

## Three new species of *Erysimum* L. (Brassicaceae) from Bulgarian flora

M. Ančev\* & A. Polatschek\*\*

### Abstract

Three new species of *Erysimum* L. (Brassicaceae) are described and illustrated. *E. pseudoatticum* ANČEV & POLATSCHKEK,  $2n = 42$ , and *E. slavjankae* ANČEV & POLATSCHKEK,  $2n = 84 + 0-2 B$ , are perennial, caespitose plants, endemic to Bulgaria. They are related to the species group of *E. sylvestre* (CRANTZ) SCOP. *E. pirinicum* ANČEV & POLATSCHKEK, a tetraploid taxon with  $2n = 28$ , is a biennial species of restricted distribution in SW Bulgaria and NE Greece. It affiliates with *E. comatum* PANČIČ. Reviews of the history of taxonomic treatment of *E. pseudoatticum* and *E. slavjankae* are presented.

**Key words:** Brassicaceae, *Erysimum*, new species; Bulgaria, Greece; chromosome numbers; dotmap, plant drawings.

### Introduction

Twelve species of *Erysimum* L. are now known in the Bulgarian flora. Three of them are perennial, caespitose plants being members of a polyploid complex of which until recently only *E. drenowskii* DEGEN was known in the European taxonomic literature (GREUTER & al. (eds.) 1986: 110; BALL 1993: 331; JALAS & SUOMINEN 1994: 62). The remaining nine species are biennial, short-lived perennial or annual plants.

The cytotaxonomic studies of the genus *Erysimum* in Bulgaria (ANČEV 1978, 1981; ANČEV & al. 1987; ANČEV 1995), as well as our investigations during the last several years have revealed two new perennial species in the mountains of SW Bulgaria. *E. pseudoatticum* ANČEV & POLATSCHKEK and *E. slavjankae* ANČEV & POLATSCHKEK are perennial plants of restricted local distribution formerly treated as *E. atticum* BOISS., *E. pusillum* BORY & CHAUB. or *E. helveticum* auct. (cf. VELENOVSKY 1898; STOJANOV & STEFANOV 1924, 1933, 1948; HAYEK 1925; ASSENOV 1970).

*E. pirinicum* ANČEV & POLATSCHKEK, a new biennial species related to *E. comatum* PANČIČ, is also described.

### Material & Methods

This study is based on herbarium material deposited in B, BP, C, M, PR, PRC, SO, SOA, SOM, W and WU, as well as on field studies and plants collected in the mountains of

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Central and SW Bulgaria in the years 1990-1997 and cultivated in Sofia and Wien, Alpengarten Belvedere. The chromosome numbers counted by both authors and karyotypes were studied on mitotic metaphase plates obtained from seedling root-tips and flower buds, the latter collected in the field and fixed in ethanol : acetic acid (3 : 1), stained immediately before squashing with acetocarmine. The root-tips were fixed in ethanol : acetic acid (3 : 1), hydrolysed in 1N HCl at 60° for 10 min. and stained with haematoxylin after Gomori (SHARMA & SHARMA 1965). The karyologically studied populations are marked by an asterisk (\*) in the list of examined specimens (paratypes). Voucher specimens are deposited in SOM and W.

The hair types and their relative abundance are indicated in the descriptions in the following way: HT $\underline{2}$ : 2-fid hairs predominant (more than 50%); HT2: 2-fid hairs common (10 to 50%); HT(2): 2-fid hairs uncommon (up to 10%); HT((2)): 2-fid hairs rare, scattered on the apex and lower surface of the leaves, or completely absent; HT $\underline{3}$ : 3-fid hairs predominant (more than 50%), etc.

## Results and Discussion

### *Erysimum pseudoatticum* ANČEV & POLATSCHKEK, sp.n.

= ANČEV, Giorn. Bot. Ital. 129 (1): 95 (1995), sub nomen provisorium.

Holotype: Bulgaria, Rila Mt., Levi Iskār River valley, 1200 m a.s.l., 28 May 1994, M. Ančev A 9426, [SOM 3294, isotypes SOM, W]; (Fig. 1).

= *E. boryanum* var. *atticum* auct. non HELDR. & SART. ex BOISS.: VELEN., Fl. Bulg. Supplementum I: 21 (1898)

= *E. pusillum* subsp. *parnassi* var. *atticum* p.p., auct. non HELDR. & SART. ex BOISS.: HAYEK, Prodr. Fl. Penins. Balc. I: 380 (1925)

= *E. parnassi* var. *atticum* auct. non HELDR. & SART. ex BOISS.: STOJ. & STEF., Fl. Bulg. ed. 2: 476 (1933)

= *E. pusillum* subsp. *parnassi* p.p, auct. non (BOISS. & HELDR.) HAYEK: ASSENOV, Fl. R. P. Bulg. IV: 357 (1970)

= *E. helveticum* p.p., auct. bulg., non (JACQ.) DC.

**Diagnosis:** Planta perennis, laxe caespitosa. Stirpes paucae, in statu florendi (60 -) 100 - 200 (- 250) mm longae, simplices. Folia caulina pubescentia, sine stirpibus axillaribus, sterilibus parvifoliis. Pili plerumque fere omnes bifidi, singuli trifidi autem in apice ut foliorum ut sepalorum. Synflorescentia brevis, simplex vel 1 (- 2) ramis brevibus ramosa, racemosa, floribus usque 15 (- 16) in axi terminali. Sepala (7 -) 9 - 10.5 mm longa, 1 - 1.7 mm lata, lateralia saccata. Petala citrino-flava (14 -) 17 - 22 mm longa, eorum lamina 3.5 - 5 (- 5.5) mm lata et sexuplo ad octuplo longiora. Siliquae 60 - 90 mm longae, tetragonae, pilis bifidis dense vestitae sed in angulis glabrescentes. Pedicelli sub angulo 50 - 60° amplo ab axi racemi divaricati. Semina 1.3 - 1.7 (- 1.8) x 0.6 - 0.7 mm. Chromosomatum numerus  $2n = 6x = 42$ ;  $x = 7$ .

