

## NOTES ON THE GENUS *PEDICULARIS* (*SCROPHULARIACEAE*) IN IRAN

**SH. Saeidi-Mehrvarz**

Saeidi-Mehrvarz, SH. 2006 01 01: Notes on the genus *Pedicularis* (*Scrophulariaceae*) in Iran. -*Iran. Journ. Botany* 11 (2): 241-245. Tehran.

Taxonomic characters and chorology of rare species of the genus *Pedicularis* distributed in Iran are given. Another locality for *P. strausii* is recorded, which is the second documented location of this species in Iran. A diagnostic key to all species of *Pedicularis* distributed in Iran is provided.

*Shahryar Saeidi-Mehrvarz, Department of Biology, Faculty of Science, University of Guilan, Rasht, Iran. E-mail: saeidimz@guilan.ac.ir.*

*Key words.* *Pedicularis*, Phytogeography, distribution, Iran.

یادداشت‌هایی بر جنس *Pedicularis* در ایران

شهریار سعیدی مهرورز

ویژگی‌های تاکسونومیکی و نقشه پراکنش گونه‌های نادر جنس *Pedicularis* در ایران ارائه می‌شود. رویشگاه دیگری از *P. strausii* گزارش می‌شود که به عنوان دومین رویشگاه این گونه در ایران ثبت می‌گردد. کلید شناسایی برای گونه‌های *Pedicularis* موجود در ایران ارائه می‌گردد.

## INTRODUCTION

*Pedicularis* is considered to be the largest genus of the family *Scrophulariaceae*, and one of the largest angiosperm genera, with at least 600-800 species primarily occurring in the northern hemisphere (Li 1948, Macior 1990, Mill 2001). Within the *Scrophulariaceae*, *Pedicularis*, along with other hemiparasitic genera, are classified within subfamily *Rhinanthoideae*. Recently, the hemiparasitic Rhinanthoids have been suggested to be transferred into *Orobanchaceae* on the basis of molecular data (Olmstead & Reeves 1995, Olmstead et al. 2001). In Iran, 9 species of *Pedicularis* are distributed. Among them *P. cabulica* is endemic to Flora Iranica area and *P. rechingeri* and *P. strausii* to Iran. Most of these species prefer humid soils, with grassy vegetation, rocky slopes, alpine and subalpine areas.

In the framework of taxonomic study of the subfamily *Rhinanthoideae* for the Farsi version of Flora of Iran (Assadi 1988), the genus *Pedicularis* has been prepared by the present author. Based on a detailed morphological descriptions for each species, a diagnostic key to the species of *Pedicularis* in Iran is presented.

## MATERIALS AND METHODS

Materials used for this study are based on herbarium specimens and author's own collection from wild populations. Voucher specimens are deposited in IRAN, TARI, TUH and GUH (Herbarium of Guilan University). Characters were selected from stem, leaves, calyx, corolla, inflorescence, bracts and capsule. Moreover, the chorology of the species has been studied using the terminology suggested in the classical work of Zohary (1973).

## RESULTS AND DISCUSSION

### Phytogeographical distribution

Table 1 shows that all *Pedicularis* species distributed in Iran belong to the Irano-Turanian

Euro-Siberian phytochoria. Following species are biregional elements of Irano-Turanian/Euro-Siberian phytochoria: *P. caucasica*, *P. condensata*, *P. pycnantha*, *P. rhinanthoides* and *P. sibthorpii*. *Pedicularis cabulica*, *P. rechingeri*, *P. strausii* and *P. wilhelmsiana* are monoregional elements.

Most species are found in North and northwestern of Iran. However, northeastern and northwestern of Iran are also rich in species of *Pedicularis*. Some species of *Pedicularis*, e.g. *P. pycnantha* and *P. sibthorpii* are widely distributed in Iran, while others such as *P. cabulica* and *P. strausii* have limited distribution. *Pedicularis sibthorpii* is a widespread species in Iran and occurs also in Caucasus, Europe, Middle Asia and Turkey.

*Life form and ecology.* All *Pedicularis* species in Iran are perennial and hemicryptophyte. The species of this genus show a variable ecology and can be found in pastures (*P. condensata* and *P. sibthorpii*), beside rocks (*P. pycnantha*), damp cliffs (*P. caucasica*) and below beech trees (*P. wilhelmsiana*) in the forests of NW Iran.

