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Distribution of Woody *Rosaceae* in W. Asia I

Cerasus microcarpa (C. A. Mey.) Boiss. — Intraspecific division and geographical distribution

From among the west Asiatic representatives of the section *Microcerasus* Spach, *Cerasus microcarpa* belongs to the best known species, and, at the same time, most often discussed, because of its exceptionally great variability. Though the systematic value of this species is unquestionable, its affinity with other species or the intraspecific division into lower taxa is in dispute and there is no uniform view in this case.

During the last 3 years when studying the subfamily *Prunoideae* for "Flora Iranica" and "Flora of Turkey", I have had the opportunity to revise the herbarium material of *C. microcarpa* (s. 1) from almost the whole region of its area. This material comes, among others, from such herbaria as: Vienna (Natural History Museum and University), Kew, Genève, Leningrad, Edinburgh, Jena, Copenhagen, Stockholm, Bergen, Götteborg, Jerusalem, Bratislava and others. On the whole I have had over 300 herbarium sheets. Besides I have made up a list of all localities of this species cited in floristic works and this enabled me to draw maps of its area, and to interpret them. With the help of all these data I have introduced my own division of *C. microcarpa* into three basic subspecies [11]. In order to give reasons for this division I wish to show a review of opinions connected with *C. microcarpa*.

In 1831 C. A. Meyer [20] described a new species, known as *Prunus microcarpa*, from east Trans-Caucasus, from the Beschbarmak Mountain. This is his diagnosis: "*Prunus fruticosa, inermis, foliis glaberrimis conduplicatis ovatis ellipticis oblongisve obtusis argute serratis, serraturis immarginatis eglandulosis, umbellis multifloris, calycibus tubulosis, drupis nuceloque oblongis*".

Though the Latin diagnosis is very short and not too precise, and even partly wrong (multiflorous umbels?), it shows clearly that leaves are wholly glabrous, ovoid-elliptic, while the hypanthium is tubular. The mistake in the description of the inflorescence is probably due to the fact that flower buds are often glomerate and so it seems that inflorescences have more than 2 flowers. Meyer's diagnosis is confirmed by a typical

herbarium specimen in the Herbarium of the Botanical Institute of the Academy of Sciences USSR, Leningrad (fig. 1). The original label of Meyer shows that the specimen was collected in July 1830. It is represented by some poorly leafed twigs and remains of flowers on distinct long peduncles and having a tubular hypanthium, ventricose at the base.

Phot. Bot. Inst. Leningrad

Fig. 1. *Cerasus microcarpa* (C. A. Mey.) Boiss. subsp. *microcarpa* — holotype (Botanical Institute, Leningrad)

Some years after the diagnosis of *C. microcarpa* had been printed, E. Spach [35] described a new species of the cherry in 1843 from Turkey and Iran and named it *C. orientalis*. For this diagnosis Spach used four herbarium specimens: 1) *In Cappadocia, ad Euphratem* — Aucher-Eloy 1486, 2) *In Persia — inter Bagdad et Kermanchah* — Olivier,

s.n., 3) *In monte Piré-Zend* — Aucher-Eloy 4473, 4) *Ad pedem montis Elwend* — Michaux, s.n.

The diagnosis of *C. orientalis* is much more exact than that of *C. microcarpa* and it refers to shoots, laeves, flowers and fruits. This diagnosis states that *C. orientalis* has leaves pubescent below, calyx teeth 2—4 times shorter than hypanthium, and fruits about 6—8 mm long, purple.

In 1872 E. Boissier [5] evaluated the syntypes of *C. orientalis* and stated that they represented not one but two species described by Boissier together with Haussknecht as: *C. tortuosa* and *C. diffusa*. Out of the herbarium specimens cited by Spach, Boissier classed one among *C. tortuosa* (Aucher-Eloy 1486) and one among *C. diffusa* (Aucher-Eloy 4473); the other two specimens are not mentioned by him. Besides, as syntypes of his new species Boissier gives still further herbarium specimens taken from Haussknecht's and Kotschy's collections. He does the same with *Prunus microcarpa*, which he transfers from the genus *Prunus* to *Cerasus*, as *C. microcarpa*.

It is remarkable that Boissier separating *C. orientalis* into two different species placed the expression *"ex parte"* which defined this division, under the description of *C. microcarpa* and *C. diffusa*, while he omitted it under *C. tortuosa*, though just to this latter species he included one of Spach's syntypes. Just this little fact may prove well how much alike all these three species were for Boissier. To emphasize the small differences among them after the diagnoses of *C. tortuosa* and *C. diffusa* Boissier gives the following short explanations: ad *C. tortuosa* — *"A C. microcarpa specifice distincta videtur ramis brevioribus divaricatis tortuosis, foliis pubescentibus brevius petiolatis angustiosibus limbo 3—5 lineas tantum longo"*; ad *C. diffusa* — *"Videtur a duabus praecedentibus specifice distincta ramis diffusis patentim ramulosissimis, floribus minoribus, corollae cum calyce proportione"*.

Boissier, however was not consistent in ranking the herbarium specimens, as, for instance, he included Kotschy's specimen No. 70 (*Antilibanus supra Zebdani, alt.* 4500′) in the *C. microcarpa*, and having pubescent leaves it should be recognized as *C. tortuosa*. On the other hand, Boissier ranked Haussknecht's specimen — *Supra Mardin Assyriae* among *C. tortuosa* though it has glabrous leaves.

The specific name *"tortuosa"* lacks point because it suggests, that the essential specific characteristic are tortuous shoots. It has often led, in later times, to a wrong determination of herbarium specimens. It would be much more accurate to use an expression pointing to the feature distinguishing, in the best way, *C. tortuosa* from *C. microcarpa* and *C. diffusa*, namely, to the pubescence of leaves. This was done by J. Bornmüller in 1899 [6]. He described a new variety of *C. microcarpa* — as var. *pubescens;* as a matter of fact it is a synonym of *C. tortuosa*.

The first to regard *C. tortuosa* as merely a variety of *C. microcarpa*

was J. E. T. Aitchison [1]. He wrote about it thus: "It would be better perphaps to treat this as variety of *Prunus microcarpa* C. A. Mey." Aitchison had not, however, introduced this new combination, only some ten years later Bornmüller [7] did so, basing on his own herbarium collections, as well as on Haussknecht's. According to Bornmüller *C. tortuosa* is only a form of *C. microcarpa* with pubescent leaves and of a lower wide-spreading stature. Between the two taxa, as Bornmüller mentions, there are distinct transitional forms. Examples of such transitional forms may be the following, described by Bornmüller [9]: f. *glaberrima sed ramis crassis prostratis pedunculis brevibus;* f. *foliis glabris, pedunculis hispidulo-pubescentibus;* f. *foliis et pedunculis pubescentibus.* Apart from this Bornmüller [6] drew attention to the considerable variability in the length of peduncles in *C. microcapra* and therefore he distinguished two further forms: f. *longipedunculata* and f. *brevipedunculata.*

In 1906 C. K. Schneider [34] acted in a similar way. He had a much richer herbarium material at his disposal, as independently from the specimens cited by Boissier, he knew specimens from collections of Bornmüller, Strauss, Stapf, and Post. Schneider contrasted two varieties with each other within the *Prunus microcarpa;* var. *typica* and var. *tortuosa.* He wrote about them in the following way: "...sehe ich mich ausserstande, die folgende Varietäten (obgleich anscheinend geographisch gut geschieden) als getrennte Arten zu behandeln".