**Description:** Loosely caespitose perennial, green to dark green, with few flowering shoots. Root long, with well developed secondary roots, without runners, 70 - 120 mm long. Stems 1 - 5, ascending to erect, (60 -) 100 - 200 (- 250) mm in flowering, up to

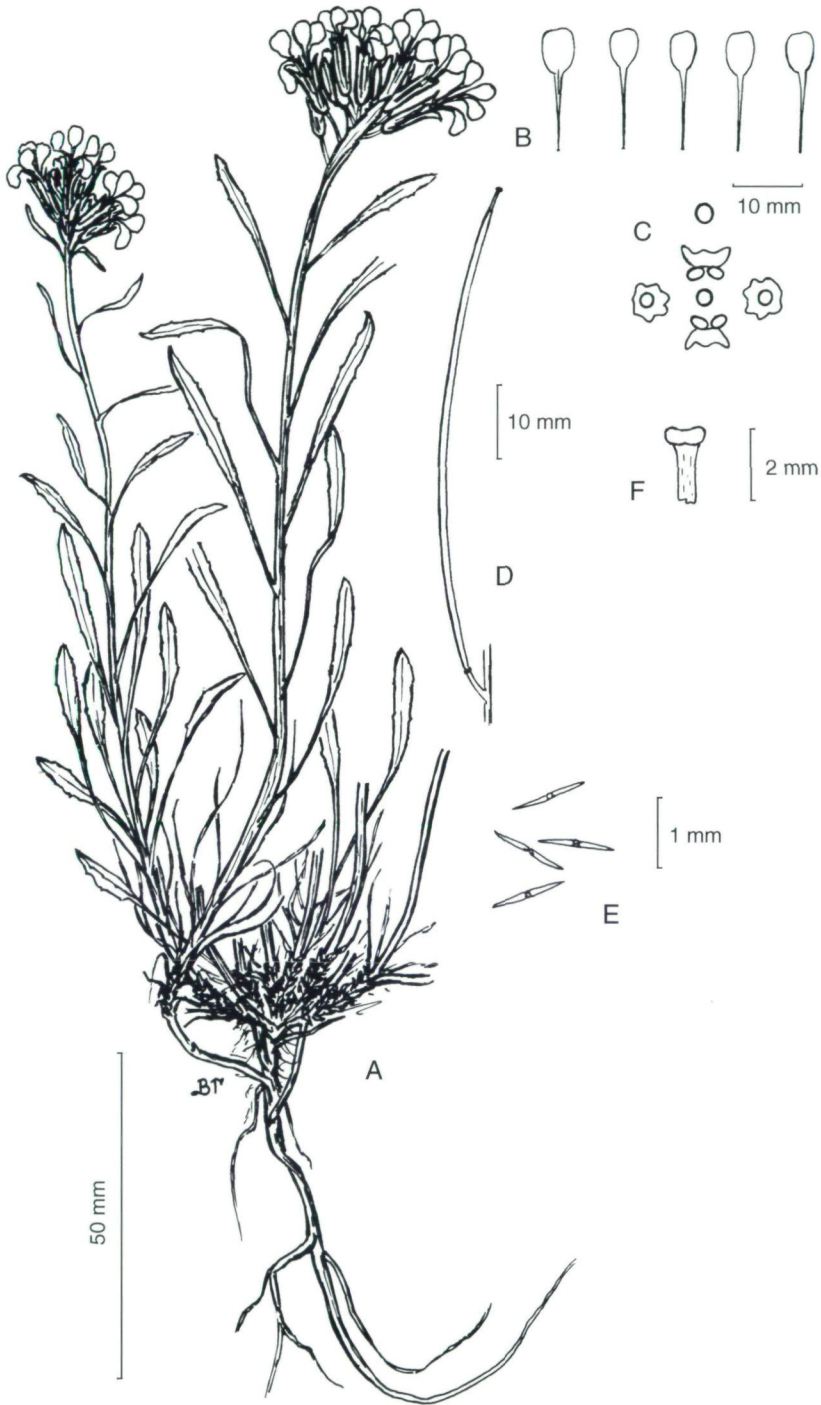


Fig. 1: *Erysimum pseudoatticum* ANČEV & POLATSCHKEK, sp.n.: A) habit, B) petals, C) nectaries, D) siliqua, E) hairs, F) stigma.

350 mm in fruiting, rounded angular, 1 - 3 mm thick, simple; withered past-year stems sometime present at anthesis, mostly without sterile rosettes; the tunic absent or with few remnants of leaves. Basal leaves narrowly spatulate, 35 - 70 x 2 - 4 mm, pubescent, apiculate, distinctly petiolate, gradually narrowed into a long petiole; margins with 1 - 3 pairs of minute teeth. Cauline leaves narrowly oblanceolate, pubescent, 20 - 35 (- 45) x 1 - 3.5 mm, apiculate or acute, with 1 - 3 pairs of minute teeth, shortly petiolate to almost sessile, without fascicles of small leaves in the axils; HT<sub>2</sub>+((3)). Synflorescence a short, simple, apical raceme, or with 1 (2) short branches, with up to 15 (- 16) flowers on the main axis and up to 6 - 8 flowers on each branch, moderately elongating during fruit development. Flowers slightly fragrant, protogynous. Flower pedicels (2 -) 3 - 5 mm, fruit pedicels 4 - 6 mm, pubescent, HT<sub>2</sub>; pedicel diameter about 2/3 of the siliqua diameter. Sepals pubescent on outer surface, (7 -) 9 - 10.5 x 1 - 1.7 mm, the lateral saccate, HT<sub>2</sub>. Petals lemon yellow, spatulate to shortly cuneate at the base (14 -) 17 - 22 mm; the blade 6 - 8 x (3 -) 3.5 - 5 (- 5.5) mm. Stamens glabrous, anthers pale yellow. Lateral and median nectaries well developed. Siliqua 60 - 90 mm long, 1.3 - 1.5 mm thick, 4-angled in cross-section, grey - greenish, densely covered with bifid hairs; edges glabrescent. Angle between the axis of the raceme and the pedicel 50° - 60°; siliqua diverging at 20° - 40°. Style (on ripe siliqua) 2 - 2.3 (- 3) mm, widening into a siliqua, HT(2) + 3; stigma capitate, retuse. Seeds 1.3 - 1.7 (- 1.8) x 0.6 - 0.7 mm, elliptical, pale brown - yellowish. Pollen grains: P = 22.5 - 25.0 (26.3) µm, E = 16.26 - 18.75 µm. Flowers (V) VI - VII. 2n = 6x = 42; x = 7 (ANČEV 1995: 96, Fig. 1b).

