



A new combination in *Erysimum* (Brassicaceae) for Baetic mountains (South-eastern Spain)

JUAN LORITE^{1*}, FRANCISCO PERFECTTI² & JOSE MARÍA GÓMEZ^{3,4}

¹Dpto. de Botánica, Universidad de Granada, E-18071 Granada, Spain; e-mail jlomite@ugr.es

²Dpto. de Genética, Universidad de Granada, E-18071 Granada, Spain.

³Dpto. de Ecología Funcional y Evolutiva, Estación Experimental de Zonas Áridas (EEZA-CSIC), E-04120 Almería, Spain.

⁴Dpto de Ecología, Universidad de Granada, E-18071 Granada, Spain.

*Corresponding author

According to the new findings on the phylogeny of the genus *Erysimum*, we propose the new combination *Erysimum bastetanum* (G. Blanca & C. Morales) Lorite *et al. comb. & stat. nov.*

Erysimum L. is one of the largest genera of the *Brassicaceae*, comprising more than 200 species and recently grouped in the unigeneric tribe *Erysimeae* (Al-Shehbaz 2012). The evolutionary history of this genus is complex, with multiple events of inter-specific hybridization and polyploidization (Ancev 2006, Marhold & Lihová 2006). This evolutionary pattern has resulted in many species complexes and cryptic species with high morphological similarities (Ancev 2006, Turner 2006, Abdelaziz *et al.* 2011).

The genus *Erysimum* is distributed primarily in Eurasia, with some species in North America and North Africa (Warwick *et al.* 2006). The genus has diversified profusely in the Mediterranean region, with more than a hundred species described in this area (Greuter *et al.* 1986). Twenty-one (Polatschek 1979, 2014) to twenty-three (Nieto-Feliner 1993, Mateo *et al.* 1998) *Erysimum* species have been described in the Iberian Peninsula depending on authors. Within the Iberian Peninsula the Baetic Range, located in the south-southeast, contains ten *Erysimum* species, seven of them endemic to the area (Blanca *et al.* 2009).

Erysimum baeticum, inhabiting the Baetic mountains, was first described by Heywood (1954) as *E. linifolium* subsp. *baeticum*. Afterwards, Polatschek (1979) changed the status of the taxa as *E. baeticum* (Heywood) Polatschek. Later, Blanca *et al.* (1992) distinguished two taxa within the species; *E. baeticum* (Heywood) Polatschek subsp. *baeticum* for Sierra Nevada, and *E. baeticum* subsp. *bastetanum* Blanca & Morales inhabiting the Sierra de Baza (Granada province) and the Sierra de María and the Sierra de Filabres (Almería). Blanca *et al.* (1992) also indicated some major morphological differences among them. Then, Nieto-Feliner (1993) in the revision of the genus for the Iberian Peninsula, considered only one taxon, *E. baeticum*, and attributed the phenotypic differences to possible hybridization events with the close related species *E. nevadense*. Nevertheless, Blanca *et al.* (2009) maintained the two taxa as subspecies (*E. baeticum* subsp. *baeticum* and *E. baeticum* subsp. *bastetanum*).

Recently, a phylogeny of *Erysimum* has been published (Gómez *et al.* 2014). The published tree shows that the two taxa belong to well-supported separate lineages. This fact, together with remarkable morphological differences (see description below) and a well-separated distribution area led us to propose two taxa at species level, *E. baeticum* (Heywood) Polatschek a narrow-endemic to Sierra Nevada and *E. bastetanum comb. & stat. nov.* for the remaining populations and endemic to some Baetic mountains.

Erysimum bastetanum (G. Blanca & C. Morales) Lorite, Perfectti & Gómez *comb. & stat. nov.*

Basionym: *Erysimum baeticum* (Heywood) Polatschek subsp. *bastetanum* G. Blanca & C. Morales. Anal. Jard. Bot. Madrid 49(2): 213–214. Type: Spain: Granada, Sierra de Baza, Prados del Rey. 7–VI–1983. Leg: C. Morales *et al.* (Holotype GDAC 17430!).