The view *C. tortuosa* being a variety was supported in the following years by H. Handel-Mazzetti [15], Fr. Náběl ek [21], A. Rehder [33], H. R. Oppenheimer and M. Evenari [22], S. Kitamura [16] and R. D. Meikle [19]. The opinion of W. J. Bean [3] my be an extreme example. He thinks that *C. tortuosa* may be only a synonym of *C. microcarpa* while pubescence depends only on the climate and conditions of the environment. In spite of this a number of florists, even in recent years, as: J. Anthony [2], K. H. Reochinger [30, 31], R. A. Blakelock [4], A. Parsa [23], M. Zohary [37], M. Köie and K. H. Rechinger [17] and Ali al-Rawi [29] admit that *C. tortuosa* is an independent species.

The other species described by Boissier and Haussknecht — i.e. *C. diffusa,* was, as Bornmüller [7] stated, specified with the help of "...sehr dürftigen Exemplaren..." and just as *C. tortuosa* it should be included in *C. microcarpa.* In the same way it is treated by Schneider [34]: "Vielleicht *diffusa,* also auch nur Varietät der *microcarpa*". Both Bornmüller and Schneider, however, did not keep on with the change, perhaps they had too scarce a number of herbarium specimens. *C. diffusa* has been represented by only a few specimens in the herbarium collections and has been very rarely mentioned in floristic works and therefore it has been almost forgotten.

Basing on the above views O. Stapf [36] declares that *C. micro-*

carpa "... should be treated as a species very variable not only in habit and stature, which depend greatly on the physical condition under which it grows, but as to pubescence, lenght of fruit-stalk, size of leaf and size and colour of fruit which vary independently". The colour of flowers has been found variable, too — from white to nearly red. It is not surprising that with time transitional forms between. *C. microcarpa* and *C. tortuosa* have been found. Meikle [19] writes about it in the following way: "The pubescent-leaved form predominates in Iraq but every intermediate seems to exist between it and glabrous or subglabrous forms of the species".

Besides, since Schneider's time, it has been known that there has been some geographical distinctness of the discussed taxa: "*microcarpa*" in the whole region of the area, while "*tortuosa*" mainly, in the south and central part. As to the third species, *C. diffusa,* there are no very precise data.

Apart from *C. tortuosa* and *C. diffusa* described in 1872, the diagnoses of three further, controversial species were published in the following years, yet they belong, without doubt, to *C. microcarpa.*

The first was described in 1888 by J. E. T. Aitchison and W. B. Hemsley [1] from north Afghanistan under the name *Prunus calycosus.* This species is almost identical with *C. microcarpa,* and the only characteristics distinguishing it from the latter are the calyx teeth, which, as the authors declare, are "... *pataloidea, venosa, tubo paullo longiora obovato-oblonga, concava...*". The typical specimens (Badghis No. 1059), collected in May 1885 has no fruits. According to Aitchison and Hemsley *P. calycosus* is a shrub or small tree to 3 m high, having the same height as *C. microcarpa*; according to I. T. Vassilczenko [38] such arborescent specimens of *C. microcarpa* were known in Kopet-Dagh.

P. calycosus has been discussed several times in floristic literature. J. Freyn [13] mentioned it from the Kopet-Dagh Mts. (USSR) — "*Aschabad: Suluklii* (*Saratovka*), *ad fines Persiae, in declivibus montium,* 27. 7. 1900. P. Sintenis 988". As A. I. Pojarkova [24] pointed out later the herbarium specimen of. Sintenis belongs to quite anather, species namely to *C. turcomanica* Pojark.

Schneider [34] who saw a typical specimen of *P. calycosus* considered it as being the same as *Prunus verrucosa* from Central Asia, described earlier by A. R. Franchet. He was, however, wrong. With this opinion disagreed E. Koehne [10] who held that *P. calycosus* was a representative of the group "*microcarpa*", and not of the "*prostrata*" to which *P. verrucosa* belongs according to Koehne.

M. G. Popov [26], too saw in *P. calycosus* a species nearly allied to *C. microcarpa* differing from it only in the lenght of calyx teeth. It seems that the best value of *P. calycosus* was given by Pojarkova [25], who states that Aitchison's herbarium type is nothing more than a teratologic from of *C. microcarpa* most flowers of which have not only very

large, but also petaloid sepals. These sepals have in the lower part only a normal colour and consistence.

A second controversial species was described by G. E. Post [27] in 1890 and came from Lebanon, as *Cerasus Anti-Libani*. According to J. E. Dinsmore [28] this cherry is probably the same as *C. tortuosa* but it cannot be agreed with as in the Latin diagnosis of *C. Anti-Libani*, the shoots are glabrous ("ramis divaricatis glabris"). Unfortunalety I have

Phot. K. Jakusz

Fig. 2. *Cerasus microcarpa* (C. A. Mey.) Boiss. subsp. microcarpa. Type specimen of *Prunus furum* Nábělek (Herbarium Instituti Botanici Academiae Scientiarum Slovacae, Bratislava)

not seen Post's typical specimen, but judging from the morphologic description *C. Anti-Libani* corresponds wholly to *C. microcarpa*. It is worth stressing that Post [27] collected both species in one day in the same locality — Wadi el-Harir. It may well be that *C. Anti-Libani* is merely one of the transitional forms of *C. microcarpa* and *C. tortuosa*.

The third and last species was described by Fr. Nábělek [21] in 1923 from Iranian Kurdistan as *Prunus furum*. Nábělek himself admits that his new species resembles *P. microcarpa* var. *tortuosa* in the habit

and differs in glabrous leaves and length of calyx teeth (very short). Comparing the 3 syntypes of *P. furum* (fig. 2) with herbarium specimens of *C. microcarpa* there can be no doubt, that they are entirely identical with them and the insignificant differences cited by Nábělek are just in the limits of variability of *C. microcarpa*. And so *P. furum* must be accepted as synonym of *C. microcarpa*.

Ending the historical review of previous opinions on the systematic value of *C. microcarpa (s. l.)* it should be fully stressed that the different views were usually caused either by a bad state of the herbarium specimens and various times of collection, or by revision of only a few specimens mostly coming from a small region or from far-off regions. And so specimens collected in different periods of development show a great deviation in the length of peduncles and petioles, in the degree of pubescence of shoots and leaves, in the size of leaves and flowers, in the size of hypanthium and the degree of inflation of its base (development of ovary).

Specimens collected in some parts of the area (e. g. in the Kopet-Dagh Mts.) are often characterized by their relatively little variability, while those from other regions have intermediate features, therefore it is rather hard to rank them properly. An example of this kind of difficulties may be also specimens represented by sprouts which have leaves even up to 5 cm long and resemble the leaves of *Betula pubescens* more than those of a cherry tree (cf. Bornmüller, 8, 10).

In order to define properly the essential characteristics of taxa separated by Boissier, and to decide about their systematic rank it is necessary to select appropriate herbarium types. In the case of *C. microcarpa* there is no trouble as the holotype was clearly quoted in Meyer's diagnosis (cf. above). The matter of types for *C. tortuosa* and *C. diffusa* is not so simple, because, both Boissier and Spach (for the collective species *C. orientalis*), mentioned several syntypes.

