

Notes on the generic position of *Brassica deserti* (Brassicaceae)

Jotham Ziffer-Berger^{a,b,*}, Alexandra Keren-Keiserman^{c,*}, Adi Doron-Faigenboim^c,
Klaus Mummenhoff^d and Oz Barazani^c

^aMulti-disciplinary Faculty, Levinsky College of Education, Shoshana Persitz 15, Tel Aviv 6937808, Israel; ^bThe Steinhardt Museum of Natural History, Tel Aviv University, Tel Aviv 6901127, Israel; ^cInstitute of Plant Sciences, Agricultural Research Organization, Rishon LeZion, 75359 Israel; ^dUniversity of Osnabrück, Department of Biology, Osnabrück 49074, Germany

ABSTRACT

Molecular tools provide new insights into phylogenetic relationships of plant species, and by relating phylogenetic groups to their geographical distribution, we can cast light upon the evolution history of plant clades. In the current study, we evaluated the phylogenetic position of the Sinai endemic *Brassica deserti* (Brassicaceae), later renamed as *Erucastrum deserti*, based on morphological data and 5.8S rDNA and ITS (Internal Transcribed Spacer) regions. Our results indicate that *B. deserti* belongs to an East-Mediterranean – Saharo Arabian clade and was not assigned to the core *Brassica* and *Erucastrum* clades, respectively, which evolved in the West Mediterranean area. We tentatively conclude that *Brassica deserti* evolved independently of core *Brassica* and *Erucastrum*.

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KEYWORDS

Erucastrum deserti; phylogeny; 5.8S rDNA; tribe Brassiceae

CONTACT Jotham Ziffer-Berger [[email](mailto:jotham.z@gmail.com)] jotham.z@gmail.com

* The first and second authors contributed equally to this article

Supplementary material

Table S1. Species and sequence data used in the current study. Sequences of the 5.8S rDNA and its ITS regions were either obtained from the NCBI database or from sequencing of DNA samples extracted from fresh leaves or herbarium dried material. Accession numbers are given for sequences derived from the database (NCBI), herbarium specimens and seeds received from the various seed banks (*). Herbarium acronyms follow Index Herbariorum (Thiers 2018). Species that represent newly obtained sequences marked in bold. Consensus sequence was used for the alignment, i.e. *B. aucheri*, *B. deflexa*, *E. arabicum*, *R. raphanistrum* and *R. rosstratus*.

Specie	Source or reference	Accession number
<i>Arabidopsis thaliana</i> (L.) Heynh.	NCBI	AJ232900
<i>Brassica aucheri</i> Boiss.	Herbarium of the Natural History Museum, Vienna	W Rechinger 426–208
<i>Brassica aucheri</i> Boiss.	Herbarium of the Natural History Museum, Vienna	W 13410
* <i>Brassica aucheri</i> Boiss.	U.S. Department of Agriculture (USDA 2017)	PI 64907
<i>Brassica balearica</i> Pers.	NCBI	AF263402.1
<i>Brassica barrelieri</i> (L.) Janka	NCBI	AY722414.1
<i>Brassica cretica</i> Lam.	NCBI	GQ268075.1
* <i>Brassica deflexa</i> Boiss.	U.S. Department of Agriculture (USDA 2017)	PI 597823
<i>Brassica deflexa</i> Boiss.	NCBI	GQ268077.1
<i>Brassica deserti</i> Danin & Hedge	Herbarium of the Hebrew University of Jerusalem	HUJ132111
<i>Brassica elongata</i> Ehrh.	NCBI	AY722417.1
<i>Brassica fruticulosa</i> Cirillo	NCBI	GQ268073.1
<i>Brassica gravinae</i> Ten.	NCBI	GQ268072.1
<i>Brassica insularis</i> Moris.	NCBI	GQ268067.1

