

A CONTRIBUTION TO THE TAXONOMY OF THE GENUS OXYTROPIS (FABACEAE) IN IRAN

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A critical taxonomic synopsis of the genus *Oxytropis* DC. is provided. In this work, 42 species recognized in Flora Iranica is reduced to 38 distinct species, 16 species are synonymized. A part of the new synonyms belongs to *Astragalus*, viz. *A. ciceropsis* Hamzehee & Maassoumi (= *Oxytropis strausii* Bornm.), *A. podocarpus* C. A. Mey. (= *O. thaumasimorpha* Rech. f.), *A. longirostratus* Pau (= *O. alavae* Rech. f.), *A. singarensis* Boiss. & Hausskn. (= *O. wendelboi* Vassilcz. p.p.), *A. daenensis* Boiss. (= *O. kermanica* Vassilcz. p.p.; *O. pussilloides* Vassilcz. p.p.), *A. aestivorum* Podlech (= *O. kermanica* Vassilcz. p.p.). The remainder of synonyms are *O. glabra* (Lam.) DC. (= *O. sorkhehensis* Ranjbar), *O. kopetdaghensis* Gontsch. (= *O. assadliensis* Vassilcz.), *O. hirsutiuscula* Freyn (= *O. caraganetorum* Vassilcz.), *O. sojakii* Vassilcz. (= *O. lalehzarensis* Vassilcz.), *O. iranica* Vassilcz. (= *O. zangolehensis* Vassilcz.), *O. persica* Boiss. (= *O. takhti-soleimani* Vassilcz.); *O. aucheri* Boiss. (= *O. mazandaranensis* Vassilcz.) and *O. binaludensis* Vassilcz. (= *O. khorasanica* Ranjbar; *O. gracillima* Vassilcz.); *O. Chrysocarpa* Boiss. (= *O. shirkuhi* Vassilcz., *O. surrmandehi* Vassilcz.). Eleven new species are described as follows: *Oxytropis shahvarica* Maassoumi, *O. pseudosuavis* Maassoumi, *O. kordkoyensis* Maassoumi, *O. compacta* Maassoumi & Joharchi, *O. salukensis* Maassoumi, *O. sabzavarensis* Maassoumi, *O. bakhtiarica* Maassoumi, *O. javaherdehi* Maassoumi, *O. sivehensis* Maassoumi & Amini Rad, *O. indurata* Maassoumi, *O. mahneshanensis* Maassoumi. *Oxytropis lupinoides* is reported as a new record for the Iranian territory, a new combination, *A. yezdii* (Vassilcz.) Podlech & Maassoumi (= *O. yezdii* Vassilcz.; *A. abditus* Podlech) is presented and *O. rudbariensis* Vassilcz. is considered as a doubtful species which need more complete material and more investigations. The occurrence of *O. czapandaghii* Boriss. in Iran is not confirmed. Two keys corresponding to flowering and fruiting materials are given. All specimens examined in the present work are deposited in FUMH, IRAN, TARI and TUH.

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Key words. Fabaceae, *Oxytropis*, Taxonomy, new species, new synonymy, Iran.

Oxytropis (Fabaceae)

علی اصغر معصومی، استاد پژوهش مؤسسه تحقیقات جنگلها و مراتع کشور

یک بررسی تاکسونومیک انتقادی بر روی جنس *Oxytropis* فراهم شد. در این اثر تعداد حقیقی گونه‌های جنس بعد از چاپ فلورا ایرانیکا از ۴۲ گونه و بررسی‌های بعد از آن از ۳۳ به حد ۳۹ گونه می‌رسد. در این اثر ۱۶ گونه به صورت مترادف تقلیل یافته است، بخشی از مترادف‌های جدید متعلق به جنس‌های *Astragalus* می‌باشد. از آن جمله:

Astragalus ciceropsis Hamzehee & Maassoumi (= *Oxytropis strausii* Bornm.), *A. podocarpus* C. A. Mey. (= *O. thaumasimorpha* Rech. f.), *A. longirostratus* Pau (= *O. alavae* Rech. f.), *A. singarensis* Boiss. & Hausskn. (= *O. wendelboi* Vassilcz. p.p.), *A. daenensis* Boiss. (= *O. kermanica* Vassilcz. p.p.; *O. pussilloides* Vassilcz. p.p.), *A. aestivorum* Podlech (= *O. kermanica* Vassilcz. p.p.).

و بقیه مترادف‌ها عبارتند از:

Oxytropis glabra (Lam.) DC. (= *O. sorkhehensis* Ranjbar), *O. kopetdaghensis* Gontsch. (= *O. assadliensis* Vassilcz.), *O. hirsutiuscula* Freyn (= *O. caraganetorum* Vassilcz.), *O. sojakii* Vassilcz. (= *O. lalehzarensis* Vassilcz.), *O. iranica* Vassilcz. (= *O. zangolehensis* Vassilcz.), *O. persica* Boiss. (= *O. takhti-soleimani* Vassilcz.); *O. aucheri* Boiss. (= *O. mazandaranensis* Vassilcz.) and *O. binaludensis* Vassilcz. (= *O. khorasanica* Ranjbar; *O. gracillima* Vassilcz.); *O. Chrysocarpa* Boiss. (= *O. shirkuhi* Vassilcz., *O. surrmandehi* Vassilcz.).

Oxytropis shahvarica Maassoumi, *O. pseudosuavis* Maassoumi, *O. kordkoyensis* Maassoumi, *O. compacta* Maassoumi & Joharchi, *O. salukensis* Maassoumi, *O. sabzavarensis* Maassoumi, *O. bakhtiarica* Maassoumi, *O. javaherdehi* Maassoumi, *O. sivehensis* Maassoumi & Amini Rad, *O. indurata* Maassoumi, *O. mahneshanensis* Maassoumi.

در این مقاله گونه *O. lupinodes* بعنوان گزارش جدید از ایران معرفی می‌گردد، یک ترکیب جدید

O. rudbariensis . *A. yezdii* (Vassilcz.) Podlech & Maassoumi (= *O. yezdii* Vassilcz.; *A. abditus* Podlech)

O. czapandaghii Boriss. . Vassilcz.

TARI

FUNH TUH IRAN

INTRODUCTION

Linneus (1753) placed several related and morphologically similar genera in the genus *Astragalus* L. Later on, some genera were excluded from *Astragalus*. De Candolle (1802) segregated several species and established the genus *Oxytropis* DC. All species of *Oxytropis* are characterized by the presence of beak on keel petal which is absent in *Astragalus*. This important character along with other taxonomic characters such as flower structure and the indumentum are well known diagnostic characters which are used to separate the two related genera from each other. In *Flora Orientalis* (Boissier, 1872) and Bunge's monographic work (1874), the genus was represented with eight distinct species. Later on, the number of its species was gradually increased. In *Flora Iranica* (Vassilczenko, 1984) the total number of the species was exagerratedly increased to 40. The majority of the newly described taxa were based on a single specimen, but after the first manuscript prepared by Vassilczenko, in the appendix of the same publication, Rechinger added two additional appendices and described several more new species (Rechinger, 1984) This decision indicates the informal complexities of the genus for the Iranian territory. The first attempt for the revision of the genus in Iran was started by Ranjbar (1999). He tried to determine some collected specimens deposited at TARI, and reduced some species to synonymy or doubtful species. Finally, he concluded that the number of species were 32 and for which a diagnostic key along with some notes were presented (Ranjbar 1999). At the first glance, the author carefully checked the authentic specimens and the availability of collected materials at TARI, IRAN, TUH, FUMH (abbreviation based on Holmgren and Holmgren, 1996) and other provincial herbaria. Then, the author found isotypes belonging to two groups of materials. The first group

was the specimens for which the herbarium numbers were the same as holotype specimens, such as: *O. yezdii*, *O. iranica*, *O. zangoulehensis* and *O. allenii*. The second group was the specimens for which the herbarium numbers were not the same as holotypes, but this specimens with other number or without number belonging to the same botanical excursion conducted by the Iranian taxonomists accompanying with Rechinger, Aellen and etc. These created the big problems for the Iranian taxonomists. In these cases, the date of excursions, elevation of localities and other labels information were similar but with different herbarium numbers, because the duplicate materials have been separately numbered and deposited at the different herbaria (Iranshahr 2010). These confusing materials were belonging to *O. surmmandehi*, *O. azarbajejanica* and *O. allavae*. Part of the materials of FUMH with good collections from Khorassan province and identification of some complexes of *O. hypsophila* Bunge by Barneby (1970) was very useful and interesting for this investigation. For the confirmation of the determined materials, the photo of the type specimens in Jstore Website (2012) was used. Whenever, I decided to identify the unknown materials, I was faced with several problems such as:

1. It was not possible to identify the unknown specimens either with *Flora Iranica* (Vassilczenko 1984) or Ranjbar's treatment (1999).
2. After appearance of *Flora Iranica* (Vassilczenko 1984), some other new species were described for the Iranian territory (Vassilczeko 1988; Ranjbar, 1999, 2008, Naqinezhad et al. 2008).
3. In the treatment of *Flora Iranica*, several new species have been shortly described probably based on a single and poor material in young stage.
4. There were several specific names in both treatments (Vassilczenko 1984, Ranjbar 1999), for which, no

specimens are available in four above mentioned herbaria or other provincial herbaria of Iran.

5. Based on long-standing studies on *Astragalus* (Maassoumi 1986, 1989, 1995, 2000, 2003, 2005) the author felt that several specific names of *Oxytropis* without flowering material might belong to *Astragalus* species.

6. For these reasons, the author precisely checked all specimens and tried to find some traces to *Astragalus* species. For several species, it seems that there is the big disjunction within the phytogeographical regions. Several species showed wide distribution ranging from Zagros, Elburz to Khorassan Mountains.

7. A very big problem for the full revision of the genus was the treatment of the short, incomplete, uninformative descriptions and missing of several informative and decisive taxonomic characters in the all prepared descriptions.

The author patiently could separate the distinct species and give rise to functional identification keys and distribution pattern for all species distributed in Iran. Morphological characters of the plants in flowering stage are completely different from those of fruiting stage. For this reason, the author tried to prepare functional identification keys to the species in both stages.

MATERIALS AND METHODS

The specimens of different herbaria including TARI, IRAN, TUH, FUMH (abbreviation based on Holmgren and Holmgren, 1996) were examined. Available literature including De Candolle (1802), (Boissier, 1872), Vassilczenko (1984), Vassilczeko (1988), Ranjbar (1999 and 2008), Naqinezhad et al. (2008) were used to study and identify the materials.

Used characters

There are very few diagnostic characters among distinct species of the genus, so the species with few cryptic taxonomic characters will be separated from each others. In the present investigation, several characters such as: indumentum, stipules, calyx, flower dissection (standard, wing-petals, keel shape and keel mucron) and pod shape were used.

Indumentum. All the species are covered with simple hairs. Direction of the hairs are variable, sometimes in some species two indumentum types are present which differs in the size and direction. e. g., in *O. azarbaijanica* Podlech, *O. karjaginii* Grossh. petioles and peduncles always are covered with long erect together with short appressed hairs. Sometimes, the calyx and pods are covered with two different hairs in color. There are several species which are covered on the calyx with long straight or spreading hairs mixed

with short appressed to spreading or curly black hairs. In few cases, the calyx is covered with only long or short white and black hairs. Length of hairs is different from one species to another, so it is a great taxonomic value to separate the closest species. For example, in *O. glabra* (Lam.) DC. in one plant, there are pods covered with black and white appressed hairs and some pods covered only with black or white hairs.

Stipules. Shape, size and adnation of stipules to the petioles are very important to detect the related species. Few species have the stipules which are vaginate and sheathing the stems and at the base shortly adnate to the petioles, such as *O. aucheri*, *O. chrysocarpa*. Many species have stipules that highly adnate to the petioles, on the opposite side there are the same features, e. g., in *O. hirsutiuscula* the stipules minutely adnate to the petiole at the base but in opposite side highly jointed to each other. Based on this character, it is immediately separable from *O. glabra*.

Calyx. The calyx shape in *Oxytropis* is always campanulate to infundibular with attenuated base or saccate. The ratio of teeth to the tube is very important for separation of the species. Indumentum type including size, direction and color are good diagnostic characters.

Flower dissection. The size, color and structure of the flowers are very different from one species to another. The standard shape varies among the species, standard shape, length, width and apex are good characters to separate the nearest taxa. e. g., *O. karjaginii* with dark violet standard is separable from its closest species. *O. aucheri* has the smaller standard, which is a diagnostic character. There are very few species, which are covered with dispersed hairs on the outside of corolla.

Wing-petals in size of limb and claw ratio, apical asymmetric incision give the good idea to segregate the taxa. Length of limb usually is longer than the claw, but rarely is equal.

Keel shape in different species and length of its apical mucron, direction of keel mucron play the important role to segregate the species. e. g., in *O. savallanica* with very short keel and in *O. kotschyana* with long keel are important characters. Some species with obovate and curved keels are separable from those species with erect keel. Keel mucron is a good character to separate the closest species. *O. savallanica*, *O. iranica*, *O. hirsutiuscula* and *O. glabra* always bear very short mucron but *O. kopetdaghensis*, *O. kotschyana* and *O. pilosa* always have long straight mucron. In some species, direction of mucron from erect to upward curved or downward status is variable. In few cases, some species show the divided apical mucron which are so hard to recognize. A few species are sparsely pilose on the keel limb, which is very useful to separate the closest species.

