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Does the Genus *Iodanthus* TORR. & GR. Subsume under the Tribe *Hesperideae*?

By

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With 4 Figures

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I. Introduction

PRANTL 1891: 183 subsumed the genus *Iodanthus* TORR. & GR. under *Sinapeae-Cardamininae* near the genus *Barbarea* R. BR. BRITTON & BROWN 1913: 178 arranged the chapter on the genus *Iodanthus* TORR. & GR. between the chapters devoted to the genera *Barbarea* R. BR. and *Arabis* L. HAYEK 1911: 222—223 reclassified the genus into the tribe *Alysseae*, the subtribe *Hesperidinae*. Here he separated an evolutionary line: *Cheiranthus* L. (○ || or ○ =) → *Iodanthus* TORR. & GR. (○ =) → *Hesperis* L. (○ ||). Certain objections against it were expressed by MOGGI 1965: 253: "Dall' areale non appaiono chiare le connessioni con *Cheiranthus*". MOGGI, however, considered the genus *Iodanthus* TORR. & GR. to be a shorter evolutionary line linked with the genus *Cheiranthus* L. SCHULZ O. E. 1936: 559 subsumed the genus *Iodanthus* TORR. & GR. under the tribe *Matthioleae*. According to the characters of the tribe and according to the enumeration of the genera is the tribe *Matthioleae* sensu O. E. SCHULZ an organizational grade and not an evolutionary line. The evolution of the genera proceeded from the genera having seeds with radicles incumbent and lengthened siliquae with separating valves to the genera having seeds with radicles accumbent and shortened siliquae with non-separating valves (ZOHARY 1948, JANCHEN 1942). These genera have usually siliquae sometimes provided with various horns for an epizooic spread of seeds. They belong, therefore, to the second degree of evolution, to telogenesis. The tribe *Matthioleae* sensu O. E. SCHULZ includes genera with radicles accumbent which must

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be the final members of various evolutionary lines. At the beginning of the tribe there were classified by O. E. SCHULZ the following genera: (1) *Solms-Laubachia* MUSCHLER, (2) *Aubrietia* ADANS., (3) *Iodanthus* TORR. & GR., (4) *Pseudocamelina* BUSCH, (5) *Notoceras* R. BR., (6) *Tetracme* BGE., (7) *Diceratella* BOISS. I do not know the first genus by my own investigation. The other genera, besides *Iodanthus* TORR. & GR., have shortened siliquae which have in the 5th—7th genera horns. It is, therefore, not correct to classify the genus *Iodanthus* TORR. & GR. with long siliquae among these genera. That is why a recent diagram of evolutionary relations (MOGGI 1965) does not follow O. E. SCHULZ's diagram either, but HAYEK's. Unfortunately the traditional classification of the genus *Iodanthus* TORR. & GR. is also kept in some more recent floras (see for inst. GLEASON 1968).

2. Investigated specimens

Herbarium of Henry S. CONARD. 2 m. e. of ?Montour. 19. 6. 1908. No. 737. W 10920. — Indiana. ?leg. W 94889. — Story County, Washington Twp., SE 1/4, Sec 6 T 83 N — R 24 W. 17. 5. 1954 MARSHALL. W 14208. — Kentucky ... ? CHORT. W 311236.

I am grateful to Prof. Dr. K. H. RECHINGER from the Botanical Department of the Museum in Vienna for lending me them.

Note: All the drawings are made by the drafting apparatus. They are original. In the drawings of the septum the arrowhead denoted by the letter A shows the direction of the longer axis of the siliqua.