<i>Brassica maurorum</i> Durand	NCBI	GQ268065
<i>Brassica montana</i> Pourr.	NCBI	GQ268066.1
<i>Brassica nigra</i> (L.) K.Koch	NCBI	GQ268057.1
<i>Brassica oleracea</i> L.	NCBI	AY833603.1
<i>Brassica oxyrrhina</i> Coss.	NCBI	GQ268074.1
<i>Brassica procumbens</i> (Poir.) O.E.Schulz	NCBI	AY722425.1
<i>Brassica rapa</i> L.	NCBI	KF704394.1
<i>Brassica repanda</i> (Willd.) DC.	NCBI	JQ042825.1
<i>Brassica rupestris</i> Raf.	NCBI	AY722427.1
<i>Brassica tournefortii</i> Gouan	NCBI	GQ268069.1
<i>Ceratocnemum rapistroides</i> Coss.& Balansa	NCBI	AY722429.1
<i>Coincya longirostra</i> (Boiss.) Greuter & Burdet	NCBI	AY722430.1
<i>Coincya monensis</i> (L.) Greuter & Burdet	NCBI	KX166021.1
<i>Coincya rupestris</i> Porta & Rigo ex Rouy	NCBI	AY722432.1
<i>Cordylocarpus muricatus</i> Desf.	NCBI	DQ249827.1
<i>Diplotaxis assurgens</i> (Delile)Thell.	NCBI	AY722443.1
<i>Diplotaxis berthautii</i> Braun-Blanq. & Maire	NCBI	AY722444.1
<i>Diplotaxis brachycarpa</i> Godr.	NCBI	AY722445.1
<i>Diplotaxis catholica</i> (L.) DC.	NCBI	AY722446.1
<i>Diplotaxis eruroides</i> (L.) DC.	NCBI	AF263401.1
<i>Diplotaxis harra</i> (Forssk.)Boiss.	NCBI	KP993522.1
<i>Diplotaxis ibicensis</i> (Pau) Gomez- Campo	NCBI	AY722450.1

<i>Diplotaxis siettiana</i> Maire	NCBI	AY722451.1
<i>Diplotaxis tenuifolia</i> (L.) DC.	NCBI	EF601913.1
<i>Diplotaxis viminea</i> (L.) DC.	NCBI	AY722454.1
<i>Enarthrocarpus arcuatus</i> Labill.	NCBI	AY722456.1
<i>Enarthrocarpus lyratus</i> (Forssk.) DC.	NCBI	AY722457.1
<i>Eruca pinnatifida</i> (Desf.) Pomel	NCBI	AY722458.1
<i>Eruca setulosa</i> Boiss. & Reut.	Herbarium of the Natural History Museum, Vienna	W Bourgeau 1856
<i>Eruca vesicaria</i> (L.) Cav.	NCBI	AY722459.1
<i>Erucastrum abyssinicum</i> (A.Rich.) O.E.Schulz	NCBI	AF531614.1
<i>Erucastrum arabicum</i> Fisch. & C.A.Mey.	Vienna University Herbarium	WU Mooney 9278
<i>Erucastrum arabicum</i> Fisch. & C.A.Mey.	Vienna University Herbarium	WU Hepper 6229
<i>Erucastrum arabicum</i> Fisch. & C.A.Mey	Herbarium of the Natural History Museum, Vienna	W 882
<i>Erucastrum arabicum</i> Fisch. & C.A.Mey.	NCBI	GI837375544
<i>Erucastrum brevirostre</i> (Maire) Gomez-Campo	NCBI	AY722461.1
<i>Erucastrum canariense</i> Webb & Berthel.	NCBI	AY722462.1
<i>Erucastrum griquense</i> (N.E.Br.) O.E. Schulz	NCBI	AF531607.1
<i>Erucastrum leucanthum</i> Coss. & Durieu	Herbarium of Komarov Botanical Institute RAS, Saint Petersburg	LE Bochantsev 1965
<i>Erucastrum littoreum</i> (Pau & Font Quer) Maire	NCBI	AY722463.1
<i>Erucastrum meruense</i> Jonsell	NCBI	AF531646.1

