

**Zeitschrift:** Candollea : journal international de botanique systématique = international journal of systematic botany

**Herausgeber:** Conservatoire et Jardin botaniques de la Ville de Genève

**Band:** 58 (2003)

**Heft:** 2

**Artikel:** Notes on the flora of Iran : 4. Two new records and synopsis of the new data in Iranian Cruciferae since Flora Iranica

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**DOI:** <https://doi.org/10.5169/seals-879310>

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# Notes on the flora of Iran: 4. Two new records and synopsis of the new data on Iranian Cruciferae since Flora Iranica

HOSSEIN AKHANI

## ABSTRACT

AKHANI, H. (2003). Notes on the flora of Iran: 4. Two new records and synopsis of the new data on Iranian Cruciferae since Flora Iranica. *Candollea* 58: 369-385. In English, English and French abstracts.

*Cakile maritima* and *Raphanus raphanistrum* are recorded for the first time from Iran, i.e. the sandy coastal parts of the South Caspian sea. Notes on the sandy flora of the S Caspian coastal dunes are added. A synopsis of all new taxa, new records, taxonomic or nomenclatural changes, and a bibliography of 79 published works on, or related to Iranian *Cruciferae* after the publication of Flora Iranica in 1968 are provided. According to these data 8 new taxa, 39 new records, 35 nomenclatural or status changes and 8 reductions to synonymy were proposed during the last 35 years. Accordingly, the total number of known Iranian *Cruciferae* increased from 104 to 120 genera, and from 319 to 358 species, respectively. There have been remarkable changes or additions in the genera *Alyssum*, *Malcolmia* and *Thlaspi*. The following genera are added, described as new or because of taxonomic or nomenclatural reasons: *Boreava*, *Cithareloma*, *Coronopus*, *Crucihimalaya*, *Fedtschenkova* [= *Malcolmia*], *Hornungia*, *Iberis*, *Irania* [= *Fibigia*], *Kotschyella*, *Microthlaspi*, *Neotorularia*, *Neurotropis*, *Noccaea*, *Olimarabidopsis*, *Petiniotia*, *Thellungiella* and *Vania*.

## RÉSUMÉ

AKHANI, H. (2003). Notes sur la flore d'Iran: 4. Deux nouvelles citations pour la flore d'Iran et synopsis des nouvelles données pour la famille des Crucifères publiées depuis Flora Iranica. *Candollea* 58: 369-385. En anglais, résumés anglais et français.

*Cakile maritima* et *Raphanus raphanistrum* sont cités pour la première fois d'Iran, des rivages sablonneux de la Mer caspienne. Un commentaire sur la flore de ces dunes est ajouté. De plus, l'auteur fournit le synopsis de toutes les nouveautés, nouveaux taxons, nouvelles citations, changements taxonomiques ou nomenclaturaux, établi à partir des 79 références publiées sur les *Cruciferae* d'Iran depuis leur traitement dans Flora Iranica en 1968. Ces données portent sur 8 nouveaux taxons, 39 nouvelles citations et 35 changements taxonomiques ou nomenclaturaux publiés durant les 35 dernières années. Au final, le nombre total des *Cruciferae* d'Iran est passé de 104 à 120 genres, et 319 à 358 espèces, respectivement. Les changements les plus marqués ont eu lieu dans les genres *Alyssum*, *Malcolmia* et *Thlaspi*. Les genres suivants sont ajoutés à la flore d'Iran, soit comme nouveaux taxons, soit pour des raisons taxonomiques ou nomenclaturales: *Boreava*, *Cithareloma*, *Coronopus*, *Crucihimalaya*, *Fedtschenkova* [= *Malcolmia*], *Hornungia*, *Iberis*, *Irania* [= *Fibigia*], *Kotschyella*, *Microthlaspi*, *Neotorularia*, *Neurotropis*, *Noccaea*, *Olimarabidopsis*, *Petiniotia*, *Thellungiella* et *Vania*.

**KEY-WORDS:** CRUCIFERAE – *Cakile maritima* – *Raphanus raphanistrum* – Psammophytes – New records – Flora of Iran – Hyrcano-Mediterranean link.

### Introduction

Although the monumental work “Flora Iranica” (RECHINGER, 1963-2001) is still not completely finished, there are a lot of new data collected since the publication of earlier accounts. A remarkable part of these data is the results of the activities by the Iranian botanists who published most of their findings in “*The Iranian Journal of Botany*”. Unfortunately the access to the material cited in this journal and preserved in the Herbarium of Research Institute of Forests and Rangelands (TARI) was not possible for the present author.

This paper is a forth of a series of contributions (AKHANI, 2002; AKHANI & GHORBANI, 2003; AKHANI & SALIMIAN, 2003) dealing with the various aspects of the Flora of Iran. It includes two new records and a synopsis of the new data on the family *Cruciferae* in Iran assembled during the last 35 years, since the publication of Flora Iranica account of the family (HEDGE & RECHINGER, 1968).

### Two new records from South Caspian Sea coasts

***Cakile maritima* Scop.**, Fl. Carniol. ed. 2, 2: 35 (1772).

Mazandaran: ca. 30 km N of Sari, Khazar-abad, sandy coasts of the South Caspian sea of the guest building of Tehran University, 36°48'N, 53°4'10"E, ca. 20 m below sea level, 8.VI.2000, *Akhani 14141* (IRAN, Hb. Akhani); *ibid.*, 22.III.2001, *Akhani 14581* (Hb. Akhani) (Figs. 1 & 2).

The species was found in the eastern parts of the South Caspian sea coasts, on sandy soils very close to the tidal zone. Only a few species can be found so near the sea such as *Convolvulus persicus* and *Arguzia sibirica*. *Cakile maritima* was known as a predominantly Euro-Mediterranean coastal sandy plant which penetrates into the Black Sea coasts (BALL, 1993; GREUTER & al., 1986). According to BALL (1993), four subspecies were distinguished for the European Flora and three subspecies according to RODMAN (1974). The eastern populations along the Black Sea belong to subsp. *euxina* (Pobed.) Nyár., which is characterised by deeply pinnatifid leaves and ± hastate fruits, which are constricted at the point of articulation. The leaves of Iranian plants are similar with those of the subsp. *euxina*, but the fruits seem more similar to subsp. *maritima*. Al-Shehbaz (in litt.) believes that it belongs to subsp. *maritima*.