The matter is rather plain in the case of *C. tortuosa*. Boissier [5] cites as many as 7 syntypes for this species. The first syntype is Aucher-Eloy's specimen No. 1486, which, according to Boissier is uncertain (*specimen imperfectum incertum*). I found this specimen in the collections of the Herbarium in Genève, with the only distinction that Spach and Boissier mention Turkey as the place of collection (*Crescit in Cappadocia, ad Euphratem*) while on the label of the specimen from Genève there is another place, namely "Persia". This specimen represents one older branch, 8 cm long, with numerous short shoots, but without any long one. On one, very short segment (3—4 mm) of an annual growth of the twig there is a short, slightly erect pubescence clearly visible. The petioles and leaves beneath are pubescent in the same way; on the upper part the leaves are almost entirely glabrous. The leaves are small, to 12 mm long and to 4 mm wide, narrowly elliptic or narrowly obovate, acute at the

top and cuneate at base, acutely serrulate. No flowers; fruits (only 2) are to 6 mm long, ovoid, acute at the top, on peduncles 6 mm long. Considering tha+ this is the first cited syntype in the diagnosis of *C. tortuosa*,

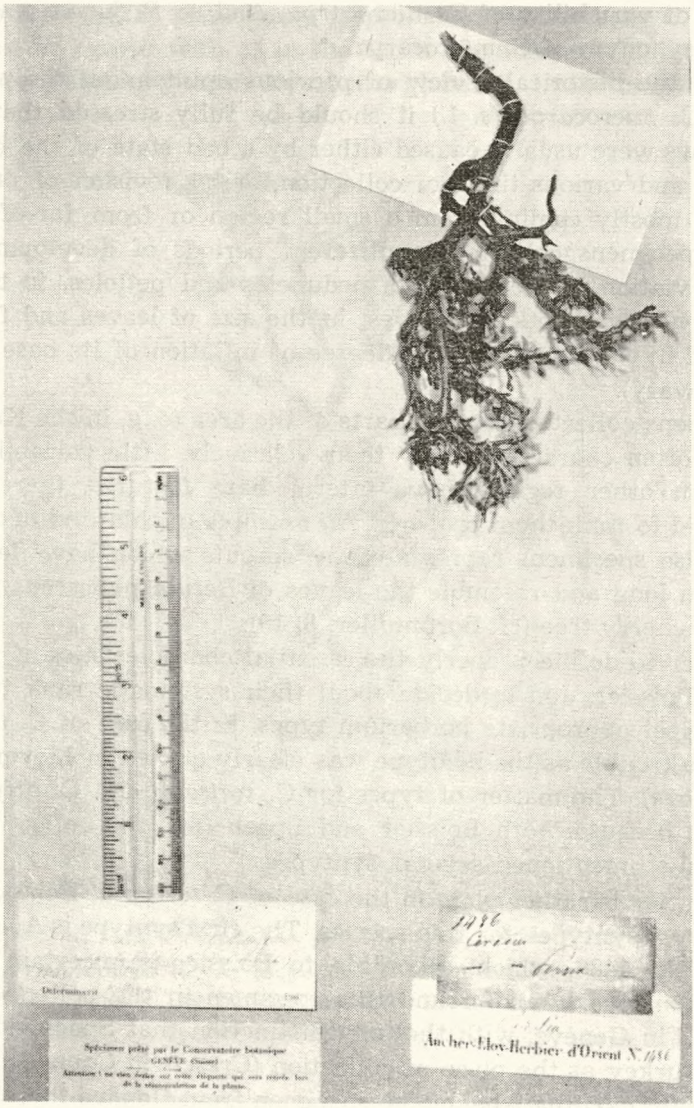

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Fig. 3. *Cerasus microcarpa* (C. A. Mey.) Boiss. subsp. *tortuosa* (Boiss. et Hausskn.) Browicz — lectotype (Conservatoire et Jardins Botanique, Genève)

and still earlier in the diagnosis of *C. orientalis*, and that it corresponds to other pubescent syntypes of *C. tortuosa* it should be taken as lectotype of the species (fig. 3).

Further syntypes introduced after Boissier's diagnosis come from Haussknecht's collections from 1867. And so the second syntype was collected in Syria — *"monte Ssoffdagh"*. I have not seen it. The third syntype — *"in montibus Gebel Taktak supra Orfa"* — collected in April 1867 is kept in herbaria in Vienna (Natural History Museum), Jena, Kew and Leningrad. It is represented by several twigs with flowers and faintly developed leaves which are more or less puberulent. Peduncles are puberulent in the same way, and so are parts of biennal shoots. The fourth syntype from May 1867 — *"Gebel Sindjar"* — is in herbaria in Jena and Leningrad. The fifth syntype — *"supra Mardin, Assyriae"* (April 1867) — as I have already mentioned, should be numbered among *C. microcarpa*, as it has quite glabrous leaves (Herbaria in Vienna, Jena nad Leningrad). The sixth syntype — *"in montibus Avroman"* from June 1867 has puberulent leaves and peduncles, while the shape and size of leaves and fruits corresponds entirely to lectotype. So far I have only seen two sheets of this syntype from herbaria in Leningrad and Vienna. At last the seventh syntype — *"in rup. m. Schahu"* from July 1867 is almost identical, with the sixth, but the pubescence of shoots, leaves and peduncles is much more distinct (Herbaria in Jena and Leningrad).

After learning to know these specimens it can be stated that characteristic features of *C. tortuosa* are: puberulent, annual twigs (sometimes even biennal), leaves puberulent bilaterally or only beneath, mostly acutely terminated, and puberulent peduncles.

The matter of choosing the lectotype of *C. diffusa* is somewhat more complicated, because of the bad state of syntypes, of which Boissier [5] mentions four in the following order: 1) *"In monte Piré-Zend"* — Aucher-Eloy 4473; 2) *"Prope ruinas u. Persepolis"* — 15. 4. 1842, Kotschy 232 (as *C. orientalis*); 3) *"Persepolis, in rup."* — 3. 1868, Haussknecht, s. n.; 4) *"In collibus Dalaki"* — Kotschy 167.

I have seen all the syntypes, but without the last. The first was collected just when the leaves began to develop. They are very small, 5—6 mm long at most, clearly about twice so long as wide, elliptic-ovate, glabrous bilaterally. The youngest parts of shoots of the previous year are distinctly puberulent. The flowers are not wholly developed, almost sessile. This syntype is kept in Herbaria in Vienna, Genève and Leningrad.

The next, Kotschy's specimen is preserved best of all, and has leafed twigs with well shaped flowers, even with old fruits. In this specimen all parts of the plant are completely glabrous (leaves both sides). Part of the leaves is quite well developed, the leaf blade is only a little longer than wide, roundish or broadly obovate. I have seen the following sheets: Genève, Jena, Leningrad, Vienna and Stockholm.

The third, syntype, just like the first, was collected in early spring, and has very little leaves, roundish, totally glabrous, and flowers on

glabrous peduncles, just beginning to open. Young shoots are glabrous, too (Herbaria in Jena, Leningrad and in Vienna).

So with the help of these syntypes and of over ten more collected in later years, we can conclude, that the essential character of *C. diffusa*

