A NEW SPECIES OF ONOBRYCHIS SECT. AFGHANICAE (FABACEAE) FROM IRAN

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Onobrychis iranensis is described and illustrated as a new species from central and eastern Iran. The new species is related to *O. tavernieraefolia* with that it is compared here. Also the pollen morphology of these tow taxa were studied using scanning electron microscopy. The pollen grains are tri-colpate with reticulate ornamentation. Differences are observed in the size of pollen grains and the type of their aperture shape.

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Key words. *Hedysareae*, new species, *Onobrychis iranensis*, Pollen morphology, *Papilionaceae*, Iran.

گونه جديدي از جنس Onobrychis بخش Afghanicae از ايران

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گونه *Onobrychis iranensis* از نواحی شرقی و مرکزی ایران به عنوان گونه جدیدی به همراه تصویری شرح داده می شود. این گونه با گونه خویشاوند خود *O. tavernieraefolia* مقایسه می گردد. مطالعه دانه گرده این دو گونه نیز موید این موضوع است که گرده دو گونه از نوع ۳ شیاری و اگزین دارای تزیینات مشبک است, ولی تفاوتهایی در اندازه و نوع دریچه آنها مشاهده شد.

Introduction

During taxonomical studies on the species of *Onobrychis* Mill. (tribe *Hedysareae*) in order to prepare the Persian Flora of Iran (Assadi 1989), a new species of section *Afghanicae* from Khorassan and Semnan provinces was identified. This study is mainly based on the herbarium specimens of the Research Institute of Forest and Rangelands (TARI) and Research Center of Agricultural and Natural Resources of Mashhad (MRCH) as well as living materials. Flora Iranica (Rechinger 1984), Flora of W. Pakistan (Ali 1977), Flora Orientalis (Boissier 1872) and also Sirjaev (1926) were used as the main literatures for the determination of specimens.

Section *Afghanicae* was treated by Rechinger (1984) in the Flora Iranica where it includes three species: *O. nummularia* Stocks in Hook., *O. tavernieraefolia* Stocks ex Boiss. and *O. rechingerorum* Wendelbo. The main distinguishing characters of the section are leaves with 1-2 pairs of leaflets, 2-seeded bilocular legumes and legume disks with distinct pits.

The Pollen morphology of *Onobrychis* is still poorly investigated, although there are several general surveys of the family *Fabaceae* (Erdtman 1966, Melhem 1971, Ohashi 1971, Pire 1974, Pavlova & Manova 2000, Ghanavati et al. 2007). Pollen grains of *Onobrychis* have been ascribed to an unique ? type (the *Onobrychis* type) by Faegri (1956), Faegri and Iversen (1989), as well as Moore et al. (1991) characterized by 3 apertures and the suprareticulate ornamentation of the exine.

Materials and methods

The pollen samples were obtained from the herbarium specimen (Table 1). For light microscopy (LM), fifty measurements of each character were made at a

Table 1. *Onobrychis* species, their localities and voucher specimens in pollen studies.

species	localities
Onobrychis iranensis	Prov.Khorassan: Khaf, 16 km from Qaen road, after Nashtifan, 900 m, on sandy soils, Assadi & Amirabadizadeh (MRCH 9316); Taybad, at the beginning of Khaf road, 1770 m, Assadi & Amirabadizadeh (MRCH 9309); Sabzevar, 25 km from SE Sabzevar to Eshghabad of Tabas, 1197 m., Amirabadizadeh, Mousavi & Paryab (MRCH 9546); Torbat-haydarieh, Shadmehr cross to Kashmar, 1 km. after Baharieh 1200 m., Paryab (MRCH 7422); Gonabad, Beimorgh village, 900 m., Mousavi & Paryab (MRCH 1614); Birjand, Bagheran mountain, Band-darreh, 1700 m., Assadi & Amirabadizadeh (MRCH 9391).
O. tavernieraefolia	Prov. Sistan and Baluchistan: 25 Km from Zahedan to Khash, 1680 m Amirabadizadeh, Saghafi & Sandoghdaran (MRCH 7435); 115 km from Zahedan to Khash, 1700 m, Sandoghdaran & Pirizadeh (Zahedan H. 284); 35 km from Zahedan to Khash, 1600 m, Assadi (TARI 22700); Khash, 11 km from Khash to Iranshahr, 1400 m, Mozaffarian (TARI 42756).

magnification of X 1000. Five characters were measured: P (polar diameter), E (equatorial diameter), L (colpus length), S (colpus width), and the P/E ratio. The microphotographs were obtained with a Leo-1455 vp scanning electron microscope. Ten measurements of each character were made at a magnification of 4000X. The exine sculpturing was studied at a magnification of 15000X. The pollen terminology in general follows Faegri and Iverson (1989) and Punt et al. (1994). Scanning electron microscopy (SEM) pollen grains were coated with gold using a Polaron-SC7620 sputter coater.

