Journal of Natural Products
Vol. 48, No. 4, pp. 667-685, Jul-Aug 1985

FLAVONOIDS FROM *BERLANDIERA TEXANA* VAR. *TEXANA*

ZOFIA BULINSKA-RADOMSKA, J.A. NORRIS, D.A. HOSAGE, and T.J. MABRY

The Department of Botany, The University of Texas at Austin, Austin, Texas 78712

The subtribe Engelmanniinae Steussy (Fam. Compositae, Tribe Heliantheae), formerly in the Melampodiinae of Hoffmann (1), was delimited in 1977 on the basis of a number of floral and achene features (2). Recently, this assemblage was included in the larger, more diverse subtribe Ecliptinae by H. Robinson (3). As a result, chemosystematic studies using terpenoids (4) and flavonoids were initiated to provide additional insight into the relationships among the genera of the Ecliptinae.

We report here from *Berlandiera texana* DC. var. *texana* (subtribe Ecliptinae), a taxon found in the southern and southeastern United States and Mexico, three flavones (apigenin, 6-methoxyapigenin, and 6-methoxyluteolin) and the 3-*O*-β-D-galactosides of kaempferol and quercetin.

EXPERIMENTAL

PLANT MATERIAL.—*B. texana* var. *texana* was collected 10 miles north of Kenedy, Texas, in November, 1982, at the junction of Highway 123 and the San Antonio River. A voucher specimen (Hosage #1) is deposited in the Plant Resources Center at The University of Texas, Austin, Texas.

EXTRACTION, ISOLATION, AND IDENTIFICATION OF FLAVONOIDS.—Dried aerial parts of *B. texana* var. *texana* (485 g) were extracted three times with 80% and 50% aqueous MeOH yielding a crude extract (144 g), which was partitioned against hexane, CH_2Cl_2, and EtOAc. Two-dimensional paper chromatography indicated that the CH_2Cl_2 (9 g) and EtOAc (11 g) fractions contained similar flavonoid components. These combined fractions were chromatographed over a Polyclar column eluted with CH_2Cl_2-MeOH-EtCOMe-Me_2CO (20:10:5:1) eventually decreasing the amount of CH_2Cl_2. The resulting flavonoid mixtures were purified by streaking on Whatmann 3MM chromatography paper developed in 15% HOAc. This procedure yielded apigenin, 6-methoxyapigenin, 6-methoxyluteolin, and the 3-*O*-β-D-galactosides of quercetin and kaempferol. All compounds were cleaned on Sephadex LH-20 prior to spectral analyses by uv and ^1H nmr (as TMSi ethers in CCl_4, excluding apigenin for which quantities were insufficient), color reactions (5) and comparisons with authentic samples (6). Hydrolysis (1 N HCl, 2 h) yielded galactose, kaempferol, and quercetin. Underivatized mass spectra were recorded for 6-methoxyluteolin, apigenin, and 6-methoxyapigenin.

ACKNOWLEDGMENTS

We wish to thank The National Science Foundation (Grant BSR 8402017) and The Robert A. Welch Foundation (Grant F-130).

LITERATURE CITED

1. O. Hoffmann, *Die Naturlichen Pfanzenfamilien*, **4** (5), 210 (1890).
2. J.B. Heywood, J.B. Harborne, and B.L. Turner, "The Biology and Chemistry of the Compositae," New York: Academic Press, 1977.
3. H. Robinson, *Smithsonian Contribution To Botany*, **51**, 1 (1981).
4. J.D. Korp, N.H. Fischer, C. Leonard, J.Y. Lee, and N. Levan, *J. Heterocyclic Chem.*, **19**, 181 (1982).
5. T.J. Mabry, K.R. Markham, and M.B. Thomas, "The Systematic Identification of Flavonoids," New York: Springer-Verlag, 1970.
6. R. Mues, B.N. Timmermann, N. Ohno, and T.J. Mabry, *Phytochemistry*, **18**, 1379 (1979).

Received 3 February 1984