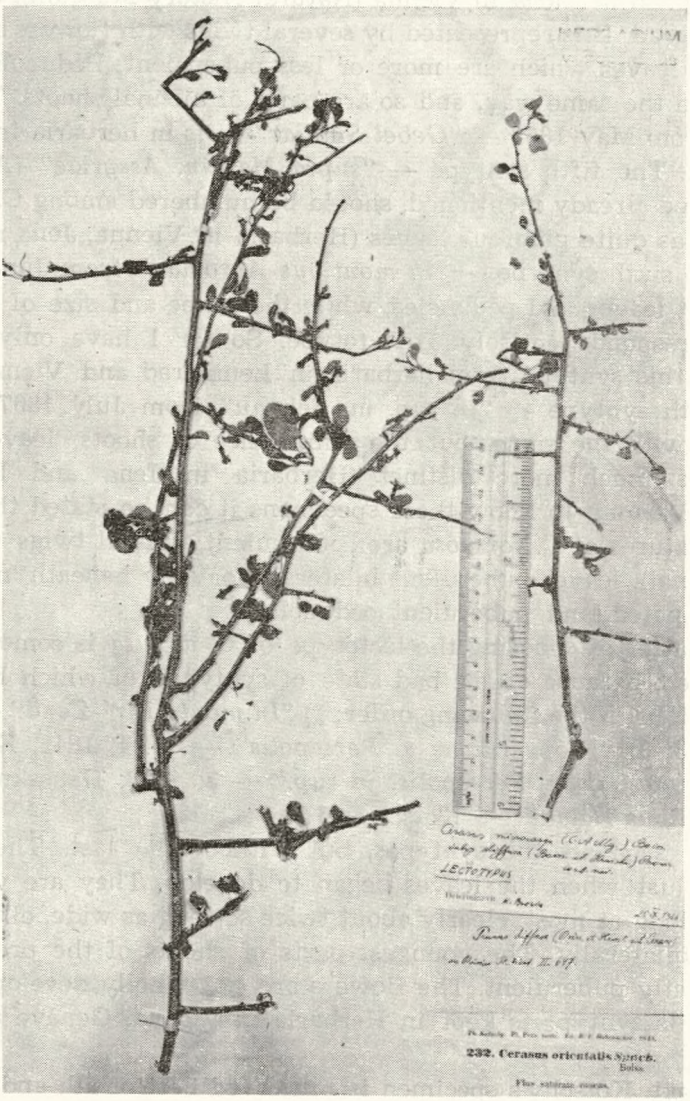

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Fig. 4. *Cerasus microcarpa* (C. A. Mey.) Boiss. subsp. *diffusa* (Boiss. et Hausskn.) Browicz — lectotype (Naturhistorisches Museum, Wien)

is that shoots, leaves and peduncles have no pubescence, and that the shape of leaves is roundish. Though Boissier [5] does not say anything about these features and stresses the character of the divarication of

shoots and the size of flowers, in evaluating herbarium materials they are the only features one can depend on. Flowers in two syntypes (Aucher-Eloy and Haussknecht) are really small, but they are scarcely unfolded, while flowers in Kotschy's syntype do not differ in size and other features from flowers of *C. microcarpa* and *C. tortuosa*.

The first syntype (Aucher-Eloy), cannot be considered as lectotype of *C. diffusa* because of its pubescent shoots and shape of leaves; this syntype should be inserted into *C. microcarpa*. Syntype 2 (Kotschy 232) represents *C. diffusa* best — and among sheets of this syntype the lectotype should be looked for. I think that it will be best to use the herbarium sheet from Natural History Museum in Vienna (fig. 4). There is still an older herbarium specimen than the syntypes cited by Boissier, namely Michaux's specimen (Herb. der Perse), kept in Genève, and defined by Spach [35] as one of the syntypes of *C. orientalis*. If it were put in the diagnosis of *C. diffusa* then just this one could be treated as lectotype.

In this way, comparing types (or syntypes) of *C. microcarpa*, *C. tortuosa* and *C. diffusa* we can see clearly that they represent forms of one and the same species, and that differences refer only and exclusively to vegetative features, namely to shoots (glabrous or puberulent) and leaves (shape and pubescence) and so there is no reason to treat them as independent species. The close affinity of these forms was already observed by Spach [35] who gave them the common name of *C. orientalis*. Though Rehder [32] negated the identity of *C. microcarpa* and *C. orientalis*, when he wrote: "Specimens of *P. microcarpa* from the Caucasus collected by F. N. Meyer certainly do not agree with Spach's description of his *Cerasus orientalis*" — the direct comparison of typical specimens confirms this similarity.

Finally we should define the rank that should be given to these three different taxa: form, variety or subspecies. To answer this question it is necessary to establish the range of their variability and areas. For that reason I have made point maps with the help of available herbarium sheets and data taken from literature (fig. 5, 6, 7). The latter, as less certain, have been marked with separate signs on the maps. In the case of *C. microcarpa* for Caucasus I made use of a ready-made pointed map published in the Flora of Caucasus [14]. When defining herbarium material I used the following features: pubescence of shoots, leaves, peduncles, as well as the shape and the leaf blade. From the enclosed maps it is clearly obvious that *C. microcarpa* (fig. 5) has the greatest area extending from the Caucasus, Elburs and Kopet Dagh in the north, to south Iran, north Iraq, Syria nad Lebanon in the south, and more or less from the middle Turkey in the west to north-west Afghanistan in the east. In literature it is mentioned that this species occurs also in Baluchistan [12, 18, 23] but the localities are not reported. I have not seen any herbarium specimen that could confirm the data. Considering, however, the point

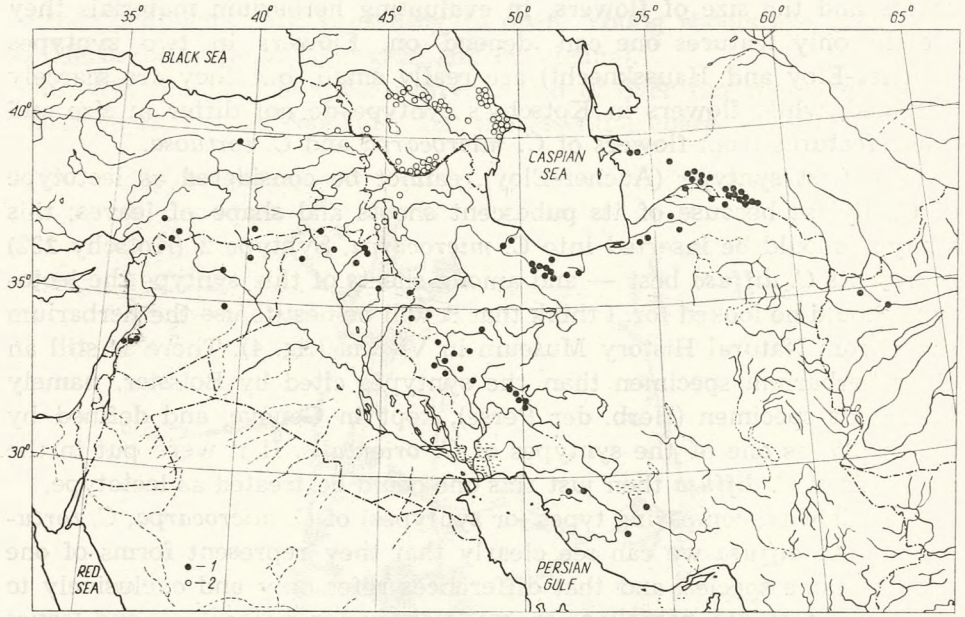

Fig. 6. Distribution of *C. microcarpa* subsp. ~~*tortuosa:*~~ 1. herbarium specimens, 2. literature

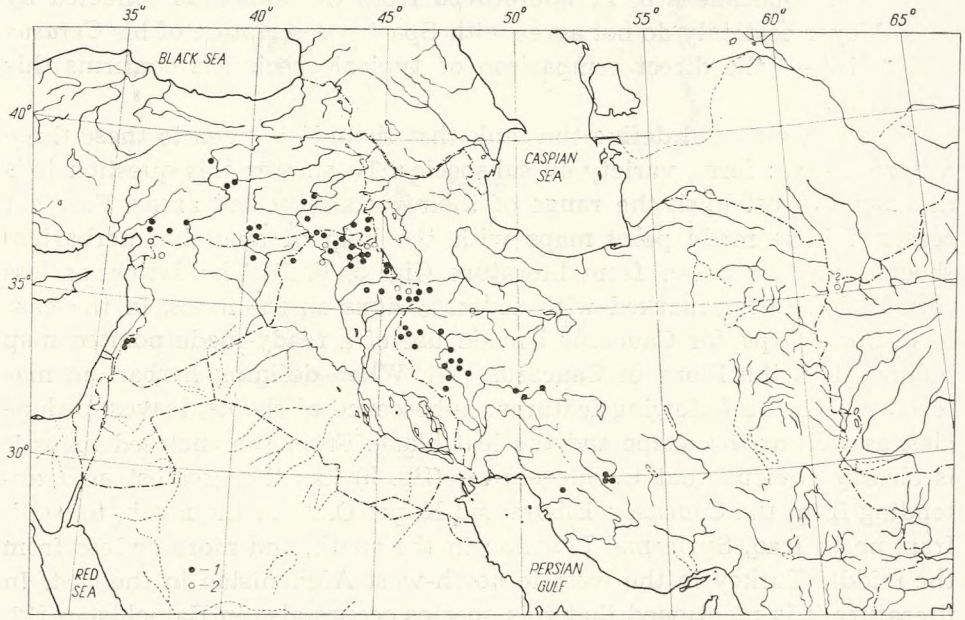

Fig. 6. Distribution of *C. microcarpa* subsp. *tortuosa:* 1. herbarium specimens, 2. literature

map of the area of *C. microcarpa*, its occurrence in Baluchistan seems rather doubtful. It may be that this information refers to another species, allied to *C. microcarpa*, namely *C. rechingeri* Browicz [11], growing in east Afghanistan and west Pakistan. The latter has been described quite recently. Meikle [19] includes also south Europe, Palestine and Jordan to the area of *C. microcarpa*. Though the presence of *C. microcarpa* in Europe is more than dubious its occurrence in Palestine and Jordan is quite possible (I have not seen any specimens from this region), as *C. microcarpa* certainly grows in the neighbouring Lebanon and in south-west Syria.

