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STUDIES ON *CRUCIFERAE*: IV. CHOROLOGICAL NOTES

by

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Abstract. A number of chorological data involving thirty-two crucifer taxa is presented. These include some new localities which have been considered to be of relevance, confirmations for some ancient citations, etc. In some cases (*Brassica amplexicaulis* (Desf.) Pomel, *Diplotaxis harra* (Forskal) Boiss., *Sinapis arvensis* L.) distant populations of the same taxon are morphologically compared. Comparisons of this type may help to trace the place of origin of some adventives, as it is exemplified by Californian *Brassica nigra* (L.) Koch and *B. tournefortii* Gouan and by Australian *B. tournefortii* Gouan.

Resumen. Se presenta un conjunto de datos corológicos relativos a treinta y dos táxones de la familia Crucíferas. Se incluyen algunas localidades nuevas, que se han juzgado de interés. confirmaciones de algunas citas antiguas, etc. En determinados casos (*Brassica amplexicaulis* (Desf.) Pomel, *Diplotaxis harra* (Forskal) Boiss., *Sinapis arvensis* L.) se comparan morfológicamente poblaciones, a veces muy distantes, de un mismo taxon. Comparaciones de este tipo pueden servir para explorar el lugar de origen de algunas adventicias, tal y como se ejemplifica con las *Brassica nigra* (L.) Koch y *B. tournefortii* Gouan de California o la *B. tournefortii* Gouan de Australia

INTRODUCTION

In the past fifteen years, much field work has been devoted to the elaboration of a seed bank of Crucifers (GÓMEZ-CAMPO et al., 1976). Seed collection activities have often yielded a number of parallel data of very diverse nature i. e. chorological, ecological, physiological, pathological. etc. A number of selected cases which have been considered of some interest are put together and described in this article. They mostly refer to chorological and/or ecological aspects, including some instances of morfological variation in relation to geography.

References for most of these citations are not dissicated specimens,

but seed samples from the above mentioned seed bank. The initials GC followed by a four digit number will serve for identification of each sample whenever available. It is warned not to mistake these figures as UTM coordinates. The use of coordinates themselves has been avoided due to difficulties in obtaining the exact figures for a number of cases.

Brassica amplexicaulis (Desf.) Pomel

Col de Jerada, North of Ain-Benimathar (N. E. Morocco) on steep slopes, 1150 m, GC-3691. Samples of this population were apparently misdescribed by VINDT (1955) as *Erucastrum varium* Durieu subsp. *barbei*. Moroccan plants of *B. amplexicaulis* show a zig-zag flowering stem, as opposite to the individuals from Alger and Constantine where the stem is straight.

Brassica barrelieri (L.) Janka

Lower part of Los Canjorros hill, South of Castellar de Santiago (Ciudad Real province, S. C. Spain), 900 m, GC-3878. This is a small «island» of calcareous sustrate surrounded by extensive acidic soils. The species, which is foundamentally acidophyll, has invaded this area without apparent loss of vegetative or reproductive vigour.

Brassica fruticulosa Cyr. subsp. **radicata** (Desf.) Batt.

Maritime sands, West of Cap Falcon, W. Oran (Algeria), GC-3684. This place is much to the West in relation to the classic locality for this subspecies near El Kolea (W. Alger), GC-3667. Both localities are separated by the area of *B. fruticulosa* Cyr. subsp. *glaberrima* (Pomel) Batt. which occupies a similar habitat in the coasts inmediately East of Oran.

The population of Cap Falcon shows somewhat larger petals and narrower cotyledons than that of El Kolea.

Brassica napus L.

El Tleta, South of Oran (Algeria), 135 m, GC-3690. A very abundant sub-spontaneous population of this species extends for several

kilometers at both sides of the road from Oran to Mascara. It is often accompanied by *B. rapa* L. and also accidentally by *B. nigra* (L.) Koch. First observed in 1970, the population maintained itself in good conditions by 1975.

It is noteworthy that the three *Brassica* basic genomes A, B, C are implicitly present in this locality.