This taxon could be differentiated from *E. baeticum* by some markedly morphological traits:

1. Plants of 30–70 (80) cm. One stem (rarely two or three), usually ramified in the upper part, sparsely leafy. Siliques erect to adpressed. Monocarpic (rarely polycarpic). Biennial.....*E. bastetanum*

- Plants up to 30 (40) cm. Multiple stems, not ramified in the upper part; densely leafy. Siliques erect-patent to subpatent. Polycarpic. Short-lived perennial*E. baeticum*

E. bastetanum inhabits gaps of holm-oak (*Quercus ilex* L.), mixed pine forests (*Pinus nigra* Arnold and *P. sylvestris* L.) and shrublands from 800–2200 m a.s.l., mainly on limestones (rarely on mica schists and quartzites). *E. baeticum* appears usually in high-mountain shrublands (*Genista versicolor* Boiss., *Cytisus galianoi* Talavera & P.E. Gibbs and *Juniperus communis* L.) and perennial grasslands from 1500–2600 m a.s.l. only in metamorphic rocks (mica schists and quartzites). *E. bastetanum* is distributed across eastern part of Baetic mountains (Sierra de Baza, Sierra de Filabres, Mencal, Sierra de María-Orce, Sierra Jureña), while *E. baeticum* is a narrow endemic species of the eastern part of the Sierra Nevada (Granada and Almería provinces).

After this proposal, the resulting two species are narrow endemics, especially *E. baeticum*. For this reason, we propose an evaluation of the conservation status of these species in order to apply, if needed, legal and management conservation measures.

Acknowledgements

This study was partially supported by grants from Junta de Andalucía (P11-RNM-7676) and the Spanish MINECO (CGL2012–34736 and CGL2013-47558-P), and was partially supported by EU FEDER funds. The Ministerio de Medio Ambiente and Consejería de Medio Ambiente of Andalucía and Sierra Nevada National Park Headquarter, granted permission to work in several protected areas of Spain. We thank University of Granada herbarium for access to specimens.

References

- Abdelaziz, M., Lorite, J., Muñoz-Pajares, A.J., Herrador, M.B., Perfectti, F. & Gómez, J.M. (2011) Using complementary techniques to distinguish cryptic species: A new *Erysimum* (Brassicaceae) species from North Africa. *American Journal of Botany* 98: 1049–1060.
<http://dx.doi.org/10.3732/ajb.1000438>
- Al-Shehbaz, I.A. (2012) A generic and tribal synopsis of the Brassicaceae (Cruciferae). *Taxon* 61: 931–954.
- Ancev, M. (2006) Polyploidy and hybridization in Bulgarian Brassicaceae: Distribution and evolutionary role. *Phytologia Balcanica* 12: 357–366.
- Blanca, G., Morales, C. & Ruiz-Rejón, M. (1992) El género *Erysimum* L. (Cruciferae) en Andalucía (España). *Anales Jardín Botánico de Madrid* 49: 201–214.
- Blanca, G., Cabezudo, B., Cueto, M., Fernández-López, C. & Morales-Torres, C. (2009) *Flora vascular de Andalucía Oriental. Vol. 3: Rosaceae-Lentibulariaceae*, Consejería de Medio Ambiente. Junta de Andalucía, Sevilla, Spain, 460 pp.
- Gómez, J.M., Perfectti, F. & Klingleberg, Ch.P. (2014) The role of pollinator diversity in the evolution of corolla-shape integration in a pollination-generalist plant clade. *Philosophical transactions B*.
<http://dx.doi.org/10.1098/rstb.2013.0257>
- Greuter, W., Burdet, H.M. & Long, G. (1986) *Med-checklist 3, Dicotyledones (Convolvulaceae-Labiatae)*. Conservatoire et Jardin botaniques de la Ville de Genève, Switzerland, 1986 pp.
- Heywood, V.H. (1954) Notulae criticae ad floram hispaniae pertinentes, I. *Bulletin of the British Museum-Natural History: Botany* 1: 81–122.
- Marhold, K. & Lihová, J. (2006) Polyploidy, hybridization and reticulate evolution: lessons from the Brassicaceae. *Plant Systematics and Evolution* 259: 143–174.
<http://dx.doi.org/10.1007/s00606-006-0417-x>
- Mateo, G., Crespo, M.B. & López-Udías, S. (1998) Acerca de un orófito minusvalorado de la Sierra de Javalambre (Teruel). *Flora Montiberica* 9: 41–45.
- Nieto-Feliner, G. (1993) *Erysimum* L. In: *Flora iberica. Vol. IV. Cruciferae-Monotropaceae*. Real Jardín Botánico, CSIC, Madrid, pp. 48–76.
- Polatschek, A. (1979) Die Arten der Gattung *Erysimum* auf der Iberischen Halbinsel. *Annalen des Naturhistorischen Museums Wien* 82:

325–362.