3. Results of the study

The anatomical structure of the septum of the genus *Iodanthus* TORR. & GR. (Fig. 1) was correctly described by PRANTL 1891: 183. It was formed by a lobed prosenchyma whose cells are lengthened parallel with the longer axis of the siliqua. A similar anatomical structure of the septum can be found in the genera *Arabis* L., *Barbarea* R. BR. (Fig. 2) and in evolutionally old genera *Stanleya* NUTTALL, *Streptanthus* NUTTALL. Such an anatomical structure of the septum is, according to my own investigation, evolutionally more original than that in which the prosenchymatous cells are lengthened perpendicularly to the longer axis of the siliqua. Out of the genera which subsume under the subtribe *Hesperidinae* the same anatomical structure of the septum as has the genus *Iodanthus* TORR. & GR. can only be found in the genus *Malcolmia* R. BR. (in a new extent). The anatomical structure of the septum of further genera is different. It is not possible to bring the genus *Iodanthus* TORR. & GR. into evolutionary relation with the genus *Malcolmia* R. BR. for two reasons:

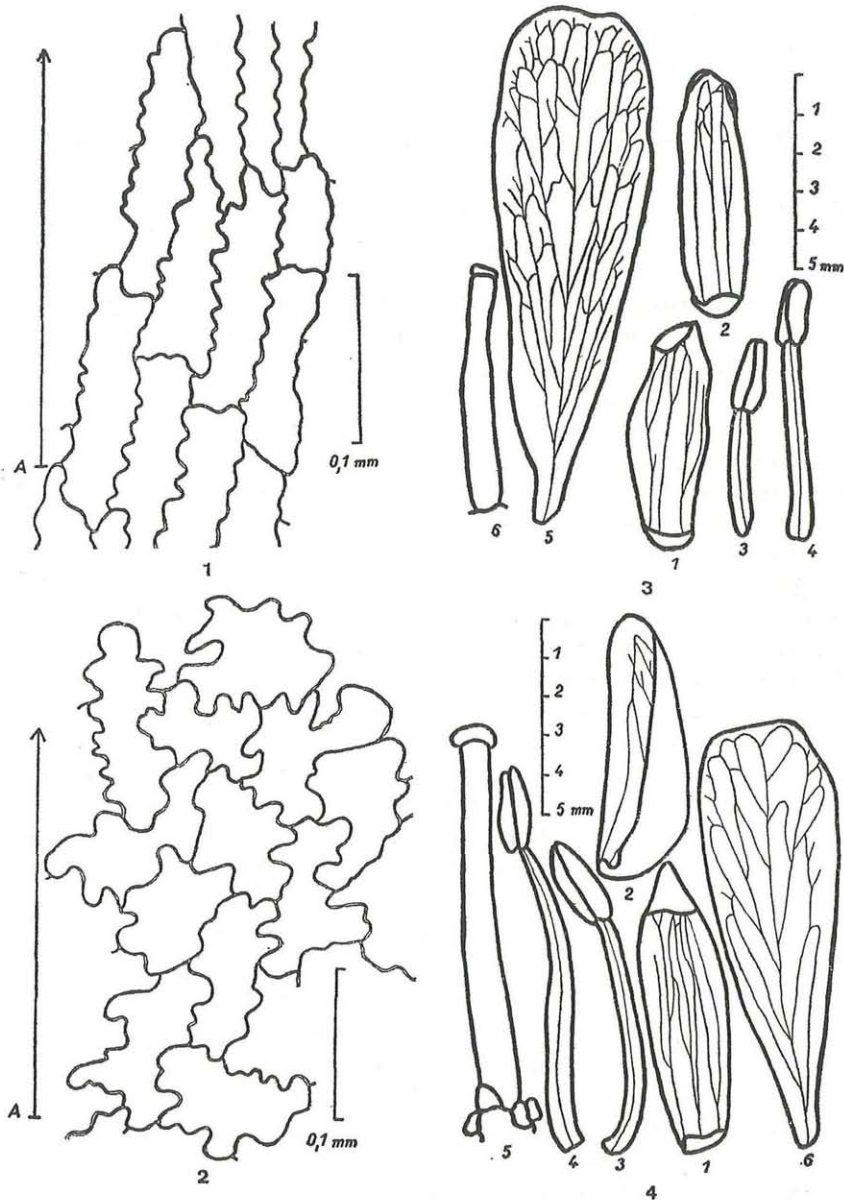


Fig. 1. *Iodanthus pinnatifidus* (MICHX.) STEUD.: septum. — Fig. 2. *Barbarea vulgaris* R. BR.: septum. — Fig. 3. *Iodanthus pinnatifidus* (MICHX.) STEUD.: 1 — outer sepal, 2 — inner sepal, 3 — outer stamen, 4 — inner stamen, 5 — petal, 6 — pistil. — Fig. 4. *Barbarea vulgaris* R. BR.: 1 — outer sepal, 2 — inner sepal, 3 — outer stamen, 4 — inner stamen, 5 — pistil, 6 — petal. — A = the direction of the longer axis of the siliqua.

1. *Iodanthus* TORR. & GR. is a monotypic genus of south-eastern North America. The genus *Malcolmia* R. BR. (with some 11 species) is a mediterranean and submediterranean genus.

2. The genus *Iodanthus* TORR. & GR. has seeds with radicles accumbent. *Malcolmia* R. BR. has seeds with radicles incumbent. As early as JANCHEN 1942: 8—9 found out that the genera having seeds with radicles incumbent are evolutionally more original. From the genera having seeds with radicles incumbent there developed genera with radicles accumbent. This regularity is not, however, of general validity only in a certain evolutionary line.

It means that according to the position of the radicle with respect to the cotyledons the genus *Iodanthus* TORR. & GR. belongs in the evolutionary line after the genus *Malcolmia* R. BR. what is not in keeping with the phytogeographic data.