Pods. There are several form of pod in *Oxytropis* e. g., ovate-oblong, oblong-elliptic, falcate (luniform), erect, narrowly elliptic and inflated. These features of pod shape with different type of appressed or ascending short and long, black or white hairs help to distinguish the nearest species from each other. Valves texture is very different, e. g., *O. persica* with thin valve and inflated pods is simply separable from *O. savallanica*, *O. iranica* and *O. immersa*.

RESULTS

Identification key to the species in flowering stage

- 1a- Plants caulescent 2
- 1b- Plant acaulescent 9
- 2a- Flowers large, more than 15 mm long 3
- 2b- Flowers small, less than 8 mm long 6
- 3a- Petals yellow **26. O. pilosa**
- 3b- Petals purplish to violet 4
- 4a- Standard ca. 20-25 mm long, Calyx with single indumentums **21. O. kotschyana**
- 4b- Standard 12-18 mm long. Calyx with double indumentums 5
- 5a- Leaflets widely ovate. Calyx ca.10 mm long **29. O. rechingeri**
- 5b- Leaflets narrowly elliptica. Calyx ca. 8 mm long.19. *O. kopetdaghensis*
- 6a- Leaflets glabrous above **10. O. glabra**
- 6b- Leaflet hairy on both sides 7
- 7a- Plant with a short stem. Pods ovoid to oblong **36. O. sojakii**
- 7b- Plants with developed stem. Pods narrowly elliptic 8
- 8a- Stipules shortly adnate to the petiols and highly connated to each others **12. O. hirsutiuscula**
- 8b- Stipules shortly adnate to the petioles and free from each others **11. O. heratensis**
- 9a- Plant densely caespitose, humile. Leaves ca. 2-4 cm long 10
- 9b- Plants laxly scapose, taller. Leaves 5-15 cm long 23
- 10a- Stipules vaginate, sheathing the stem, at the base adnate to the petioles 11
- 10b- Stipules in different length adnate to the petioles15
- 11a- Stipules glabrous 12
- 11b- Stipules with sparse hairs, later glabrescent 14
- 12a- Calyx ca. 3 mm long, covered with appressed hairs **35. O. sivehensis**
- 12b- Calyx ca. 4-7 mm long, covered with spreading hairs 13
- 13a- Keel mucron ca. 0.4 mm long **24. O. mahneshanensis**
- 13b- Keel mucron ca.1-1.5 mm long **14. O. immersa**
- 14a- Leaflets 5-8 pairs. Pods covered with long spreading hairs **34. O. shahvarica**

- 14b- Leaflets 7-11 pairs. Pods covered with short appressed hairs **33. O. savallanica**
- 15a- Leaf rachis thick, indurate **15. O. indurata**
- 15b- Leaf rachis flexible, not indurate 16
- 16a- Plants covered with spreading to ascending hairs **25. O. neo-rechingeriana**
- 16b- Plants covered with appressed to subappressed hairs 17
- 17a- Calyx covered with white hairs, occasionally mixed with few blackish hairs 18
- 17b- Calyx densely covered with white and predominant short and black hairs 21
- 18a- Calyx ca. 3-4 mm long, covered with white and black hairs **27. O. persica**
- 18b- Calyx ca. 6-7 mm long, covered with only white hairs 19
- 19a- Peduncles ca. 4-8 cm long **32. O. salukensis**
- 19b- Peduncles ca. 2.5-4 cm long 20
- 20a- Peduncles thin, soft. Inflorescence dense **5. O. iranshahrii**
- 20b- Peduncles thick. Inflorescence lax **22. O. javaherdehi**
- 21a- Corolla pale violet. Standard ca. 12 mm long **1. O. aellenii**
- 21b- Corolla dark violet. Standard ca. 8-10 mm long 22
- 22a- Standard ca. 8-9 mm long. Calyx teeth equalling the tube **13. O. hypsophila**
- 22b- Standard ca. 10-11 mm long. Calyx teeth longer than the tube **6. O. binaludensis**
- 23a- Stipules vaginate, sheathing the stem 24
- 23b- Stipules in different length adnate to the petioles26
- 24a- Leaflets 5-7 pairs **2. O. aucheri**
- 24b- Leaflets 9-17 pairs 25
- 25a- Leaflets 9-12 pairs. Calyx teeth longer than the tube **7. O. chrysocarpa**
- 25b- Leaflets 12-17 pairs. Calyx teeth equaling to shorter than the tube **38. O. szovitsii**
- 26a- Plants 30-50 cm tall 27
- 26b- Plants up to 20 cm tall 28
- 27a- Calyx ca. 8 mm long. Standard ca. 15 mm long **4. O. bakhtiarica**
- 27b- Calyx ca. 13-15 mm long. Standard ca. 16-18 mm long **23. O. lupinoides**
- 28a- Calyx covered with white hairs, occasionally mixed with few blackish hairs 29
- 28b- Calyx densely covered with white and predominant short and black hairs 33
- 29a- Peduncles clearly longer than the leaves 30
- 29b- Peduncles equalling the subtending leaves 31
- 30a- Leaflets 8-9 pairs **32. O. salukensis**
- 30b- Leaflets 10-12 pairs **5. O. bicornis**
- 31a- Standard 9-10 (-11) mm long. Keel mucron ca. 0.5-1.5 mm **22. O. kuchanensis**
- 31b- Standard 12-15 mm long Keel mucron longer than

- 1.5 mm 32
 32a- Calyx teeth 1.5 times longer than the tube. Keel mucron 1.5 mm 37. **O. suavis**
 32b- Calyx teeth equalling to shortly longer than the tube. Keel mucron ca. 1.5-2 mm long 30. **O. rhodontha**
 33a- Standard equalling the wings and keel. Pods stipitate; stipe ca. 2 mm long 8. **O. cinerea**
 33b- Standard longer than wings and keel. Pods sessil or shortly stipitate 34
 34a- Standard ca. 8-10 (-11) mm long 35
 34b- Standard ca. 12-15 mm long 37
 35a- Calyx teeth 1.5-2 times shorter than the tube 16. **O. iranica**
 35b- Calyx teeth equalling the tube 36
 36a- Standard 8-9 mm long; limb ovate 13. **O. hypsophila**
 36b- Standard 11.5 mm long; limb elliptic 31. **O. sabzavarica**
 37a- Standard ca. 14-15 mm long. Leaflets 5-10 pairs 3. **O. azarbaijanica**
 37b- Standard ca. 12-13 mm long. Leaflets 6-11 pairs. Petioles and peduncles covered with long spreading or appressed hairs 38
 38a- Peduncles and petioles covered with sparse spreading long hairs 18. **O. karjagunii**
 38b- Peduncles and petioles covered with sparse appressed long hairs 39
 39b- Stipules at the base ca. 4 mm adnate to the petiole; free portion linear-lanceolate ca. 8 mm long 28. **O. pseudosuavis**
 39b- Stipules at the base ca. 2.5 mm adnate to the petiole; free portion linear-lanceolate ca. 5 mm long 20. **O. kordkoyensis**

Identification key to the species in fruiting stage

(*O. rhodontha* and *O. compacta* not included)

- 1a- Plants caulescent 2
 1b- Plant acaulescent 9
 2a- Plants with thick stems. Leaflets widely ovate 3
 2b- Plants with thin stems. Leaflets narrowly ovate-elliptic 6
 3a- Pods erect, linear to narrowly elliptic 26. **A. pilosa**
 3b- Pods erect, horizontal or deflexed, ovate to narrowly-elliptic 4
 4a- Pods erect, narrowly elliptic, covered with short appressed hairs 19. **O. kopetdaghensis**
 4b- Pods ovate to oblong, horizontal or deflexed 5
 5a- Leaflets 12-17 pairs. Stipe very short 21. **O. kotschyana**
 5b- Leaflets 9-10 pairs. Stipe ca. 2.5-3 mm long 29. **O. rechingeri**
 6a- Stems up to 10-15 cm long 7
 6b- Stems up to 40 cm long 8

- 7a- Leaflets glabrous above. Pods erect, linear to narrowly elliptic 10. **O. glabra**
 7b- Leaflets covered with sparse appressed hairs on both sides 36. **O. sojakii**
 8a- Stipules highly jointed to each other 12. **O. hirsutiuscula**
 8b- Stipules, only at the base adnate to each other 11. **O. heratensis**
 9a- Stipules at the base shortly adnate to the petioles 10
 9b- Stipules highly adnate to the petioles 14
 10a- Pods with thin valves, inflated, ovate, ca. 12 mm long, covered with short appressed white hairs 11
 10b- Pods with thick valves, covered with long spreading to ascending hairs 20
 11a- Stipules glabrous 35. **O. sivehensis**
 11b- Stipules pilose 12
 12a- Pods ovate 27. **O. persica**
 12b- Pods elliptic 13
 13a- Pods covered with long spreading hairs 34. **O. shahvarica**
 13b- Pods covered with very short appressed hairs 33. **O. savallanica**
 14a- Plant densely caespitose, humile. Leaves ca. 2-4 cm long 15
 14b- Plants laxly scapose, higher. Leaves 30-50 cm long 21
 15a- Pods covered with black and white hairs 14. **O. immersa**
 15b- Pods covered with only white hairs 16
 16a- Leaf rachis indurate; terminal leaflet absent 15. **O. indurata**
 16b- Leaf rachis flexible, non indurate 17
 17a- Calyx covered with spreading hairs 24. **O. mahneshanensis**
 17b- Calyx covered with appressed to subappressed hairs 18
 18a- Plants covered with spreading hairs 25. **O. neo-rechingeriana**
 18b- Plants covered with appressed to subappressed hairs 19
 19a- Pods oblong to linear, ca. 20 x 5 mm 17. **O. javaherdehi**
 19b- Pods elliptic, ca. 12 x 6 mm 20
 20a- Calyx teeth 1.5 times longer than the tube 6. **O. binaludensis**
 20b- Calyx teeth equaling the tube 13. **O. hypsophila**
 21a- Plants about 30-50 cm tall 22
 21b- Plants up to 20 cm tall 23
 22a- Peduncle densely villose. Calyx ca. 13-15 mm 23. **O. lupinoides**
 22b- Peduncle covered with short and long appressed hairs. Calyx ca. 8 mm 4. **O. bakhtiarica**
 23a- Stipules vaginate, sheathing the stem 24
 23b- Stipules in different length adnate to the petioles 26

- 24a- Leaflets 5-7 pairs
 24b- Leaflets 9-17 pairs
 25a- Leaflets 9-12 pairs. Calyx with black and white hairs; the teeth longer than the tube
 25b- Leaflets 12-17 pairs. Calyx covered with white hairs; teeth equaling to shorter than the tube
- 2. O. aucheri** 25
7. O. chrysocarpa
38. O. szovitsii
- 26a- Pods oblong to linear, ca. 20 mm long 27
 26b- Pods elliptic, ca. 12-15 mm long 33
 27a- Pods arcuate, gradually tapering toward the apex 28
 27b- Pods straight, abruptly attenuated at apex 29
 28a- Pods arcuate, luniform, at the base rounded
- 3. O. azarbaijanica**
 28b- Pods minutely curved, at the base attenuated
- 18. O. karjaginii**
- 29a- Leaflets 10-14 pairs 30
 29b- Leaflets 5-9 pairs 31
 30a- Peduncles 2 times longer than the leaves
 30b- Peduncles equaling to longer than the leaves
- 5. O. bicornis**
37. O. suavis
- 31a- Pods stipitate; stipe ca. 2 mm long
 31b- Pods sessile or with very abbreviated stipe
 32a- Calyx teeth 2-3 times longer than the tube
- 8. O. cinerea** 32
16. O. iranica
- 32b- Calyx teeth shortly longer than the tube
28. O. pseudosuavis
- 33a- Valves concealing by the very dens yellowish spreading hairs
 33b- Valves densely hairy but not concealing by indumentum
- 20. O. kordkoyensis** 34
 34a- Peduncles and petioles covered with double ascending to spreading hairs. Calyx teeth 2-3 times longer than the tube
31. O. sabzavarica
- 34b- Peduncles and petioles covered with double appressed hairs. Calyx teeth equaling to shorter than the tube 35
 35a- Calyx covered with black and white hairs 36
 35b- Calyx only covered with white hairs; teeth ½ length of the tube
32. O. salukensis
- 36a- Calyx teeth equaling the tube
 36b- Calyx teeth ½ length of tube
22. O. kuchanensis
1. O. aellenii

Taxonomic treatment

1. Excluded species from the genus *Oxytropis*
 Following species are treated as the new synonymous.
 Most of which belong to the genus *Astragalus*.

NEW COMBINATION

Astragalus yazdii (Vassilcz.) Podlech & Maassoumi, **comb. nov.**

=*A. abditus* Podlech, Ann. Nat. Mus. Wien 105B: 566 (2004), **syn. nov.**

Typus: Bakhtiari: Chehel Dokhtaran Kuh, norther side Wendelbo W-1769 (hol. BG; iso MSB).

= *O. yazdii* Vassilcz., Bjull. Mosk. Obsca. Isp. Prir. Otd. Biol. 93(3): 100 (1988), **syn. nov.**

Typus: Yazd: Tezerjan, Barf khaneh, Foroughi & Assadi 18019 (hol. W; iso TARI!).

Surprisingly the specimen with the same number “Foroughi & Assadi 18019” was clearly mentioned and described as *A. abditus* Podlech (see Flora Iranica no. 178: 29 (2010)).