<i>Erucastrum nasturtiifolium</i> (Poir.) O.E.Schulz	NCBI	AY722464.1
<i>Erucastrum strigosum</i> (Thunb.) O.E.Schulz	NCBI	AY722465.1
<i>Erucastrum varium</i> (Durieu) Durand	NCBI	AY722466.1
<i>Erucastrum virgatum</i> C. Presl	NCBI	AY722467.1
<i>Guiraoa arvensis</i> Coss.	NCBI	AY722468.1
<i>Hemicrambe fruticulosa</i> Webb	NCBI	AY722469.1
<i>Hirschfeldia incana</i> (L.) Lagr.-Foss.	NCBI	AY722470.1
<i>Kremeriella cordylocarpus</i> (Coss. & Durieu) Maire	NCBI	AY722471.1
<i>Moricandia arvensis</i> (L.) DC.	NCBI	EF601899.1
<i>Moricandia moricandioides</i> (Boiss.) Heywood	NCBI	EF601904.1
<i>Moricandia suffruticosa</i> (Desf.) Coss. & Durieu	NCBI	EF601908.1
<i>Morisia monanthos</i> (Viv.) Asch.	NCBI	AY722476.1
<i>Otocarpus virgatus</i> Durieu	NCBI	AY722477.1
<i>Raffenaldia primuloides</i> Godr.	NCBI	AY722478.1
* <i>Raphanus pugioniformis</i> Boiss	Available at Israel Plant Gene Bank	27623
<i>Quidproquo confosum</i> Greuter & Burdet		Ziffer-Berger et al. 2014
<i>Raphanus odessanus</i> Spreng.	Herbarium of Komarov Botanical Institute RAS, Saint Petersburg	LE 2950
* <i>Raphanus raphanistrum</i> L.	Israel Plant Gene Bank	23608
<i>Raphanus raphanistrum</i> L.	Herbarium of the Hebrew University of Jerusalem	HUJ102459
<i>Raphanus raphnistrum</i> var. <i>landra</i>	Herbarium of the Natural History Museum, Vienna	W Rechinge 1959
<i>Raphanus raphnistrum</i> var. <i>landra</i>	Israel Plant Gene Bank	101334

<i>Raphanus rostratus</i> DC.	Herbarium of the Natural History Museum, Vienna	W 450
<i>Raphanus rostratus</i> DC.	Herbarium of the Natural History Museum, Vienna	W Rechinge 1975
<i>Raphanus rostratus</i> DC.	Herbarium of the Natural History Museum, Vienna	W 54132
<i>Raphanus rostratus</i> DC.	Herbarium of the N.I.Vavilov Institute of Plant Gen.Res, Saint Petersburg	WIR 98178
<i>Rapistrum perenne</i> (L.) All.	NCBI	AY722481.1
<i>Rapistrum rugosum</i> (L.) All.	NCBI	DQ249825.1
<i>Rytidocarpus moricandioides</i> Coss	NCBI	EF601910.1
<i>Sinapidendron angustifolium</i> Lowe	NCBI	AY722484.1
<i>Sinapidendron frutescens</i> Lowe	NCBI	DQ249823.1
* <i>Sinapis alba</i> L.	Israel Plant Gene Bank	21694
<i>Sinapis arvensis</i> L.	NCBI	DQ249828.1
<i>Sinapis pubescens</i> subsp. <i>pubescens</i> L.	NCBI	AY722488.1
<i>Sisymbrium irio</i> L.	NCBI	KF730127.1
<i>Sisymbrium officinale</i> (L.) Scop.	NCBI	KF730124.1
<i>Trachystoma aphanoneurum</i> (Maire & Weiller) Maire & Weiller	NCBI	AY722491.1
<i>Trachystoma ballii</i> O.E.Schulz	NCBI	AY722492.1
<i>Trachystoma labasii</i> Maire	NCBI	AY722493.1

