

## Some Remarks on the Genus *Clausia*

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With 7 Figures

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### 1. Introduction

The study of the genus *Hesperis* L. requires a specification of the generic characters by which it differs from other genera, especially from the genus *Clausia* KORN.-TR. in Index sem. Horti Kazan. 1834 (cit. sec. VASILČENKO 1939). TZVELEV himself 1959: 117 writes that the problem of the independence of the genus *Clausia* has not yet been solved.

### 2. Differentiating generic characters between the genus *Hesperis* and the genus *Clausia*

According to HAYEK 1911: 223—224 the genus *Clausia* differs from that of *Hesperis* „... hauptsächlich durch die seitenwurzigen Samen ...“ An equally important differentiating character between the genus *Hesperis* and the genus *Clausia* I consider to be the flattened seeds provided by a margin, further the anatomical structure of the pod partition. As ensued from the study of the genus *Hesperis* a different anatomical structure of the partition is linked with the existence of further characters, differentiating the investigated taxon from other taxa. It offers itself, therefore, as a very valuable character for the elaboration of infrageneric or generic categories.

TZVELEV 1959: 117 calls the attention to the fact that the species of the genus *Hesperis* differ from the species of the genus *Clausia* by a series of further important characters consisting in the structure of the pod and in the root system. The author does not specify more in detail the term “the structure of the pod”. He had, probably, in mind the anatomical structure of the partition of the pod.

Further important differentiating character between the genus *Hesperis* and the genus *Clausia* are the pedicellate glands — glandulae stipitatae globosae. They are multicelled glands with not only a multicelled basal part, but also with a multicelled globularly enlarged apical part. No species of the genus *Hesperis* has this kind of glands in its indumentum.

A remarkable result was brought by the study of the holotype of the taxon *Hesperis limprichtii* O. E. SCHULZ var. *violacea* O. E. SCHULZ. At the slightest touch of the leaves the lowest one broke off. A closer investigation of this easy breaking showed that the leaves adhere to special salient pulvini (Fig. 1). I did not find this character, which I consider to be very important, with no other species of the genus *Hesperis*. I take it for another generic character differentiating the genus *Hesperis* from that of *Clausia*.

It follows from the chapter that the species of the genus *Clausia*, compared with the genus *Hesperis*, have six important generic characters: a radicle accumbent; flat seeds provided with a margin; the anatomical structure of the pod partition; the root system; pedicellate glands; pulvinus. Even if the two characters that I have determined are probably not developed with all species of the genus *Clausia*, nevertheless, the absence of these characters with the genus *Hesperis* proves the difference of both genera.

### 3. *Clausia trichosepala* (TURCZANINOV) DVOŘÁK comb. nova

Basionym: *Hesperis trichosepala* TURCZANINOV 1832: 180. — Synonyms: *Cheiranthus apricus* STEVEN var. *trichosepalus* FRANCHET 1884: 32 (cit. sec. KITAGAWA 1939). *Donstonemon hispidus* MORI 1922: 174 (cit. sec. KITAGAWA 1939). *Hesperis Limprichtii* O. E. SCHULZ 1922: 390. *Hesperis limprichtii* O. E. SCHULZ var. *violacea* O. E. SCHULZ 1924: 162.

I prove the relevance of the species *Hesperis trichosepala* both by the study of the works quoted and by the study of the taxon *Hesperis limprichtii*.

I used for it the following specimens: 1. "Prov. Chili: Hsiao-wu-tai-shan: Yang-kia-p'ing, Tung-lin, am Ackerrand, ca. 1200 m s. m.: 27. 8. 1921 HARRY SMITH No. 481", B (holotype). — 2. "Mongolia interior: 70 li ad orient. Golchagan (= Gul-chaghan) in montosis: 29. 6. 1934 JOEL ERIKSSON No. 860", S. — 3. "Mongolia interior: Hongor Obo = Khonghor-obo in declivi montis: 11. 8. 1926 JOEL ERIKSSON No. 261", S.

I wish to express here my thanks to prof. NORLINDH from Naturhistoriska Riksmuseet, Botaniska Avdelningen in Stockholm for his great kindness in sending me the photograph of another specimen with the label "920. Mongolia, Hongor obo 30. 8. 1920 JOEL ERIKSSON".