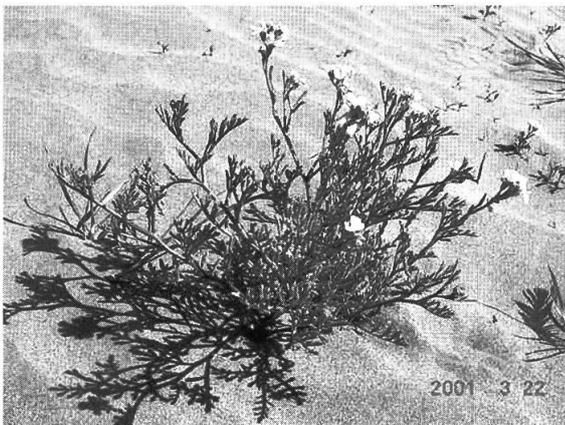


Fig. 1. – *Cakile maritima* Scop. Habit on coastal dunes near Khazarabad in full flower at the beginning of spring [*Akhani 14581*].



Fig. 2. – *Cakile maritima* Scop. Fruiting specimen [*Akhani 14141*].

**Raphanus raphanistrum** L., Sp. Pl.: 669 (1753).

Mazandaran: ca. 30 km N of Sari, Khazar-abad, sandy coasts of the South Caspian Sea near guest building of Tehran University, 36°48'N, 53°4'10"E, ca. 20 m below sea level, 8.VI.2000, *Akhani 14147* (IRAN, Hb. Akhani); *ibid.*, 22.III.2001, *Akhani 14851* (Hb. Akhani).

The occurrence in Iran of this widely distributed weedy species in Europe, N. Africa and SW Asia has been expected by Hedge (HEDGE & RECHINGER, 1968) in Flora Iranica. The species has been found from the same locality as *Cakile maritima*, but it occurs as a ruderal species in a longer distance from the coast but still on sandy soils.

The coastal parts of the South Caspian Sea are severely degraded because of intensive human activities. Nearly all parts of the area are occupied by villas, hotels, industry or are under cultivation. Only a narrow stripe along the Miankaleh Protected Area in the easternmost parts is still natural. Some fragmented dunes can be seen in the eastern parts between Anzali and Astara, which they are invaded by many ruderal plants. Our knowledge on the vegetation and flora of this area is very poor. FRÉY & PROBST (1974) provided a preliminary study on the vegetation of the sandy dunes near Babolsar. A preliminary list is given according to the author's collection and field notes. The species which are indicated by an asterisk seem to be restricted to, or prefer, sandy habitats. The other species are either weedy species or hygrophillous species with long roots, which profit the high water table that exists in the area.

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|--|--|
| <i>Amaranthus cruentus</i> L.  | <i>Froriepia subpinnata</i> (Ledeb.) Ball      |
| <i>Arenaria leptoclados</i> (Rchb.) Guss.*                                     | <i>Gleditsia caspica</i> Desf.*                |
| <i>Arguzia sibirica</i> (L.) Dandy*  | <i>Henrardia persica</i> (Boiss.) C. E. Hubb.* |
| <i>Artemisia tscherviniana</i> Besser*   | <i>Kickxia elatina</i> L.                      |
| <i>Brassica tournefortii</i> Gouan *   | <i>Maresia nana</i> (DC.) Batt.*               |
| <i>Bupleurum marschallianum</i> C. A. Mey.*                                    | <i>Medicago minima</i> (L.) Bartal.*           |
| <i>Cakile maritima</i> Scop.*  | <i>Medicago polymorpha</i> L.*                 |
| <i>Chenopodium ambrosioides</i> L.*  | <i>Melia azedarach</i> L.                      |
| <i>Convolvulus persicus</i> L.*  | <i>Phyla nodiflora</i> (L.) Greene*            |
| <i>Conyzanthus squamatus</i> (Spreng.) Tamamsch.                               | <i>Physalis alkekengi</i> L.                   |
| <i>Corispermum aralocaspicum</i> Iljin   | <i>Phytolacca americana</i> L.                 |
| <i>Corynephorus articulatus</i> (Desf.) P. Beauv.<br>(Det: H. Scholz, Berlin)* | <i>Plantago psyllium</i> L.*                   |
| <i>Cyperus</i> spp.  | <i>Polycarpon tetraphyllum</i> (L.) L.*        |
| <i>Datura stramonium</i> L.*   | <i>Punica granatum</i> L.*                     |
| <i>Daucus littoralis</i> Smith subsp. <i>hyrcanicus</i><br>Rech. f. *          | <i>Raphanus raphanistrum</i> L.*               |
| <i>Digitaria sabulosa</i> Tzvelev (Det: H. Scholz,<br>Berlin)*                 | <i>Rubus sanctus</i> Schreb.*                  |
|  | <i>Senecio vernalis</i> Waldst. & Kit.         |
|  | <i>Silene conica</i> L.*                       |

**Synopsis of the new informations on Iranian *Cruciferae*  
available after the publication of Flora Iranica**

The treatment of the *Cruciferae* family in Flora Iranica (HEDGE & RECHINGER, 1968) is one of the early volumes, but undoubtedly one of the well written accounts. Among the 127 genera and 469 species dealt with in Flora Iranica, 104 genera and 310 species have been reported from Iran. After the publication of Flora Iranica a total of ca. 47 taxa including 8 new species and 39 new records, which are listed below, are added to the Iranian Flora. There has been some nomenclatural changes and reductions into synonymy, which increase the total number of species to 358 and number of genera to 120 (Table 1). The synopsis of the new information published since Flora Iranica is provided. It reflects only published data available in the literature. It may facilitate further studies, but is not reflecting author's opinion on correctness or acceptance of data. The author names are abbreviated according to BRUMMITT & POWELL (1992) and the citations according to BPH: LAWRENCE & al. (1968) and BPH/S: BRIDSON & SMITH (1991), respectively.