Results

Onobrychis iranensis Amirabadizadeh & Ghanavati**, sp. nov. –** (fig.1).

Typus: Iran, Prov. Khorassan, 63 km. from Qaen to Birjand, near Sedeh village, 1760 m., 19.5.2003, Assadi & Amirabadizadeh 9331 (holotypus MRCH; isotypus TARI).

Differt ab *Onobrychis tavernieraefolia* Stocks ex Boiss. dentibus calycis tubo aequilongis vel sublongioribus (nec subduplo longioribus), alis apice acutiusculis (nec obtusissimis), ovario uniloculari et uniovulati (nec biloculari et biovulati), legumine 10-12.5 mm longo, unispermis, (nec. bispermis), disco foveolato subinconspicuo (nec conspicuo), margine setoso setis in dimidio inferiore connatis (nec libris).

Herb, annual, stemless, 4-14 cm. long, prostrate, appressed tomentose throughout. Stipules free, laminate, subulate, tomentose, 2-4 mm. long. Leaves reduced to a single terminal leaflet or with 1(-2) pair of leaflets; petiole 8-35 mm. long; leaflets variously orbicular, obovate, broadly ovate, cordate or rarely elliptic, at the apex rounded, retuse or ± truncate, mucronate, pilose on both surfaces but denser on the lower surface; terminal leaflet (13-) 17-26 (-30) × 15-34 mm; lateral leaflets much smaller than the terminal one. Peduncle equal to or somewhat shorter than the leaves, 3.5-14 cm long; inflorescence racemose with 3-11 flowers. Pedicel 0.6-1.5 mm long, hairy, ± curved. Bracts 1-2.6 mm long, lanceolate, pilose. Calyx 3.8-5 mm long, hirsute-tomentose; teeth subulate, unequal, somewhat longer or equaling the tube. Corolla pinkish, veined; veins liver-purple. Standard oblong or ± orbicular-elliptic, emarginate, pubescent, 6.5-8.5 mm long. Wings glabrous, oblong, auriculate, (2.3-) 3-3.3 mm long. Keel smaller than the standard, glabrous, oblique; claw 2-3 mm long. Ovary ± orbicular, 1-1.6×1.2-1.8 mm, hirsute on the margins, unilocular, uniovulate; stalk short, up to 1.5 mm long; ovule 0.5-0.7×0.7-1.4 mm, smooth, reniform. Pod ± orbicular, unilocular (without any suture), 1-seeded, 10-12.5 mm in diam.; disk outstanding, ± orbicular, 6×8 mm, on upper face with very short spines; foveoles 2-5, ± indistinct; marginal spines thin, cartilaginous, pink-purple or yellowish green to pink, 2.1-2.7(-3) mm long, fused from base to ±1/3 or rarely up to half, covered with arachnoid white hairs; seed one, 1.9-3.4 × 2.2-4.5 mm, smooth, dark brown.

Flowering period. April to May. Fruiting period. May to June.

Habitat. It grows on plains and hills including dry gravelly and sandy places in the East of Iran (map 1).

Further materials examined. – IRAN: Prov.Khorassan: Taybad, at the beginning of Khaf road, 1770 m, Assadi & Amirabadizadeh (MRCH 9309); about 20 km from Taybad to Khaf, 1000 m, Assadi & Amirabadizadeh (MRCH 9313); Khaf, 16 km from Qaen road, after Nashtifan, 900 m, on sandy soils, Assadi & Amirabadizadeh (MRCH 9316); Sabzevar, 25 km from