While from the description of the taxon *Hesperis limprichtii* O. E. SCHULZ 1922: 390 its difference from the species of the genus *Hesperis* is not obvious, then in the description of *Hesperis limprichtii* var. *violacea* we can read the specific characters of the genus *Clausia*: "Semina ... compressa, anguste alata, ... pleurorrhiza" (Fig. 2). The outside sepals

are bisaccate at the base. At the top they have several eglandular simple hairs (Fig. 3). The nectaires (Fig. 5) have the shape of a horseshoe ridge open at the front, closed at the back. The style is 0,9 mm wide, the stigma 1,2 mm broad, nearly ball-shaped (Fig. 4). The lobes of the stigma are shorter than is the length of the stigma; they do not adhere but stand apart. A total absence of pedicellate glands and the existence of the pulvini partly differentiate this species from other species of the genus *Clausia*.

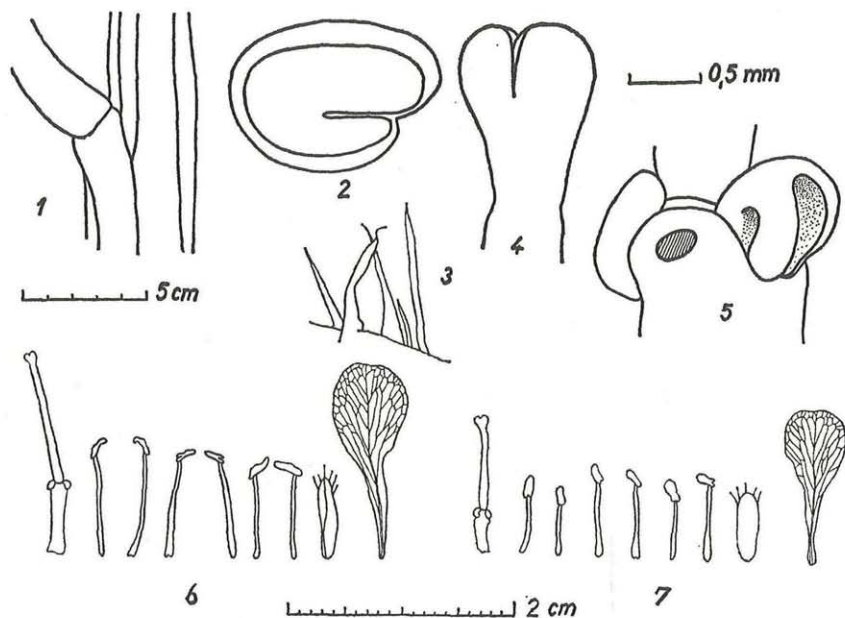


Fig. 1—7. *Clausia trichosepala* (TURCZ.) DVOŘÁK. — Fig. 1. folii pulvinus; Fig. 2. seed; Fig. 3. indumentum of the end of the sepals; Fig. 4. stigma; Fig. 5. nectaires; Fig. 6. parts of the flower of f. *duplex* DVOŘÁK; Fig. 7. parts of the flower of f. *trichosepala*.

Interesting results were obtained by the biometric investigation of the pollen grains. See the tables 1, 2, 3. The specimen (1) and (3) have a nearly identical size of the pollen grains (table 1). The shape of the pollen grains is nearly globular (table 3). The specimen (2) has fairly bigger pollen grains (tables 1, 2). The difference of the size of the pollen grains permits — on the basis of analogical situation, found with the genus *Hesperis* (see DVOŘÁK 1965) — to infer that it is a polyploidy.

It is also confirmed by the comparison of the flowers (Fig. 6, 7 and table 4).

The habit of both compared plants, the shape of the leaves, the indumentum and some further characters are nearly the same. Besides the

