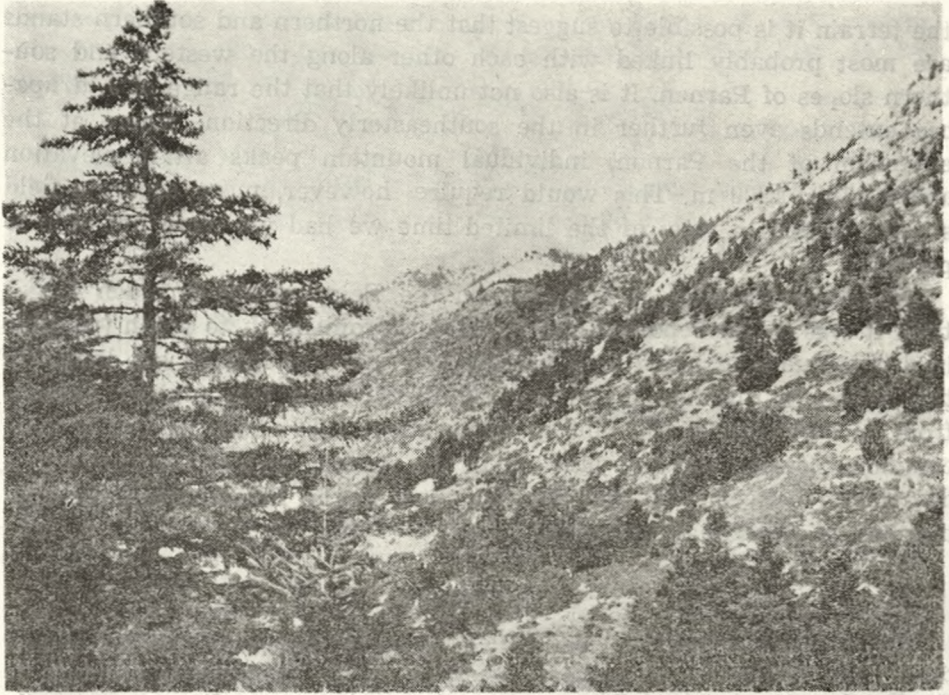


Phot. A. Boratyński

Fig. 9. *Juniperus drupacea* having a conical crown, on a pasture near Agios Ioannis, at about 800 m elevation

the north *J. drupacea* becomes increasingly common, but still occurs only not far from the stream. Usually these are single trees 5-7 m tall growing either on the stream itself or else in neighbouring thickets of *Quercus coccifera* L. At an elevation of about 700 m the road leading to Kosmas leaves the stream and cuts through fields, abandoned vineyards and orchards. *J. drupacea* appears again only on at 850-900 m, near the lower limit of a degraded fir forest. Here the juniper is becoming more common, but it does not form pure forests occurring primarily in gorges and various depressions in the terrain where fir forests are somewhat better preserved (Fig. 10).

In a similar manner *J. drupacea* occurs on the ridge of the massif, both south and east of Kosmas, at an elevation of 1000-1100 m together



Phot. A. Boratyński

Fig. 10. General view of a degraded *Abies cephalonica* forest with a slight participation of *Juniperus drupacea* on the slopes of Parnon Mts., about 2-3 km southwest of Kosmas, at about 950-1000 m elevation

with *Abies cephalonica* Loudon., *Juniperus oxycedrus* L. and *Quercus coccifera* L. In this sparse fir forest, split up by large openings it is also possible to find even quite commonly *Crataegus heldreichii* Boiss.

Further north, 5-6 km from Kosmas (road to Leonidi), on a steep slope of NE exposition, at an elevation of 850-900 m *J. drupacea* represents a supplementary species in a completely different type of forest, in which the main element is *Quercus ilex* L. and *Q. pubescens* Willd. and less commonly *Abies cephalonica* Loudon and *Laurus nobilis* L. In that forest there occur also *Ostrya carpinifolia* Scop., *Quercus coccifera* L., *Fraxinus ornus* L., *Phillyrea latifolia* L., *Acer sempervirens* L., *Arbutus unedo*, *A. andrachne* L. and *Cercis siliquastrum* L. In view of the unique character of this forest, the formation here of a second reserve for *J. drupacea* would be most appropriate.

Further north, near the Elonis monastery at an elevation of 600 m it is possible to find single junipers in a rich maquis (*Quercus coccifera* L., *Q. ilex* L., *Laurus nobilis* L., *Cotinus coggygria* Scop., *Fraxinus ornus* L., and *Erica manipuliflora* Salisb.). Most probably in this place there occurred an evergreen forest similar in character to that near Kosmas.

Taking into consideration the site condition and the configuration of

the terrain it is possible to suggest that the northern and southern stands are most probably linked with each other along the western and southern slopes of Parnon. It is also not unlikely that the range of *J. drupacea* extends even further in the southeasterly direction, where at the extension of the Parnon, individual mountain peaks attain elevation above 1100 - 1200 m. This would require, however, more accurate field studies, which in view of the limited time we had we were not able to perform.

