A monographic study of the genus Prangos (Umbelliferae)

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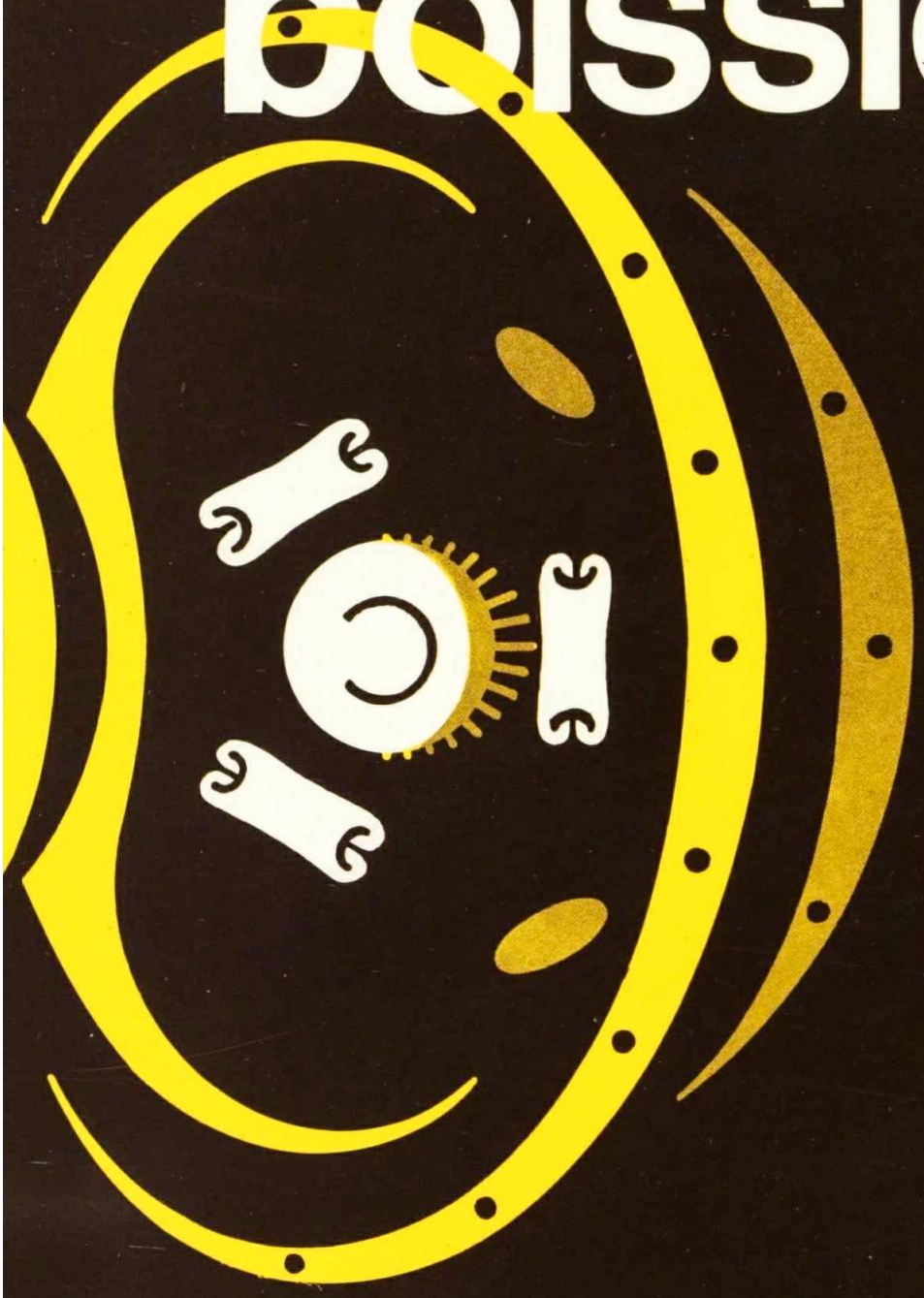

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A monographic study of the genus Prangos (Umbelliferae)

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Genève, le 13 mai 1977

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Preface

The study of this difficult genus was begun in 1967 as a Ph. D. thesis of one of us (I. H.). It took a considerable number of years to be accomplished and some more to be prepared for publication.

The encouragement, received during this time from friends and colleagues at the Hebrew University and other institutions in Israel and abroad, is hereby acknowledged.

The authors are indebted to the directors and the staff of the following herbaria for either sending material or photographs of specimens, or enabling us to work at their institutions: B, BM, BR, CGE, E, G, GB, JE, K, L, LE, M, UPS, W (abbreviations are according to Holmgren & Keuken 1974). We are also grateful to Dr. Huber-Morath (Basel) for lending material from his own herbarium and to Dr. R. Alava (Turku), Dr. H. Peşmen (Izmir), Prof. D. Phitos (Patras), the Botanical Gardens of Moscow and of Erevan for sending us seeds of *Prangos*.

The staff of our department were of great help during our studies and in the preparation of the manuscript: Dr. Irene Gruenberg-Fertig gave us important nomenclatural advice and wrote the Latin diagnoses; Mrs. Stefania Grizi typed the manuscripts and checked literature with unending patience; Mr. J. Gamburg prepared the photographs; Mr. R. Van der Molen helped us in preparation of anatomical slides. Special thanks are due to Mrs. Esther Huber who has succeeded to combine artistic skill with scientific accuracy in her drawings of *Prangos*, prepared from the usually most unsatisfactory herbarium specimens.

Introduction

The concept of the genus Prangos

The genus *Prangos* has been differently delimited from other genera of the tribe *Smyrnieae* (*e.g.*, Bentham & Hooker 1967, Drude 1898, Tutin 1968). The genera united with or separated from *Prangos* are mainly "*Cachrys* L.", "*Hippomarathrum* Link", and also *Heptaptera* Margot & Reuter (= *Colladonia* Boiss.). A list of authors with different concepts of these genera has been published elsewhere (Gruenberg-Fertig & al. 1973). Part of the present study has been devoted to the delimitation of the genus *Prangos.*

Arguments for the separate generic status of *Heptaptera* and "*Hippomarathrum*" have been published previously (Herrnstadt & Heyn 1971 and 1975a, respectively). A study of native populations proved that *Prangos* and "*Cachrys*" should be considered as a single genus (Herrnstadt & Heyn 1975b). However, further complications have their source in some nomenclatural problems: these are caused mainly by the mixed concept of the monotypic Linnaean genus *Cachrys* (Linnaeus 1753) and the typification of *C. libanotis* L. either by an element referable to *Cachrys* sensu auct. or to *Hippomarathrum.*

At first we tended to reject the name *Cachrys* entirely and to consider the genus including both *Cachrys* and *Prangos* as *Prangos* (Herrnstadt & Heyn 1972). Following the typification of *Cachrys libanotis* L. (Gruenberg-Fertig & al. 1973) by a Burser specimen, the name *Cachrys* was used for the above genus and new combinations have been published (Herrnstadt & Heyn 1975a). Consequently, the generic name *Hippomarathrum* was proposed for conservation (Gruenberg-Fertig & al. 1974).

The rejection of this proposal by the Committee for Spermatophyta, dealing with the conservation of generic names, was based on its refusal to accept the above-mentioned typification of *Cachrys.* Complying with this, the genus, in its wider sense, has to be named *Prangos* and the new combinations published by us have to be treated as synonyms.

Special problems in the taxonomic study of Prangos

Up to the recent years, plant collections have been very scarce in the main centres of distribution of *Prangos.* This may explain the fact that, in many cases, sectors of the range of variation of single species have been described as separate taxa. Additional material seen by us resulted in the reduction of many binomials to synonyms. Even today specimens are not abundant for many *Prangos* species and often only one and the same collection is represented in different herbaria.

Herbarium specimens of *Prangos* are often rather unsatisfactory. Due to the big size of the plants, it is almost impossible to include all parts of diagnostic value in

a single herbarium sheet. In addition, specimens usually have been collected only with young fruit, although characteristic features may be discerned only in mature ones. The reason for this is that, because of their thickness, pressing of mature fruit causes many difficulties. This problem has been previously discussed by Townsend (1966).

Growing *Prangos* experimentally is rather difficult, if not impossible, due to a number of reasons:

- viable seeds are only rarely available. First, seeds are rather short-lived. In addition, the embryo often does not reach full development before the fruits become detached from the plant. It is, however, impossible to discern between mericarps with normal or undeveloped embryos because the endosperm occupies the main part of the volume of the mericarp. Fully developed embryos are often attacked by insects, especially by *Lygus* (Robinson 1954), which destroy the embryo;
- seedlings often tend to degenerate after their first stages of development.

General Part

Evaluation of taxonomic characters

The evaluation of taxonomic characters in this study is based mainly on the investigation of a great amount of herbarium specimens. Important information was obtained from a biosystematic research carried out in local populations of *Prangos ferulacea* (Herrnstadt & Heyn 1975b).

We arrived at the conclusion that many characters on which previous authors based specific delimitation should be altogether discarded or used within certain limits. The main diagnostic characters used in this study are listed below:

- *Leaves.* The extent to which leaves are dissected and the shape and size of leaf lobes have been found to be valuable diagnostic characters within certain limits. However, basal and cauline leaves of one plant may differ in these characters. Comparison between plants is to be based, therefore, on one type of leaves only, preferably on the basal ones which show a smaller range of variation within plants.
- *Umbels.* The number of rays and their size in terminal umbels were found to be specific characters. The ratio of hermaphrodite versus male flowers in lateral umbels may also serve, at least in some cases, for specific characterization.
- *Bracts and bracteoles.* Both are typical for some species, but may be deciduous at an early stage of development and therefore of little use in herbarium specimens. It should be noted that, at least in some species, the shape, size and number of bracteoles are not similar in different umbellules of the terminal umbel.
- *Sepals.* The existence or lack of sepals is an important diagnostic character.
- *Corolla.* The pubescence of the outer surface of the corolla has served for subdivision of the genus into groups (Boissier 1872). It has been found to be a stable character within species.
- *Fruit.* The taxonomy of *Prangos,* as of *Umbelliferae* in general, is based mainly on fruit morphology. The characters of diagnostic value are the form and texture of fruit, the degree of development of ribs and wings and the shape of wings. However, within some species, certain fruit characters (*e.g.*, outgrowths between wings in *P. pabularia* or width of wings in *P. ferulacea*) show a continuous variation. Fruit characters may change gradually during ontogenesis. For that reason only mature mericarps should serve for comparison (Herrnstadt & Heyn 1975b). The fruit anatomy has been found to be a most important character for the grouping of species into sections (see p. 15).

Distribution

Prangos is mainly a plant of the Irano-Turanian phytogeographic region. The majority of species occur between 30°-40°E. and 30°-70°N. *P. trifida* and *P. ferulacea* are the only two species distributed west to 30° and the *P. pabularia* species complex east as far as 80°.

Species are recorded to grow mainly on soils developed from chalky rocks, rarely on loess, basalt and in Central Asia in salines. Korovin (1961) discussed speciation in the genus on different soils.

Some of the characteristic features of *Prangos* make the genus well adapted to growing in extreme habitats. All the species are perennials and, according to their life form, belong to the group of hemicryptophytes (Raunkiaer 1934). In such plants only the underground parts remain alive for more than one season and the remnants of the dead stems and leaves of each year may be seen as a fibrous collar around the base of the plant (see fig. 3). In *P. ferulacea* we found that the buds are buried 5-10 cm below the surface of the soil.

Germination in *Prangos* follows an uniform pattern: the shoot apex is enveloped by a cotyledonary tube up to a certain degree of development and is protected by it from desiccation. Such a cotyledonary tube was observed in *Prangos* (Yaniševskii & Pervuhina 1948) and in various other umbelliferous genera (Haccius 1952, Tronchet 1967, Zoz & Chernykh 1961).

The two most outstanding features in the geographic distribution of *Prangos* are the occurrence of two centres of speciation and the great number of species endemic to very small areas (point endemics).

Among the 24 known species of the genus, only very few have a wide range of distribution. *P. ferulacea* (map 2) and *P. pabularia* (map 1) mentioned above, which are distributed throughout a large area, are the most variable species and might, in fact, be aggregate species. *P. trifida* (map 5) is the only exclusively North Mediterranean species of the genus.

All remaining species (maps 1-7) are clustered around two centers: the western (Turkey to W. Iran, including Syria) comprising the majority of species and the eastern (E. Iran, Afghanistan to Central Asia) comprising 6 species. About half of the species are endemics with a most restricted area of distribution.

The large proportion of endemic plants in the high mountain areas of the Irano-Turanian phytogeographic region has been pointed out in botanical literature of recent years (Davis 1971, Zohary 1973). The species of the genus *Prangos* which occur, more or less exclusively, on mountain slopes, mainly at over 1000 m and up to 4000 m, may serve as a further illustration of this phenomenon.

The correlation between distribution patterns and species groups is discussed in connection with evolution in the genus (pp. 17-21).

Chromosome studies

Previous records of chromosome numbers are very few in *Prangos*. They are $2n = 22$ in *Cachrys odontalgica* (Kordyum 1967) and $2n = 36$ in *Prangos pabularia* (Podlech & Dieterle 1969). According to Moore (1971), chromosomal data are relatively few in the *Umbelliferae*, covering only about 30% of the species of the family.

In the present study, chromosomes have been counted in 6 species (23 samples). We did not succeed to carry out a wider study, due to the small proportion of viable seeds available and the difficulties in obtaining seedlings for cytological investigations (see p. 9).

The chromosome numbers found by us are summarized in table 1. These, and the previous record in *Prangos odontalgica,* show the basic chromosome number of *Prangos* to be $x = 11$ (the only exception, $2n = 36$ of Podlech & Dieterle, needs further elucidation). Three levels of "ploidy" have been found in our study: $n = 11$, $n = 22$ and $n = 33$. Except for *P. ferulacea* ($n = 22$, 33) and its close relative *P. asperula* subsp. *haussknechtii* ($n = 33$), all species studied are diploids ($n = 11$).

Polyploidy is a comparatively rare phenomenon in the *Umbelliferae,* more so the occurrence of hexaploidy ($n = 33$) which is not recorded at all in the *Smyrnieae,* the tribe to which *Prangos* belongs (cf. Moore 1971). The fact that *P. ferulacea,* the most variable and widespread species in the genus, is a polyploid, may perhaps serve as an example for the positive correlation between polyploidy and adaptivity to diverse habitats.

However, the concept presented here is incomplete, as chromosomal data for the majority of species, including European populations of *P. ferulacea* and the only other European species, *P. trifida,* are so far not available.

The karyotypes of all species are symmetric. Chromosomes are metacentric or submetacentric and about equal in length. As the root tips have been pretreated by para-dichlorobenzene, it is difficult to reach any conclusions as to the absolute length of chromosomes. However, the size of chromosomes does not seem to decrease with higher ploidy level (pl. I).

Pollen

Pollen grains of the *Umbelliferae* are characterized by their general uniformity. A thorough palynological survey has been carried out during many years by Cerceau-Larrival (*e.g.,* 1962, 1963, 1965, 1967, 1971). She grouped the pollen grains around 5 basic types according to the inner outline of the endexine (nexine). The types are: subrhomboidal *(Rh),* subcircular *(C),* ovoid *(O),* subrectangular *(Rg)* and equatorially constricted *(E).* She examined two species from the genus studied here *"Cachrys alpina" (= Prangos trifida)* and *"Cachrys goniocarpa" (= P. ferulacea),* and included both in the *Rg* type.

In our study, acetolyzed pollen (according to Erdtman 1952) of 8 species of *Prangos* has been studied. Pollen grains from 14 populations of *P. ferulacea* from diverse localities, throughout its range of distribution, have been compared. The sources of the pollen are listed in table 2.

By measuring in each sample 20 viable pollen grains by the light microscope, the average size was recorded. The length of pollen grains was found to range from 39 to 65 μm. However, in cases where several pollen samples of one species were measured, a considerable variation in size between populations was observed: in 3 samples of *P. pabularia* the lowest record was 44 μm, the highest 53 μm; in 14 samples of *P. ferulacea,* 39 and 65 μm, respectively.

Contrary to Cerceau-Larrival (1971), who assumes the internal contour of the endexine to be a stable generic character, some infrageneric and even infraspecific variation has been found by us in *Prangos* (table 2; pl. II-III).

Species	Sources*	2*n*	*n*	Pl. I
P. (Intactae) ferulacea	Turkey, entre Trabzon et Erzurum, *Carbonnier JC/70/1* (W)	44		A
	Turkey, Malatya, Dogansehir, Eskiköy, *Peşmen*	66		B
	Israel, Aiyalon valley, Beyt-Hashmonai, *Herrnstadt*	66		
	Israel, Esdraelon Plain, Dovrat, *Herrnstadt* . . .		33	
	Israel, Lower Galilee, Belvoir, *Herrnstadt*		33	
	Israel, Lower Galilee, Beyt-Netofa valley, *Herrnstadt*	66		
	Israel, Upper Galilee, Rosh-Pinna, *Herrnstadt*		33	
	Israel, Upper Galilee, Mt. Almon, *Herrnstadt*	66		
	Israel, Upper Galilee, Meyron junction, *Herrnstadt*		33	
	Iran, Azerbidjan, Ghoje Dagh, *Lamond 4961* . .	66		
	USSR, Hort. Bot. Acad. Sci., Armeniae Erevan	66		
	USSR, Bot. Gard. Moscow, No. 714	66		
P. (Intactae) asperula subsp. *hausknechtii*	Iran, Azerbidjan, *Lamond 4617*	66		C
P. (Intactae) gaubae	Iran, Azerbidjan, *Lamond 4443*	22		
	Iran, Azerbidjan, *Rechinger 42662* (W)	22		D
P. (Intactae) bucharica	Afghanistan, Takhar, *Anders 6807* (W)	22		E
P. (Prangos) pabularia	Turkey, Gümüsane, *Lamond 2597*	22		
	Turkey, entre Erzurum et Agri, *Carbonnier JC/70/2* (W)	22		F
	Turkey, Malatya, Dogansehir, Eskikoy, *Peşmen*	22		
	Turkey, Malatya, 27 km N. of Gölbasi, *Alava 6950*	22		
	USSR, Hort. Bot. Acad. Sci., Mosqua "H-276" No. 904	22		
	USSR, Hort. Bot. Acad. Sci., Armeniae Erevan	22		
P. (Prangos) uloptera	USSR, Hort. Bot. Acad. Sci., Mosqua "H-276" No. 905	22		G

*Voucher specimens or seeds at HUJ, unless otherwise stated.

Table 1. – Chromosome numbers in the genus *Prangos*.

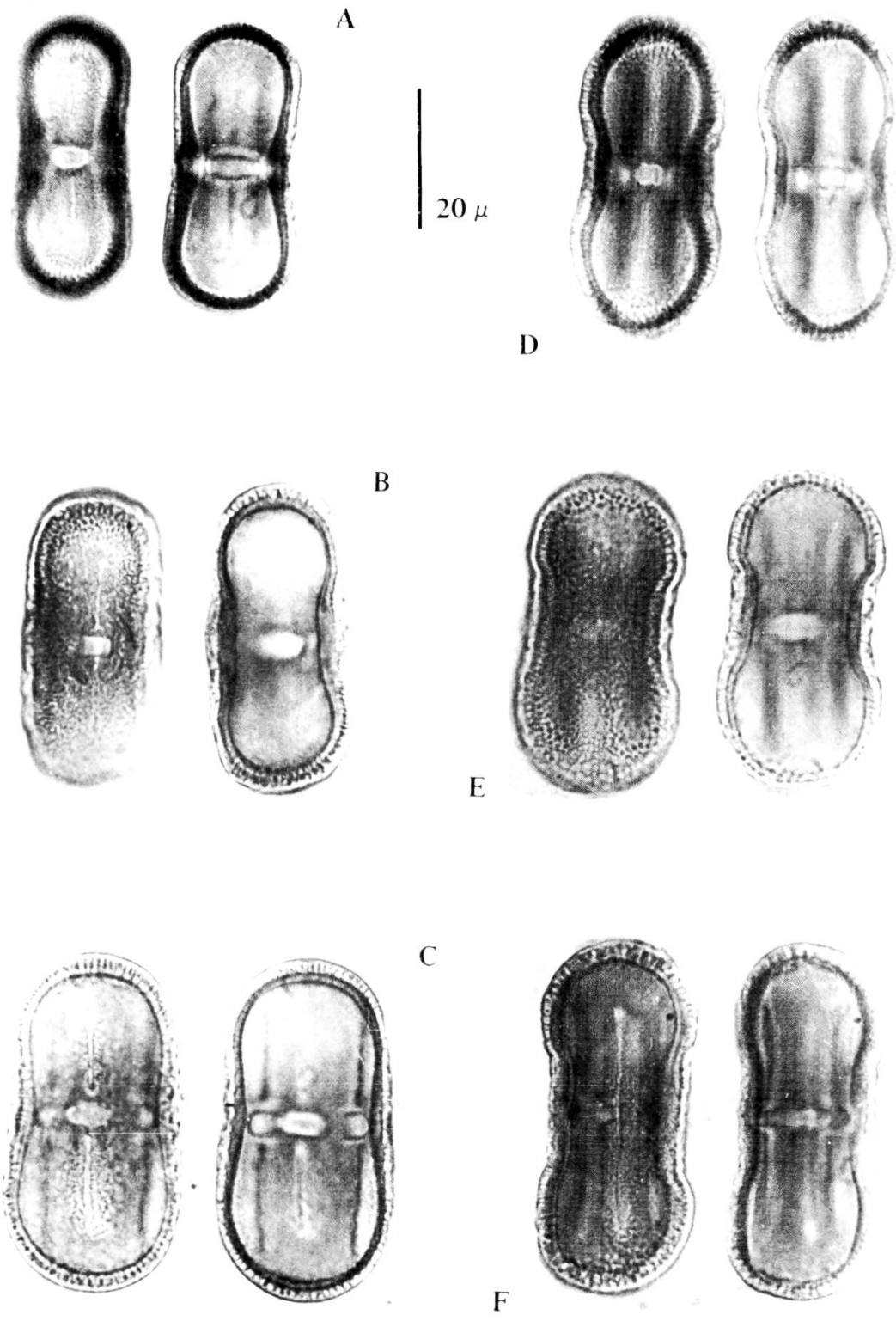
Species	Source	Basic shape*	Plate
P. pabularia	Turkey: Munzur Dag, *Davis 31365* (E)	O, E (Rg)	
	Turkey: 12 km from Özaep to Van, *Davis 44346* (E)	O	
	Turkey: Kavussapah Dag, *Davis 23055* (E)	O	
	Afghanistan: Takhar, Oberes Khausch-Tal, *Podlech 11785* (E)	Rg (R)	
P. uloptera	Turkey: Van, *Huber-Morath 9292* (herb. Hub.-Mor.)	O (Rg)	
	Turkey: Resadiye-Kotum, *Davis 22376* (E)	O (Rg) E?	
P. peucedanifolia	Turkey: 10 km S von Sürgü, *Huber-Morath 13657* (herb. Hub.-Mor.)	O (Rg)	
P. platychloena	Turkey: Pülümir, *M. & D. Zohary 3011* (HUJ) . . .	Rg-O	
P. ferulacea	Turkey: 6 km S. of Bitlis, *Davis 43063* (E)	Rg	
	Turkey: 32 km from Çat to Erzurum, *Davis 47376* (E)	O?	
	Turkey: 2 km S.W. of Hamur, *Davis 44172* (E)	Rg	II F
	Turkey: Nemrut Dagh, 7600 ft., *Davis 23568* (E)	Rg	II D-E
	Turkey: 8 km from Kars, *Davis 30611* (E, HUJ)	Rg-O	
	Italy: Sicily, supra Panormum, *Leresche* (G)	E	II A
	Italy: Sicily, prana della Canna, *Huet du Pavillon* (G)	Rg	II B
	Romania: Inter Verciorova et Guravoie, *Degen* (JE)	O	III C
	Greece. Peloponnesos: Olonos, *Cyrén* (GB)	O (E)	II C
	Israel: Philon, *Herrnstadt* (HUJ)	(Rg) O (E)	
	Israel: Between Zafed and Rosh Pinna, *Herrnstadt* (HUJ)	O	III D
	Israel: Tel Arad, *Herrnstadt* (HUJ)	Rg-O	
	Iran: prope Schiras, *Kotschy 324* (JE)	E	III B
	USSR. Azerbaijan: Schuscha, 5-6.1838, *Hohenacker* (JE)	Rg	III A
P. uechtritzii	Turkey: Hadim Taçkent, *Huber-Morath 8604* (herb. Hub.-Mor.)	Rg-O	
P. acaulis	Iran: Persepolis, *Kotschy 835* (G-BOIS)	Rg-O	
P. meliocarpoides	Turkey: near Tuz Golu, *Davis 18655* (E)	(E) O (Rg)	

*Abbreviations according to Cerceau-Larrival (1971). See explanation in the text.

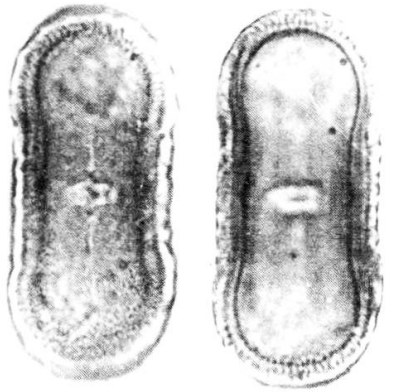
Table 2. – Types of pollen grains in the genus *Prangos.*

Mitotic metaphase plates in squashes of root tips (pretreated with α-paradichlorobenzene, stained with orcein-acetate 2%).
A, *Prangos ferulacea* ($2n = 44$); B, *P. ferulacea* ($2n = 66$); C, *P. asperula* subsp. *haussknechtii* ($2n = 66$); D, *P. gaubae* ($2n = 22$); E, *P. bucharica* ($2n = 22$); F, *P. pabularia* ($2n = 22$); G, *P. uloptera* ($2n = 22$); for localities see table 1).

Pl. II

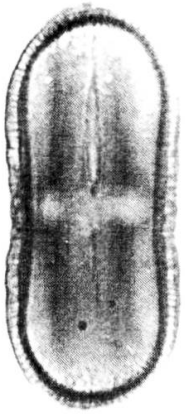


Pollen grains of *Prangos ferulacea* from diverse localities (light microscope; photograph of two levels: one focussed on the ectexine and the second on the inner outline of the endexine. **A, B,** Italy; **C,** Greece; **D-F,** Turkey. For a detailed list of localities see table 2.

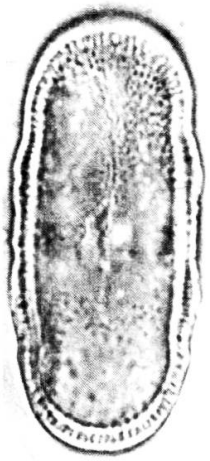


A

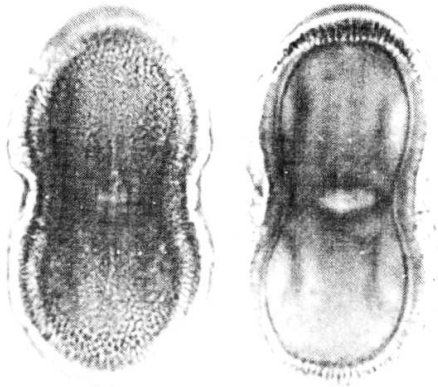
20 μ



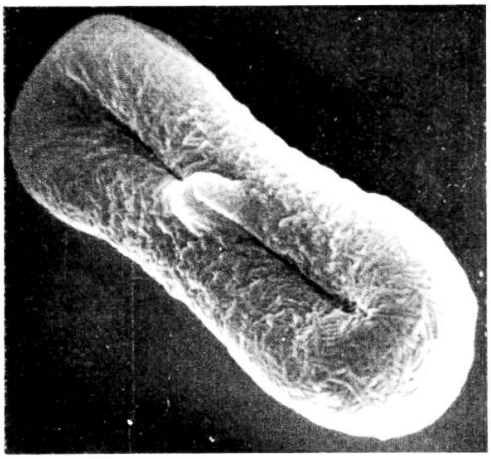
C



D

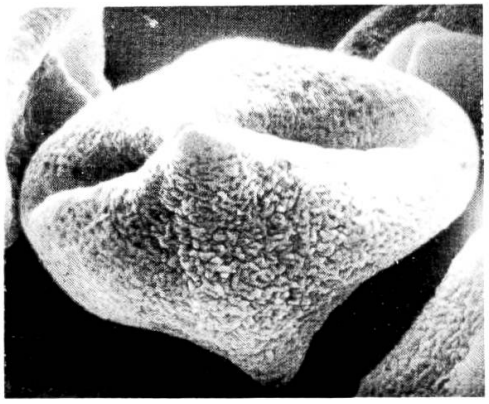


B



E

10 μ



F

10 μ

A-D, pollen grains of *Prangos ferulacea* from diverse localities (continued from pl. II, *q.v.*). **A**, USSR; **B**, Iran; **C**, Romania; **D**, Israel. **E**, pollen of *Heptaptera anisoptera* from Israel (scanning electrone microscope); **F**, pollen of *Trachydium* sp. from Afghanistan (scanning electrone microscope).

A comparison of the pollen of *Prangos* and related genera is included in table 3.

The tectal surface of the pollen of all *Prangos* species studied by SEM is uniform and agrees with that recorded by Cerceau-Larrival (1971, pl. 9). This character is more or less identical in all the genera related to *Prangos* (pl. II-III).

Fruit anatomy

Fruits of *Prangos* are, as a rule, conspicuously large and have a thick layer of mesocarp. The seeds are small as compared to the whole size of the mericarps and consist mainly of the endosperm (fig. 1 A-C), whereas the embryo occupies only about 5% of the volume of the mericarp. The endosperm, which contains lipids and proteins, has involute margins in the mature fruit, a character common to the species of the tribe *Smyrnieae*. Involution of the endosperm proceeds gradually during fruit ontogenesis (Herrnstadt & Heyn 1975b; fig. 4 A-C).

The thick mesocarp tissue of the fruit of some umbelliferous species has been mentioned under various names: spongy tissue, aerenchyme, pleenchyme, etc. Briquet (1929) discussed its adaptive value for seed dispersal by water and described the cells as "full with air", having lignified but never suberized cell walls.

In cross sections of fruits of *Prangos* species studied by us, the thin cell walls of the wide mesocarp layer reacted positively to Sudan IV and negatively to phloroglucinol, proving the existence of suberin, not lignin.

The nature of the mesocarp tissue adapts *Prangos* fruits to dispersal by water or wind. The habitat of the majority of species is on mountain slopes, where fruit dispersal is possible by wind but not by water. Some of the evolutionary trends in the genus *Prangos* lead to the improvement of the adaptation of the fruit to wind dispersal (see p. 17).

Fedtschenko (1899) was the first who proposed a subdivision of *Prangos* (sensu Boissier – not including *Cachrys*) according to fruit anatomy. He recognized two species groups without formal taxonomic rank: the first is characterized by a dense, uninterrupted layer of mesocarp and the second by mericarps with mesocarp divided into five blocks by the exocarp.

Kuzmina (1962) subdivided *Prangos* (without *Cachrys*) into two sections – *P.* sect. *Prangos* and sect. *Intactae*. She mainly followed Fedtschenko (1899) adding, among other diagnostic characters, the different distribution pattern of the vascular bundles in the two sections: in *P.* sect. *Prangos* they occur in and around the mesocarp, in sect. *Intactae* around the mesocarp only.

In our studies we arrived at the conclusion that *P.* sect. *Intactae* Kuzmina comprises, in fact, two anatomical groups which are considered by us as two separate sections: while in *P.* sect. *Intactae* s.str. the aerenchymatous mesocarp is subdivided into 5 blocks; in our new section, *P.* sect. *Meliocarpoides*, this tissue is continuous. Kuzmina, who was aware of the two anatomical types in her *P.* sect. *Intactae*, did not, however, evaluate them properly.

It seems to us that the continuous mesocarp, which among the genera related to *Prangos* occurs only in *Cryptodiscus* (cf. fig. 1 A-G), should be regarded as a derived character in the genus. The fruit anatomy in general is one of the diagnostic characters of *Prangos* with respect to the genera considered as its relatives: *Heptaptera*, *Hippomarathrum*, *Cryptodiscus* and *Trachydium* (fig. 1; table 3).

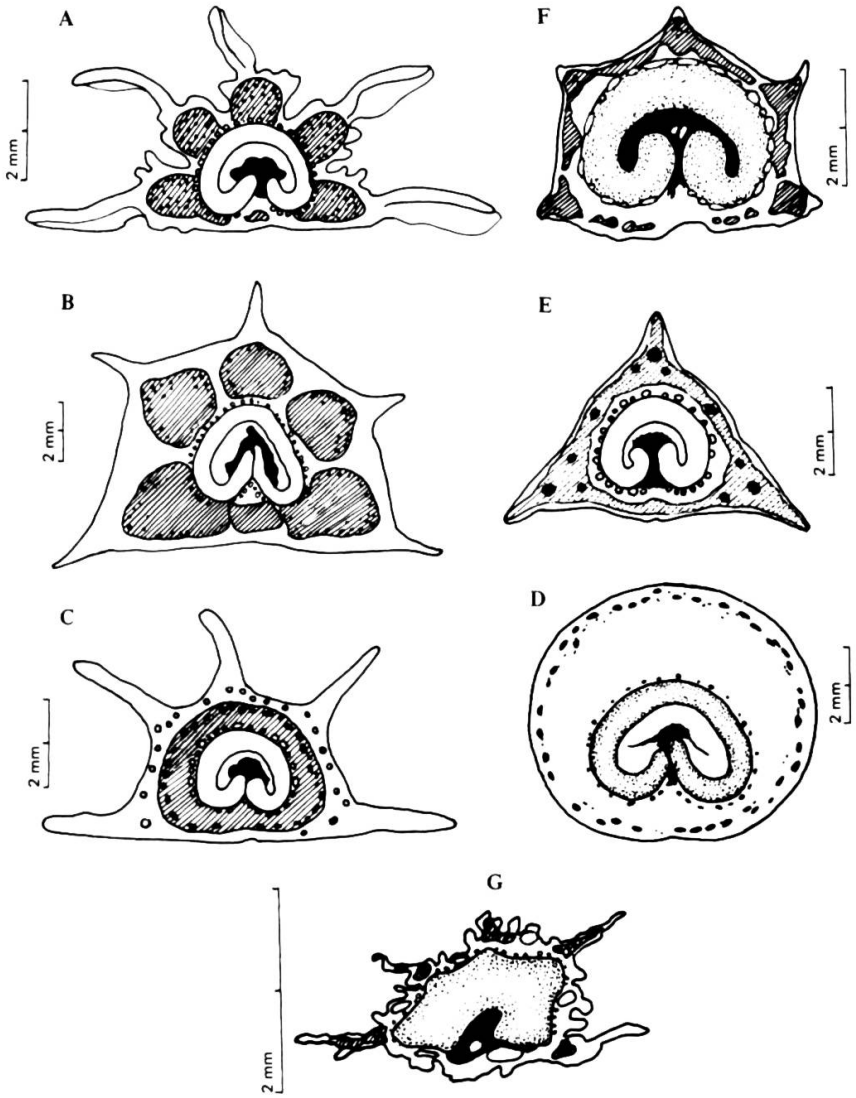


Fig. 1. – Cross sections of fruits of *Prangos* and related genera. **A**, *P. (Prangos) pabularia;* **B**, *P. (Intactae) ferulacea;* **C**, *P. (Meliocarpoides) meliocarpoides;* **D**, *Cryptodiscus persica;* **E**, *Heptaptera anisoptera;* **F**, *Hippomarathrum cristatum;* **G**, *Trachydium* sp. (Afghanistan, *Furse 8754,* K). – Dots = vascular bundles; circles = vittae.