Table 1

| No. | Specimens                                                                                                                                                                  | The length of the polar axis<br>(in $\mu$ ) |         | The equatorial diameter<br>(in $\mu$ ) |         | n   |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------|----------------------------------------|---------|-----|
|     |                                                                                                                                                                            | $\bar{x} \pm 3 \cdot s_x$                   | $\pm s$ | $\bar{x} \pm 3 \cdot s_x$              | $\pm s$ |     |
| 1   | <i>C. trichosepala</i> . "Prov. Chili: Hsiao-wu-tai-shan: Yang-kia-p'ing, Tung-lin, Am Ackerrand, ca. 1200 m s. m": 27. 8. 1921 HARRY SMITH, No. 481, B                    | 26,05 $\pm$ 3.0,100                         | 0,709   | 23,31 $\pm$ 3.0,081                    | 0,575   | 50  |
| 2   | <i>C. trichosepala</i> . "Mongolia interior: 70 li ad orient. Golchaggan (= Gul-chaghan) in montosis": 29. 6. 1934 JOEL ERIKSSON, No. 860, S                               | 33,77 $\pm$ 3.0,668                         | 6,688   | 25,49 $\pm$ 3.0,372                    | 3,726   | 100 |
| 3   | <i>C. trichosepala</i> . "Mongolia interior: Hongor Obo = Khonghor-obo in declivi montis": 11. 8. 1926 JOEL ERIKSSON, No. 261, S                                           | 26,02 $\pm$ 3.0,445                         | 4,453   | 22,15 $\pm$ 3.0,293                    | 2,926   | 100 |
| 4   | <i>C. aprica</i> . "Regio transbaicalensis, ad oppidum Verchne Udinsk": 16. 6. 1900 K. J. EHNBURG, JE                                                                      | 30,23 $\pm$ 3.0,140                         | 0,987   | 24,50 $\pm$ 3.0,127                    | 0,900   | 50  |
| 5   | <i>C. aprica</i> . "Am Ural": POLETOW, JE                                                                                                                                  | 29,69 $\pm$ 3.0,080                         | 1,333   | 23,39 $\pm$ 3.0,083                    | 0,589   | 50  |
| 6   | <i>C. aprica</i> . "Orenburg": KÜHLENWEIN, 85436 BRNU                                                                                                                      | 34,87 $\pm$ 3.0,175                         | 1,237   | 23,59 $\pm$ 3.0,088                    | 0,617   | 50  |
| 7   | <i>C. turkestanica</i> . "Prov. Mayamana Darrah Zang near Belçeragh, rocky slopes alt. c. 1400 m": 29. 5. 1962 HEDGE & WENDELBO, No. W. 3733, E                            | 25,49 $\pm$ 3.0,075                         | 0,756   | 23,32 $\pm$ 3.0,072                    | 0,727   | 100 |
| 8   | <i>C. turkestanica</i> . "Prov. Bamian: Kargana-tu on road to Band-e-Amir, dry slopes, 3100 m": 28. 6. 1962 HEDGE & WENDELBO, No. W. 4736, E                               | 26,76 $\pm$ 3.0,085                         | 0,851   | 22,64 $\pm$ 3.0,102                    | 1,021   | 100 |
| 9   | <i>C. turkestanica</i> . "Prov. Kabul: Panjao, in the vicinity of Panjao, limestone rocks, 2700 m": 1. 7. 1962 HEDGE & WENDELBO, No. W. 4907, E                            | 26,48 $\pm$ 3.0,103                         | 0,725   | 22,96 $\pm$ 3.0,095                    | 0,675   | 50  |
| 10  | <i>C. hispida</i> . "Herbarium Florae Asiae Mediae ab Universitate Asiae Mediae editum. Fasc. IV. Martius a. 1925. No. 99. Prov. Syr-Darja, distr. Taschkent". 131340 BRNU | 24,18 $\pm$ 3.0,108                         | 0,763   | 21,60 $\pm$ 3.0,055                    | 0,386   | 50  |



mentioned differences in the length of the parts of the flowers the diploid plants differ from the polyploid one, perhaps, also by the height (diploid: 15–25 cm; polyploid ca. 50 cm — of course, the syntype No. 920 has a stem also some 50 cm high); the basal flowers of some diploid plants (not of all) grow from the axil of the bract; the diploid plants have more often a branched stem (branches being 3–10 cm long), the polyploid plants have a single stem. In spite of the existence of certain differentiating characters I infer that it is an autopolyploidy. I evaluate the specimen (2) as a form.

Table 4

| Flowers (in mm)                         | <i>Clausia trichosepala</i> (TURCZ.) DVOŘÁK |                                           |
|-----------------------------------------|---------------------------------------------|-------------------------------------------|
|                                         | Specimen (1)<br>(f. <i>trichosepala</i> )   | Specimen (2)<br>(f. <i>duplex</i> DVOŘÁK) |
| sepals                                  | 6                                           | 7                                         |
| the claw of the petals                  | 7                                           | 8                                         |
| the blade of the petals                 | 7 × 5                                       | 9 × 7                                     |
| shorter stamens (filament and<br>anther | 4,0+2,0                                     | 7,0+3,0                                   |
| longer stamens (filament and<br>anther  | 6,5+2,0                                     | 9,0+3,0                                   |
| style                                   | 7,0                                         | 10,5                                      |
| stigma                                  | 1,0×1,0                                     | 1,2×0,9                                   |

*Clausia trichosepala* (TURCZANINOV) DVOŘÁK f. *duplex* DVOŘÁK  
f. nova.

Diagnosis: Typo fere respondet, planta autem polyploidea. Grana pollinis: vide table 1, 2, 3. Florum dimensiones: vide table 4 and Fig. 6. — Typus: S; label: "Mongolia interior: 70 li ad orient. Golchaggan (= Gulchaghan) in montosis: 29. 6. 1934 JOEL ERIKSSON No. 860."