Brassica nigra (L.) Koch

Plants from four distant localities were grown side by side in the greenhouse and morphologically compared. These were:

GC-2248 Tarifa (S. Spain); GC-1720 S. Diego (California); GC-2262 from Ethiopia; GC-3751 Persepolis (Iran).

Plants from S. Spain and California were practically identical to each other, but they showed several differences in relation to the oriental ones (Iran and Ethiopia).

Cauline leaves of the Eastern plants were smaller in size (fig. 1) and

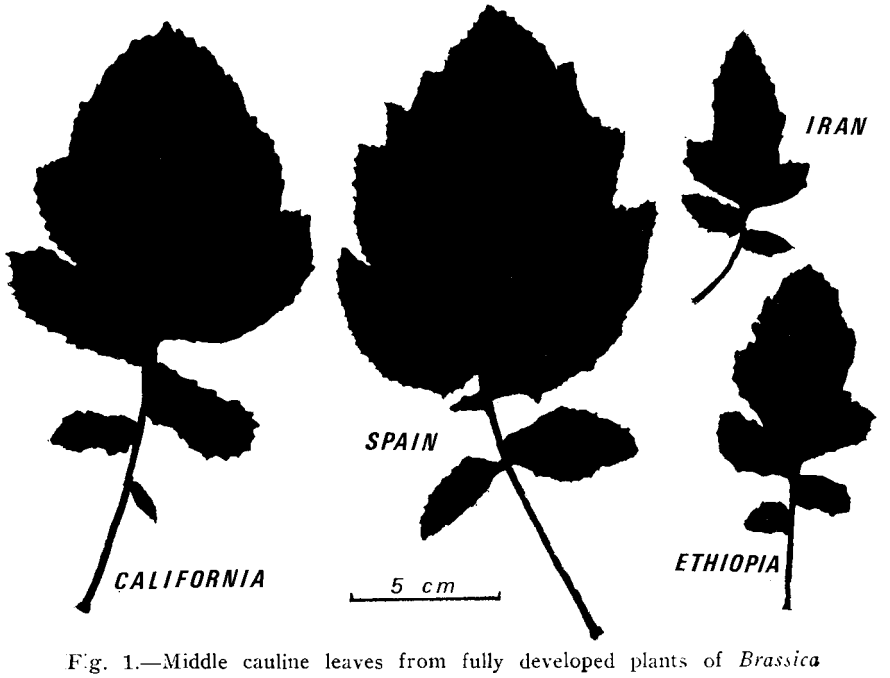

Fig. 1.—Middle cauline leaves from fully developed plants of *Brassica nigra* (L.) Koch from four distant localities.

less hirsute. Fruit was slightly longer. In the terminal part of flowering racemes, there were only 3-4 visible flower buds which were overtopped by the inmediate 4-5 open flowers. In the Western group, caulinar leaves are larger and more hirsute, and the fruit shorter and more acutely carenate. There were 10-12 flower buds in the top of the flowering racemes which were not surpassed by the inmediate open flowers. The oriental plants showed some characters in common with var. *bracteolata* (Fisch et Mey) Spach from Egypt, Syria and Sinai, but they clearly did not belong to this taxon.

The high similarity between Spanish and Californian plants was to be expected in advance on historical grounds, since a massive introduction of weeds —and crops— took place in late XVIII and early XIX centuries from the Iberian Paninsula. Nonetheless, this case demonstrates the possibility of exploring the place of origin of other adventives through the use of morphological characters as «tracers».

Brassica rapa L.

El Tleta, South of Oran (Algeria), GC-3687. An abundant subspontaneous roadside population mixed with *B. napus* L.

Brassica repanda (Willd.) DC. subsp. **blancoana** (Boiss.) Heywood

Near the summit of La Almenara in Sierra de Alcaraz (Albacete province, S. E. Spain), 1700 m, GC-2032. By its altitude and openness, this habitat shows a deep contrast with the nearby shadowy place Los Chorros del Río Mundo, 1050 m, GC-2030.

North of Nogueruelas (Teruel province) on slopes, GC-4769, 1200 m. The population shows a wide variability in plant size and fruit size and position. Some flowering shoots reached 120 cm. Fruit length ranged between 4 and 9 cm. Most pods were erecto-patent or patent, but some cases of outwardly arcuated semi-deflexed ones were also recorded.