With the genus *Malcolmia* R. BR. are evolutionally connected for inst. the following genera: *Maresia* POMEL (a mediterranean-submediterranean genus), *Eremobium* BOISS. (a saharian-sindian genus), *Morettia* DC. (a saharian-sindian genus).

The genus *Iodanthus* TORR. & GR. has evolutionary relations neither to the genera *Hesperis* L. (a genus with the radicle incumbent, a different anatomical structure of the septum, a different area), and to *Cheiranthus* L. (a genus with radicle incumbent or even accumbent, a different anatomical structure of the septum, a different area).

I consider the original classification of PRANTL's of the genus *Iodanthus* TORR. & GR. to be nearest to the truth. It is suggested by the areas of the genera subsumed under the subtribe *Cardamininae* and by the comparison of the morphological characters of the genus *Iodanthus* TORR. & GR. (Fig. 3) with those of the genus *Barbarea* R. BR. (Fig. 4) after which the genus *Iodanthus* TORR. & GR. was arranged by BRITTON & BROWN.

From the genera subsumed both by PRANTL 1891 and by HAYEK 1911 under the subtribe *Cardamininae* there grow in North America for inst. the genera *Barbarea* R. BR., *Platyspermum* HOOKER, *Leavenworthia* TORR., *Dryopetalum* A. GRAY, *Cardamine* L. (see for inst. BRITTON & BROWN 1913).

Besides the anatomical structure of the septum the genus *Iodanthus* TORR. & GR. has also further characters similar to those of the genus *Barbarea* R. BR., out of which I underline above all the base, the apex and the venation of the sepals, the shape of the petals, the shape of the filaments of the stamens and anthers of both whorls, the shape of the stigma, the seeds with radicles accumbent arranged in one row, the same indumentum. According to the references (HAYEK 1911) both genera have the same arrangement of myrosine cells. The absence of median nectaries, by which (besides the habit) HAYEK substantiated his classification, occurs also in some genera subsumed under the subtribe *Cardamininae* (for inst. in the genus *Nasturtium* R. BR.).

4. Conclusion

According to the comparison of the areas and of morphological characters of the genus *Iodanthus* TORR. & GR. does not subsume under the tribe *Hesperideae*. I consider the original classification of PRANTL's into the sub-tribe *Cardamininae* to be nearest to the truth.

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