Thus the range of *J. drupacea* on the Peloponnisos is much larger than it was so far reported and it extends from north to south (possible in a continuous manner) as a narrow belt more or less 50 km long. On the region in question in its vertical distribution this juniper extends from an elevation of 350 - 400 m up to about 1200 - 1250 m, but is most common between 900 and 1100 m. In the Asiatic part of the range it is distributed between 600 and 2050 m, thus on the Peloponnisos the species has its altitudinal minimum.

SUMMARY

On the basis of field observations performed in September 1980 the authors discuss the distribution of *Juniperus drupacea* on the Peloponnisos peninsula in Greece, the only region in Europe where the species occurs. It grows primarily in lower mountain locations of the Parnon massif in the southeastern part of Arkadia province. So far only stands are known there between localities Agios Petros and Agios Ioannis on the northern end of the massif and near Kosmas in the south. Besides the authors have found one further stand in province Argolis about 15 - 20 km north of the nearest stands in the Parnon. In its vertical distribution on the Peloponnisos *J. drupacea* attains its altitudinal minimum, here growing already at 350 - 400 m and up to 1200 - 1250 m. In the main Asiatic part of the range of this species (Anatolia, Syria, Lebanon) it grows between 600 and 2050 m.

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Juniperus drupacea Labill. w Grecji

Streszczenie

We wrześniu 1980 roku autorzy odwiedzili znane do tej pory stanowiska *Juniperus drupacea* na Półwyspie Peloponeskim, jedynym miejscu występowania tego gatunku w Europie. Rośnie on tam w masywie górskim Parnon, z jednej strony na północnym krańcu masywu między Agios Petros i Agios Ioannis, a z drugiej na krańcu południowym koło Kosmas. Ponadto znaleźli oni nowe stanowisko położone w odległości około 15 - 20 km na północ od stanowiska w Agios Petros-Agios Ioannis, wzdłuż drogi z Argos do Tripoli, około 8 km na wschód od Ahladokambos, na wysokości 400 - 500 m.

Każde ze stanowisk autorzy dokładnie charakteryzują, podając jednocześnie skład gatunkowy drzew i krzewów występujących razem z jałowcem. Rośnie on zarówno w zbiorowiskach makii, w której dominuje *Quercus coccifera* L., jak i w lasach jodłowych (*Abie cephalonica* Loudon). Ponadto, zwłaszcza w pobliżu monastynu Malevis, *J. drupacea* tworzy własne zbiorowiska, niemal lite zarośla i laski. Niektóre okazy tego jałowca osiągają do 15 m wysokości, a jeden z nich, jaki został znaleziony na zboczach poniżej monastynu, osiąga nawet wysokość 22 - 23 m i obwód pnia w pierśnicy 182 cm. Jest rzeczą uderzającą, że w porównaniu z za-

sięgiem *J. drupacea* w Anatolii, Syrii i Libanie, na Peloponezie stanowiska położone są znacznie niżej, mniej więcej od 350 - 400 m do 1200 - 1250 m.

Autorzy przypuszczają, że odległe od siebie o 35 km stanowiska północne i południowe w Parnonie powiązane są ze sobą wzdłuż zachodnich i południowych zboczy tego górskiego masywu. Cały zasięg *J. drupacea* na Peloponezie rozciąga się więc wąskim pasem z północy na południe na przestrzeni około 50 km. Być może jednak, że *J. drupacea* rośnie i dalej na południowym wschodzie półwyspu, gdzie poszczególne szczyty gór osiągają ponad 1100 - 1200 m wysokości. Celem zachowania niektórych zbiorowisk *J. drupacea* autorzy sugerują potrzebę utworzenia dwóch rezerwatów: jeden koło monasteru Malevis, a drugi koło Kosmas. Ochrony wymagają także pojedyncze, stare i dorodne okazy drzew tego jałowca i uznania ich za pomniki przyrody.

АДАМ БОРАТЫНЬСКИ, КАЗИМЕЖ БРОВИЧ

Juniperus drupacea Labill. в Греции

Резюме

На основании сделанных авторами в сентябре 1980 года полевых наблюдений, обсуждается размещение *Juniperus drupacea* а на Пелопоннеском полуострове в Греции, являющимся единственным районом Европы, где этот вид встречается. Он растет главным образом в более низких местах горного массива Парнон, в юго-восточной части провинции Аркадия. До сих пор известны там только местообитания между местностями Агиос Петрос и Агиос Иоаннис в северной окраине массива, а также около Космас, в его южной части. Кроме того авторы описали одно новое местообитание в провинции Арголис, расположенное около 15 - 20 км к северу от ближайших местонахождений в Парноне. В вертикальном размещении на Пелопоннесе *J. drupacea* опускается до самой малой высоты, появляясь уже с около 350 - 400 м над ур. моря до 1200 - 1250 м; в главной азиатской части ареала (Анатолия, Сирия, Ливан) он растет между 600 и 2050 м.