Evolutionary trends in Prangos

In order to understand the evolutionary trends in *Prangos,* they have to be studied in a frame including related genera.

In floristic treatments the genera *Hippomarathrum* (sensu auct.), *Heptaptera* Boiss. & Reuter (= *Colladonia*), *Cryptodiscus* Schrenk and *Trachydium* Boiss. are usually considered as close to *Prangos,* or are even united with it. Discussion of the relationship of *Prangos* with *Heptaptera* and *Hippomarathrum* have been included by us in papers previously published (Herrnstadt & Heyn 1971, 1975b). In table 3 the distribution of characters in *Prangos* and related genera is summarized.

It must be stressed that our knowledge of *Prangos* is much more thorough than of the other genera, and that even in *Prangos* information on infraspecific variation is somewhat unbalanced: whereas we are well acquainted with every detail of variation in *P. ferulacea* in which we were able to carry out field studies, we had to rely in other species on herbarium material only. As stated above, this material was, at least in several cases, rather scarce and unsatisfactory.

From all available data, plants with the following combination of characters may be suggested as the hypothetical "basic *Prangos*": glabrous to somewhat papillate plants with compound, at least 3-pinnate, leaves with long lobes; sepals conspicuous and petals with reflexed margins; fruit somewhat suberized and with entire, straight-margined wings; no outgrowths on the fruits surface.

Some of the above basic characters may be discerned in *P.* sect. *Prangos* (species 1-3): *P. pabularia, P. latiloba* and *P. uloptera,* which occupy the easternmost part of the area of the genus (E. Turkey to S.E. USSR and Kashmir – map 1). These are the only *Prangos* species with conspicuous sepals and with thickened mesocarp occurring exclusively under the primary ribs of the mericarps.

Two important evolutionary trends of the genus in general may be seen in *P.* sect. *Prangos:* there is a gradual variation in fruit morphology from the typical *"uloptera"* to the extreme *"pabularia"* type, *i.e.,* from fruit with straight to slightly undulate, entire-margined wings without any outgrowths between them, to fruit with plicate, crenate to fimbriate-margined wings and with outgrowths varying in shape, size and density on the wings and between them; intermediate forms are abundant (table 4; fig. 5). A similar trend of outgrowths development in *P.* sect. *Intactae* (group 4) will be discussed below.

In *P.* sect. *Intactae,* in which 19 out of the 24 species of the genus are included, it is possible to derive all existing forms from the "basic *Prangos* type" by assuming the existence of three main trends in fruit evolution.

1. Moderate thickening of the mesocarp, together with increase of the width and, subsequently, undulation of the wings.
2. Extreme thickening of the mesocarp, together with wing reduction.
3. Development of outgrowths on fruit surface.

Trends 1 and 2 are of adaptive value for wind dispersal (see p. 15).

Based on these trends it is possible to divide *P.* sect. *Intactae* roughly into 4 main species-groups connected by intermediates, and several exceptional forms (fig. 2). Within each group there are some parallel trends of variation, as increase in pubescence of vegetative parts, more rarely also of petals, and decrease in length of leaf lobes. At least some of the species in each group are endemic.

Genus	*Number of species*	*Fruit*							
		shape	*length in mm*	*ribs*	*surface*	*mericarps*	*endosperm*	*pericarp*	*position of vascular bundles*
Prangos	24	ellipsoid to globose pyriform	(7-) 10-25 (-30)	absent to winged	glabrous, pubescent, tuberculate	equal, separated	margins involute	> endosperm	corresponding with primary ribs, or scattered. Sect. *Meliocarpoides* (fig. 1 A-C)
Cryptodiscus	4*	subglobose to subcylindrical	4-9	obtuse	glabrous, densely pubescent	equal, geminate	margins involute	> endosperm	scattered (fig. 1 D)
Heptaptera	6	wedge-shaped	(8-) 10-20 (-25)	winged	glabrous	unequal, separated	margins involute	> endosperm	corresponding with primary ribs (fig. 1 E)
Hippomarathrum	12*	obpyriform to broadly globose	(4-) 5-10 (-11)	obtuse to conspicous	glabrous, papillate, verrucose	equal, separated	margins involute	< endosperm	corresponding with primary ribs (fig. 1 F)
Trachydium	10*	ovoid to subglobose	1-4	conspicous to winged	vesiculose	equal, separated	margins straight	< endosperm	corresponding with primary ribs (fig. 1 G)

*According to Willis (1966).

Genus	*Leaves*		*Calyx teeth*	*Pollen shape**	*Chromosome numbers*	*Distribution*
	degrees of dissection	*terminal lobes*				
Prangos	(3-)4-6	filiform to broad-linear	– (sect. *Intactae* & *Meliocarpoides*) + (sect. *Prangos*)	Rg (O, E)	$n = 11$ (6 spp.) [$n = 18$ (1 sp.)] $n = 22, 33$ (1 sp.) $n = 33$ (1 sp.)	N. & E. Medit., Iraq, Iran, Afghanistan, C. Asia, Kashmir
Cryptodiscus	± 3	linear to ovate	–	Rg	–	Iran, C. Asia
Heptaptera	none to 3(-4)	ovate to elliptic	–	Rg (O)	$n = 11$ (1 sp.)	N.E. & E. Medit., Iraq, W. Iran
Hippomarathrum	(3-)4-6	filiform to linear	+	Rg (O)	$n = 11$ (2 spp.)	N. & E. Medit., Iran, Caucasus
Trachydium	2-3	linear to ovate	+	Rh	–	Turkey, Iran, Afghanistan, C. Asia, Himalaya

*Classified according to Cerceau-Larrival (1971).

Table 3. – Comparison of *Prangos* with related genera.

The first group (species 4-7) includes *P. ferulacea* and the related species: *P. uechtritzii, P. asperula* and *P. denticulata.* The only two polyploid species found so far in the genus are from this group (cf. table 1). *P. ferulacea* is the most widespread and variable species in the genus and within it both trends 1 and 2 of the genus are represented. There is a gradual increase of scabridity of all plant parts within *P. ferulacea* and *P. asperula.* Except for *P. ferulacea,* the species of the group occur from Central Anatolia to Central and Southern Iran and along the Eastern Mediterranean basin.

P. platychloena (species 8) from Eastern Turkey with fruits resembling those of the first group differs, however, from all other species of the genus in some unique characters and has to be kept separately.

The species of the second group (species 9-12) represent the first trend of evolution. They are *P. peucedanifolia, P. acaulis, P. hermonis* and *P. corymbosa,* distributed from E. Anatolia through Syria and Iraq to Northern Iran. Their broad-winged fruits have a well developed corky mesocarp and are quite uniform.

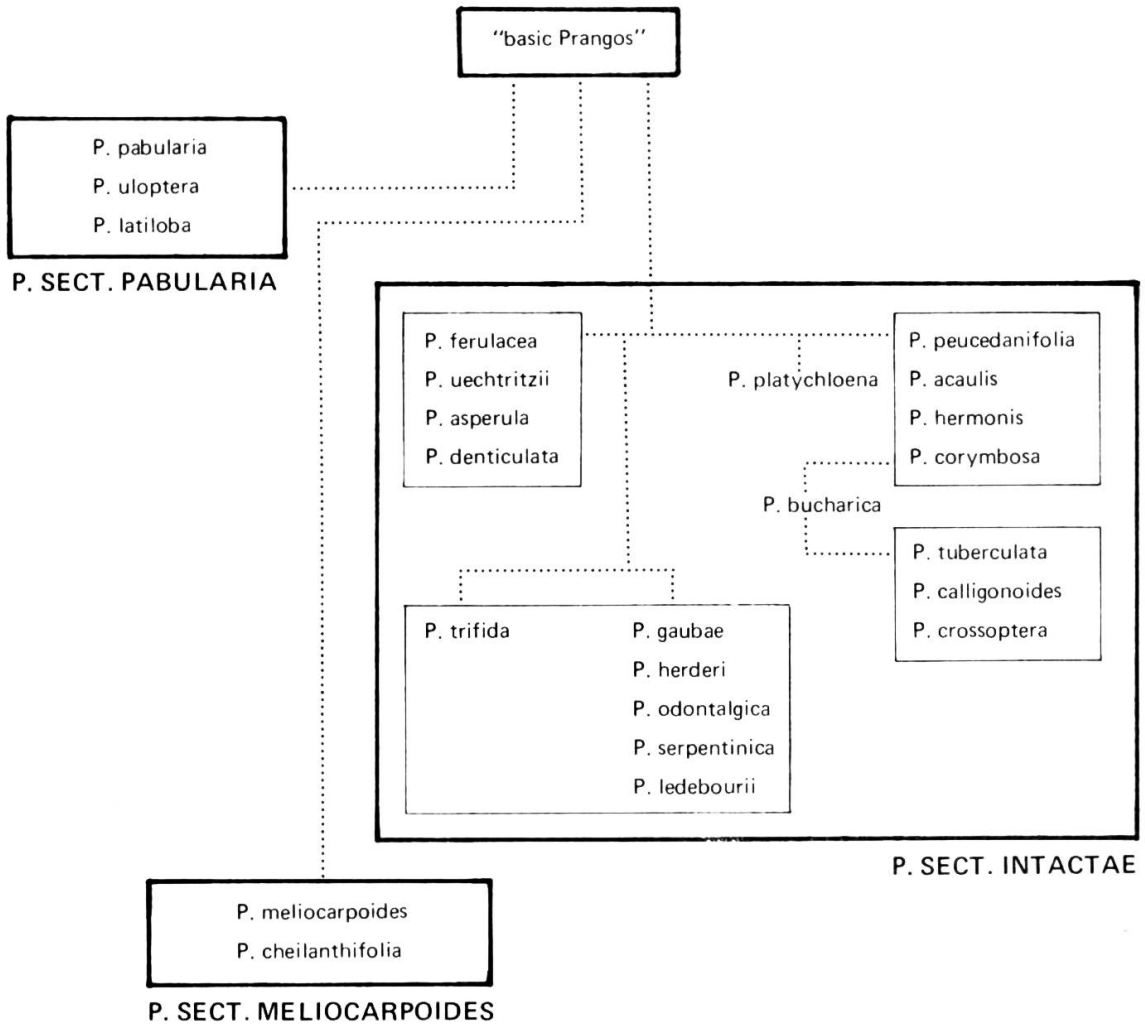


Fig. 2. – Relationships in the genus *Prangos.*

Within the group, there is a trend to increase in pubescence and to decrease in size of leaf-lobes and petioles.

The third group comprises species with wingless fruit, the end line of development of trend 2. The species (13-18) are *P. trifida, P. gaubae, P. herderi, P. odontalgica, P. serpentinica* and *P. ledebourii.* Except for the European *P. trifida,* the species are distributed mainly in Central Asia, some of them are endemic to small areas. Within the group there is a trend to reduction of the leaf-lobes. *P. ledebourii* is unique in having mericarps with conspicuous primary ribs and keels between them.

P. bucharica (species 19), from Afghanistan and Central Asia, resembles *P. peucedanifolia* in habit and fruit morphology. However, the commissural face of the mericarps is not obovate, as in the majority of *Prangos* species, but pear-shaped (fig. 21). Such a commissural face is characteristic also for *P. tuberculata* and *P. calligonoides,* of group 4 (species 20-22), but not for *P. crossoptera* of this group. This W. Iranian group shows a trend to gradual increase, in size and density, of the outgrowths on the fruit surface, a trend similarly observed in *P.* sect. *Prangos.*

The two species of *P.* sect. *Meliocarpoides, P. meliocarpoides* from Anatolia and *P. cheilanthifolia* from Iran (species 23 and 24), differ from all other species in their fruit anatomy which seems to be derived from that prevailing in other sections of *Prangos* (see pp. 16-17). Some unique fruit features of *P. cheilanthifolia* (indumentum, shape of mericarps and wings) raise the question whether this species, together with *"Cachrys eriantha"* (see p. 84), should not be included in a separate genus.

Fig. 2 is a representation of the relationships within the genus *Prangos* as assumed by us.

Special Part

Prangos Lindley in Quart. J. Sci. Lit. Arts 19: 7. 1825.

– *Cachrys* sensu auct. (non L., Sp. Pl. 246. 1753).

– *Pteromathrum* Koch ex DC., Prodr. 4: 239. 1830, *pro syn.*

Erect perennials (hemicryptophytes), 15-150 cm, with a well developed fibrous collar (fig. 3). Stem terete, branched above. Leaves (3-)4-6-pinnatisect, segments usually with numerous linear to filiform, mucronate lobes; width of lobes gradually decreasing from basal leaves towards upper cauline leaves; sheaths of basal leaves conspicuous, often separated from the petiole by a node. Flowers of terminal umbels mainly hermaphrodite, of lateral umbels mainly male. Bracts and bracteoles several, subulate to linear or rarely ovate, persistent or caducous, entire, rarely terminating in a few lobes. Sepals obsolete or sometimes conspicuous. Petals yellow, very rarely whitish, glabrous, papillate or pubescent on the outer surface. Stylopodium somewhat flattened above, often with an undulate margin, usually narrower than the ripe fruit. Fruit more or less compressed laterally, narrowly ellipsoid to globose, rarely turbinate or pear-shaped; mericarps smooth, ribbed or with 5 straight, undulate or plicate, entire or crenate wings on the primary ribs; mesocarp suberized; vittae in a continuous layer in its innermost part; endosperm involute. Ratio mericarp/wings may change during fruit ontogenesis as the result of variation in the development of tissue and the extent of growth of the wings. $2n = 22, 44, 66$.

24 species, mainly E. Mediterranean to C. Asia.

Key to the species

1a. Sepals usually conspicuous. Exocarp involute, separating 5 blocks of mesocarp tissue 2

1b. Sepals usually obsolete. Exocarp not involute 4

2a. Wings of mature fruit usually plicate or sometimes undulate; of young fruit usually clearly undulate. Base of wings with outgrowths varying in size and density 3

2b. Wings of mature fruit usually undulate or nearly straight; of young fruit from slightly undulate to straight. Base of wings either without outgrowths or with a few small ones . . . . . 3. *P. uloptera*

3a. Leaf lobes divaricate, short, 3-10 mm long. Rays of fruiting umbels numerous, 15-26(-30); pedicels 1-1.5(-2) times as long as ripe fruits. Fruit globose, 7-13 mm long . . . . . 2. *P. latiloba*

3b. Leaf lobes usually more than 10 (up to 50) mm long. Rays of fruiting umbels 5-19; pedicels usually shorter than ripe fruits or equalling them, seldom longer. Fruit globose to broad-ellipsoid, 8-20 mm long 1. *P. pabularia*

4a. Fruit ovate-oblong; mesocarp with 5 blocks of tissue not separated by exocarp; each block usually surrounded by vascular bundles 5

4b. Fruit pyriform; mesocarp continuous, with a layer of vascular bundles in the outer part of the dense corky tissue of the mesocarp 24

5a. Bracts and bracteoles conspicuous; bracts 6-10 mm, bracteoles 3-5(-8) mm wide . . . . . 8. *P. platychloena*

5b. Bracts and bracteoles up to 3 mm wide 6

6a. Fruit with tubercles between wings 7

6b. Fruit without tubercles 9

7a. Leaf lobes short (up to 4 mm). Commissural face of mericarps narrowly obovate, wing margin fimbriate, tubercles large also on wings, some as long as the width of wings. Plants densely covered with long crispate hairs . . . . . 22. *P. crossoptera*

7b. Leaf lobes long (up to 15 mm). Commissural face of mericarps pear-shaped (-ellipsoid), wing margin not fimbriate, wings without tubercles. Plants covered with short nearly straight hairs 8

8a. Fruit with few small tubercles between the wings . . 20. *P. tuberculata*

8b. Fruit with numerous well-developed tubercles between the wings 21. *P. calligonoides*

9a. Fruit wingless 10

9b. Fruit with wings 16

10a. Glabrous plants. Leaf lobes up to 50 mm long, sometimes arcuate, 0.25-0.75 mm wide . . . . . 13. *P. trifida*

10b. Papillate or hairy plants. Leaf lobes up to 35 mm long, not arcuate, 1-1.5 mm wide 11

11a. Petals glabrous outside 12

11b. Petals papillate or hairy outside 14

12a. Plants covered with short hairs. Leaf lobes obtuse. Fruit smooth (without conspicuous ribs), with truncate apex . . . . . 16. *P. odontalgica*

12b. Plants papillate. Leaf lobes mucronate. Fruit smooth or ribbed, apex not truncate 13

13a. Plants up to 40 cm high. Basal leaves with 4-5 segment pairs, 4-5-pinnatisect. Fruit ribbed; sometimes additional keel between the primary ribs . . . . . 18. *P. ledebourii*

13b. Plants up to 1.5 m high. Basal leaves with over 5 segment pairs, 6-pinnatisect. Fruit smooth or ribbed . . . . . 4. *P. ferulacea*

14a. Petals with long hairs. Plants up to 25 cm high. Leaves 3-4-pinnatisect 14. *P. gaubae*

14b. Petals papillate. Plants over 35 cm high. Leaves (4-)5-6-pinnatisect 15

15a. Hairy plants. Basal leaves (4-)5-pinnatisect, usually with 4 segment pairs; leaf lobes 2-3 mm long. Rays of fruiting umbels 5, 5-8 cm long. Mericarps hemispherical ..... 17. *P. serpentinica*

15b. Papillate plants. Basal leaves 6-pinnatisect, with 5-6 segment pairs; leaf lobes 10-15 mm long. Rays of fruiting umbels 8-14, 2.5-4 cm long. Mericarps semicylindrical ..... 15. *P. herderi*

16a. Wings of fruit undulate, with interruptedly reflexed margin 17

16b. Wings of fruit straight, or undulate without reflexed margin 18

17a. Wing margin dentate ..... 7. *P. denticulata*

17b. Wing margin not dentate, entire or sometimes erose .... 6. *P. asperula*

18a. Petals pubescent. Plants covered with short or long-crispate hairs or with both 19

18b. Petals glabrous. Plants glabrous, papillate or covered with both papillae and short hairs 21

19a. Wings of fruit 2 mm wide, straight, with entire margins (plants of Syria) ..... 11. *P. hermonis*

19b. Wings of fruit 4-5 mm wide, straight to undulate, with entire or crenate margins (plants of E. Anatolia and Iran) 20

20a. Stems c. 60 cm high. Basal leaves 4-5(-6)-pinnate, with (5-)6-7 pairs of nearly sessile primary segments. Fruit 20 x 12-14 mm; wings straight to slighlty undulate ..... 12. *P. corymbosa*

20b. Stems c. 35 cm high. Basal leaves (3-)4-pinnate, with 4(-5) pairs of primary segments on ± long petiolules. Fruit 12-17 x 10-15 mm; wings undulate ..... 10. *P. acaulis*

21a. Plants 30-60(-70) cm high. Basal leaves 20-30(-45) cm long, (3-)4(-5)-pinnatisect. Terminal umbel usually single. Wings of fruit (3-)4-6 mm wide 22

21b. Plants 50-150 cm high. Basal leaves 60-80 cm long, 6-pinnatisect. Terminal umbels usually in a group. Wings of fruit up to 3 mm wide 23

22a. The first leaf segment pair on long petiolules. Commissural face of mericarps obovate ..... 9. *P. peucedanifolia*

22b. The first leaf segment pair sessile. Commissural face of mericarps pear-shaped ..... 19. *P. bucharica*

23a. Leaf lobes rigid, up to 50 mm long. Rays of fruiting umbels 12-20 5. *P. uechtritzii*

23b. Leaf lobes not rigid, up to 35 mm long. Rays of fruiting umbels 7-15 (exceptionally more) ..... 4. *P. ferulacea*

24a. Petals glabrous outside. Fruit glabrous; wings 2-4 mm wide
23. *P. meliocarpoides*

24b. Petals pubescent outside. Fruit densely covered with short hairs; wings absent or up to 1.5 mm wide . . . . . 24. *P. cheilanthifolia*

Prangos sect. **Prangos** ≡ *Koelzella* Hiroe, Umb. Asia 1: 146. 1958, *nom. illeg.* ***Type:*** *P. pabularia* Lindley

Calyx teeth conspicuous; petals glabrous, seldom papillate, never hairy. Fruit ellipsoid to globose with well developed, undulate or plicate wings; exocarp involute, separating 5 blocks of mesocarp tissue with vascular bundles; vittae numerous in the epimesocarp.

3 species, distributed in Turkey, N. Iraq, Iran, USSR (Caucasus, Azerbaijan, Central Asia), Afghanistan, N. & W. Pakistan, N. India.

Kuzmina (1962) divided *P.* sect. *Prangos* into two subsections: *P.* subsect. *Mamillaria* (fruit with outgrowths at the base of the wings) and *P.* subsect. *Emamillaria* (fruit without outgrowths). On the basis of the investigated material, this subdivision does not seem valid: the extent of development of the outgrowths strongly varies in individuals of a single species and even, sometimes, the fruits of single plant. Therefore, it is not adopted here. However, the plants with entirely emamillate fruits have been retained here as a separate species, *P. uloptera.* In some cases this division is rather artificial, as scattered small tubercles may occur even at the base of the wings in some of the plants apparently referable to *P. uloptera.*

Within this section a great number of species were described especially from Central Asia by Russian authors (Fedtschenko, Lipsky, Korovin and Kuzmina – see synonyms), often based on scarce material. In our studies, the number of accepted species has been reduced to three only. The reasons for this treatment will be given below.

1. **Prangos pabularia** Lindley in Quart. J. Sci. Lit. Arts 19: 7. 1825 ≡ *Cachrys pabularia* (Lindley) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975 ≡ *Koelzella pabularia* (Lindley) Hiroe, Umb. Asia 1: 146. 1958, *nom. illeg.* ***Type:*** India, in the neighbourhood of Imbal or Draz, *Lindley* (CGE – photograph seen).

= *P. lophoptera* Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 82. 1844. ***Type:*** Turkey: Taurus, *Aucher 3587* (G-BOIS).

= *Hippomarathrum seravschanicum* Regel & Schmalh. in Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 603. 1878 ≡ *P. seravschanica* (Regel & Schmalh.) Korovin in Bot. Mater. Gerb. Inst. Bot. Zool. Akad. Nauk Uzbeksk. SSR 12: 24. 1948. ***Type:*** [USSR] "Turkestan, in valle Sarawschan, Anzob, 7000′", 22.6.1870, *Fedtschenko* (LE – photograph seen).

= *Hippomarathrum fedtschenkoi* Regel & Schmalh. in Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 603. 1878 ≡ *P. fedtschenkoi* (Regel & Schmalh.) Korovin in Bot. Mater. Gerb. Inst. Bot. Zool. Akad. Nauk Uzbeksk. SSR 12: 24. 1948 (non (Fedtsch.) Korovin 1934). ***Type:*** [USSR] "Turkestan, prope Chodschent", 4.6.1871, *Fedtschenko* (LE – photograph seen).

= *P. pachypoda* Korovin in Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 5: 73. 1924. ***Type:*** [USSR] "Tian-Schan occidentalis, m. Mogol-Tau", *Korovin* (LE – not seen).
= *P. cylindrocarpa* Korovin in Bot. Mater. Gerb. Inst. Bot. Zool. Akad. Nauk Uzbeksk. SSR 12: 24. 1948. ***Type:*** [USSR] "Pamiralai prope pag. Tasch-Kurgan", 30.6.1936, *Botschantzev & Butkov 501* (TAK – not seen).
= *P. lamellata* Korovin in Fl. Uzbekistan 4: 490. 1959. ***Type:*** [USSR] Pamiralai, Seravschan, near Urgut, 6.6.1936, *Nesdillo 167* (LE – photograph seen).

Ic.: fig. 3, 4, 5.

Plant to 100 cm high, glabrous or papillate, with basal and cauline leaves. Basal *leaves* about 3-4, 15-50 cm long with conspicuous sheath separated from the petiole by a node; blade c. 6-pinnatisect; lobes (5-)10-30(-50) x 0.5-2 mm, mucronate. Terminal *umbels* in a group; lateral umbels usually in whorls or opposite, with male or hermaphrodite flowers. *Bracts* and *bracteoles* narrow-linear to filiform, often persistent; bracts (3-)5-10(-15) mm, bracteoles 3-5 mm long. *Fruiting umbels* 5-20-rayed, 2-8 cm long. *Pedicels* 0.5-1.5 times as long as ripe fruit. *Sepals* usually conspicuous; *petals* yellow, glabrous. *Fruit* widely varying in size; narrow- to broad-ellipsoid or nearly globose, 7-20 x 4-11 mm;[1] wings 2-5 mm wide, varying in width and in degree of undulation or plication, sometimes with erose or crenate margins, considerably changing during maturation of fruit; base of wings with outgrowths varying in size and density. $2n = 22$ ($2n = 36$, Podlech & Dieterle 1969).

Distribution

E. and S. Turkey, N. Iraq, Iran, USSR (Caucasus, Azerbaijan, Central Asia), Afghanistan, N. Pakistan, N. India. Map 1. Mountain areas: rocky screes, often limestone slopes (rarely river banks), 780-3600 m.

P. pabularia grows in diverse habitats differing in ecological requirements (Korovin 1961). In N. India and Central Asia it is cut for hay.

Selected specimens

Turkey. Gümüşane: Berdak, prope Baibout, *Bourgeau 101* (B, G-BOIS, JE); Kars: 50 km S of Kars, 1540 m, *M. Zohary & Plitmann 2267-30* (HUJ); Kayseri: 58 km N von Göksun, 1580 m, *Huber-Morath 10918* (herb. Hub.-Mor.); Maraş: Berythdagh, 7000′, 8.8.1865, *Haussknecht* (G-BOIS, JE); Malatya: 27 km N of Gölbaşi, *Alava 6950* (E, HUJ); Tunçeli: Munzur dağ above Ovacik, 2400 m, *Davis & Hedge D 31365* (E); Kharput: supra Pekenik, *Sintenis 555* (JE); Erzurum: 28 km from Varto to Hinis, 1700 m, *Davis 46267* (E); Erzurum, mont. Kop Dagh, 2000-2450 m, *Rechinger 32904* (W); Bitlis: Nemrut crater, 10000′, *Tong 172* (E); Malatya: 9 km S von Perveri, 780 m, *Huber-Morath 13655* (herb. Hub.-Mor.). ***Iraq.*** Kurdistan: Erbil, mont. Qandil, ca. 2600-3000 m, *Rechinger 11125* (W); Kurdistan: W. of Sulemaniya, 6000-8000′, *Thesiger 1126* (W); Bijan: Penjwin, 1800 m, *Rawi 12200* (K); Khalana, 1500 m, *Rawi 13835* (K); Sarsang: Qara Dagh,

[1] Width of fruit is measured along the comissural plane, including the wings.

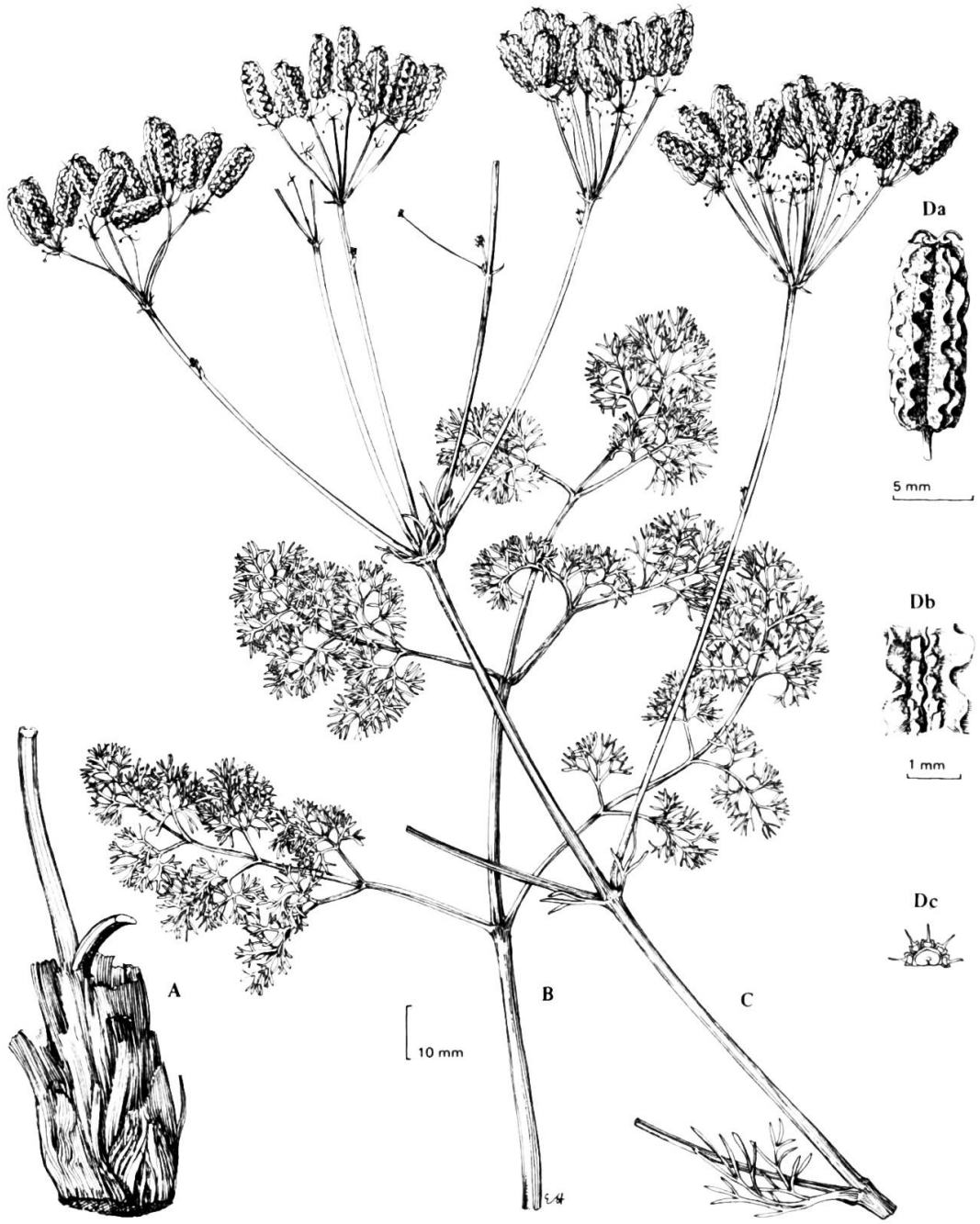


Fig. 3. – *Prangos pabularia*. **A,** base of stem with fibrous collar; **B,** basal leaf; **C,** stem with terminal and lateral umbels; **Da,** fruit; **Db,** enlarged part of **Da; Dc,** cross section of one mericarp (Turkey, *Alava 6950*).

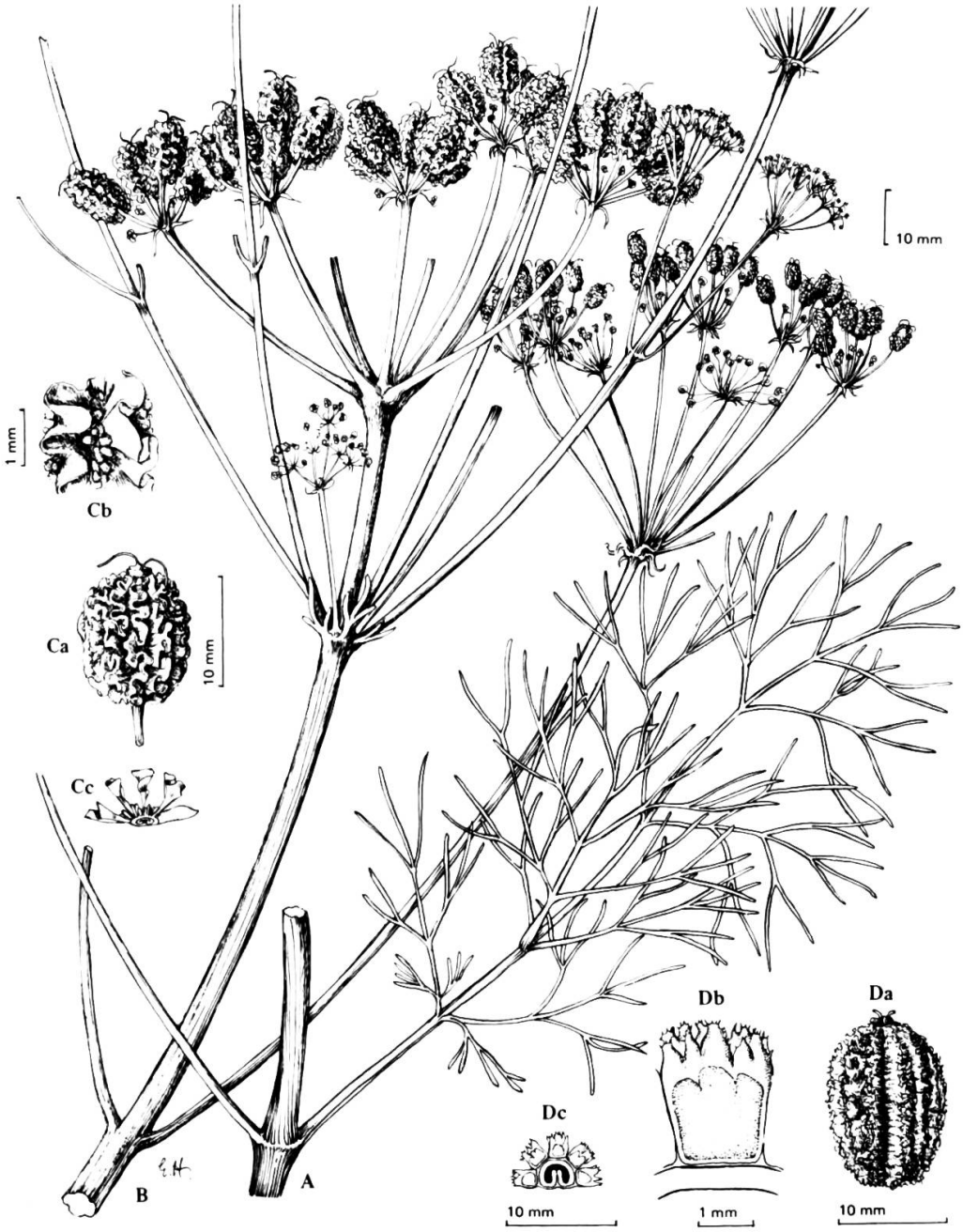


Fig. 4. – *Prangos pabularia.* **A,** stem with cauline leaf; **B,** terminal and lateral umbels; **Ca,** fruit; **Cb,** enlarged part of **Ca**; **Cc,** cross section of one mericarp (Afghanistan, *Podlech 11602*); **Da,** fruit; **Db,** cross section of a primary rib; **Dc,** cross section of one mericarp (Turkestan, *Fedtschenko 69,* spec. nova?).