*Endemism.* The most important speciation center of *Pedicularis* is in China (Yang & al. 1998). *Pedicularis cabulica*, *P. caucasica*, *P. condensata*, *P. pycnantha*, *P. rhinanthoides* and *P. wilhelmsiana* are known only from Iran and adjacent areas (Fischer 1978). *Pedicularis rechingeri* and *P. strausii* are endemics known from NE (Kopet Dagh mountain range) and Centre of Iran, respectively.

*Altitudinal distribution.* Most species of *Pedicularis* grow at an altitude of 1300-4000 m, *P. pycnantha* and *P. caucasica* occur in alpine regions of NW and N Iran at an altitudes higher than 2700 m.

*Rare species.* Based on studied specimens in TARI, *P. cabulica* Benth. and *P. strausii* Hausskn. ex Bornm. are distinguished as rare species. A collection of *P. cabulica* from Kerman (Laleh-zar mountain, 3000 m, Foroughi & Assadi (16331) is present in TARI.

The type specimen of *P. strausii* is Rasvand mountain, near Arak. Wendelbo (1977) reported *P. strausii* from central Zagros; near Arak and Khomein. Again, no more collection of this plant has been recorded for this species. I found another locality of this species in Prov. Isfahan, near Khansar, Bala-Mohamad tower, Golastan mountain, 2480-2850 m, Saeidi & Sobhani 2264, 9 July 2004 (Guilan University Herbarium). Flowering time for this species is June-July.

*Pedicularis strausii* resembles *P. rechingeri* in its verticillate inflorescence and the color of corolla. It differs from *P. rechingeri* mainly by its short calyx (to 13 mm against more than 13 mm in *P. rechingeri*) and the length of galea beak (to 1 mm against more than 1 mm in *P. rechingeri*).

#### Taxonomic characters

*Stem.* Seven *Pedicularis* species in Iran have erect or more often ascending stems branched to simple. The stems of *P. cabulica* and *P. condensata* are erect, more or less recurved and erect or slightly flexuous, respectively.

*Indumentum.* The type and abundance of indumentum on stems, leaves and bracts is another important taxonomic character in the genus. Most *Pedicularis* species have various kinds of hairs, such as crispate-pilose, eglandular-pubescent and villous on stems of the studied species. In *P. cabulica*, *P. rhinanthoides* and *P. strausii* stems are glabrous or covered by sparse hairs. In some species, there are also long crispate-pilose or villous indumentum on the axis and lower surface of leaves, mainly along the veins, e.g. *P. caucasica*, *P. condensata*, *P. wilhelmsiana*, *P. rechingeri* and *P. sibthorpii*.

*Leaves.* The shape and size of leaves have no use in specific distinction among the studied taxa, because of low variability. The leaves are

mostly 1-2 pinnatisect and pinnatiparite, with deep-pinnatilobed to incised-toothed segments, e.g. *P. caucasica* and *P. pycnantha*, respectively.

*Inflorescence.* The flowers are arranged in lateral cymes which themselves form capitulum-raceme or they are elongated and spiciform in most of *Pedicularis* species. *Pedicularis rechingeri* and *P. strausii* have verticillate inflorescence.

*Flower.* Calyx is tubular to campanulate, often  $\pm$  bilabiate, usually deeply cleft anteriorly and (2-)5-lobed. Corolla in Iranian species of *Pedicularis* is purple, yellow, creamy, white or pink in color, strongly bilabiate; upper lip or galea is hooded, enclosing anthers, laterally compressed, rounded or truncate at the apex, or ending into teeth or in a beak; lower lip 3-lobed, usually spreading, external to upper lip in bud. Stamens 4, didynamous; filaments glabrous or pubescent; anthers mucronate or not. Stigma capitate.

*Fruit.* Capsule is oblong or  $\pm$ ovate, moderately compressed or not, loculicidal. Seeds numerous, reticulate or costate among studied taxa.