*E. pseudoatticum* is morphologically close to *E. drenowskii* DEGEN, but well distinguished from the latter by quantitative characters of the flower, siliqua and seed as well as by the hexaploid chromosome number (Table 1). Both species, *E. pseudoatticum* and *E. drenowskii* belong to the species group of *E. sylvestre* (CRANTZ) SCOP.

### Distribution and ecological characteristics

Bulgarian endemic. Occurs in Western & Central Stara Planina and Rila Mts. on open slopes, on river banks, in high mountain grasslands, on gneiss, granite, or limestone substrate. Its localities are scattered from the oak forest belt up to the alpine belt, ranging from 700 up to 2600 m a.s.l. In W Stara Planina Mts. *E. pseudoatticum* grows on rocky and gravelly terrains of limestone facing southeast at 700 - 750 m altitude, in the periphery of shrub communities of *Carpinus orientalis*, *Quercus dalechampii*, *Acer campestre*, and *Crataegus monogyna*, together with *Briza media*, *Dianthus petraeus*, *Campanula sibirica*, *Hieracium piloselloides*. (Fig. 5).

In Rila Mts. the species occurs in the lower part of the coniferous forest belt of Central Rila Mts., in the valleys of Beli and Levi Iskār rivers, from 950 to 2600 m a.s.l, reaching the uppermost parts of mounts Mramoretz, Riletz, and Josafitza.

### Taxonomic notes

VELENOVSKY (1898: 21 - 22) reported "*Erysimum Boryanum* var. *atticum* BOISS. & SART." from a locality above Samokov, probably in Rila Mts.: "Supra Samokov a. 1894 legit am. Střibrný". Herbarium specimens collected by V. Střibrný in 1894 were not found, neither in the Bulgarian [SO, SOM, SOA], nor in Czech [PR, PRC] herbariums. There is a specimen from a later collection of V. Střibrný in the same area identified as

"*Erysimum Boryanum* BOISS. & SPRUN.: Rila, [the locality] Kobilino branište, VI.1898. V. Stribrny" [SOA]. The plants are with flowers and correspond to our *E. pseudoatticum*.

Another 14 specimens identified as "*Erysimum helveticum* DC." or "*E. helveticum* var. *comatum* (PANČIČ) ACHT.", collected in Rila Mts. in the area of distribution of *E. pseudoatticum*, here listed under examined specimens (paratypes), belong to the latter species. URUMOV (1904: 9) reported "*E. Boryanum* BOISS. & SPRUN." for Tekiiska Mt. (C. Stara Planina Mts.) and later for Rila Mts. as well (URUMOV 1923: 113). STOJANOV & STEFANOV (1924: 522) in Flora of Bulgaria, following VELENOVSKÝ (l.c.) and URUMOV (l.c.), also reported *E. Boryanum* var. *atticum* BOISS. & SPRUN. In the second edition of Flora of Bulgaria "*E. Parnassi* var. *atticum* (HELD. & SART.) STOJ. & STEF." was reported for Rila, Ali-Botuš, Rhodopes, Central Stara Planina (STOJANOV & STEFANOV 1933: 476). In the further editions of the same Flora (STOJANOV & STEFANOV 1948: 522; STOJANOV, STEFANOV & KITANOV 1966: 481) "*E. Parnassi* var. *atticum* (HELD. & SART.) HAYEK" was reported for Rila, Pirin, Central and Western Stara Planina, Ali-Botuš Mts.

ASSENOV (1970: 354-357) accepted *E. pusillum* BORY & CHAUB. subsp. *parnassi* (BOISS. & HELDR.) HAYEK and reported it for Rila, Central Stara Planina and Slavjanka (= Ali-Botuš) Mts. *E. Boryanum* var. *atticum* was listed in the synonymy of the species.

POLATSCHKEK (1983: 88) and later JALAS & SUOMINEN (1994: 61) noted that *E. atticum* HELDR. & SART. ex BOISS. had been erroneously reported for Bulgaria.

From the morphological and cytological studies and the references reviewed above it is evident that the perennial caespitose plants occurring in Western & Central Stara Planina, and Rila Mts, earlier connected with *E. atticum*, *E. boryanum*, *E. pusillum*, or *E. helveticum*, the first three species endemic to Greece, belong to *E. pseudoatticum*, a hexaploid member of a polyploid complex in the mountains of Western Central and SW Bulgaria (ANČEV 1995).

**Examined specimens** (paratypes): Rila Mts., Kobilino branište. VI. 1898, V. Stribrny, as *E. Boryanum* Boiss. [SOA]; Smradlivo ez., VII. 1921, N. Stojanov, as *E. helveticum* DC. [SOA]; In m. Rilo, 1915. I. Urumov, not determined [BP 20493]; In pascuis saxosis Samokovski lag, 950 m, 10. V. 1911, B. Davidov, B. Achtarov, as *E. helveticum* DC.; In umbrosis saxosis mt. Malka Rila, Sišman vräh, versus Iskär, 1250 m, 27. VI. 1911, B. Davidov, B. Achtarov, as *E. helveticum* DC. [SOM 33293, 33296]; In saxosis calcareis mt. Tzarska Rila, Sokoletz, 1500 m, 30. V. 1911, B. Davidov, B. Achtarov, as *E. helveticum* DC. [SOM 33292]; Montes Rila, infra opp. Samokov, in valle alpestri Levi Iskär pr. Mala Čerkva, 20. - 21. Juni 1929, S. Jävorka as *E. helveticum* DC. [BP 454170]; In rupestribus mt. Bela Rila, Ivanovo ravnište supra pag. Mala Čerkva, 1400 m, 12.V.1911, B. Davidov, B. Achtarov as *E. helveticum* DC. var. *comatum* (PANČIČ) ACHT. [SOM 33348, 33351]; Sredonos above Levi Iskär, 6. VI. 1936, N.V. Tzar Boris III, as *E. helveticum* var. *comatum* (PANČIČ) ACHT. [SOM 33306]; - Džendema, Riletz, 2600 m, 5. VIII. 1964, M. Simeonovsky, as *E. helveticum* DC. [SO 29100]; Josafitza, limestones, 5. VIII. 1964, M. Simeonovsky, as *E. helveticum* DC. [SO 29099]; Mramorecki circus, 2500 m, 10. VII. 1990, V. Rusakova, as *E. helveticum* [SO 29097; SOM 150516]; Mramoretzki circus, 2600 m, 12. VII. 1995, M. Ančev [SOM 153563]\*; B. Iskär river valley, 1200 m, 2. VII. 1997, A. Polatschek, M. Ančev [SOM 153564]\*; Zentrale Stara planina, Karnare gegen Trojanski prohod, 1350 m, Kalkfels und - schutt; mit *Geranium sanguineum*, *Thesium linophyllon*, 25. 6. 1997, A. Polatschek [W].