Fig. 7. Distribution of *C. microcarpa* subsp. *diffusa* (herbarium specimens)

In the region of its area *C. microcarpa* is not uniformly distributed. It occurs much more frequently in the north becoming sparser and sparser and more dispersed in the south. Though in the north it is characterized by stable features, in the south, where numerous forms transitional to *C. tortuosa* and *C. diffusa* appear, its variability is striking. In the Caucasus, according to Pojarkova [25], peduncles of flowers in *C. microcarpa* are always puberulent, and in Kopet-Dagh mostly glabrous. In Iraq, in mountains east of Erbil (Mesopotamia), according to Bornmüller [10] *C. microcarpa* is distinguished by a greatly variable habit and a variable length of peduncles of flowers and fruits; a similar variability was found by Stapf [36] in the district of Shiraz in south Iran. As I stated by means of herbarium material available to me, forms with an acutely terminated

leaf blade, though glabrous bilaterally, are more and more often seen towards the south of the area. These forms are very near to *C. tortuosa*, the more so that single hairs can be sometimes observed on leaves, especially beneath. Shoots in all forms, both in the north as in the south, are more or less clearly puberulent. But in this case, too, there are some exceptions, as, for instance, in west and south Iran, where forms with glabrous or almost glabrous shoots are known; they seem to form transition to *C. diffusa* from which they differ, however, in elongated leaves.

The area of *C. tortuosa* (fig. 6) is much more limited. This taxon does not grow in the Caucasus, Turkmenia, and north Iran. It is usually characterized by distinctly puberulent leaves and peduncles of flowers and fruits, acutely terminated leaf blades, and rather distinct nervation. Beside transitional forms discussed above, *C. tortuosa* shows a great variability in the shape of leaves, so obvious in specimens from Iraq. Some specimens, for instance, have leaves nearly lanceolate and sharply serrate. Special attention should be paid to forms from mountains of west Iran with leaves exceptionally strongly puberulent and with a hypanthium more or less puberulent. Thanks to these characteristics they resemble a little another species of a cherry — *C. brachypetala Boiss.*, which occurs in the same region. They differ from it in an entirely glabrous ovary and long peduncles. It may well be that we have to do with hybrids of *C. brachypetala* and *C. tortuosa* in which characteristics of the latter species predominate.

C. diffusa has the smallest area, not yet well recognized. It grows only and exclusively in Iran, especially in the south-west part, and in the north it reaches the Kurdistan Mts. (fig. 7). This species, too, has transitional forms with *C. microcarpa* (cf. above) and with *C. tortuosa*. They sometimes appear even in one and the same locality (e. g. Persepolis). Transitional forms to *C. tortuosa* are scarcer and are distinguished by only a minute puberulence of shoots and leaves, while the shape of the leaf blade is roundish, what characterises *C. diffusa* so well.

The presence of numerous transitional forms makes it sometimes impossible to define where some of the herbarium specimens belong, and it is the best proof for treating *C. microcarpa*, *C. tortuosa* and *C. diffusa* as subspecies of one great species. Their areas partly overlapping, and therefore in these regions there exists a full possibility of hybridization. A further division of subspecies into taxa of lower order — varieties or forms, with the exception of subsp. *tortuosa* perhaps, seems to be quite aimless. Maybe in the future when living (and not herbarium) material will be available such a division will be possible. Then, however, most attention should be given tu fruits, their colour, size and shape.

In *C. microcarpa (s. l.)* forms with both globular and ovoid fruits are known, but as we can state from known material both forms occur in each subspecies. Most probably the colour of fruits will be a better

feature. Data from literature and remarks on herbarium labels show that the most constant colour of fruits is met in subsp. *microcarpa*. In this subspecies the fruits are black [25] while in the subsp. *tortuosa* and subsp. *diffusa* the colour of fruits range from yellow through orange to red. If it turned out that the differences in the colour of fruits between subsp. *microcarpa* and the other subspecies are constant to some extent in the region of the whole, or most of the area, then we would have still another characteristic to define the subspecies. But it calls for further obserwations in nature, as the colour of fruits changes when they are dry.

Below I give the division of *C. microcarpa* into subspecies giving the synonyms and references to literature as well as the key to their determination.

Cerasus microcarpa (C. A. Mey.) Boissier, Fl. Or. 2 : 646 (1872)

Syn.: *Prunus microcarpa* C. A. Mey., Verzeichn. Pfl. Cauc. 166 (1831);
Cerasus orientalis Spach, Ann. Sc. Nat. sér. 2., 19 : 128 (1843);
Prunus orientalis (Spach) Walpers, Repert. Bot. Syst. 2 : 91 (1843);
Microcerasus orientalis (Spach) Roem., Fam. Nat. Reg. Veg. Syn. 3 : 91 (1847).

1a. Leaves persistently and usually bilaterally pubescent, mostly elliptical and acute at the top. Twigs pubescent. Petioles, pedicels and hypanthium glabrous or pubescent . . . . . 2. subsp. *tortuosa*

1b. Leaves bilaterally glabrous or only slightly pubescent when young, especially beneath, usually rounded at the top. Hypanthium glabrous 2

2a. Leaves distinctly longer than broad. Twigs, petioles, pedicels, glabrous or pubescent . . . . . 1. subsp. *microcarpa*

2b. Leaves, petioles and pedicels glabrous. Twigs glabrous or sometimes slightly pubescent. Leaves more or less roundish, or only a little longer than broad, broadly cuneate or truncate at the base . . . . . 3. subsp. *diffusa*

1. *C. microcarpa* (C. A. Mey.) Boiss. subsp. *microcarpa*

Syn.: *C. microcarpa* (C. A. Mey.) Boiss. — Post, Pl. Post. 1 : 8 (1890); Bornmüller, Bull Herb. Boiss., sér 2., 6, 8 : 606 (1906); Bornmüller, Verh. k. k. Zool. — Bot. Ges. Wien 60 : 110 (1910); Woronow, Bull. appl. Bot. Genet. Pl. Breed. 14, 3 : 51 (1924—25); Grossheim, Fl. Cauc., 1 ed. 4 : 341 (1934); Bornmüller, Gauba, Feddes Repert. 39 : 117 (1935); Pojarkova, Fl. URSS 10 : 563 (1941); Parsa, Fl. Iran 2 : 535 (1948); Grossheim, Determin. plant. Cauc. 95 (1949); Sosnovskii in Fl. Gruzii 5 : 518 (1949); Zohary, Fl. Iraq (Dep. Agric. Iraq Bull. 31) 77 (1950); Grossheim, Fl. Cauc., 2 ed., 5 : 137 (1952); Kodyrov in Fl. Azerbaidjana 5 : 192 (1954); Sokolov, Tress shrubs USSR, 3 : 751 (1954); Fedorov in Fl. Armenii 3 : 328 (1958); Rawi, Wild Pl. Iraq (Dep. Agr. Iraq Techn. Bull. 14) 81 (1964).