Annotationes: (1) The specification of the form categories is based on the study of BÖCHER's 1954 paper. — (2) Let's notice the table 3 (line 1, 2, 3). The pollen grains of the specimen (1) and of the specimen (3) are nearly globular. If we transfer the difference between the length and the breadth of the pollen grains of the specimen (2) into the graph, we get a curve with two conspicuous culminant points. On the basis of the study of the genus *Hesperis* I infer that the plant on the specimen (2) is partly of a hybrid origin.

#### 4. Remarks on the genus *Pseudoclausia* POPOV

According to the diagnosis the genus *Pseudoclausia* should differ from that of *Clausia* by "... radice bienne, siliquis rostro manifesto terminatis ..." (POPOV 1955: 18). The study made so far has brought the following results:

1. The pods of the four species of the genus *Clausia*, which were investigated, are compressed from the ridge. They are nearly equally broad along their whole length. The measurement of the narrowed top part — i. e. of the beak (from the end to the valves) — brought the following data (in mm):

Table 5

| Taxon                  | Beak            | Length of the stigma lobes | n  |
|------------------------|-----------------|----------------------------|----|
| <i>C. turkestanica</i> | (1,7)–2,8–(3,9) | (1,6)–2,2–(2,3)            | 20 |
| <i>C. aprica</i>       | (1,2)–1,3–(1,8) | (0,5)–0,57–(0,7)           | 20 |
| <i>C. trichosepala</i> | (1,0)–1,4–(1,7) | (0,4)–0,47–(0,6)           | 20 |

It ensues from the table that there exist differences, which can be statistically proved, in the length of the beak and in the length of the stigma lobes between the species of the genus *Clausia* (*C. aprica*, *C. trichosepala*) and the species shifted to the genus *Pseudoclausia* (*C. turkestanica*).

2. VASILČENKO 1939 gives with all the species of the genus *Clausia* the symbol perennis; only with *C. papillosa* there is the symbol annua. The investigated plants of *C. turkestanica* — according to POPOV *Pseudoclausia turkestanica* — are perennial. The use of the character biennial — perennial with the genus *Hesperis* as a generic character would not stand the proof.

3. Comparison of the shape of the size of pollen grains. I use this character as it proved valuable at the separation of *Hesperis tristis* into an independent genus *Deilosma* SPACH. It ensues from the table 1, 2, 3 that the pollen grains of the taxa *C. turkestanica*, *C. hispida*, *C. trichosepala* f. *trichosepala* have a very similar shape of the pollen grains. From this group of taxa differ, by this size and by the shape, the pollen grains of the taxa *C. aprica* and *C. trichosepala* f. *duplex*. *C. trichosepala*, that according to the shape of the petals, the length of the beak and according to the shape of the stigma seem to be closely related to the species *C. aprica*, forming thus two forms linking the genus *Pseudoclausia*, defined by POPOV, with the genus *Clausia*.

4. I did not notice any difference between the compared species in the pod, in the anatomical structure of the pod partition and in the seeds.

5. The shape of the petals of *C. aprica* and *C. trichosepala* is broadly obovate. *C. hispida* and *C. turkestanica* have the petals narrowly obovate till oblong.

It follows from the points 1–5 that *C. trichosepala* and *C. aprica* differ from *C. turkestanica* and *C. hispida* obviously by the shape of the stigma, by the length of the beak and by the shape of the petals. Certainly, the shape of the petals may be fairly variable with some taxa — I have in mind for inst. *Hesperis bicuspidata* (WILLD.) POIR.: from an obovate

till a narrowly oblong one. It does not seem to me proper, therefore, to use this character as a differentiating generic character between the genus *Clausia* and the genus *Pseudoclausia*. The character could have been used thus only after the study of the shape of petals of all species of both genera mentioned. I have not done that by far. The polyploidy found by a biometric investigation of the pollen grains of the genus *Clausia* urgently requires a reexamination to know, whether the species, included by POPOV 1955 in the genus *Pseudoclausia* are not a diploid group of taxa that gave rise to the polyploid species of the genus *Clausia*. Until the correctness of the separation of the genus *Clausia* is verified by this karyological investigation, I incline to the determination of the group of the species, shifted by POPOV to the genus *Pseudoclausia*, as a mere infrageneric taxon of the genus *Clausia*.

### 5. Summary

The genus *Clausia* KORN-TR. differs from that of *Hesperis* L. by six generic characters. *Hesperis trichosepala* TURCZANINOV 1832 is transferred to the genus *Clausia*. The taxon *Clausia trichosepala* (TURCZANINOV) DVOŘÁK comb. nova forms a polyploid f. *duplex*. It is necessary to confirm the correctness of the determination of the genus *Pseudoclausia* POPOV by a karyological investigation.

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