#### A key to *Pedicularis* species distributed in Iran

1. Synflorescence verticillate 2
- Synflorescence racemose, spicate to capitate 3
2. Indumentum composed of sparse hairs; calyx to 13 mm long in flowering time; beak of galea to 1 mm long *P. strausii*
- Indumentum composed of long crispate hairs; calyx more than 13 mm long in flowering time; beak of galea more than 1 mm long *P. rechingeri*
3. Stem leaves opposite or whorled 4
- Stem leaves alternate 5

Table 1. List of *Pedicularis* species distributed in Iran. En=Endemic, H=Hemicryptophyte, IT= Irano-Turanian, IT/ES= Irano-Turanian / Euro-Siberian. Specimens deposited in TARI are not designated by the name of herbarium.

Taxon	Locality	Chorotype	En	Life form	Distribution				
					NW	N	NE	W	C
<i>Pedicularis cabulica</i> Benth.	<b>Kerman:</b> Laleh-zar mountain, 3000 m, Foroughi & Assadi 16331.	IT	+	H					+
<i>P. caucasica</i> M. B.	<b>Mazandran:</b> 30 km south of Ramsar, Sefid-Kuh, 3100-3400m, Assadi & Massoumi 51305; Ramsar, 60 km southwestern of Javaher-Deh, 2500-2700 m, Saeidi 2261 (GUH). <b>Azərbayjan:</b> Shahbil, Sabalan-Kuh, 3850 m, Foroughi & Assadi 13918.	IT/ES		H	+	+			
<i>P. condensata</i> M. B.	<b>Mazandran:</b> 13 km from Kandavan road to Haraz, 2400 m, Assadi & Mozaffarian 25295; <b>Azərbayjan:</b> 3 km southwestern Kaleybar, 1800-2600 m, Terme 14212-E (IRAN).	IT/ES		H	+	+			
<i>P. pycnantha</i> Boiss.	<b>Mazandran:</b> about 40 km south of Ramsar, Southern slope of Khash-chal kuh, 2900-3600 m, Assadi & Massoumi 56156; Firouz- Kuh, 50 km of Najaf-Dareh, Mamouteh- Kuh, 2150-2750 m, Terme & Zarkani (without no) (IRAN). <b>Khorassan:</b> between Ghouchan and Dar-Gaz, National park of Tandoureh, 2300 m, Assadi & Massoumi 50992; Shirvan, Namanlou, Golol-Sarani, 2200-2500 m, Terme E- 39097 (IRAN). <b>Tehran:</b> North of Darband-Sar, 2700- 3500 m, Mozaffarian & Mohamadi 49140; Tuchal plateau, 3700-3800 m, Ghahreman 17063 (TUH); Touchal, 3600-3900 m, Terme 39076 -E (IRAN).	IT/ES		H	+	+	+		
<i>P. rechingeri</i> Wendelbo	<b>Khorassan:</b> 60 km to Torbat-Heihydariéh, Robat-Sefid, 1750- 1900m, Assadi & Mozaffarian 35845.	IT	+	H			+		
<i>P. rhinanthoides</i> subsp. <i>rotundalata</i> Vved.	<b>Semnan:</b> 30 km of southeastern Shahroud, Tash, Shahvar mountains, 3000 m, Assadi & Massoumi 21091. <b>Tehran:</b> Karadj, Dizin, 3200 m, Wendelbo & Cobham 14019.	IT/ES		H		+			
<i>P. sibtorpii</i> Boiss.	<b>Mazandran:</b> 50 km southwestern of Chalus, above Dalir village, 2800 m, Assadi & Massoumi 51626. <b>Guilan:</b> Damash, East of Roudbar, 1900 m, Wendelbo 18228. <b>Azərbayjan:</b> 20 km to Ahar, Tabriz road, 1700-1800 m, Wendelbo & Assadi 27247; 22 km to Marand, 1700 m, Iranshahr 14189-E (IRAN)., Ardebil, 4 km west of Neour, Lisar, 2400 m, Saeidi & Asaadi 2257 (GUH). <b>Tehran:</b> 5 Km from Tafresh to Dastjerd, Saveh, 2100 m, Mozaffarian & Massoumi 48181; Theran Dizin, Attar & Mehdigholi 25561 (TUH). <b>Kurdistan:</b> Divandareh, Saral, 1800-2100 m, Iranshahr & Dezfoulian 14142-E. <b>Semnan:</b> 30 km southwestern of Shahroud , between Tash & Chaharbagh, 2300 m, Assadi & Massoumi 21150.	IT/ES		H	+	+		+	
<i>P. strausii</i> Hausskn. ex Bornm.	<b>Isfahan:</b> near Khasar Bala-Mohamad tower, Golestan mountain, 2480-2850 m, Saeidi & Sobhani 2264 (GUH).	IT	+	H					+
<i>P. wilhelmsiana</i> Fisch. ex M. B.	<b>Azərbayjan:</b> Kaleybar, east of Vaighan Mountain, 1700-2000m, Assadi & Massoumi 2027; Osko, Sahand, Soltan Kuh, 2600-3130 m, Terme & Mousavi (without number) (IRAN).	IT		H	+				