C. orientalis Spach — Boissier, Buhse, Aufzaehlung 80 (1860); Rehder. Jour. Arn. Arb. 3 : 27 (1922).

C. Anti-Libani Post, Pl. Post. 1 : 8 (1890).

C. furum (Nábělek) Parsa, Fl. Iran, 2 : 537 (1948).

C. calycosus (Ait, et Hemsl.) Parsa, Fl. Iran ,2 : 539 (1948).

Prunus microcarpa C. A. Mey. — Ledebour, Fl. Ross. 2 : 6 (1844—46); Trautvetter, Acta Hort. Petrop 9, 2 : 453 (1886); Aitchison, Trans. Linn. Soc. London (Bot.) Ser. 2., 3 : 61 (1888); Lace, Hemsley, Jour. Linn. Soc. London (Bot.) 28 : 315 (1891); Schneider, Ill. Handb. Laubholzk. 1 : 604 (1906); Burkill, working list 29 (1909); Bornmüller, Beih, Bot. Centr. 28, 2 : 150 (1911); Stapf, Bot. Mag. 137 : 8360 (1911); Stapf, Bull. miscell. Inform. R. G. Kew, 205 (1911); Koehne, Pl. Wilson. 1 : 271 (1913); Bornmüller, Beih. Bot. Centr. 32, 2 : 386 (1914); Medwedew, Trees shrubs Cauc. 104 (1919); Meyer, Feddes Repert. (Beihft.) 22 : 45 (1923); Nábělek, Iter Turc.--Pers. (Publicat. Facult. Sc. Univ. Masaryk, Brno, 35) 1 : 105 (1923); Rehder, Manual; trees shrubs 465 (1927); Popov, Bull. appl. Bot. Genet. Pl. Breed. 22,3 : 397 (1928—29); Czerniakowska, Bull. appl. Bot. Genet. Pl. Breed. 23,5 : 190 (1929—30); Bobrov, Acta Hort. Acad. Sc. (ante Petropol.), 44 : 65 (1931); Post, Dinsmore Fl. Syria, Palest. Sinai 1 : 450 (1932); Bornmüller, Beih. Bot. Centr. 58B : 260 (1938); Bean, Trees shrubs Brit. Isl. 2 : 560 (1951); Rechinger, Ark. Bot. 1,5 : 526 (1952); Köie, Rechinger, Dansk Bot. Ark. 15,4 : 38 (1954—55); Kitamura, Fl. Afghan. 179 (1960); Rechinger, Ark. Bot. 5,1 : 196 (1960); Meikle, Fl. Iraq 2 : 166 (1966).

P. orientalis (Spach) Tchihatcheff, Asie Mineure 3 : 110 (1860).

P. calycosus Aitch. et Hemsl., Trans. Linn. Soc. London (Bot.) Ser. 2. 3 : 61 (1888); Schneider, Ill. Handb. Laubholzk. 1 : 604 (1906); Koehne, Pl. Wilson. 1 : 271 (1913); Popov, Bull. appl. Bot. Genet. Pl. Breed 22,3 : 397 (1928—29); Pojarkova, Fl. URSS 10 : 564 (1941).

P. microcarpa C. A. Mey. var. *typica* Schneid., Ill. Handb. Laubholzk. 1 : 605 (1906).

P. furum Nábělek, Iter. Turc.-Pers. (Publicat. Facult. Sc. Univ. Masaryk, Brno 35) 1 : 106 (1923).

Prunus antilibanotica (Post) Dinsm. in Post. Dinsmore, Fl. Syria, Palest, Sinai 1 : 451 (1932).

Type: *Hab. in rupestribus montanis, mons Beschbarmak Trascaucasiae ad Caspium* — 7.1830 c. fl., C. A. Meyer 1469 (LE-holotype).

Geographical distribution: USSR (Caucasus, Kopet-Dagh, Bol. Balkhan), W. Turkey, N. and W. Syria, Lebanon, N. Iraq, N., W., and S. Iran, NW Afghanistan, 600—2800 m a.s.l. (fig. 5).

2. *C. microcarpa* (C. A. Mey.) Boiss. *subsp. tortuosa* (Boiss. et Hausskn). Browicz, Fl. Iranica (1967) manuscript.

Syn.: *C. tortuosa* Boiss. et Hausskn. in Boiss. Fl. Or. 2 : 647 (1872); Stapf, Denkschr. Acad. Wiss. Wies 51 : 327 (1886); Blakelock, Kew Bull. 3 : 426 (1948); Parsa, Fl. Iran 2 : 536 (1948); Zohary, Fl. Iraq. (Dep. Agric. Iraq Bull. 31) 77 (1950); Rawi, Wild Pl. Iraq (Dep. Agr. Iraq Techn. Bull. 14) 82 (1964).

C. microcarpa (C. A. Mey.) Boiss. var. *pubescens* Bornm., Österr. Bot. Zeitschr. 49 : 16 (1899) including f. *longipedunculata* and f. *brevipedunculata* Bornm.

C. microcarpa (C. A. Mey.) Boiss. var. *tortuosa* (Boiss. et Hausskn.) Bornm., Beih. Bot. Centr. 19, 2 : 252 (1905); Bornmüller, Beih. Bot. Centr. 28, 2 : 226 (1911).

Prunus tortuosa (Boiss. et Hausskn.) Aitch. et Hemsl., Trans. Linn. Soc. London (Bot.), Ser. 2., 3 : 61 (1888); Koehne, Pl. Wilson. 1 : 271 (1913); Post, Dinsmore, Fl. Syria, Palest, Sinai 1 : 451 (1932); Guest, Dep. Agr. Iraq. Bull. 27 : 78 (1933); Anthony, Notes Roy, Bot. Gard. Edinb. 18 : 288 (1935); Rechinger, Ann. Naturh. Mus. Wien 53, 1 : 340 (1943); Köie, Rechinger, Dansk Bot. Ark. 15, 4 : 38 (1954—55); Rechinger, Ark. Bot. 5, 1 : 197 (1960).

P. microcarpa C. A. Mey. var. *tortuosa* (Boiss. et Hausskn.) Schneid., Ill. Handb. Laubholzk. 1 : 605 (1906); Handel-Mazzetti, Ann. Naturh. Hofmus. Wien 27 : 69 (1913); Nábělek, Iter Turc.-Pers. (Publicat. Facult. Sc. Univ. Masaryk, Brno, 35), 1 : 105 (1923); Rehder, Manual trees shrubs 465 (1927); Bornmüller, Beih. Bot. Centr. 58B : : 260 (1938); Oppenheimer, Evenari, Florul. Cisjordanica, Bull. Soc. Bot. Genève 31 : 267 (1940); Kitamura, Fl. Afghan. 179 (1960).

P. microcarpa C. A. Mey. var. *pubescens* (Bornm.) Meikle, Kew Bull. 19,2 : 230 (1965); Meikle, Fl. Iraq 2 : 167 (1966).

2a. *C. microcarpa* (C. A. Mey) Boiss. subsp. *tortuosa* (Boiss. et Hausskn.) Browicz var. *tortuosa*

Type: *In Cappadocia ad Euphratem,* Aucher-Eloy 1486 (G.-lectotype).

Hypanthium glabrous.

Geographical distribution: On whole area of subspecies — SW Turkey, Lebanon, N. and W. Syria, N. Iraq, W. and SW Iran, 460—2600 m (3900) a.s. 1. (fig. 6).