NEW SYNONYMS

Astragalus ciceropsis Hamzehee & Maassoumi, Iran. Journ. Bot. 10: 60 (2004).

Typus: Kermanshah, 25 km from Kermanshah to Sanandaj, Mahmoud abad, Hamzehee 83521(hol. TARI!; iso MSB).

= *Oxytropis straussii* Bornm., Mitt. Thur. Bot. Ver. N.F. 23:22 (1908), **syn. nov.**, non *A. straussii* Bornm.

Typus: Kermanschah: in angustiis Tengi-Dinawar, Strauss (LE, photo jstore site !).

Oxytropis straussii Bornm. was described based on an incomplete specimen. In the description, there is no explanation about the keel structure, because the type material is in fruiting stage and there was no complete flower to describe keel. The author checked both descriptions and type photos (Jstore website 2012) together. All given data on *A. ciceropsis* was totally matched with those of *O. straussii* and therefore they are regarded as synonyms.

A. podocarpus C. A. Mey. Verz. Pfl. Cauca.: 142(1831).

Typus: Talysch, pr. Suwant, C. A. Meyer (Lectotype LE.; Iso. E,H,K,LE,P,W)

= *Oxytropis thaumasimorpha* Rech. f., Fl. Iranica 157: 163 (1984), **syn. nov.**

Typus: Qazvin: in decl. Montium 8 km a pago Zia'an (Kuh-e Syalan), ca. 50 km E. Qazvin, 11.07.1977 Sojak 7712 (hol. PR; the same collection. 7713 W).

O. thaumasimorpha was described based on an incomplete material of Sojak collection. In the description, it was mentioned the keel with short mucron. It is necessary to add that in *A. podocarpus*, the keel apex is nearly rounded not tapering to a short visible mucron. In the same collection, other specimens under number “Sojak 7762” which is not very far from type locality was cited clearly as *A. podocarpus* (see Fl. Iranica 178: 123 (2010)).

A. longirostratus Pau, Trab. Mus. Cienc nat. Madrid, Bot. 14: 21(1918).

Typus: Bakhtiari: Valle de Bazoft, F. Martinez de la Escalera (Hol. MAD!).

= *O. alavae* Rech. f., Fl. Iranica 157: 162 (1984). **syn. nov.**

Typus: Lurestan: 58 km from S. Aligudarz. In ripa rivuli ad viam montem Khali kuh ducentem, 2300, 14.06.1974, Alava 13798 (TUR; the same collection Rechinger 47899 W and Iranshahr s.n. IRAN!).

O. alavae was described based on very poor material. In the original description there is no information about flower structure such as standard, wing and keel. The author checked both descriptions and all given data together. It is necessary to mention that several specimens were collected from Khali-kuh "Ghali Kuh". On the other hand, *A. longirostratus* (iso: Recinger 47899 from the same collection) show the wide distribution from Bakhtiari, Esfahan and extended to Luristan which is clearly mentioned in Fl. Iranica (see no.178:43 (2010)).

A. singarensis Boiss. & Hausskn. in Boiss., Fl. Or. 2: 263 (1872).

Typus: Iraq: In monte Ginjar Mesopotamiae, H. CA. Haussknicht 320 (G-Bposs).

= *O. wendelboi* Vassilcz., Novit. Syst. Pl. Vasca. Leningrad 17: 195(1980) p.p., **syn. nov.**

Typus: Afghanistan: In decl. occidentalibus jugi Shibar, 2800 m, Hedge & Wendelbo (W-4233 BG, photo jstore site!).

O. wendelboi was described based on the materials from Afghanistan. In the short note in Fl. Iranica (p. 152), it was explained that the Iranian specimen has not flower to describe the keel structure. So, it is a doubtful species for the Iranian flora. But according to the photo in Fl. Iranica, it is mentioned the length of keel mucron is about 2-2.5 mm long, this feature seems that long beak of the mature pods expanded from the keel apex, was given instead of keel mucron. Therefore, distribution pattern of *A. singarensis* stretch to Afghanistan, which show a big disjunction with the collected specimens from Iran.

A. daenensis Boiss. in sched Imp. Ad Th. Kotsch, Pl. Pers austral. ed. Hohen. 724 (1845).

Typus: Persia: In monte Kuh Daena, Th. Kotschy 724 (hol. G-BOISS !; iso. BM, CGE, G.LE, LIV, MSB, OXF, P, PRC, W. Z).

= *O. kermanica* Vassilcz. Freyn & Bornm., Bull. Herb. Boissier 5: 606 (1897), **syn. nov.**

Typus: Kerman: Kuh-e Lalezar ad nives deliquescentes, 3700-4200 m, Bornmuller 3766 (hol. W; iso: LE, photo jstore site!) p.p.

= *O. pussilloides* Vassilcz., Nov. Syst. Pl. Vasca. Leningrad 17: 186 (1980), **syn. nov.**

Typus: Afghanistan: in decl. Orientalibus jugi Salang, Fohlen N 1a.

Specimens cited for *O. kermanica* are a mixture of species. Specimens from Qashqai are clearly coinciding with *A. daenensis*, but specimens cited from Mazandaran and Tehran (central Elburz) are *A. aestivorum* Podlech, (see Fl. Iranica no. 178: 30 (2010)), specimen no. Wendelbo 1284 is the holotype of *A. aestivorum*. This *Oxytropis* species was basically described on the materials, for which the previous author did not deeply check the precise structure of the keel beak. Surprisingly the distribution pattern of *O. kermanica* was expanded from Kerman to central Elburz. This is a big misidentification of the herbarium specimens. The specimen Wendelbo 1284 from central Elburz is clearly the type of *Astragalus aestivorum* Podlech

Among the cited specimens the specimen, Behboudi 1082, 1067 (IRAN!) is clearly *A. daenensis* and the specimen Terme et al. 39831 (IRAN!) is clearly "*O. persica*".

2. EXCLUDED SPECIES FOR THE IRANIAN TERRITORY.

O. czapan-daghi B. Fedtsch, Fl. URSS. 13:543(1948).

Typus: Turcomania: Ad summum m. Czapan-Dagh, Bobrov (LE).

Specimen Terme et al. 36737-E, which is mentioned in Fl. Iranica, 157: 134 as *O. czapan-daghi* is in fact *O. binaludensis* Vassilcz.

3. DOUBTFUL SPECIES

Following species was established based on the young plants in flowering stage, for which not easy to separate it from its related *O. chrysoarpa* Boiss.

O. rudbariensis Vassilcz., Bjill. Nosk. Obsca. Isp. Prir., Otd. Biol. 93 (3) 97-102 (1988).

Typus: Guilan: Auf der Felsstellen der Berge bei Rudbar in Cefidrut(rud) elev., Pichler (W).

According to the incomplete description, the presence of dark black punctuation on the leaflets is not common in *Oxytropis* species. This character is a diagnostic character of one species from *Astragalus* sect. *Incani*, namely *A. demavendicus* Boiss. & Buhse (= *A. rudbaricus* Bunge) from the same area. The type of indumentums and length of keel mucron cited in the description need more investigation to understand the taxonomic position of *O. rudbariensis*.

4. ENUMERATION OF SPECIES

1. O. aellenii Vassilcz., Nov. Syst. Plan. Vasc. Leningrad 17: 195(1980).

Typus: Semnan: Damghan, Kuhi Nizva, 3000 m, Behboudi & Aellen 5596E (W, the same collections Behboudi & Aellen 5593E, IRAN!, 5595E, IRAN!). Gen. Dist. Iran (endemic).

Examined specimen: **Semnan:** Damghan, Kuhi Nizva, 2900-3000 m, Behboudi & Aellen 5593 E, 5595 E (IRAN!).

This is a distinct species and it can be related to *O. iranica* Vassilcz. (Ranjbar, 1999).

2. *O. aucheri* Boiss., Diagn. Pl. Or. Nov. Ser.1, 2: 44 (1843).

Typus: Azarbaijan: Ardabil, Aucher- Eloy 4424 (G-Boiss).

= *O. masandaranensis* Vassilcz., Nov. Syst. Pl. Vasc. Leningrad 17: 197(1980), **syn. nov.**

Typus: Mazandaran: In decl. borealibus Kuh-i Nezva, P. Wendelbo 1240 (W; IRAN!).

Gen. Dist.: Caucasus, Turkey and Iran.

Examined specimens: **Mazandaran:** Neyzva Kuh, 08.02.1959, Wendelbo 1240 (typus *O. masandaranensis*, IRAN!); ca. 25 km S. of Ramsar between Tanoorekash and Janat Rudbar, 3000 m, Assadi & Maassoumi 51357 (TARI!); Firouzkuh, 2000 m, Moussavi 23980; Firouzkuh, 1900 m, Goodvin 24800 (TARI!). - **Azarbayejan:** Tabriz to Ahar, Goja-Bel pass, summit, Shale, 1800m, Rechinger 40632 (TARI!); Shabestar, Benis village, Kuh-e Misho Dagh Dareh, 1950 m Kasebi et al. 6439 (TARI!); Ahar, 16 km Tabriz road, 1900 m Foroughi 1604 (TARI!); Tabriz, Bostanabad, 1900 m, Foroughi 1604b (TARI!). - **Semnan:** ca. 20-25 km from Semnan to Damghan, Ahuvan pass, 1700-2100 m, Mozaffarian 58921(TARI!); ca. 35 km N. of Damghan, above Tuyeh, 2000 m, Wendelbo & Assadi 29509 (TARI!); Sangsar, 1680 m, Mozaffarian 58882.- **Tehran:** 13 km from Firouzkuh to Semnan, 2000 m, Assadi & Mozaffarian 35269 (TARI!).

This species with the sheathing stipules is clearly related to *O. aucheri*, which is well distributed in Albourz Mountain Range.

3. *O. azarbaijanica* Podlech, Sendtnera, 6:171 (1999).

Typus: Azarbaijan: In jugi inter Marand et Sufian, 1600-1750 m, 06.06.1971, Rechinger 41162 (Hol. M, photo jstore site!; iso.W, Iranshahr s.n. IRAN!)

Gen. Dist.: Iran (endemic).

Examined specimen: **Azarbaijan:** Marand to Sufian, 12 km to Marand, 06.06.1971, 1700 m, Iranshar s.n. (iso. IRAN!).

4. *Oxytropis bakhtiarica* Maassoumi, **sp. nov.**, Fig. 1
Planta ab pedunculis longis, floribus et calycibus remotiusculis, pilis albis insignis.

Plant ca. 30-35 cm tall, acaulescent, covered with thin, mostly subappressed to spreading white hairs up to 1.7 mm, in fruit up to 2.5 mm long. Caudex laxly divided, with short branches, densely covered with remnants of

old petioles and stipules. Stipules whitish-hyaline, narrowly triangular, long acuminate, 11 mm long, adnate to the petiole for ca.5 mm, rather densely covered with appressed hairs up to 1 mm long. Leaves 5-15 cm long; petiole 2-6 cm long, like the rachis with a clearly double indumentum, densely covered with short subappressed, confusely curled hairs 0.5 mm long and with fewer straight, ascending to spreading long hairs up to 1.2 mm long. Leaflets in 9-10 pairs, narrowly ovate to elliptic, 5-13 x 3-6 mm, acute at the apex, on both sides densely covered with subappressed short and long hairs. Peduncles 12-17 cm long, erect, hairy like the rachis. Racemes 13-15 flowered, later elongated ca. 10-17 cm long. Bracts whitish, linear-acute, ca. 3-4 mm long, with white and black hairs. Pedicels deflexed, ca. 1 mm long, with white hairs. Calyx ca. 8 mm long, campanulate, shortly gibbose at the base, rather densely covered with few spreading white long hairs up to 1 mm long and more shorter, often curly and spreading white hairs; teeth linear, acute, 5 mm long. Petals dark violet. Standard 15 mm long; blade widely elliptic, 8 mm wide, at the apex retuse, at the base subabruptly and shortly narrowed. Wings 1.5 mm long; blades oblong, slightly dilated toward the obliquely emarginate apex ca. 10 mm; auricle wide, ca.1.5 mm long; claw 4 mm long. Keel ca.12 mm long; blades oblong-elliptic, in upper part shortly curved, lower edge nearly straight, 8 x 3 mm, at the apex with a short mucron ca. 1.2 mm long; auricle ca.0.8 mm long; claw 4.5 mm long. Ovary shortly stipitate, long white hairy. Legumes on a stipe ca.1 mm long, deflexed, oblong (immature), 15 mm long, ca. 4 mm wide, carinate ventrally, very deeply grooved dorsally, at the base attenuated, at the apex gradually narrowed into a straight beak 1 mm long, unilocular; valves straw-colored, densely covered with thin, mostly flexuose, ± spreading white hairs up to 2.5 mm long.

Typus: Bakhtiari: Boroujen, Kuh-e Par, Nezamy, 1880 m, 18.05.1997, Mozaffarian 1197 (holotypus TARI!).

Other specimen seen (Paratypus): Kohgiluyeh: ca. 10-40 km from Yasuj to Sepidan to Shiraz, 25.05. 1995, 1700-2200 m, Ghahreman & Mozaffarian 18252 (TUH).

5. *O. bicornis* Vassilcz., Fl. Iranica 157:123(1984).

Typus: Gorgan: Wildlife park, in planitie Dasht ad viam N. Robat Qarab-Bil, E. versus Behkadeh ducentem, 1200 m, Rechinger 53020 (W, photo jstore site!).