1150 m, *Chapman 26371* (K). ***Iran.*** Inter Shahpur et Rezaiyeh, 1600-1800 m, *Rechinger 41941* (W); Bakhtiari Gahar, 8000′, *Koelz 18019* (B); Ispahan, 9.5.1859, *Bunge* (B, as *P. uloptera* DC.); Schlucht bei Nesmabad, 2.6.1889, *Strauss* (B, JE, as *P. uloptera* var. *brachyloba* Boiss.); Sultanabad: Shuturun Kuh, 2.-5.7.1890, *Strauss* (K, as *P. uloptera* DC.); Fars: NW of Takht e Jamshid, 1700 m, *Wendelbo 789* (W). ***Afghanistan.*** Bedakshan: Jawarzan, c. 30 km S of Qeshn, 1500 m, *Hedge & Wendelbo W 9279* (E); Kataghan: Mirza Atbili pass, S.E. of Semangan, 1350 m, *Hedge & Wendelbo 4016* (E, GB); Hindukush: Sunsir Valley, 10 000′, *Gilbert 44* (K); top of pass Tashkurghan, 5000′, *Furse 7822* (K, as *P. seravschanica*); Parwan: 2800 m, *Podlech 12316* (E); Parwan: Salang Tal, 1800 m, *Anders 3810* (W); Shibar pass, 2800 m, *Hedge & Wendelbo 4244* (E); near Chimar, 2800 m, *Hedge & Wendelbo W 5511* (E, GB); 20 km SW Panjao versus jugum Waras, 2500 m, *Rechinger 36536* (W); W. Ghazni, 2400 m, *Anders 4042* (W); Bamian: Shahtu, 2800-3000 m, *Rechinger 36351* (W); Kabul, Oberhalb Paghman, 2500 m, *Podlech 11602* (M); Hajigak Pass: Koh-i-Baba, 9000′, *Furse 8544* (K, as *P. seravschanica*); Obeh Pente, *Lindberg 49* (W); Ghorat: mont. Kuh-Tschaling-Safed-Daraq, ca. 2600-2800 m, *Rechinger 19088* (W); Siah Sung, *Griffith 1006* (K). ***Pakistan.*** Baluchistan: Singarh, *Harsuku 20533* (K); Chitral: Oihor Gol, 8000′, *Bowes Lyon 830* (E, W). ***Kashmir.*** West Tibet, *Falconer 500* (G-BOIS, K); W. Himalaya: Gagangair, Cindvalley, *Duthie 25626* (K); Draz, 10 000′, 26.9.1848, *Thomson* (K – type locality); Battrotan: Abroz Dras, 11 000-12 000′, 25.8.1893, *Duthie* (E); Srinuggur, 7800′, *Clarke 29108* (K); Kostorkut: 8 miles N.W. of Vishensar, 11 000′, *Polunin 56/696* (E). ***USSR.*** Azerbaijan: Nakhichevan, near Danzik, c. 950 m, 5.6.1947, *Grossheim, Ilinskaya, Kirpischenkov* (E); Turkmenistan: Kushitang, *Nevski 45* (LE); Bukhara: prov. Karateyin, Atscha-alma, 7500′, 31.7.1897, *Lipski* (B); Kazakhstan: Kara Tau, between Kentau and Chulak-Kurgan, 17.6.1970, *Kuzmina* (LE, as *Prangos equisetoides* Kuzmina – type locality?); Uzbekistan: Pamir Alai (Servaschi) between Termes and Tashkent, *Kuzmina 75* (LE); Samarkand: Seravshan, near Simarl, 2700 m, *B. A. Fedtschenko 4146* (B, L, as *P. seravschanica*); 374 km S. of Samarkand, *Kuzmina 73* (LE); Turkestan: Sardym-Rivak, 22.7.1901, *Fedtschenko* (B); Khodsheni (Khadschinsk) junction Pridonov, 24.4.1916, *Androsov* (LE, as *P. fedtschenkoi*); Tadzhikistan: Pamir Alai, S. of Gissar, *Kuzmina 126a* (GB, K, LE, as *P. seravschanica*); S. slope of Mt. Gissari, bank of river Varzob, 18.6.1959, *Kuzmina* (K); Mogol-tau, Kisbivi, 19.5.1959, *Kuzmina* (GB, K); W. Tien Shan, monte Tschimgan Minore, *Baranov & Ljuschin 318* (E, HUJ, K); Badakhashanskaya W. Pamir, Khorog, 21.7.1959, *Kuzmina* (GB).

In this study *P. pabularia* is accepted as a species complex including, in addition to *P. lophoptera,* also several species described by Russian botanists. These species were considered as differing in the following morphological characters: shape of leaf lobes, number of the rays of the fruiting umbels, relative size of pedicels, length of fruit, shape of wings of fruits, degree of development of outgrowths on the base of the wings. We found that these diagnostic characters change gradually and may occur in different combinations, and therefore refrained from accepting any specific division (see table 4; fig. 5).

Prangos scabra Nab. (Spisy Přír. Fak. Masarykovy Univ. 35: 126. 1923), described from Turkey (Hakkari, Mt. Kela Mame, above Hoz, c. 2000 m, *Nabělěk 531;* BRA – not seen), is supposed to differ from *P. pabularia* chiefly in the densely papillate outer surface of the petals and in the general scabridity of the plant.

	Fruit length:			*over 12 mm*									*up to 12 mm*								
	Width of wings:			<2 mm			=2 mm			>2 mm			<2 mm			=2 mm			>2 mm		
	Fruit/pedicel:			>1	=1	<1	>1	=1	<1	>1	=1	<1	>1	=1	<1	>1	=1	<1	>1	=1	<1
Oblong-ovoid fruits	*Lobes of basal leaves*																				
	<12 mm long	<1 mm wide	a	7-10	10		11										14		8		
			b	11						5									9	9-15	
		>1 mm wide	a	7	8																
			b																	11	12
	>12 mm long	<1 mm wide	a	6-15	7-10	15							7					8			8
			b	11-19			8										7		7		7
		>1 mm wide	a	5-9	13									9	7		15	7-16			
			b	7						11										12	
Globular fruits	*Lobes of basal leaves*																				
	<12 mm long	<1 mm wide	a	7									9	8	8		9-11	9			
			b																	9	
		>1 mm wide	a											9			10	13			
			b			9															
	>12 mm long	<1 mm wide	a	9	9								6	6-9		14	8-10	11		16	
			b																8	18	
		>1 mm wide	a		7										12	10	7-9	11		8	12
			b																		

Table 4. — Variation of characters in *Prangos pabularia.*
The figures represent the number of rays of fruiting umbels; a = fruits strongly tuberculate; b = fruits with few tubercles only.

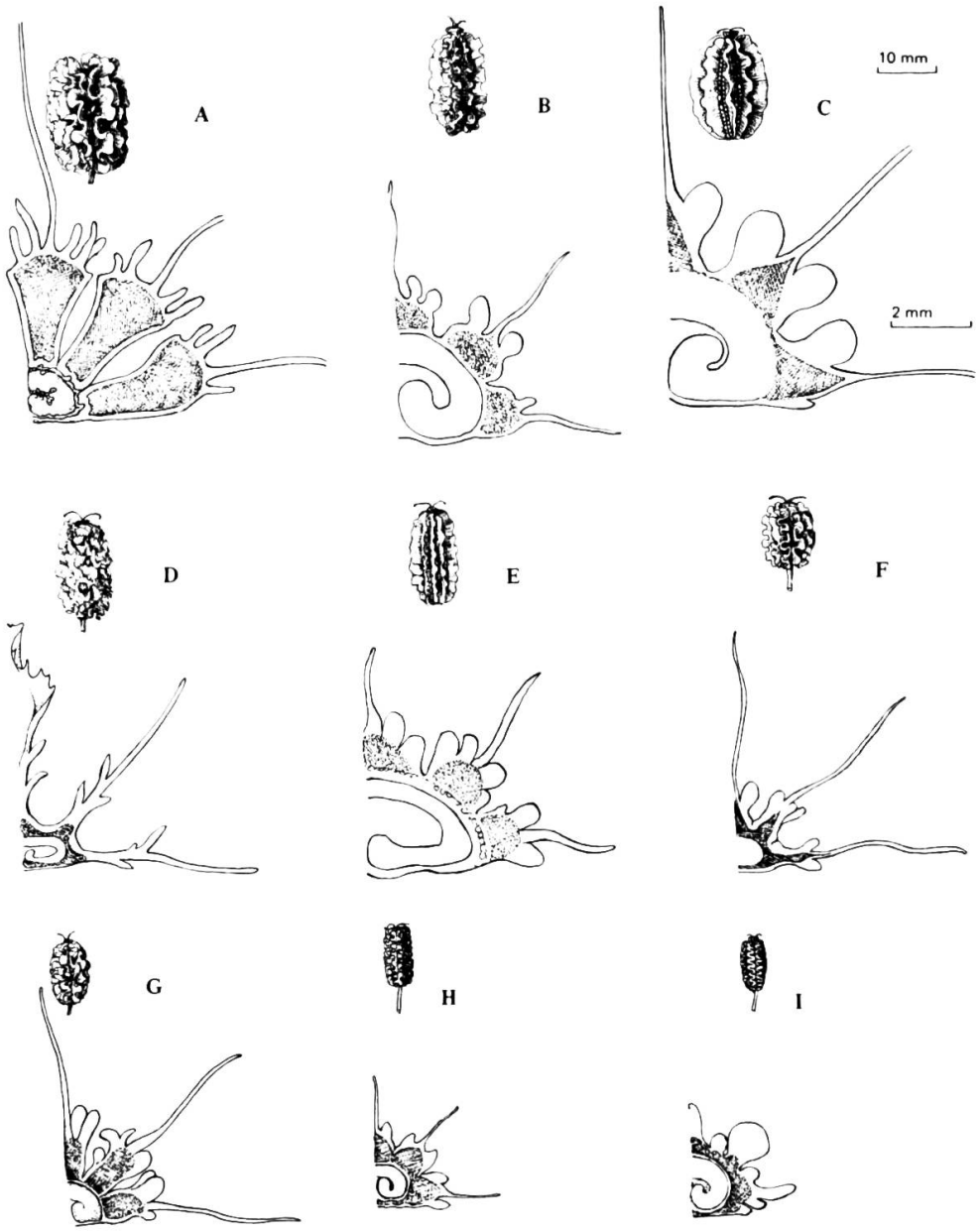


Fig. 5. – Variation in fruit in *Prangos pabularia* from different localities: fruit and cross section of half a mericarp. **A**, Iraq, *Chapman 26371;* **B**, Afghanistan, *Rechinger 31315;* **C**, Afghanistan, *Podlech 11566;* **D**, Iraq, *Rawi 12200;* **E**, Kashmir, *Clarke 29108;* **F**, Afghanistan, *Hedge & Wendelbo 4386;* **G**, Afghanistan, *Rechinger 17123;* **H**, Turkey, *Alava 6950;* **I**, Iran, *Wendelbo 789.*

This type (lacking ripe fruit) is described as having remotely undulate wings and scabrid valleculae on the ovary. Two specimens from Turkey: (Van: Sisanis Dağ, above Van, 1.7.1949, *Huber-Morath,* herb. Hub.-Mor.; Mardin: Cudi Dağ, above Hessana, 1200-1400 m, *Davis 42793,* E) fit this description; the former, however, also has ripe fruit which are indistinguishable morphologically and anatomically from those of *P. pabularia.* Whether *P. scabra* should be considered just a scabrid form (scabridity is a reoccurring character in *Prangos*) of *P. pabularia* or a taxon in its own right, remains an open question.

Kuzmina (1962) published *P. equisetoides,* in *P.* subsect. *Emamillaria,* characterized by exceptionally long and rigid leaf lobes (up to 40-50 mm). We saw a photograph of the type specimen (Kazakhstan, Kara Tau, LE) and two additional specimens also from Kara Tau, determined by Kuzmina as *P. equisetoides,* which have typical *"pabularia"* fruit with outgrowths. *P. equisetoides* is either a local variant or, perhaps, a distinct infraspecific taxon within *P. pabularia.*

One specimen (Buchara, Samarkand: inter pagos Bagrin et Karatepe, c. 1000 m, 14.7.1913, *B. A. Fedtschenko 69,* B – fig. 4 D) resembles *P. pabularia* but differs from it in some conspicuous fruit characters. Each primary rib is densely covered with long-branched flat outgrowths, hiding among them the interruptedly incised, slightly undulate wings; outgrowths and wings have crenate margins. Because of the unique fruit structure, it should be perhaps considered as a separate species. However, additional material is needed before such a separation may be carried out.

2. **Prangos latiloba** Korovin in Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 5: 74. 1924 ≡ *Cachrys latiloba* (Korovin) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** [USSR] "Montes Kopet Dağ, in regione alpina et inferiore prope Kaschka", 1.5.1914; "prope Firusa", 2.-3.7.1923, *Eug. Korovin* (TAK – not seen).

Ic.: fig. 6.

Plant 30-40(-45) cm high, somewhat papillate. Basal *leaves* about 3, 17-35 cm long, 4-5-pinnatisect; lobes very short and divaricate, 3-10 x 0.75-1.5 mm, mucronate. Terminal *umbel* usually single; lateral umbels in whorls or opposite, with male flowers. *Bracts* and *bracteoles* narrow-linear to filiform, often persistent; bracts 5-10 mm, bracteoles 3-5 mm long. *Fruiting umbels* 15-30-rayed, 4-9 cm long. *Pedicels* 1-1.5(-2) times as long as ripe fruit. *Sepals* usually conspicuous; *petals* yellow, glabrous. *Fruit* broad-ellipsoid to globular, 7-13 x 6-12 mm; wings undulate-plicate, 4-5 mm wide; base of wings with dense, medium-sized outgrowths. *Fl. 4-7.*

Distribution

Iran, Afghanistan, USSR (Turkmenistan). Map 1. Rocky limestone, slopes; mountain areas, 750-2660 m.

Selected specimens

Iran. Azerbaijan occidentalis: in declivibus saxosis inter vallem fluvii Rud-e Aland et pagum Querus NNW Khvoy, 2100 m, *Rechinger 49450* (W); Damghan-

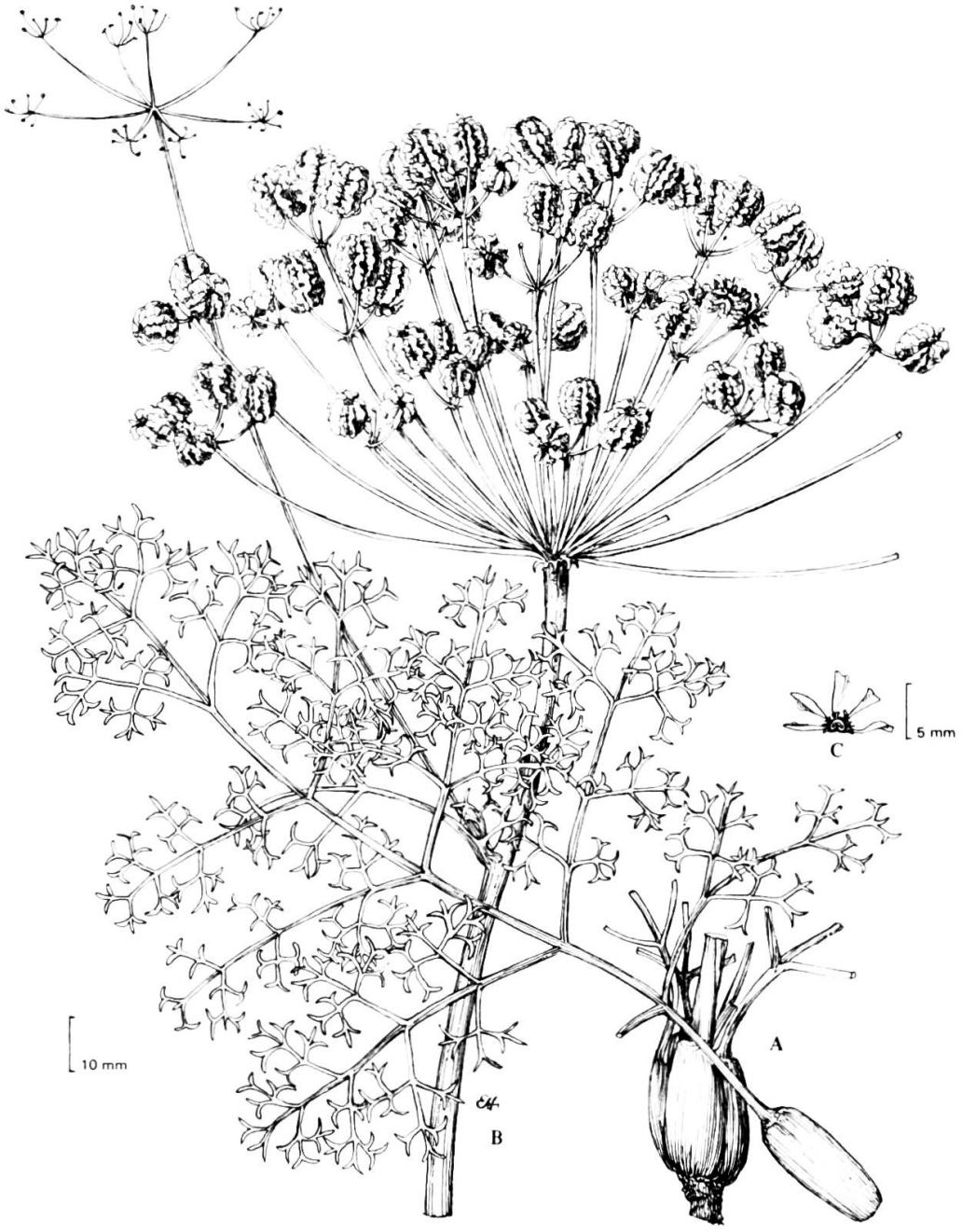


Fig. 6. – *Prangos latiloba*. **A**, basal leaf and fibrous collar; **B**, terminal and lateral umbels; **C**, cross section of a mericarp (Iran, *Furse 7455*).

Semnan: Elburs, Berghang, 2200 m, *Behboudi & Aellen 1162* (W); 30 miles E. of Bojnurd, Kopet Dagh, 4000′, *Furse 7455* (K); Khorasan: inter Shirwan et Budjnurd, *Rechinger 1826* (W, as *P. uloptera* DC. var. *brachycarpa* Rech. fil.); Khorasan: Montes Kuh-e Nishapur, c. 1200-1600 m, *Rechinger 4585* (E, K, W); Khorasan: Mt. Hazar Masdjid, c. 1200-1600 m, *Rechinger 4918* (W); Khorasan: dit. Robat Safid, c. 1800-2000 m, *Rechinger 4458* (W); Askabad, Suluklu, *Bornmüller 569* (B, as *P. uloptera* DC. var. *brachyloba* Boiss.); Baluchistan: 15 km W of Nostratabad, 1300 m, *Grant 15370* (W). ***Afghanistan.*** Herat: between Obeh and Khodla Chisht, c. 1500-1900 m, *Hedge, Wendelbo & Ekberg 7776* (E); 35-40 km S. Herat, 1300-1500 m, *Rechinger 33331* (W); Fariah: pass betw. Farahrood and Shindand, 1160 m, *Hedge, Wendelbo & Ekberg 7681* (E); Gazni to Shasgo, *Johnston* (E); E. of Jaji Shinkai, 2660 m, 11.7.1965, *Rechinger* (W). ***USSR.*** Turkmenistan: Ashchabad, Kopet Dagh, 750 m, 21.6.1956, *Nikitin* (K – vicinity of type locality); Kizyl-Arwat, Kara Kala, *Sintenis 1739* (JE).

P. latiloba is closely allied to the *P. pabularia* complex and is characterized by a combination of diagnostic characters which seem to justify its separation as a distinct species.

3. **Prangos uloptera** DC., Prodr. 4: 239. 1830 ≡ *Cachrys uloptera* (DC.) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** "in rupestribus as Seidkhodzi prov. Aderbeidjan Persiae", *Szovits* (holotype G-DC – not seen; isotypes G-BOIS, LE).

= *P. microcarpa* Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 83. 1844. ***Type:*** Persia, loco non citato, *Aucher* (G-BOIS).

= *P. aucheri* Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 83. 1844. ***Type:*** Persia, prope Ispahan, *Aucher 3788* (G-BOIS).

= *P. tschimganica* Fedtschenko in Bull. Herb. Boissier 7: 180. 1899. ***Type:*** [USSR] Pesochny pass near Chimgan, 17.7.1897, *O. & B. Fedtschenko* (LE – photograph seen).

= *P. lipskyi* Korovin in Bjull. Sredne-Aziatsk. Gosud. Univ. 15, suppl.: 49. 1927. ***Type:*** USSR, Tien Shan occidentalis, m. Ferganenses, *Korovin* (TAK – not seen).

= *P. isphairamica* B. Fedtschenko in Komarov, Fl. SSSR 16: 594. 1950. ***Type:*** [USSR] "Asia media, jugum alaicum in systemate flum. Isphairam", 1915, *Drobov* (LE? – not seen).

= *P. ornata* Kuzmina in Bot. Žurn. (Moskva & Leningrad) 47: 253. 1962. ***Type:*** [USSR] prope pagum Iskander, 15.7.1897, *O. Fedtschenko* (LE – photograph seen).

= *P. quasiperforata* Kuzmina in Bot. Žurn. (Moskva & Leningrad) 47: 252. 1962. ***Type:*** [USSR] Turkestan, Alabuga, 7000-8000′, 4.6.1880, *Regel* (LE – photograph seen).

= *P. gyrocarpa* Kuzmina in Bot. Žurn. (Moskva & Leningrad) 47: 253. 1962. ***Type:*** [USSR] prope pagum Daraut-Kurgan, 22.9.1940, *Stanjukovicz 569* (LE – photograph seen).

= *P. akymatodes* Rech. fil. & Riedl in Biol. Skr. 13/4: 111. 1963. ***Type:*** Afghanistan, Shanbashak Pass, 9000′, 31.8.1939, *Koelz 13875* (W).

– *P. ferganensis* O. & B. Fedtschenko, Rastit. Turkest.: 607. 1915, *nom. nud.*

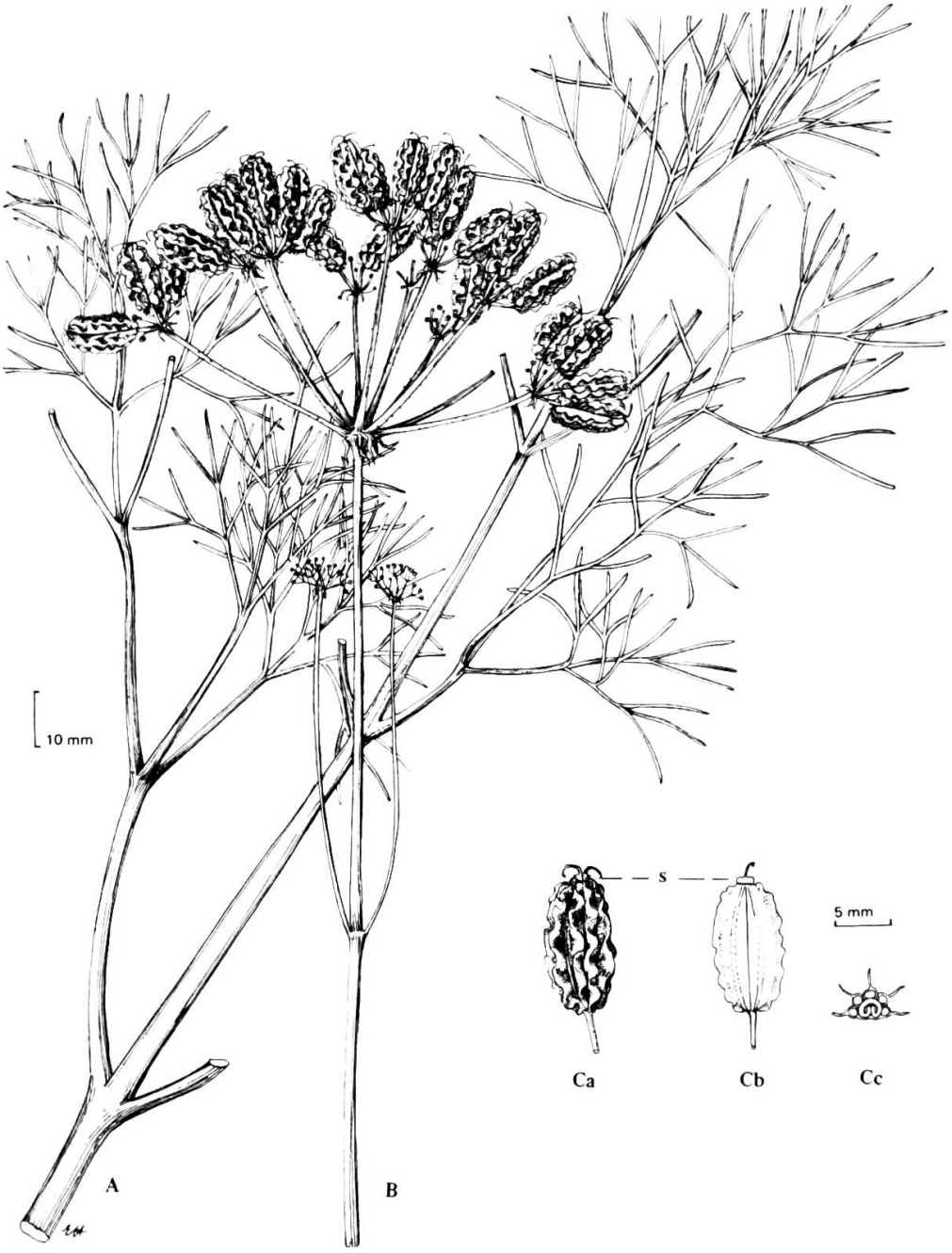


Fig. 7. – *Prangos uloptera*. **A**, part of basal leaf; **B**, fruiting umbel; **Ca**, fruit; **Cb**, mericarp (commissural view); **Cc**, cross section (*s* = stylopodium) (Turkey, *McNeill 595*).

Ic.: fig. 7.

P. uloptera differs from *P. pabularia* in its more or less uniformly narrow-ellipsoid fruit, the less compactly undulate, sometimes nearly straight wings without outgrowths or rarely with scattered short ones on their base; sometimes the base of the wings has a keel on both sides. *Fl. 5-8.* $2n = 22$.

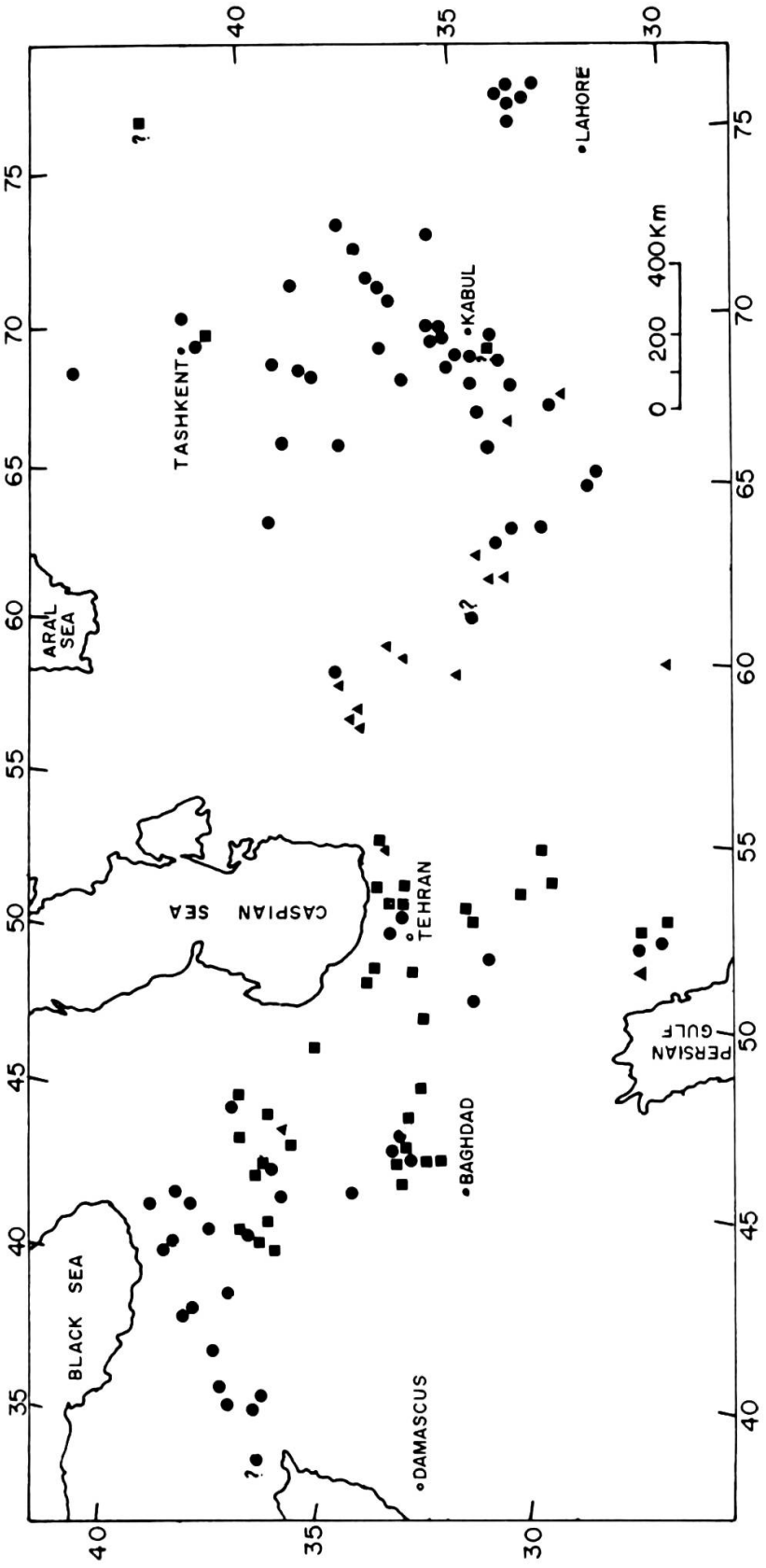
Distribution

E. and S. Turkey, N. Iraq, Iran, E. Afghanistan, USSR (Transcaucasia, Tien-Shan). Map 1. Mountains, 1100-3500 m.

Selected specimens

Turkey. Bitlis, crater on Nemrut Dağ, 2600 m, *McNeill 595* (E, HUJ); Kambos Dağ, above Hurmuz, 6000′, *Davis & Polunin D 23432* (E, K – fruit ovate, resembling *C. pabularia,* but without outgrowths); zwischen Avata und Garzit, 1640 m, *Huber-Morath 10915* (herb. Hub.-Mor.); Bitlis to Shemaran, *Post 657* (E); Resadiye-Kotum, *Davis & Polunin D 22, 376* (E); Van: Toprak Kale, 1900 m, 30.6.1949, *Huber-Morath 9292* (herb. Hub.-Mor.); 26 km from Başkale to Hoşap, 2400 m, *Davis 45891* (E). ***Iraq.*** Mela Kowa: Sulaimaniya-Penjwin highway, 1320 m, *Rawi 22477* (K); Chia-i-Mandali, 6500′, *Guest 2694* (K); Malikh Mt., Qandil range, c. 2400-2600 m, *Rawi & Serhang 24032* (K); Arl Gird Dagh, 3000-3500 m, *Gillett 12379* (K); Amarat, near Qaradagh, 5000′, *Haines W 1146* (E, K). ***Iran.*** Azerbaijan: SE Shahpur versus lacum Rezaiyeh (Urmia), 1300 m, *Rechinger 41871* (W); Mishab Dagh prope Yam, 1800-2400 m, *Termé 43920* (W); in monte Kaflan Kuh prope Mianeh, 1100-1500 m, *Lamond & Iranshahr 40826* (W); Ghoje Dağ, near Bazargan, c. 2200-2250 m, *Lamond 5006* (HUJ), *Rechinger 43960* (W); montes Avroman et Schahu, 6000-9000′, 7.1867, *Haussknecht 515* (G-BOIS, JE); Kurdistan: Kuh-Sefin, 1400 m, *Bornmüller 1263* (B); prope Salavatabad, 25 km E Sanandaj, 2300 m, *Rechinger 42796* (W); Hamadan: Mt. Elvend, 7.1903, *Strauss* (B); Qazvin: Kuhin versus Manjil, 1100-1300 m, *Rechinger 39479* (W); Mazanderan: inter Kamarband et jugum Naftab, 2600-3200 m, *Rechinger 6458* (W); inter Rasht et Teheran, 1800 m, *Bornmüller 7154* (B); C. Elburz: Totschal, N. von Teheran, 1300-1500 m, *Aellen 1396* (W); Elburz: S. of Damavend, 2600 m, *Wendelbo 1400* (GB, W); env. of Tehran above Shemiran, 2000 m, *Danin & Plitmann 65-3288* (HUJ); Kashan: Kavir, *Iranshahr 13605-E* (W); Isfahan, 5.1859, *Bunge* (G-BOIS); Kohrud: Kuh-i-Barsuk, 23.6.1904, *Strauss* (B, JE); inter Yezd et Ispahan, *Buhse 1416* (G-BOIS, syntype of *P. uloptera* var. *brachyloba* Boiss.); Mt. Sabst-Buschom prope Shiras, *Kotschy 421* (G-BOIS, syntype of *P. uloptera* var. *brachyloba* Boiss.); Fars-Kuhé Dena, *Behboudi 1126 E* (W); Mt. Sawers, 10 000′, 7.1868, *Haussknecht* (G-BOIS, syntype of *P. uloptera* var. *brachyloba* Boiss.); Dalinkou, *Aucher 4625* (G-BOIS). ***USSR.*** Transcaucasia: Dorosham, 19.5.1933, *Prilipko* (HUJ); Nakhichevan: in valle Koschadara, *Szovits 475* (G-BOIS); Tien-Shan: inter pagos Niazbek et Majskoë, *Granitov 319a* (E, HUJ, K); in valle fl. Tschotkal, in loco Schungak, *Mokeva 319b* (HUJ, K). ***Afghanistan.*** Urgun: 35 km NW Urgun versus Surmat, 2200-2400 m, *Rechinger 35917* (W).

The isotype of *P. uloptera* (G-BOIS) comprises three separate fruiting umbels, each of them with fruit differing in size, degree of undulation and width of wings:



Map 1. – Distribution of *Prangos pabularia* (●), *P. latiloba* (▲) and *P. uloptera* (■).

– small, 10-12 x 5 mm; wings nearly straight, 1-1.5 mm wide, resembling very much fruit of *"P. microcarpa* Boiss.";

– 13-15 x 5-6 mm, wings undulate, 1-1.5 mm wide;

– 14-16 x 8 mm, wings slightly undulate, 2 mm wide.

Boissier (1872) described a new variety of this species, *P. uloptera* var. *brachyloba,* mainly characterized by shorter and more rigid, divaricate leaf-lobes. We do not accept this variety as a separate taxon in this case: variation in length of leaf-lobes occurs repeatedly in the genus *Prangos (e.g., P. pabularia, P. ferulacea)* even within single populations. One specimen (Iran: Kohrud, *Bunge,* G-BOIS), determined by Boissier as *"P. uloptera",* comprises, in addition to a long-lobed leaf, another leaf with the short lobes typical for var. *brachyloba.* We examined the four plants cited by Boissier as var. *brachyloba:* one of the four syntypes (from Iran, Kuh Gelu, *Haussknecht,* G-BOIS) is without fruit, but a plant from the same collection deposited in JE, has young fruits in which the outgrowths typical for *P. pabularia* could be discerned.