2b. *C. microcarpa* (C. A. Mey.) Boiss. subsp. *tortuosa* (Boiss. et Hausskn.) Browicz var *iranica* Browicz, Fl. Iranica (1967) manuscript.

Type: Durud, Luristan, 5500′, 21. V. 1940 c. fl., W. Koelz 15669 (W.-holotype).

Hypanthium more or less puberulent.

Geographical distribution: Only in W. Iran.

3. *C. microcarpa* (C. A. Mey.) Boiss subsp. *diffusa* (Boiss. et Hausskn.) Browicz, Fl. Iranica (1967) manuscript.

Syn.: *C. diffusa* Boiss. et Hausskn., Fl. Or. 2 : 647 (1872); Parsa, Fl. Iran. 2 : 538 (1948) including f. *orbicularis* (Bornm.) Parsa.

Prunus diffusa (Boiss. et Hausskn.) Schneid., Ill. Handb. Laubholzk. 1 : 606 (1906); Koehne, Pl. Wilson. 1 : 271 (1913); Meyer, Feddes Repert. (Beihft.) 22 : 45 (1923); Nábělek, Iter. Turc.-Pers. (Publicat. Fac. Sc. Univ. Masaryk, Brno, 35) 1 : 105 (1923); Bornmüller, Beih. Bot. Centr. 58B : 260 (1938) including f. *orbicularis* Koehne ex Bornm.

Type: *Prope ruinas u. Persepolis,* 15. 4. 1842 c. fl., Th. Kotschy 232 (W.-lectotype).

Geographical distribution: W nd SW Iran only, 1000—2300 m a.s.1 (fig. 7).

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KAZIMIERZ BROWICZ

Cerasus microcarpa (C. A. Mey.) Boiss. — wewnątrzgatunkowy podział i geograficzne rozmieszczenie

Streszczenie

Spośród zachodnioazjatyckich przedstawicieli sekcji *Microcerasus* Spach, *Cerasus microcarpa* należy do gatunków najlepiej poznanych, a jednocześnie z uwagi na wyjątkową zmienność, najczęściej dyskutowanych. O ile wartość systematyczna tego gatunku nie budzi u nikogo żadnych zastrzeżeń, to jego pokrewieństwo z innymi gatunkami, względnie wewnątrzgatunkowy podział na jednostki niższego rzędu, stanowi obiekt sporów i pod tym względem brak jest dotąd jednolitego poglądu.

Autor w czasie opracowywania podrodziny *Prunoideae* dla „Flora Iranica" i dla „Flora of Turkey" miał możność przeprowadzenia rewizji materiałów zielnikowych *C. microcarpa (s. l.)* z całego niemal obszaru zasięgu. Dysponował ponad 300 arkuszami zielnikowymi, które pochodziły z najważniejszych zielników europejskich. Niezależnie od tego zestawił wszelkie dane o stanowiskach tego gatunku cytowane w rozmaitych pracach florystycznych. Na podstawie tych materiałów opracował mapy zasięgu oraz przeprowadził krytyczną ocenę *C. microcarpa* i systematycznie bliskich, choć spornych gatunków, jak: *C. tortuosa* Boiss. et Hausskn., *C. diffusa* Boiss. et Hausskn., *C. orientalis* Spach, *C. calycosus* (Ait. et Hemsl.) Parsa, *C. Anti-Libani* Post., i *C. furum* (Nábělek) Parsa. Cztery ostatnie gatunki okazały się identycznymi z *C. microcarpa*, toteż zostały włączone do jej synonimiki. Z wyjątkiem *C. Anti-Libani* autor dysponował klasycznymi okazami zielnikowymi — typami.

W wyniku krytycznej oceny okazało się, że *C. microcarpa* jest gatunkiem szczególnie zmiennym w owłosieniu i kształcie liści, przy czym ta zmienność znajduje swoje odzwierciedlenie w geograficznym rozmieszczeniu form. Autor dochodzi do wniosku, że w obrębie *C. microcarpa* dają się wyróżnić trzy zasadnicze podgatunki.

1. subsp. *microcarpa*. Liście obustronnie nagie, bardziej długie niż szerokie, przeważnie zaokrąglone na wierzchołku. Młode pędy, szypułki i ogonki liściowe nagie lub owłosione. Podgatunek ten występuje na całym obszarze zasięgu *C. microcarpa*, z tym że częstszy jest na północy: ZSRR — Kaukaz, Kopet-Dag, Bolszije Bałchany, wschodnia Turcja, północna i zachodnia Syria, Liban, północny Irak, pół-

nocny, zachodni i południowo-zachodni Iran oraz północno-zachodni Afganistan. Rośnie od 600—2800 m n.p.m.

2. subsp. *tortuosa* (Boiss. et Hausskn.) Browicz. Liście obustronnie w mniejszym lub większym stopniu owłosione, przeważnie eliptyczne i zaostrzone na wierzchołku. Pędy, ogonki liściowe i szypułki owłosione. Występuje w południowo-wschodniej Turcji, Libanie, północnej i zachodniej Syrii, północnym Iraku oraz w zachodnim i południowo-zachodnim Iranie, między 460—2600 (3900) m n.p.m.

W podgatunku tym mogą być wyróżnione dwie odmiany:

a) var. *tortuosa* — rurka kielicha naga; występuje na całym obszarze zasięgu.

b) var. *iranica* Browicz — rurka kielicha owłosiona, występuje tylko w zachodnim Iranie.

3. subsp. *diffusa* (Boiss. et Hausskn.) Browicz. Liście mniej lub bardziej okrągławe, tylko nieznacznie dłuższe od szerokości, obustronnie nagie. Nagie są również ogonki liściowe, szypułki i rurka kielicha. Młode pędy mogą być niekiedy nieznacznie owłosione. Endemiczny dla zachodniego i południowo-zachodniego Iranu podgatunek, występujący między 1000—2300 m n.p.m.

Między tymi trzema podgatunkami zwłaszcza na obszarach, gdzie ich zasięgi częściowo się pokrywają, pojawiają się formy przejściowe, wskazujące na obecność mieszańców. Formy takie są trudne do określenia i ich zaliczenie do jednego z podgatunków opiera się przede wszystkim na przewadze cech właściwych dla danego podgatunku.

Autor zwraca również uwagę na zmienność innych cech, które jednakże na podstawie suchych materiałów zielnikowych nie mogą być należycie ocenione. Cechami tymi jest forma wzrostu (krzewy wyprostowane lub pokładające się) oraz barwa owoców. Na podstawie danych z literatury i notatek na etykietach zielnikowych można sądzić, że subsp. *microcarpa* charakteryzuje się raczej wyprostowanym wzrostem i czarnymi owocami, podczas gdy subsp. *tortuosa* jest raczej krzewem rozpostartym. Jeśli chodzi o barwę owoców, to zarówno u subsp. *tortuosa*, jak i subsp. *diffusa* znane są formy o owocach żółtych, pomarańczowych i czerwonych. Niestety, tylko obserwacje na żywym materiale w terenie mogą dać odpowiedź na pytanie, w jakim stopniu te formy mogą być traktowane jako samodzielne jednostki systematyczne.

КАЗИМЕЖ БРОВИЧ

Cerasus microcarpa (C. A. Mey.) Boiss. — внутривидовая систематика и географическое распространение

Резюме

Cerasus microcarpa относится к наиболее изученным видам среди западно-азиатских представителей секции *Microcerasus* Spach. В то же время, из-за его исключительной изменчивости, систематика этого вида чаще всего вызывает споры. Если таксономическая ценность вида ни у кого не вызывает никаких возражений, то родство его с другими видами и подразделение на внутривидовые таксоны служит объектом больших споров и единства взглядов здесь нет.