Gen. Dist.: Iran (endemic).

Examined specimens: **Gorgan:** Wildlife park, road to Behkadeh, 1250-1300 m, Wendelbo & Foroughi 12828 (TARI). - **Semnan:** Shahrud, Mojen, Sangbon, Shahkuh, 01.07.1992, 2400-2450 m Termeh et al. s.n



Fig. 1. *Oxytropis bakhtiarica* ($\times 0.5$); petals ($\times 2$).

(IRAN); ca. 50 km N. of semnan, between Sheli and Hikuh village, 2400 m Assadi & Mozaffarian 40603 (TARI); Shahpasand to Shahrud, after pass, 1800-1950 m, Wendelbo & Assadi 29694 (TARI). -**Khorassan**: W. of Bujnurd, Darkesh, Kani Mokhtar, 2000-2100 m, Joharchi & Aydani 35606 (33950) (FUMH), SW. Bujnurd, Rein, W. slope of Topal Rayeh, Memariani et al. 37702 (FUMH); W. of Bujnurd, Ghoorkhor protected area 1540-1600 m, Memariani & Arjmandi 43832 (FUMH).

6. O. binaludensis Vassilcz., Fl. Iranica 157: 135(1984).

Typus: Khorassan: Kuh-e Binalud, 20 km oppidi Neyshabur, 2300-2800 m, Sojak 7664 (hol. PR).

= *O. khorasanica* Ranjbar, nom. nov. Sendtnera 6: 194 (1999), = *O. gracillima* Vassilcz., Fl. Iranica 157:131 (1984) non Bge.

Typus: Khorasan: Kuh-e Binalud. ca. 20 km boreo-orient. Ab oppido Neyshabur, 2300-2800 m, Sojak 7656 (hol. PR).

Gen. Dist.: Iran (endemic).

Examined specimens: **Gorgan**: In declivibus borealis montium Shahvar, supra Hajilang, 3500-3800 m, Rechinger 6016 (sub nomen *O. immersa*). -**Semnan**: ca. 30 km NW of Shahrud, mnt Shahvar, above Tash, 3500 m, Assadi & Maassoumi 21072, 21116 (TARI); 20 km NW of Shahrud, above Nekarman, Kuh-e Shahvar, 3700-3900 m, Assadi & mozaffarian 40874 (TARI); NE. of Neyshabur, Binaloud mnt., above the village Sowghand, 1600-2500 m, Assadi & Ranjbar 82284 (TARI); Neyshabur, Kuh-e Binaloud, from Bojan village 1500-1700 m, Mozaffarian 49013 (TARI). - **Khorassan**: Sabzevar, before Zarghan village, 1610 m, Amirabadi & Abbasi 2774 (TARI); 58 km N. Torbat-e Heydariyeh, 1800 m, Assadi & Mozaffarian 35817 (TARI); Chenaran, Radkan, Gorou to Hezar Masjed, 2500-2700 m, Termeh et al. (subnom. *O. czapan-daghi*) 36737E (IRAN); northern elevation of Bujnourd, Gazori & Sheikh 679 (TARI).

7. O. chrysocarpa Boiss., Diagn. Pl. Or. Nov. Ser 1, 6: 34 (1845).

Typus: Fars: kuh-e Delu, propr nives, Kotschy 475 (G-BOISS., photo jstore site !).

= *O. shirkuhi* Vassilcz., Bjull. Mosk. Obsca. Isp. Prir. Otd. Biol. 93 (3): 101 (1988), **syn. nov.**

Typus: Yazd, Deh-e bala, Shirkuh mountain in valle, 3700-4000 m, Foroughi & Assadi 17989? (G; iso. correcte Foroughi & Assadi 17982!).

= *O. surmmandehi* Vassilcz., Bjull. Mosk. Obsca. Isp. Prir. Otd. Biol. 93 (3): 100 (1988), **syn. nov.**

Typus: Bakhtiari, W. Qashqai, Kuh-e Surmmandeh, N. Semirom in declivibus boreo- Orientalibus, 07.06.1974,

Rechinger 47570 (hol.W; iso: Iranshahr s.n.,IRAN!).

Gen. Dist.: Turkey and Iran.

Examined specimens: **Hamadan**: Famenin, Ghorveh, Karafs mnt, NE of Karafs, 2000-2600m, Mozaffarian 64548 (TARI). -**Yazd**: Deh-e bala, Shirkuh mountain, in valley, 3700-4000 m, Foroughi & Assadi 17982 (isotype of *O. shirkuhi* (TARI); Taft, Deh Bala village, Shirkuh, 04.07.2012, 3800 m, Mahmoodi & Noroozi 98610 (TARI). -**Esfahan**: N. side of Kuh-e Dena, above the village Noghol, 3500-4000 m, Assadi & Abouhamzeh 46159 (TARI); Dena from Bideh, Bijan pass, 2700-3000 m, Mozaffarian & Maassoumi 76753 (TARI). -**Lorestan**: Azna, Oshtorankuh, between Bidestaneh village and Sanboran, 23.07.2012, 3400 m, Mahmoodi & Hosseini 98500. -**Bakhtiari**: Brujen to Dorahan, after Godar-e Kabk, Kuh-e Doudelu, 2300-2700 m Mozaffarian 57214(TARI); Boroujen to Dorahan, after Godar-e Kabk, Kuh-e Doudelou, 2300-2700 m, Mozaffaria 57214 (TARI); Kuh-e Kallar, from Sibak village, 2835 m, Mozaffarian 96824 (TARI); Boroujen, S. slope of Godar-e Kabk, 2780 m. Gholamian 2412 (TARI); Farsan, between Sefid Daneh and Shahriari, 3025 m, Mozaffarian 96708 (TARI); Prope Semorom, Kuh-e Surmandeh, 07.06.1974, 2750-3600 m, Iranshahr s.n. (isotype of *O. surmmandehi*, IRAN). -**Kerman**: Sarcheshmeh, after deviation to Sarcheshmeh Maadan, 2600 m, Khodashenas 3984 (TARI). -**Kohgilouyeh-Boirahmad**: Kuh-e Dena, Gardaneh Bijan, 3500-3900 m, Assadi & Mozaffarian 31228 (TARI); Kuh-e Dena, Tang-e Namaki, 3920 m, Safaian 248; Kuh-e Dena, Gardaneh-e Bijan 3000-3600 m, Assadi & Mozaffarian 31170 (TARI); N. side of Dena, near Ab Malakh, 2800-3600 m, Assadi & Mozaffarian 31457 (TARI). -**Fars**: 220 km Shiraz, Ahmad abad, 01.06.1965, Assefi, Ledingham & Rostaian 24483 (TARI); Eghlid, forestry park, 2500 m, Khorami E323, E201 (TARI).- **Tehran**: Arak, Komijan, Vafs mnt, Ranjbar 2583 (TARI) (standard sometimes pilose).

O. shirkuhi was established based on an incorrect herbarium specimen number “ Foroughi & Assadi 17989” from TARI. It is surprising that according to the field booklet deposited in TARI, the same number “17989” is *Gagea stipitata* which is mentioned in Fl. Iranica (see Fl. Iranica no. 165: 48 (1990)). So probably the type specimen number should be “ 17979 or 17980”. In this case, these later numbers cited as *A. abditus* Podlech (see Fl. Iranica no. 178: 29 (2010)), which was, herein, changed to *A. yezdii* (Vassilcz.) Podlech & Maassoumi. So it is supposed that the correct number of the type should be “17982” which is confirmed with the field booklet.

8. O. cinerea Vassilcz., Fl. Iranica, 157:138 (1984).

Typus: Tehran: inter Dizin et Shemshak, 3300 m, Klein7868.

Gen. Dist.: Iran (endemic)

Examined specimen: **Mazandaran**: 85 km from Kandavan to Haraz road, Mazid village, 1900-2300 m, Assadi & Mozaffarian 33031 (TARI).

9. *Oxytropis compacta* Maassoumi & Joharchi, **sp. nov.**, Fig. 2.

Planta dense caespitosa, pedunculis longis et tenuibus, foliolis parvis, argenteis insignis.

Plant ca. 7 cm tall, acaulescent, densely caespitose, covered with silvery appressed white hairs up to 0.1-1 mm long, in fruit up to 1.5 mm long. Caudex densely divided, with very short branches, densely covered with remnants of old petioles. Stipules chartaceous, ca. 4 mm long, free portion triangular, acuminate, ca. 1 mm long, adnate to the petiole for ca. 3 mm, rather densely covered with appressed hairs up to 0.7 mm long. Leaves 2-2.5 cm long; petiole 1-1.5 cm long, like the rachis with double indumentum, densely covered with appressed very short, curled hairs and with fewer disperse straight, ascending to nearly spreading hairs up to 0.7 mm long. Leaflets in 7-9 pairs, narrowly ovate to narrowly elliptic, folded, 4 x 1.5 mm, acute at the apex, on both sides densely covered with mostly straight, appressed hairs up to 0.6-0.7 mm long. Peduncles 3-4 cm long, erect, hairy like the rachis. Racemes (in fruit) rather loosely 8-10 flowered. Bracts whitish, linear-acute, ca. 2 mm long, white hairy. Pedicels ca. 1.5 mm long, white and black hairy. Calyx ca. 6-7 mm long, campanulate, rather densely covered with mostly subappressed white hairs up to 0.7 mm long and with shorter, often curled and appressed white hairs; teeth linear-lanceolate, acute, 3-4 mm long. Petals dark violet. Standard 10 mm long; blade narrowly elliptic, ca. 5 mm wide, at the apex retuse to emarginate, at the base subabruptly and shortly narrowed. Wings 10 mm long; blades narrowly oblong, minutely dilated toward the obliquely emarginate apex, 7 x 2.5 mm; auricle wide, ca. 1.5 mm long; claw 3.5 mm long. Keel ca. 9.5 mm long; blades oblong 7 x 3 mm, at the apex obliquely obtuse with a slightly straight beak ca. 1 mm long; auricle short, claw 3.5 mm long. Ovary shortly stipitate, long white hairy. Legumes on a stipe ca. 1 mm long, erect to spreading, or deflexed, oblong, shortly curved, 15 mm long, ca. 4 mm wide, carinate ventrally, very deeply grooved dorsally, at the base nearly attenuated, at the apex gradually narrowed into a straight beak 2.5 mm long, unilocular; valves thin, greenish to straw-colored, densely covered with thin, mostly flexuose, \pm spreading white hairs up to 1.5 mm long.

Gen. Dist. Iran (endemic).

Typus: Khorassan: NW Mashhad, Hezar Masjed neck mountain, 3132 m, Joharchi & Behroozian 44191 (holotypus FHUM; photo TARI).

10. *O. glabra* (Lam.) DC., *Astragalologia* 35 (1802).

Typus: Siberia, P.

= *O. sorkhehensis* Ranjbar, R. Karamian & Bayat, *Ann. Bot. Fennici* 46: 235 (2009), **syn. nov.**

Typus: Semnan: subalpine near Sorkheh, 1200-1400 m, Maddah 4105 (Bu Ali Uni.).

Gen. Dist. W & E Siberia, Iran, Central Asia, Mongolia, Pakistan, Kashmir and Tibet to China.

Examined specimens: **Mazandaran**: Firouzkuh, ca. 10 km after Firouzkuh toward Gaduk, 2200 m, Maassoumi et al. 89919 (TARI !, Naqinezhad et al. 251, Naqinezhad 36933, TUH, K.).

Among the Iranian *Oxytropis* species, *O. glabra* is a single species in which the leaflets are glabrous above.

11. *O. heratensis* Bunge in Boiss. *Fl. Or.* 2: 507 (1872).

Typus: prope Herate, Bunge (LE, photo jstore site !).

Gen. Dist.: Iran and Afghanistan.

Examined specimen: **Khorassan**: ca. 50 km NNE. Kashmar, Kuh-e Bezgh, 2500 m Assadi & Mozaffarian 35751, 35701 (TARI).

12. *O. hirsutiuscula* Freyn, *Bull. Herb. Boissier sei.* 2, 5: 1021 (1905).

Typus Pamir, ad laca. Jasjal- kul. O. Paulsen

= *O. caraganetorum* Vassilcz. *Nov. Syst. Pl. Vasca. Leningrad* 17: 178 (1980), **syn. nov.**

Typus: Afghanistan: Ghazni, ad marginem boreo-orientalem, altoplanitiei Dasht-i Nawar, 3100 m, Freitag 1543 (Herb. Freitag).

Gen. Dist.: Iran, Afghanistan.

Examined specimens: **Yazd**: Mountains above the village Dehbala, 2821-3800 m, Assadi & Ranjbar 82789 and 82832 (TARI); Shirkuh, from Dehbala and Sheikh Alishahr and Lagerda village, 2400-3400 m, Mozaffarian 77665 (TARI); Taft to Nir, gardaneh Sakhvid, 2900 m, Mozaffarian 77681 (TARI).

Species *O. hirsutiuscula* is widely distributed in Yazd, Shirkuh mts. This species is very variable in terms of shape and size of leaflets, but in all specimens the feature of stipules are similar which are shortly adnate to the petiole at base and in opposite side highly jointed to each other. This important taxonomic character helps to separate also from *O. heratensis* Bunge from the same area.

13. *O. hysophila* Bunge ex Boiss., *Fl. Or.* 2: 501



Fig. 2. *Oxytropis compacta* ($\times 1$); petals ($\times 4$).

