

FLAVONOL GLYCOSIDES IN SOUTH AMERICAN SPECIES OF *OENOTHERA* SECT. *OENOTHERA*

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Key Word Index—*Oenothera*; Onagraceae; quercetin and kaempferol glycosides.

Whereas the flavonoid patterns of several species of diverse subgenera of *Oenothera* [1–8] have been investigated, those of South American species of *Oenothera* sect. *Oenothera* have not. Therefore, the flavonoid patterns of 21 South American species of subsection *Munzia*, were studied. The flavonoid glycosides isolated are (Table 1): quercetin-3-*O*-glucoside (Qu-3-Glc), quercetin-3-*O*-galactoside (Qu-3-Gal), quercetin-3-*O*-rhamnoside (Qu-3-Rha), quercetin-3-*O*-rhamnosylglucoside (Qu-3-GlcRha), quercetin-3,7-*O*-diglucoside (Qu-3,7-Glc), quercetin-3,7-*O*-glycoside (Qu-3,7-Gly), kaempferol-3-*O*-galactoside (Km-3-Gal), kaempferol-3-*O*-glycoside (Km-3-Gly). Up to 7 further unidentified flavonoid like substances were detected on two-dimensional TLC.

The flavonoid patterns of the series *Allochroa*, *Clelandia* and *Renneria* seem to be fairly similar (Table 1) and consist only of flavonol glycosides, a feature which is quite common in other species of *Oenothera* [1, 3, 4]. The only striking difference between the series *Renneria* and the other two is the regular occurrence of quercetin-3-*O*-glucoside as the main glycoside. There was no evidence of myricetin glycosides in any of the South American species. Thus, these species of the section *Oenothera* appear to be closely related chemically to the North American species of the subgenera *Oenothera* and *Raimannia* [10, 11] which also lack myricetin and they differ from the other subgenera of *Oenothera* which regularly have myricetin derivatives [1, 3, 4].

EXPERIMENTAL

Plant material. Leaves of the following species: (1) *Oenothera indecora* Cambess. subsp. *bonariensis* Dietrich, (2) *O. mendocinensis* Gillies ex Hooker, (3) *O. rivadaviae* Dietrich, (4) *O. affinis* Cambess., (5) *O. montevidensis* Dietrich, (6a–c) *O. picensis* Phil. subsp. *bonariensis* Dietrich, subsp. *cordobensis* Dietrich, subsp. *picensis*, (7) *O. weberbaueri* Krause, (8) *O. mollissima* L., (9) *O. brevipedata* Dietrich, (10) *O. odorata* Jacq., (11) *O. punae* Kuntze, (12) *O. magellanica* Phil., (13) *O. villaricae* Dietrich,

(14) *O. parodiana* Munz subsp. *parodiana*, (15) *O. pseudolongiflora* Dietrich, (16) *O. santarii* Dietrich, (17) *O. longituba* Dietrich, (18) *O. versicolor* Lehm., (19) *O. scabra* Krause, (20) *O. recurva* Dietrich, (21) *O. tarijensis* Dietrich. The plants were collected by Dr. Santarius in South America and cultivated in the Botanical Garden, Düsseldorf, GFR. Voucher specimens are deposited in DUS, M, and MO. The nomenclature was adopted from W. Dietrich [9].

Isolation and identification of compounds. 1.5 g of air dried material were extracted by 50% aq. Me₂CO. The flavonol glycosides were separated by 1D TLC on microcrystalline cellulose (Avicel) in BuOH (2)–HOAc–H₂O (14:1:5) and 1D PC in 6 or 15% HOAc. They were eluted from the adsorbent and paper respectively with 80% MeOH. In some cases an additional purification by CC on Sephadex LH 20 with MeOH was performed. Identification of the glycosides, their aglycones and sugars was done as described previously [8].

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Table 1. Flavonol glycosides of 21 South American species of *Oenothera**

Compound	ser. <i>Allochroa</i>												Species										
													ser. <i>Clelandia</i>				ser. <i>Renneria</i>						
	1	2	3	4	5	6a	6b	6c	8	10	14	15	9	11	12	13	7	16	17	18	19	20	21
Qu-3-Glc	++	++	+	+	+	+	+	+	+	+	++	+	+	+	++	++	++	++	++	++	++	++	++
Qu-3-Gal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+	+	+	+
Qu-3-Rha	+	+	+	+	++	+	—	+	++	+	+	+	+	++	+	—	+	+	—	+	+	+	+
Qu-3-GlcRha	+	+	+	+	+	+	+	+	+	—	+	—	+	+	—	?	?	+	+	+	+	+	+
Qu-3,7-Glc	—	?	—	—	—	—	—	+	—	+	—	—	+	—	?	?	—	+	—	+	—	—	—
Qu-3,7-Gly	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Km-3-Gal	+	+	++	+	+	++	++	+	+	++	++	+	++	+	+	+	+	+	?	+	+	+	+
Km-3-Gly	—	—	+	+	+	+	++	++	+	++	—	++	+	+	—	—	—	+	—	+	—	—	—

* Nomenclature was adopted from W. Dietrich [9]

++ indicates the main glycoside(s)