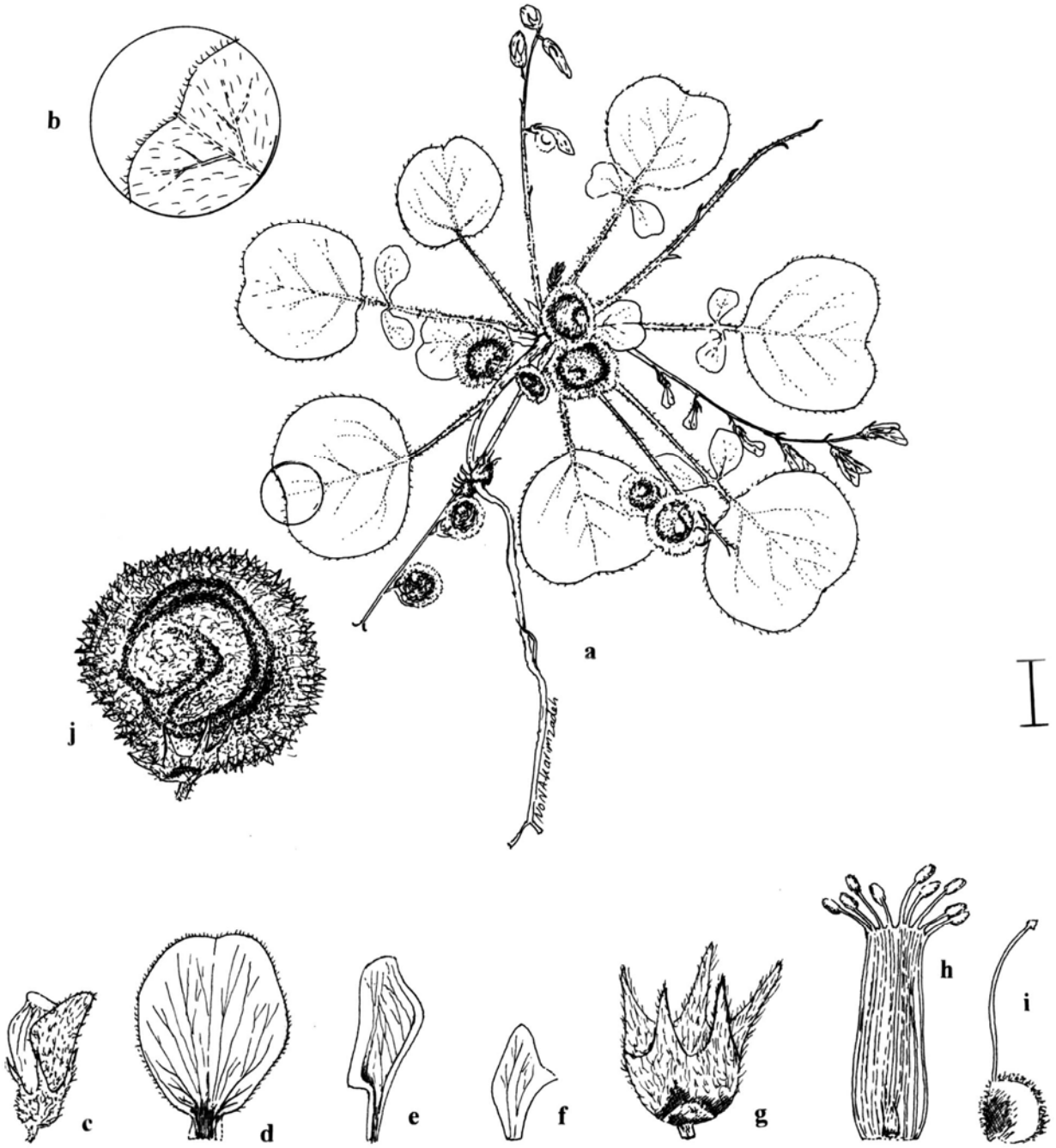


Fig. 1. *Onobrychis iranensis* – a: habit; b: leaf; c: flower; d: standard; e: keel; f: wing; g: calyx; h: androecium; i: pistil; j: fruit. – Scale bar for a = 1 cm, b =0.33 cm, c = 0.5 cm, d – f = 0.25 cm, g = 0.2 cm, h – i = 0.17 cm, j = 0.29 cm.

