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PLANTS OF THE KHABR VA RUCHOUN PROTECTED AREA, S IRAN

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ABSTRACT. An account of the vegetation of the Khabr va Ruchoun protected area (S Iran) is presented, along with a floristic list derived from two botanical expeditions from Edinburgh in 1975 and 1977. The reserve covers an area of 169,000 ha. of plains and mountains near the southern boundary of Kerman province.

Khabr va Ruchoun protected area was established in 1971 by the Iranian Department of Environmental Conservation with the main aim of protecting its populations of Persian Ibex, Wild Sheep and Jebeer Gazelle. The reserve covers an area of 169,000 hectares in a remote and mountainous region of Kerman province, not far from its border with the coastal province of Banader va Jazayer-e Bahr-e Oman (roughly equivalent to Farsistan). The northern edge of the reserve is about 40 km south of Baft (Fig. 1), from where an adequate road runs north via Mashiz to Kerman, 150 km distant. The southern part of the reserve can be reached from the road which leaves the main Sirjan to Bandar Abbas road at Hajjiabad, about 40 km south of Aliabad.

Barbara Parris visited the area in early May 1975, during an expedition organised by the Iranian Department of the Environment; her collections, totalling some 600 numbers, included about 130 specimens from the Khabr va Ruchoun reserve. Because of the variety of vegetation types observed, particularly on the floristically rich Kuh-e Khabr massif, the area was chosen for further study by John Edmondson and Tony Miller in June 1977. They were accompanied by Mostafa Assadi from the Botanical Institute of Iran. Their collections included about 160 numbers from the area of the reserve. The difference of a month in the timing of the two visits, as well as the fact that different parts of the reserve were explored, led to a total of over 220 species being recorded. This figure is by no means exhaustive; several as yet unidentified gatherings represent additional species, and others not in flower were not collected.

The flora of the highest levels of Kuh-e Khabr is especially interesting; many of the species represented there are members of a distinctively high-alpine element of the Iranian endemic flora, which includes a number of chasmophytes (plants inhabiting cliff ledges) notably on the marble precipices at around 3500 m. Further discussion of this and other floristic elements can be found in an article by Hedge & Wendelbo (1978), which includes distribution maps.

VEGETATION

Seven major subdivisions of the reserve have been recognised subjectively according to topography and altitude. Records in the floristic list are coded

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from 1 to 7 according to this system, and more precise details of locality etc. can be found in an Appendix under the collection number, together with altitude, habitat and date of collection.

1. LOW PLAINS. These are floristically rich, though sparsely vegetated, with a range of dominant species: *Gaillonia aucheri, Ochradenus aucheri, Pycnocycla nodiflora, Stocksia brahuica* and *Zygophyllum eurypterum. Taverniera glabra* and *Tamarix* sp. were dominant in the wadis. An isolated tree of *Pistacia khinjuk* perhaps represents a remnant of the Irano-Turanian woodland, but the present-day vegetation is largely Saharo-Sindian though with some Irano-Turanian penetrants (e.g. *Astragalus fasciculifolius*). The endemic element in this vegetation is important; several species such as *Cousinia stocksii, Dicyclophora persica, Platychaete aucheri* and *Stocksia brahuica* are of restricted distribution in S Iran and adjacent Afghanistan and the Pakistan province of Baluchistan.

2. TRANSITIONAL STEPPE. Except in the wadis, where *Tamarix* and *Tecomella undulata* spread up from the lower levels, the Saharo-Sindian vegetation is largely replaced above 1500 m by steppe vegetation with markedly different floristic composition. It occupies the interface with the Irano-Turanian montane steppe of higher levels, and is marked by the appearance of *Artemisia, Otostegia kotschyi* and *Convolvulus acanthocladus*.

3. HIGH PLAINS. With the exception of irrigated areas such as the small ones around the hamlets of Kahat and Ruchoun and the much larger one associated with Khabr village (see area 5), the vegetation of the high plains has the characteristic form of Irano-Turanian montane steppe with a marked component of tragacanthic species (sometimes called thorn-cushions), thistles and spiny shrubs. The vegetational cover appears even sparser than at lower levels. In some areas there are many trees of *Amygdalus scoparia*, and the steppe flora is almost entirely Irano-Turanian although there are a number of Mediterranean therophytes flowering in early spring. On the gentle slopes of talus east of Kuh-e Khabr small vineyards have been planted, and the exclusion of grazing has provided a refuge for a rich herbaceous flora.

4. RUCHOUN HILLS. These take their name from the settlement of Ruchoun (sometimes spelled Rutchun or Rouchoon) situated about 20 km south of the village of Khabr. Although their foothills fall away to the south into a much lower area of plains dissected by seasonal water-courses, the highest ridges have a montane character and reach 2800 m in places. For floristic records from this area we rely entirely on Barbara Parris's 1975 collections, which as they were made at the beginning of May included few of the late-flowering perennials. This part of the reserve is thus the least well-known and deserves further study in late May and June.