<b>Table 1. – Statistical comparison of number of genera and species in Iran in Flora Iranica (HEDGE &amp; RECHINGER, 1968) and new data summarised in this paper.</b>		
	<b>Species</b>	<b>Genera</b>
Flora Iranica	469	127
Iran	319	104
<b>Changes</b>		
New records	+39	+16
Newly described	+8	
New synonymy	–8	
Total	358	120

The changes are marked by the following characters:

- \* new species
- + new species record or added species due to new transfers
- reduced as synonym
- § new combination or status
- # newly described or recorded genus for Iran
- ± other changes, including infraspecific additions

\**Aethionema semnanensis* Mozaff. in Iran. J. Bot. 7: 128 (1996).

**Type:** Semnan, Dastjerd, Eij to Javin, 1900 m, *Taherian & Maddah 850* (holo-: TARI; iso-: Research Center of Semnan).

\**Alyssopsis trinervis* Botsch. & Sejfulin in Novosti Sist. Vyssh. Rast. 25: 89 (1988).

**Type:** Turcomania, distr. Karakala, inter Saarli et Czekan-Kala, ad declivia ardua argilloso-lapida prope viam, 7.10.1986, *E. Sejfulin* (LE).

The easternmost range of the true Hyrcanian *Alyssopsis mollis* (Jacq.) O. E. Schulz in Turkmenistan, Khorassan and Semnan was replaced by this new species described by BOTSCHANTZEV & SEJFULIN (1988).

+*Alyssum alyssoides* (L.) L., Syst. Nat. ed. 10: 1130 (1759).

Reported as a new record from Golestan National Park, NE. Iran (AKHANI, 1999).

+*Alyssum argenteum* All., Auct. Syn. Stirp. Taurin.: 20 (1773).

The species was reported for Iran by KAVOUSI (2001) from some localities in Mazandaran, Azerbaijan and Lorestan provinces.

+*Alyssum callichroum* Boiss. & Balansa in Boiss., Diagn. Pl. Orient. ser. 2, 5: 34 (1856).

It was reported as new record by KAVOUSI (2001) from Alvand mountain in Hamadan province.

+*Alyssum condensatum* Boiss. & Hausskn. in Boiss., Fl. Orient. 1: 268 (1867).

The species was reported by KAVOUSI (2001) from one locality, Almus mountain near Khalkhal in E Azerbaijan.

+*Alyssum harputicum* T. R. Dudley in J. Arnold Arbor. 45: 76 (1964).

Known from one locality, 59 km SE Firuzkuh in Tehran province (KAVOUSI, 2001).

*Alyssum inflatum* Nyár. in Bul. Gräd. Bot. Univ. Cluj 9: 43 (1929).

See notes under *Alyssum tortuosum* Willd.

-*Alyssum marginatum* Boiss. in Ann. Sci. Nat. Bot. ser. 2, 17: 157 (1842).

It was reduced to synonymy of *Alyssum szovitsianum* Fisch. & C. A. Mey., Index Sem. Hort. Bot. Petrop. 4: 31 (1837) by BOTSCHANTZEV (1978).

\**Alyssum mozaffarianii* Kavousi in Iran. J. Bot. 9: 48 (2001).

**Type:** Tehran, road of Chalus, Kandavan mont., 2710 m, 21.VII.1972, *Foroughi 2180* (holo-: TARI).

+*Alyssum obtusifolium* DC., Syst. Nat. 2: 305 (1821).

Known from one locality near Tehran by KAVOUSI (2001).

+*Alyssum penjwinense* T. R. Dudley in Notes Roy. Bot. Gard. Edinburgh 24: 162 (1962).

The species was known from some localities in Kordestan and Kermanshah Provinces by KAVOUSI (2001).

+*Alyssum sibiricum* Willd., Sp. Pl. 3: 465 (1800).

The species was recorded from one locality from Goli Dagh in Azerbaijan by KAVOUSI (2001).

+*Alyssum singarense* Boiss. & Hausskn. in Boiss., Fl. Orient. Suppl.; 49 (1888).

The species was reported from one locality in W Azerbaijan by KAVOUSI (2001).

\**Alyssum stipitatum* Kavousi & T. D. Dudley in Iran. J. Bot. 9: 48 (2001).

**Type:** Tehran, 12 km after Tehran, on road of Karaj, near the road, 1320 m, 22.V.1972, Malekpour & Foroughi 6051 (holo-: TARI).

*Alyssum tortuosum* Willd., Sp. Pl. 3: 466 (1800). Syn.: *A. inflatum* Nyár.; *A. nyárádyi* Bornm. & Gauba; *A. decandolleianum* Nyár.

*Alyssum inflatum* Nyár. has been reported by Rechinger (in HEDGE & RECHINGER, 1968) as an endemic species distributed widely in Iran and adjacent Turkmenistan. Some evidences have been given on the identity of this species with widely distributed *A. tortuosum* Willd. in AKHANI (1998).

\**Anchonium elyChrisifolium* subsp. *persicum* (DC.) Cullen & Coode in Notes Roy. Bot. Gard. Edinburgh 26: 193 (1965). Syn.: *Anchonium elyChrisifolium* (DC.) Boiss. subsp. *elyChrisifolium* (cf. JACQUEMOUD, 1984: 749).

+*Arabis christiana* N. Busch in Věstn. Tiflissk. Bot. Sada 6: 7 (1906).

Reported by ASSADI (1984: 85) from two localities in Azerbaijan. According to Hedge (in HEDGE & RECHINGER, 1968: 202), Bornmüller in Verh. Zool.-Bot. Ges. Wien 60: 71 (1910) reported *Arabis christiana* from a gathering by Knapp in Qareh Dag, Ali Bolagh in NW Azerbaijan.

#+*Boreava orientalis* Jaub. & Spach in Ann. Sci. Nat. Bot. ser. 2, 16: 342 (1841).

Reported by MOZAFFARIAN (1985: 82) as new record from Khorassan: Esfarayen, N. slopes of Shah-Jahan mountain.

