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Experimental taxonomic study of the species *Hesperis velenovskyi*

By

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Introduction

The subject of the study is: (1) to find out the unmber of chromosomes in the species *Hesperis velenovskyi* (Fritsch) Fritsch 1896: 5 ac 1899: 469; (2) to establish the crossability of this taxon with the species *Hesperis sylvestris* Crantz 1762: 34.

Material and method

Investigation of the number of chromosomes

Seeds: (1) Sindel (distr. Varna) — the eastern slopes of the elevation 96 m above the left bank of the river Provadijska reka, 14. 8. 1967, F. Dvořák; (2) East of the village Sindel (distr. Varna), 14. 8. 1967, F. Dvořák. The specimens are deposited: BRNU 430111—430114.

Method: I used root tips; fixation (3 parts of 96% C_2H_5OH : 1 part of CH_3COOH) for 10 minutes; maceration (1 part of 37% HCl : 1 part of 96% C_2H_5OH) for 10 minutes; rinsing with water for 10 minutes; staining by acetocarmine.

Hybridization

H. velenovskyi: seeds from the localities No. 1 and No. 2 mentioned above. *H. sylvestris*: seeds from the slopes above the Brno Dam (the locality called "Zouvalka") — locality No. 3. 10. 8. 1967, F. Dvořák.

The seeds of both species were sown in spring 1968 and 1970 in the experimental department of the Botanical Garden in Brno. The crossbreeding was carried out in 1969 and 1971.

An artificial hybridization was carried out in an usual manner (by taking out the stamens from the flower buds, always before the ripeness of the pollen; by protecting by means of bags the flowers prepared in this way from the

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pollination by insect; the pollination of castrated flowers by the pollen from the flowers of another plant — carried out 3 times in three successive days; the bags were left on the plant until the ripeness of the siliquae).

Explanation of the signs:

$\bar{x}$ Arithmetic mean (SPECHT 1968: 34, Nr. 132).

$s_{\bar{x}}$ Standard error of mean (SPECHT 1968: 598, Nr. 2029).

$\pm s$ Standard error (SPECHT 1968: 595, Nr. 2022).

Table 1

H. syl. = *Hesperis sylvestris* CRANTZ
H. vel. = *Hesperis velenovskyi* (FRITSCH) FRITSCH

No.		Year	Number of crossed flowers	Number of developed siliquae	The length of siliquae $\bar{x} \pm 3.s_{\bar{x}}$; $\pm s$	The average number of seeds in one siliqua
1	*H. vel.* Locality No. 1 & 2	1967	—	238	5,15±3.0,08; 1,29	13,6
2	*H. vel.* Plants grown in Brno from seeds gathered in Bulgaria	1969	—	75	5,48±3.0,25; 2,17	13,4
3	*H. syl.* Locality No. 3	1965	—	58	5,53±3.0,19; 1,49	18,7
4a	*H. vel.* Mutually artificially crossed	1969	38	38	7,44±3.0,38; 2,38	25,3
b		1971	39	39	6,95±3.0,46; 1,87	27,1
5a	*H. vel.* ♀×*H. syl.* ♂	1969	34	31	5,68±3.0,27; 1,54	13,5
b		1971	51	50	6,91±3.0,29; 2,05	26,4
6a	*H. syl.* ♀×*H. vel.* ♂	1969	56	53	6,25±3.0,25; 1,82	17,2
b		1971	53	51	7,28±3.0,21; 1,51	29,1
7	*H. vel.* ♀×*H. syl.* ♂ artificially crossed with *H. vel.* ♂×*H. syl.* ♀	1971	185	161	7,48±3.0,08; 2,26	21,2
8	*H. vel.* ♀×*H. syl.* ♂ and *H. vel.* ♂×*H. syl.* ♀ freely pollinated by insect	1971		171 (No. 1) 133 (No. 2)	6,64±3.0,12; 1,62 6,87±3.0,11; 1,33	19,4 23,4

Results of the study

Number of chromosomes: *H. velenovskyi* 2n = 14. *H. velenovskyi* subsumes, therefore, under the diploid series of the genus *Hesperis* L. subg. *Hesperis* under the species: *H. sylvestris* CRANTZ (DVOŘÁK 1964), *H. elata* HORNEM. (SOKOLOVSKAJA & STRELKOVA 1948 — sub *H. sibirica* L.), *H. pycnotricha* BORB. & DEG. (DVOŘÁK 1966), *H. steveniana* DC. (DVOŘÁK 1967, MATVEJEVA & TICHONOVA 1968 — see FEDOROV 1969).

Hybridization: Table No. 1. On the plants of the species *H. velenovskyi*, which were artificially crossbred, there developed longer siliquae (line 4: $\bar{x} = 6{,}95$; $\bar{x} = 7{,}44$) than on the plants of the same species not pollinated artificially. After the crossbred of *H. velenovskyi* with *H. sylvestris* there developed siliquae (line 5 and 6: $\bar{x} = 5{,}68$; $\bar{x} = 6{,}25$; $\bar{x} = 6{,}91$; $\bar{x} = 7{,}28$) with the minimum $\bar{x}$ and also maximum $\bar{x}$ situated in the extent of the variability of the length of the siliquae of both parental species. The length of the siliquae of F_1 generation (line 7: $\bar{x} = 7{,}48$) is nearly equal to the length of the siliquae of the species *H. velenovskyi* on the line 4a.

By hybridization in 1969 a good crossability of *H. velenovskyi* with *H. sylvestris* was established. The tests repeated in 1971 only confirmed this fact. As also in the F_1 generation there developed long siliquae (both by artificial pollination and by free pollination by insect) with the number of seeds corresponding to the extent of the variability established during the experiment, I infer that between both taxa does not exist a genetic barrier. Morphologically the two taxa differ one from another only by the indumentum of the flower stalks. Between the taxa there also does not exist a geographic isolation. I am inclined, therefore, to believe that *H. velenovskyi* is only a subspecies of the species *H. sylvestris*, as already BORZA 1947 inferred.

Summary

Hesperis velenovskyi (FRITSCH) FRITSCH: 2n = 14. It is well crossable with *H. sylvestris* CRANTZ. Experimental investigation has corroborated that there are good reasons for the combination of *H. sylvestris* CRANTZ subsp. *velenovskyi* (FRITSCH) BORZA, which was established on the basis of morphological and phytogeographical studies.

Zusammenfassung

Hesperis velenovskyi (FRITSCH) FRITSCH: 2n = 14. Die Art läßt sich gut kreuzen mit *H. sylvestris* CRANTZ. Die experimentelle Forschung bestätigte die Richtigkeit der Kombination *H. sylvestris* CRANTZ subsp. *velenovskyi* (FRITSCH) BORZA, die auf Grund morphologischer und pflanzengeographischer Studien aufgestellt wurde.

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