4. Corolla tube falciform-curved, galea straight; calyx to 7 mm long in flowering time

*P. caucasica*

- Corolla tube more or less falciform-curved, galea spreading backward, slightly curved; calyx more than 7 mm long in flowering time

*P. pycnantha*

5. Corolla purple

*P. cabulica*

- Corolla yellow, creamy, white or pink 6

6. Galea of corolla extended in long snout-shaped, slender and curved beak

*P. rhinanthoides*

- Galea without beak or with a short straight beak only 7

7. Bracts much longer than flowers, deflexed or spreading; style to 13 mm long

*P. wilhelmsiana*

- Bracts not as above; style more than 13 mm long 8

8. Corolla tube falcate-curved; galea of corolla without beak; capsule subovate

*P. condensata*

- Corolla tube erect; galea of corolla with a short beak; capsule oblong *P. sibthorpii*

#### ACKNOWLEDGEMENTS

I am grateful to the Mr. Dr. Shahin Zarre (Tehran University) for his helpful comments on the manuscript. I am also appreciate to Dr. M. Assadi for allowing me to use facilities at Research institute of Forests and Rangelands.

#### REFERENCES

Assadi, M., 1988: Plan of the flora of Iran. - Research Insitute of Forests and Rangelands, Tehran.

Fischer, M. A., 1978: *Pedicularis*. In: Davis P. H.(ed.): Flora of Turkey and the East

Aegean Islands 6. 685. 689-753. - Edinburgh: Univ. Press.

- , 1981: *Pedicularis*. In: Rechinger K.H.,(ed.): Flora Iranica 147: 25 -165. -Akad. Druck. U.- Verlagsanstalt, Graz.

Li, H-L., 1948: A revision of the genus *Pedicularis* in China. Part II. -Proc. Acad. Nat. Sci. Philadelphia 101: 1-214.

Macior, L. W., 1990: Pollination ecology of *Pedicularis punctata* Decne. (Scrophulariaceae) in the Himachal Himalaya. -Plant Species Biol. 5: 215-223.

Mill, R. R., 2001: Notes relating to the Flora of Bhutan: XLII. Scrophulariaceae (*Pedicularis*). Edinburgh. J. Bot. 58: 57-98.

Olmstead, R. G. & Reeves P. A., 1995: Evidence for the polyphyly of the Scrophulariaceae based on chloroplast *rbcL* and *ndhF* sequences. -Ann. Missouri. Bot. Gard. 82: 176-193.

Olmstead, R. G., de Pamphilis, C. W., Wolfe, A. D., Young, N. D., Elisons, W. J. & Reeves, P. A., 2001: Disintegration of the Scrophulariaceae. -Amer. J. Bot. 88: 348-361.

Wendelbo, P., 1977: *Pedicularis rechingeri* (Scrophulariaceae) A new species from NE. Iran. -Iran. J. Bot. 1 (2): 113-115.

Yang, H. B., Holmgren, N. H. & Mill, R. R., 1998: *Pedicularis*. In: Wu Z-Y, Raven P. H. (eds.) Flora of China. Beijing: Science Press and St Louis: Missouri botanical Garden Press, vol. 18, pp.97-209.

Zohary, M. 1986: Geobotanical Foundation of the Middle East. 2 Vols.- Gustav Fischer Verlag.