- Polatschek, A. (2014) Revision der Gattung *Erysimum* (Cruciferae): Nachträge zu den Bearbeitungen der Iberischen Halbinsel und Makaronesiens. [Serie B] *Annalen des Naturhistorischen Museums in Wien* 116: 87–105.
- Turner, B.L. (2006) Taxonomy and nomenclature of the *Erysimum asperum* - *E. capitatum* complex (Brassicaceae). *Phytologia* 88: 279–287.
- Warwick, S.I., Francis, A. & Al-Shehbaz, I.A. (2006) Brassicaceae: Species checklist and database on CD-ROM. *Plant Systematics and Evolution* 259: 249–258.
<http://dx.doi.org/10.1007/s00606-006-0422-0>

APPENDIX 1. List of specimens examined.

Erysimum baeticum (Heywood) Polatschek

SPAIN. Almería: Laujar de Andarax, finca Bonalla, 1700 m, 13–june–1989, A.B. Robles & C. Morales 33335 (GDAC). Ibidem, 1680 m, 13–june–1989, A. B. Robles & C. Morales 33336 (GDAC). Ibidem, 1890 m, 13–june–1989, A. B. Robles & C. Morales 33337 (GDAC). SPAIN. Almería: Bayárcal, Sierra Nevada, pr. Las Minillas, 1920 m, 23–june–1999, G. Nieto Feliner & al. 633227-1 (MA). SPAIN. Almería: Laujar de Andarax, finca Bonalla, 1700 m, 13–june–1989, A.B. Robles & C. Morales 33335 (GDAC). SPAIN. Granada: Laroles, puerto de la Ragua, VG9707, 2100 m, 27–may–1979, J. Molero Mesa 9775(GDA). Ibidem, cruce a Bayárcal, VG9803, 1800 m, 14–july–1978, J. Molero Mesa 9774(GDA). SPAIN. Granada: Sierra Nevada, puerto de la Ragua, july–1973, M. Ladero & E. Valdés, 7075(GDA). Ibidem, sobre Alquife, 1600 m, 7–may–1990, G. Blanca, J. M. Román & M. J. Salinas, 33332(GDAC). Ibidem, Jeres del Marquesado, 4–may–1976. A. Gil & G. Blanca, 2485, 2486, 2488, 2489 (GDAC).

Erysimum bastetanum (G. Blanca & C. Morales) Lorite *et al. comb. & stat. nov.*

SPAIN. Almería: Sierra de Filabres, refugio arroyo Berruga, 1720 m, 2–july–1990, G. Blanca & M. Cueto 33328 (GDAC). Ibidem, c. Calar Alto, 1900 m, 2–july–1990, G. Blanca & M. Cueto 33330 (GDAC). Ibidem, calar del Gallinero, 14–july–1984, F. Mota 33338 (GDAC). Ibidem, entre Tetica y Sierro, 1700 m, 2–july–1990, G. Blanca & M. Cueto 33329 (GDAC). SPAIN. Almería: Sierra de María, 16–july–1988, F. Mota 33331 (GDAC). Ibidem, vert. norte, 21–june–1989. G. Blanca & M. Cueto 33334 (GDAC). Ibidem, portachico de María, vert. norte, 1800 m, 29–june–1985, A. Ortega 33333 (GDAC). SPAIN. Almería: Velefique, S^a de los Filabres, prox. al Collado de la Herradura, 1740 m, 23–jun–1991, J. Peñas 3419-1 (HUAL). GRANADA: Sierra de Baza, 4–july–1975, B. Cabezudo & al. 25383 (SEV). Ibidem, Rambla de los Blanquizaes, 8–june–1983, C. Morales & al. 17431 (GDAC). Ibidem, collado de Doña Ana, WG13, 1650 m, 17–june–1984, J. Torres, G. Blanca & C. Morales 26809 (GDAC). Ibidem, barranco del Relumbre, WG13, 10–june–1984, J. Torres, G. Blanca & C. Morales 28929 (GDAC). Ibidem, prados del Rey, 7–june–1983, C. Morales & al. 17430 (GDAC), holotypus. Ibidem, camino del calar de Santa Bárbara, 7–july–1984, C. Morales & al. 17427 (GDAC). Ibidem, minas subiendo al calar de Santa Bárbara. 7–may–1983, C. Morales & al. 17433 (GDAC). Ibidem, subiendo al calar de Santa Bárbara, 7–june–1984, A. B. Robles & G. Blanca 23880 (GDAC). SPAIN. Granada: Baza, cortijo de la Canaleja Alta, 1650 m, 18–jun–1992. C. Aedo, F. Muñoz Garmendia & C. Navarro 508697-1 (MA).