5. KHABR OASIS. The village of Khabr (or Khabr Bala) is the only sizeable settlement in the vicinity of the reserve. The village's fields and orchards are irrigated by a copious stream which issues from beneath the western flank

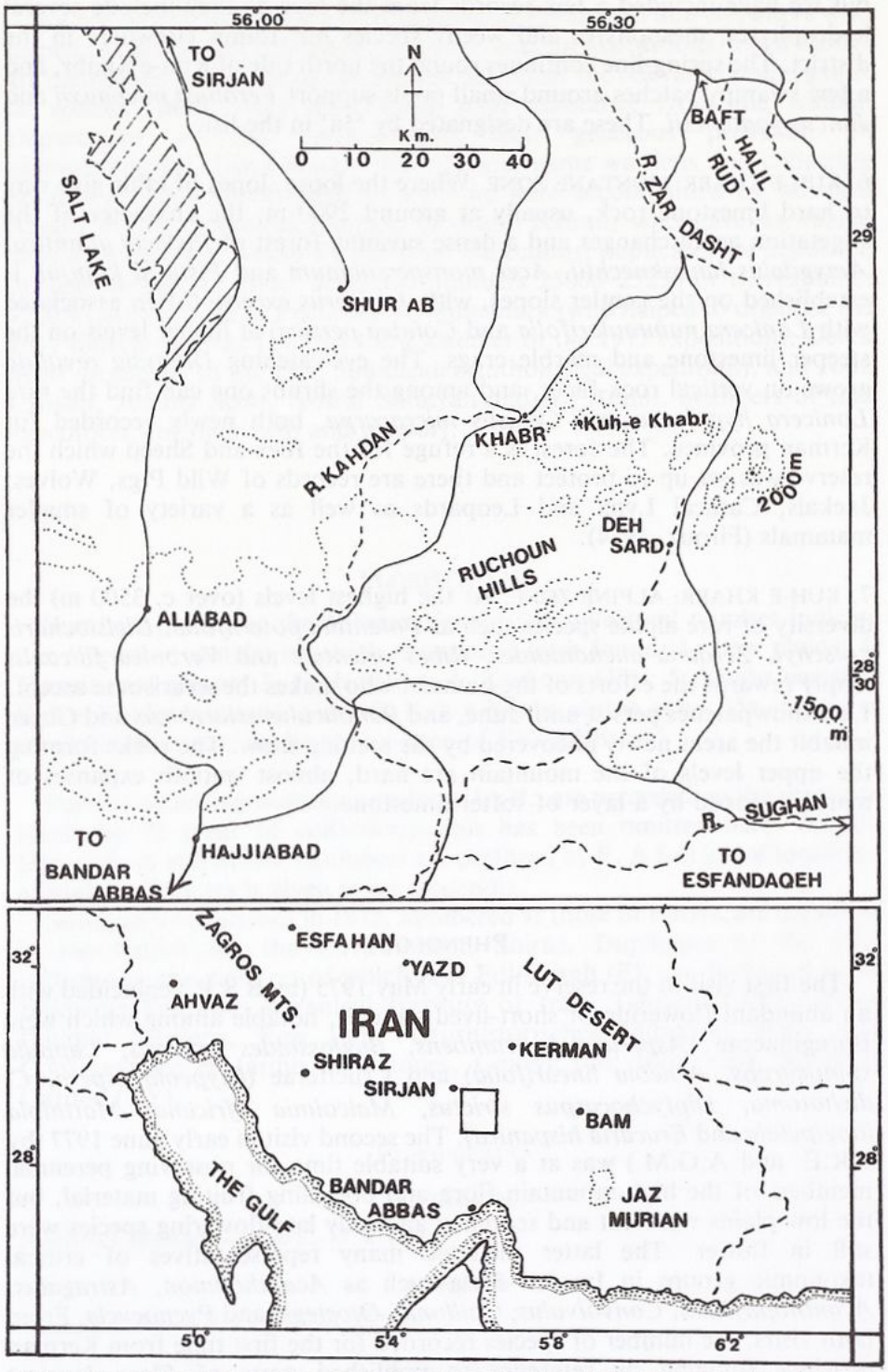

FIG. 1. Map of S Iranian region (below) showing location of Khabr va Ruchoun Protected Area (above). Key to upper map: - - - rivers; —— roads; . . . . contours at 500 m intervals.

of Kuh-e Khabr. The reserve boundary skirts the eastern edge of the village, but we have included a few records from the area as they include several hydrophytes, mesophytes and weedy species not found elsewhere in the district. The spring-line continues round the north side of Kuh-e Khabr, and a few swampy patches around small pools support *Veronica michauxii* and *Juncus fontanesii*. These are designated by '5a' in the list.

6. KUH-E KHABR: MONTANE ZONE. Where the loose slopes of talus give way to hard limestone rock, usually at around 2900 m, the character of the vegetation again changes and a dense savanna-forest of *Pistacia atlantica, Amygdalus haussknechtii, Acer monspessulanum* and *Pistacia khinjuk* is established on the gentler slopes, with *Juniperus excelsa* (often associated with *Lonicera nummularifolia* and *Colutea persica*) at higher levels on the steeper limestone and marble crags. The eye-catching *Dionysia revoluta* grows on vertical rock-faces, and among the shrubs one can find the rare *Lonicera hypoleuca* and *Cerasus microcarpa*, both newly recorded for Kerman province. The forest is a refuge for the Ibex and Sheep which the reserve was set up to protect and there are records of Wild Pigs, Wolves, Jackals, Caracal Lynx and Leopards as well as a variety of smaller mammals (Firouz, 1974).

7. KUH-E KHABR: ALPINE ZONE. At the highest levels (over c. 3500 m) the diversity of rare alpine species such as *Potentilla poteriifolia, Dielsiocharis kotschyi, Zerdana anchonioides, Ribes orientale* and *Veronica filicaulis* amply rewards the efforts of the botanist who makes the wearisome ascent. Late snowpatches persist until June, and *Ranunculus eriorrhizus* and *Gagea* inhabit the areas newly uncovered by the melting snow. The rocks forming the upper levels of the mountain are hard, almost smooth expanses of marble, topped by a layer of softer limestone.