In *P. uloptera,* as considered here, a number of characters were found to vary independently. These are, in addition to the dimensions of the leaf-lobes, also several fruit characters as size of fruit and wings and degree of wing undulation. In accordance, a considerable number of different species were described, based on plants representing each a part of the range of variability, often on single specimens. They are considered in this study as belonging to *P. uloptera.*

There are some difficulties in retaining *P. uloptera* and *P. pabularia* as two separate species. The diagnostic characters are widely varying and may occur in various combinations in different plants. Even in a single plant, the degree of outgrowth development can vary from one umbel to the other (*e.g.,* Iran: Ghoje Dagh, 2200-2250 m, 1.8.1971, *Lamond 5006,* HUJ). In one specimen (Nakitschevan, *Szovits 475,* G-BOIS), within a single umbel, fruits with and without the outgrowths typical for *P. pabularia* may be discerned. Though it is easy to distinguish between the extreme forms, they are connected by numerous intermediates. In Anatolia, as well as in Iran, the typical specific forms seem to occur together in single localities *(Tong 172* and *McNeill 595; Davis 45956* and *Davis 45891).*

Prangos sect. **Intactae** Kuzmina, Bot. Žurn. SSSR 47: 252. 1962, emend ["*Intacta*"].
Lectotype: P. bucharica Fedtschenko.

– *Cachrys* sect. *Eucachrys* DC., Prodr. 4: 236. 1830, *nom. inval.*

– *Cachrys* sect. *Aegomarathrum* sensu DC., Prodr. 4: 237, *pro minima parte.*

Calyx teeth usually obsolete; petals glabrous or hairy, seldom papillate. Fruit ellipsoid to globose, wingless or winged; mesocarp well developed, with 5 blocks of mesocarp tissue not separated by the exocarp; vascular bundles usually surrounding each block; vittae few in the epimesocarp.

19 species, throughout the range of distribution of the genus.

The main trends of evolution in *P.* sect. *Intactae* have been discussed above (p. 17-21 and fig. 2). It was tried here to arrange the species according to the evolutionary hypothesis proposed there.

4. **Prangos ferulacea** (L.) Lindley in Quart. J. Sci. Lit. Arts 19: 7. 1825 ≡ *Laserpitium ferulaceum* L., Sp. Pl. ed. 2: 358. 1762 ≡ *Cachrys ferulacea* (L.) Calestani in Webbia 1: 154. 1905. ***Type:*** herb. Linné *351/14* (LINN – photograph seen).
= *Cachrys alata* M.B., Fl. Taur.-Cauc. 1: 217. 1808 ≡ *P. alata* (M.B.) Grossh. in Izv. Azerbajdžansk. Fil. 1-2: 117. 1939 (non Bentham & Hooker ex Drude, 1898) ≡ *P. biebersteinii* Karjagin, Fl. Azerb. 6: 418. 1955. ***Type*** [USSR] "in Caucaso orientali", 5.-6.1798? (LE – not seen).
= *P. cylindracea* DC., Prodr. 4: 239. 1830 ≡ *P. ferulacea* var. *cylindracea* (DC.) Fiori & Paol., Fl. Anal. Ital. 2: 206. 1900. ***Type:*** [Italy] Calabria, *Gussone* (G-DC – not seen).
= *P. foeniculacea* C. A. Meyer, Verz. Pfl. Cauc.: 131. 1831. ***Type:*** [USSR] Caucasus: montes Talüsch, 700-900 m, *Meyer* (LE – not seen).
= *Cachrys libanotis* var. *sphaerocarpa* Ten., Fl. Nap. 3: 293. 1831. ***Type:*** [Italy] monte Vergine, June, *Tenore* (NAP? – seen plant from type locality).
= *Cachrys prangoides* Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 76. 1844. ***Type:*** [Iran] "ad Dalmkou", *Aucher 46294A* (isotypes: BM, G-BOIS).
= *P. macrocarpa* Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 77. ***Type:*** "In Persia australi", *Aucher* (G-BOIS).
= *Cachrys goniocarpa* Boiss., Diagn. Pl. Or. Nov. 10: 53. 1849. ***Type:*** "Philistean Plain, Ashdod", 4.-5.1846, *Boissier* (G-BOIS).
= *P. stenoptera* Boiss. & Buhse in Nuov. Mém. Soc. Imp. Naturalistes Moscou 12: 104. 1860 ≡ *P. asperula* var. *stenoptera* (Boiss. & Bushe) Boiss., Fl. Or. 2: 942. 1872 ≡ *P. goniocarpa* var. *stenoptera* (Boiss.) Zohary, Fl. Palaest. 1/2: 408. 1972. ***Type:*** Persia, Im Ssahendgebirge bei Herbi, 17.6.1847, *Buhse 490, 524* (G-BOIS).
= *P. ferulacea* var. *scabridula* Boiss., Fl. Or. 2: 937. 1872. ***Syntypes:*** [Iran] Mt. Kuh-Barfi, prope Shiras, 3.5.1842, *Kotschy 324* (G-BOIS, JE); [Iran] Kuh Sawers et Eschker, 9000′, 8.1868, *Haussknecht* (G-BOIS).
= *P. asperula* var. *leiopetala* Post, Fl. Syr. Pal. Sin.: 338. 1883-1896. ***Syntypes:*** Gaza, *Post;* Jebel Quleb (Hauran), *Post* (BEI – not seen).
= *P. carinata* Griseb. ex Degen in Természettud. Közl. 28: 44. 1896 ≡ *P. ferulacea* var. *carinata* (Griseb.) Fiori, Nuova Fl. Anal. Ital. 2: 98. 1925. ***Type(?):*** Romania, Verciorova et Guravoie et Danubium, *Grisebach* (GOET – seen plants from type locality).
= *P. asperula* var. *judaica* Rech. fil. in Ark. Bot. ser. 2, 2/5: 396. 1952. ***Type:*** [Israel] el Kubab, 200 m, 20.3./13.4.1911, *Dinsmore 1557* (LD – not seen).
= *Cachrys goniocarpa* var. *asperifolia* Mouterde, Fl. Djebel Druze: 158. 1953. ***Syntype:*** Syria, about Azra, 16.5.1931, *M. Zohary* (HUJ).
= *Cachrys nematoloba* Rech. fil. & Riedl in Österr. Akad. Wiss. Math.-Naturwiss. Kl. Anz. 98: 248. 1961. ***Type:*** [Iraq] "Kurdistan, montes Avroman, in ditione pagi Tawilla", 1800-2000 m, 15.-18.6.1957, *Rechinger 10363* (W).
– *Cachrys libanotis* sensu Guss., Fl. Sic. Prodr. 1: 358. 1827 (non L. 1762).
– *Cachrys cylindracea* Guss. ex DC., Prodr. 4: 239. 1830, *pro syn.*

Ic.: fig. 8.

Tall robust plant, 50-150 cm high, from nearly glabrous to papillate. Basal and lower cauline *leaves* large, 60-80 cm, up to 6-pinnatisect; lobes linear to filiform, 5-35 x (0.3-)0.5-1.5(-2) mm, mucronate. Terminal *umbels* in a group, with herma-

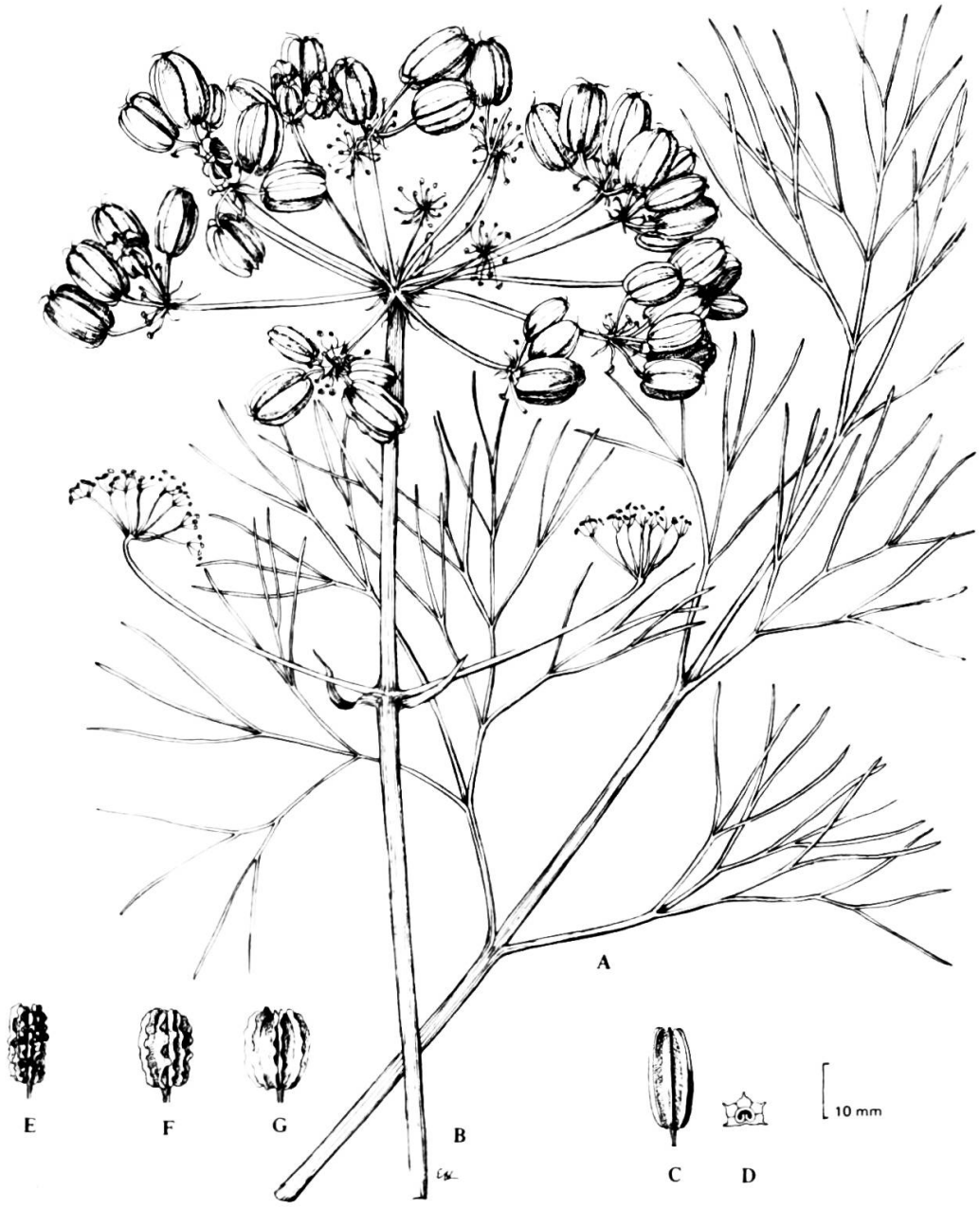


Fig. 8. – *Prangos ferulacea*. **A**, part of basal leaf; **B**, terminal and lateral umbels (Turkey, *Davis 20455*); **C, D**, mericarp and cross section (Turkey, *Rechinger 32836*); **E-G**, fruits of a single plant (Israel, *Herrnstadt*).

phrodite flowers; lateral umbels in whorls or opposite, with mainly hermaphrodite flowers; umbels with male flowers branch off from both terminal and lateral peduncles. *Bracts* and *bracteoles* often persistent; bracts (subulate-)linear to filiform, acuminate, 8-15 mm long; bracteoles 9-10 mm long. *Fruiting umbels* 7-15(-20)-rayed, 30-85 mm long. *Pedicels* two thirds to as long as ripe fruit. *Petals* yellow, glabrous, rarely with short papillae especially on the margins. *Fruit* widely varying in the amount of corky mesocarp, ellipsoid to globose, 12-25(-30) x 10-15 mm; wings absent or up to 3 mm wide, straight to slightly undulate, sometimes with erose margins; stylopodium comparatively small, somewhat embedded in the mericarp. *Fl. 3-7.* $2n = 66$ (Israel, Turkey, Iran, USSR); $2n = 44$ (Turkey).

Distribution

Libya (Cirenaica), C. and S. Italy, W. Jugoslavia, Albania, Greece, S.W. Romania, Bulgaria, Turkey, W. Syria, Lebanon, Israel, N. Iraq, Iran, USSR (Caucasus, Armeniya). Map 2. In widely differing habitats, in primary and secondary plant communities, 150-3000 m.

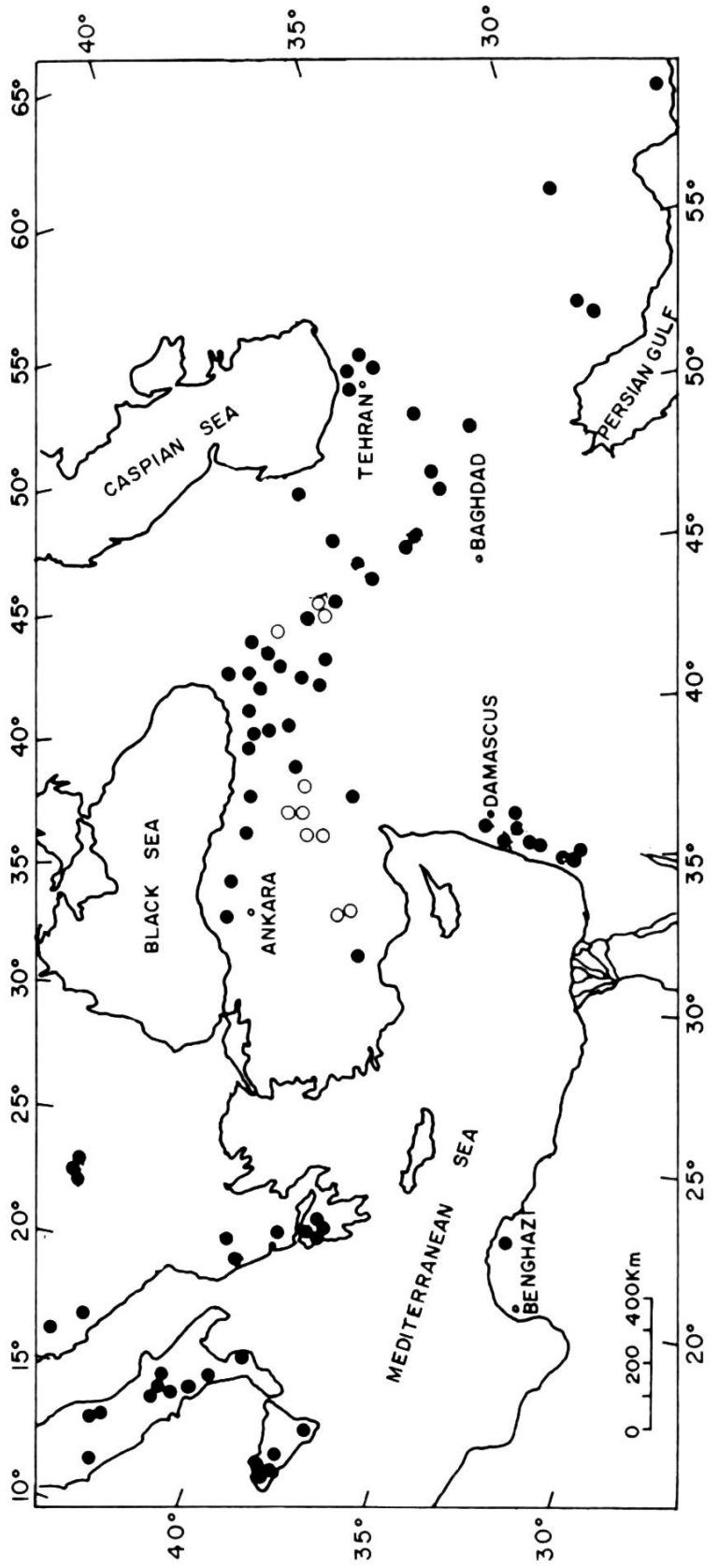
Selected specimens

Libya. Cirenaica, tra Caulan e el-Gubba, *Pampanini & Pichi-Sermolli 5700* (BM, HUJ). ***Italy.*** Morrone, Monte Vergine near Avellino, 1400 m, 26.6.1899, *Guadagno* (B, JE); Calabria, near San Giovanni in Fiore, 1300 m, *Bornmüller 165* (B); Pignola, mt. Serronetto, c. 1400 m, 30.5./18.7.1925, *Gavioli* (GB); Piceno: M. Vettore, *Orsini* (G); M. Dirupata di Murano, 800-1300 m, *Huter, Porta & Rigo 333* (G, GB). ***Sicily.*** Pizzo di Palermo, Pizzo Antenna, 1910-1945 m, 15./22.7.1873, *Strobl* (G); in pascuis subalpinis Busambra, *Huet du Pavillon 95* (G); piana della Canna, 24.6.1855, *Huet du Pavillon* (G); in M. Pizzanta supra Panormum, 6.1844, *Leresche* (G). ***Jugoslavia.*** Dalmatia, Ragusa, 7.1897, *Sagorski* (JE); Monte Negro, Korila, 1700 m, 7.1903, *Rohlena* (JE). ***Albania.*** Hasi, Pastrik, c. 1800 m, *Dörfler 902* (GB); Strakavec, 4500′, *Alston & Sandwith 2205* (K); Vrh-Suta versus Lamenice, *Baldacci 22* (K); in summis Mt. Murgana supra Subi, *Baldacci 53* (K). ***Greece.*** Pindus Tymphaeus, Mt. Baba supra Klinovo, 24.7.1885, *Haussknecht* (JE, K); Ahaia: Mt. Kyllene, 4000-4500′, 23.6.1887, *Heldreich* (B, E); Peloponnisos: Olonos, c. 1600 m, 7.6.1935, *Cyrén* (GB). ***Romania.*** Banat: inter Orsova et Portam Ferream, ad Danubium infer., 28.6.1870, *Janka* (E, G, as *Prangos jankae* Ascherson); in der Nähe des "eisernen Thores", 70 m, 17.5./29.5.1895, *Baenitz* (B, E, HUJ); inter Verciorova et Guravoie ad Danubium, 14.6.1911, *Degen* (GB – type locality of *P. carinata*); Mehedinti: Oltenia, inter pagos Verciorova et Gura Vaii, c. 60-80 m, *Borza & Nyárády 579* (E, as *P. carinata* Griseb.). ***Turkey.*** Kastamonu: Giaurdagh, *Sintenis 4183* (B, JE); Giresun: Şebinkarahisar, 1400 m, *Davis, Dodds & Çetik D 20455* (E, HUJ); Gümüşane: Argyridagh, *Sintenis 5828* (B, E, JE, L); Mt. de Almusk, près Beibout, *Bourgeau 99* (G-BOIS); Kars: 8 km from Kars, 1800 m, *Davis & Hedge D 30611* (E, HUJ); Erzurum: Tercan Aşkale, 1680 m, *Huber-Morath 10917* (herb. Hub.-Mor.); Agri, 2 km S.W. of Hamur, 1700 m, *Davis 44172* (E); Bitlis: 6 km S. of Bitlis, 1350 m, *Davis 43063* (E); Van: 3 km S.W. of Ercis, 1750 m, *M. Zohary & Plitmann 2160-5* (HUJ – leaf petioles with scattered compound papillae); Konya: Bozkir-Haydar dagh, 2000 m, *Çetik 281* (herb. Hub.-Mor.); Cappadocia: Ali Hodscha, 1400 m, *Siehe 27* (JE, as *Prangos cappadocica*); Maraş: Akher Dagh, 3300′, *Ball 971* (E – fruits with a slightly hidden stylopodium);

between Jalnizca and Artvin, 2500 m?, *Baytop 18364* (E); Hakkari: 8 km from Semdinli to Yikselova, 1900 m, *Davis 44990* (E). ***Syria.*** Mt. Hermon: Shib'ah, 10.10.1943, *D. Zohary* (HUJ). ***Lebanon.*** Qua'at-e-Shaqif, 16.5.1925, *Smoly* (HUJ); Mt. Hadet, *Blanche 273bis* (G-BOIS, type of *P. asperula* var. *stenoptera* Boiss.). ***Israel.*** Upper Jordan Valley: Mavo Hamma, 13.3.1971, *Hernnstadt* (HUJ); Upper Galilee: env. of Meron, 19.4.1968, *Yavin & Shmida* (HUJ); Tarshiha to Peqi'in, 31.5.1926, *Eig, M. Zohary & Feinbrun* (HUJ); near Mahenayim, 4.1924, *Smoly* (HUJ); Lower Galilee: E. Slope of Kokhav Ha Yarden, 18.4.1970, *Berliner* (HUJ); Migdal Ha'Emeq, 13.3.1971, *Herrnstadt* (HUJ); Esdraelon Plain: env. of Balfourya, 7.4.1924, *Eig* (HUJ – with wingless fruits); Mt. Gilboa, near Beit Alfa, *Davis 4191* (E, HUJ); Shefela: env. of Qubeiba, 21.3.1932, *Eig* (HUJ, as *Prangos goniocarpa* (Boiss.) Zoh.); 6 km N. of Masmiye, 27.3.1968, *Herrnstadt* (HUJ); Faluja to Shoval, 21.3.1954, *M. Zohary* (HUJ); N. Negev, 1 km E. of Tel Arad, 6.5.1967, *M. Zohary* (HUJ). ***Iraq.*** Kurdistan: Riwandous, 2200 m, *Bornmüller 1262* (B, JE); Avroman, above Darimar, above 1800 m, *Gillett 11848* (K, as *C. nematoloba*); N. of Halabja, c. 1500-1830 m, *Rawi 22087* (K, as *C. nematoloba*); Sersang, 3000′, *Haines W 1008* (K). ***Iran.*** Azerbaijan occid.: in monte Ghogeh Dagh, W. Bazargan, 2100-2250 m, *Rechinger 43994* (W); Rezaiyeh Silvanech, 1580-2550 m, *Termé 13596-E* (W); Kermanshah: Kuh Tarikha, 11.5.1904, *Strauss* (B, JE); Hamadan: Aq Bulaq, *Rioux & Golvan 322* (W); Kazvin: Mt. Elburs centr. prope Darbandak, 2400 m, *Gauba & Sabeti 894* (W); Elburz, in valle Scheheristanek, 2200 m, *Bornmüller 7150* (B); Tehran: ad Pril-e-Djadje-rud, 30.5.1909, *Bruns* (B); Damavend, c. 3000 m, *Bornmüller 7151* (BM, E); prope Shahrud, 5.1858, *Bunge* (G-BOIS); prope ruinas Persepolis, *Kotschy 830* (G-BOIS, as *Cachrys prangoides* Boiss.); Kerman: inter Kerman et Saidabad (Sirdjan), 2580 m, *Rechinger, Aellen & Esfandiari 3015* (E). ***USSR.*** Azerbaijan: Schuscha, 5-6.1838, *Hohenacker* (BM, G-BOIS, JE, as *Prangos foeniculacea* C. A. Meyer); Divitchi: Mt. Besch-barmak, 5.6.1937, *Karjagin & Scherlyakov* (HUJ); Iberia caucasica, 1841, *Hohenacker* (G-BOIS, as *P. foeniculacea* C. A. Meyer); Nakitschivan, *Szovits 339* (B, G-BOIS, as *P. foeniculacea* C. A. Meyer); Armenia: Kafan, 1850 m, 11.6.1960, *Grigorian* (E); Armenia: Mt. Karny-Jarych, 7000′, 9.-13.7.1926, *Schelkovnikov* (HUJ).

P. ferulacea is the most widespread species of the genus. Though it comprises many different forms, it is impossible to subdivide it because of the continuous variation of many characters. We include in *P. ferulacea* plants with winged and plants with wingless fruits. This concept is mainly based on morphological, anatomical and biosystematical studies (Herrnstadt & Heyn 1975b).

Four species with wingless fruits are included here in *Prangos ferulacea.* Of these only *P. carinata* is recorded from Europe. The other three *(Cachrys goniocarpa, C. prangoides* and *C. nematoloba)* occur in the eastern part of the distribution range of *P. ferulacea.* Fruits without conspicuous ribs occur sometimes, but only in plants from Turkey, Israel, Iraq, and Iran. No such fruits were discerned in European plants. In some plants with wingless fruits, especially if the development of one of the two mericarps is inhibited, the stylopodium is somewhat inclined and is inserted between the upper parts of the two mericarps, resembling the stylopodium of *Cryptodiscus.* It seems that this is a repeatedly occurring trend in fruits with a well developed mesocarp and may be discerned in different species of *Prangos,* as *P. gaubae* and *P. serpentinica* as well as in different forms of *P. ferulacea, e.g. "Cachrys prangoides"* and *"C. nematoloba".*



Map 2. – Distribution of *Prangos ferulacea* (●) and *P. uechtritzii* (○).

Although Boissier (1844) described *C. prangoides* as having a cup-shaped stylopodium, that of the fruit of the type specimen (Dalmkou, *Aucher 4629A*, BM, G-BOIS) is ± flat, as typical for *P. ferulacea*. The second specimen cited for this species by Boissier (1872) – inter Tschinar et Maregun, 8.1868, *Haussknecht* (BM, G-BOIS) – has, however, a stylopodium as described for *C. prangoides*. The above trend of the stylopodium was noticed by Townsend (1966) in three specimens of *C. nematoloba* Rech. fil. from Iraq (Mt. Avroman). However, even between the plants examined by him, we found variation in the degree of the insertion of the stylopodium. In an additional specimen from the same region, also named *C. nematoloba* by Townsend (*Wheeler-Haines 1008*, E), some fruits have slightly immersed stylopodia while the majority has flat ones. It seems to us that the plants described as *"C. nematoloba"* should be regarded only as a local variation of *P. ferulacea:* the large wingless fruits with conspicuous ribs fit into the range of variability of the latter.

Scabridity may occur at different degrees in *P. ferulacea*, and even plants cited by Boissier as belonging to the typical variety may be at least somewhat scabrid. For that reason plants with different degrees of scabridity are not described as varieties. Some correlation was found between the aridity of the habitat, the extent of scabridity and the width of leaf-lobes. The plants from drier habitats have a denser cover of papillae and basal leaves with wider leaf-lobes as compared to those growing in more favourable habitats.

Scabrid forms of *P. ferulacea* resemble *P. asperula* subsp. *asperula* of Syria and Lebanon in their general habit and also in their sometimes slightly papillate petals. They differ, however, in lacking the typical undulation of the wings with interruptedly reflexed margins. There is no doubt that *P. ferulacea* and *P. asperula* are closely related species. In a collection from Lebanon: Sannin *(Bornmüller 647* to *651)* there are typical *P. asperula* subsp. *asperula* plants together with plants resembling *P. ferulacea* as well as some intermediates. As pointed out above in table 1, these two are so far the only species of the genus in which hexaploids ($2n = 66$) have been found.

5. **Prangos uechtritzii** Boiss. & Hausskn. in Boiss., Fl. Or. 2: 938. 1872 ≡ *Cachrys uechtritzii* (Boiss. & Hausskn.) Herrnst. & Heyn, in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** Turkey, "in rupestribus montis Berytdagh Cataoniae", 7000′, 8.8.1865, *Haussknecht* (holotype: G-BOIS; isotype: JE).

Ic.: fig. 9.

Plant very similar to *P. ferulacea*, but taller, with leaf lobes rigid, up to 50 mm long. Rays of fruiting umbels 12-20. Bracts and bracteoles linear-filiform.

Distribution

Turkey: C., S. and E. Anatolia. Map 2.

Selected specimens

Turkey. Kayseri: Ali Dagh, 1490 m, *Balansa 1008* (G-BOIS); Maraş: Binboga dağ above Yalak, 2000 m, *Davis, Dodds & Çetik D 20158* (E); Bitlis: Suphan dağ above Achilceraz, 9000′, *Davis & Polunin D 24700* (E); Agri to Horasan, 2050 m,

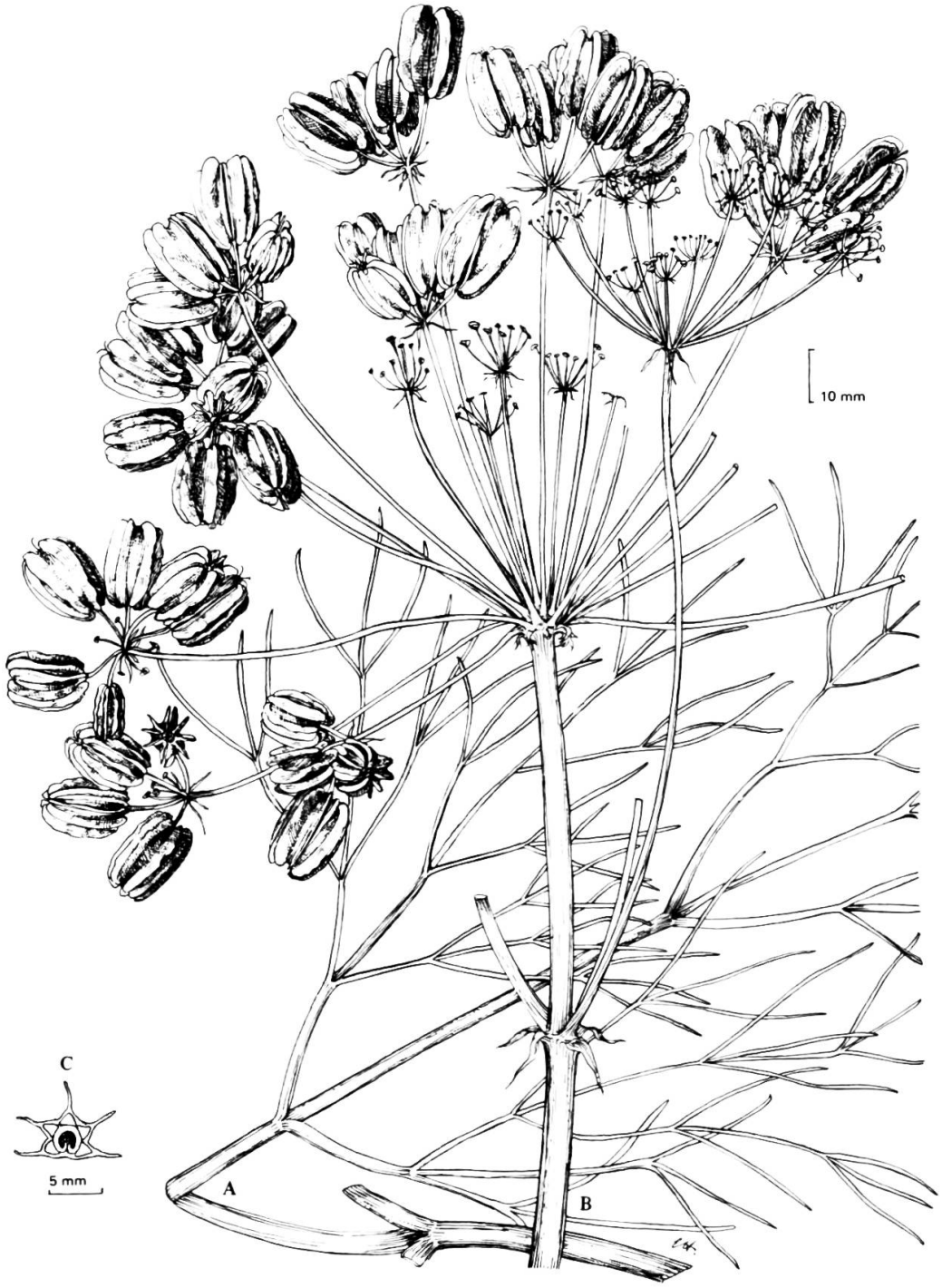


Fig. 9. – *Prangos uechtritzii.* **A,** part of basal leaf; **B,** terminal and lateral umbels; **C,** cross section of a mericarp (Turkey, *Haussknecht*).

Lamond 2560 (E, HUJ); Konya: Ermenek-Fariske, 1000 m, *Huber-Morath 9798* (herb. Hub.-Mor.); Hadim Taşkent, 1650 m, *Huber-Morath 8604* (herb. Hub.-Mor.); Maraş: Ahir dağ above Maraş, 1100 m, *Davis & Hedge D 27479* (E, HUJ); Hakkari: 6 km N. of the junction of the Van-Hakkari and Yüksekova roads, 1800 m, *Davis 45756* (E).

Some specimens seem to occupy an intermediate position between *P. ferulacea* and *P. uechtritzii.*

6. Prangos asperula Boiss., Diagn. Pl. Or. Nov. 10: 54. 1849 ≡ *Cachrys asperula* (Boiss.) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Syntypes:*** Lebanon, Rascheya, 5.6.1846, *Boissier* (G-BOIS); Eden, 5.-7.1846, *Boissier* (G-BOIS).

Ic.: fig. 10 A-G.

Tall plant, 50-150 cm, from nearly glabrous to densely papillate all over. Basal *leaves* and lower cauline leaves large, 30-70 cm long, up to 6-pinnatisect; lobes linear to filiform, (5-)10-30(-40) x (0.3-)0.5-1.5(-2) mm, mucronate. Terminal *umbels* in a group, with hermaphrodite flowers; lateral umbels in whorls or opposite, with hermaphrodite or male flowers. *Bracts* and *bracteoles* more or less persistent; bracts subulate, linear to filiform, acuminate, 8-20 mm long; bracteoles 5-10 mm long. *Fruiting umbels* (7-)9-16(-18)-rayed, 4.5-11 cm long. *Pedicels* half to as long as ripe fruit. *Petals* yellow, glabrous, to shortly papillate. *Fruit* broad-ellipsoid, (10-)15-20(-25) x 6-10 mm; wings 3-4 mm wide, undulate with interruptedly reflexed margins (seldom margins crenate). *Fl. 5-7.* $2n = 66$.

1a. Petals sometimes papillate, especially on margins; all other organs (except fruits) more or less densely papillate. Leaf lobes usually 1-1.5 mm wide (Lebanon, Syria) . . . . . 6a. subsp. *asperula*

1b. Petals glabrous; leaf lobes glabrous to sparsely papillate, stems glabrous or rarely covered with compound papillae (fig. 10 G). Leaf lobes usually 0.3-0.75 mm wide (Iraq, Iran) . . . . . 6b. subsp. *haussknechtii*

6a. P. asperula subsp. **asperula** (synonymy as in the species).

Distribution

Widespread in Lebanon and Syria. Map 3. Mountains, up to 1900 m.

Selected specimens

Lebanon. In jugo Sannin, 1600-1800 m, *Bornmüller 647* (B, E, JE); Gebel Sannûnaus, 1700-1900 m, 10.6.1904, *Kneucker* (B); Weir el Beida, *Davis 6012A* (E, HUJ); *Cedrus* forest above Eden, 1700-1900 m, 24.7.1931, *Eig & M. Zohary* (HUJ); ad pagum Bhamdun, 1200-1300 m, *Bornmüller 11849* (B, JE); Khan Mrad, route de Beyrouth à Damas, *Gaillardot 450* (G-BOIS, JE); Dahr el Bedar, 19.6.1932, *Eig & M. Zohary* (HUJ); Djurd Hadet, *Blanche 272* (G-BOIS); route de Saïda à Damas, *Gaillardot 450* (G-BOIS, JE); Diman (Gublu), 20.6.1866, *Blanche* (JE). ***Syria.*** Hama, à Tripoli au Kalat al Hasam, *Blanche 3966* (G-BOIS); mountain E. of Duma, 4.7.1865, *Post* (E).

