

Chemical and biological evaluation on scopadulane-type diterpenoids from *Scoparia dulcis* of Vietnamese origin

Phan M.G., Phan T.S., Matsunami K., Otsuka H.

Faculty of Chemistry, College of Natural Science, Vietnam National University, 19 Le Thanh Tong Street, Hanoi, Viet Nam; Graduate School of Biomedical Sciences, Hiroshima University, 1-2-3 Kasumi, Minami-ku, Hiroshima 734-8553, Japan

Abstract: From the aerial parts of *Scoparia dulcis* L. (Scrophulariaceae) grown in Vietnam, four scopadulane-type diterpenoids (4-7), of which 7 is new and was given the trivial name scopadulcic acid C, together with nine known compounds were isolated. Their structures were elucidated by spectroscopic analyses. The absolute configurations of 4-7 were ascertained by applying the modified Mosher's method to iso-dulcinol (6). The isolation of the lignans nirtetralin and niranthin for the first time from *S. dulcis* is also of chemotaxonomic interest. The cytotoxic activity in KB cells, inhibitory effect on LPS/IFN γ -induced NO production, inhibition of multidrug resistance (MDR), and antibacterial and antifungal activities of the scopadulane-type diterpenoids 4-7 were examined in this study. © 2006 Pharmaceutical Society of Japan.

Author Keywords: Methicillin-resistant *Staphylococcus aureus*; Multidrug resistance; Scopadulane-type diterpenoid; *Scoparia dulcis*; Scrophulariaceae

Index Keywords: diterpenoid; dulcidiol; epi scopadulcic acid; gamma interferon; iso dulcinol; lipopolysaccharide; niranthin; nirtetralin; nitric oxide; plant extract; scopadulcic acid c; *Scoparia dulcis* extract; unclassified drug; antibacterial activity; antifungal activity; article; cancer cell culture; cell strain KB; chemotaxonomy; cytotoxicity; drug isolation; drug structure; human; medicinal plant; minimum inhibitory concentration; multidrug resistance; nonhuman; *Scoparia*; spectroscopy; Viet Nam; Anisoles; Antibiotics, Antifungal; Antineoplastic Agents, Phytogetic; Dioxoles; Diterpenes; Drug Resistance, Multiple; Humans; Inhibitory Concentration 50; Interferon Type II; Lignans; Lipopolysaccharides; Nitric Oxide; *Scoparia*; Scrophulariaceae; *Staphylococcus aureus*; Tumor Cells, Cultured; Vietnam

Year: 2006

Source title: Chemical and Pharmaceutical Bulletin

Volume: 54

Issue: 4

Page : 546-549

Cited by: 5

Link: [Scopus Link](#)

Chemicals/CAS: gamma interferon, 82115-62-6; nitric oxide, 10102-43-9; Anisoles; Antibiotics, Antifungal; Antineoplastic Agents, Phytogetic; Dioxoles; Diterpenes; Interferon Type II, 82115-62-6; Lignans; Lipopolysaccharides; niranthin, 50656-77-4; nirtetralin, 50656-78-5; Nitric Oxide, 10102-43-9

Correspondence Address: Faculty of Chemistry, College of Natural Science, Vietnam National University, 19 Le Thanh Tong Street, Hanoi, Viet Nam; email: hotsuka@hiroshima-u.ac.jp

ISSN: 92363

CODEN: CPBTA

DOI: 10.1248/cpb.54.546

PubMed ID: 16595962

Language of Original Document: English

Abbreviated Source Title: Chemical and Pharmaceutical Bulletin

Document Type: Article

Source: Scopus

Authors with affiliations:

1. Phan, M.G., Faculty of Chemistry, College of Natural Science, Vietnam National University, 19 Le Thanh Tong Street, Hanoi, Viet Nam
2. Phan, T.S., Faculty of Chemistry, College of Natural Science, Vietnam National University, 19 Le Thanh Tong Street, Hanoi, Viet Nam
3. Matsunami, K., Graduate School of Biomedical Sciences, Hiroshima University, 1-2-3 Kasumi, Minami-ku, Hiroshima 734-8553, Japan
4. Otsuka, H.