PHENOLOGY

The first visit to the reserve in early May 1975 (by B.S.P.) coincided with an abundant flowering of short-lived annuals, notable among which were Boraginaceae (*Asperugo procumbens, Buglossoides arvensis, Lappula spinocarpos, Arnebia linearifolia*) and Cruciferae (*Clypeola aspera, C. dichotoma, Diptychocarpus strictus, Malcolmia africana, Matthiola longipetala* and *Erucaria hispanica*). The second visit in early June 1977 (by J.R.E. and A.G.M.) was at a very suitable time for observing perennial members of the high-mountain flora and obtaining fruiting material, but the low plains were hot and scorched and only late-flowering species were still in flower. The latter included many representatives of critical taxonomic groups in Iranian flora such as *Acantholimon, Astragalus, Acanthophyllum, Convolvulus, Gaillonia, Otostegia* and *Pycnocycla*. From both visits, the number of species recorded for the first time from Kerman province (judging by reference to published parts of *Flora Iranica*) illustrated the fact that the region is poorly explored and undoubtedly contains many more such species.

ACKNOWLEDGMENTS

We are indebted to the many colleagues at Edinburgh and elsewhere who helped to identify the collections from our Iranian expeditions. Their names are mentioned in the text of the floristic list under the relevant family, genus or species. Both visits were made with assistance from the Iranian Department of the Environment; their generous provision of accommodation, Land Rovers with drivers, game wardens and collecting permits is much appreciated. In 1977 we were accompanied by Mostafa Assadi of the Botanical Institute of Iran, Tehran, who gave us valued assistance and with whom we share our collections; duplicates are deposited in their herbarium under accession numbers 25000–25250 or thereabouts. Thanks are also due to Professor H. Runemark (who helped to organise the 1977 itinerary), Prue Lee (the third member of the 1977 expedition), Derek Scott (organiser of the 1975 botanical/ornithological expedition), and John Croxall, Joanna Scott, Nosrat Safaiyan and Ali Atami, members of that expedition, for their help and support.

FLORISTIC LIST

Numbers preceding the abbreviation of the collectors' number indicate the vegetation zone(s) in which the species were found: 1. Low plains; 2. Transitional steppe; 3. High plains; 4. Ruchoun Hills; 5. Khabr oasis; 6. Kuh-e Khabr montane zone; 7. Kuh-e Khabr alpine zone. [5a. refers to small marshy areas in the spring-zone of Kuh-e Khabr.]

Parris's collecting numbers, prefaced by P., are preceded on the specimen labels by 75 (year of collection)—this has been omitted here. Assadi, Edmondson and Miller's numbers are prefaced by E. A full list of localities, altitudes and dates is given in an Appendix.

Sofaiyan's collections in 1975, numbered as those of Parris, are deposited in the Center for the Environment, Shiraz. Duplicates of the 1977 collections, the main set of which is at Edinburgh (E), can be found in the following herbaria: Botanical Institute of Iran, Tehran (TARI); Royal Botanic Gardens, Kew (K); Naturhistorisches Museum, Wien (W); Conservatoire et Jardin Botaniques, Genève (G); New York Botanical Garden (NY).

PTERIDOPHYTA

Aspleniaceae

Asplenium adiantum-nigrum L.—7. E.1738.

Athyriaceae

Cystopteris fragilis (L.) Bernh.—7. E.1765.

Sinopteridaceae

Cheilanthes pteridioides (Reich.) C. Chr.–4. P.5385; 6. P.5384.
C. vellea (Aiton) F. Mueller–4. P.5382.

GYMNOSPERMAE

Cupressaceae

Juniperus excelsa Bieb.—6. P.326 & E.1696. Local name 'Overs'.

Ephedraceae

Ephedra pachyclada Boiss.—6. E.1727. There are good illustrations of this mainly S Iranian species in Parsa & Maleki (1978), t. 139 (♂) and 140 (♀).

E. procera Fisch. & Mey. [det. K. Browicz]—3. E.1655 & 1704; 6. P.327 & E. 1724. Local name 'Kheymak'. The orange fruits are eaten by the local people.

ANGIOSPERMAE

Aceraceae

Acer monspessulanum L. subsp. *persicum* (Poyark.) Rech. f.—6. E.1692 & 1725. Common on the flanks of Kuh-e Khabr.

Anacardiaceae

Pistacia atlantica Desf.—2. P.298; 3. E.1877; 6. E.1743.

P. khinjuk Stocks—1. E.1718 (see p. 112); 6. E.1723.

Asclepiadaceae

Pergularia tomentosa L.—4. P.412.

Periploca aphylla Decne.—4. P.408.

Both members of this family have typical Saharo-Sindian distributions; a third Asclepiad *Caralluma edulis* (Edgew.) Bentham, collected beyond the southern boundary of the Protected Area, had only been recorded once before from Iran: Makran, Kuh-e Bam Posht, by Hotson. Our gathering came from 122 km from Hajjiabad to Esfandaqeh, at Ab-e Dasht, 1650 m, near chromite mines (E.1943).

Berberidaceae

Leontice leontopetalum L.—6. P.332.

Bignoniaceae

Tecomella undulata (Roxb.) Seem.—2. E.1902 (see Fig. 3). First record of this Saharo-Sindian species from Kerman province, growing only in the wadis with *Tamarix* sp. It appears to be completely native here; there are doubts about its status in Oman.

Boraginaceae

Arnebia linearifolia DC.—4. P.416.