§*Brassica aucheri* Boiss. in Ann. Sci. Nat. Bot. ser. 2, 17: 88 (1842). Syn.: *Sinapis aucheri* (Boiss.) O. E. Schulz.

The species which was treated under *Sinapis* in Flora Iranica (Hedge in HEDGE & RECHINGER, 1968) is retained into *Brassica* by AL-SHEHBAZ & WARWICK (1997), based on morphological, chromosome numbers and molecular criteria (WARWICK & BLACK, 1991). A distribution map of this species is given by AL-SHEHBAZ (1985).

+*Cakile maritima* Scop., Fl. Carniol. ed. 2, 2: 35 (1772).

It is reported firstly from Iran in this paper (see above).

*Cheiranthus tomentosus* Willd., Sp. Pl. 3: 523 (1800). Syn.: *Sterigmostemum caspicum* (Lam.) Rupr.

This species is not indigenous in Iran. Rechinger (in HEDGE & RECHINGER, 1968: 350) doubtfully considered this as belonging to complex *Sterigmostemum sulphureum* (Banks & Soland.) Bornm. According to JACQUEMOUD (1988: 100), this last species being limited to the Zagros basis. The other Iranian specimens cited by Rechinger (in HEDGE & RECHINGER, 1968: 281) are *S. acanthocarpum* (Fisch. & C. A. Mey.) O. Kuntze, *S. incanum* M. Bieb. and *S. longistylum* (Boiss.) O. Kuntze.

#+ *Cithareloma lehmannii* Bunge, Del. Sem. Hort. Dorpat. 1843: 6 (1843).

A doubtful identification was reported by RECHINGER (1977) from Turan Protected Area. Then it was reported from Kavir-e Lut by LÉONARD (1980a). *Cithareloma registanicum* Rech. f., Fl. Iranica 57: 249 (1968) from Afghanistan is reduced to the synonymy of *C. lehmannii* by Léonard. ESFANDIARI (1978: 32) has reported two localities of this species under *C. registanicum* from Kashan, Abuzeidabad towards Fakhreh and from Yazd: 37 km from Shah-Malek towards Tchoupanan.

+ *Conringia austriaca* (Jacq.) Sweet, Hort. Brit. 1: 25 (1826).

Reported from Azerbaijan: Ghotour (ESFANDIARI, 1978: 35).

#+ *Coronopus didymus* (L.) Sm., Fl. Brit. 2: 691 (1800).

Reported from Khuzestan: Masjed Soleyman by MOZAFFARIAN (1994: 236). The species has been collected and observed as a frequent spring weed in Tehran University Campus by the author. The genus *Coronopus* is united with *Lepidium* by AL-SHEHBAZ & al. (2002).

+ *Coronopus squamatus* (Forssk.) Asch., Fl. Brandenb. 1: 62 (1864).

Reported from two localities in Mazandaran, Miankaleh Protected Area and Azarbayjan, 28 km NE Germi (AKHANI & JOHARCHI, 1995).

#§ *Crucihimalaya wallichii* (Hook.f. & Thomson) Al-Shehbaz & al. in Novon 9: 301 (1999). Syn: *Sisymbrium wallichii* Hook. f. & Thomson in J. Linn. Soc. Bot. 5: 158 (1861). *Arabidopsis wallichii* (Hook.f. & Thomson) N. Busch in Kusn., Fl. Cauc. Crit. 3(4): 457 (1909).

The genus *Crucihimalaya* is separated from *Arabidopsis* by AL-SHEHBAZ & al. (1999) because of the occurrence of some stalked stellate trichomes, sessile and auriculate to sagittate cauline leaves, and bracteate or ebracteate inflorescence.

+ *Drabopsis nuda* (Bél.) Stapf in Denkschr. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. 51(2): 298 (1886). Syn.: *Arabis nuda* Bél., Voy. Indes Orient., Bot. 3: tab. sine numero, fig. A (1834).

In Flora Iranica the name *Drabopsis verna* Koch in Linnaea 15: 253 (1841) is concerned and *D. nuda* put as a synonym because of priority of the former. LÉONARD (1977) argued that the *Arabis nuda* Bél. was already illustrated in 1834 and therefore according to Art. 44 of the International Code of Botanical Nomenclature, an illustration can be accepted as the valid publication of a name before 1 January 1908.

+ *Erysimum kerbabaevii* Kurbanov & Gudkova in Bot. Žurn. 68: 236 (1983).

It has recently been reported from Golestan National Park (AKHANI, 1996, 1998).

- *Erysimum stocksianum* (Boiss.) Boiss., Fl. Orient. 1: 199 (1867).

Polatschek (in RECHINGER, 1977: 170) reduced this name as a synonym of *E. crassicaule* (Boiss.) Boiss.

+ *Erysimum strictisiliquum* N. Busch in Komarov, Fl. CCCP 8: 126, 638 (1939); in Izv. Akad. Nauk SSSR, Ser. 7, Otd. Fiz.-Mat. Nauk 1931: 458 (1931).

The species was reported by ESFANDIARI (1978: 50) from Azerbaijan, Kalibar. It has wrongly been reported as new record for Iran by ASSADI (1987: 163).

\**Farsetia assadii* Kavousi in Iran. J. Bot. 9: 50 (2001).

**Type:** Kerman, Hamun Jazmurian, Zehkalat, Hossein abad village, 300 m, 24.X.1983, *Mozaffarian 45634* (holo-: TARI).

+*Farsetia jacquemontii* Hooker f. & Thomson in J. Linn. Soc. Bot. 5: 148 (1861).

The species is added by JONSELL (1986) for Iran based on a specimen collected by Léonard from Jaz Murian.

+*Farsetia longisiliqua* Decne. in Ann. Sci. Nat. Bot. ser. 2, 4: 69 (1864).

The species was known from one locality in Yazd Province by KAVOUSI (2001). As the nearest localities to the Iranian record are located in the southern and western Arabian Peninsula (JONSELL, 1986: Fig. 53), this record needs confirmation.

+*Farsetia stylosa* R. Br. in Denham & Clapperton, Trav. App.: 216 (1834). Syn.: *F. hamiltonii* Royle; *F. ramosissima* Fourn.