### *Erysimum slavjankae* ANČEV & POLATSCHKEK, sp. n.

≡ ANČEV, Giorn. Bot. Ital. 129(1): 96 (1995), sub nomen provisorium.

Holotype: Bulgaria, Slavjanka Mt., Tzarev vräh, 2000 m a.s.l. M. Ančev, A 9545, 3. June 1995 [SOM 3295, isotypes: SOM, W]; (Fig. 2).

= *E. helveticum* p.p., auct. bulg., non (JACQ.) DC.

**Diagnosis:** Planta perennis, dense caespitosa. Stirpes ramosae, ± lignosae, relictis petiolorum defunctorum dense obiectae, paucae ad numerosae, florentes (50 - ) 100 - 180 (- 200) mm longae, simplices. Folia caulina pilis bifidis pubescentia; nonnulli pili trifidi in foliorum latere inferiore occurrunt. Inflorescentia brevis et simplex, racemum apicalem formans, flores usque ad 12 (- 15) ferens. Flores fragrantés similiter ut *Amyris* P.Br. (Burseraeae). Sepala 10 - 13 mm longa, (1.5 - ) 2 - 2.7 mm lata, lateralia saccata. Petala obscure lutea, spatulata, (16 - ) 18 - 22 mm longa, eorum lamina (4 - ) 5 - 7 mm lata et septuplo ad octuplo longiora. Stylus 3 - 4 mm longus, a siliqua clare diversus. Stigma profunde emarginatum. Pedicelli sub angulo 40° - 60° amplo ab axi racemi divaricati. Siliquae 55 - 70 mm longae, pilis bifidis etiam in angulis dense vestitae. Semina 1.7 - 2 (-2.2) x 1.3 - 1.7 mm, late elliptica, fusca. Chromosomatum numerus  $2n = 12x = 84$ ;  $x = 7$ .

**Description:** Densely caespitose, green, perennial with branched ± woody stock, densely covered with petiole remnants. Root long, branched, 90 - 230 mm, without runners. Nonflowering rosettes often present. Stems (2- ) 5 - 12 (- 20), ascending to erect, (50 - ) 100 - 180 (- 200) mm in flowering, slightly elongated during fruiting, rounded angular, 1.5 - 3 mm thick, simple; withered past-year stems present at anthesis; the tunic very dense, formed by the broad leaf bases. Basal leaves linear oblanceolate, (30 - ) 40 - 55 (- 60) x 2 - 5 mm, pubescent, sometimes slightly succulent, acute, petiolate, gradually narrowed into sometimes pale lilac petioles; margins without or with 1 - 2 (- 3) pairs of minute teeth. Cauline leaves 7 - 10, without leaf fascicles in the axils, linear to linear oblanceolate, pubescent, 25 - 50 (- 60) x (1 - ) 2 - 3 (- 4) mm, acute, entire, shortly petiolate to almost sessile. HT<sub>2</sub>+3. Inflorescence a short, simple, apical raceme with up to 12 (- 15) flowers, slightly elongating during fruit development. Flowers balmily fragrant, protogynous. Flowering pedicels (1 - ) 3 - 5 mm, fruiting pedicels 3.5 - 6 mm, pubescent, HT<sub>2</sub>; pedicel diameter about 2/3 of the siliqua diameter. Sepals ovate to lanceolate, pubescent on the outer surface, 10 - 13 x (1.5 - ) 2 - 2.7 mm, the lateral saccate, in flower buds lilac on the tips. HT<sub>2</sub>+3. Petals dark yellow, spatulate, (16 - ) 18 - 22 mm, the blade 7 - 8 x (4 - ) 5 - 7 mm, glabrous. Stamens glabrous, anthers pale yellow. Lateral and median nectaries well developed. Siliqua 55 - 70 mm long, 1.7 - 2 mm thick, 4-angled in cross-section, grey greenish, densely covered with bifid hairs, HT<sub>2</sub>, edges pubescent, slightly lilac, covered with scattered hairs. The angle between the axis of the raceme and the pedicel 40° - 60°; siliqua diverging at 20° - 40°. Style (on ripe siliqua) 3 - 4 mm, clearly set up on the siliqua, HT<sub>2</sub>+3; stigma deeply retuse. Seeds 1.7 - 2.0 (- 2.2) x 1.3 - 1.7 mm., elliptical, pale brown-yellowish. Pollen grains: P = 30.0 - 35.0 μm, E = 25.0 - 28.7 μm. Flowers VI - VII (VIII).  $2n = 12x = 84 + 0-2 B$ ;  $x = 7$ . (Fig. 3)

*E. slavjankae* is well differentiated morphologically from the other two perennial species in the Bulgarian flora - *E. drenowskii* and the above described *E. pseudoaticum* (cf tab. 1 and tab. 2).

We suppose that one of the first collections of *E. slavjankae* was that of N. Stojanov. In mount Ali-Botuš he found low caespitose plants with large flowers and identified the specimens as "*E. helveticum* DC." (Ali-Botuš, Tzarev vrāh, 23. VI. 1923, N. Stojanov [SOA]). Subsequently, "*E. helveticum*" reported for Rila, Pirin, Stara Planina (STOJANOV & STEFANOV 1924: 522) and Slavjanka (Ali-Botuš) Mts. (STOJANOV & STEFANOV 1933: 476) turned out to be a rather confusing name. Caespitose perennial plants which belong to *E. slavjankae*, *E. drenowskii* or *E. pseudoaticum* collected by different botanists at different times in the high mountains of Central & SW Bulgaria were treated as "*E. helveticum* DC."