(1872).

Typus: khorasan: region Summa et alpina Neishapur et Mesched Bunge (LE, photo jstore site !).

Gen. Dist Iran (endemic)

Examined specimens:**Khorassan:** Birjand, 69 km to Darmian, 2200 m, Zokaie & Ghoreishi 494 (FUMH); Neyshabur, Kharou-olia area, beginning of the road to Kharou, 1200-1300 m, Ghoreishi 1747(467) (FUMH); Shirvan, Astartkhi, 1650 m, Joharchi & Zangooei 10427 (4675) (FUMH); Bajguiran road to Emamgholi, 1250-1600 m, Ghoreishi 903G (4676) (FUMH); Ghoochan,

Kalat-e Mollah Mohammad, 1500-1550 m, Ghoreish 994G (4677) (FUMH); Torbate-e Heydariyeh to Mashhad, around Robat-Sefid, Maassoumi et al. 83358 (TARI), Ibid. Assadi & Mozaffarian 35836 (TARI); Robat-e Sefid (serpantin), Rechingher, Esfandiari & Aellen 4437 (IRAN); Northern elevation of Bujnourd, Gazori & Sheikh 736; N. Slope of Binalud mts, above Zoshk village, Rudkhaneh Abdolla, 2100-3000 m, Mozaffarian 48895 (TARI).

In the same area, some specimens are closely similar to *O. humifusa* from west Afghanistan. To solve this

problem, it is necessary to check the type specimens.

14. *O. immersa* (Baker) Bunge ex B. Fedtsch., Beih. Bot. Centrabl 22, 2: 212 (1907).

Typus: Afghanistan: Aitchson 924 (hol. K; iso. BM, LE, photo jstore site!).

Gen. Dist.: former USSR, Turkey, Iran, Afghanistan and China.

Examined specimens: **Azarbayejan:** Meshkinshahr, Sabalan mnt, 02.08.1970, Izadyar s.n. (IRAN); Ardabil, Ghotour soum Kuh-e Sabalan, 15.07.1971, 2400-3800 m, Termeh 40875 (IRAN); Ouromiyeh, Seyveh, Dizaj, Kuh-e Boz-e Sena to Dalamper Bozorg, 1700-3000 m, Mozaffarian 69915 (TARI); Kuh-e Sabalan, 3650 m, Foroughi 7511 (TARI); Hezar Pych (Savallan), 3500 m, Javanshir 1274 (TARI); Ardabil, Savallan, 2500 m, Sheikh Akbari & Ghorbani s.n. (TARI).

The species is much closed to *O. persica* and *O. savallanica* but it differs by having the calyx with spreading hairs, not appressed hairs; pods covered with white and black long hairs, not covered only by short appressed white hairs.

15. *Oxytropis indurata* Maassoumi, **sp. nov.** e sect. *Xerobia* Bunge, Fig. 3.

Species ab petiolibus et rachidibus persistentiter indurascens insignis.

Plant ca. 5-10 cm tall, acaulescent, Caudex divided, with short branches, densely covered with remnants of old petioles. Stipules whitish-hyaline, ca. 4 mm long, free portion-acuminate, ca. 2 mm long, adnate to the petiole for ca. 2 mm, sparsely covered with appressed hairs up to 0.5 mm long. Leaves 1.5-6 cm long; petiole 0.5-1.7 cm long, like the rachis densely covered with subappressed short and long hairs ca. 0.1-0.2 mm long. Leaflets imparipinnate and paripinnate in 4-5 pairs, narrowly elliptic, 2-4 x 1-1.5 mm, acute at the apex, folded, on both sides densely covered with straight, appressed hairs up to 0.5 mm long. Peduncles 0.2-0.3 cm long, hairy like the rachis. Racemes nearly basal, loosely 2-3 flowered. Bracts linear, acute, ca. 1 mm long, with sparsely white hairs. Pedicels ca. 1 mm long, white and rarely black hairy. Calyx ca. 4.5-5 mm long, campanulate, rather densely covered with mostly appressed long white hairs up to 0.5 mm long and mixed with shorter, often curled and appressed black hairs; teeth linear, acute, 2 mm long, inner side pilose. Petals dark violet. Standard 8.5 mm long; blade widely ovate, ca. 6 mm wide, at the apex retuse to emarginate, at the base subabruptly and shortly narrowed. Wings 7.5 mm long; blades slightly dilated toward the obliquely entire apex, 5 x 2.5 mm; auricle wide, ca. 1 mm long; claw 2.5 mm long. Keel ca. 7 mm long; blades oblong, erect, 7 x 2.5 mm, at the apex with a

short mucron ca. 0.5 mm long; auricle indistinct; claw 3 mm long. Ovary shortly stipitate, white hairy. Legumes (immature) on a stipe ca. 1 mm long, erect linear to oblong, 5 mm long, ca. 1.5 mm wide, densely covered with appressed hairs ca. 0.1-0.2 mm long.

Typus: Khorassan: Mashhad to Kalat, on the old road, 1700-2000 m, Moussavi & Abbasi 4771 (holotypus TARI).

This species belongs to sect. *Xerobia* Bunge, which is the first record of the section for the Iranian *Oxytropis*.

16. *O. iranica* Vassilcz. Novi. Syst. Pl. Vasca. Leningrad 17: 180 (1980).

Typus: Mazandaran: in jugi Gaduk versus Kabud Cheshmeh, Behboudi & Aellen 5581E (W; iso: IRAN).

= *O. zangolehensis* Vassilcz. Bjull. Mosk. Obsca. Isp. Prir. Otd. Biol. 93 (3): 101 (1988).

Typus: Irania, Babakhanlou & Amin, 91 km a Karaj-Chalus, Pol-e Zangoleh, 2400 m, 27.07.1973, 15239 (hol. W; iso. TARI).

Gen. Dist.: Iran (endemic).

Examined specimens: **Mazandaran:** Gaduk, Mouss Cheshmeh, Kaboud Gonbad, Behboudi & Aellen 5598E (IRAN); Pol-e Zangoleh protected area on Chalous road, 2400 m, Babakhanlou & Amin 15239 (TARI); 13 km from Kandavan to Haraz road, 2400 m, Assadi & Mozaffarian 32964 (TARI); 6 km SW of Javaherdeh, (SW of Ramsar), N-exposed slope, 2500-2700 m, Runemark & Maassoumi 20929 (TARI); Kandavan, 5.5 km on the road to Yoush Deh, 2500-2700 m, Jamzad & Salimi 71172 (TARI). **-Tehran:** Elbourz, Gachsar to Gajereh, Varang rud to Sorkhab, 2240-2450 m, Termeh & Matin 36753E (IRAN).

17. *Oxytropis javaherdehi* Maassoumi, **sp. nov.**, Fig. 4. Differt ab *O. aucheri* Boiss. et Buhse calyce albo piloso (nec albo-nigro piloso), leguminibus oblongis (nec ellipticis), brevissime appresse pilosis (nec patenter pilosis).

Plant ca. 8-9 cm tall, acaulescent. Caudex much divided, with short branches, densely covered with remnants of old petioles and stipules. Stipules whitish-hyaline, from narrowly triangular base, long linear-acuminate, 9 mm long, adnate to the petiole for ca. 5 mm, free portion triangular, ca. 4 mm long, rather densely covered with appressed hairs up to 0.7 mm long. Leaves 2.5-4 cm long; petiole 1-1.5 cm long, like the rachis densely covered with appressed hairs 1.5 mm long. Leaflets in 11-12 pairs, narrowly ovate to elliptic, contiguous, 3-6 x 2-3 mm, acute at the apex, on both sides densely covered with mostly straight, subappressed up to 1 mm long hairs. Peduncles 2.5-3 (-4) cm long, erect, thick, double hairs, densely covered

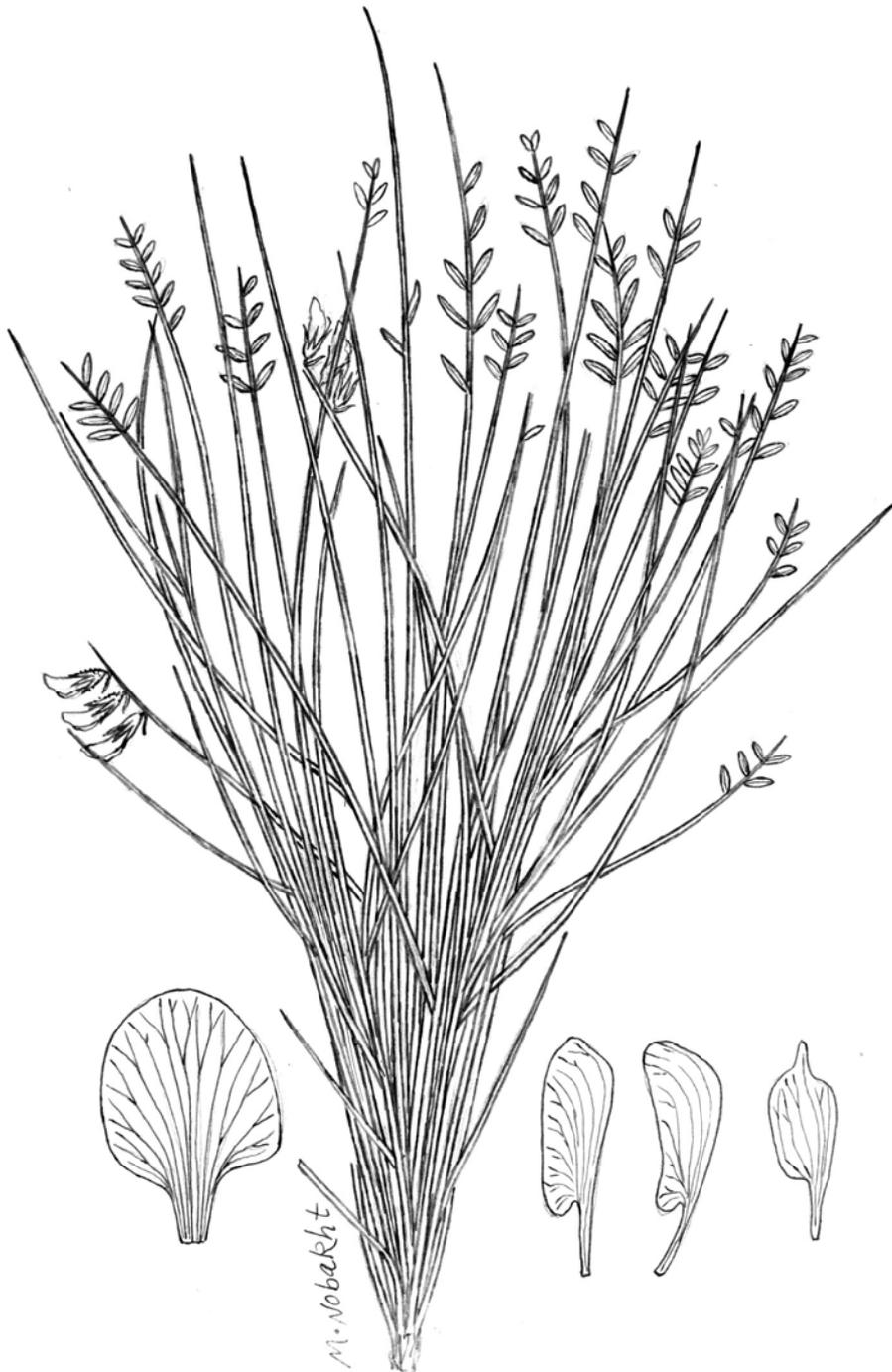


Fig. 3. *Oxytropis indurata* ($\times 2$); petals ($\times 4$).



Fig. 4. *Oxytropis javaherdehi* ($\times 1$); petals ($\times 4$).

with short curled appressed mixed with sparse long hairs. Racemes capitate, 6-7 flowered. Bracts ovate, ca. 2.5 mm long, white hairy. Pedicels ca. 2 mm long, erect, white hairy. Calyx ca. 6 mm long, campanulate, rather densely covered with mostly subappressed short and long white hairs up to 0.2-0.7 mm long; teeth linear, acute, 2.5 mm long. Petals violet. Standard 11 mm long; blade widely elliptic, 7 mm wide, at the apex deeply emarginate, at the base subabruptly and shortly narrowed. Wings 9.5 mm long; blades oblong, minutely dilated toward the obliquely emarginate apex, 7 x 3.5 mm; auricle wide, ca. 1.5 mm long; claw 4 mm long. Keel ca. 9 mm long; blades oblong-obovate, with in upper part slightly erect, lower edge nearly erect, 6 x 2.5 mm, at the apex with a mucron ca. 1.5 mm long; auricle ca. 0.5 mm long; claw 4 mm long. Ovary linear, white hairy. Legumes sessile, erect, oblong, 16 mm long, ca. 4 mm wide, carinate ventrally, very deeply grooved dorsally, at the base nearly attenuated, at the

apex gradually narrowed into a straight beak 3 mm long, unilocular; valves thick, maculate, brownish, ruptured from the apex, densely covered with thin, straight, appressed short white hairs up to 0.5 mm long. Typus: Mazandaran: S of Ramsar, between Javaherdeh and Bagh-e Dasht, 11.08.1976, 2700 m, Runemark & Maassoumi 21722 (holotypus TARI).

Other specimen seen: Guilan: Amarlou, Damash, Kuh-e Zad chin, 04.07.1972, Termeh & Daryadel 40990 (IRAN).

