

## Flavones from four plants of the Lamiaceae family

Maurizio Bruno,<sup>1\*</sup> Franco Piozzi,<sup>1</sup> K. Husnu Can Baser<sup>2</sup>

<sup>1</sup> Dipartimento di Chimica Organica, Università di Palermo, Viale delle Scienze, Parco d'Orleans II, 90128 Palermo, Italy. Tel: +39-091-596825; Fax +39-091-596905; Email: bruno@dicpm.unipa.it

<sup>2</sup> Department of Pharmacognosy, Faculty of Pharmacy, Anadolu University, 26470 Eskisehir, Turkey

**Abstract.** From the aerial parts of four plants of different genera of the Lamiaceae family some known flavones (cirsimaritin, ladanein, pectolinarigenin) were isolated.

**Keywords.** Lamiaceae, flavones

**Resumen.** De las partes aéreas de cuatro plantas de diferentes géneros de la familia Lamiaceae, se aislaron algunas flavonas conocidas (cirsimaritina, ladaneína, pectolinarigenina).

**Palabras clave.** Lamiaceae, flavonas.

The flavonoids are ubiquitous components of plants. Many families are particularly rich in these compounds, and one of them is the Lamiaceae (Labiatae) family, that show a large variability of structures. During our work for the investigation of new diterpenoids from some genera of the Lamiaceae family, sometimes it happened to isolate chromatographic fractions containing flavonoids. We report here on the identification of some flavonoids from species of four genera.

We isolated one flavone from *Scutellaria rubicunda* Hornem. subsp. *linneana* (Caruel) Rech.fil., one from *Anisochilus carnosus* (Linn.fil.) Benth., one from *Ballota sechmenii* Gemici et Leblebici and one from *Sideritis niveotomentosa* Huber-Morath. Previously, investigations for diterpenoids had been reported for *S. rubicunda* [1], *B. sechmenii* [2] and *S. niveotomentosa* [3], whereas *A. carnosus* had been studied only for flavonoids [4] and for the essential oil [5].

The flavone isolated from *S. rubicunda* was identified with the well known cirsimaritin (5,4'-dihydroxy-6,7-dimethoxy-flavone), on the basis of physical data and spectroscopic analysis. Its <sup>1</sup>H and <sup>13</sup>C NMR spectra are in perfect agreement with those quoted in the literature [6-8]. The flavone isolated from *A. carnosus* was also identical with cirsimaritin. It can be remarked that cirsimaritin was not reported in the previous paper [4], whereas we did not find the flavonoids isolated by previous authors [4]. This fact could be attributed to the different geographic origin of our plant material. The compound isolated from *B. sechmenii* showed <sup>1</sup>H, <sup>13</sup>C NMR and MS data identical with those reported for ladanein (5,6-dihydroxy-7,4'-dimethoxy-flavone) [7,9]. The compound found in *S. niveotomentosa* was identified as pectolinarigenin (5,7-dihydroxy-6,4'-dimethoxy-flavone), as their <sup>13</sup>C NMR data matched exactly with those reported in the literature [7] and the MS was compatible with the structure.

From the taxonomic point of view, it can be observed that these compounds, even if widespread in the family Lamiaceae, are rather infrequent in the genera here investigated. Indeed, concerning the occurrence in the genus, as far as we know, ladanein was found only in *B. hirsuta* Benth [10] and in *B. saxatilis* C. Presl subsp. *saxatilis* [11]. Cirsimaritin was never detected in the genus *Anisochilus*. As for the genus *Scutellaria*, cirsimaritin was reported to occur only in *S. planipes* Nakai et

Kitag [12]. Pectolinarigenin was found previously in the genus *Sideritis* in the species *S. gomeræ* De Noé ex Bolle [13,14], *S. nutans* Svent. [14], *S. perezii* (Negrin) Marrero [14] and *S. dasygnaphala* [13].

### Experimental Section

**General procedures.** Column chromatography was performed using Merck Si gel (No. 7734). NMR spectra were recorded on a Bruker AC 250 E apparatus. MS were registered on a Finnigan TSQ70 instrument (70 eV, direct inlet).

**Plant material.** *S. rubicunda* was collected in July 1999 at Rocca Busambra 80 Km south of Palermo (Italy). *A. carnosus* was cultivated in the Botanic Garden of the University of Palermo. Voucher specimen are deposited at the Herbarium of the Botanic Garden in Palermo. *B. sechmenii* was collected in 1995 near Antalya (Turkey). *S. niveotomentosa* was harvested in July 1995 in the Icel province (Turkey). Voucher specimens are deposited at the Herbarium, Faculty of Pharmacy, Anadolu University, Eskisehir, Turkey.

**Extraction and Isolation.** Dried and finely powdered aerial parts of each species (about 200 g) were extracted three times with acetone at room temperature for 1 week. After filtration, the solvents were evaporated under reduced pressure and the residues chromatographed with solvent gradient from 100% petroleum ether to 100% EtOAc. Fractions containing flavones were identified by NMR and MS, in comparison with literature data and with authentic substances.

### References

1. Bruno, M.; Vassallo, N.; Simmonds, M. S. J. *Phytochemistry* **1999**, *50*, 973-976.
2. Citoglu, G.; Sever, B. *Amsterdam G. A. Symposium* **1999**. Abstract 172.
3. Bondi, M. L.; Bruno, M.; Piozzi, F.; Baser, K. H. C.; Simmonds, M. S. J. *Biochem. Syst. Ecol.* **2000**, *28*, 299-303.
4. Sankara Subramanian, A. G. R. *Phytochemistry* **1972**, *11*, 452.
5. Senatore, F.; Lentini, F.; Venza, F.; Bruno, M.; Napolitano, F. *Flavour Fragr. J.* **2003**, *18*, 202-204.
6. Joussef, D.; Frahm, A. W. *Planta Medica* **1995**, *61*, 570-573.

7. Horie, T.; Ohtsuru, Y.; Shibata, K.; Yamashita, K.; Tsukayama, M.; Kawamura, Y. *Phytochemistry* **1998**, *47*, 865-874.
8. Kisiel, W.; Stojakowska, A.; Piozzi, F.; Rosselli, S. *Acta Soc. Botanic. Poloniae* **2001**, *70*, 199-201.
9. Yang, F.; Li, X. C.; Wang, H.; Yang, C.-R. *Phytochemistry* **1996**, *42*, 867-869.
10. Ferreres, F.; Tomás-Barberán, F. A.; Tomás-Lorente, F. *J. Nat. Prod.* **1986**, *49*, 554-555.
11. Citoglu, G.; Tanker, M.; Sever, B. *Pharmaceut. Biol.* **1999**, *37*, 158.
12. Zhang, Y. Y.; Guo, Z.; Ageta, H.; Harigaya, Y.; Onda, M.; Hashimoto, K.; Ikeya, Y.; Okada, M.; Maruno, M. *J. Chin. Pharm. Sciences* **1998**, *7*, 100.
13. González, A. G.; Fraga, B. M.; Hernández, M. G.; Larruga, F.; Xavier, G.; Ravelo, A. G. *Llodia* **1978**, *41*, 279-280.
14. Gil, M. I.; Ferreres, F.; Marrero, A.; Tomás-Lorente, F.; Tomás-Barberán, F. A. *Phytochemistry* **1993**, *34*, 227-232.