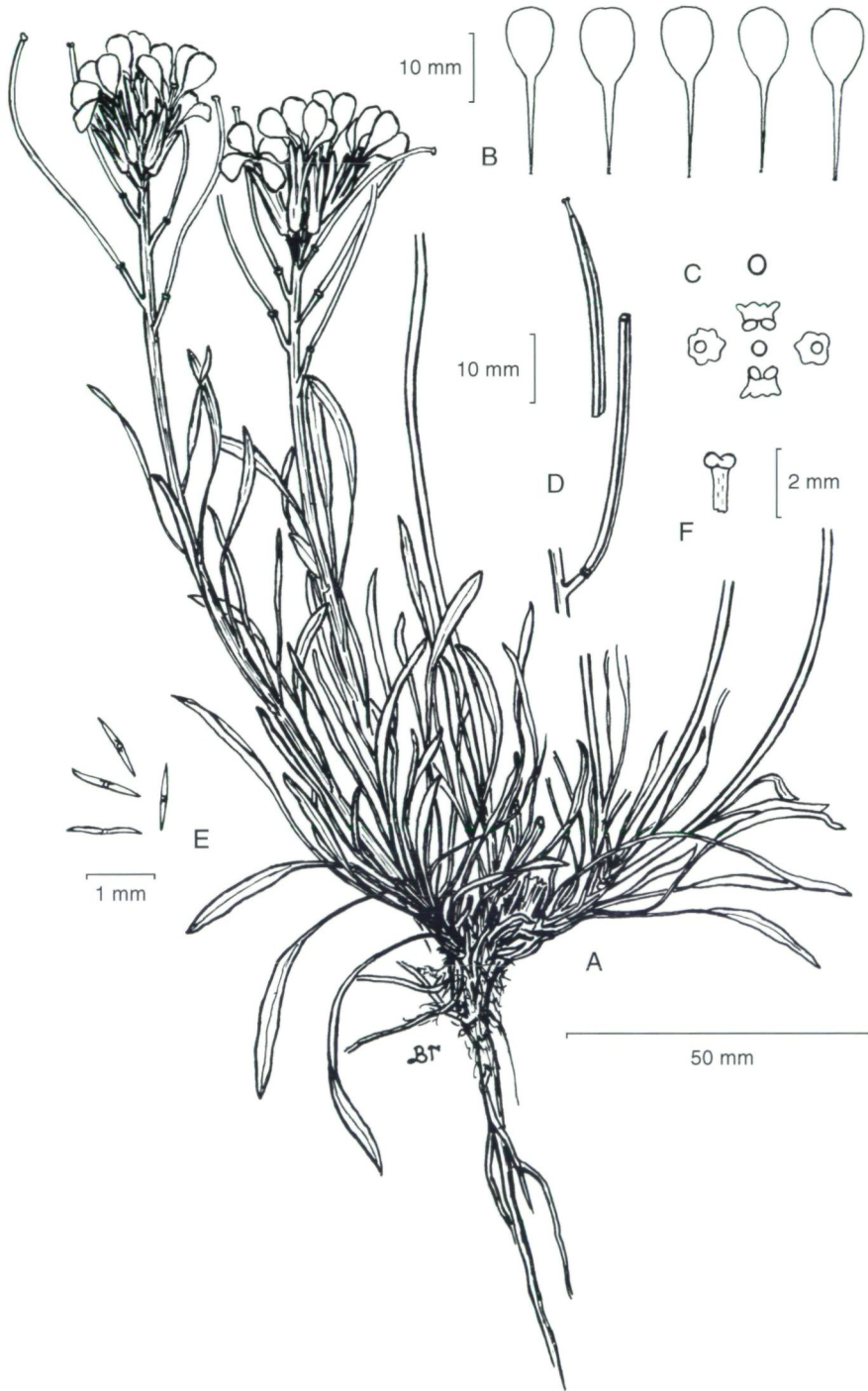


Fig. 2: *Erysimum slavjankae* ANČEV & POLATSCHKEK, sp.n.: A) habit, B) petals, C) nectaries, D) siliqua, E) hairs, F) stigma.

Table 1. Characters distinguishing *Erysimum pseudoatticum* from *E. drenowskii*.

| Characters | <i>Erysimum pseudoatticum</i>     | <i>Erysimum drenowskii</i> |
|------------|-----------------------------------|----------------------------|
| Sepals     | (7) 9 - 10.5 x 1 - 1.7 mm         | 7 - 8 x 2 - 2.1 mm         |
| Petals     | (14 - ) 17 - 22 mm                | 11 - 14 mm                 |
| Blade      | 6 - 8 x (3 - ) 3.5 - 5 (- 5.5) mm | 5 - 5.5 x 4 - 4.5 mm       |
| Siliqua    | 60 - 90 mm                        | 30 - 60 (- 70) mm          |
| Style      | 2 - 2.3 (- 3) mm                  | 1 - 1.5 mm                 |
| Stigma     | retuse                            | retuse                     |
| Seeds      | 1.3 - 1.7 (- 1.8) mm              | 0.9 - 1.2 mm               |
| 2n         | 42                                | 14                         |

Table 2. Characters distinguishing *Erysimum slavjankae* from *E. drenowskii*.

| Characters | <i>Erysimum slavjankae</i>    | <i>Erysimum drenowskii</i> |
|------------|-------------------------------|----------------------------|
| Habit      | densely caespitose            | loosely caespitose         |
| Sepals     | 10 - 13 x (1.5 - ) 2 - 2.7 mm | 7 - 8 x 2 - 2.1 cm         |
| Petals     | (16 - ) 18 - 22 mm            | 11 - 14 mm                 |
| Blade      | 7 - 8 x (4 - ) 5 - 7 mm       | 5 - 5.5 x 4 - 4.5 mm       |
| Siliqua    | 55 - 70 mm                    | 30 - 60 (- 70) mm          |
| Style      | 3 - 4 mm                      | 1 - 1.5 mm                 |
| Stigma     | deeply retuse                 | retuse                     |
| Seeds      | 1.7 - 2 (- 2.2) mm            | 0.9 - 1.2 mm               |
| 2n         | 84 + 0-2 B                    | 14                         |

Table 3. Characters distinguishing *Erysimum pirinicum* from *E. comatum*.

| Characters | <i>Erysimum pirinicum</i>       | <i>Erysimum comatum</i>    |
|------------|---------------------------------|----------------------------|
| Tunic      | With few petiole remains        | With dense petiole remains |
| Sepals     | 6 - 8.5 x 1-1.8 mm              | 7 - 8 x 2 - 2.2 mm         |
| Petals     | 11 - 15.5 (- 17) mm             | (16 - ) 18 - 25 mm         |
| Blade      | 6 - 7.5 x 4 - 6.5 mm            | 6 - 6.5 x 5 mm             |
| Siliqua    | (30 - ) 37 - 55 mm              | (60 - ) 70 - 100 mm        |
| <          | 30 - 50°                        | 40 - 50°                   |
| Style      | (1 - ) 1.7 - 2.3 mm             | 1.5 - 2 mm                 |
| Seeds      | (0.9 - ) 1 - 1.2 x 0.6 - 0.7 mm | 1.3 - 1.5 x 0.6 - 0.7 mm   |
| 2n         | 28                              | 14                         |