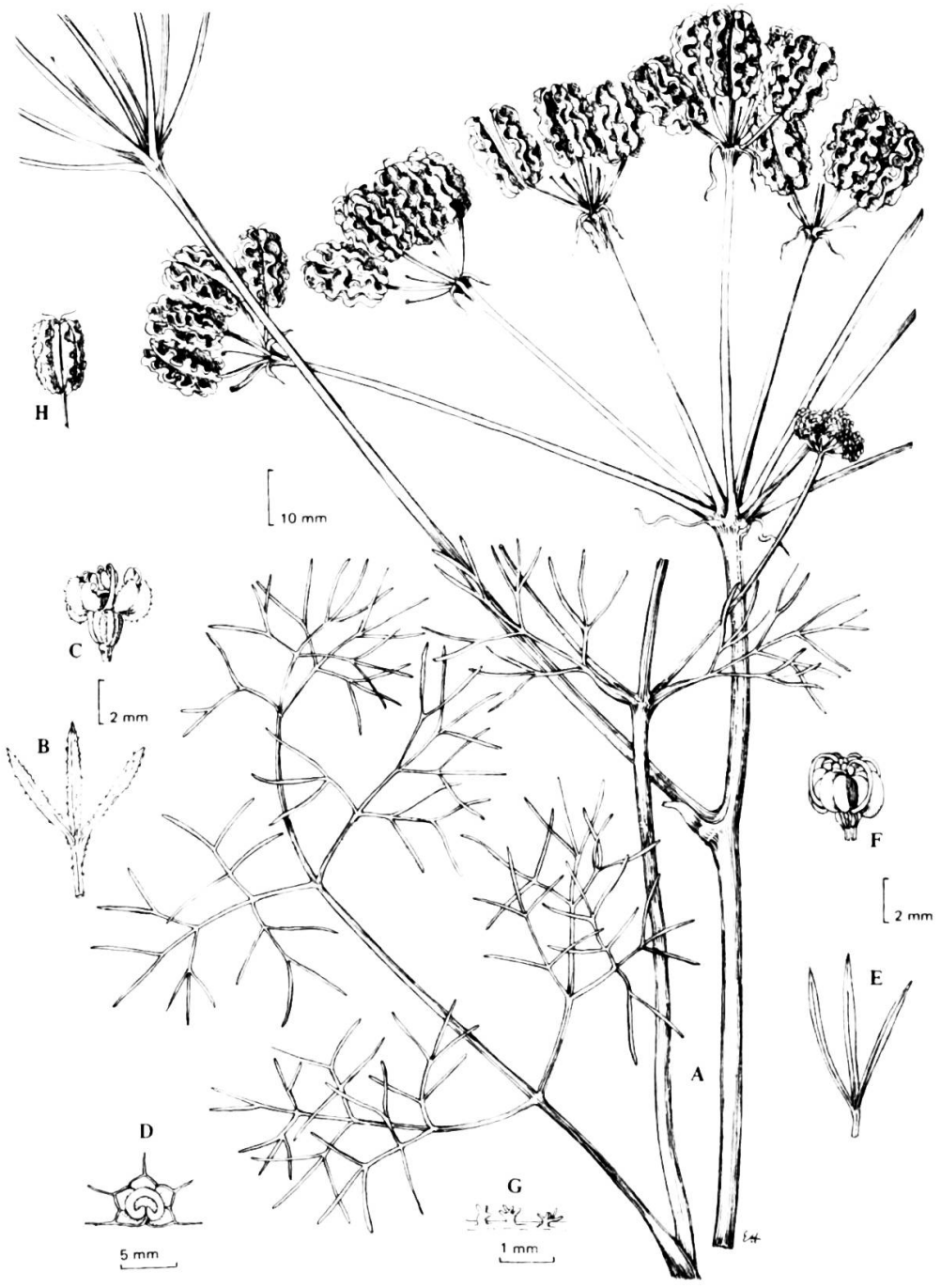


Fig. 10. – *Prangos asperula* subsp. *asperula* **(A-D)**; *P. asperula* subsp. *haussknechtii* **(E-G)**; *P. denticulata* **(H)**. **A,** stem with cauline leaf and terminal umbel; **B,** leaf lobes; **C,** flower; **D,** cross section of a mericarp (Lebanon, *Eig & Zohary*); **E,** leaf lobes; **F,** flower (Iran, *Wright 530-205)*; **G,** compound papillae (Iran, *Lamond 4278*); **H,** fruit (Turkey, *Tchihatcheff 748*).

6b. P. asperula subsp. **haussknechtii** (Boiss.) Herrnst. & Heyn, **comb. nova** ≡ *P. haussknechtii* Boiss., Fl. Or. 2: 940. 1872 ≡ *Cachrys asperula* subsp. *haussknechtii* (Boiss.) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Syntypes:*** Iran, in M. Savers et Kuh Gelu, 9000-12 000′, 7.1868, *Haussknecht* (G-BOIS, isosyntype: JE); Iran propre Shahrud, 5.1858, *Bunge* (G-BOIS).

Distribution

Widespread in Iran; only one specimen seen from Iraq. Map 3. Mountains, up to 4000 m.

Selected specimens

Iraq. Chia-i-Mandali, 7000′, *Guest 2693* (K). ***Iran.*** Azerbaijan: S.E. Shahpur versus lacum Rezaiyeh, 1300 m, *Rechinger 41863b* (W); Rezaiyeh, 26 km N.W. versus Sero, 1600-1700 m, *Rechinger 42046* (W); Kurdistan: 11 km N. Saqqez, 1550 m, *Rechinger 43136* (W); Khamseh: Kuh Anguran, inter Manjil et Zanjan, 1900-2200 m, *Rechinger 40883* (W); Luristan: Safed Kuh, 5000 m, *Koelz 17577* (W); Lorestan, inter Dorud et Azna, ca. 7000′, *Bent & Wright 530-205* (W); G. Zagros, betw. Khorramabad and Hamadan, ca. 2000 m, 11.6.1970, *Wysylikowa* (KRAM); Prov. Bakhtiari: Gahar, 8000′, *Koelz 18017* (W); in valle Scheheristanek, montium Elburs, ca. 2200 m, *Bornmüller 7150* (JE); Demavend, ca. 3000 m, *Bornmüller 7151b* (B); Fars, Ardakan, Kuh Madab, *Kashkouh 12938E, 13003E* (W); Kerman, zw. Sirjan und Bardsir, 2500 m, *Bobek 5* (W); 7 km N. of Sirjan, 8600′, *M. Zohary & Orshan 6800* (HUJ); Gulbar in Mt. Sawers, 7.1868, *Haussknecht* (GB).

In one collection (Iran: Prov. Kahmseh, 8-20 km from Zanjan on road to Bijar, 1900 m, *Lamond 4278;* E, HUJ), the plants have stems covered with compound papillae.

In Boissier's subdivision of the genus, *P. haussknechtii* is included within the group with "petala glabra", *P. asperula* within the group with "petala extus hirta". In fact, Boissier's specimens of *P. asperula* (including the type) have petals which are not hairy but papillate, mainly on their margins. (The extent of papillosity of the petals is usually in correlation with the general degree of scabridity of the whole plant, *e.g.,* in *P. ferulacea* and *P. pabularia.*) In our *P. haussknechtii* subsp. *haussknechtii,* the whole plants, including the petals, are usually glabrous. It seems to us that the degree of papillosity is not a character by which the otherwise similar *P. asperula* and *P. haussknechtii* can be delimited at specific level. However, as this character is correlated with a difference in geographical distribution, they are given subspecific rank.

7. Prangos denticulata Fischer & C. A. Meyer in Ann. Sci. Nat. Bot. ser. 4, 1: 35. 1854 ≡ *Cachrys denticulata* (Fischer & C. A. Meyer) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** Turkey, Ankara, Kuré-Dagh, 1849, *Tchihatcheff* (holotype: LE; drawing seen; isotype (?): G-BOIS).

Ic.: fig. 10 H; Tchihatcheff, As. Min. Atl.: 19. 1860.

Tall papillate plant. Lower *leaves* large, ovate, 5-6-pinnatisect; lobes 7-12 x 0.5 mm, mucronate. Terminal *umbels* in a group (always?); lateral umbels opposite, with

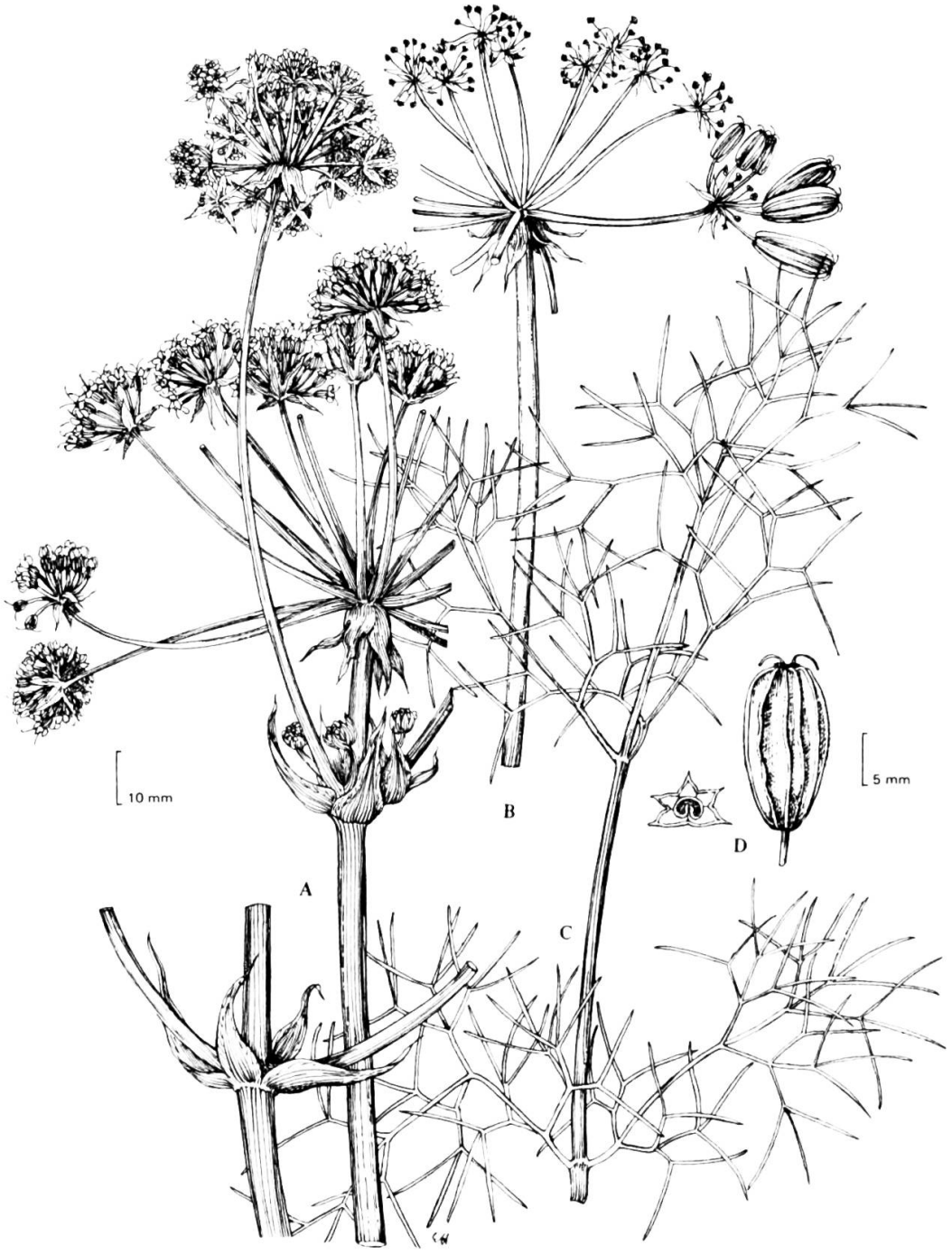


Fig. 11. – *Prangos platychloena.* **A,** stem with flowering umbels; **B,** mature umbel; **C,** part of leaf; **D,** fruit and cross section of one mericarp (Turkey: **A-C,** *Davis 31253;* **D,** *Sintenis 3350*).

male flowers. *Bracts* and *bracteoles* linear to filiform, often persistent; bracts up to 12 mm, bracteoles 4-6 mm long. *Fruiting umbels* 9-13-rayed, 3-5 cm long. *Pedicels* two thirds as long as ripe fruit. *Petals* yellow, glabrous. *Fruit* broad-ellipsoid, 13-15 x 8 mm; wings 3 mm wide, undulate with interruptedly reflexed and dentate margins.

Distribution

Turkey: C. Anatolia. Map 3. Mountains, about 500-1000 m

Specimens seen

Turkey. Ankara: in monte trachytico Hussein Kazi prope Angora, *Wiedemann* (G-BOIS).

P. denticulata is distinguished from *P. asperula* mainly by the dentate margins of the fruit wings and its isolated distribution. We have not been able to find more than one specimen, in addition to the specimen which is perhaps the isotype (both from the Ankara district in Turkey). Further material is necessary to reach a firm decision on the taxonomic status of this species.

8. **Prangos platychloena** Boiss. ex Tchih., As. Min. Bot. 1: 457. 1860 ≡ *Cachrys platychloena* (Boiss. ex Tchih.) Hermst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** Turkey, Armenia, "prope pagum Kale, haud procul a m. Mille Lacuum (Bingoeldagh)", 1900-2000 m, *Tchihatcheff 896* (G-BOIS).
– *P. armena* Kotschy & Boiss. in sched. impr. Kotschy, It. Cilic.-Kurd. a. 1859, n. 515, *nom. nud.*

Ic.: fig. 11.

Tall robust plant, to 100-150 cm high, with glabrous stem and papillate leaves. Basal and lower cauline *leaves* large, 30-60 cm long; basal leaves with a well developed sheath, up to 5-pinnatisect; lobes (15-)20-50 x (0.5-)1-2 mm, mucronate. Terminal *umbels* in a group or single; lateral umbels in whorls or opposite, with hermaphrodite or male flowers; leaves at the base of the lateral umbels consist of a broad, ovate-acuminate sheath, often terminating in a few lobes. *Bracts* (2-)3-7, conspicuous, 12-15 x 6-10 mm, shaped as the leaves of the lateral umbels, usually without lobes, persistent; *bracteoles* 5-7, 6-10 x 3-5(-8) mm, ovate-acuminate. *Fruiting umbels* 9-20-rayed, 6-13 cm long. *Pedicels* half to two thirds as long as ripe fruit. *Petals* pale yellow, glabrous. *Fruit* narrowly ellipsoid, 15-22 x 7 mm; wings narrow, 1.5-2 mm, straight, in young fruits sometimes undulate. *Fl. 5-7.*

Distribution

Widespread throughout Anatolia; rare in Iran. Map 3. Screes, rocky limestone slopes, 1000-3000 m.

Selected specimens

Turkey. Giresum: 4 km nördlich Sebin Karahisar, 1260-1300 m, *Huber-Morath 13700* (herb. Hub.-Mor.); Gümüşane: Karagoelldagh, 29.7.1894, *Sintenis 7261* (JE); Sipikor: versus Orumserai, 9.8.1890, *Sintenis 3350* (JE); Gümüşane: Bayburt, Kop

Dağ, 2130 m, *Bertschinger 15417* (herb. Hub.-Mor.); Sivas: Kezelmezra köyü, *Yeldizay 12454* (E); Malatya: Alh Dagh, Bölam Dagh, 13.9.1865, *Haussknecht* (G-BOIS, JE); Tunceli: Munzur Dağ above Ovacik, 2700 m, *Davis & Hedge D 31253* (E); Tunceli: Erzincan, env. of Pülümür, 1900 m, *M. Zohary 534* (HUJ); Elazig: Karakoçan, Saribaşak Köyü, *Gözler 15810* (E); Erzurum: Kop Dağ, 2300 m, *T. Baytop 14-341* (E); Muş: Bulanik-Muş, 2000 m, *Huber-Morath 10919* (herb. Hub.-Mor.); Bitlis: Sünhan Dağ, 8500-9500′, *Stileman 53* (E). ***Iran.*** Azerbaidjan, Khalkal-Ardalul, 1400-1700 m, *Termé el Maussau* (W).

P. platychloena is a most distinct species, mainly on account of the well-developed leaf sheaths, the conspicuous persistent bracts and bracteoles and the great number of fruiting rays.

9. **Prangos peucedanifolia** Fenzl in Flora 16: 463. 1843 ≡ *Cachrys peucedanifolia* (Fenzl) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** Turkey, Diarbakir, in monte Karadaja Dagh prope Diarbakir Mesopotamiae, *Kotschy 197* (holotype: W; isotype: E).

= *P. pumila* Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 77. 1844. ***Type:*** Turkey, Taurus Mts., *Aucher 3589 ex parte* (G-BOIS).

= *P. deserti* Post & Beauverd in Dinsm., Pl. Post. Dinsm. 1: 6. 1932. ***Type:*** Syria: "inter Izriyah (Isria) et ul-Mawraydagh", 4.1900, *Post* (BEI – not seen; isotype: HUJ).

= *P. kurdica* Rech. fil. in Symb. Bot. Upsal. 11/5: 27. 1952. ***Type:*** Kurdistan: Uçum, 22 km S.W. von Mukus, 1900 m, 21.6.1939, *Frödin II: 116* (UPS).

Ic.: fig. 12.

Small plant, to 35 cm high, glabrous, papillate or short-hairy especially on lower parts, sometimes with a single cauline leaf. Basal *leaves* 2-3, 20-25 cm long, with a conspicuous sheath; blade ovate in outline, (3-)4(-5)-pinnatisect; segments few, 3-4(-5) pairs, the petiolules of the first pair much longer than those of the others; lobes 5-25 x 1.5-2 mm, mucronate. Terminal *umbel* usually single, hermaphrodite; lateral umbels 2-4, opposite, rarely alternate, with mainly male flowers. *Bracts* about 5 mm, *bracteoles* 2-3 mm long, both subulate, usually caducous. *Fruiting umbels* 12-16-rayed, 3-6 cm long. *Pedicels* about half as long as ripe fruit. *Petals* whitish, glabrous. *Fruit* broad-ellipsoid to nearly globose, 12-20(-23) x 10-15 mm, edible in young stage; wings 3-4 mm wide, slightly undulate, sometimes margin crenate. *Fl. 5-6.*

Distribution

Turkey (mainly in S. and E. Anatolia), W. Syria, N. Iraq. Map 3. Rocky, often calcareous mountain slopes (200-)480-1900 m.

Selected specimens

Turkey. Malatya: Sürgü-Perveri, 1380 m, 26.5.1956, *Huber-Morath* (herb. Hub.-Mor.); Adiyaman: 36 km nach Malatya, 1150 m, 14.6.1949, *Huber-Morath* (herb. Hub.-Mor.); Elazig: Ergani-Maden, *Huber-Morath 13658* (herb. Hub.-Mor.); Kharput, *Sintenis 554* (K – with especially large fruit); Urfa: N. slope of Karacadağ, 1250 m, *Davis & Hedge D 28309* (E); Aludja Dagh, *Fenzl* (G-BOIS); Mardin, *Sintenis 899*

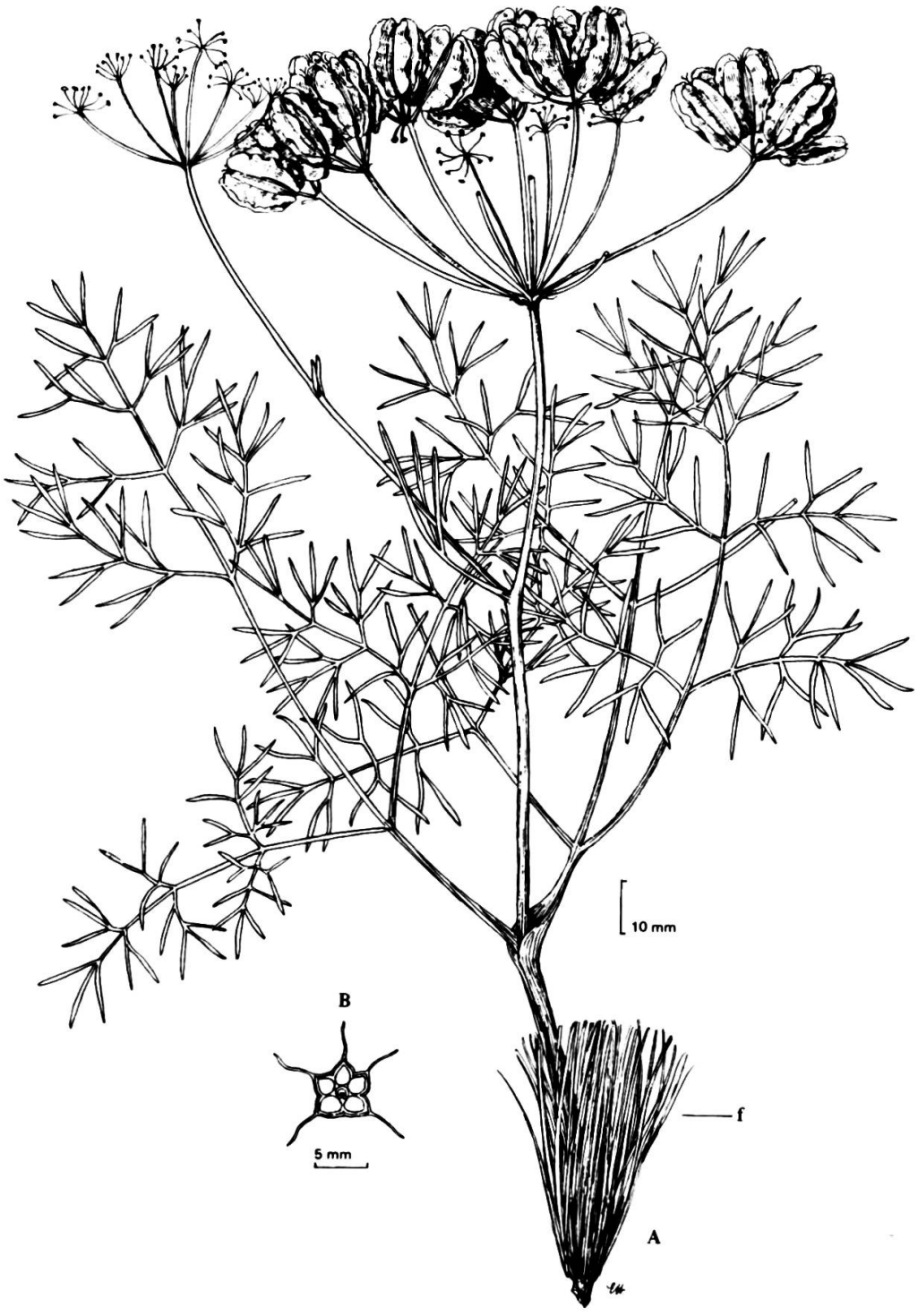
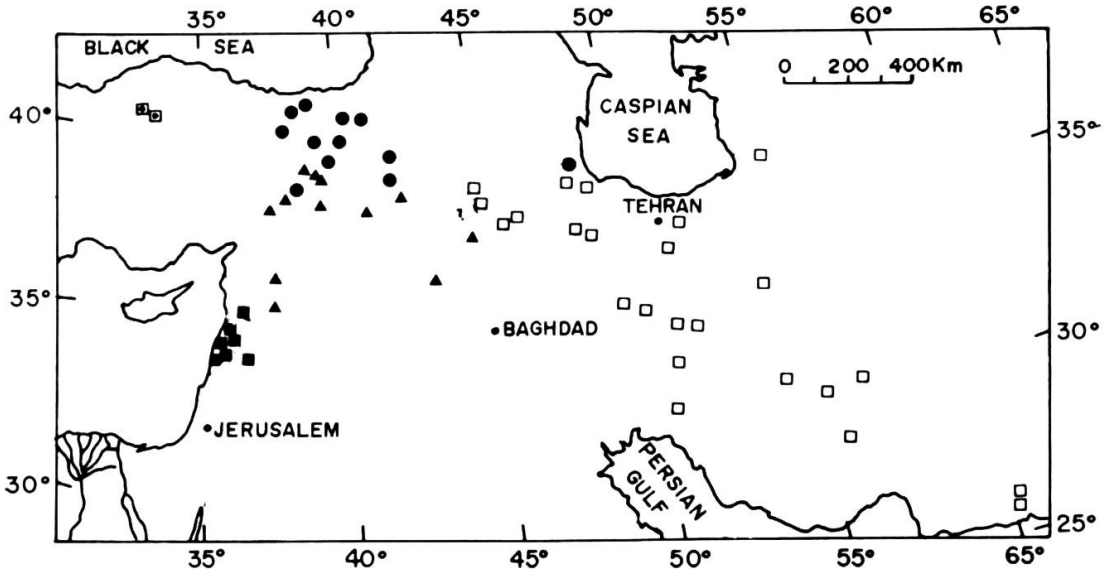


Fig. 12. – *Prangos peucedanifolia*. **A**, habit (*f* = fibrous collar made of remnants of sheaths from previous years); **B**, cross section of a mericarp (Turkey, *Davis 29046*).



Map 3. – Distribution of *Prangos asperula* subsp. *asperula* (■), *P. asperula* subsp. *haussknechtii* (□), *P. denticulata* (⊡), *P. platychloena* (●) and *P. peucedanifolia* (▲).

(JE); de Hama à Palmyra, *Blanche 3963* (G-BOIS – cited by Boissier (1872) as *Prangos asperula*). ***Syria.*** Jebel Zebed, *Post 23* (HUJ). ***Iraq.*** Shaqlawa, 900 m, *Gillett 11562* (K); Ain Dibs-Jebel Makhul, 200-480 m, *Gillett & Rawi 7216* (K).

Prangos deserti and *P. kurdica* resemble *P. peucedanifolia* in the fruit, the indumentum and the structure of leaves. They have been described as having shorter leaf lobes (3-7 mm). However, even in the type specimen of *P. kurdica,* some of the cauline leaves have leaf lobes similar to those of typical *P. peucedanifolia* plants. Therefore, it is assumed that this is a character which varies in some populations of *P. peucedanifolia,* and the two above-mentioned "species" are included in it.

10. Prangos acaulis (DC.) Bornm. in Repert. Spec. Nov. Regni Veg. 39: 122. 1935 ≡ *Cachrys acaulis* DC., Prodr. 4: 238. 1830 ≡ *P. szovitsii* Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 78. 1844, *nom. illeg.* ***Type:*** [Iran] "ad lacum Ormiah in Aderbeidjan", *Szovits* (holotype: G-DC, photograph seen; isotype: G-BOIS).

= *P. odontoptera* Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 78. 1844. ***Type:*** Turkey, Taurus,[1] *Aucher 3589 ex parte* (G-BOIS).

= *P. ovatifolia* Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 79. 1844 ≡ *P. odontoptera* var. *conferta* Boiss., Fl. Or. 2: 942. 1872. ***Type:*** Persia, loco non notato, *Aucher s.n.* (holotype: P – not seen; isotype: G-BOIS).

= *P. cinerea* Boiss. in Ann. Sci. Nat. Bot. Ser. 3, 2: 80: 1844. ***Type:*** Persia, Aderbidjan, *Aucher 4590A* (G-BOIS).

[1] Boissier (1872) mentions the possibility that the actual collecting locality of Aucher's specimen might be in Persia.

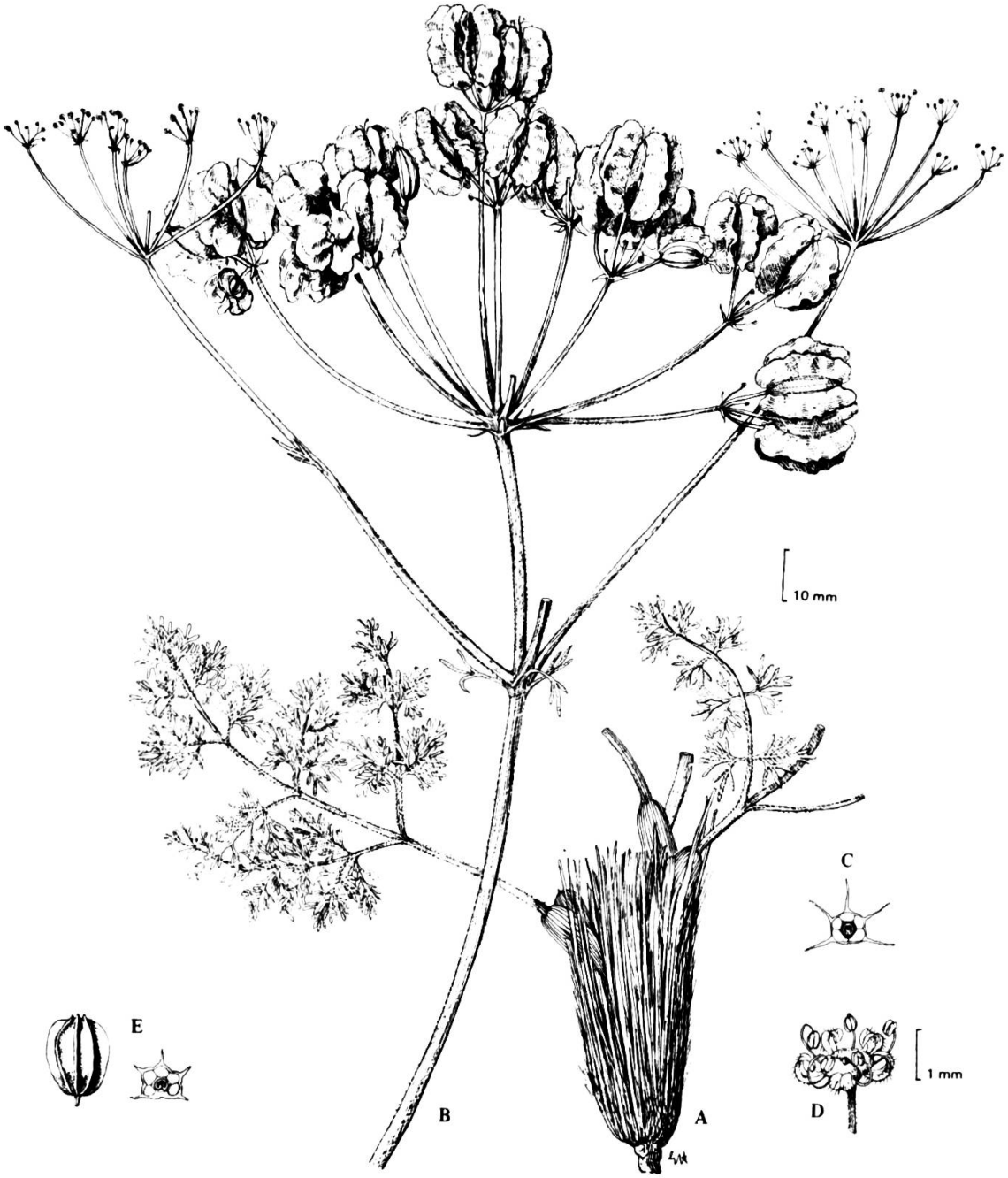


Fig. 13. – *Prangos acaulis* **(A-D)**; *P. hermonis* **(E).** **A,** base of stem with basal leaves and fibrous collar; **B,** terminal and lateral umbels; **C,** cross section of a mericarp; **D,** flower (Iran, *Strauss*); **E,** mericarp and its cross section (Syria, *Kotschy 216*).

= *P. humilis* Fischer in Ledeb., Fl. Ross. 2: 359. 1844. ***Type:*** [USSR] pr. Nackitschewan, *Szovits* (LE? – not seen).
= *P. arabica* Velen. in Repert. Spec. Nov. Regni Veg. 13: 27. 1913. ***Type:*** "Arabia: in distr. el Wudijan, Gezar", *Velenovský* (PR? – not seen).

Ic.: fig. 13.

Greyish plant to about 35-40 cm high, covered with short and long crispate hairs, only sometimes with one cauline leaf. Basal *leaves* 4(-5), 15-25 cm long, with a conspicuous sheath separated from the petiole by a node; blade (3-)4-pinnatisect; segments few, 4(-5-6) pairs; lobes short, 1.5(-10) x 1.5-3 mm. Terminal *umbel* usually single, hermaphrodite; lateral umbels male, rarely hermaphrodite, opposite or alternate. *Bracts* and *bracteoles* subulate, caducous; bracts 6-9 mm, bracteoles 3-4 mm long. *Fruiting umbels* (5-)7-12-rayed, 30-50 mm long. *Pedicels* about half to two thirds as long as ripe fruit. *Petals* pale yellow, pubescent outside. *Fruit* broad-ellipsoid, 12-17 x 10-15 mm; wings undulate, about 3-5 mm wide, sometimes with crenate, remotely denticulate margin. *Fl. 4-7(-8).*

Distribution

E. Turkey (Taurus), Soviet Armenia and Iran. Map 4. Mountains up to 1200-2300 m.

Selected specimens

Turkey. Van: Erçis, 1700 m, *Karamanoğlu 66-69* (E); 8 km from Van to Erçek, 1850 m, *Davis 44273* (E – has well developed sepals, but probably belongs to this species). ***Iran.*** Kurdistan: m. Hamzeh Arab, S.E. Bijar, 2000 m, *Rechinger 42495* (W); Luristan: Dorud, 7000′, *Koelz 17344* (W); Dscham Tuch, 14:5.1904, *Strauss* (B, JE); 50 km S.W. von Sultanabad, 2100 m, *Kφie 840* (B); inter Teheran et Tabris, 6.1859, *Bunge* (G-BOIS, as *P. odontoptera*); Hamadan-Kermanshah, ad Kangavar, 23.5.1903, *Strauss* (JE); Gulpayegan, 6.1899, *Strauss* (B, JE); Karaghan, 1902, *Strauss* (B, JE); 27 km S.E. of Hamadan, *Bent & Wright 528-602* (W); Kuh-Wafs, 10.6.1905, *Strauss* (B, JE); Burudjind (Borujerd), 7.1897, *Strauss* (B, JE, as *P. odontoptera* var. *conferta*); inter Sultanabad et Kum, 6.1897, *Strauss* (B, JE); Mowdere, 2.6.1895, *Strauss* (B, JE); Teheran: Pul-e-Djedje-Sud, 30.5.1909, *Bruns* (B); Karadj-Tal, Velian, 2200 m, *Iranshahr 12932E* (W); Inter Qazvin et Teheran, prope Kusch Kerabad, 1200-1300 m, *Bornmüller 7152* (B); Keredj: Salzberge bei Mardabad, *Gauba 306* (B); inter Pashand et Khur, 1400 m, *Gauba 895* (W); Isfahan, 5.1859, *Bunge* (G-BOIS, as *P. odontoptera*); prope ruinas urbis Persepolis, *Kotschy 835* (G-BOIS, as *P. szovitzii*); Mt. Kuh-i-Gäsawend, 1.7.1909, *Strauss* (B, JE, as *P. odontoptera* var. *conferta*); Sultanabad ad Abbasabad, 18.7.-1890, *Strauss & Bornmüller* (B).

In our study three species described by Boissier (1844), *P. odontoptera, P. szovitsii* and *P. ovatifolia,* are included in *P. acaulis.* Boissier (1872) discerned between *P. odontoptera* and *P. szovitsii* by the degree of thickening of the base of the wings and the form of their margin. These were found, however, to be most variable and gradually changing characters. Boissier himself transferred *P. ovatifolia* to *P. odontoptera* as var. *conferta. P. odontoptera* var. *conferta* is described as having short leaf lobes which are compactly arranged, as a result of the reduction of petiolules. (The same phenomenon occurs also in *P. cheilanthifolia* and some-

times in *P. meliocarpoides.*) We found that the leaf lobes may be intermediate between those of typical *P. acaulis* and "*P. odontoptera* var. *conferta*", and even that both leaf types may occur together in the same population (*e.g.*, Persia: Sultanabad, Chaladsihertan, inter Sultanabad et Kum, 1898, *Strauss,* B, JE: one plant with leaves typical for *P. acaulis,* the other with leaves typical for "*P. odontoptera* var. *conferta*").