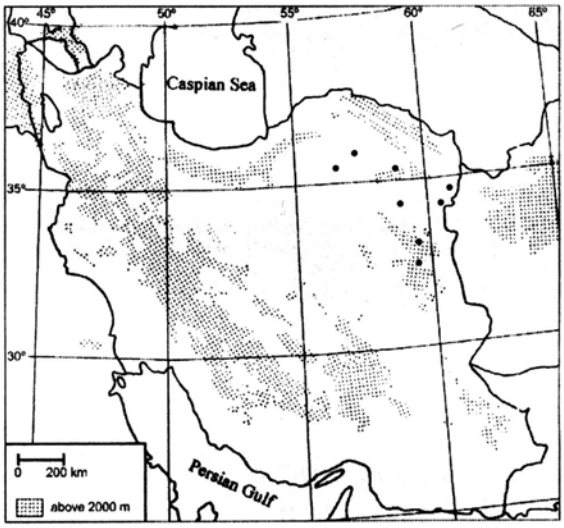
SE Sabzevar to Eshghabad of Tabas, 1197 m, Amirabadizadeh, Mousavi & Paryab (MRCH 9546); Torbat-haydarieh, Shadmehr cross to Kashmar, 1 km after Baharieh 1200 m, Paryab (MRCH 7422); Gonabad, Beimorgh village, 900 m, Mousavi & Paryab (MRCH 1614); Birjand, Bagheran mountain, Band-darreh, 1700 m, Assadi & Amirabadizadeh (MRCH 9391); Prov. Semnan: protected region of Turan, foot of Payghambar mountain, Freitag & Jadidi (TARI 29038).

Table 2. Morphological comparison between *Onobrychis iranensis* and *O. tavernieraefolia.*

Taxa	*O. iranensis*	*O. tavernieraefolia*
Calyx teeth	equal to somewhat longer than the tube	± twice longer than the tube
Wing	± acute at the tip with distinct and slender auricle	obtuse at the tip
Ovary	unilocular	bilocular
Pod	1- seeded; with few and ± indistinct disk pits without any suture	2-seeded; with distinct pits and distinct suture
Marginal spines of disk	fused for one third to half of their length	free

Table 3. Some examined features of pollen grains in *Onobrychis iranensis* and *O. tavernieraefolia*. -Abbreviations: (P) polar axis, (E) equatorial axis, (L) length of the colpus, (S) width of the colpus, (P/E) the shape index.

Taxa/Characters	*P (µm)*	*E (µm)*	*L (µm)*	*S (µm)*	*P:E*
O. iranensis	33.7(34.7)35.7	15.4(15.7)16	32.0(33.1)34.2	0.85(0.97)1.1	2.2
O. tavernieraefolia	34.5(35.7)37.1	16.2(17.3)18.2	21.7(22.3)23.0	0.75(0.82)0.84	2.05



Map 1. Distribution of *Onobrychis iranensis* (●) in Iran.

Affinities. The new species is closely related to *Onobrychis tavernieraefolia* but differs from it in length of calyx teeth, number of seeds and ovules of pods and so on (Table 2). All specimens studied shows unilocular and 1-seeded pods, which have not been reported for sect. *Afghanicae* yet.

Pollen morphology

The measurements of five characters of the studied taxa are shown in table 3. Pollen grains of *Onobrychis iranensis* and *O. tavernieraefolia* are 3-colpate.

Onobrychis iranensis (fig.2A-D).

Pollen description. Pollen grains perprolate, P/E= 2.1-2.23, dimensions P×E= 33.7-35.7×15.4-16 µm., elliptic, elongated in equatorial view and circular in polar view. Colpi long, shallow, the membrane covered by large and small sculptural elements, L×S=32.0-34.2×0.85-1.1 µm. Exine reticulate; lumina unequal in size and shape in the intercolpium 0.53-1µm in diam., sharply decreasing in size at the margin of the colpi. Apocolpium bireticulate.

Onobrychis tavernieraefolia Stocks ex Boiss. (fig. 2 E-H).

Pollen description. Pollen grains prolate to perprolate, P/E= 1.95-2.12, dimensions P×E= 34.5-37.1×16.25-18.2 µm., triangular-obtuse in polar view and elliptical elongated with concave mesocolpium in equatorial view. Colpi long, deep, slit-like, L×S=21.75-23.0× 0.75-0.84 µm., ornamentation reticulate. Lumina almost equal in size and shape in the intercolpium and at the extreme margin of the colpi, diameter of the largest lumina about 1.7-2.3 µm. Apocolpium bireticulate.