Asperugo procumbens L.—?5a. P.329.

Buglossoides arvensis (L.) Johnston—4. P.377.

Cynoglossum creticum L.—5. E.1852. First record for Kerman province.

Heliotropium ramosissimum (Lehm.) DC.—2. E.1886.

Lappula spinocarpos (Forsskål) Aschers. ex O. Kuntze—6. P.295 & 303.

Nonea caspica (Willd.) G. Don—6. P.300 & 340.

Onosma stenosiphon Boiss.—4. P.383. Because the nectariferous ring at the base of the corolla is glabrous in our material of this species, it cannot be identified correctly using the key in *Flora Iranica*, which assumes (couplet 14) that it is pilose.

Paracaryum strictum (C. Koch) Boiss.—2. E.1885. According to Mill in *Fl. Turkey* 6:299 (1979) this is the correct name for the species treated as *P. undulatum* Boiss. by Riedl (1967, p. 100).

P. rugulosum (DC.) Boiss.—4. P.384.

Campanulaceae

Campanula incanescens Boiss.—4. P. 380; 7. E.1737. This species is unusual in occurring both at medium altitudes (1500–2000 m) on the Ruchoun hills and in the alpine zone of Kuh-e Khabr (c. 3500 m). Our collections show scant evidence of floristic similarities between the summit zones of the two ranges, but the difference between the dates of the two visits has undoubtedly reduced the chances of a species being collected from both areas.

Capparidaceae

Capparis spinosa L. var. *spinosa*—4. P.405.

Caprifoliaceae

Lonicera hypoleuca Decne. in Jacquem.—6. E.1695. This is only the second record of this species from Iran; it was previously recorded from Kuh-e Eshger in Luristan (Wendelbo, 1965).

L. nummulariifolia Jaub. & Spach.—6. E.1752 & 1782.

Caryophyllaceae

Acanthophyllum sp.—4. P.419.

A. bracteatum Boiss.—2. E.1863.

A. crassifolium Boiss.—2. E.1865.

A. glandulosum [Bunge ex] Boiss. (det. H. Schiman-Czeika)—6. E.1784.

A. spinosum (Desf.) C. A. Mey. (det. H. Schiman-Czeika)—2. P.401.

A. sp. nov. (according to H. Riedl in litt.)—2. P.356. This new species will be published in a future part of *Flora Iranica*, for which Dr Schiman-Czeika is preparing the treatment of *Acanthophyllum*. We are grateful to her for advance notice of this discovery.

Dianthus spp. (not yet fully identified)—3. E.1663 & 1671; 4. P.403; 6. E.1769.

Gymnocarpus decander Forsskål—2. E.1878a; 4. P. 362.

Lepyrodiclis holosteoides Fisch. & Mey.—5. P.282.

Silene spp. (not yet fully identified)—2. P.417; 6. E.1770; 7. E.1762.

Cistaceae

Helianthemum cinereo-flavescens Rech. f., Aellen & Esfand.—4. P.407. Although this species was relegated to an observation under *H. stipulatum* by Rechinger (1967), our specimen agrees well with the diagnosis of the former species. The difference in habit, the golden-suffused indumentum, and the 5 mm calyces with stellate hairs provide ample grounds for considering it as distinct from *H. lippii*.

H. lippii (L.) Pers.—1. E.1713. This gathering is typical of the species, with greyish indumentum, intricately branched stems and 3 mm calyces with ± simple hairs.

Compositae

Achillea wilhelmsii C. Koch—3. E.1707; 4. P.385.

Anvillea garcina (Burm. f.) DC.—2. E.1881.

Artemisia sp.—2. E.1879a (obs.—no collection).

Centaurea bruguierana (DC.) Hand.-Mazz. subsp. *belangerana* (DC.) Bornm.—1. E.1716; 3. E.1667.

C. microlonchoides Boiss.—2. E.1887. This is only the fifth known collection of this endemic Iranian species and a new record for the province of Kerman.

Cousinia prolifera Jaub. & Spach.—4. P.388. This species is atypical of the majority of members of the genus in having a rather widespread distribution from southern Iran to Afghanistan and Pakistan. One of the few annual species of *Cousinia*, it was growing as a weed of cultivated fields.

C. stocksii C. Winkl.—2. E.1889. Another widespread species of the Baluchistan-Makran region.

Crepis kotschyana Boiss.—4. P.352.

Echinops sp.—4. P.368.

E. armatus Boiss. & Hausskn.—2. E.1870.

E. aucheri Boiss. [det. K. H. Rechinger]—2. E.1871.

Gnaphalium luteo-album L.—5. P.280.

Helichrysum leucocephalum Boiss. [det. E. Georgiadou & K. H. Rechinger]—4. P.404; 6. E.1785. The former specimen was first identified as *H. buhseanum* Boiss., which is treated as a synonym of the above species in the *Flora Iranica* account.

Phagnalon persicum Boiss.—6. E.1773; 7. E.1763.

Picris strigosa Bieb.—6. E. 1691.

Platychaete aucheri (Boiss.) Boiss. [det. H. W. Lack]—1. E.1715 & 1908.

Scorzonera sp.—3. E.1680.

S. tortuosissima Boiss.—2. E.1862 & 1884.

Senecio glaucus L. subsp. *coronopifolius* (Maire) Alexander—2. P.301.

Tragopogon aff. *caricifolius* Boiss.—6. P.339.