Brassica repanda (Willd.) DC. subsp. **nudicaulis** (Lag.) Heywood

Km. 98 of the road from Madrid to Andalucía. A small population observed during 1971 and 1972 seasons, seems to have dissapeared afterwards.

Brassica tournefortii Gouan

Plants from the following distant localities were grown side by side in the greenhouse and compared morphologically:

GC-3241 Almería (S. E. Spain); GC-1740 Cottonwood (California); GC-3241 Ahwaz (Irán); GC-2227 Perth (Australia).

Young plants from Iran and Australia showed very early division of the leaf margin into acute segments, both samples being identical at this respect. Young plants from Spain and California needed more time —and more leaves— to develop a similar number of leaf segments, which were also distinctly less acute (figure 2); they were also both identical at this respect and different from the oriental group, not only in the mentioned juvenile characters, but also in leaf color which was darker in Western plants. Adults were hardly distinguishable to each other.

Since Australian and Californian plants should be considered to be introduced, juvenile characters strongly suggest their respective origins: while Australian representatives did not come from Europe but from the Eastern Asiatic range of the species, Californian plants were obviously introduced from W. Europe.

As in the case of *B. nigra* (L.) Koch described above, these conclusions could perhaps be expected in advance, but the case again provides an example of how the origin of some adventives could be traced.

Calepina irregularis (Asso) Thell

Fuencarral, North of Madrid, on granitic soil, 700 m; La Molata, near Alcaraz (Albacete province, S. E. Spain) at the base of North oriented calcareous rocks, 1000 m; South of Ain Sefra (N. W. Algeria). 800 m, on desertic sands.

The above citations exemplify the diversity of habitats where this species can be found.

Camelina microcarpa Andrz.

Its occurrence near the summit of Dornajo peak in Sierra Nevada (Granada province, S. Spain), 2100 m, was confirmed in 1972. By the same time, it seems that this plant could not be observed by ESTEVE CHUECA (1973-74).

It grows on the Southern side.

Ceratocnemum rapistroides Coss. et Ball

6 km. Nort of Debdou (N. E. Morocco), 1100 m. A locality much on the N. E. part of the species range. It makes believable that this monotypic genus can be eventullay found in N. W. Algeria.

Crambe filiformis Jacq.

Barranco behind the Ermita de Nuestra Señora de Gádor, near Berja (Almería province, S. E. Spain) on calcareous rocks, 380 m, GC-3252. A locality much on the East side of the range in S. Spain. The species might also exist in Murcia province (ESTEVE-CHUECA, 1972).

Crambe hispanica L. var. **glabrata** (DC.) Coss.

Los Canjorros hill, South of Castellar de Santiago (Ciudad Real province, S. C. Spain) on limestone rocks, 900 m, GC-3879. An abundant population, perhaps the most abundant of this species in Spain.

Cheiranthus cheiri L.

Castle of Atienza (Guadalajara province, C. Spain) on rocks. It is doubtful whether this population is native or anciently escaped from ornamental use by the castle inhabitants.

Diplotaxis harra (Forskal) Boiss.

Plants of this species collected from localities 4000 km apart were grown side by side and compared morphologically:

GC-1849 Biskrá (Algeria); GC-3737 Quars-el-Shirin (Iran).

Iranian plants had longer seeds and longer cotyledon laminas (with a ratio width/length equal to 0,67 against 0,85 in Algerian material). They also showed larger petals (11-12 × 6 mm) light yellow in color, and hairy flower stalks. Algerian plants showed deep yellow petals of 8 × 4 mm and glabrous flower stalks.