References:

1. Hayashi, T., Okamura, K., Kakemi, M., Asano, S., Mizutani, M., Takeguchi, N., Kawasaki, M., Morita, N., (1990) Chem. Pharm. Bull., 38, pp. 2740-2745
2. Ahmed, M., Jakupovic, J., (1990) Phytochemistry, 29, pp. 3035-3037
3. Hayashi, T., Asano, S., Mizutani, M., Takeguchi, N., Kojima, T., Okamura, K., Morita, N., (1991) J. Nat. Prod., 54, pp. 802-809
4. Hayashi, T., Hayashi, K., Asano, S., Takeguchi, N., Horie, S., Watanabe, K., Miyahara, T., Sankawa, U., (1998) Towards Natural Medicine Research in the 21th Century, pp. 197-205. , ed. by Ageta H., Aimi N., Ebizuka Y., Fujita T., Honda G., Elsevier Science B. V., Amsterdam
5. Ahsan, M., Islam, S.K.N., Gray, A.I., Stimson, W.H., (2003) J. Nat. Prod., 66, pp. 958-961
6. Lala, P.K., Chakraborty, C., (2001) Lancet Oncol., 2, pp. 149-156
7. Deeley, R.G., Cole, S.P.C., (1997) Semin. Cancer Biol., 8, pp. 193-204
8. Johnson, L.F., Jankowski, W.C., (1978) Carbon-13 NMR Spectra. A Collection of Assigned, Coded, and Indexed Spectra, , Robert E. Krieger, New York
9. Chen, C.M., Chen, M.T., (1976) Phytochemistry, 15, pp. 1997-1999
10. Mahato, S.B., Kundu, A.P., (1994) Phytochemistry, 37, pp. 1517-1575
11. Chang, C.C., Lien, Y.C., Chen Liu, K.C.S., Lee, S.S., (2003) Phytochemistry, 63, pp. 825-833
12. Rossi, M.H., Yoshida, M., Maia, J.G.S., (1997) Phytochemistry, 45, pp. 1263-1269
13. Markham, K.R., Geiger, H., (1994) The Flavonoids. Advances in Research since 1986, pp. 441-497. , ed. by Harborne J. B., Chapman & Hall, London
14. Nugroho, B.W., Edrada, R.A., Wray, V., Witte, L., Bringmann, G., Gehling, M., Proksh, P., (1999) Phytochemistry, 51, pp. 367-376
15. Mahato, S.B., Das, M.C., Sahu, N.P., (1981) Phytochemistry, 20, pp. 171-173
16. Kawasaki, M., Hayashi, T., Arisawa, M., Morita, N., Berganza, L.H., (1988) Phytochemistry, 27, pp. 3709-3711
17. Li, Y., Chen, X., Satake, M., Oshima, Y., Ohizumi, Y., (2004) J. Nat. Prod., 67, pp. 725-727

18. Ohtani, I., Kusumi, T., Kashman, Y., Kakisawa, H., (1991) *J. Am. Chem. Soc.*, 113, pp. 4092-4096
19. note(1997) NCCLS: Methods for Dilution of Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically. Fourth Edition, 17 (2). , Approved Standard. NCCLS Document M7-A4
20. (2002) Reference Method for Broth Dilution Antifungal Susceptibility Testing of Yeasts, , Approved standard M27-A2, 2nd ed. NCCLS, Wayne, Pa
21. Carmichael, J., DeGraff, W.G., Gazdar, A.F., Minna, J.D., Mitchell, J.B., (1987) *Cancer Res.*, 47, pp. 939-942
22. Dirsch, V.M., Stuppner, H., Vollmar, A.M., (1998) *Planta Med.*, 64, pp. 423-426
23. Van Zanden, J.J., Wortelboer, H.M., Bijlsma, S., Punt, A., Usta, M., Bladeren, P.J., Rietjens, I.M., Cnubben, N.H., (2005) *Biochem. Pharmacol.*, 69, pp. 699-708