11. **Prangos hermonis** Boiss., Fl. Or. 2: 943. 1872 ≡ *Cachrys hermonis* (Boiss.) Hermst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** [Syria] "In valle Orny ad latus orientale montis Hermonis Antilibani sita, alt. 5000'", *Kotschy 216* sub *P. cheilanthifolia* (holotype: G-BOIS; isotype: K).
= *P. meliocarpoides* var. *trachonitica* Post in J. Linn. Soc. Bot. 24: 430. 1888. ***Type:*** [Syria] Tell-Shihân, ditionis Trachonitis, *Post* (BEI – not seen; isotype: K).

Ic.: fig. 13 E.

P. hermonis resembles *P. acaulis* in the general structure of the fruit, except for the straight narrow wings (up to 2 mm wide) with an entire margin and a thicker corky base.

Distribution

Syria: Mt. Hermon, S.E. Golan. Map 4.

Specimen seen

Syria. Shahbah volcanic cone, 1350 m, 21.5.1933, *Meyers & Dinsmore 11058* (K).

Only very few specimens, all from the same region, could be studied in herbaria. During recent collections carried out in the southern parts of Mt. Hermon no plants of this species were found. It was decided, with some reluctance, to retain *P. hermonis* as a species separate from *P. acaulis* because of the above-mentioned differences in wing characters as well as its specific geographic distribution.

Post (1896) does not mention *Prangos meliocarpoides* var. *trachonitica,* described by him previously (Post 1888), but cites a specimen from the same locality as *P. hermonis.*

12. **Prangos corymbosa** Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 81. 1844 ≡ *Cachrys corymbosa* (Boiss.) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** [Turkey] in Cappadocia ad Euphratem, *Aucher 3591* (holotype: G-BOIS; isotype: K).

Ic.: fig. 14.

Tall plant, more or less densely covered with crispate hairs. Basal *leaves* over 30 cm long, ovate, 4-5(-6)-pinnatisect, primary segment pairs nearly sessile; lobes short, 2-3 x 1 mm, mucronate, sessile. Terminal *umbel* single, hermaphrodite; lateral umbels in whorls or opposite, rarely alternate, with male flowers. *Bracts* and *bracteoles* subulate to narrow-linear, often caducous; bracts 10-15 mm, bracteoles 5-7 mm long. *Fruiting umbels* 6-10 rayed, 6 cm long. *Pedicels* two thirds

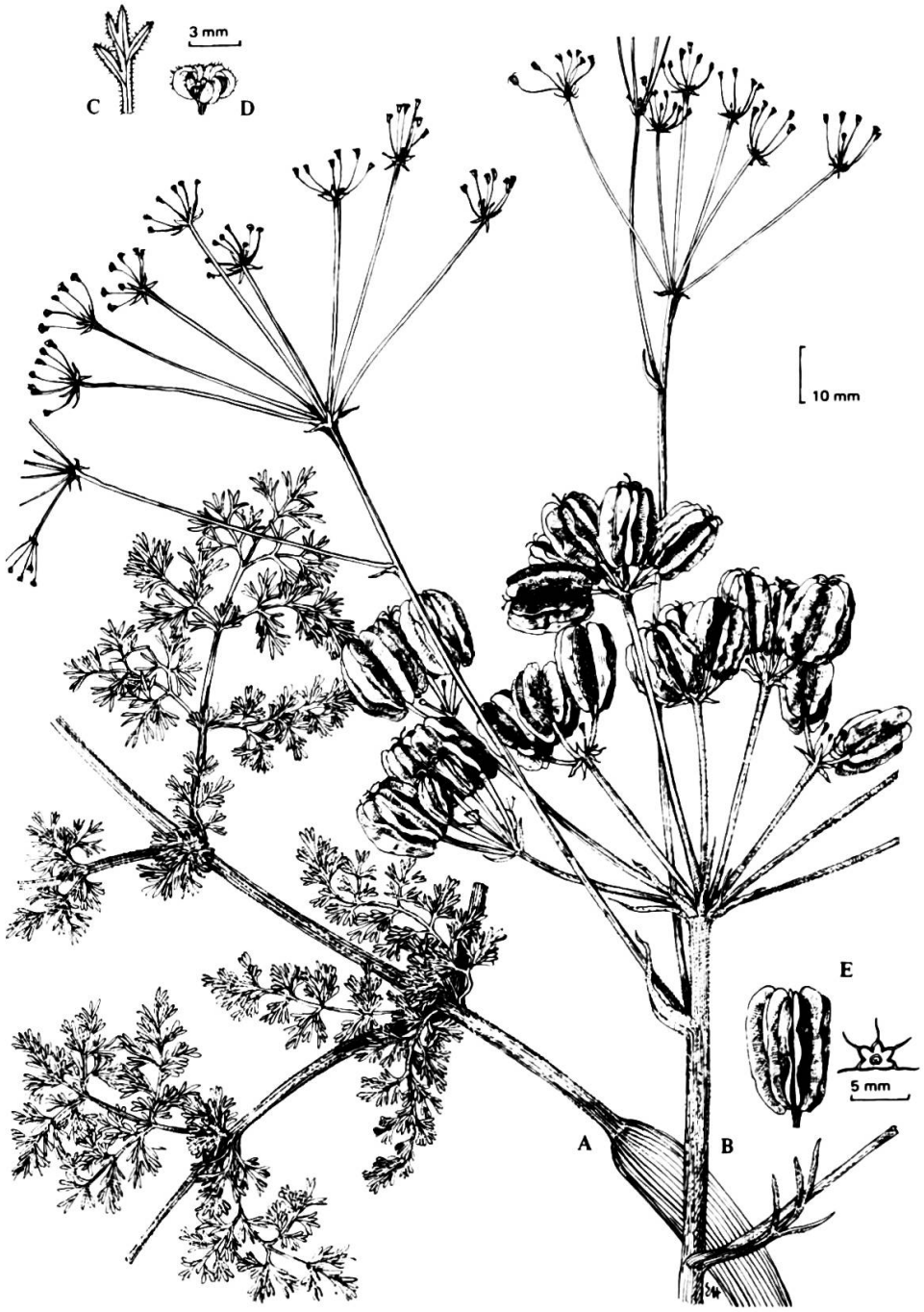
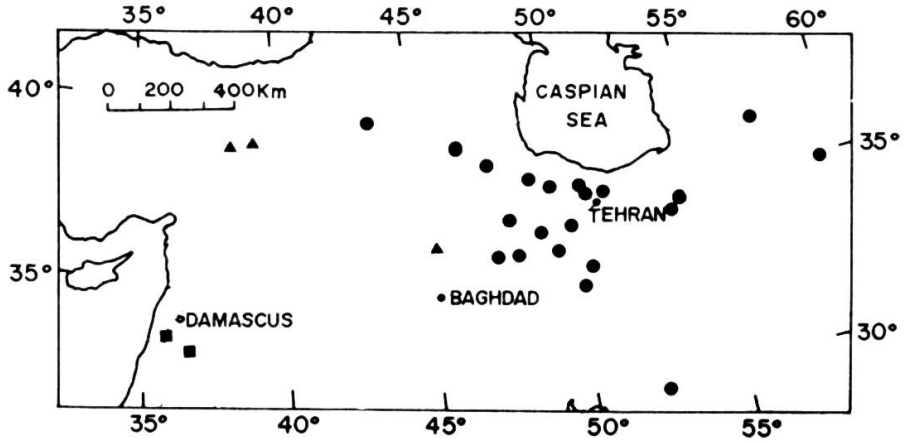


Fig. 14. – *Prangos corymbosa*. **A**, part of basal leaf; **B**, terminal and lateral umbels; **C**, leaf lobes; **D**, flower (Turkey, *Sintenis 813*); **E**, mericarp and cross section (Iraq, *Wheeler Haines 1524*).



Map 4. – Distribution of *Prangos acaulis* (●), *P. hermonis* (■) and *P. corymbosa* (▲).

or as long as ripe fruit. *Petals* yellow, pubescent outside. *Fruit* large, broad-ellipsoid, 20 x 12-14 mm; wings straight to slightly undulate, about 4 mm wide.

Distribution

Turkey (Cappadocia, Elazig) and N. Iraq. Map 4.

Specimens seen

Turkey. Elazig, Keban-Maden, Denislübaseti, 21.6.1889, *Sintenis 813* (JE). ***Iraq.*** Kopi Qaradagh, 4000′, *Haines W 1524* (K – with fruit narrowing towards base).

This species seems delimited from the others by its unique leaves – nearly sessile leaf segments and sessile ultimate leaf lobes. Though the type specimens lack ripe fruit, these were studied in the other specimens.

13. Prangos trifida (Miller) Herrnst. & Heyn, **comb. nova** ≡ *Cachrys trifida* Miller, Gard. Dict. ed. 8: *Cachrys* n. 1. 1768 ≡ *C. laevigata* Lam., Encycl. Méth. Bot. 1: 259. 1783, *nom. illeg.* ***Type:*** Morison, Umbelliferae, t. 3, f. 1 (typotype OXF? – not seen).

= *Cachrys morisonii* All., Fl. Pedem.: 23. 1789. ***Type:*** "supra Breglio loco dicto Mauriana" (TO – not seen).

= *Cachrys alpina* M.B., Fl. Taur.-Cauc. 1: 217. 1808. ***Type:*** "in summis Tauriae montibus, Julio", *Marschall von Bieberstein* (LE – not seen).

– *Cachrys libanotis* sensu L., Sp. Pl.: 246. 1753, *ex parte,* et auct. mult.

Ic.: fig. 15.

Plant 50-100 cm, glabrous. Basal *leaves* large, 6-pinnatisect; lobes linear to filiform, when filiform often arcuate, crenate, 5-40(-50) x 0.25-0.75 mm, mucronate. Terminal *umbels* in a group, mainly hermaphrodite; lateral umbels in whorls or opposite, mainly hermaphrodite. *Bracts* up to 11 mm, *bracteoles* 6-7 mm long, both small, linear to filiform, often caducous. *Fruiting umbels* 10-15-rayed, 40-70

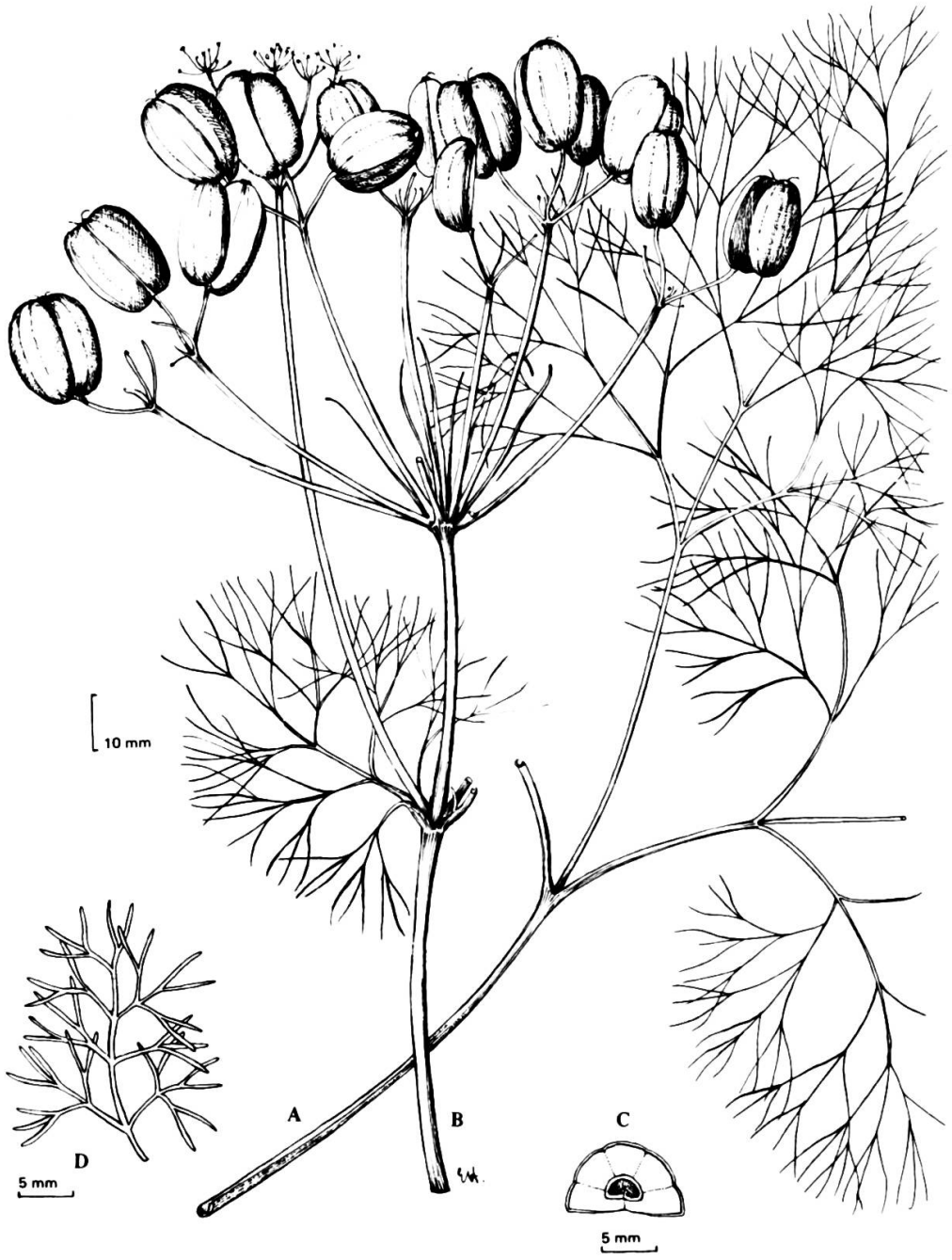


Fig. 15. – *Prangos trifida*. **A**, part of basal leaf; **B**, stem with terminal and lateral umbels; **C**, cross section of a mericarp (France, *Huet & Hanry 674*); **D**, terminal part of leaf segment (France, *Respand 852*).

mm long. *Pedicels* half as long to as long as ripe fruit. *Petals* yellow, glabrous. *Fruit* with a thick mesocarp, narrowly ellipsoid, with truncate apex, broadly ellipsoid to globular, 11-20 x 6-12 mm, completely wingless, smooth to weakly longitudinally sulcate, without conspicuous ribs; stylopodium comparatively small, immersed in the pericarp, sometimes one mericarp less developed than the other. *Fl. 5-6.*

Distribution

W. Mediterranean and S.E. Europe: Portugal, Spain, S. France, Italy, Jugoslavia, Romania, Bulgaria and S. USSR. Map 5. On rocky slopes of mountains up to 1800 m, in clearings of oak and pine forests.

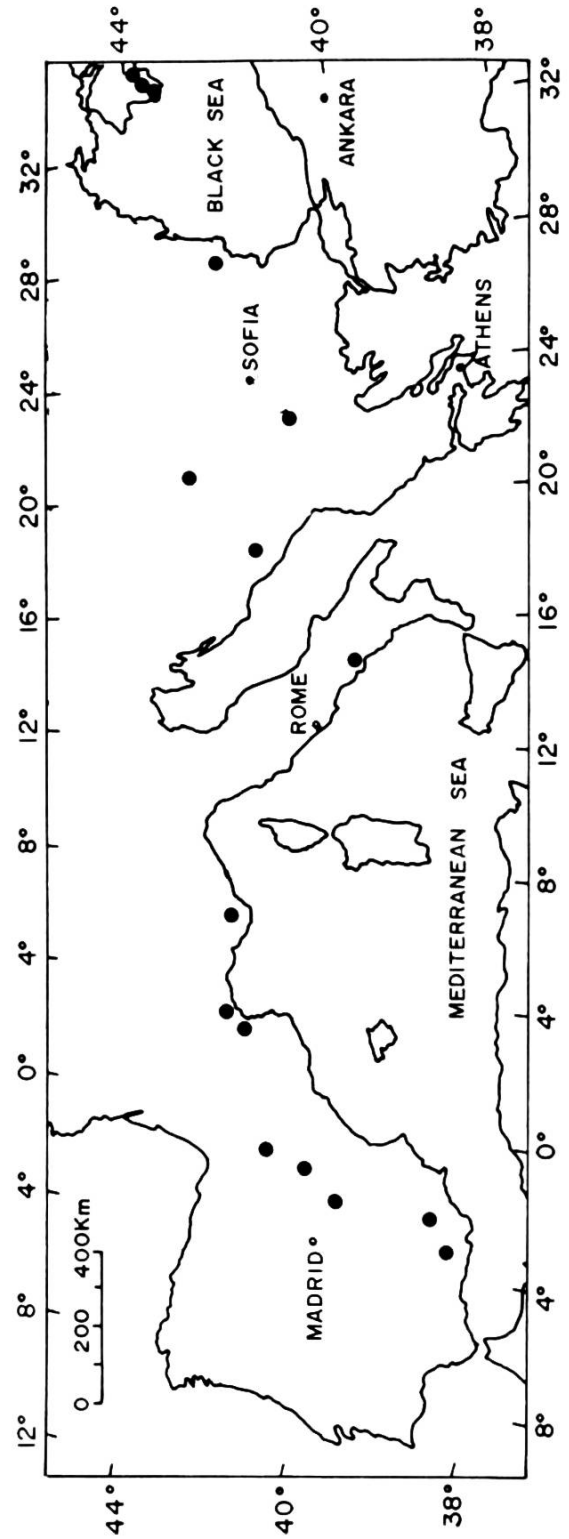
Selected specimens

Spain. Sommet de la Sierra de Segura, *Bourgeau 670* (E); Regnum Granatense: Sierra Nevada, S. Geronimo, 2100 m, *Porta & Rigo 474* (B); Teruel: Sierra d'Albarracin, 1500 m, 6.1894, *Reverchon* (B); Sierra del Cuarto, 1800 m, *Reverchon 419* (E). ***France.*** Insula Fitou, 14.6.1888, *Chevalier* (B); Aude: île de la Sidrière, *Respaud 852* (B); Var: près Le Luc, *Huet & Hanry 674* (B); Aude: près Narbonne, 23.5.1897, *Marty* (B). Pyrénées-Orientales: Ste-Lucie, 1834, *Prugoli* (B). ***Jugoslavia.*** Hercegovina: Mostar, 200 m, 30.5.1898, *Baenitz* (B); Serbia: in horto Belgrad, 7.1887. *Brunell* (B); Makedonija: Wardar ad Demir-Kapu, 600 m, *Bornmüller 4157* (B); mountains ad Demir-Kapu, 700-800 m, *Bornmüller 997* (B); Serbia: Berg Wiš bei Sitscheros, *Ilić* (GB). ***Bulgaria.*** Dobrudscha: Mt. Suluku, 13.7.1872, *Janka* (E). ***USSR.*** Tauria: Jaila, 700 m, 20.6/25.7.1909, *Wankow* (B, GB); Tauria: supra Yalta, 10.-23.6.1912, *Wankow* (GB); montes Tauriae, 1856, *Steven* (G-BOIS – region of type locality of *Cachrys alpina* M.B.).

Plants from the western Mediterranean region were described as *Cachrys trifida* Miller, whereas those from S.E. Europe, the eastern part of the distribution range, were described as *C. alpina* M.B. The main diagnostic characters by which these two "species" are usually distinguished are the length and the width of the leaf lobes and the extent of their arching. At the easternmost and westernmost parts of their distribution, the distinction between the two taxa is quite clear, whereas in interjacent areas, like Hercegovina and Serbia, it is impossible to delimit them. There is a continuous change from plants with short, wide and straight leaf lobes (typical for *"C. trifida"*) in the western Mediterranean towards those with narrow, long ones (typical for *"C. alpina"*) in the east (comp. fig. 15 A, D).

Already Boissier (1872) pointed out the close relationship between *"C. alpina"* and *"C. laevigata"* (synonymous with *"C. trifida"*) in spite of the longer leaf lobes and smaller fruits of *"C. alpina"*. Bornmüller (1934), who collected plants with large fruits in Macedonia, Hercegovina and Hungary, also expressed some doubts as to the delimitation of the two species.

14. Prangos gaubae (Bornm.) Herrnst. & Heyn, **comb. nova** ≡ *Cachrys gaubae* Bornm. in Repert. Spec. Nov. Regni Veg. 36: 345. 1934. ***Type:*** [Iran] "in ditione oppidi Keredj in declivitatibus montium Elburs, c. 1500 m", 29.6./1.7.1934, *Gauba* (B – two specimens collected by Gauba from the type locality have a different date, though an envelope with fruits, attached to one of them, is dated 1.7.1934).



Map 5. – Distribution of *Prangos trifida* (●).

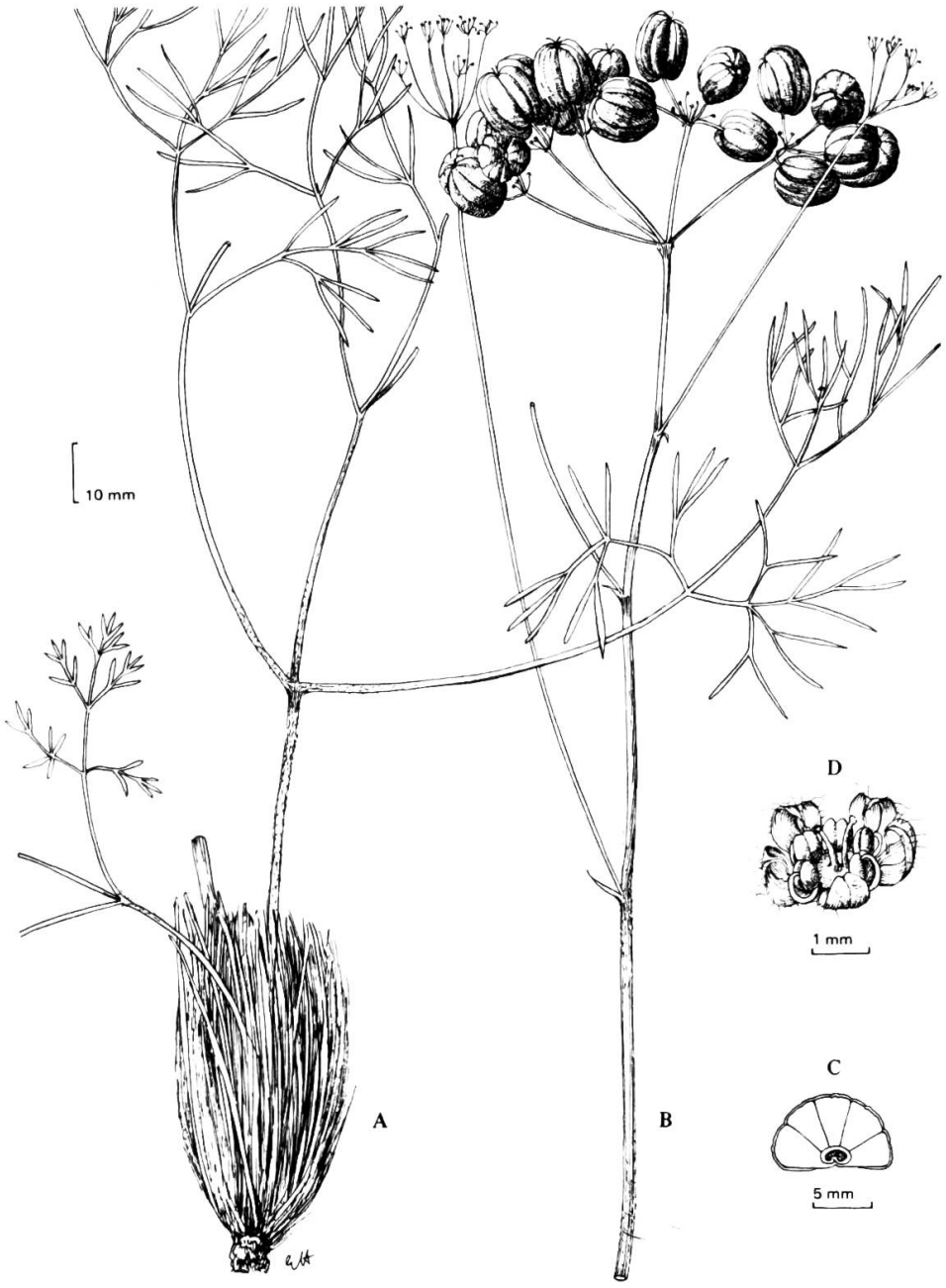


Fig. 16. – *Prangos gaubae*. **A,** stem with basal leaves and fibrous collar; **B,** terminal and lateral umbels; **C,** cross section of a mericarp; **D,** flower (Iran, *Gauba*).

Ic.: fig. 16.

Small plant up to 25 cm high, covered with long, crispate, easily detachable hairs forming a woolly cover, especially dense on the basal parts of the stem and on the petioles of radical leaves. Basal *leaves* 2-3, 10-15 cm long, with a conspicuous sheath; blade ovate in outline, 3-4-pinnatisect; segments few, 3-4 pairs, the petiolules of the first fairly longer than the others; lobes (3-)5-20(-25) x 1-1.5 mm, mucronate; cauline leaves reduced, all with umbels in their axils. Terminal *umbel* single, hermaphrodite; lateral umbels 2-3, alternate, mainly male. *Bracts* and *bracteoles* small, subulate, covered with long crispate hairs, usually caducous, leaving a scale-like base; bracts 2-3 mm, bracteoles 1-2 mm long. *Fruiting umbels* 6-9-rayed, 2.5-3 cm long. *Pedicels* two thirds to as long as ripe fruit. *Petals* pale yellow, with long hairs outside. *Fruit* broad-ellipsoid to nearly globose, 10-20 x 6-11 mm, wingless, smooth, with fine longitudinal striae, valleculae slightly grooved; stylopodium comparatively small, embedded in the mericarp, sometimes slightly hidden as the result of delayed growth of the commissural side of mericarps. *Fl. 5-6.* $2n = 22$.

Distribution

N. Iran, endemic. Map 6. On mountain slopes near rocks, 1500-3200 m.

Specimens seen

Iran. Azerbaidjan: Kurdistan, 47 km from Bijar, on road to Sanandaj, 1950 m, *Lamond 4443* (E, HUJ); 47 km W. Bijar versus Divandarreh, 2000 m, *Rechinger 42662* (W); Hamadan: Aq Bulaq, *Rioux & Golvan 317* (W); Elburs centr.: In ditione oppidi Keredj, in montibus ad pagum Kalak, *Rechinger 134* (W – type locality); 66 km N. of Turbat-I-Haidan, 6600′, 28.5.1961, *M. Zohary* (HUJ).

15. Prangos herderi (Regel) Herrnst. & Heyn, **comb. nova** ≡ *Cachrys herderi* Regel, Trudy Imp. S.-Peterburgsk. Bot. Sada 5: 601. 1877. ***Type:*** "In Turkestaniae orientalis montibus alatavicis cisiliensibus Kara Tschek", *Semenov* (LE – photograph seen).

Ic.: fig. 17.

Plant over 50 cm high, densely covered with well developed papillae. Basal *leaves* 25-35 cm long, ovate in outline, 6-pinnatisect; lobes linear, 10-15 x 1 mm, mucronate. Terminal *umbels* in a group, mainly hermaphrodite; lateral umbels in whorls or opposite, mainly hermaphrodite. *Bracts* and *bracteoles* linear to filiform, subulate, often persistent; bracts 8-10 mm, bracteoles 4-5 mm long. *Fruiting umbels* 8-14-rayed, 2.5-4 cm long. *Pedicels* half as long to as long as ripe fruit. *Petals* yellow, with well developed papillae on their outside. *Fruit* broad-ellipsoid, 10-16 x 7-10 mm, completely wingless, smooth to somewhat longitudinally sulcate. *Fl. 6.*

Distribution

USSR (Central Asia: Kazakhstan, Turkestan, Kirgiziya). Map 6. Mountain slopes, among rocks and cliffs, 1000-2000 m.

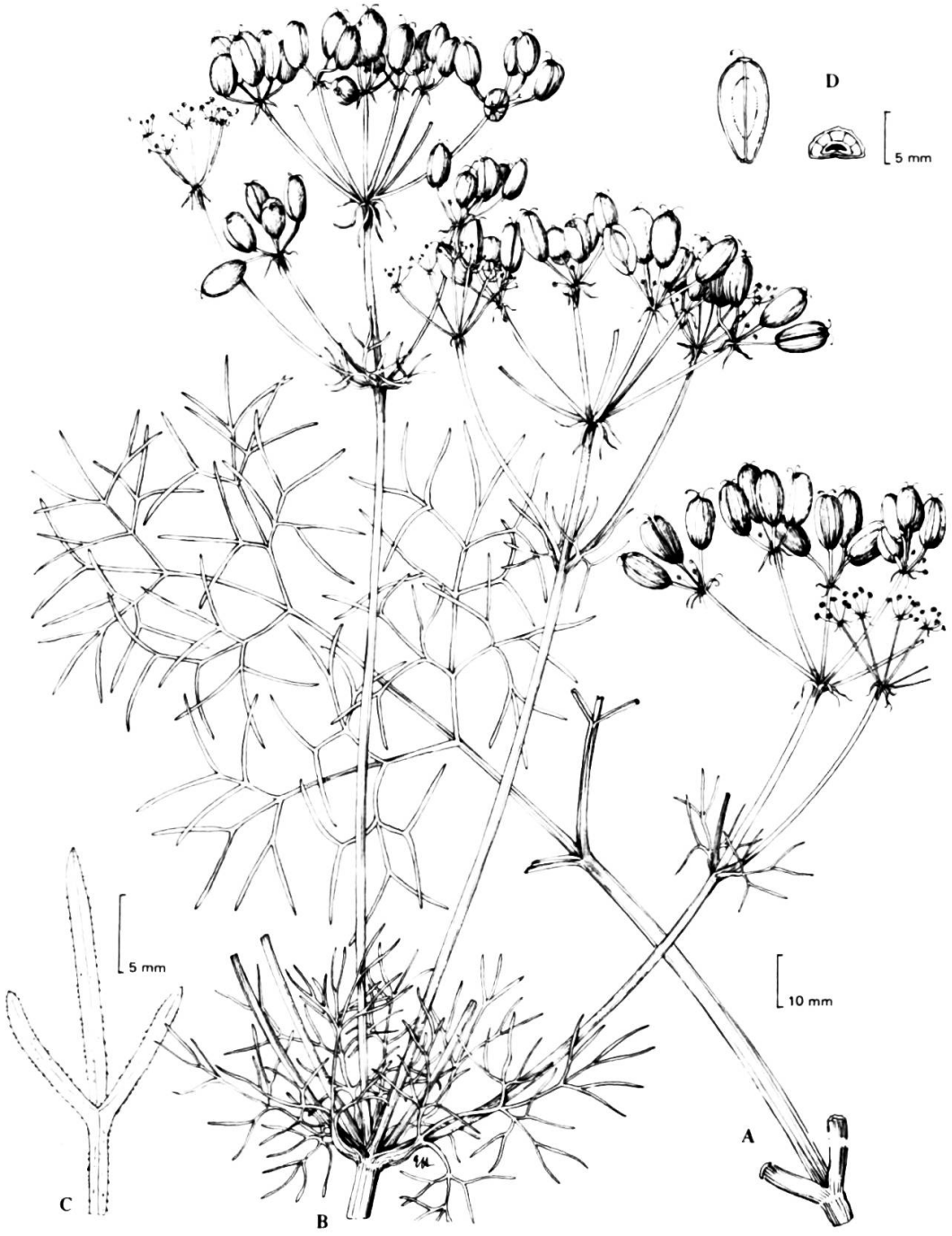


Fig. 17. – *Prangos herderi*. **A**, part of leaf; **B**, stem with a group of terminal and lateral umbels; **C**, leaf lobes; **D**, mericarp – commissural view and cross section (USSR, *Goloskokov*).

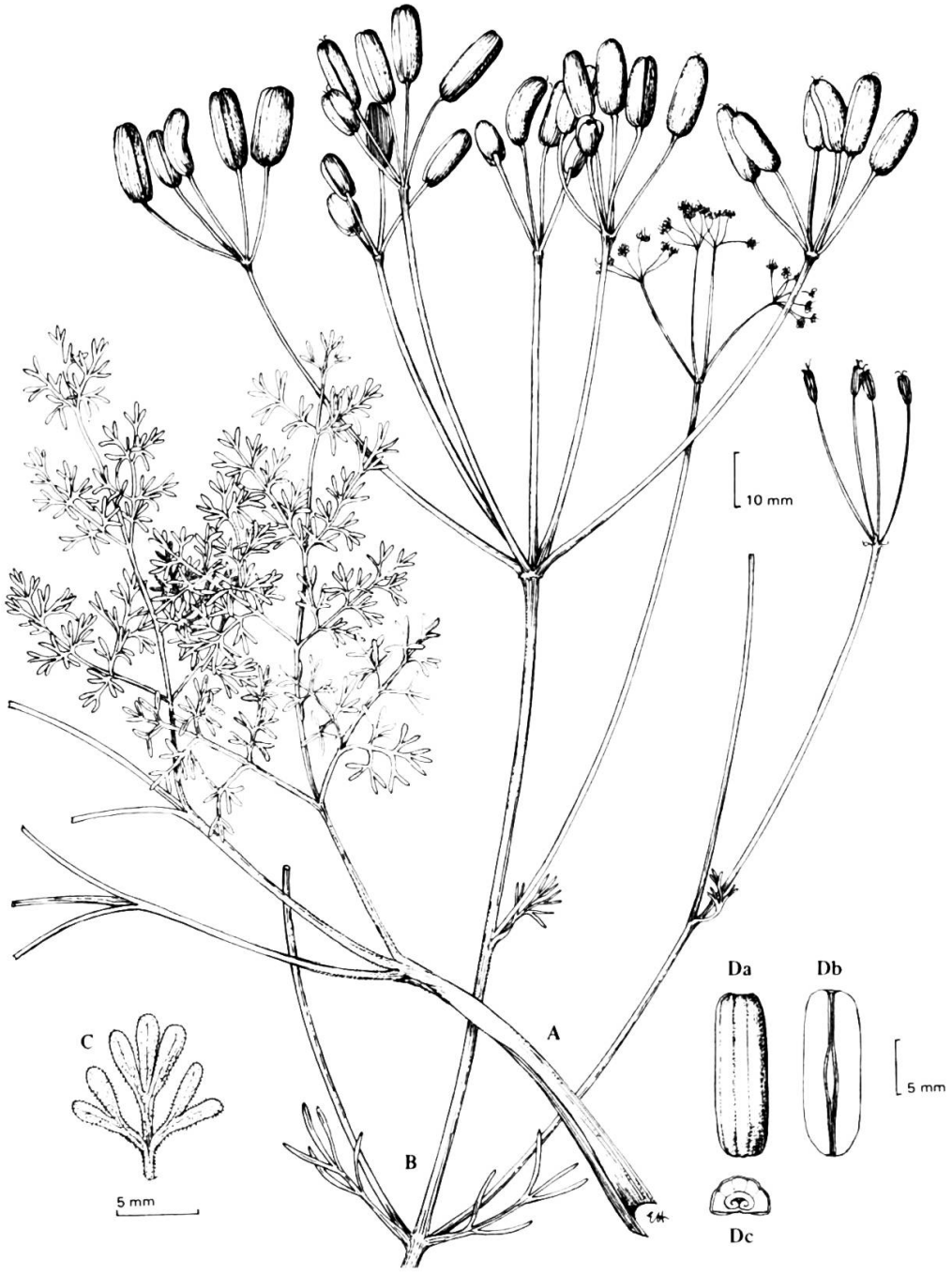


Fig. 18. – *Prangos odontalgica.* **A,** part of basal leaf; **B,** terminal and lateral umbels; **C,** terminal part of leaf segments; **D,** mericarp: **Da,** dorsal view; **Db,** commissural view; **Dc,** cross section (USSR, *Hayek*).