T. jesdianus Boiss. & Buhse—7. E.1759. New for Kerman province.

Tricholepis sp. nov. [det. K. H. Rechinger fil.]—1. E.1913. The species seems to have affinities with *T. chaetolepis* (Boiss.) Rech. Fil. (Afghanistan) and *T. spartioides* C. B. Clarke (Gilgit) [JRE].

Zoegea purpurea Fres.—6. P.289; 7. E.1742.

Chenopodiaceae

Hammada salicornica (Moq.) Iljin—1. E.1717.

Convolvulaceae

Convolvulus acanthocladus Boiss.—2. E.1851; 4. P.350.

C. leiocalycinus Boiss.—4. P.391; 6. E.1688.

C. oxysepalus Boiss.—2. E.1878. The specimen is not typical of this species. It was examined by Shahina Ghazanfar (University of Cambridge) who confirmed that it did not fall within the range of typical Pakistani *C. scindicus* Stocks; nevertheless its vegetative characters—height c. 30 cm, lateral shoots arcuate-ascendent, smaller leaves (7–12 × 3–4·5 mm) than typical *C. oxysepalus* (10–15 × 4–8 mm fide *Flora Iranica*) with distinctly impressed veins—distinctly resemble those of *C. scindicus* (Austin & Ghazanfar, 1979). Its floral characters closely approach those of *C. oxysepalus*, but the bracts subtending the capitulum are very broadly ovate, the apex mucronate, glabrescent on the outer surface. It seems either to represent a distinct subspecies or an intermediate between the two species, but more material is required before its status can be settled.

Cruciferae

Aethionema umbellatum (Boiss.) Bornm.—7. E.1760. New for Kerman province; its nearest station is Kuh-e Dinar in the southern Zagros.

Alyssum inflatum Nyar.—6. E.1781. New for Kerman province.

Clypeola aspera (Grauer) Turrill—4. P.367; 6. P.287.

C. dichotoma Boiss.—6. P.296.

Dielsiocharis kotschyi (Boiss.) O. E. Schulz—7. E.1739. One of the characteristic high mountain chasmophytes of Iran and adjacent Turkmenia. A monotypic genus, it reaches the southern limit of its known distribution on Kuh-e Khabr, where it grows within a few metres of the summit pinnacle (3862 m).

Diplotaxis harra (Forsskål) Boiss.—4. P.410.

Diptychocarpus strictus (Fisch.) Trautv.—4. P.371. New for Kerman province.

Erucaria hispanica (L.) Druce—4. P.374.

Fortuynia garcinii (Burm.) Shuttlew. (syn. *F. bungei* Boiss.—Rechinger, 1977)—2. E.1869. One of the indicator-species of the interface between the Irano-Turanian and Saharo-Sindian phytochoria.

Isatis cappadocica Desr.—3. E.1660.

Malcolmia africana (L.) R.Br.—6. P.304.

Matthiola longipetala (Vent.) DC.—4. P.371a.

Nasturtium officinale R. Br.—5. P.283. A hydrophyte of the irrigation canals around Khabr village.

Sterigmostemon longistylum (Boiss.) Bornm.—5. E.1905.

Zerdana anchonioides Boiss.—7. E.1764. New for Kerman province; this species was also found on Shir Kuh (near Yazd) by *Aryavand, Edmondson & Miller* (E.1450: Tezerjan Kuh, SE of Shir Kuh, 3800 m, 26 v 1977). See map (Fig. 6) in Hedge & Wendelbo (1978). In both localities the plant grew only in fine loose limestone scree.

Dipsacaceae

Pterocephalus afghanicus (Aitch. & Hemsl.) Boiss.—6. E.1776.
Scabiosa kermanensis Bornm.—2. P.409; 5. E.1874.
S. olivieri Coulter—1. E.1907; 3. E.1675 & 1673; 4. P.358 & 359; 6. P.294.

Euphorbiaceae

Chrozophora obliqua (Vahl) Juss.—2. E.1904.
Euphorbia buhsei Boiss.—3. E.1709; 6. P.331.
E. spp.—2. E.1890; 6. E.1686.

Geraniaceae

Erodium pulverulentum (Cav.) Willd. subsp. *bovei* (Delile) Schönb.-Tem.—2. P.402.

Gramineae

Aegilops kotschyi Boiss.—4. P.593.
Boissiera squarrosa (Banks & Sol.) Nevski—4. P.589 & 590.
Bromus danthoniae Trin.—6. E.1697.
B. tectorum L.—4. P.586b.
B. sp.—4. P.586a.
Chrysopogon aucheri (Boiss.) Stapf—2. P.415.
Cymbopogon olivieri (Boiss.) Bor—2. E.1883; 3. E.1661.
Cynodon dactylon L.—3. E.1710.
Eremopoa persica (Trin.) Roshev.—4. P.588.
Eremopyrum confusum Melderis var. *glabrum* Melderis—4. P.591.
Festuca arundinacea L.—5. E.1854. New for Kerman province but recently recorded from several localities in prov. Farsistan by Alexeev (*Not. Syst. Pl. Vasc. (Leningrad)* 16:15–16, 1979).
Hordeum glaucum Steud.—4. P.592.
Lolium rigidum Gaudin—4. P.594.
Pennisetum orientale L. C. Rich.—4. P.370; 6. E.1659; 7. E.1768.
Piptatherum laterale (Regel.) Roshev. subsp. *laterale*—6. E.1757.
Psathyrostachys fragilis (Boiss.) Nevski—6. E.1750.
Stipa haussknechtii Boiss.—6. E.1749; 7. E.1772. This species is a dominant tussock-forming grass throughout the top 1000 m of Kuh-e Khabr.
Stipagrostis plumosa (L.) Munro ex T. Anders.—3. E.1664.