KAVOUSI (2001) mentioned the species as new record from several localities in Baluchestan. He did not mention that some of his cited materials (*Runemark, Assadi & Sardabi 22442* and *Mozaffarian 43791*) were already reported from Iran by ASSADI & RUNEMARK (1983) under *F. ramosissima* [Hochst. ex Boiss.] Fourn. and MOZAFFARIAN (1985) under *F. hamiltonii* Royle. Both are synonyms of *F. stylosa* according to JONSELL (1986).

#*Fedtschenkova* Regel in Izv. Obšč. Ljubit. Estestv. 18(3): 9 (1882).

Several species of Iranian *Malcolmia* was transferred to *Fedtschenkova* by DVORŽÁK & KOŇŘÍKOVÁ (1970). Due to a latter treatment of this group by BOTSCHANTZEV (1972), these transfers are not listed here. For more details, see notes under *Strigosella*.

+*Fibigia thesigeri* Rech. f. in Anz. Österr. Akad. Wiss., Math.-Naturwiss. Kl. 15: 426 (1964).

The species was added to the flora of Iran by MOUSSAVI (1985: 64) from Zanjan, Mah-neshan.

-*Fourtuynia bungei* Boiss., Fl. Orient. 1: 402 (1867).

The genus *Fortuynia* is represented in the Fl. Iranica 57: 52-53 (1968), by two species: *F. garcinii* (Burm.) Shuttlew. in Ann. Sci. Nat. Bot. ser. 2, 17: 178 (1842), and *F. bungei* Boiss. This later species is reduced as a synonymy of the former by RECHINGER (1977: 171).

#§*Hornungia procumbens* (L.) Hayek in Repert. Spec. Nov. Regni Veg. Beih. 30(1): 480 (1925). Syn.: *Hymenolobus procumbens* (L.) Nutt. in Torrey & A. Gray, Fl. N. Amer. 1: 117 (1838).

APPEL & AL-SHEHBAZ (1998) included the genera *Hymenolobus* and *Pritzelago* into *Hornungia*.

+*Iberis acutiloba* Bertol., Misc. Bot. 2: 12, tab. 2, fig. 2 (1843).

It was reported by ESFANDIARI (1978: 61) from Kermanshah, Ghasre-Shirine.

+*Isatis trachycarpa* Trautv. in Trudy Imp. Bot. S. Peterburgsk. Bot. Sada 9: 370 (1886).

The species was added for Iran from Turan Protected Area by RECHINGER (1977: 171).

#*Irania* Hadač & Chrtek in Acta Univ. Carol. Biol. 4: 248 (1973).

The genus *Irania* was separated from *Fibigia* by HADAČ & CHRTEK (1973). Three combinations were proposed for Iranian species. According to APPEL & AL-SHEHBAZ (2002) and AL-SHEHBAZ (in litt.) this separation is not acceptable.

*Irania multicaulis* (Boiss. & Hohen.) Hadač & Chrtek in Acta Univ. Carol. Biol. 4: 248 (1973). Syn.: *Fibigia multicaulis* (Boiss. & Hohen.) Boiss., Fl. Orient. 1: 259 (1867).

*Irania pendula* (Boiss.) Hadač & Chrtek in Acta Univ. Carol. Biol. 4: 248 (1973). Syn.: *Fibigia pendula* (Boiss.) Boiss., Fl. Orient. 1: 259 (1867).

*Irania umbellata* (Boiss.) Hadač & Chrtek in Acta Univ. Carol. Biol. 4: 248 (1973). Syn.: *Fibigia umbellata* (Boiss.) Boiss., Fl. Orient. 1: 259 (1867).

#§*Kotschyella stenocarpa* (Boiss.) F. K. Mey. in Feddes Repert. 84: 457 (1973). Syn.: *Carpoceras stenocarpum* Boiss., Diagn. Pl. Orient. 8: 37 (1849); *Thlaspi stenocarpum* (Boiss.) Hedge in Rechinger, Fl. Iranica 57: 116 (1968).

+*Lepidium campestre* (L.) R. Br. in Aiton, Hort. Kew. ed. 2, 4: 88 (1812).

ASSADI (1983: 6-7) reported and illustrated this species from Azarbaijan, Arasbaran Protected Area.

-*Malcolmia karelinii* Lipsky in Vidensk. Meddel. Dansk. Naturhist. Foren Kjøbenhavn: 139 (1903), Trudy Imp. Bot. S. Peterburgsk. Bot. Sada 23: 31 (1904).

It was reduced as a synonym of *Strigosella brevipes* (Bunge) Botsch. (see below).

+*Malcolmia meyeri* Boiss. in Ann. Sci. Nat. ser. 2, 17: 71 (1842).

An addition to the flora of Iran from Azerbaijan, between Ardebil and Germe, according to ESFANDIARI (1978: 71).

DOROFEEV (1994) transferred invalidly this name into *Strigosella* without giving the detailed citation of the basionym.

-*Malcolmia taraxacifolia* (Balbis) DC., Syst. Nat. 2: 439 (1821).

It is considered as a synonym of *Strigosella africana* (L.) Botsch. by BOTSCHANTZEV (1972: 1038).

\**Matthiola subglabra* Ponert in Feddes Repert. 84: 733 (1974).

**Type:** Iran: Montes Elborz, pars meridionalis, inter oppidis Gachsar et Marzan-abad, declive orientale subglareoso argillosum, 2700 m supra mare, 25.VII.1970, Jiří Ponert (Hortus Botanicus Batumensis).

‡§*Matthiola chenopodiifolia* var. *porphyrantha* (Rech. f. & al.) J. Léonard in Bull. Jard. Bot. Belg. 53: 293 (1983). Syn.: *M. porphyrantha* Rech. f. & al. in Phytion 3: 61 (1951).

*Matthiola porphyrantha* which was reduced as a synonym of *M. chenopodiifolia* merits a varietal rank by LÉONARD (1983).

+*Matthiola longipetala* subsp. *bicornis* (Sibth. & Sm.) P. W. Ball in Feddes Rept. 68: 194 (1963).