Specimens seen

USSR. Ala-tau: S.W. side of Dzhungarskiy, Mt. Tshulan, Taldy-Say, 10.6.1951, *Goloskokov* (LE); Mount Matay, 17.6.1951, *Goloskokov* (LE); Turkestan: Kuiankus?, 3000′, 31.6.1878, *Regel* (LE).

The plants somewhat resemble certain forms of *P. trifida,* except for being more rigid and having a papillate indumentum.

16. Prangos odontalgica (Pallas) Herrnst. & Heyn, **comb. nova** ≡ *Cachrys odontalgica* Pallas, Reise 3: 720. 1776. ***Type:*** [USSR] "Copiosissime provenit in desertis limosis, aridissimis inter Volgam et Iaïkum", *Pallas* (BM – not seen; isotype: LINN – photograph seen).

= *Ferula pubescens* Pallas ex Sprengel in Roemer & Schultes, Syst. Veg. 6: 598. 1820 ≡ *Cachrys pubescens* (Pallas ex Sprengel) Schischkin in Komarov, Fl. SSSR 16: 259. 1950. ***Type:*** Sibiria, *Pallas* in herb. Willdenow (B – not seen).

Ic.: fig. 18; Pallas, Reise 3: tab. G, fig. 1-3: 1776.

Plant up to 35-65 cm high, with short and long hairs. Basal *leaves* 5, about 20 cm long; blade ovate in outline, c. 5-pinnatisect; segments up to 4 pairs, the petiolules of the first pair much longer than those of the others; lobes 2-3 x 1.5 mm, obtuse; cauline leaves reduced, all with umbels in their axils. Terminal *umbels* single or in a group, hermaphrodite; lateral umbels numerous, usually opposite or in whorls, rarely alternate, with mainly hermaphrodite flowers, the upper ones sometimes on long peduncles; umbels with male flowers branch off from the peduncles of the terminal and lateral umbels. *Bracts* and *bracteoles* often caducous; bracts 5 mm long, obtuse; bracteoles 3 mm long, acute. *Fruiting umbels* 5-rayed, 5-8 cm long. *Pedicels* 1-1.5 times longer than ripe fruit. *Petals* yellow, glabrous. *Fruit* narrow, ellipsoid-cylindrical with a somewhat truncate apex, 10-15 x 5-6 mm, wingless, smooth, with fine longitudinal striae; stylopodium comparatively small, embedded in the corky pericarp. *Fl. 5-6.* $2n = 22$ (Kordjum 1967).

Distribution

USSR (Central Asia: Kazakhstan). Map 6. Steppes, on calcareous or clay soils in associations with *Artemisia* and *Stipa;* sometimes on saline soils.

Specimens seen

USSR. Kirgisia: Bogdo, *Hayek* (GB); desert ad Mare Caspium, 1795, *Ivaroh* (BM); Simbirsk, *Visenmeyer* (K); Andreyevka, 4.9.1890, *Red?* (K).

One Pallas specimen (herb. Willdenow n° 5763), determined as *Cachrys odontalgica* (by Pallas?) seems not to belong to this species, but probably to *P. herderi.*

The roots of *P. odontalgica* contain starch and have an aromatic smell. They are reported to be used as food and as a folk medicine for tooth ache.

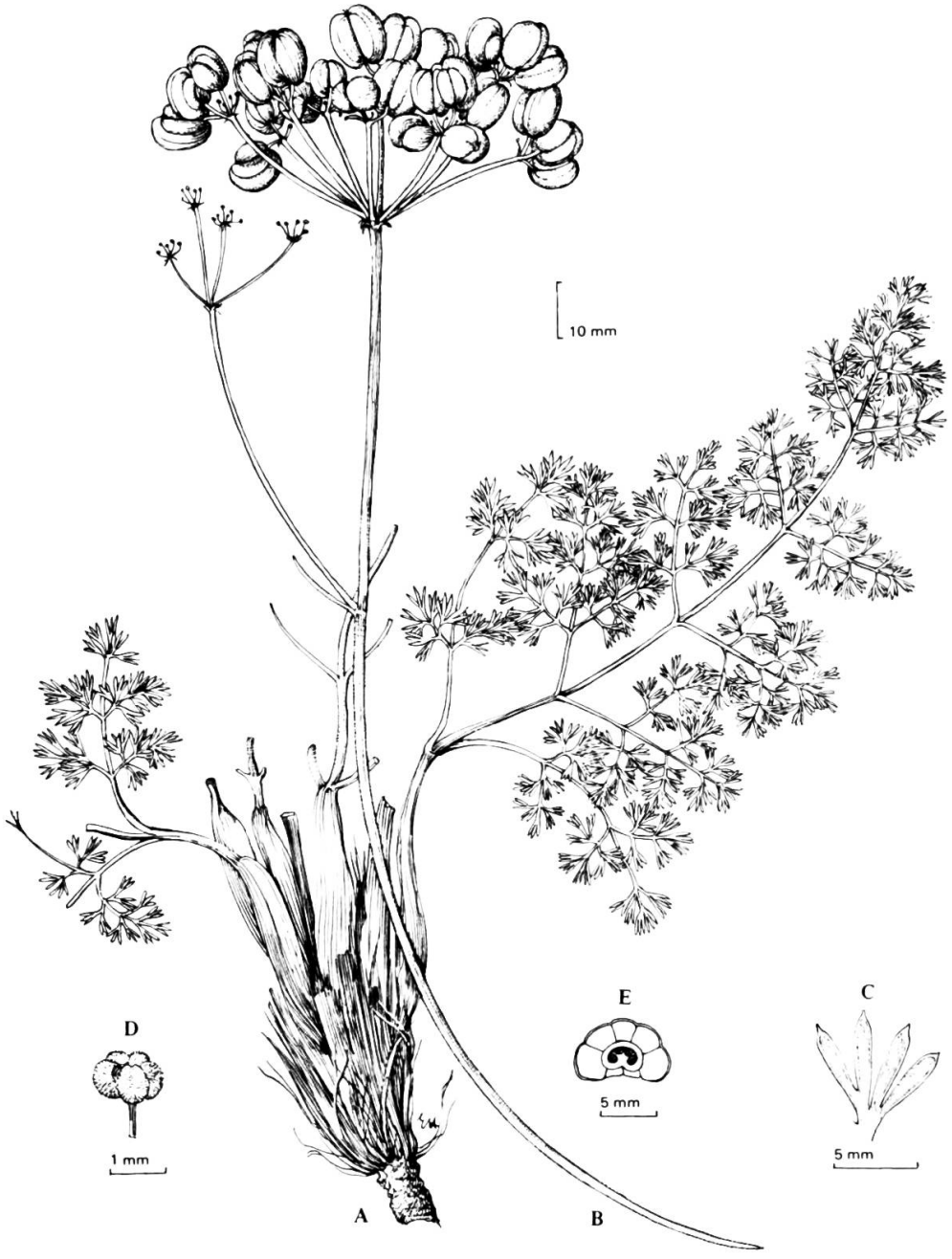


Fig. 19. – *Prangos serpentinica.* **A,** stem with basal leaves and fibrous collar; **B,** terminal and lateral umbels; **C,** leaf lobes; **D,** flower; **E,** cross section of a mericarp (holotype).

17. **Prangos serpentinica** (Rech. fil. & al.) Herrnst. & Heyn, **comb. nova** ≡ *Cachrys serpentinica* Rech. fil. & al. in Österr. Akad. Wiss. Math.-Naturwiss. Kl. Anz. 89. 197. 1952. ***Type:*** [Iran] "Khorasan, in montibus serpentinicis ditionis Robat-Safid", c. 1800-2000 m, 27.5.1948, *Rechinger, Aellen & Esfandiari 4396* (W).

Ic.: fig. 19.

Plant resembling *P. odontalgica* except in the following characters: leaf lobes subulate with scarious margins (not obtuse); petals with papillae outside (not glabrous); mericarps hemispheric (not semi-cylindric). *Fl. 5-6.*

Distribution

E. Iran, S. USSR. Map 6. Steppes, on serpentine soil.

Specimens seen

USSR. Kazakhstan, Aktyubinskaya: Yel-Emba, *Roshevitz, Iljin & Avoramezik 106* (HUJ); Songoria orient., *Karelin & Kirilov* (B, K); Semipalatinsk, Zaysan: near Karakask, 24/25.6.1905, *Siedielnikov* (LE).

The holotype and isotype of *P. serpentinica* have only one or two fertile umbels and seem, therefore, very different in their general habit from the much-branched *C. odontalgica.* However, the three other cited specimens, though having the general combination of characters of *P. serpentinica,* are branched like *P. odontalgica.* The scarcity of plant material does not enable us to assess the value of the type of branching as a diagnostic feature between *P. serpentinica* and *P. odontalgica.*

18. **Prangos ledebourii** Herrnst. & Heyn, **nom. nov.** ≡ *Cachrys macrocarpa* Ledeb., Fl. Alt. 1: 364. 1829 (non *P. macrocarpa* Boiss. 1844). ***Syntypes:*** USSR, "in collibus apricis et rupestribus deserti Songorokirghisici ex adverso fortalitii Ustkamenogorsk et alibi", *Ledebour* (LE – drawing seen); "inter fortalitium Buchtorminsk et lacum, qui Noor-Saisan vocatur", *Meyer* (LE – not seen).

Ic.: fig. 20; Ledebour, Ic. Pl. Ross. 4: t. 313. 1833.

Plant up to 40 cm high, papillate (most papillae slender). Basal *leaves* usually 3, 20-25 cm long, with a conspicuous sheath; blade ovate in outline, 4-5-pinnatisect; segments few, 4-5 pairs, the petiolules of the first pair much longer than those of the others; lobes (5-)7-12(-15) x 1-1.25 mm, mucronate. Terminal *umbel* usually single, hermaphrodite; lateral umbels in whorls or opposite, with hermaphrodite and male flowers. *Bracts* and *bracteoles* usually caducous, mucronate; bracts 4-10 mm, bracteoles 2-3 mm long. *Fruiting umbels* 7-10(-14)-rayed, 2.5-5 cm long. *Pedicels* half to two thirds as long as ripe fruit. *Petals* yellow, glabrous. *Fruit* broad-ellipsoid, 10-14 x 5-6 mm, wingless with prominent primary ribs and sometimes with up to 6 keels between the 5 primary ribs of each mericarp. *Fl. 5-7.*

Distribution

USSR (Central Asia: E. Kazakhstan), endemic. Map 6. Steppes of rocky mountain slopes.

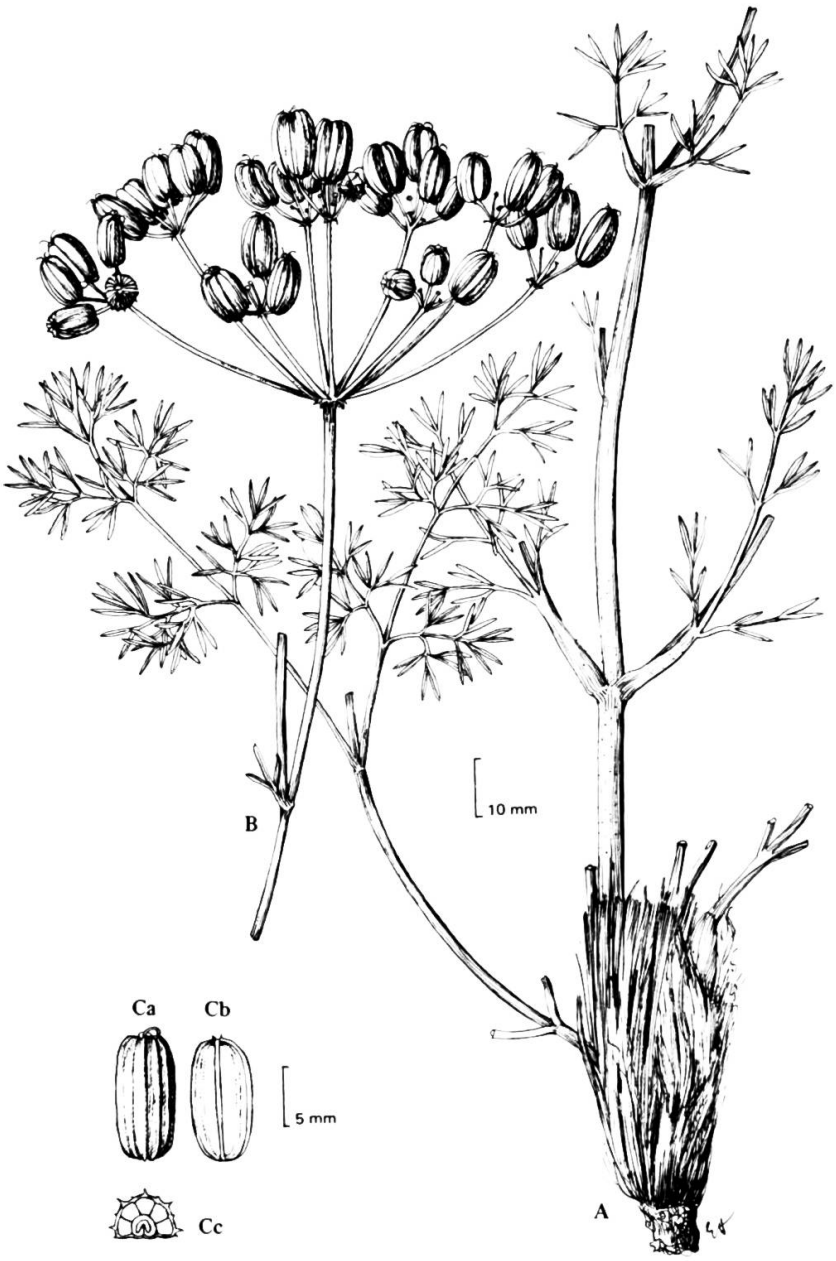
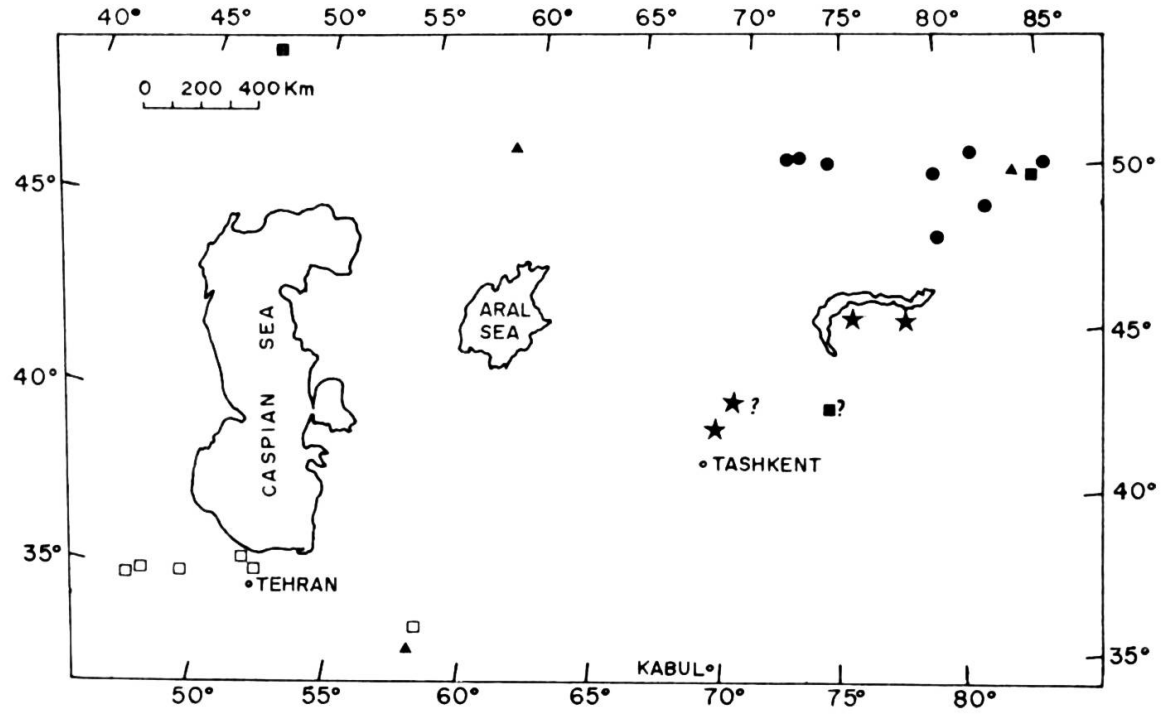


Fig. 20. – *Prangos ledebourii.* **A,** stem with leaves and fibrous collar; **B,** fruiting umbel; **C,** mericarp: **Ca,** dorsal view; **Cb,** commissural view; **Cc,** cross section (USSR, *Schrenk*).



Map 6. – Distribution of *Prangos gaubae* (□), *P. herderi* (★), *P. odontalgica* (■), *P. serpentinica* (▲), *P. ledebourii* (●).

Specimens seen

USSR. Kazakhstan: Karagandan, Atasuekiy, Mt. Ak-Tau, *Varivzeva 64* (LE). Kysyltau, 9 km S. of Jujunsker, *Karamysheva 7301* (LE); 20 km N.W. of Mointy, *Karamysheva & Unatov 9494* (LE); Songaria: in desertis ad fl. Ajagus, 24.5.1840, *Schrenk* (K, L, LE); Songoria: Ajagus, *Karelin & Kirilow* (B); Semipalatinsk Zaysan, 3.7.1914, *Schischkin* (LE); Kazakhstan: Mt. Narymskiy, 12.6.1931, *Schischkin & Sumnivitz* (LE); Tarbagatay: in montibus Tarbagatay in alpinis, 20.6.1863, *Potanin* (K).

19. Prangos bucharica Fedtsch. in Bull. Herb. Boissier 7: 179. 1899 ≡ *Cachrys bucharica* (Fedtsch.) Hermst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** Buchara, in montibus Chirmat, 1897, *Geyer* (LE – not seen).
= *P. afghanica* Podlech in Mitt. Bot. Staatssamml. München 13: 175. 1970. ***Type:*** Afghanistan, prov. Takhar, c. 5 km S. von Iskamish, 1300 m, 14.5.1965, *Podlech 10640* (M).

Ic.: fig. 21.

Plant 30-60(-70) cm high, nearly glabrous or with short papillae. Basal *leaves* and lower cauline leaves small, 20-30(-45) cm long, oblong, (3-)4-pinnatisect; all segment pairs sessile; lobes 5-10(-14) x (0.75-)1(-1.25) mm, mucronate. Terminal *umbel* single, hermaphrodite; lateral umbels alternate or opposite (whorls), usually with male, rarely hermaphrodite flowers. *Bracts* and *bracteoles* more or less per-

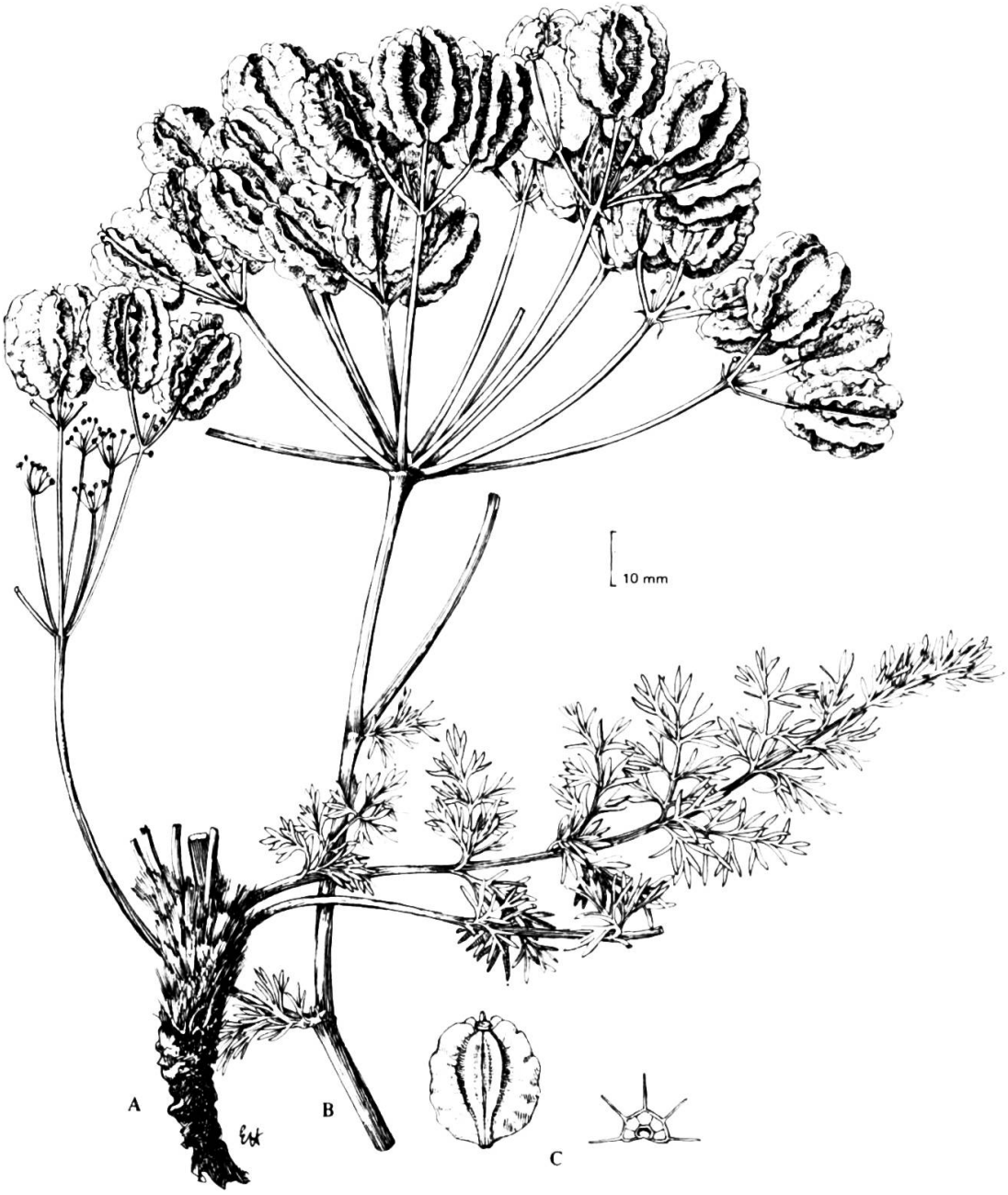


Fig. 21. – *Prangos bucharica*. **A**, base of stem with fibrous collar; **B**, terminal and lateral umbels; **C**, mericarp (commissural view) and its cross section (Afghanistan, *Rechinger 16430*).

sistent; bracts 7-10 mm, bracteoles 4-5(-8) mm long, linear to filiform, acuminate. *Fruiting umbels* 7-11-rayed, (4-)5-9 cm long. *Pedicels* rigid, half to one and a half times as long as ripe fruit (nearly half as thick as rays). *Petals* yellowish, more or less glabrous. *Fruit* globose to ovoid, widely varying in size, (13-)15-25 x 12-15(-20) mm; wings well developed, 4-6 mm wide, densely undulate in younger stages, undulation decreasing during maturity, with entire to slightly crenate margins; commissural face pear-shaped. *Fl. 4-5, fr. 5-7.* $2n = 22$.

Distribution

USSR (S. Central Asia), Afghanistan, Pakistan (Baluchistan). Map 7. Mountain slopes, 1000-2700 m (on granite).

Selected specimens

USSR. Bukhara, Gissar, Duoba, 4500′, *Lipsky 37* (LE); ad fl. Kafiruagan, 4000′, 4.1883, *Regel* (LE); Mt. Khodzha, near Kulab, 3000′, 1.-13.4.1883, *Regel* (LE); Tadžikistan: Mt. Kara Tau, W. of the river Kisil-Su, *Botschanzev & Egorova 542* (LE); Pamiro-Alayi: Mt. Gissarskiy, river Kondar, 28.5.1960, *Kuzmina* (GB, K); river Varzob, 8-9 km N. of Stalinabad, *Trinoviev 59* (LE); Pamir-Alai; Shakhrinauski near river Karatag Gissarskiy, *Kuzmina* (GB, K). ***Afghanistan.*** Takhar: bei Farkhar, 1250 m, *Podlech 10457* (M); Taliq-an: Farqar, 1280-1800 m, *Hewer 1238A* (K); Baghlan: Darrah-i-Till, 2700 m, *Podlech 11192* (M); Kataghan: near Doshi, 1200 m, *Hedge & Wendelbo W 3478* (E); Mazar-i-Sharif: betw. Samangan and Mirza Atblil, 1250 m, *Hedge & Wendelbo 4009* (E, GB); Kabul, Baber-Schah Parks, 1820 m, *Gilli 2004, 2005* (W); Paktia: Khost, c. 2700 m, *Lamond 2438* (E); Deh Kundi, 3-30 km N.E. Shahrestan, 2200 m, *Rechinger 36758* (W). ***Pakistan.*** Baluchistan: Qila Abdullah, Chaman Road, 5000′, *Zaffar Ali 5718* (K).

Although the type specimen of *P. bucharica* was not seen by us, the identity of the species seems well established. Fedtschenko characterized it by the pear-shaped commissural face of the fruit. This trait, rare in the genus, was found in the plants studied from northern Afghanistan and southern Central Asia. *Prangos afghanica* Podlech, described from the same area, has the same fruit character. It is here considered as synonymous with *P. bucharica* because of this and other characters. The fruit of *P. bucharica* is, in its general shape, much like that of *P. acaulis* and *P. peucedanifolia.*

20. Prangos tuberculata Boiss. & Hausskn. in Boiss., Fl. Or. 2: 943. 1872 ≡ *Cachrys tuberculata* (Boiss. & Hausskn.) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** "Persia austro-occidentalis, in regione alpina montium Kuh-i-Nur et Kuh Sawers", 9000-12000′, 7.1868, *Haussknecht* (holotype: G-BOIS; isotypes: BM, JE).

Ic.: fig. 22.

Plant rigid, about 45 cm high, covered with short, nearly straight hairs. Basal *leaves* 25-30 cm long; blade (4-)5-6-pinnatisect; lobes somewhat rigid and straight, (3-)5-15 x 1.5-2.5 mm; cauline leaves numerous, with lobes sometimes twice the length of those of basal leaves. Terminal *umbels* in a group, hermaphrodite; lateral umbels male, opposite or alternate. *Bracts* and *bracteoles* filiform, subulate, usually

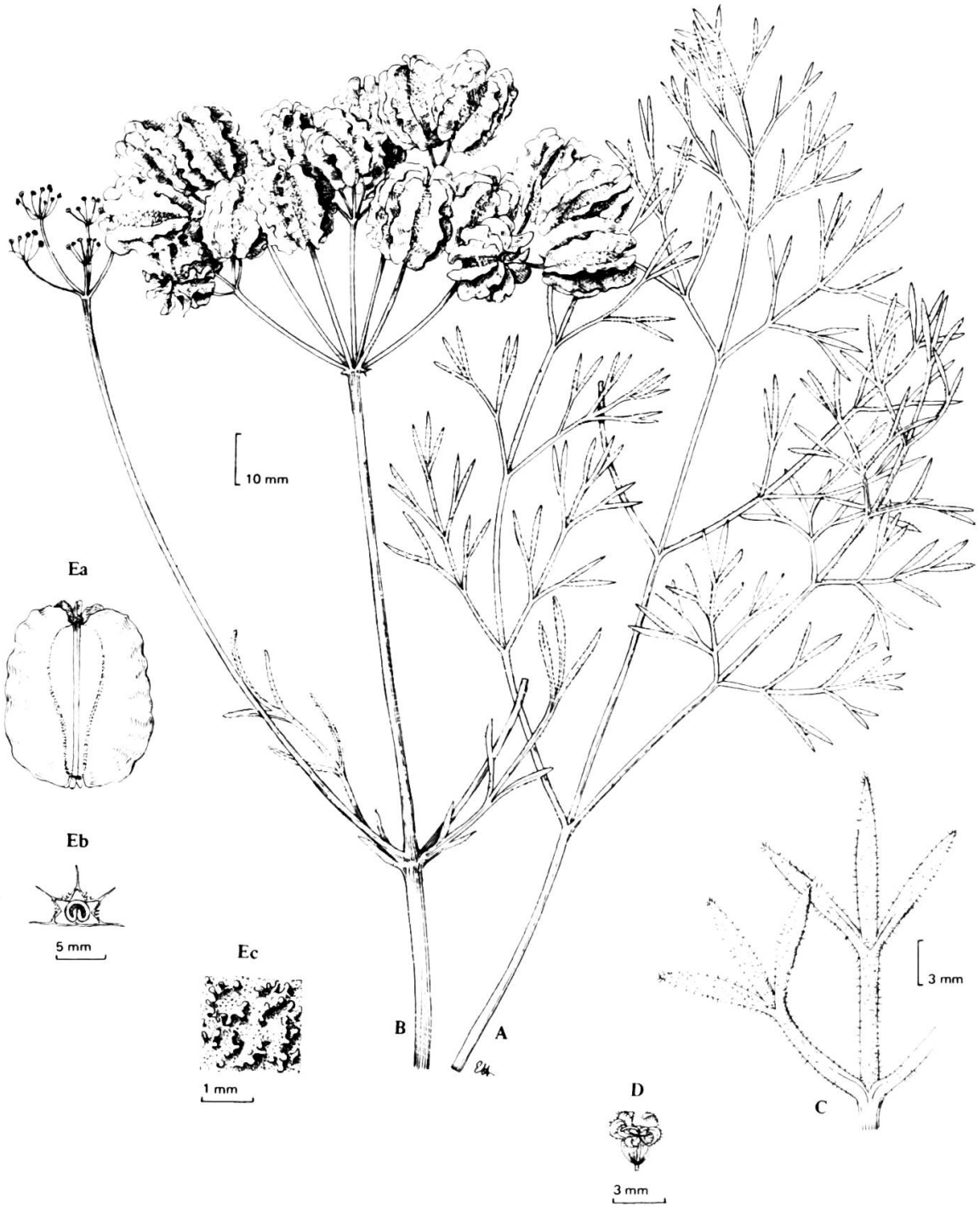


Fig. 22. – *Prangos tuberculata*. **A**, part of leaf; **B**, terminal and lateral umbels; **C**, terminal part of leaf segment; **D**, flower; **E**, mericarp: **Ea**, commissural view; **Eb**, cross section; **Ec**, surface between wings (isotype).

caducous; bracts 10 mm, bracteoles 4-5 mm long. *Fruiting umbels* 5-8-rayed, about 35-45 mm long. *Pedicels* half to two thirds as long as ripe fruit. *Petals* pale yellow, pubescent outside. *Fruit* globose to broad-ellipsoid, 14-20 x 14-15 mm; wings slightly undulate, 4-5 mm wide, sometimes with a crenate margin; valleculae covered densely with short rigid tubercles; commissural face pear-shaped to ellipsoid. *Fl. 5, fr. 5-7.*

Distribution

Iran, probably endemic. Map 7. Mountains, up to 4000 m

Specimens seen

Iran. Hamadan: montes Karaghan, 7.1899, *Strauss* (B, as *P. szovitsii* Boiss.); Kuh-i-tschuy, *Stapf* (JE – doubtful specimen with short leaf lobes and young fruit only); 50 km E. of Khorramabad, 1400 m, *Kφie 653* (BM).

Very few collections of this species seem to exist in herbaria, though many duplicates of Haussknecht's type collection are to be found, especially in G-BOIS and JE.

Prangos tuberculata is much like *P. acaulis* but taller, more rigid, and sparsely covered with shorter hairs; the leaf lobes are longer; fruit is covered with tubercles between the wings.

21. **Prangos calligonoides** Rech. fil. in Österr. Akad. Wiss. Math.-Naturwiss. Kl. Anz. 89: 197. 1952 ≡ *Cachrys calligonoides* (Rech. fil.) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** Iran, Luristan: Bisheh, 50 km a Khorramabad orientem versus, c. 1200-1400 m, 14.-16.7.1948, *Rechinger 5758* (holotype: W; isotype: E, K).

Ic.: fig. 23.

P. calligonoides resembles *P. tuberculata* in its vegetative parts, but differs in the fruit morphology. The outgrowths between the wings in the fruit of *P. calligonoides* are longer, sometimes branched, and more numerous. No specimens in addition to the type collection were seen by us. See map 7.

22. **Prangos crossoptera** Herrnst. & Heyn, **spec. nova.** ***Type:*** Iran, Kordestan: Sanandaj, 1200-1400 m, 25.5.1963, *Jacobs 6687* (holotype: K; isotype: E).

Ic.: fig. 24.

Planta 35-40 cm alta. Caulis rigidus, dense crispato-villosus. Folia basalia ovata, 25-30 cm longa, (4-)5(-6)-pinnatisecta, lobis 1-4 x 1-2 mm. Umbella fructifera 7-11-radiata, 30-40 mm longa. Pedicelli fructibus maturis breviores. Petala extus pubescentia. Fructus subglobosus, 14-16 x 10-14 mm; alae undulatae, 3-4 mm latae, margine dentatae et fimbriatae; alae et interstitia tuberculis densis brevibus vel longis, simplicibus vel ramosis obsita; circumscriptio faciei commissuralis anguste obovata.