### Distribution and ecological characteristics

Bulgarian endemic. Occurs on rocky and gravely marble terrains on open slopes, along edges of *Pinus heldreichii* forests, as well as in high-mountain grassland above the timberline, in plant communities of *Juniperus communis* subsp. *alpina*, *Chamaecytisus absinthioides*, *Peridiction sanctum* (= *Festucopsis sancta*), *Paronychia kapela*, *Iberis saxatilis*, *Centaurea parilica*, sometimes together with the chasmophytes *Saxifraga sempervivum*, *Androsace villosa*, *Alyssum montanum* subsp. *ali-botushicum*, *Campanula orphanidea*. Pirin Mts., the area of the mountains Orelek and Baba, and Slavjanka Mts., from 1800 up to 2200 m a.s.l. (Fig. 5).



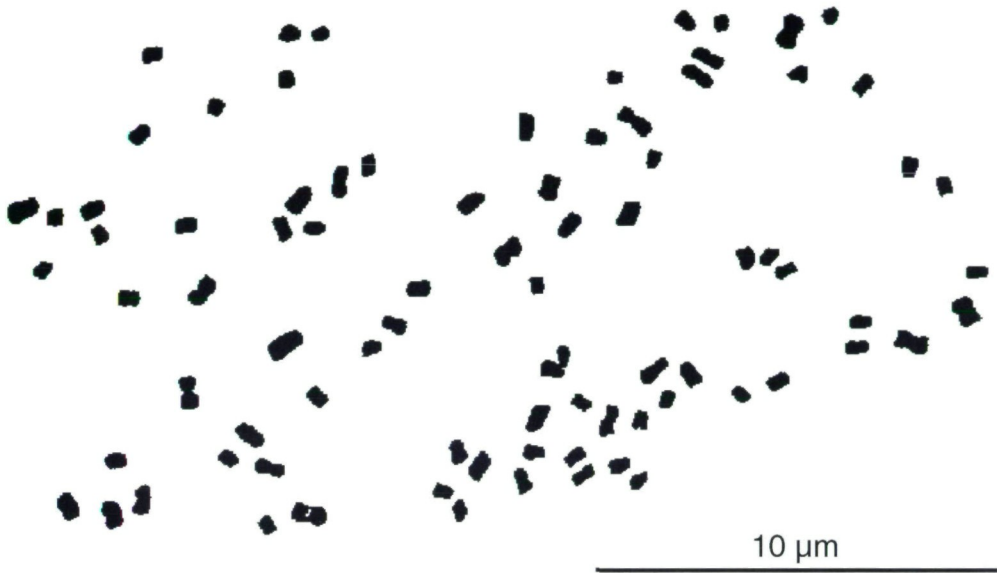


Fig. 3: Drawing of mitotic metaphase of *Erysimum slavjankae* ANČEV & POLATSCHKEK.:  $2n = 12x = 84$  [SOM 94190].

### Karyotype

$2n = 12x = 84 + 0-2 B$  (Fig. 3). The species is dodecaploid. The karyotype consists of small chromosomes diverse in length. Ten to eleven pairs of chromosomes ( $1.0 - 1.3 \mu\text{m}$ ) are longer than the others, 17 - 18 pairs of chromosomes are of medium size, 14 pairs are very short, some of them ball-shaped. Two accessory chromosomes were observed in some of the karyotypes. The highest chromosome number found earlier in the *E. sylvestre* group in Europe was  $2n = 10x = 70$  (POLATSCHKEK, unpubl.).

**Examined specimens (paratypes):** Ali-Botuš, Tzarev vräh, 23. VI. 1923, N. Stojanov, as *E. helveticum* DC [SOA]; Ali-Botuš, Gotzev vräh, 2200 m, 19. V. 1994, D. Stojanov, as *E. helveticum* (JACQ.) DC. [SO 92399]; Pirin Mts, Baba, 1950 m, 9. VI. 1988, D. Stojanov, as *E. comatum* PANČIČ [SO 94061]; Slavjanka: near Tzarev vräh, ca 2000 m, 18. X. 1994, M. Ančev [SOM 153558]\*; Slavjanka, above G. Kojnarnik, 1850 m, 3. VI. 1995, M. Ančev [SOM 153559]; Pirin Mts, Orelek, 2000 m, 12. VIII. 1995, V. Goranova & M. Ančev [SOM 15357]\*; Pirin Mts, near Orelek, 1980 m, 30. VI. 1997, A. Polatschek & M. Ančev [SOM 153560]\*.

### *Erysimum pirinicum* ANČEV & POLATSCHKEK, sp.n.

≡ ANČEV, Giorn. Bot. Ital. 129(1): 98 (1995), sub nomen provisorium.

Holotype: Central Pirin Mt., on southeastern slopes of mount Orelek, at 1800 m a.s.l. M. Ančev, A94183, 17 October 1994. (SOM: n3296). (Fig. 4). Isotypes: SOM, W.

= *E. comatum* auct. p.p. min. non PANČIČ.

**Diagnosis:** Planta perennis. Stirps simplex vel in basi 1 - 3 (- 5) ramis erectis ramosa, 200 - 400 (- 550) mm longa, in basi relictis foliorum defunctorum paucis tunicata. Synflorescentia racemum simplicem formans vel 2 - 6 (- 8) ramis brevibus ramosa.