Grossulariaceae

Ribes orientale Desf.—7. E.1730. Very rare and local in Iran, having previously been recorded from a few localities in the Alborz mountains (prov. Gilan) and from Kuh-e Hezar, at an altitude of 4200 m, by Bornmüller.

Illecebraceae

Paronychia bungei Boiss.—4. P.411.

Juncaceae

Juncus fontanesii Gay subsp. *kotschyi* (Boiss.) Snog. [det. S. Snogerup]—5a. E.1658.

Labiatae
[det. I. C. Hedge]

Ajuga chamaecistus Ging.—6. P.334.
Ballota aucheri Boiss.—6. E.1694.
Eremostachys adenantha Jaub. & Spach.—4. P.381; 5. E.1906.
Lallemantia royleana (Benth.) Benth.—4. P.366.
Lamium amplexicaule L.—6. P.330.
Marrubium crassidens Boiss.—6. E.1744.

Nepeta dschuparensis Bornm.—6. E.1687 & 1771; 7. E.1734. This rather variable species has also been recorded recently from Kuh-e Lalehzar and Kuh-e Genou (near Bandar Abbas) and each population shows minor differences as well as the expected variation due to differences of microhabit. The plant was very common throughout the *Juniperus* zone and above. The highest collection from Kuh-e Khabr (c. 3800 m, E.1734) is exceptionally glandular and has the smallest leaves and bracts.[JRE].
N. glomerulosa Boiss.—6. E.1775.
N. ispahanica Boiss.—2. E.1850.
Otostegia kotschyi Boiss.—2. E.1850.
Salvia macrosiphon Boiss.—3. E.1678 & 1706. Only seen as a weed in vineyard enclosures free from grazing.
S. sheilei Boiss.—6. E.1778.
S. santolinifolia Boiss.—2. E.1868.
Scutellaria multicaulis Boiss.—6. E.1756.
Stachys inflata Bentham—3. E.1666.
Teucrium polium L.—1. E.1909; 2. E.1882.
T. taylori Boiss.—2. E.1860; 3. E. 1708; 6. E.1786. These determinations are provisional pending a revision of the whole *T. orientale* group in Iran.
Ziziphora tenuior L.—3. E.1674; 4. P.598.

Leguminosae

Alhagi pseudalhagi (Bieb.) Desv.—4. E.1699.
Astragalus sp. sect. *Chronopus*—2. E.1861.
Astragalus sect. *Malacothrix*: three gatherings can be referred to this critical section, but in the absence of material for comparison they could only be named by reference to the published descriptions. With this qualification, the following identifications are provisionally offered:
A. griseus Boiss.—6. P.346.
A. spachianus Boiss. & Buhse—3. E.1679.
A. tenuiscapus Freyn. & Bornm.—6. E.1751.
A. calliphysa Bunge (sect. *Poterium*)—3. E.1669.
A. calvescens Boiss. (sect. *Chronopus*)—4. P.387.
A. cephalanthus DC. (sect. *Microphysa*)—3. E.1672.
A. fasciculifolius Boiss. (sect. *Poterium*)—1. E.1712.
A. podolobus Boiss. (sect. *Ammodendron*)—6. P.307. This gathering should perhaps be referred to *A. tarumensis* Sirj. & Rech. f., which is sometimes treated as a synonym of *A. podolobus*.
A. remotiflorus Boiss. (sect. *Megalocystis*)—6. E.1775.
A. reuteranus Boiss. (sect. *Microphysa*)—6. E.1698.
A. strictifolius Boiss. (sect. *Rhacophorus*) [det. D. McKean]—3. E.1662.
A. wartoënsis Boiss. & Kotschy (sect. *Rhacophorus*) [det. D. McKean]—3. E.1875.
Cicer kermanense Bornm.—3. E.1681.
Colutea persica Boiss.—6. E.1728 & 1779.
Lathyrus vinealis Boiss. & Noë—4. P.373.
L. aphaca L.—6. P.281.
Medicago sativa L.—4. P.376.
M. radiata L.—4. P.363.
Onobrychis cornuta (L.) Desv.—7. E.1733.
O. aff. *petraea* (Bieb.) Fischer—5. P.284. According to the field note this plant was cultivated in the village fields; the same species (in fruit) was found at Zehrud Bala below Kuh-e Hezar in 1977 (E.1613) growing along the margins of irrigated fields, presumably as a weed or escape. Although our material resembles Caucasian specimens in several characters such as fruit shape, it has much broader leaflets, especially those of the upper cauline leaves, and perhaps represents a distinct taxon.
Oxytropis kermanica Freyn. & Bornm.—7. E.1746.
Sophora griffithii Stocks—5. P.348 & E.1858. Like P.284 above, this may be grown as a crop.
Trigonella monantha C. A. Mey.—4. P.599; 6. P.306.
Vicia peregrina L.—6. P.349.

Liliaceae

Allium scabriscapum Boiss.—7. E.1787.
A. sp.—6. P.333.
Asphodelus fistulosus L.—4. P.602.
Gagea spp.—6. P.338; 7. E.1736 & 1789.
Tulipa spp.—6. P.341; 7. P.335.

Malvaceae

Malva neglecta Wallr.—4. P.378.
M. nicaeënsis All.—4. P.375.

Moraceae

Ficus sp.—4. P.382.