Diplotaxis siettiana Maire

The classic —and unique— locality in this species, Alborán Island (between Almería and Melilla) was visited by the end of June 1974

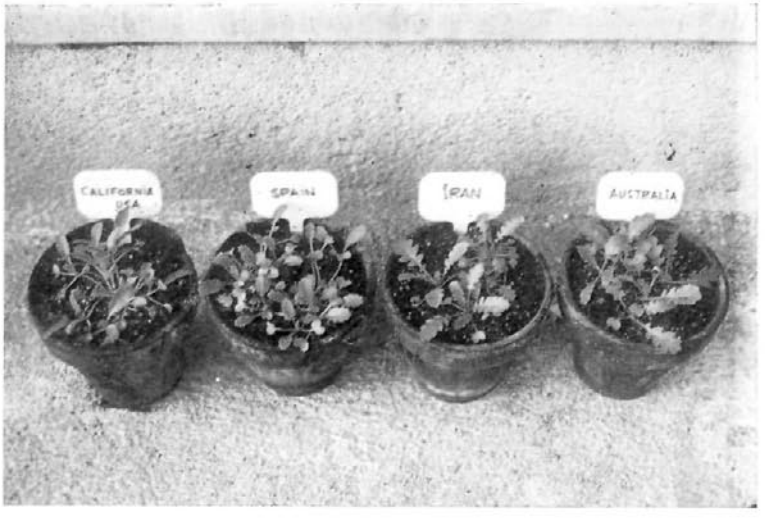

Fig 2.—Juvenile plants of *Brassica tournefortii* Gouan from four distant localities.

Fig. 3.—*Diplotaxis siettiana* Maire from Alborán island.

(Figure 3). The population was estimated to contain no more than 140 individuals, all growing in the surroundings of an helicopter landing platform. By several superposed reasons, such population should be considered as endangered.

A small seed sample was collected in 1974 and multiplied in Madrid by 1975 and 1976. Some fifty thousand seeds are now preserved in the crucifer seed bank which is kept in the author's laboratory (GC-3025).

Diplotaxis virgata (Cav.) DC.

The same type of places and habitats which this species occupies in the Southern half of Spain, seems to be more succesfully colonized in Morocco by *D. tenuisiliqua* Del. *D. virgata* is nonetheless also frequent in Morocco where it shows a wider polimorphism. Some localities are recorded from S. and S. W. Morocco:

16 km. Earts of Tafraute (S. W. Morocco) GC-2987; 52 km. North of Tazenakh (S. Morocco) GC-3003; 57 km. South of Agadir (S. W. Morocco) GC-2973; 144 km. Sounth of Agadir (S. W. Morocco) GC-2976; Valley of the Dades (S. Morocco) GC-3646; Oued Noum (S. W. Morocco) GC-2985; 15 km. East of Sidi Ifni (S. W. Morocco) GC-2980.

Erucaria hispanica (L.) Druce

It is suggested that this East Mediterranean species was historically introduced in Alicante province (S. E. Spain) as a weed by ancient Greek or Phoenician navigators and colonists. A population near Oran (N. W. Algeria) has apparently maintained itself during at least seventy years (MAIRE, 1965) but it could not be found by the author despite intensive explorations in 1967 and 1971.

Erucastrum varium Durieu

A wide intra-specific variation occurs in the area between Beni Snassen mountains (N. E. Morocco) and Oran (N. W. Algeria). The most common type can be easily confused with *Brassica cossoniana* Boiss. et Reut. However, the last species has almost completely sphaerical seeds, while in *E. varium* they are somewhat ellipsoidal or ovoid. They can also be distinguished by the number of leaf segments.

Erucastrum varium Durieu subsp. **subsiifolium** Maire

Col de Jerada, North of Ain-Benimathar (N. E. Morocco) on roadsides, 1150 m, GC-3692. The population shows a weedy habit, but it is morphologically identical to that from the *Macrochloa* steppes South of Ain-Benimathar.

Erucastrum laevigatum (L.) O. E. Schulz subsp. **brachycarpum** (Rouy) O. Bolós et Vigo

The small population of El Montgó, near Denia (Alicante province, E. Spain), 320 m, upon which the original description of this taxon was based, persisted in apparent good conditions by 1976 (GC-4305). RIGUAL (1972) was unable to confirm this locality.

Erysimum grandiflorum Desf.

Numancia ruins, near Soria (N. C. Spain), 1050 m.