The taxon was reported by ESFANDIARI (1978: 75) from Azerbaijan: Between Ardabil and Ghotour-Sou.

§#*Microthlaspi perfoliatum* (L.) F. K. Mey. in Feddes Rept. 84: 453 (1973). Syn.: *Thlaspi perfoliatum* L., Sp. Pl.: 646 (1753).

§*Microthlaspi umbellata* (DC.) F. K. Mey. in Feddes Rept. 84: 453 (1973). Syn.: *Thlaspi umbellata* DC., Syst. Nat. 2: 377 (1821).

#*Neotorularia* Hedge & J. Léonard in Bull. Jard. Bot. Belg. 56: 393 (1986).

It was described as an obligate “nomen novum” replacing *Torularia* O. E. Schulz in Engl., Pflanzenr. 86: 213 (1924), because of existing a validly published name for fungi. Therefore all known representatives of this genus were transferred into *Neotorularia* in LÉONARD (1986).

§*Neotorularia aculeolata* (Boiss.) Hedge & J. Léonard in Bull. Jard. Bot. Belg. 56: 393 (1986). Syn.: *Sisymbrium aculeolatum* Boiss. in Ann. Sci. Nat. Bot. ser. 2, 17: 75 (1842); *Torularia aculeolata* (Boiss.) O. E. Schulz in Engl., Pflanzenr. 86: 223 (1924).

§*Neotorularia contortuplicata* (Willd.) Hedge & J. Léonard in Bull. Jard. Bot. Belg. 56: 393 (1986). Syn.: *Cheiranthus contortuplicatus* Willd., Sp. Pl. 3: 521 (1800); *Torularia contortuplicata* (Willd.) O. E. Schulz in Engl., Pflanzenr. 86: 219 (1924).

§*Neotorularia dentata* (Freyn & Sint.) Hedge & J. Léonard in Bull. Jard. Bot. Belg. 56: 394 (1986). Syn.: *Cryptospora dentata* Freyn & Sint. in Bull. Herb. Boissier ser. 2, 3: 693 (1903); *Torularia dentata* (Freyn & Sint.) Kitam., Fl. Afgh.: 165 (1960).

§*Neotorularia torulosa* (Desf.) Hedge & J. Léonard in Bull. Jard. Bot. Belg. 56: 395 (1986). Syn.: *Sisymbrium torulosum* Desf., Fl. Atlant. 2: 84 (1798-1800); *Torularia torulosa* (Desf.) O. E. Schulz in Engler, Pflanzenr. 86: 214 (1924).

§#*Neotropis kotschyana* (Boiss. & Hohen.) Czerep., Sosud. Rast. SSSR: 140 (1981). Syn.: *Thlaspi kotschyianum* Boiss. & Hohen. in Boiss., Diagn. Pl. Orient. 8: 39 (1849).

The genus *Neotropis* (DC.) F. K. Mey. belongs to the “*Thlaspi*” genus complex by MEYER (1973).

§#*Noccaea pumila* (Steven) Steud., Nomencl. Bot. ed. 2, 2: 197 (1841). Syn.: *Iberis pumila* Steven in Mém. Soc. Imp. Naturalistes Moscou 3: 269 (1812); *Thlaspi pumilum* (Steven) Ledeb., Fl. Ross. 1: 164 (1842).

§*Noccaea tenuis* (Boiss. & Buhse) F. K. Mey. in Feddes Repert. 84: 459 (1973). Syn.: *Iberidella tenuis* Boiss. & Buhse in Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 25 (1860); *Thlaspi tenue* (Boiss. & Buhse) Hedge in Rechinger, Fl. Iranica 57: 117 (1968).

§*Noccidium hastulatum* (DC.) F. K. Mey. in Feddes Repert. 84: 456 (1973). Syn.: *Hutchinsia hastulata* DC., Syst. Nat. 2: 388 (1821); *Thlaspi hastulatum* (DC.) DC., Syst. Nat. 2: 388 (1821).

+§*Noccidium tuberculatum* F. K. Mey. in Feddes Repert 84: 456 (1973).

**Typus:** Persia borealis, Kandavan (Elborz), trockene Hänge, alt. 2400m, 9.VI.1937, leg. D. E. Gauba 1336 (B).

The type locality of this species is close to the one of *Thlaspi inhumile* described by PONENT (1972).

§#*Olimarabidopsis pumila* (Stephan) Al-Shehbaz & al. in Novon 9: 303 (1999). Syn.: *Sisymbrium pumilum* Stephan in Willd., Sp. Pl. 3: 507 (1800); *Arabidopsis pumila* (Stephan) N. Busch in Kusn., Fl. Cauc. Crit. 3(4): 457 (1909).

The genus *Olimarabidopsis* was distinguished from *Arabidopsis* by having yellow flowers, auriculate cauline leaves, and pubescent fruits (AL-SHEHBAZ & al., 1999).

#*Petiniotia* J. Léonard in Bull. Jard. Bot. Belg. 50: 228 (1980).

The genus *Petiniotia* was described by LÉONARD (1980b) as a monotypic genus separated from *Sterigmostemum*: *Petiniotia purpurascens* (Boiss.) J. Léonard in Bull. Jard. Bot. Belg. 50: 230 (1980). Syn.: *Sterigmostemum purpurascens* (Boiss.) Kuntze, Revis. Gen. Pl. 1: 36 (1891); *Sterigmostemum rhodanthum* Rech. f. & al. in Phytion 3: 66 (1951); Rechinger, Fl. Iranica 57: 278 (1968). The genus was reduced as a subgenus of *Sterigmostemum* by JACQUEMOUD (1988) and is not accepted by APPEL & AL-SHEHBAZ (2002). SONBOLI & al. (2001) believe that *Petiniotia* is a good genus.

+*Raphanus raphanistrum* L., Sp. Pl.: 669 (1753).

It is reported firstly from Iran in this paper (see above).

+*Sisymbrium brassiciforme* C. A. Mey. in Ledeb., Fl. Alt. 3: 129 (1831).

Reported as new for Iran from Khorassan, Shirvan towards Ziarat, Beyk (ESFANDIARI, 1978: 88).