Oleaceae

[Olea aucheri (Chev.) Ehrend.—Not seen. We were specially asked by Mr Vahedi, of the Department of the Environment in Tehran, to look out for this species. A record of this rare species from the Baft region of prov. Kerman: 'in silva Kuh Chah inter Esfandaqeh et Sirjan, 2000–2500 m, *Djazirei*' (Murray, 1968) indicates that it might well occur in the vicinity of the Khabr va Ruchoun protected area.]

Orobanchaceae

Cistanche tubulosa (Schenk) Wight—3. E.1677.
Orobanche aegyptiaca Pers.—6. E.1777.

Papaveraceae

Glaucium grandiflorum Boiss. & Huet.—6. P.347.
Papaver decaisnei [Hochst. & Steud. ex] Boiss.—5a. P.276.

Plumbaginaceae

Acantholimon aff. *festucaceum* (Jaub. & Spach) Boiss.—3. E.1705. Not in flower when collected; identification based on material in bud and from the previous year's dead spikes.
A. modestum Rech. f. & Schiman-Czeika—6. P.286.
A. scorpius (Jaub. & Spach) Boiss.—3. E.1876; 4. P.389.

Polygonaceae

Polygonum spinosum Gross—6. E.1745. New for Kerman province.
Rumex sp.—5. E.1857.
R. vesicarius L.—4. P.365.

Primulaceae

Dionysia revoluta Boiss.—6. P.285, E.1684 & 1754. Records from Kuh-e Khabr and from Kuh-e Genou (Hedge & Wendelbo, 1978) establish a large eastward extension in the known range of this southern Zagros species.

Punicaceae

Punica granatum L.—4. E. obs. Growing inside the old fort near Kahat.

Ranunculaceae

Ceratocephalus testiculatus (Crantz) Roth—5a. P.328.
Clematis ispahanica Boiss. [det. C. Grey-Wilson]—3. E.1676.
Delphinium sp.—4. P. 400.
Ranunculus sp. (sect. *Batrachium*)—5a. P.278.
R. eriorrhizus Boiss. & Buhse—6. P. 343; 7. E.1735.
Thalictrum sp.—5. E.1853.

Resedaceae

Ochradenus aucheri Boiss.—1. E. 1711; 4. P.355.
Reseda pruinosa Del.—4. P.372.

Rhamnaceae

Rhamnus persica Boiss. [det. K. Browicz]—3. E.1668; 6. P.293.
Sageretia thea (Osbeck) M. C. Johnston supsp. *thea*—6. E.1767; 7. E.1731.

Rosaceae

Amygdalus eburnea Spach—3. E.1670.
A. elaeagnifolia Spach. subsp. *leiocarpa* (Boiss.) Browicz [det. K. Browicz]—6. E.1726. This species is a major component of the *Pistacia-Amygdalus-Acer* forest on the lower slopes of Kuh-e Khabr.
A. haussknechtii (C. K. Schneider) Bornm.—6. P.345.
A. lycioides Spach—5. P.299.
A. scoparia Spach—3. E.1873. This species dominates the 'savanna-steppe' SE of the Kuh-e Khabr massif.
Cerasus microcarpa (C. A. Mey.) Boiss. subsp. *diffusa* (Boiss. & Hausskn.) Browicz [det. K. Browicz]—6. E.1729. New for Kerman province; a considerable extension in the distribution both of the subspecies and of the species as a whole.
Cotoneaster spp. 6. E.1747, 1753 & 1766. This genus requires further critical revision; we have insufficient comparative material for naming.
Potentilla poteriifolia Boiss.—7. E.1741. New for Kerman province; previously known mainly from the southern Zagros.
Rubus aff. *ochthodes* Juz.—5. E.1856. Our material keys out to this species using *Flora Iranica* (Gilli, 1969) but differs notably in its pink petals and turions with equal-sized spines. Compared to a photograph of authentic Caucasian material, the leaflets are less markedly acuminate though this may be of little taxonomic value. Possibly a new taxon.

Rubiaceae

Callipeltis cucullaris (Jusl.) Rothm.—3. E.1683.
Crucianella sp.—3. E.1701.
Gaillonia aucheri (Guill.) Jaub. & Spach—1. E.1720; 2. E.1888.
G. crucianelloides Jaub. & Spach—4. P.406.
G. macranthera Blatt & Kallb.—2. E.1857.
Galium incanum Sm.—3. E.1682.
Rubia albicaulis Boiss.—3. E.1700. Most records of *Rubia* from Kerman province have been referred to *R. kermanensis* Bornm. which is probably synonymous with the above species.

Sapindaceae

Stocksia brahuica Bentham—1. E.1714. See map (Fig. 8) in Hedge & Wendelbo (1978) which includes our record.

Scrophulariaceae

Scrophularia leucoclada Bunge [det. J. Grau]—2. E.1872.
S. striata Boiss. [det. J. Grau]—3. E.1874.
S. subaphylla Boiss [det. J. Grau]—6. E.1783; 7. E.1732.
Verbascum sp.—3. E.1656.
V. farsistanica (Murb.) Hub.-Mor.—4. P.353; 6. E.1780.
Veronica sp.—6. P.336.
V. filicaulis Freyn. [det. M. Fischer]—7. E.1761.
V. michauxii Lam. [det. M. Fischer]—5a. E.1657.

Solanaceae

Hyoscyamus sp.—7. E.1740.
H. senecionis Willd.—6. P.277 & 291.
H. squarrosus Griff.—4. P.379. This species is included in *H. reticulatus* L. by Al-Musawi (in sched.).
Lycium depressum Stocks—4. P.414.
Solanum alatum Moench—6. E.1690. New for Kerman province.