18. *O. karjagini* Grossh., Trudy Azarb. Fil. Akad. Nauk URSS 1: 54 (1933).

Typus: Armenia: Ahkend, Daralages Grossheim, (BAK., photo jstore site !).

Gen. Dist.: Caucasus, Turkey and Iran.

Examined specimens: **Azərbaycan:** Zanjan, from Mahneshan to Dandi, ca. 12-18 km from Anguran to Belgheis mnt. 2100-2200 m. Maassoumi 64821

(TARI); ca. 15 km S. of Marand, Mishu Dagh mnt. 1800-2250m Assadi & Mozaffarian 29921 (TARI); Between Marand and Sufian, Payam, Kuh-e Mishow, 2400-2700 m, Assadi 85323 (TARI); Near Maku, Keshmesh Tappeh, 1800 m, Assadi 85250 (TARI); Myshe (Yam), 1900 m, Youssefi 1430 (TARI).

19.O. kopetdaghensis Gontsch., Fl URSS. 13: 544 (1948).

Typus: Turcomania, Cheiabad, D. Litwinow (LE).

= *O. assadliensis* Vassilcz., Fl. Iranica 157: 121(1984),

syn. nov.

Typus: Khorassan: Locis stepposis montium ad pagum Assadli, 30 km meridiem versus ab oppidio Bojnurd, 17.06.1977, Sojak 7707 (hol. PR).

Gen. Dist.: Turkmenistan and Iran.

Examined specimens: **Khorassan:** Ghouchan, Sarvellayat, after Tavakol Bagh, 2340 m Amirabadi & Ranjbar 7745 (TARI); Esferayaen, N. slope of Kuh-e Shah Jahan from Darparchin bala village 1700-2500 m, Mozaffarian 48559 and 48581 (TARI); Shirvan, Kohneh Ughaz to bajguiran, 1900-2000 m Moussavi & Paryab 10392 (TARI); W. of Bujnurd, darkesh, Kani mokhtar, 2000-2100 m, Joharch & Aydani 35610 (33957) (FUMH); SW Bujnurd, Rein, sandy road, Barzanlou, 2220 m, Memariani et al. 37965 (36139) (FUMH); E. of Bujnurd, between Ghaleh Mohammadi and Jafarabad, Mohammad Beig spring, 1550 m. Joharchi & zangoeei 20750 (17138) (FUMH); W. of Bujnurd, Ghoor Khor protected area, Agh-mazar pass, 2350-2470 m, Memariani & Arjmandi 43988 (FUMH), ibidem, below pass, 2000-2300 m, 44031 (FUMH).

O. assadliensis artificially have been separated as a distinct species. The two species show the same distribution pattern. Specimens collected from North Khorassan and N. Ghouchan compared with those of South Bojnurd, Assadli pass, around Shah Jahan Mountain "Sojak 7708" with the exception of the small size of the leaflets and flowering parts, no differences are distinguishable. Both species on the calyx are covered with short cured black hairs mixed with long straight dispersed hairs.

20. Oxytropis kordkoyensis Maassoumi, **sp. nov.**, Fig. 5.

Differt ab *O. kuchanensis* Vassilcz. calyce albo piloso (nec albo-nigrosque piloso), leguminibus ellipticis, dense luteo-velutinosus (nec oblongis, sparse pilosis).

Plant ca. 10-15 cm tall, acaulescent, covered with thin, silvery appressed white hairs up to 0.5 mm long, in fruit up to 2.2 mm long. Caudex much divided, with short branches, densely covered with remnants of old petioles. Stipules ca. 7 mm long, free portion triangular to linear-acuminate, 5 mm long, adnate to the petiole

for ca. 2.5 mm, rather densely covered with appressed hairs. Leaves 3-7 cm long; petiole 1-2.5 cm long, like the rachis with a clearly double indumentum, densely covered with subappressed, confusely curled hairs 2 mm long and with sparse straight, nearly spreading hairs up to 1 mm long. Leaflets in 8-12 pairs, narrowly ovate to narrowly elliptic, 5-8 x 2-3 mm, obtuse at the apex, on both sides densely covered with straight, appressed hairs up to 1 mm long. Peduncles 5-10 cm long, erect, hairy like the rachis. Racemes densely capitate, many flowered. Bracts linear-acute, ca. 2 mm long, white hairy. Pedicels ca. 2 mm long, white straight hairy. Calyx ca. 7-9 mm long, campanulate, rather densely covered with spreading white hairs up to 4 mm long and with shorter, often curled and more appressed white hairs occasionally mixed with dispersed black hairs; teeth linear, acute, 2-4 mm long. Petals violet. Standard ca. 13 mm long; blade ovate to elliptic, ca. 8 mm wide, at the apex retuse, at the base abruptly and shortly narrowed. Wings 13 mm long; blades narrowly oblong, slightly dilated toward the obliquely emarginate apex, 7.5 x 5 mm; auricle wide, ca. 1.5 mm long; claw 4 mm long. Keel ca. 11 mm long; 5 x 2.7 mm, with a slightly curved mucron ca. 2 mm long; auricle very short; claw 5 mm long. Ovary sessile, densely woolly white hairy. Legumes sessile erect to spreading, oblong, 10 mm long, ca. 5 mm wide, unilocular; valves thin but tough, straw-colored, densely covered with thin, mostly flexuose, ± spreading white hairs up to 4 mm long, completely conciling the fruit.

Typus: Gorgan: S. of Kordkoy, between Radkan and Chaman, 23.05.1986, 1400-1500 m, Maassoumi 55090 (holotypus TARI).

Other specimen seen: Gorgan: S of Kordkoy, between Radkan and Hajiabad (Gol Cheshmeh), 1700 m, Maassoumi 55063 (TARI).

21.O. kotschyana Boiss. & Hohen. in Boiss., Diagn. Pl. Or. Nov. Ser. 1, 9: 36 (1849).

Typus: Tehran: ad radices M. Damavand, prope Lar, Kotsch-332 (G, photo jstore site!).

Gen. Dist.: former USSR, Turkey and Iran.

Examined specimens: **Mazandaran:** Shurab to Gaduk, Miankhal, Ghahreman et al. 7388 (TUH); Lar valley, below Rudkhaneh Abru (Sefidab), 2300 m, Wendelbo et al. 11832 (TARI); Lar valley, 2500, Dini & Arazm 15779 and Wendelbo & Assadi 13343 (TARI); pol-e Veresk, 1190 m, Gheisari 1335; 50 km SW of Chalous, above the village Delir, 2800 m, Assadi & Maassoumi 51571 (TARI). -**Azərbaycan:** 30 km W of Uroumiyeh, Silvana, 1650 m Akbarzadeh 74 (TARI); Ouroumiyeh, Soluk, 1200 m Sabeti 5758 (TARI); Razhan, Rabat village, 900 m, Siami 5745 (TARI);



Fig. 5. *Oxytropis kordkoyensis* ($\times 1$); petals ($\times 4$).

Ouromiyeh, Khosha Kuh, 1800 m, Maassoumi & Nikchereh 80251 (TARI); Mianeh, Bozghosh mnt, Touthmanlou (road of Khalkhal), 1650-1950 m. Mozaffarian & Ramazani 96301 (TARI). -**Lorestan:** Dorud, Oshtorankuh, between Cheshmeh Darre and Panbehkar, neck mnt, 2350-2550 m, Mozaffarian 83715 (TARI); Aligudarz, 60 km SW Aligudarz to Shulabad, Sarab-e Durak, 2000 m, Dehshiri s.n. (TARI). - **Bakhtiari:** Ben, between Bard and Uregun, Kharsank, 2565 m. Mozaffarian 97159 (TARI). - **Hamadan:** Avaj, Ranjbar 556 (TARI). - **Tehran:** Karaj, Asemwarak, Gachsar, 2300 m Ghahreman et al. 7386 (TUH); Sorkh-e Hesar, Ghahreman et al. 7387 (TUH); Karaj to Chalus, ca. 2 km before the tunnel, 2570 m, Maassoumi & Jalili 82410 (TARI); 71 km on the road from Karaj to Chalus, 2200 m Maassoumi 55104 (TARI); Ab Ali road, Polour, Lar protected area, 2500 m, Dini & Arazm 5776 (TARI); Emamzadeh Hashem, 2700 m, Dini & Arazm 15507 (TARI).

22. *O. kuchanensis* Vassilcz., Nov. Syst. Pl. Vas. Leningrad 17: 198 (1980).

Typus: Khorasan: Inter Quchan et Bajgiran 1100-1600 m, Schmid 6312 (hol. G; iso. W).

Gen. Dist.: Iran (endemic).

Examined specimens: **Gorgan:** Shahpassand to Bojnurd, l'embranchement de la route Almeh, 07.06.1975, 1200-1300 m, Termeh s.n. (IRAN). - **Khorassan:** Kuh-e Hezar Masjed, 08.07.1948, Rechinger, Aellen & Esfandiari 5056 (IRAN); ca. 45 km N. of Shirvan, Golool-Sarani protected area, 1600-2300m, Assadi & Maassoumi 50474 (TARI); Esferayen, N. slope of kuh-e Shah Jahan from Darparchin Bala village, 1700-2500 m Mozaffarian 48560 (TARI); Moussavi 3115 (TARI); 50 km S. of Ghouchan, 105 km NE Sabzevar, 1500, Pabot 7919 (28578) (TARI); Bajguiran, beginning of the road to Emamgholi, 1500-1600 m, Ghoreishi 893G (4681) (FUMH); Gonabad, Dehshak, 1700 m, Zargari 41 (4683) (FUMH); SW. Ghouchan, Barsalan to Mokharan, 1820-1850 m, Joharch 44417 (FUMH); NE Birjand, Naveh to Ghatlish, 3.5 km to Izman, 1200-1300 m, Memarian & Zangoeei 43142 (FUMH); S. W. Kalat-e Naderi, between Khalil abad and Ghale now, 1200 m, Joharchi 43003 (FUMH).

23. *O. lupinoides* Grossh., Fl. Kavk. 5: 448 (1952).

Typus: Nachitshevan: prope Vica, Ahura Noraschen dist. Grossheim, Iljinskaja & Kirpicznikov (LE, photo jstore site !).

Gen. Dist. Caucasus, Turkey and Iran.

Examined specimens: **Azarbayejan:** Marand to Zonuz, between Zunuzagh and Kuhkamar, 2500 m, Ghahreman & Mozaffarian 17416 (TUH); 36 km

Kharvana, on the road from Varzeghan to Siahrud, 1550 m, Assadi 86698 (TARI); Marand, 8 km Tabriz road, 2050 m, Foroughi 6293 (TARI); ca. 6 km from Siran to Golzar, 1780 m, Maassoumi, Safavi & Ghahremani 82530 (TARI).

24. *Oxytropis mahneshanensis* Maassoumi, sp. nov., Fig. 6.

Differt *O. immersa* Bunge foliis dense patentibus villosis (nec appresse pilosis), legumibus albo pilosis (nec albo-nigrosque pilosis), stipulis deinde glabris.

Plant ca. 3-5 cm tall, acaulescent, densely covered with spreading white hairs up to 0.5 mm, in fruit up to 2 mm long. Caudex much divided, with very short branches, at the base covered with remnants of the old petioles. Stipules whitish-hyaline, ca. 3 mm long, sparsely hairy, later glabrescent, at the base adnate to the petiole and at the upper part nearly vaginate, sheathing the stem, free portion late ovate, acuminate, ca. 8 mm long. Leaves 0.5-0.8 (-1.5) cm long; petiole 0.1-0.3 cm long, like the rachis with double indumentum, densely covered with short appressed, confusely curled hairs mixed with dense long, straight, ascending to nearly spreading hairs up to 1 mm long. Leaflets 7-10 pairs, small, contiguous, narrowly ovate to narrowly elliptic, 2-2.5 x 1-1.5 mm, acute at the apex, on both sides densely covered with mostly straight, subappressed hairs up to 1 mm long. Peduncles 1.5-2 cm long, erect, covered with short appressed hairs mixed with long spreading hairs. Racemes loosely 3-5 flowered. Bracts whitish, narrowly triangular, curved, acute, ca. 4 mm long, white hairy. Pedicels ca. 1 mm long, densely with spreading white hairs. Calyx ca. 4.5-5 mm long, tubular, campanulate, rather densely covered with mostly spreading white hairs up to 1 mm long and mixed with shorter, often curled and more appressed black hairs; teeth linear, acute, 1.5-2 mm long. Petals pale violet. Standard 10 mm long; blade orbicular, ca. 7 mm wide, at the apex deeply emarginate, at the base subabruptly and shortly narrowed. Wings 9 mm long; blades narrowly oblong, slightly dilated toward the obliquely emarginate apex, 5.5 x 3 mm; auricle wide, ca. 1.5 mm long; claw 4 mm long. Keel ca. 8 mm long; blades oblong-obovate, in upper part shortly curved, slightly concave, 5 x 2.5 mm, at the apex with very short and curved mucron ca. 0.4 mm long; auricle ca. 0.5 mm long; claw 3.5 mm long. Ovary shortly stipitate, long white hairy. Legumes on a stipe ca. 1 mm long, erect, oblong, straight, 8 mm long, ca. 2.5 mm wide, carinate ventrally, grooved dorsally, at apex gradually narrowed into a straight beak 1.5 mm long, unilocular; valves straw-colored, densely covered with thin, mostly flexuose, \pm spreading white hairs up to 2 mm long.