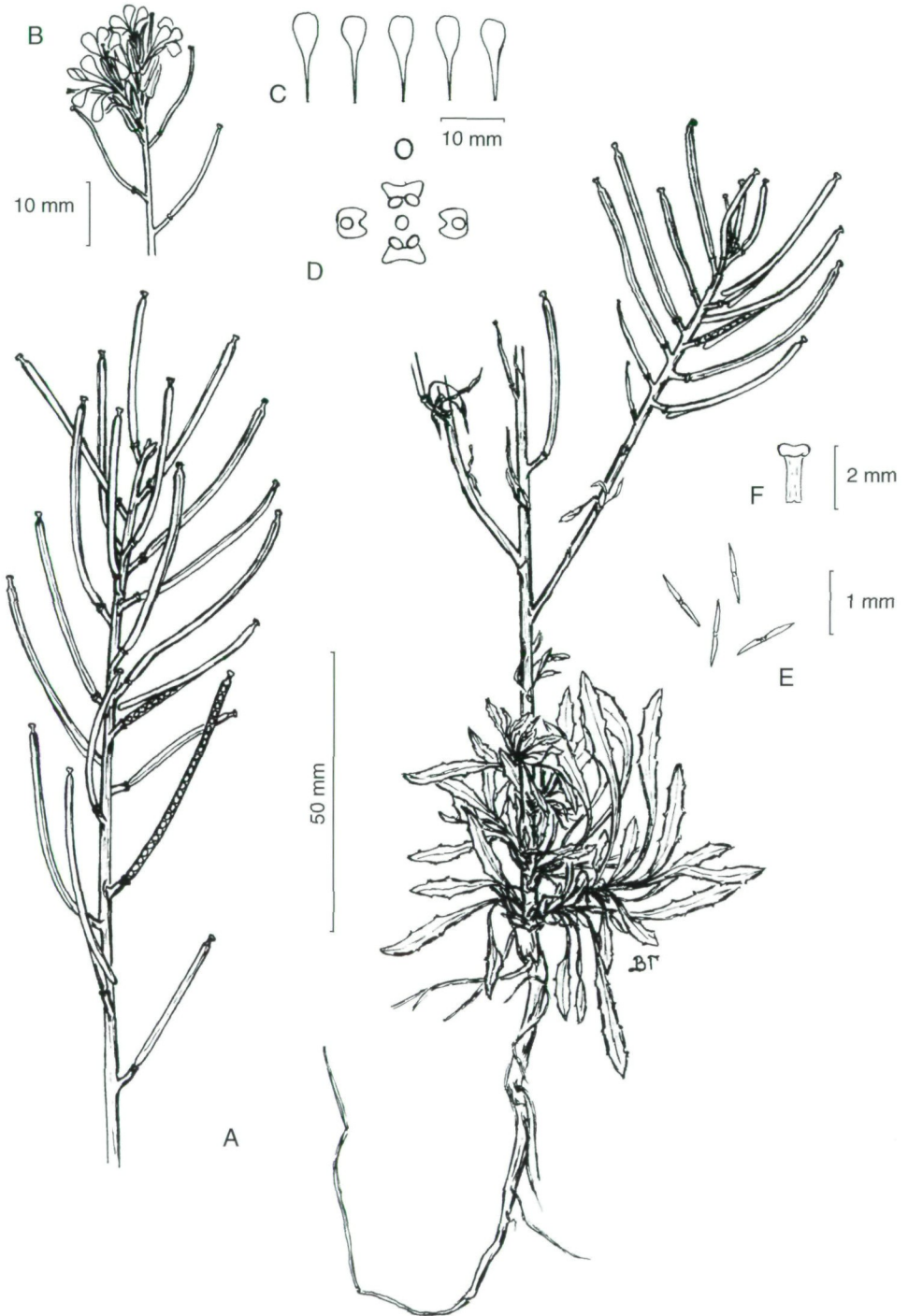


Fig. 4: *Erysimum pirinicum* ANČEV & POLATSČEK, sp.n.: A) habit, B) part of inflorescence, C) petals, D) nectaries, E) hairs, F) stigma.