Автор в процессе обработки подсемейства *Prunoideae* для таких изданий, как „Flora Iranica" и „Flora of Turkey" имел возможность провести ревизию гербарных материалов по *C. microcarpa* (*s. l.*) почти из всего ареала вида. Он располагал более чем 300 гербарными листами из важнейших европейских гербариев. Помимо этого, были сведены все данные о местонахождениях вида, цитируемые в различных флористических трудах. На основании собранных

материалов были обработаны карты ареала и осуществлен критический пересмотр *C. microcarpa* и некоторых других систематически близких, хотя и спорных видов, как: *C. tortuosa* Boiss. et Hausskn., *C. diffusa* Boiss. et Hausskn., *C. orientalis* Spach., *C. calycosus* (Ait. et Hemsl.) Parsa, *C. Anti-Libani* Post., *C. furum* (Nábělek) Parsa. Четыре последние вида оказались идентичными с *C. microcarpa* и поэтому были включены в число ее синонимов. За исключением *C. Anti-Libani*, автор располагал всеми классическими гербарными образцами (типами).

В результате критической оценки оказалось, что *C. microcarpa* отличается исключительной изменчивостью опушенности к формы листьев, причем эта изменчивость находит отражение и в географическом распространении форм. Автор приходит к выводу, что в пределах *C. microcarpa* можно выделить три основных подвида:

1. subsp. *microcarpa*. Листья голые с обеих сторон, длина их превышает ширину, преимущественно закругленные на вершине. Молодые побеги, плодоножки и черешки листьев голые или опущенные. Этот подвид представлен на всем протяжении ареала вида, но чаще всего он встречается на севере: СССР —Кавказ, Копет-Даг, Большие Балханы, Восточная Турция, северная и западная Сирия, Ливан, северный Ирак, северный, западный и юго-западный Иран, северо-западный Афганистан. Растет от 600 до 2800 м над ур. м.

2. subsp. *tortuosa* (Boiss. et Hausskn.) Browicz. Листья с обеих сторон в большей или меньшей степени опушенные, преимущественно элипсовидные и заостренные на вершине. Побеги, черешки листьев и плодоножки опушенные. Встречается в юго-восточной Турции, в Ливане, северной и западной Сирии, северном Ираке, западном и юго-западном Иране, от 460 до 2600 (3900) м над ур. м.

В этом подвиде можно выделить две разновидности:

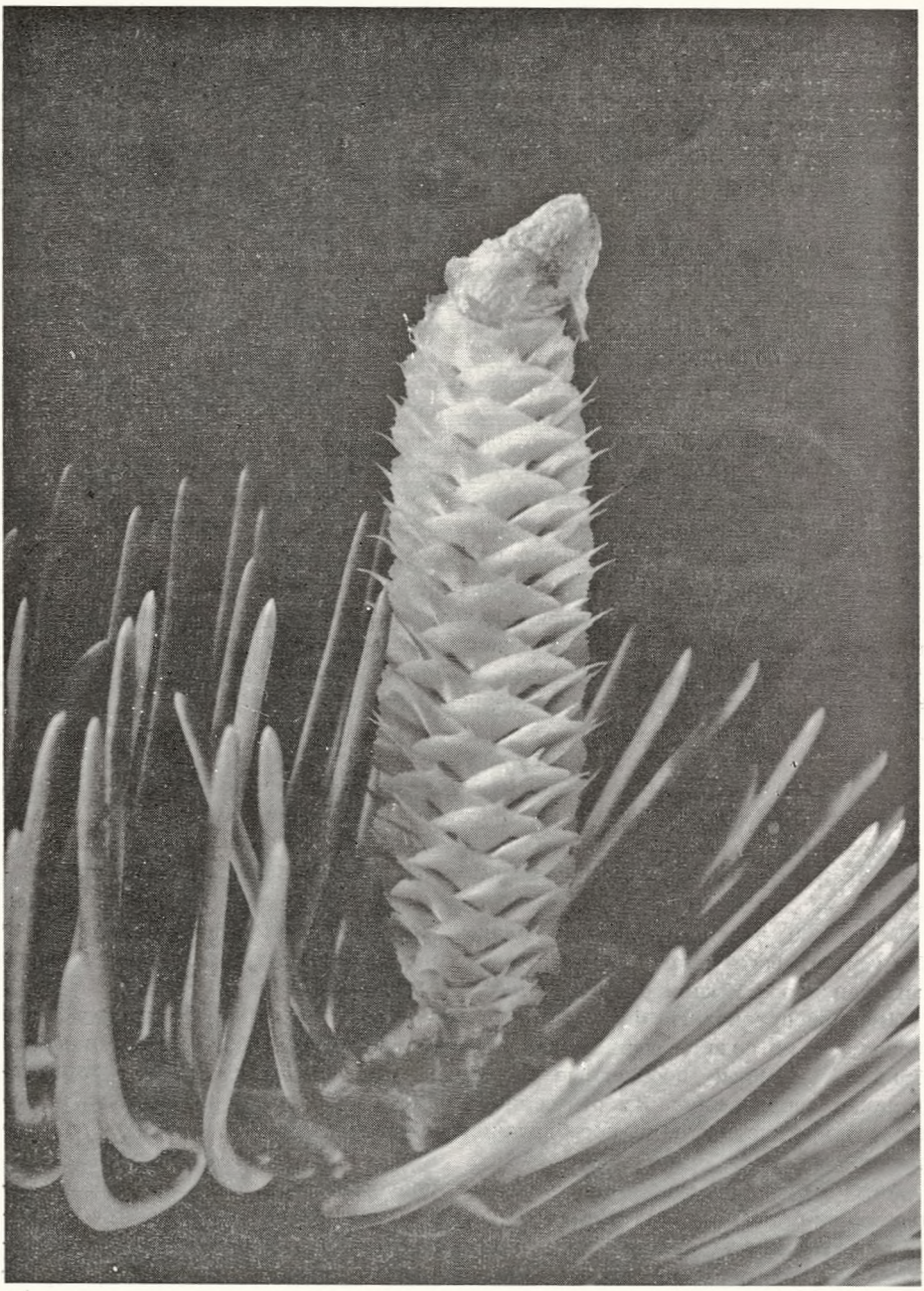
а) var. *tortuosa* — трубка чашечки голая. Встречается по всему ареалу.

б) var. *iranica* Browicz — трубка чашечки опушенная. Встречается только в западном Иране.

3. subsp. *diffusa* (Boiss. et Hausskn.) Browicz. Листья более или менее округлые, длина лишь ненамного превышает ширину, голые с обеих сторон. Голые также черешки листьев, плодоножки и трубки чашечки. Молодые побеги могут быть иногда незначительно опушены. Эндемичен для западного и юго-западного Ирана, растет от 1000 до 2300 м над ур. м.

Имеются переходные формы между этими тремя подвидами, особенно в тех районах, где их ареалы взаимно перекрываются. Это свидетельствует о наличии гибридов. Подобные переходные формы трудно поддаются точной характеристике и определению. Их отнесение к одному из указанных подвидов основывается прежде всего на преобладании признаков, характерных для данного подвида.

Автор обращает также внимание на изменчивость других признаков, которые однако, не могут быть должным образом оценены на основании засушенных гербарных материалов. Такими признаками являются: форма роста (кустарники прямостоящие или стелющиеся) и окраска плодов. На основании литературных данных и текстов гербарных этикеток можно судить, что subs. *microcarpa* характеризуется скорее прямостоящими стеблями и черными плодами, в то время, как subs. *tortuosa* стелющимися стеблями. Если говорить о цвете плодов, то как у subsp. *tortuosa*, так и у subsp. *diffusa* известны формы с желтыми, оранжевыми и красными плодами. Тем не менее, только наблюдения на живом материале (в поле) могут дать ответ на вопрос, в какой степени можно рассматривать эти формы как особые таксоны.



Fot. K. Jakusz

Młoda szyszka jodły (*Abies concolor* Engelm.)