

IRIDOID GLYCOSIDES IN THE LOASACEAE AND THE TAXONOMIC POSITION OF THE FAMILY

P. KOOIMAN

Laboratorium voor Algemene en Technische Biologie Technische Hogeschool, Delft

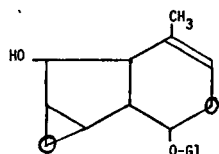
Recently two iridoid glycosides, mentzeloside (I) and decaloside (II), have been isolated from *Mentzelia decapetala* (*Loasaceae*) (BLISS *et al.* 1968, DANIELSON *et al.* 1973a, b). By using methods described earlier (KOOIMAN 1970) the present author isolated loganoside (III) from the seeds of *Blumenbachia hieronymi* and got evidence by paper chromatography that this compound occurs in leaves and seeds of *Cajophora lateritia*, *Loasa vulcanica*, *Mentzelia lindleyi* and *Blumenbachia hieronymi*. In the leaves loganoside is accompanied by another iridoid compound which is probably loganic acid (norloganoside).

The knowledge that iridoid glycosides occur in the *Loasaceae* prompted to a consideration of the taxonomic position of the family. Rather generally the *Loasaceae* are classified in the *Violales* (BENTHAM & HOOKER 1862–1883; ENGLER & DIELS 1936; WETTSTEIN 1935, although he obviously had his doubts: “Sehr isoliert ist die Stellung der *Loasaceae*”, and ‘Der Samenbau spricht gegen eine Verwandtschaft mit *Caricaceae*, *Passifloraceae* und *Cucurbitaceae*’; MELCHIOR 1964, who has the family in a separate sub-order; CRONQUIST 1968; PULLE 1952). HUTCHINSON (1967, 1969) assigned the family to the order *Loasales*, along with the *Turneraceae*; in his view the order was “perhaps derived from *Passiflorales* and tracing back to *Bixales*” (1967). *Bixales* in the sense of Hutchinson are part of the *Violales* as used in the present contribution*.

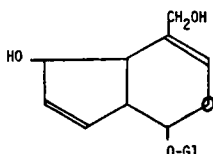
BENSON (1957) has an order *Loasales* (containing *Loasaceae*, *Datisceae* and *Ancistrocladaceae*) belonging to his group *Calyciflorae*; the *Violales* belong to his *Thalamiflorae*. A relation between the *Loasaceae* and the *Cucurbitaceae* was seen by BENTHAM & HOOKER (1862–1883) and by WETTSTEIN (1935).

The opinions referred to above are mostly based on “classical” morphology. Palynological support for a place in a system is not available (ERDTMAN 1952). Indications for relationship of the family with quite different groups of plants are based on embryological evidence. CRÉTÉ (1946) points to the resemblance of the embryogenies of *Loasa lateritia* and *Hyoscyamus*. Furthermore, CRÉTÉ (1951) and WUNDERLICH (1959) call attention to the endosperm haustoria occurring in the *Loasaceae* which are rare outside the *Gamopetalae*. Crété launches the possibility of a relationship with the *Symplocaceae*.

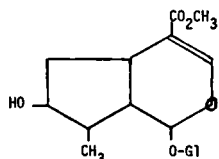
WUNDERLICH (1959) summarizes the families outside the *Gamopetalae* where endosperm haustoria occur and remarks that these families had been placed by Wettstein in the *Choripetalae* probably erroneously. One of these few families



I. mentzeloside



II. decaloside



III. loganoside

is the *Loasaceae*; because of its embryological characters the family does not fit in the *Violales*: its members have a tenuinucellate and unitegmic embryos, which have cellular endosperm, and do not have a cover cell. The implication of Wunderlich's statement is that this family might find a more natural place in one of the sympetalous orders where endosperm haustoria occur; these orders (*Ericales*, *Gentianales*, *Tubiflorae* and *Campanulales*) are tenuinucellate and unitegmic.

TAKHTAJAN (1969, 1973) has the *Loasaceae* in the *Polemoniales* and states that the family is probably related to the *Boraginaceae* and *Hydrophyllaceae*, basing his statement on the presence of endosperm haustoria, on the cellular endosperm, and on the occurrence of multicellular glandular hairs with cystolith-like concretions. He further considers the *Polemoniales** as very near the *Scrophulariales**, these orders having a common origin in the immediate ancestry of the *Loganiaceae* (*Gentianales*).

Now iridoid glycosides occur in many species belonging to the orders mentioned by Wunderlich, whereas none of these compounds have been found in any of the *Violales* (exclusive the *Loasaceae*), nor in the *Cucurbitaceae*. The present author investigated 23 species belonging to 23 genera and 14 families of the *Violales* and 5 species of 5 genera of *Cucurbitaceae*. However, iridoid glycosides are also absent from the *Polemoniales** (60 species belonging to 46 genera of 5 families were tested). The occurrence of iridoid glycosides is therefore not in support of Takhtajan's view on a relationship of the *Loasaceae* with the *Polemoniales*, but it does support his opinion on a relationship with the *Gentianales* and the *Scrophulariales**.

* Names of orders are used throughout as in ENGLER's Syllabus (1964); however, the terms *Polemoniales* and *Scrophulariales* are used in the sense of TAKHTAJAN (1969), the former therefore without the *Callitrichaceae* and the *Fouquieriaceae*.

On the basis of chemical evidence the conclusion is drawn that the taxonomic position of the *Loasaceae* should be reconsidered and that especially the possibility of a more natural place in the neighbourhood of the *Gentianales* or the *Scrophulariales** should be investigated.

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