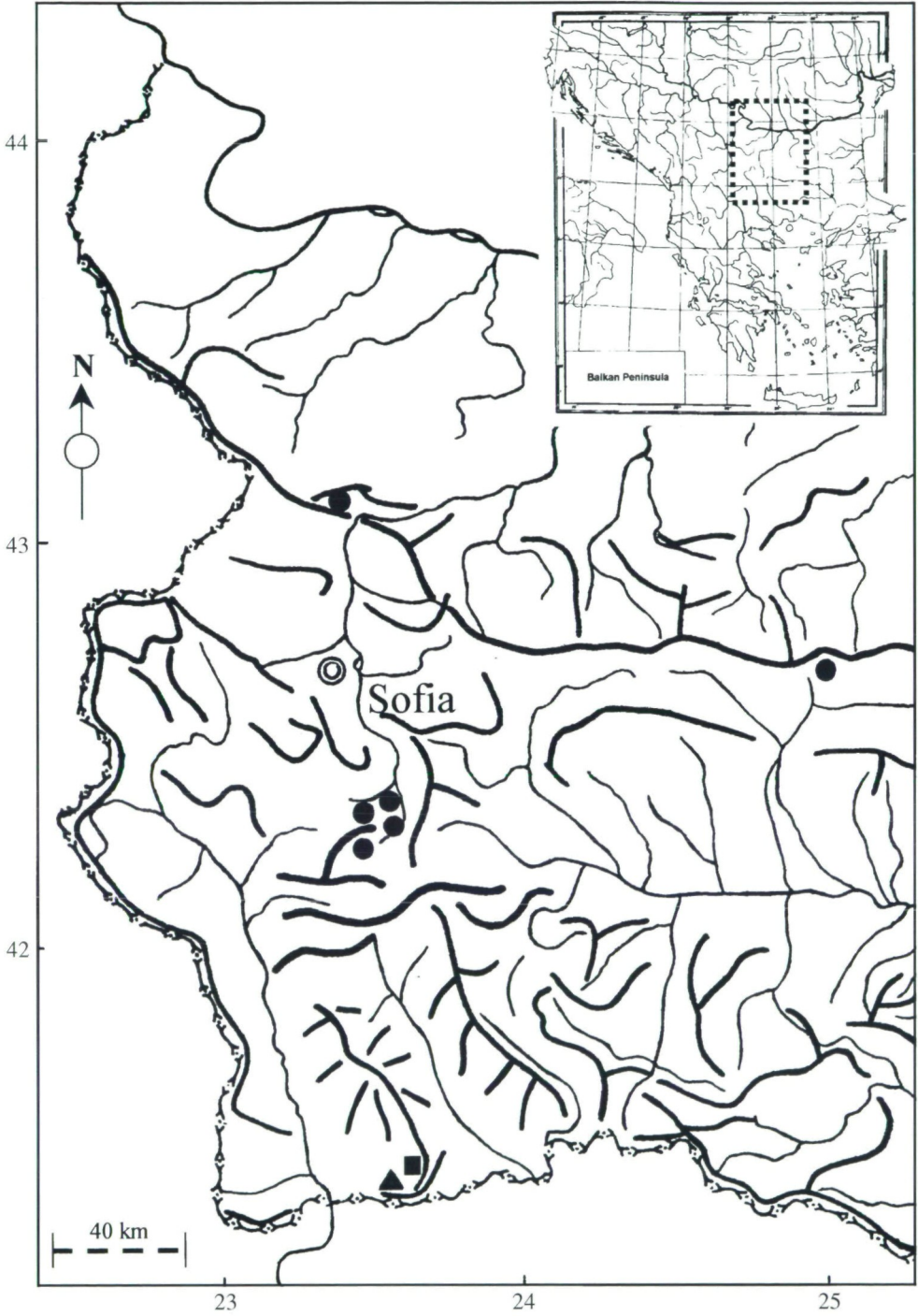


Fig. 5: Distribution map of *Erysimum pseudoatticum* - ●, *E. slavjankae* - ▲, *E. pirinicum* - ■, in Bulgaria.

Flores leviter fragrantes. Sepala 6 - 8.5 mm, lateralialia leviter saccata. Petala flava, 11 - 15.5 (- 17) mm longa, eorum lamina 6 - 7.5 x 4 - 6.5 mm. Stylus (1 -) 1.7 - 2.3 mm longus. Stigma capitatum, emarginatum. Siliquae (30 -) 37 - 55 mm longae, tetragonae, pilis bifidis etiam in angulis dense vestitae. Semina (0.9 -) 1 - 1.2 x 0.6 - 0.7 mm. Pedicelli sub angulo 40 - 60° amplo ab axi racemi divaricati. Chromosomatum numerus  $2n = 4x = 28$ ;  $x = 7$ .

**Description:** Biennial, grey-green with 2-fid hairs; 3-fid hairs scattered on the lower surface of the leaves and on the style. Root 70 - 150 mm, tapering to fusiform, slightly branched, with filiform secondary roots. Stem simple or caudex branched, with 1 - 3 (- 5) erect stems, 200 - 450 (- 550) mm high in flower, slightly elongated during fruiting, rounded angular to almost cylindrical, 1.5 - 3 mm thick near the base; the tunic with few leaf remnants. Leaves oblanceolate, (25 -) 30 - 83 x 1 - 3.5 (- 6) mm, almost of the same size along the stem, pubescent, acute, the basal distinctly petiolate, the cauline shortly petiolate to sessile with fascicles of small leaves in the axils; the leaf margin distantly denticulate with fine set up teeth.  $HT_2+3+(4)$ . Synflorescence a simple raceme or above the middle with 2 - 6 (- 8) short lateral branches; flowers yellow, few to numerous, slightly fragrant. Flower pedicels 2 - 3 (- 4) mm, fruit pedicels (2 -) 3.5 - 5 mm, pubescent. Sepals ovate oblanceolate, pubescent on outer surface, 6 - 8.5 x 1 - 1.8 mm, the lateral shallowly saccate.  $HT_2+(3)$ . Petals cuneate, 11 - 15.5 (- 17) mm, blade 6 - 7.5 x 4 - 6.5 mm. Stamens glabrous; anthers pale yellow. Siliqua (30 -) 37 - 55 mm long, 1.5 - 1.8 mm thick, in cross-section tetragonal, grey-whitish, densely covered with 2-fid hairs; edges pubescent. The angle between the axis of the raceme and the pedicel 40° - 60°, siliqua diverging at 30° - 50°. Style (on ripe siliqua) (1 -) 1.7 - 2.3 mm, as thick as the siliqua,  $HT_2+(3)$ ; stigma capitate, retuse. Seeds (0.9 -) 1 - 1.2 x 0.6 - 0.7 mm, elliptical, pale brown-yellowish. Pollen grains: P = 21.20 - 25.0 µm, E = 16.26 - 18.75 µm. Flowers VI (- VII).  $2n = 4x = 28$ ;  $x = 7$  (ANČEV 1995: 96, Fig. 1b).

*E. pirinicum* in its general appearance is similar to *E. comatum* but differs from it in several essential characters: stem basis with few petiole remains, smaller petals, shorter siliqua, tetraploid chromosome number (tab. 3).

### Distribution and ecological characteristics

SW Bulgaria (Pirin Mt. Fig. 5) and NE Greece (Mt. Kožuf, Mt. Menikion, S. Polytamos). *E. pirinicum* frequently occupies open calcareous, rocky and gravelly habitats, mostly on marble terrains, in mountain grasslands often in spots of burned-out shrubs of *Juniperus communis* subsp. *alpina*, sometimes on embankments along mountain roads, together with *Arabis sagittata*, *Cerastium alpinum* subsp. *lanata*, *Onobrychis montana* subsp. *scardica*, *Polygala comosa*, *Campanula patula* subsp. *epigea*, *Achillea millefolium* s.l., *Erigeron alpinus* ect., from 1300 up to 2000 m a.s.l.

**Examined specimens (paratypes):** Bulgaria: Pirin Mts, SE of Orelek, 1800 m, 17. X. 1994, M. Ančev [SOM 153561]\*; Pirin Mts, between the pass Popski preslap and Orelek, 1700 m, 12. VIII. 1995, V. Goranova, M. Ančev [SOM 153562]\*; Südteil des Pirin, zwischen dem Pass von Popovi Livadi (1320 m) und dem Gipfel des Orelek (2099 m), W-Hang, Felsen, 1700 m, 29 Juli 1993, H. Kalheber, as *E. comatum* PANČIČ [M]; Pirin Gebirge, Auffahrt zum Orelek, 1750 - 1850 m, Marmor; Strassenhang mit *Geranium sanguineum*, 30. 6. 1997, A. Polatschek [W]\*.

Greece: Macedonia occidentalis, Distr. Almopia, montes Kožuf, in latere meridionali verticis Tzena, 1700 m, in fissuris rupium calcarearum, 30. VII. 1976, W. Greuter, as *E. cf. calycinum* GRISEB. [B, W]; Mt. Menikion - SW Teil, ca 4.5 km N. Innousa, 1300 - 1500 m, felsige Hänge, Kalk, A. Strid, Papanicolao [C, W]; Vernon-Gebirge, S. Polytamos, 1200 m, 11. VI. 1989, H. Malicky [W]\*.

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