Typus: Zanjan: Mahneshan, Alam Kandy village,



Fig. 6. *Oxytropis mahneshanensis* ($\times 1$); petals ($\times 4$).

Sandough Cenderan mnt, 3000 m, 05.05, 1373 (Persian calendar), Moussavi 411 (holotypus TARI!).

25. *O. neo-rechingeriana* Vassilcz., Fl. Iranica 157: 134 (1984).

Typus: Khorassan: Kuh-e Binalud ca. 20 km NE oppido Neyshabur, 2300-2800 m, Sojak 7658 (PR).

Gen. Dist.: Iran (endemic).

Examined specimens: **Khorassan:** N. of Farouj, 3.5 km

to Koran, Kordiyeh toward Sarcheshmeh, 1550-1570 m, Memariani & Zangooei 42929a (FUMH); Ghale Safa, Oghaz Tazeh, Memariani & Zangooei 43081 (FUMH); Shirvan, Namanlou, Golul, Tcheshmeh Gabri, 2400 m, 19.07.1986, Termeh, Moussavi & Tehrani 41371 (IRAN).

26. *O. pilosa* (L.) DC., Astragal. 21 (1908).

Typus: Europa et Sibiria (photo jstore site !).

Gen. Dist.: Caucasus, Iran.

Dist. In Iran: **Azərbaycan**: Arasbaran protected area, Kalaleh village, margin of forest, 1300 m, 17.03.1380 (Persian calendar), Ghahremani, Talebpour & Imani 6903 (TARI).

Within Iranian material, this species with yellow flowers is distinguishable from all the other species.

27. *O. persica* Boiss, Diagn. Pl. Or. Nov. Ser. 1, 2: 40 (1843).

Typus: Mazandaran: mont Alamut 4420 (G-Boiss, photo jstore site!).

= *O. pusilloides* Vassilcz., Nov. Syst. Pl. Vasca. Leningrad 17: 186 (1980), **syn. nov.**

Typus: Afghanistan: in decl. Orientalibus jugi Salang, Föhlen N 1a., p.p.

= *O. Takhti-soleimani* Vassilcz., Nov. Syst. Pl. Vasca. Leningrad 17: 185 (1980).

Typus: Mazandaran: Takhti-soleiman, 4320 m, Klein 2177 (W).

Gen. Dist. Caucasus, Turkey, Iran, Afghanistan and China.

Examined specimens: **Mazandaran**: ca. 40 km S. of Ramsar, N. slope of Khash Chal mnt, 2900-3600 m, Assadi & Maassoumi 51217 (TARI); ca. 30 km S. of Ramsar, between Khash Chal and Miankuh, Assadi & Maassoumi 51253 (TARI). - **Azərbaycan**: Mianeh, Tark, Fandoghlu to Sevi village to Bozghoush, 2200-2800 m, Mozaffarian & Ramazani 96401 (TARI). - **Semnan**: ca. 20 km NW of Shahrud, above Nekarman, Kuh-e Shahvar, 3700-3950 m., Assadi & Mozaffarian 40886, 40867, 40863 (TARI). - **Tehran**: Elbourz, Elika, Varvasht, 3600-4100 m, Terme s.n. (IRAN).

O. pusilloides was described based on the materials of Afghanistan. In Flora Iranica the cited specimens are the mixture species of *Astragalus daenensis* and *O. persica*. Specimen no. Terme et al. 39831 which was cited in Fl. Iranica, is clearly *O. persica*.

28. *Oxytropis pseudosuavis* Maassoumi, **sp. nov.**, Fig. 7.

Differt *O. suavis* Boriss. Foliolis 6-8 (nec 10-12) jugis, vexillo apicem rotundato (nec emarginato), legumine 10-12 mm longo basi ca. 2 mm stipitato (nec 20 mm longo).

Plant ca. 20 cm tall, acaulescent, covered with thin, mostly spreading white hairs up to 1.25, in fruit up to 2 mm long. Caudex divided, with short branches, densely covered with remnants of old petioles. Stipules whitish-hyaline, ca. 12 mm long, free portion lanceolate ca. 8 mm long, adnate to the petiole for ca. 4 mm, sparsely covered with appressed hairs up to 1.2 mm long, later glabrescent. Leaves 6-11 cm long; petiole 4-6 cm long,

like the rachis with a clearly double indumentum, densely covered with subappressed, confusely curled short hairs and with fewer straight, ascending to nearly spreading hairs up to 1.5 mm long. Leaflets 7-8 pairs, narrowly ovate to narrowly elliptic, 7-15 x 3-5 mm, obtuse at the apex, on both sides densely covered with mostly straight, appressed to subappressed or ascending hairs. Peduncles 10-15 cm long, erect, covered with short curved appressed hairs mixed with few straight long hairs. Racemes rather 10-12 flowered. Bracts lanceolate to linear, ca. 4 mm long, white hairy. Pedicels ca. 1.5 mm long, white and black hairy. Calyx ca. 10 mm long, campanulate, rather densely covered with mostly spreading white hairs up to 1 mm long and with shorter, often curled and spreading black hairs; teeth lanceolate-linear, acute, ca. 6 mm long. Petals violet. Standard 12-13 mm long; blade narrowly elliptic, ca. 5 mm wide, at the apex rounded, at the base subabruptly and shortly narrowed. Wings 11 mm long; blades oblong, minutely dilated toward the entire apex, 8 x 3.5 mm; auricle wide, ca. 1.5 mm long; claw 3.5 mm long. Keel ca. 9.5 mm long; blades oblong-ovate, with in upper part slightly curved lower edge and slightly concave upper edge, 7 x 3 mm, at the apex with the curved mucron ca. 1 mm long; auricle ca. 0.75 mm long; claw 4 mm long. Ovary shortly stipitate, long white hairy. Legumes on a stipe ca. 1.5 mm long, erect to spreading, oblong, shortly curved, 10-15 mm long, ca. 4 mm wide, ventrally carinate, straight, very deeply grooved dorsally, at the apex gradually narrowed into a straight beak 2 mm long, unilocular; valves coriaceous, green to straw-colored, densely covered with thin, mostly straight, spreading white hairs up to 2 mm long.

Typus: Khorassan: W. of Ghaen, hills SW of Tajan, 18.08.2009, 1900-2000 m, Joharch & Zangoeei 42458 (holotypus FUMH; isotypus TARI); ibidem, Joharch & Zangoeei 42457 (FUMH)

29. *O. rechingeri* Vassilcz., Ann. Nat. Hist. Mus. Wien: 24: 24 (1971).

Typus: Khorasan: Inter Quchan et Bajgiran, 1100-1600 m, 03.07.1956, Schmid 6303 (hol. W).

Gen. Dist.: Iran (endemic).

Examined specimens: **Khorassan**: ca. 14 km NE of Gifan, mountains N. of Yazdanabad, 2000 m, Assadi & Maassoumi 50334 (TARI).

30. *O. rhodontha* Vassilcz., Bjill. Nosk. Obsca. Isp. Prir., Otd. Biol. 93 (3): 97-102 (1988).

Typus: Azərbaycan: Ourmiyeh, Serow, 1860 m, Foroughi (hol. W; correcte iso. Foroughi 6310 TARI!).

Gen. Dist. Iran (endemic).



Fig. 7. *Oxytropis pseudosuavis* ($\times 1$); petals ($\times 4$).

Examined specimens: **Azarbayejan:** Ouromiyeh, Serow, 1860 m, Foroughi 6310 (TARI).

31. *Oxytropis sabzavarensis* Maassoumi, sp. nov., Fig. 8.

Differt a *O. kuchanensis* Vassilcz. pedunculis indumentis vix duplicatis (nec appressis), calyce pilis patulis ca. 0.2-1.5 mm longis (nec appressis), dentibus tubis 2-3 plo longioribus (nec aequantibus), a *O. suavis* Fedtsch. pedunculis pilis patulis (nec appressis), foliolis 7-9 jugis (nec 9-14).

Plant ca. 12-20 cm tall, acaulescent, covered with mostly spreading white hairs up to 0.2-1.5 mm, in fruit up to 2 mm long. Caudex divided, with short branches, densely covered with remnants of old petioles and stipules. Stipules whitish-hyaline, 10-12 mm long, adnate to the petiole for ca. 4 mm, free portion linear acuminate, ca. 8 mm long, densely covered with appressed to ascending hairs up to 1 mm long. Leaves 6-10 cm long; petiole 3-6 cm long, like the rachis with double indumentum, densely covered with subappressed, confusely short hairs 0.3 mm long and with straight, ascending to nearly spreading hairs up to 1 mm long. Leaflets in 7-9 pairs, oblong to elliptic, ca. 4-7 x 2.5 mm, margin cartilagineous, reddish, acute at the apex, upper side densely covered with mostly straight, lower side covered with subappressed to slightly ascending hairs up to 2 mm long. Peduncles 7-14 cm long, erect, covered with short and long hairs (different from those of petioles) like the rachis. Racemes (in fruit) rather loosely 9-12 flowered. Bracts greenish, linear-acute, ca. 2.5 mm long, white and black hairy. Pedicels ca. 2 mm long, white and black hairy. Calyx ca. 11 mm long, campanulate, rather densely covered with mostly spreading white hairs up to 2 mm long and occasionally with few rarely shorter, often curly spreading black hairs; teeth lanceolate, acute, 6 mm long, inner side hairy. Petals dark violet. Standard 11.5 mm long; blade widely elliptic, 6 mm wide, at the apex retuse to emarginate, at the base subabruptly and shortly narrowed. Wings 10.5 mm long; blades narrowly oblong, slightly dilated toward the obliquely emarginate apex, 7.5 x 3 mm; auricle wide, ca. 1.5 mm long; claw 3 mm long. Keel ca. 10 mm long; blades oblong-obovate, 6 x 3 mm, at the apex obliquely obtuse with a slightly straight beak ca. 2 mm long; auricle very short; claw 3 mm long. Ovary shortly stipitate, long white hairy. Legumes on a stipe ca. 1.5 mm long, pilose, erect to spreading, oblong, shortly curved, 17 mm long, ca. 5 mm wide, carinate ventrally, very deeply grooved dorsally, attenuated at the base, at the apex gradually narrowed into a straight beak 3 mm long, unilocular; valves thin, straw-colored, densely covered with thin, mostly flexuose, ± spreading white

hairs up to 2 mm long.

Typus: Khorassan: W of Sabzavar, mountains in E of Sarough, N: 36, 20; E: 57,18, Joharchi & Zangooei 42454 (holotypus FUMH; isotypus TARI).

32. *Oxytropis salukensis* Maassoumi, sp. nov., Fig. 9.

Differt a *O. iranica* Vassilcz. calyce pilis tantum albis (nec nigris et albis immixitis) leguminibus ellipticis, pilis dense patulis (nec olongis et nec pilis brevibus appressis).

Plant ca. 15 cm tall, acaulescent, covered with appressed white hairs up to 0.2-1 mm, in fruit up to 1.5 mm long. Caudex much divided, with short branches, densely covered with remnants of old petioles and stipules. Stipules whitish-hyaline, ca. 7 mm long, free portion lanceolate, ca. 3 mm long, adnate to the petiole for ca. 3 mm, rather densely covered with subappressed hairs up to 1 mm long. Leaves 3-4 cm long; petiole 1.5-2 cm long, like the rachis with a clearly double indumentum, densely covered with short appressed confusely curled hairs 0.2-0.3 mm long and with fewer straight, subappressed to nearly spreading hairs up to 1.25 mm long. Leaflets in 8-9 pairs, narrowly oblong to narrowly elliptic, 2-3 x 0.5-1 mm, acute at the apex, on both sides densely covered with mostly straight, appressed hairs up to 0.3 mm long. Peduncles 4-8 cm long, erect, hairy like the rachis, covered with longer hairs up to 1.5 mm long. Racemes (in fruit) rather loosely 8-9 flowered. Bracts greenish, linear, acute, ca. 2 mm long, white hairy, tapering to the apex. Pedicels ca. 1 mm long, white hairy. Calyx ca. 7 mm long, campanulate, rather densely covered with mostly subappressed to spreading white hairs up to 1.25 mm long and with few shorter, often appressed white hairs; teeth linear, acute, 3.5 mm long. Petals violet. Standard 10 mm long; blade narrowly elliptic, ca. 4 mm wide, at the apex retuse, at the base subabruptly and shortly narrowed. Wings 10 mm long; blades narrowly oblong, minutely dilated toward the obliquely emarginate apex, 7 x 3 mm; auricle wide, ca. 1 mm long; claw 3 mm long. Keel ca. 10 mm long; blades oblong-obovate, 5 x 2.5 mm, at the apex obliquely obtuse with a slightly straight mucron ca. 1.6 mm long; auricle ca. 0.5 mm long; claw 4 mm long. Ovary stipitate, long white hairy. Legumes on a stipe ca. 1 mm long, erect to spreading, elliptic, straight, 15 mm long, ca. 4.5 mm wide, carinate ventrally, shortly grooved dorsally, at the base nearly rounded, at the apex gradually narrowed into a straight beak 2.5-3 mm long, unilocular; valves thin, green to straw-colored, densely covered with thin, mostly flexuose, ± spreading white hairs up to 2.5 mm long.

Typus: Khorassan: SW Bujnourd, Ghaleh Saluk, around microwave station, N: 37,15; E: 57,08, 2940-



Fig. 8. *Oxytropis sabzavarensis* ($\times 0.82$); petals ($\times 3.8$).



