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PHYTOCHEMICAL INVESTIGATION OF THE ENDEMIC PLANT *Zygophyllum cornutum*

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The genus *Zygophyllum* consists of about 150 species belonging to the family Zygophyllaceae, distributed in deserts and steppes from the Mediterranean to Central Asia, South Africa and Australia [1]. *Zygophyllum* species are reported to be medicinal plants in the scientific literature [2, 3] as well as in folklore, and their medicinal values are well documented; notably, *Zygophyllum coccineum* is recommended against rheumatism, gout, hypertension [4], and diabetes [5], and *Zygophyllum gaetulum* is known as an antidiabetic [6], antispasmodic, antieczema, and as a remedy for stomach and liver pain [7].

In Algeria, *Zygophyllum album* is used for the treatment of diabetes, dermatitis, spasms, and dysmenorrhea [8]; *Zygophyllum geslini* is used to diabetes [9], as are some other *Zygophyllum* species. The endemic plant *Zygophyllum cornutum* [10] was collected at Ouargla in the Central Sahara (Algeria) in June 2005.

The coarse powder of the whole plant of *Zygophyllum cornutum* (1800 g), was extracted with 70:30 MeOH–water (3 × 4 L), and the methanolic extracted was concentrated to dryness *in vacuo* at 70°C. The residue was dissolved in water (500 mL). The insoluble part was filtered off. The aqueous solution was successively extracted with ethyl acetate and butanol. The ethyl acetate extract was evaporated and repeatedly chromatographed on KSK silica gel columns and eluted with a dichloromethane–methanol mixture, with increasing concentrations of methanol. Fractions eluted with 100% dichloromethane gave a precipitate which afforded compound **1** [11]. The butanol extract was subjected to polyamide column chromatography using a toluene-methanol step gradient. Fractions eluted with 25% methanol in toluene were further subjected to preparative polyamide plate chromatography and eluted with methanol–water–acetic acid (18:1:1) to give pure compound (**2**) [12].

Phytochemical investigation of the whole plant of *Zygophyllum cornutum* resulted in the isolation of two known compounds, *β*-sitosterol (**1**) [11] and isorhamnetin-3-rutinoside (narcissin) (**2**). The structure elucidations of the compounds were based on 1D and 2D analysis, including UV spectroscopy.

Isorhamnetin-3-rutinoside (2). Yellow amorphous powder, mp 180–182°C. UV (MeOH, λ_{max}): 254 and 355; +NaOMe 271, 327 and 413; +NaOAc: 274, 318 and 374; +NaOAc/H_3BO_3 255, 268 and 359; +$AlCl_3$ 268, 302, 364 and 403; +$AlCl_3$/HCl 269, 359 and 401.

^{1}H NMR (DMSO-d_6, δ, ppm, J/Hz): 7.86 (1H, d, J = 1.6, H-2′), 7.52 (1H, dd, J = 8.4 and 1.6, H-6′), 6.94 (1H, d, J = 8.4, H-5′), 6.49 (1H, d, J = 1.6, H-8), 6.20 (1H, d, J = 1.6, H-6), 5.45 (1H, d, J = 7.25, H-1″ anomeric proton of glucose), 4.32 (1H, d, J = 1.6, H-1‴ anomeric proton of rhamnose), 3.85 (3H, s, OCH_3), 3.80–3.00 (m, remaining sugar protons overlapped by OH protons), 0.98 (3H, d, J = 6.0, CH_3 methyl group of rhamnose).

This compound was isolated from the genus *Zygophyllum* for the first time.

REFERENCES

1. B. A. Beir, M. W. Chase, and M. Thulin, *J. Plant Syst. Evol.,* **240**, 11 (2003).
2. M. M. Shabana, Y. W. Mirhom, A. A. Genenah, E. A. Aboutabl Amer, and H. A. Study, *Arch. Exp. Veterinarmed.,* **44**, 389 (1990).

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3. V. Rimbau, C. Cerdan, R. Vila, and J. Iglesias, *Phytother. Res.*, **13**, 128 (1999).
4. A. H. Saber and A. M. El-Moghazy Shoaid, *J. Pharm. Sci. U.A.R.*, **1**, 1 (1960).
5. E. F. Eskander and H. Won Jun, *Egypt. J. Pharm.. Sci.,* **36**, 33 (1995).
6. J. T. Jaouhari, H. B. Lazrek, and M. Jana, *J. Ethnopharmacol.*, **69**, 17 (2000).
7. J. Bellakadhar, R. Claisse, J. Fleurotin, and C. Younos, *J. Ethnopharmacol.,* **35**, 123 (1981).
8. K. Maiza, V. Hammiche, and R. A. Brac de la Perriere, *Acta Horticult.,* 332 (1993).
9. D. Smati,V. Hammiche, H. Nehari, B. Alamir, and R. Merad, *Zygophyllum Geslini Coss: Chemical Investigation of Hypoglycemic Activity,* H. Schilcher, J. D. Phillipson, and D. Loew, (eds.), ISHS, Wageningen, Netherlands, 1993.
10. P. Quezel and S. Santa, *Nouvelle Flore de l′Algerie et des Regions Desertiques Medionales*, Tome **I**, CNRS, Paris (1963), p. 588.
11. H. Kojima, N. Sato, A. Hatano, and H. Ogura, *Phytochemistry*, **29**, 2351 (1990).
12. T. J. Mabry, K. R. Markham, and M. B. Thomas, *The Systematic Identification of Flavonoids,* Springer Berlin, 1970.