-*Sterigmostemum contortuplicatum* (Boiss.) Bornm. in Repert. Spec. Nov. Regni Veg. 40: 775 (1936).

The identity of this species with *S. incanum* M. Bieb. is suggested by JACQUEMOUD (1988: 76).

-*Sterigmostemum laevicaule* Bornm. in Mitt. Thüring. Bot. Vereins 27: 23 (1910).

The name is reduced as a synonym of *Erysimum crassicaule* (Boiss.) Boiss., and neotypified by SONBOLI & al. (2000).

-*Sterigmostemum rhodanthum* Rech. f. & al. in *Phyton* 3: 66 (1951).

This species is reduced as a synonym of *S. incanum* M. Bieb., *Fl. Taur.-Cauc.* 3: 444 (1819) by JACQUEMOUD (1988: 122).

*Sterigmostemum purpurascens* (Boiss.) Kuntze. See notes under *Petiniotia*.

#§*Strigosella* Boiss., *Diagn. Pl. Orient. ser. 2, 4: 22* (1859).

In recent taxonomic works the genus *Strigosella* has been separated from *Malcolmia* by characters like: not or scarcely saccate inner sepals, branched hairs being stalked, lobes of stigmas not or scarcely carpoidally decurrent, cells of septum elongated transversely across the minor axis and nectary glands furnished with divergent processes. *Malcolmia* is characterized by the strongly saccate inner sepals, sessile branched hairs, strongly carpoidally decurrent stigma lobes and cells of septum elongated lengthwise along the major axis (DVORÁK, 1969, 1972, 1973b; DVORÁK & KONARIKOVA, 1970; BOTSCHANTZEV, 1972; Townsend in HEDGE & al., 1980). Furthermore DVORÁK (1969, 1972, 1973b) has suggested the separation of the genus *Fedtschenkova*. This has not been accepted by BOTSCHANTZEV (1972). Following new combinations of the Iranian species are therefore proposed, although the genus *Strigosella* is not accepted as a separate genus from *Malcolmia* by APPEL & AL-SHEHBAZ (2002) and AL-SHEHBAZ (in litt.).

§*Strigosella africana* (L.) Botsch. in *Bot. Žurn.* 57: 1038 (1972). Syn: *Hesperis africana* L. *Spec. Pl.* 2: 663 (1753); *Malcolmia africana* (L.) R. Br. in Aiton, *Hort. Kew. ed. 2, 4: 121* (1812).

§*Strigosella behboudiana* (Rech. f. & Esfand.) Botsch. in *Bot. Žurn.* 57: 1042 (1972). Syn.: *Malcolmia behboudiana* Rech. f. & Esfand. in *Phyton* 3: 64 (1951).

+§*Strigosella brevipes* (Bunge) Botsch. in *Bot. Žurn.* 57: 1041 (1972). Syn.: *Dontostemon brevipes* Bunge in *Arbeiten Naturf. Vereins Riga* 1(2): 149 (1848); *Malcolmia karelinii* Lipsky in *Vidensk. Meddel. Dansk. Naturhist. Foren Kjøbenhavn* : 139 (1903), *Trudy Imp. Bot. S. Peterburgsk. Bot. Sada* 23: 31 (1904).

It has replaced *M. karelinii* Lipsky in BOTSCHANTZEV (1972).

+§*Strigosella hyrcanica* (Freyn & Sint.) Botsch. in *Bot. Žurn.* 57: 1042 (1972). Syn.: *Malcolmia hyrcanica* Freyn & Sint. in *Bull. Herb. Boissier ser. 2, 3: 688* (1903).

§*Strigosella grandiflora* (Bunge) Botsch. in *Bot. Žurn.* 57: 1044 (1972). Syn.: *Dontostemon grandiflorus* Bunge in *Arbeiten Naturf. Vereins Riga* 1(2): 147 (1848); *Malcolmia grandiflora* (Bunge) Kuntze in *Trudy Imp. Bot. S. Peterburgsk. Bot. Sada* 10: 167 (1887).

+§*Strigosella intermedia* (C. A. Mey.) Botsch. in *Bot. Žurn.* 57: 1040 (1972). Syn.: *Malcolmia intermedia* C. A. Mey., *Verz. Pfl. Cauc.*: 186 (1831); *Malcolmia africana* var. *intermedia* (C. A. Mey.) Boiss., *Fl. Orient.* 1: 223 (1867).

BOTSCHANTZEV (1972) considered the specific rank for one of the varieties of the polymorphic *Strigosella africana*.

§*Strigosella scorpioides* (Bunge) Botsch. in Bot. Žurn. 57: 1041 (1972). Syn: *Dontostemon scorpioides* Bunge in Arbeiten Naturf. Vereins Riga 1(2): 150 (1848); *Malcolmia scorpioides* (Bunge) Boiss., Fl. Orient. 1: 225 (1867).

§*Strigosella strigosa* (Boiss.) Botsch. in Bot. Žurn. 57: 1039 (1972). Syn.: *Malcolmia strigosa* Boiss. in Ann. Sci. Nat. Bot. ser. 2, 17: 70 (1842).

+§*Strigosella trichocarpa* (Boiss. & Buhse) Botsch. in Bot. Žurn. 57: 1038 (1972). Syn: *Malcolmia trichocarpa* Boiss. & Buhse in Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 21 (1860); *Malcolmia africana* var. *trichocarpa* (Boiss. & Buhse) Boiss., Fl. Orient. 1: 223 (1867).

BOTSCHANTZEV (1972) considered the specific rank for this taxon, which was accepted in Flora Iranica (HEDGE & RECHINGER, 1968) as a variety.

§*Strigosella turkestanica* (Litw.) Botsch. in Bot. Žurn. 57: 1045 (1972). Syn.: *Malcolmia turkestanica* Litw. in Sched. Herb. Fl. Ross. 4: no. 1005 (1900).

+*Stroganowia bupleuroides* (Rech. f.) Botsch. in Novosti Sist. Vyssh. Rast. 21: 77 (1984). Syn.: *Lepidium bupleuroides* Rech. f. in Feddes Repert. 48: 36 (1940); *S. affghana* auct. non (Boiss.) Pavl.: Rech. f. in Fl. Iranica 57: 122 (1968).