Hirschfeldia incana (L.) Lagrèze-Fossat var. **geniculata** Bennet

Very common in Alger and Constantine areas. Plants which clearly exhibit the characters of this taxon can be found in the «ramblas» (dry riverbeds) South of Sierra Alhamilla (Almería province, S. E. Spain), GC-4716

Hutera hispida (Cav.) Gómez-Campo

The species has been recently recorded from Sierra Morena where some infra-specific variability has been described (GÓMEZ-CAMPO, 1977). In the opinion of the author of this article, most penibetic populations perhaps with the only exception of Sierra Nevada *H. cheiranthos* subsp. *nevadensis*) should also be adscribed to *H. hispida sensu lato*. Several infra-specific taxa remain to be adequately described from that area. Some material collected in Sierra Bermeja (Málaga province, S. Spain), GC-1615, between Ronda and San Pedro, has much shorter fruits (5 cm) than var. *granatensis* (O. E. Schulz) Gómez-Campo as described in *Flora Europaea* under *Rhynchosinapis granatensis* (O. E. Schulz) Heywood (HEYWOOD, 1964). Some early citations of *H. longirostra*

by Boissier (in WILLKOMM & LANGE, 1880) in this area, probably also correspond to *H. hispida*.

The species is most common along the Central mountain range (Cordillera Carpetana) between both Castillas. Some collections from this area (all between 700 and 1600 m of altitude) are:

Barraco (Avila) GC-0331; South Avila city, GC-0336-0337; Hoyo del Espino (Avila) GC-0339; Navacepeda (Avila) GC-0374; Parador de Gredos (Avila) GC-0958-1609; Puerto de Villatoro (Avila) GC-2015; Hernansancho (Avila) GC-1603; Sanchidrián (Avila); Fte. del Cántaro (Béjar, Salamanca) GC-2019-2299; El Pardo (Madrid) GC-0949; Aravaca (Madrid); Canencia (Madrid) GC-2028; Montejo de la Sierra (Madrid) GC-2027; Hoyo de Manzanares (Madrid) GC-2290; Cerro Abantos, El Escorial (Madrid); Sigüenza, pinar (Guadalajara) GC-0845.

Hutera longirostra (Boiss.) Gómez-Campo

Several localities for this species in the East part of Sierra Morena are included in the article by GÓMEZ-CAMPO (1977).

Moricandia spinosa Pomel

Beni Ounif, N. W. Algeria in desertic slopes and dry riverbeds, GC-1935. A population much on the N .W. side of the range of this species. Cotyledons are less elongated than in other *M. spinosa* populations. This character should be viewed as primitive within the species.

Myagrum perfoliatum L.

La Molata, near Alcaraz (Albacete province, S. E. Spain) very rare. Not far from the classic locality of the narrow endemic *Hutera rupestris* Porta.

Savignya longistyla Boiss. et Reuter

Near Outat-Oulad-el-Hadj (E. Morocco) a locality much on the N. W. part of the range. Arid pasturelands, GC-1469.

Sinapis arvensis L.

The position of the fruit in relation to the axis is particularly variable in this species. Most diversity seems to correspond to Morocco

and Algeria, but no geographic pattern of variation can be recognized within that area.

The pubescence of flower stalks and the morphology of the stigmata were also found to show geographic variation. Plants from South Oran (N. W. Algeria), GC-3687, showed entirely glabrous flower pedicels and stigmata with very slightly decurrent lips. Plants from Hamadan (W. Iran) GC-3732, showed retrorse hairs in their flower pedicels and entirely capitate stigmata.

Sisymbrella aspera (L.) Spach subsp. **pseudoboissieri** (Degen.) Heywood

La Molata, near Alcaraz (Albacete province, S. E. Spain), 1050 m, GC-2153.

Sisymbrium austriacum Jacq subsp. **contortum** (Cav.) Rouy

The citation of *S. austriacum* Jacq. subsp. *chysanthum* in Teruel province (E. Spain) inter Gea et Albarracin (under *S. austriacum* var. *acutangulum* (DC.) Koch) by ZAPATER (in WILLKOMM, 1893) should be referred to the subsp. *contortum*, GC-1238.

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