Fig. 9. *Oxytropis salukensis* ($\times 0.77$); petals ($\times 3$).

2950 m, Joharchi & Memariani 44125 (hol. FUMH; iso: TARI).

33. *O. savallanica* Bunge ex Boiss., Fl. Or. 2: 503 (1872).

Typus: Azarbajejan: In summa alpe Savallan in province Adserbidschan, Persia boreali occidentalis, Seidlitz (P).

Gen. Dist.: Caucasus, Turkey, Iran, Iraq, Afghanistan, China.

Examined specimens: **Mazandaran:** S. of Ramsar, W. of Lapasar, 3280 m, Runemark & Maassoumi 21779 (TARI).

The species is very closed to *O. persica*, but separable from it by jointed stipules to each others sheathing the stem and at the base shortly adnate to the petioles.

34. *Oxytropis shahvarica* Maassoumi, sp. nov., Fig. 10.

Differt a *O. savallanica* Bunge ex Boiss. caudice laxe (nec dense) diviso, leguminibus pilis densis, longis et patulis (nec brevibus et appressis), a *O. immersa* (Baker) Bunge ex Fedtsch. stipulis vaginatis dense pilosis, basim petiola breviter adnatis (nec glabris et nec basim petiola longe adnatis).

Plant ca. 5-8 cm tall, acaulescent, covered with short appressed white hairs up to 0.1-0.5 mm, in fruit up to 2.5 mm long. Caudex divided, with short and lax branches, covered with remnants of old petioles and stipules. Stipules whitish-hyaline, at the base narrowly triangular, linear-acuminate, 4-5 mm long, jointed to each other, sheathing the stem, at the base shortly adnate to the petiole, rather densely covered with subappressed hairs up to 0.25 mm long. Leaves 1.5-2.5 cm long; petiole 0.5-1 cm long, like the rachis with a clearly double indumentum, densely covered with short appressed hairs 0.1 mm long and with fewer straight, ascending to nearly spreading hairs up to 0.5 mm long. Leaflets 5-8 pairs, narrowly elliptic, 5 x 1 mm, acute at the apex, on both sides densely covered with appressed to subappressed hairs up to 1.2 mm long. Peduncles 3-7 cm long, thin, erect, hairy like the rachis. Racemes rather loosely 4-6 flowered. Bracts greenish, lanceolate-ovate, acute, ca. 2 mm long, white and black hairy. Pedicels ca. 1 mm long, densely black hairy. Calyx ca. 5 mm long, campanulate, rather densely covered with subappressed to spreading white and black hairs up to 0.25 mm, occasionally with clearly only white hairs; teeth lanceolate, acute, 2 mm long. Petals pale violet. Standard 11 mm long; blade widely elliptic, ca. 6-6.5 mm wide, at the apex retuse to emarginate, at the base shortly narrowed. Wings ca. 10 mm long; blades narrowly obovate, slightly dilated

toward the obliquely emarginate apex, 6.5x3.5 mm; auricle wide, ca. 2.5 mm long; claw 3.5 mm long. Keel ca. 10 mm long; blades oblong-obovate, in upper part slightly curved, 4.5 x 3 mm, at the apex obliquely obtuse with a slightly straight beak ca. 1.5 mm long; auricle very short; claw 5 mm long. Ovary shortly stipitate, long white hairy. Legumes (immature) on a stipe ca. 0.8 mm long, erect to spreading, oblong, 8 mm long, ca. 3 mm wide, carinate ventrally, rotundate dorsally, at the base attenuated, at the apex gradually narrowed into a curved beak ca. 2.5 mm long, unilocular; valves thin, greenish yellow, densely covered with thin, mostly flexuose, \pm spreading white hairs up to 2.5 mm long.

Typus: Semnan: ca. 20 km NW of Shahvar, above Nekarman, Kuh-e Shahvar (CF2), near the top, 3600-3900 m, Assadi & Mozaffarian 40892 (holotypus TARI!).

35. *Oxytropis sivehensis* Maassoumi & Amini Rad, sp. nov., Fig. 11.

Leguminibus membranaceis, dense brevissime appresse albo pilosis insignis. Differt a *O. persica* Boiss. & Buhse calycis albo-nigrosque pilosis (nec albo pilosis), a *O. immersa* Bunge leguminibus albo (nec albo-nigrosque) pilosis, a *O. savallanica* Bunge stipulis glabris, vexillo 6-6.5 mm longo (nec 8-10 mm).

Plant ca. 6-7 cm tall, acaulescent, densely caespitose, covered with thin, appressed white hairs up to 0.25 mm, in fruit up to 0.2 mm long. Caudex divided, intricate, with short branches, densely covered with remnants of old petioles and stipules. Stipules whitish-hyaline, at first sparsely hairy, later glabrescent, margin ciliate, 6 mm long, free portion lanceolate, ca. 2 mm long, adnate to the petiole for ca. 4 mm. Leaves 2-2.5 cm long; petiole 0.5-1 mm long, like the rachis densely covered with appressed hairs. Leaflets 5-6 pairs, narrowly elliptic, 3-4 x 1-2 mm, folded, acute at the apex, on both sides densely covered with straight, appressed hairs up to 1 mm long. Peduncles 2-5 cm long, procumbent, covered sparsely with short and long appressed hairs. Racemes densely 4-6 flowered. Bracts linear-acute, ca. 1-1.5 mm long, with appressed white and few black hairs. Pedicels ca. 1.5 mm long, white and black hairy. Calyx ca. 3 mm long, campanulate, rather densely covered with mostly appressed white hairs up to 0.25 mm long and with very shorter, often curled and more appressed black hairs; teeth triangular, acute, 1 mm long. Petals dark violet. Standard 7.5-8 mm long; blade ovate, ca. 5.5 mm wide, at the apex deeply emarginate, at the base gradually narrowed. Wings 7 mm long; blades narrowly oblong, minutely enlarged toward the obliquely emarginate apex, 5 x 2 mm; auricle wide, ca. 1 mm long; claw 2.5 mm long. Keel

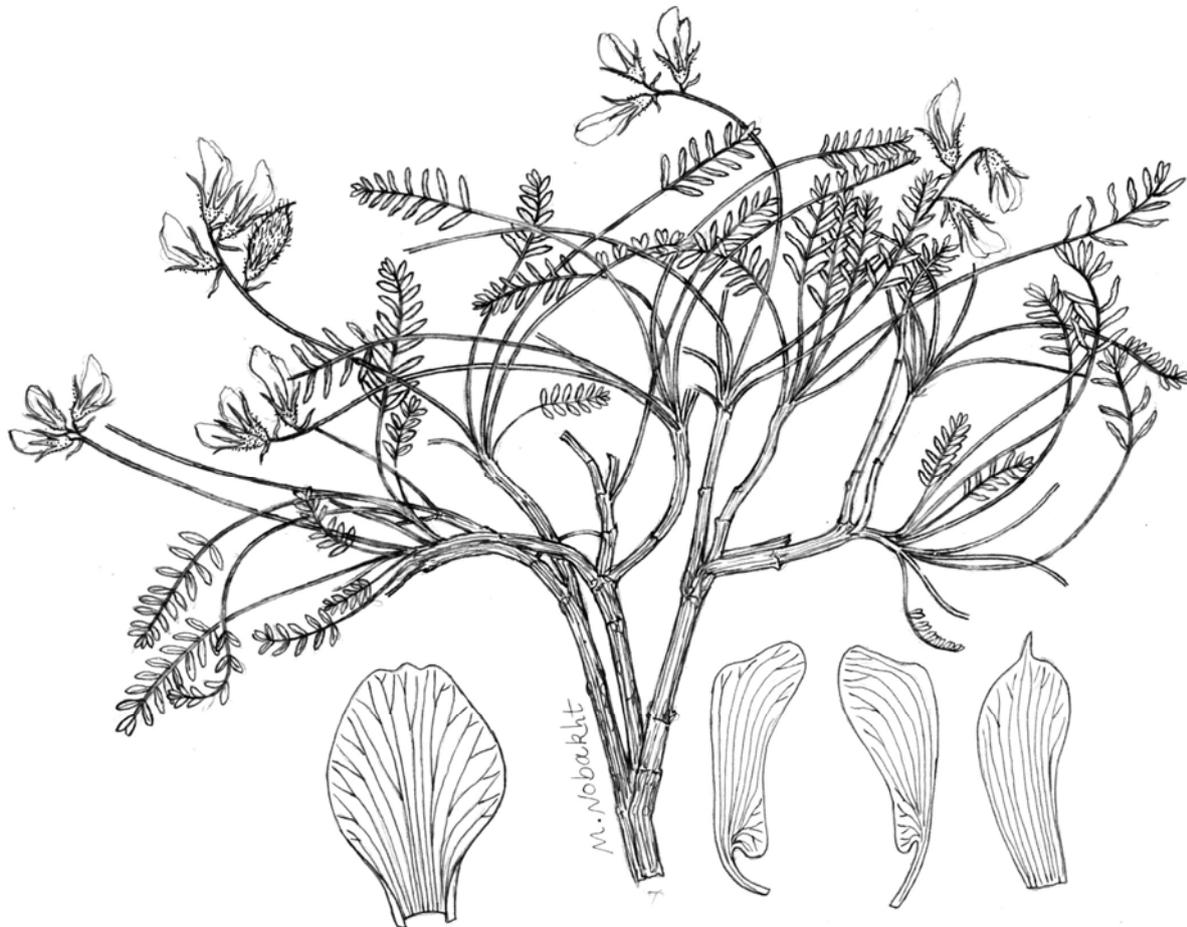


Fig. 10. *Oxytropis shahvarica* (×1); petals (×4).

ca. 7 mm long; blades oblong, nearly erect, 3.5 x 2 mm, at the apex with a mucron ca. 1.5 mm long; auricle very short; claw 2 mm long. Ovary shortly stipitate, white hairy. Legumes on a stipe ca. 1 mm long, inflated, erect to spreading, oblique-oblong, 13 mm long, ca. 7 mm wide, ventrally rotundate, carinate, dorsally straight, carinate, at the apex gradually narrowed into a runcinate beak 2 mm long, unilocular; valves thin, membranous, straw-colored, densely covered with short, straight curly subappressed to spreading white hairs up to 0.25 mm long.

Gen. Dist. Iran (endemic).

Examined specimens: Azarbayjan: Piranshahr, Silveh, Gerdasor, Darreh mnt, 24. July 2011, 3150-3257 m, Amini Rad & Torabi s.n. (holotypus IRAN; isotypus TARI); other specimen seen: Azarbayjan: Piranshahr, Silveh, Zivke, Chighdarreh mnt. 3130-3570 m, 04.07.2012, Amini Rad & Torabi s.n. (IRAN!).

36. *O. sojakii* Vassicz., Fl. Iranica 157: 119 (1984).

Typus: Kerman: in pratis ad pagum Lalehzar, 2800-

4000 m, 25. 05.1977, Sojak 7755 (PR).

= *O. lalehzarensis* Vassilcz., Novit. Syst. Pl. Vasca. 21: 113 (1984).

Typus: Kerman: in pratis ad pagum Lalehzar, 2800-4000 m, 25.05. 1977, Sojak 7755 et 7754 (W). nom. invalid., **syn. nov.**

O. lalehzarensis was published as a distinct species by introducing two types (syntypi). These two specimens cited in Flora Iranica for *O. sojakii* as well. There seems to be no differences between the descriptions of the two taxa and therefore they are regarded as synonymy. The two taxa have been published in the same date, but as for *O. sojakii* a single specimen was cited as type, it is accepted as the correct name.

Gen. Dist.: Iran (endemic).

Examined specimens: **Kerman:** Kuh-e Hazar, bab Zangui, 3150 m, Saberi et al. 5471 (TARI); Rayen, above the village Baba Zangui, s. slope of Kuh-e Hazar, 3100-3900 m, Assadi 83196 (TARI).

37. *O. suavis* Boriss., Not. Syst. Leningrad 10: 80 (1947).



Fig. 11. *Oxytropis sivehensis* ($\times 1$); petals ($\times 4$).

Typus: In schistosis mont Czisch in juniperetis, Borissova 95 (LE).

Gen. Dist.: Iran and Turkmenistan.

Examined specimens: **Gorgan:** Golestan park, Sharlegh station, 1300 m, Maassoumi 47579 and 47588 (TARI). **-Khorassan:** 15 km on the Gifan road to Bujnurd, near the village Soorek, 1000 m, Assadi & Maassoumi 50074 (TARI). **-Khorassan:** Esferayen to Sabzevar, Hesari, Kuh-e Shah-e Jahan, 17.06.1975, 1400-0750 m, Termeh s.n. (IRAN); N. of Farouj, 3.5 km to Koran, Kordiyeh toward Sarcheshmeh, 1550-1570 m, Memariani & Zangooei 42883 (FUMH).

38. *O. szovitsii* Boiss. & Buhse, Nov. Mem. Soca. Nat. Mosca. 12: 57 (1860).

Typus: Tehran, M. Elburs bei Warahosul 7000' Buhse (LE).

Gen. Dist. Caucasus, Turkey and Iran.

Examined specimens: **Mazandaran:** Chalous, Doab vers Dasht-e Nazir. 11 km de Doab, 450 m Termeh et al. 33756 E (IRAN). **-Guilan:** Baresar to Leushan, 16 km after Baresar, 1720 m, Zarre & Moazen 33897 (TUH).

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