Tamaricaceae

Tamarix sp.—2. E.1903. Though resembling *T. dubia* Bunge and *T. passerinoides* Del. in some respects, the gathering could not be matched with either and may be a new taxon.

Thymelaeaceae

Diarthron vesiculosum (Fisch. & Mey.) Mey.—3. E.1665.

Umbelliferae
[det. J. Lamond p.p.]

Bupleurum falcatum L. subsp. *cernuum* (Ten.) Arc.—3. E.1702; 6. E.1693b.
Dicyclophora persica Boiss.—1. E.1719; 2. E.1879; 4. P.360. For further recent records of this species see Hedge & Lamond (1978).
Ducrosia anethifolia (DC.) Boiss. [det. R. Alava]—1. E.1912.
Ferula oöpoda (Boiss. & Buhse) Boiss. [det. D. Chamberlain]—6. E.1774.
Ferulago angulata (Schlecht.) Boiss. subsp. *carduchorum* (Boiss. & Hausskn.) Chamb. [det. D. Chamberlain]—6. E.1693a; Local name 'Kahkom'.
Prangos aff. *acaulis* (DC.) Boiss.—3. E.1703. Seed only.
Psammogeton canescens (DC.) Vatke—1. E.1910.
P. stocksii (Boiss.) Nasir—2. E.1867. The correct genus to which this species belongs is in doubt; it is provisionally retained under *Psammogeton* pending completion of a revision by Dr S. Jury.
Pycnocycla aucherana [Decne. ex] Boiss.—1. E.1914.
P. nodiflora [Decne. ex] Boiss.—1. E.1722; 2. E.1866. Further notes on this remarkable genus are given in Hedge & Lamond (1973).

Urticaceae

Forsskahlea tenacissima L.—4. P.418.
Urtica dioica L.—6. E.1689.

Zygophyllaceae

Fagonia bruguieri DC.—4. P.357.
Zygophyllum eurypterum Boiss.—1. E.1721.

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APPENDIX

Collecting sites of B. S. Parris in 1975

P.276–278, 328–330: Khabr spring; 2800 m; 3 v.
P. 326–327: *Artemisia* steppe above Khabr spring; 2800 m; 3 v.
P. 280–284: Khabr village fields and edges of stream; 2000 m; 2 v.
P. 285–297: W side of Kuh-e Khabr, gorge above Khabr village; 2300–2400 m; 2 v.
P. 298–307: below gorge, steppe hills near river bed; 2 v.
P. 330–346: Kuh-e Khabr; 3 v. All except 335 & 337 from between 2800–3100 m; 337 from 3400 m; 335 from (3300–)3500 m.
P. 347–349: near Khabr village; 4 v.
P. 350–391, 400–419, 566, 586–603: Ruchoun hills; 4 & 5 v. 400–419 and 601–603 were collected on 5 v from below 1500 m, the remainder were collected on 4 v from between 1500 and 2000 m. All numbers except the following are from rocky slopes and flats: P. 361: steppe flats; P. 365: dry river flats; P. 368–369: steppe dominants; P. 373, 375–377: inside caravanserai; P. 378–379, 388: caravanserai outer grounds and fields; P. 385, 599–600: near Ruchoun village; P. 405: dry rocky streambed.

Collecting sites of Assadi, Edmondson & Miller in 1977

E.1655–56, 1659–63: NE side of Kuh-e Khabr, near col; *Pistacia-Acer-Amygdalus* forest; 2500 m; 7 vi.
E.1657–58: by spring on NE side of Kuh-e Khabr; highly alkaline, rather stagnant pool; 2200 m; 7 vi.
E.1664–1670: c. 15 km SE of Khabr village; thorn-cushion steppe; 2000 m; 7 vi.
E.1671–83, 1701–1710: SE side of Kuh-e Khabr; vineyard enclosure; 2400 m; 8 vi.
E.1699: inside old fort at Kahat, between Khabr and Ruchoun; eroded mud-brick walls; 2000 m; 8 vi.
E.1700: SE side of Kuh-e Khabr; vineyard wall; 2300 m; 8 vi.
E.1711–1722: c. 15 km SW of Ruchoun village; plain with *Gaillonia*; 1500 m; 9 vi.
E.1748–1789: ascent of Kuh-e Khabr from valley on SE side, 8 vi; 3000–3400 m except for the following numbers, which are from 3500–3600 m: E.1732–34, E.1737–42, E.1758–65, E.1787–89.
E.1723–1747: descent of Kuh-e Khabr (W side) to Khabr village; 9 vi.
E.1850–51: 5 km N of Khabr; *Otostegia* steppe; 2400 m; 6 vi.
E.1852–57: in Khabr village; moist ground by river; 2100 m; 7 vi.
E.1858–69, 1905–06: outskirts of Khabr village, waste ground and *Artemisia* steppe; 2200 m; 7 & 10 vi.
E.1870–72: 2 km NW of Khabr village; *Artemisia* steppe; 2300 m; 8 vi.
E.1873–77: 10 km NW of Khabr village, open *Pistacia-Amygdalus* woodland, 7 vi.
E. 1878–1890: 20 km from Khabr to Kahat, *Otostegia-Fortuynia-Artemisia* steppe, 1600 m, 7 vi.
E.1902–1904: 20 km from Khabr to Ebrahimabad, in river bed, *Tamarix-Calligonum* association, 10 vi.
E.1907–1914: c. 20 km SW of Ruchoun village, plain with *Gaillonia*, 1300 m, 10 vi.