BOTSCHANTZEV (1984) has reviewed the genus *Stroganowia* and proposed the above combination. The genus *Stroganowia* is united with *Lepidium* by AL-SHEHBAZ & al. (2002).

+*Tetracme quadricornis* (Steph.) Bunge, Del. Sem. Hort. Dorpat. 7 (1836).

Reported by ESFANDIARI (1978: 93) from Semnan: Between Garmsar and Semnan. The same species was reported by LÉONARD (1980c) from a locality in NC Iran.

+*Tetracme contorta* Boiss., Fl. Orient. 1: 317 (1867).

The species was known by LÉONARD (1980c) from a locality in Dasht-e Kavir.

#+§*Thellungiella parvula* (Schrenk) Al-Shehbaz & S. L. O’Kane in Novon 5: 309 (1995).

Syn.: *Arabidopsis parvula* (Schrenk) O. E. Schulz in Engl., Pflanzenr. 86: 269 (1924).

This halophytic species was known as a new record for Iran from Arak, Kavir-e Meyghan (AKHANI, 1988: 107), under *Arabidopsis*. The new generic placement was provided by AL-SHEHBAZ & O’KANE (1995).

### *Thlaspi*

The genus *Thlaspi* s.l. has been split into several genera by MEYER (1973, 1979, 1991), based on the morphological and seed-coat anatomical characters. This generic segregation has recently been supported by chloroplast DNA sequencing (MUMMENHOFF & KOCH, 1994). See new combinations under “*Noccidium*”, “*Microthlaspi*”, *Noccaea*, *Vania*, and “*Kotschyella*”. MOZAFFARIAN (1996) described two new *Thlaspi* from Iran and transferred two further species from *Aethionema*, based on fruit morphology and chromosome numbers given by KHOSRAVI (1989) and KÜPFER (1980).

§ *Thlaspi apterocarpum* (Rech. f. & Aellen) Mozaff. in Iran. J. Bot. 7: 139 (1996). Syn.: *Aethionema apterocarpum* Rech. f. & Aellen in Phytion 3: 49 (1951).

\* *Thlaspi inhumile* Ponert in Preslia 44: 272 (1972).

**Type:** Iran: Montes Elborz, pars meridionalis, inter oppidia Gachsar et Marzan-abad, declive boreale argillosum, 2650m supra mare, 25.VII.1970, *Jiří Ponert* (Hortus Botanicus Batumensis).

See note under *Noccidium tuberculatum*.

\* *Thlaspi maassoumii* Mozaff. in Iran. J. Bot. 7: 135 (1996).

**Type:** Mazandaran: S. of Ramsar, Siemam mt., 3600 m, *Runemark & Maassoumi 21825* (Holo-: TARI).

This species is very close to the very polymorphic *Aethionema trinervium* (DC.) Boiss. and probably conspecific with it.

\* *Thlaspi pulvinata* Mozaff. in Iran. J. Bot 7: 138 (1996).

**Type:** Azerbaijan: between Shahindege and Takab, Kuh-e Gharadash (Aghdash), from Ghezghapan and Auchdare, 2500-2800 m, 4.VII.1991, *Mozaffarian 69874* (Holo-: TARI).

+ *Thlaspi tatiana* Bordz. in Izv. Kievsk. Bot. Sada 12-13: 114 (1931).

The species was reported by ESFANDIARI (1978) from Azerbaijan: Between Khoy and Ghotour, Avrine.

§ *Thlaspi trinervium* (DC.) Mozaff. in Iran. J. Bot. 7 (1): 139 (1996). Syn.: *Hutchinsia trinervia* DC. Reg. Veg. Syst. Nat. 2: 387 (1821); *Aethionema trinervium* (DC.) Boiss., Fl. Orient. 1: 342 (1867).

+ *Turritis laxa* (Sibth. & Sm.) Hayek in Repert. Spec. Nov. Regni Veg. Beih. 30(1): 402 (1925).

Reported by ESFANDIARI (1978: 98) from two localities in Azerbaijan: between Hashtpar and Lissar and between Astara and Heyran.

+§ *Vania kurdica* (Hedge) F. K. Mey. in Feddes Repert. 84: 467 (1973). Syn.: *Thlaspi kurdicum* Hedge in Notes Roy. Bot. Gard. Edinburgh 23: 547 (1961).

The species was reported under *Thlaspi kurdicum* by ESFANDIARI (1978: 95) from Azerbaijan: Between Makou and Sari-Tchaman, Guerklhar. The genus *Vania* was described by MEYER (1973) segregating the genus *Thlaspi*.

*Zerdana anchonioides* Boiss. in Ann. Sci. Nat. Bot. ser. 2, 17: 84 (1842).

In his review of the genus *Zerdana*, JACQUEMOUD (1985) distinguished three subspecies of the monotypic *Z. anchonioides*. All these three subspecies were known from the Central and Southern parts of Zagros mountain.

± *Zerdana anchonioides* Boiss. subsp. *anchonioides*

\**Zerdana anchonioides* subsp. *stenophylla* (Boiss. & Hausskn.) Jacquemoud in *Candollea* 40: 368 (1985). Syn.: *Z. anchonioides* var. *stenophylla* Boiss. & Hausskn. in Boiss., *Fl. Orient. Suppl.*: 46 (1888).

\**Zerdana anchonioides* subsp. *stenocarpa* Jacquemoud in *Candollea* 40: 369 (1985).

#### ACKNOWLEDGEMENTS

This paper is part of the results of the research project No. 513/4/608 supported by the Research Council, University of Tehran. A three months research award in Germany by the German Academic Exchange Service (DAAD) facilitated the final preparation and publication of the paper. The great help of Dr. F. Jacquemoud during a herbarium visit to Geneva and his suggestions on a draft of the manuscript, the valuable comments by Dr. E. Al-Shehbaz and the determination of two grasses from the coastal sandy dunes by Dr. H. Scholz are much appreciated.

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