Plant with a rigid stem, 35-40 cm high, densely covered with long crispate hairs. Basal *leaves* ovate, 25-30 cm long, (4-)5(-6)-pinnatisect, lobes 1-4 x 1-2 mm; cauline leaves usually with 5-10 mm long lobes. Terminal *umbels* in a group of 2-3,

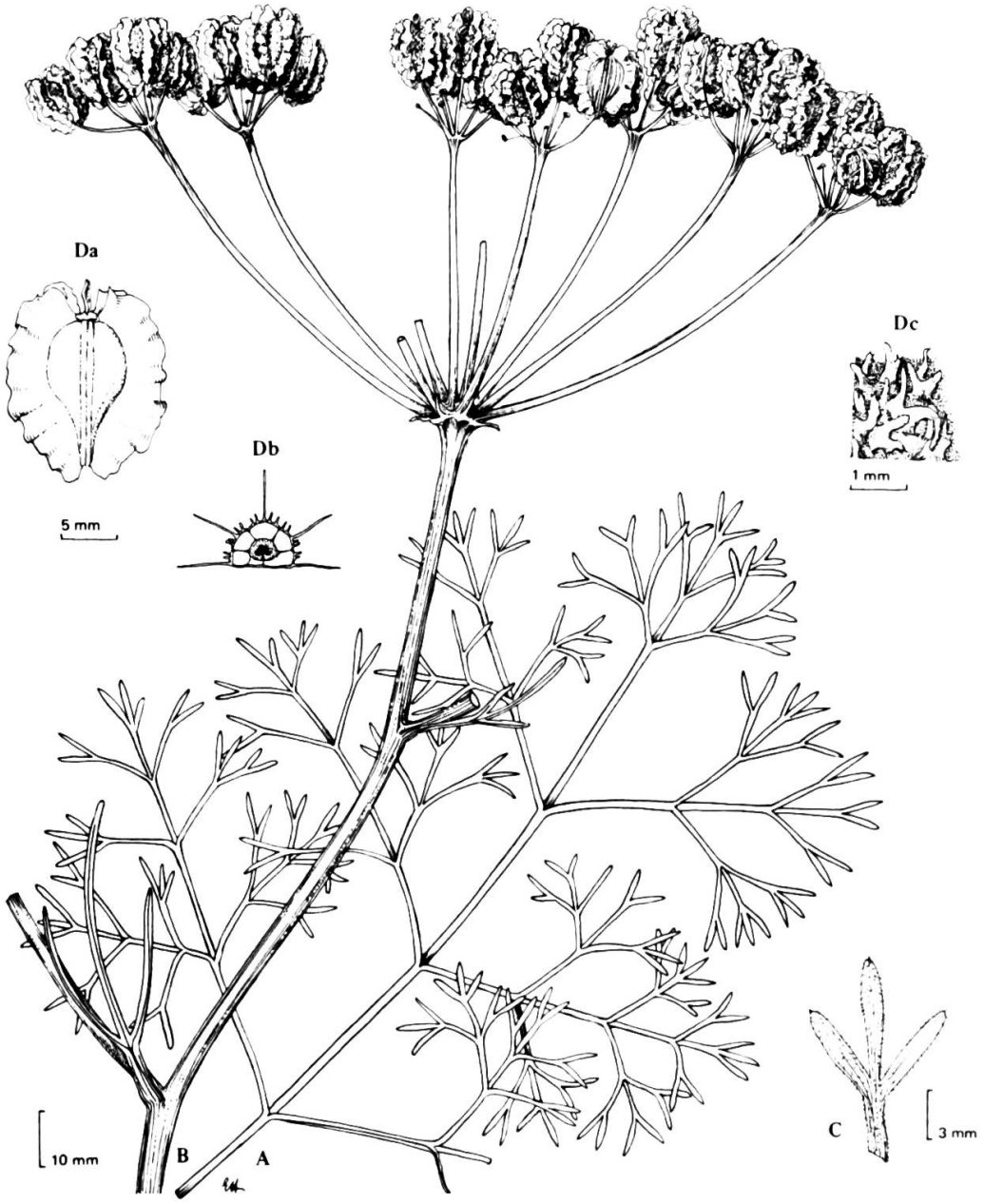


Fig. 23. – *Prangos calligonoides.* **A,** part of leaf; **B,** terminal umbel; **C,** leaf lobes; **D,** mericarp: **Da,** commissural view; **Db,** cross section; **Dc,** surface between wings (isotype).

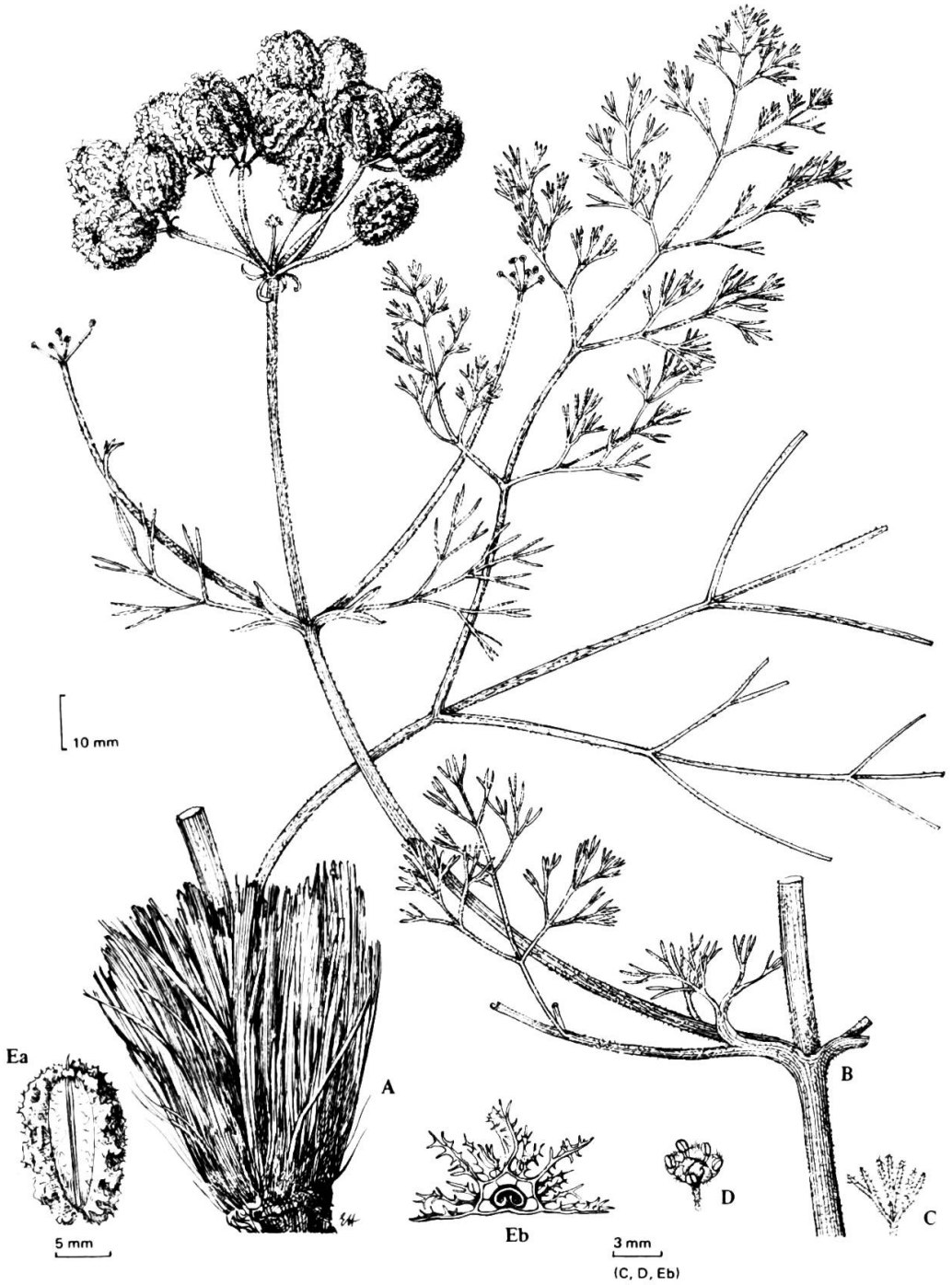


Fig. 24. – *Prangos crossoptera*. **A,** stem with part of basal leaf and fibrous collar; **B,** stem with terminal and lateral umbels; **C,** leaf lobes; **D,** flower; **E,** mericarp: **Ea,** commissural view; **Eb,** cross section (holotype).

hermaphrodite, lateral umbels in whorls or opposite, with hermaphrodite or male flowers. *Bracts* and *bracteoles* linear to filiform, subulate, often conspicuous; bracts 6-8 mm, bracteoles 2-3 mm long. *Fruiting umbels* 7-11-rayed, 30-40 mm long. *Pedicels* one third to two thirds as long as ripe fruit. *Petals* yellow, pubescent outside. *Fruit* nearly globose, 14-16 x 10-14 mm; wings undulate, 3-4 mm wide, with dentate and fimbriate margins; tubercles usually long, simple or branched, dense on the wings and between them to an extent which makes the identification of the wings sometimes difficult; commissural face narrowly obovate. *Fl. 5-6.*

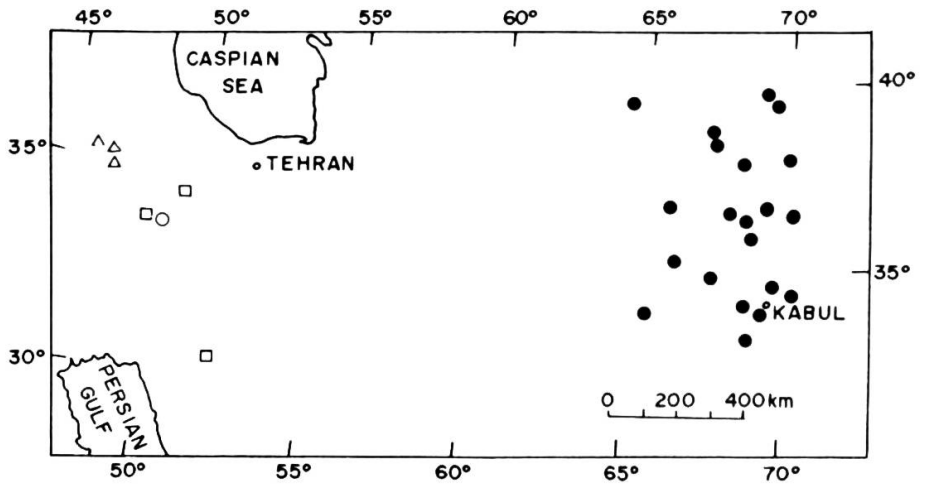
Distribution

Iran, probably endemic. Map 7. Mountains of slaty rock, with open herbaceous vegetation, 1200-2100 m.

Selected specimens

Iran. Kordestan, N. of Sanandaj, c. 1500 m, *Jacobs 6478* (E, K); Sanandaj-Marivan, *Sabeti 20* (W); 18 km N. of Sanandaj, c. 1500 m, *Wendelbo 1850* (GB); Dinan-Darrah, Saral, 1800-2100 m, *Iranshahr & Dezfoulian 13663E* (W).

The three species – *P. tuberculata, P. calligonoides* and *P. crossoptera* – are doubtless closely related. They seem to occur exclusively in W. Iran. The main difference between them is in the amount of the outgrowths on the fruit and their extent of development. There is an ascending line in the above characters from *P. tuberculata* through *P. calligonoides* to *P. crossoptera;* in the latter the outgrowths occur also on the wings. *P. crossoptera* differs from the other two species also by the fimbriate margin of the wings, the narrowly obovate commissural face and the short leaf lobes. A single specimen (Luristan, Durud, 5500′, 21.5.1940, *Koelz 15688,* W), though having fruit resembling *P. tuberculata* in the shape and in the development of the tubercles, has, unlike it, an obovate commissural face as *P. crossoptera.* Since available material was very scarce, the possibility cannot be



Map 7. – Distribution of *Prangos bucharica* (●), *P. tuberculata* (□), *P. calligonoides* (○) and *P. crossoptera* (△).

excluded that additional collections from other regions of this area might reveal the existence of more plants with intermediate fruit characters and would compel us to reconsider our concept of the three species of this group. In *P. pabularia*, where a similar trend in the development of tubercles on the fruit exists, the continuous gradual change of this character within the complex made us unite a number of forms in one species.

Prangos sect. **Meliocarpoides** Herrnst. & Heyn, **sect. nova.** ***Type:*** *P. meliocarpoides* Boiss.

– *P.* sect. *Intactae* sensu Kuzmina, *pro minima parte* (non s.str.).

Dentes calycini obsoleti. Fructus pyriformis, costatus vel alatus; mesocarpium texturâ suberosâ, continuum nec in massas 5 sejunctum, in strato exteriore fasciculis vascularibus percursum; epimesocarpium vittis carens.

Calyx teeth obsolete; petals glabrous or hairy. Fruit pyriform, ribbed or winged; mesocarp continuous, not separated into blocks, with a layer of vascular bundles in the outer part of tissue; vittae absent in the epimesocarp.

2 species distributed in Turkey and Western Iran.

23. **Prangos meliocarpoides** Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 81. 1844 ≡ *Cachrys meliocarpoides* (Boiss.) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** [Turkey] "Cappadocia ad Euphratem", *Aucher 3752* (G-BOIS).

= *P. pestalozzae* Boiss., Diagn. Pl. Or. Nov. 10: 55. 1849. ***Type:*** [Turkey] Elmalu Lyciae, 1846, *Pestalozza* (G-BOIS – not seen).

Ic.: fig. 25.

Small, slender plant, 15-30 cm high, papillate or crispate-hairy, especially on the basal parts. Basal *leaves* few, up to 10 cm long, with a conspicuous sheath; blade 3-4-pinnatisect; primary segment pairs few, the petiolules of the first pair much longer than those of the others, the two ultimate lobes sessile, thereby forming compact groups; lobes short, 2-4 x 0.5-1.5 mm, mucronate; cauline leaves reduced, all with umbels in their axils. Terminal *umbel* single, hermaphrodite; lateral umbels 1-2(-3), alternate, mainly with male flowers. *Bracts* and *bracteoles* subulate, usually caducous; bracts 6-10 mm, bracteoles 2-3 mm long. *Fruiting umbels* (4-)5-11(-12)-rayed, 15-40 mm long. *Pedicels* about half as long as ripe fruit. *Petals* yellow, glabrous. *Fruit* pyriform, 12-17(-20) x 6-8(-14) mm; wings about 2-4 mm wide above, gradually decreasing in width towards the base, straight to slightly undulate, with an entire or crenate margin. *Fl. 5-7(-8).*

Distribution

Turkey, W. Iran (and Soviet Armenia?). Mountain areas, on rocky slopes, 850-2000 m.

1a. Plants covered with long, crispate, easily detachable, sometimes clustered hairs (see fig. 25 B). Wings of mericarps usually straight
23a. subsp. *meliocarpoides*

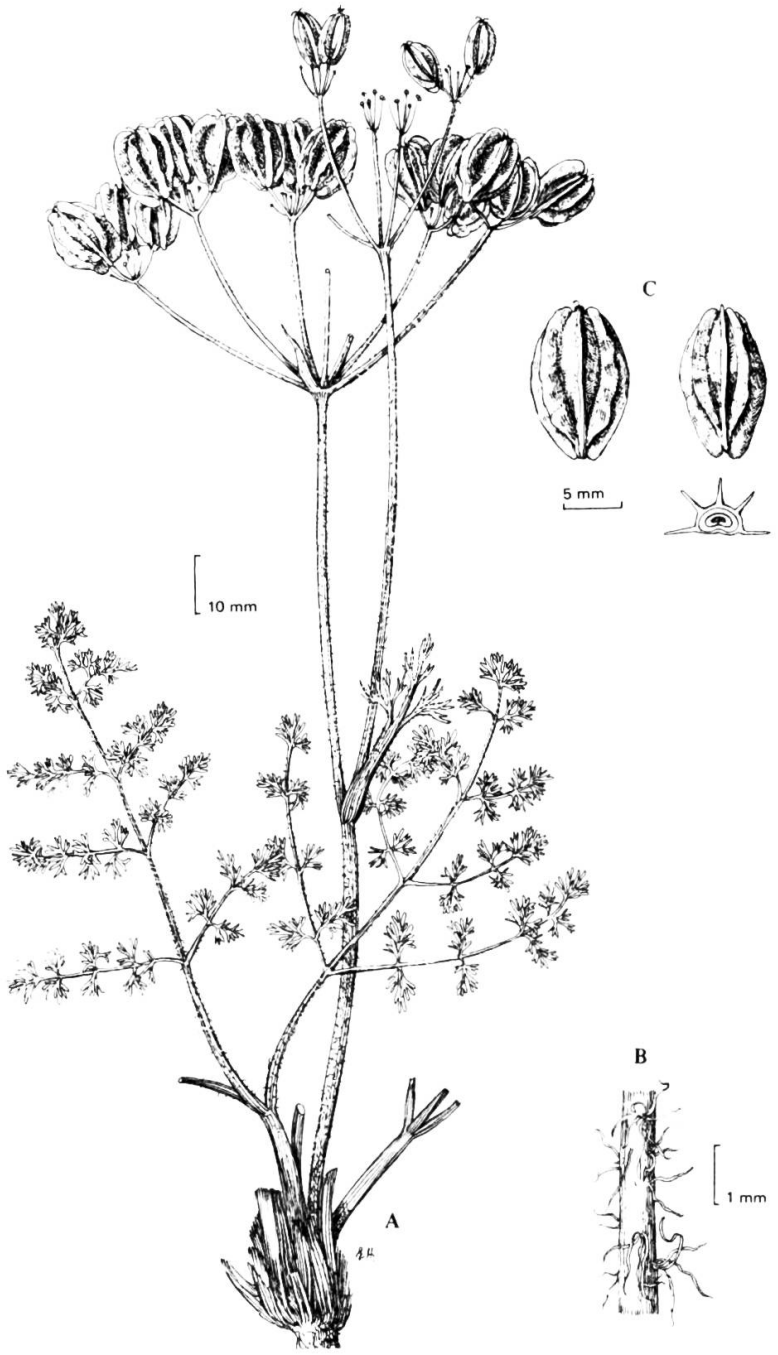


Fig. 25. – *Prangos meliocarpoides* subsp. *meliocarpoides*. **A**, habit; **B**, enlarged part of stem with indumentum; **C**, mericarps from two fruits, one with cross section (Turkey, *Bourgeau 285*).

1b. Plants covered with short hairs. Wings of mericarp weakly undulate
23b. subsp. *arcis-romanae*

23a. P. meliocarpoides subsp. **meliocarpoides** ≡ *Cachrys meliocarpoides* (Boiss.) Herrnst. & Heyn var. *meliocarpoides*, Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975.

Distribution

N., C. and S. Turkey; W. Iran. Map 8.

Selected specimens

Turkey. Phrygien: Kütahya-Gediz, 1020 m, 14.6.1954, *Huber-Morath* (herb. Hub.-Mor.); Burdur: Dirmil-Tefenni, 1200 m, *Huber-Morath 5166* (herb. Hub.-Mor.); Lycia: circa Elmalu, *Bourgeau 285* (G-BOIS); Cappadocia: env. de Kara-Hissar, 1300 m, *Balansa 412* (G-BOIS); Ankara: 68 km S. of Ankara, *Birand & M. Zohary 3045* (HUJ); Konya: Südhang des Sultan Dagh am Weg Celendos-Akşehir, 1500 m, *Wall 2735* (herb. Hub.-Mor.); distr. Cihanbeyli, 830 m, *Huber-Morath 13656* (herb. Hub.-Mor.); Karaman-Mut, 11 km S. Karaman, 1350 m, *Huber-Morath 17250* (herb. Hub.-Mor.); Kirsehir: *M. & D. Zohary 2660* (HUJ); Amasya: Ak-dagh, 1000 m, *Bornmüller 511* (JE); Kayseri (Cappadocia): inter Caesaream et Yosgad, 1200 m, *Bornmüller 2892d* (B); Seyhan (Adana); Bakirdağ-Seimbeyli, 25 km E. of Dabirdağ, 2000 m, *Huber-Morath 10916* (herb. Hub.-Mor.); Sivas: Zara-Sivas road, 1500 m, *Stainton & Henderson 5328* (E); Maraş: Göksun-Elbistan, 19 km E. of Göksun, 1280 m, *Huber-Morath 12018* (herb. Hub.-Mor.); Malatya-Adiyaman: 44 km von Malatya, 1000-1050 m, *Huber-Morath 9294* (herb. Hub.-Mor.); Elazig: Kharput, *Noë 842* (G-BOIS); Urfa: Siverek–Dundarli ad Allah Dagh, 3500', *Kotschy 1127* (G-BOIS); Kurdistania, *Sintenis 849* (K – with especially large fruits). ***Iran.*** Bakhtiari, 2300-2700 m, *Rechinger 47057* (W); Damghan-Semnan, 1300-1400 m, *Rechinger 52163* (W).

23b. P. meliocarpoides subsp. **arcis-romanae** (Boiss. & Huet) Herrnst. & Heyn, **comb. nova** ≡ *P. arcis-romanae* Boiss. & Huet in Boiss., Diagn. Pl. Or. Nov. ser. 2, 2: 105. 1856 ≡ *Cachrys meliocarpoides* var. *arcis-romanae* (Boiss. & Huet) Herrnst. & Heyn in Notes Roy. Bot. Gard. Edinburgh 33: 443. 1975. ***Type:*** [Turkey]: "Erzerum, in collibus supra Erzerum", *Huet du Pavillon* (G-BOIS).

= (?) *P. goktchaica* O. & B. Fedtsch. in Bull. Herb. Boissier ser. 2, 1: 963. 1901. ***Type:*** Goktcha: sur les rochers, près du village Elenovka (LE? – not seen).

Distribution

E. and N.E. Turkey (and Soviet Armenia: Goktschai?). Map 8.

Selected specimens

Turkey. Gümüşane: près Baibout, *Bourgeau 98* (G-BOIS); Erzincan: Refahiye-Erzincan, 1 km nach Refahiye, 1540-1560 m, *Huber-Morath 13651* (herb. Hub.-

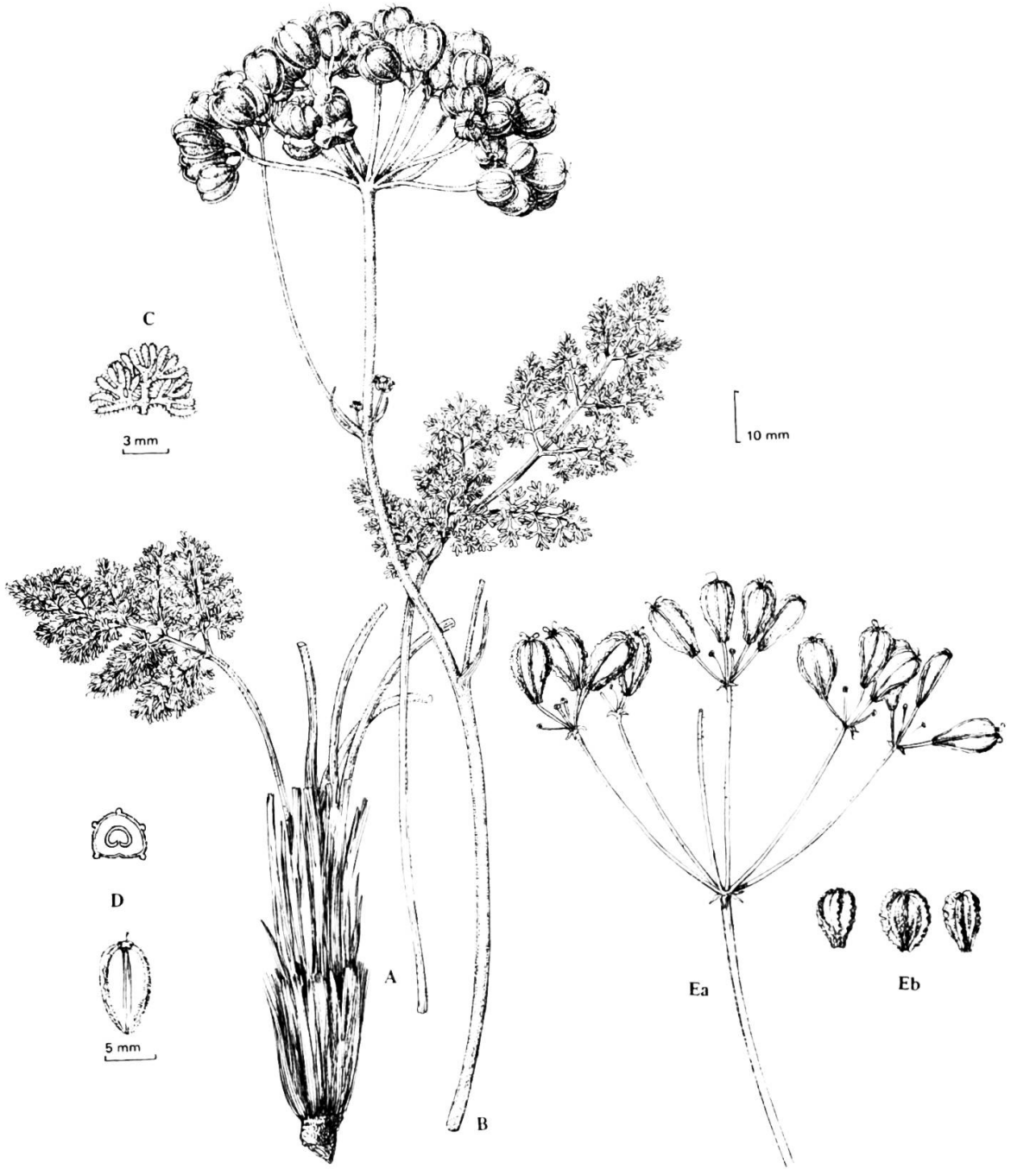


Fig. 26. – *Prangos cheilanthifolia*. **A**, stem with basal leaves and fibrous collar; **B**, stem with terminal and lateral umbels; **C**, terminal part of leaf segment; **D**, mericarp (commissural view) and its cross section (Iran, *Zohary & Orshan 6316/8*); **Ea**, terminal umbel; **Eb**, fruit with differently shaped wings from a single locality (Iran, *Gauba 5a*).

Mor.); Erzurum: Horasan, 1600 m, *Davis & Hedge D 29367* (HUJ); Erzurum: Caucase-Erzurum, *D'Alleizette 2848* (L); Armenia, *Calvert & Zohrab* (K).

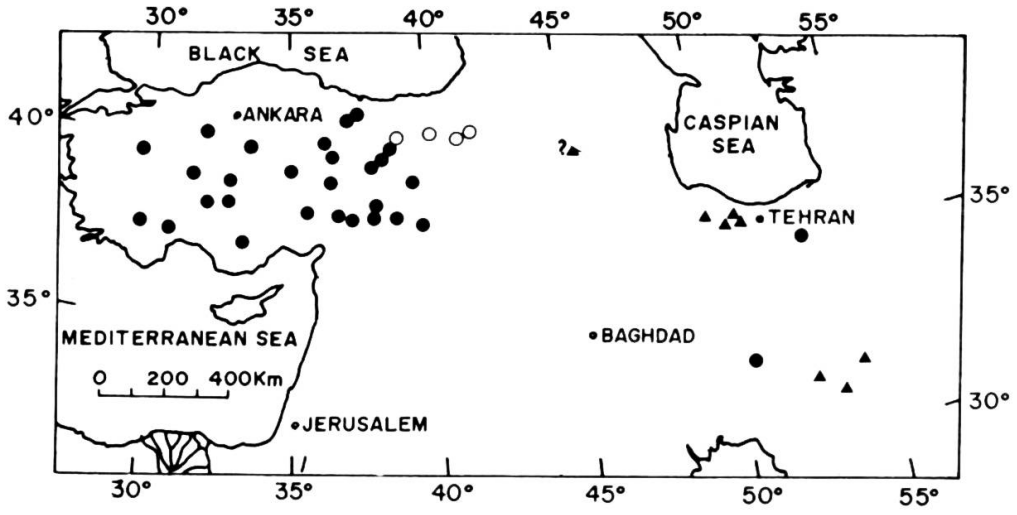
24. Prangos cheilanthifolia Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 79. 1844 ≡ *Cachrys cheilanthifolia* (Boiss.) Boiss., Fl. Or. 2: 936. 1872. ***Type:*** "Persia, prov. Aderbidjan", *Aucher 4590* (holotype: G-BOIS; isotype: K).

= *Cachrys turbinata* Bornm. & Gauba in Repert. Spec. Nov. Regni Veg. 36: 347. 1934 ≡ *C. turbinata* var. *schizoptera* Bornm. & Gauba in Repert. Spec. Nov. Regni Veg. 36: 348. 1934. ***Type:*** "Persia borealis: prope Mardabad, südwestlich von Keredj auf den Salzbergen, c. 1300 m", 29.6/1.7.1934, *Bornmüller* (B).

= *Cachrys turbinata* var. *odontoptera* Bornm. & Gauba in Repert. Spec. Nov. Regni Veg. 36: 348. 1934. ***Type:*** "Persia borealis, montis Elburs, supra Keredj, c. 1500-1600 m", 29.6./1.7.1934, *Bornmüller* (B).

Ic.: fig. 26.

Plant somewhat fleshy, 20-50(-70) cm high; all plant organs densely covered with short and long, straight to slightly crispate hairs. Basal *leaves* 3-4, 10-20(-30) cm long, with a conspicuous sheath separated from the petiole by a node; blade (3-)4-pinnatisect; segments short, nearly sessile, petiolules very short, nearly obsolete, therefore forming a very compact arrangement of the leaf lobes; lobes very short, 1-2 x 0.5-1.5 mm, acute, grooved, margins somewhat involute; cauline leaves reduced almost to the sheath, each with an umbel in its axil. Terminal *umbel* single, hermaphrodite, lateral umbels 2-3, alternate or opposite, with hermaphrodite and male flowers. *Bracts* and *bracteoles* subulate, often persistent; bracts very small, almost reduced to scales, 0.5-1 mm long; bracteoles longer, filiform, 1-2 mm long. *Fruiting umbels* 6-15-rayed, 25-45 mm long. *Pedicels* one third to as long as ripe fruit. *Petals* yellow, pubescent outside. *Fruit* pubescent in young stages, sometimes nearly glabrous at maturity, pyriform to turbinate, 8-10 x 3-4 mm; wings narrow, 1-1.5 mm wide, slightly undulate, sometimes with a somewhat crenate



Map 8. – Distribution of *Prangos meliocarpoides* subsp. *meliocarpoides* (○), *P. meliocarpoides* subsp. *arcis-romanae* (●) and *P. cheilanthifolia* (▲).

margin, or wings obsolete; rarely narrow wings on young fruit only, which disappear with maturity. *Fl. 4-7.*

Distribution

N. & C. Iran, endemic. Map 8. Mountain slopes, occasionally on sandy cover of granite, 1100-2200 m.

Selected specimens

Iran. Kazvin: Keredj, *Gauba & Behboudi 903* (W, as *C. turbinata*); Mt. Elburs: Keredj, in montibus Kuh-e Dasht, ca. 2000 m, *Rechinger 273* (K, W, as *C. turbinata*); Mt. Elburs: Keredj, Mt. Pic Kuh, ca. 1600-2200 m, *Rechinger 548* (W, as *C. turbinata*); Elburs: Abhänge über Keredj, bei Mardabad, *Gauba 354* (B, as *C. turbinata*); entre Dilijan et Ispahan, 1000-2000 m, *Schmid 5199* (G); inter Kerman et Jesd, 12.4.1859, *Bunge* (G-BOIS, K); 105 km S.E. of Jasd, 5200′, *M. Zohary & Orshan 6316/8, 9, 18* (HUJ); Deh-ballo, *Buhse 1344* (G-BOIS); 13 km N.W. de Nain, steppe à *Artemisia,* limons pierreux, 169 m, *Pabot 7001* (G).

Bornmüller (1934) described *Cachrys turbinata* from Mt. Elburs, env. of Keredj (Karaj), with two varieties. He studied the Bunge specimen cited by Boissier (1872) as *C. cheilanthifolia* (the only one with nearly mature fruit in that collection), and pointed out the difference in the fruit and leaf shape and in indumentum between his and Boissier's species. However, when more material is studied, the differential characters are found to show a continuous variation and it is not possible to retain *"C. turbinata"* as a separate species. The same applies to the characters by which Bornmüller divided his species into varieties (relative width of wings, size of fruit, wing-margins).

Species of doubtful association with Prangos

Cachrys eriantha DC., Prodr. 4: 238. 1830. ***Type:*** Persia, Badalan, 21.7.1828, *Szovits 565* (holotype: G-DC – not seen; isotype: G-BOIS).

Specimen seen also from: Iran, 16.5 km S. of Mianeh, 1090 m, *Pabot 5120* (G).

The fruit of *"C. eriantha"* resembles the fruit of *Prangos* in general morphology. In cross section the mericarp is identical with that of *P.* sect. *Intactae.* However, we have some doubts about the position of *"C. eriantha"* in *Prangos,* as it differs from other species of the genus in the following characters: *C. eriantha* has umbels with 2-3 rays only; in all the umbellules only about half of the flowers are hermaphrodite and there are no separate lateral male umbels as is typical for *Prangos;* the petals are white (not yellow as in *Prangos* species) and pubescent not only outside but also along the veins inside; the fruit is nearly sessile and densely pubescent, both characters rare in *Prangos.* The indumentum, especially dense on the fruit, includes also a unique type of many-celled, branched hairs.

C. eriantha is, without doubt, closely related with *Prangos,* but the possibility that it might perhaps represent a different genus cannot be ignored.

Cachrys papillaris Boiss. in Ann. Sci. Nat. Bot. ser. 3, 2: 75. 1844. ***Type:*** Mesopotamia, *Aucher 3582* (G-BOIS).

Pubescent plants; stem and leaf petioles with compound papillae (cf. fig. 10 G). Basal leaves large, 40 cm long, 6-pinnatisect, with nearly sessile segments. Sepals obsolete; petals yellow, glabrous. Immature fruit 5-6 mm long, with stylopodium partly hidden between the two mericarps.

Specimens from two collections in addition to the type, both from the same region, probably also belong to this taxon: Turkey, Mardin, between Mardin and Kotschassar, 4.1867, *Haussknecht 515* (G-BOIS, K); N. Iraq, N. of Mosul, 27 km S. of Khanaq, 500 m, 24.4.1933, *Eig & M. Zohary* (HUJ – without fruit).

The type and the above specimens have only young fruits, but it can be assumed from these that mature fruits would be significantly smaller than in any of the known species of *Prangos.* Furthermore, the stylopodium is partly hidden between the mericarps. Both characters make the inclusion of this species in *Prangos* rather doubtful.

Doubtful names

Prangos bornmuelleri Huber-Morath & Reese in Candollea 10: 152. 1942 – not *Prangos* (gen. nov.?).

P. bungei Boiss., Fl. Or. Suppl.: 260. 1888.

P. eryngioides Pau in Trab. Mus. Ci. Nat. Ser. Bot. 14: 26. 1918.

P. euryangioides Stapf & Wettst. ex Stapf in Denkschr.-Kaiserl. Akad. Wiss. Math.-Naturwiss. Kl. 51: 323. 1886.

P. longiradia Wolff in Repert. Spec. Nov. Regni Veg. 17: 456. 1921.

P. pamiroalaica Korovin, Rastit. Srednei Azii i Juzn. Kazahst. 2: 524. 1962.

P. polyactina Bornm. & Gauba in Repert. Spec. Nov. Regni Veg. 51: 100. 1942.

P. scabrifolia Post & Beauv. in Dinsm., Pl. Post. & Dinsm. 1: 6. 1932.

Excluded species

Prangos alata (Boiss.) Drude = **Heptaptera anisoptera** (DC.) Tutin

P. anatolica (Boiss.) Bentham & Hooker ex Drude = **Heptaptera anatolica** (Boiss.) Tutin

P. angustifolia (Bertol.) Nyman = **Heptaptera angustifolia** (Bertol.) Tutin

P. anisopetala DC. = **Heptaptera anisoptera** (DC.) Tutin

P. anisoptera (Boiss.) Drude = **Heptaptera anisoptera** (DC.) Tutin

P. cilicica (Boiss. & Bal.) Bentham & Hooker ex Drude = **Heptaptera cilicica** (Boiss. & Bal.) Tutin

P. colladonioides (Margot & Reuter) Nyman = **Heptaptera colladonioides** Margot & Reuter

P. crenata (Fenzl) Drude = **Heptaptera anisoptera** (DC.) Tutin

P. heptaptera (Boiss.) Drude = **Heptaptera colladonioides** Margot & Reuter

P. pauciradiata Boiss. & Hohen. = **Trachydium elbrusense** Boiss.

P. thapsioides DC. = **Elaeoselinum foetidum** Boiss.

P. triquetra (Vent.) Nyman = **Heptaptera triquetra** (Vent.) Tutin

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