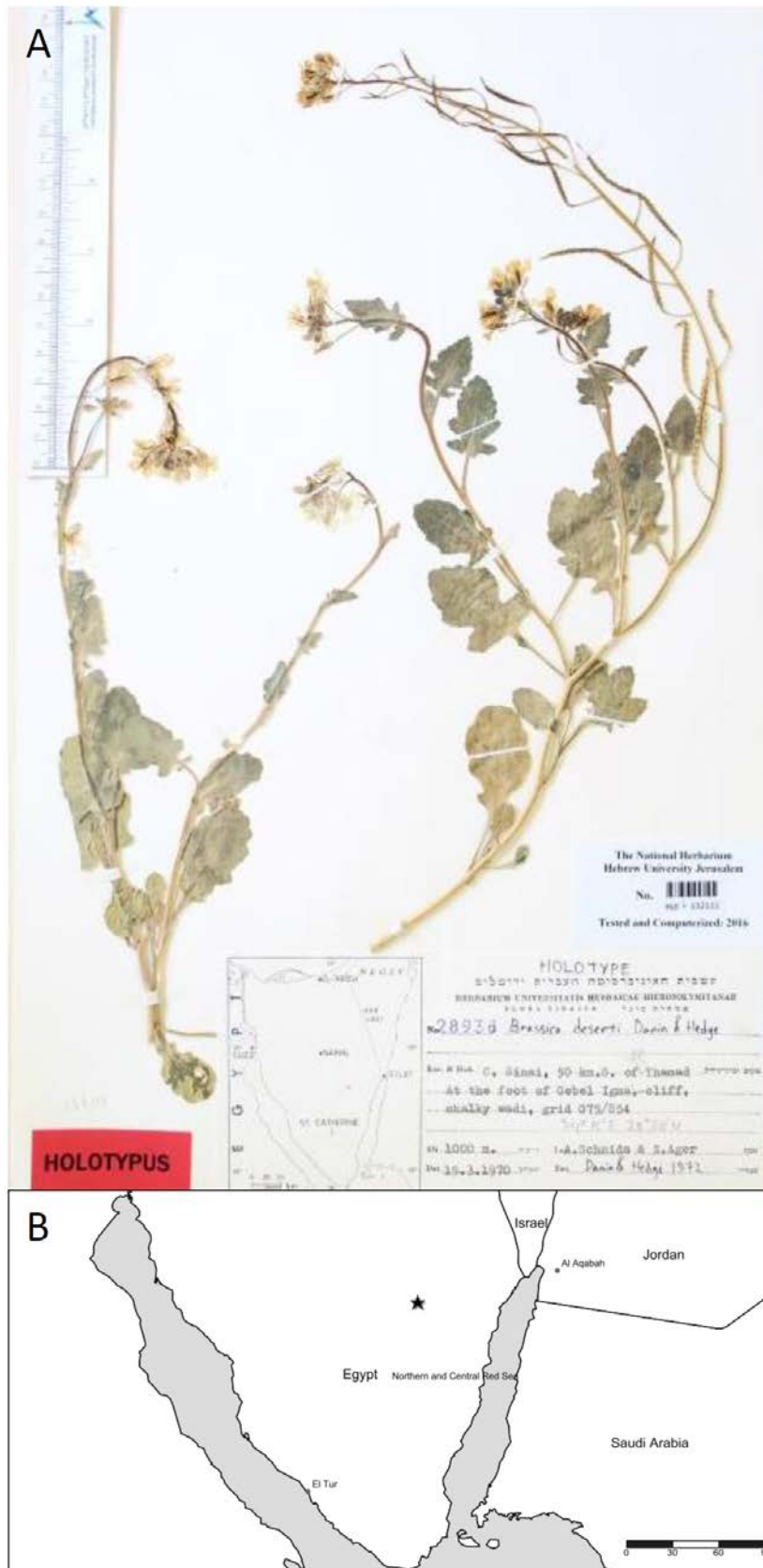


Figure S1. *Brassica deserti* Danin & Hedge A. Holotype (HUJ-132111), designated in the protologue (Danin and Hedge 1973). B. Map of the Sinai desert area. Created with SimpleMappr (<http://www.simplemappr.net>).

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