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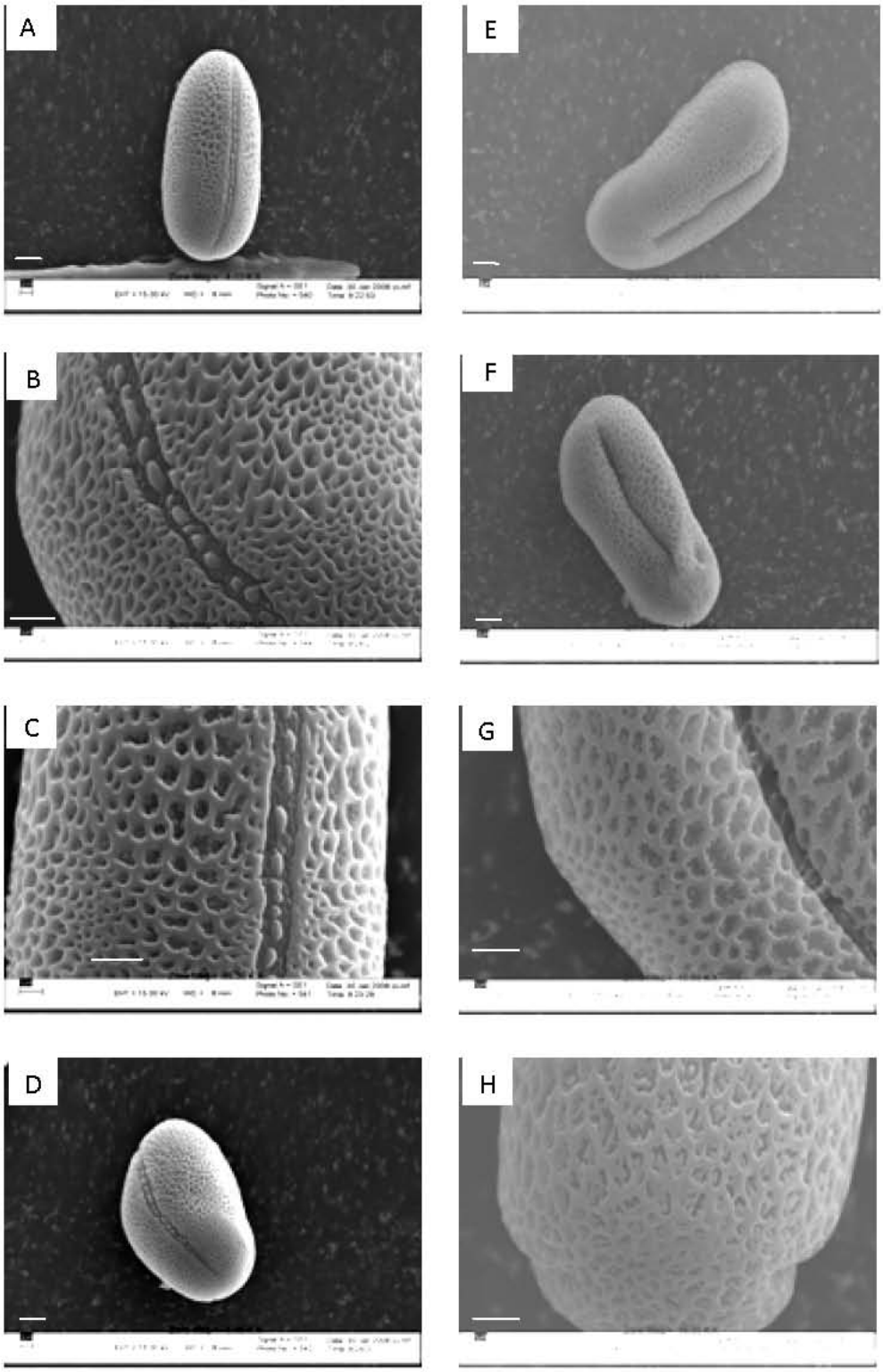

Fig. 2. A-D: Pollen grains of *Onobrychis iranensis*. A: equatorial view, B and C: colpus and ornamentation, D: polar view. -E-H: Pollen grains of *O. tavernieraefolia*. E and F equatorial view and the colpus, G: ornamentation, H: polar view. Scale bar = 4μm.

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