

New diterpenoids and the bioactivity of *Erythrophleum fordii*

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Abstract: A phytochemical investigation of the leaves of *Erythrophleum fordii* Oliv. has led to the isolation of three new cassaine-type diterpenoids, erythrofordin A (1), erythrofordin B (2) and erythrofordin C (3), as well as a norcassaine diterpenoid with a novel skeleton, norerythrofordin A (4), and 27 known compounds (5-31). The structures of 1-4 were elucidated on the basis of spectroscopic analysis. Selected compounds from this plant were examined for anti-inflammatory activity. Taraxerol (16) displayed potent NO-reducing activity in microglial cells, and gallic acid (27) exhibited excellent DPPH radical-scavenging effects. Crown Copyright ?? 2008.

Author Keywords: Anti-inflammatory activity; Cassaine-type diterpenoids; *Erythrophleum fordii* Oliv

Index Keywords: 1,1 diphenyl 2 picrylhydrazyl; diterpenoid; erythrofordin a; erythrofordin b; erythrofordin c; *Erythrophleum fordii* extract; gallic acid; n(g) nitroarginine methyl ester; nitric oxide; nitric oxide synthase; norerythrofordin a; reduced nicotinamide adenine dinucleotide phosphate oxidase; taraxerol; unclassified drug; animal cell; antiinflammatory activity; article; controlled study; drug isolation; drug structure; *Erythrophleum fordii*; legume; microglia; mouse; nonhuman; Animals; Anti-Inflammatory Agents; Cells, Cultured; Diterpenes; Fabaceae; Free Radical Scavengers; Mice; Nitric Oxide; Plant Extracts; *Erythrophleum fordii*

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Chemicals/CAS: 1,1 diphenyl 2 picrylhydrazyl, 1898-66-4; gallic acid, 149-91-7; n(g) nitroarginine methyl ester, 50903-99-6; nitric oxide synthase, 125978-95-2; nitric oxide, 10102-43-9; reduced nicotinamide adenine dinucleotide phosphate oxidase, 9032-22-8; taraxerol, 127-22-0; Anti-Inflammatory Agents; Diterpenes; Free Radical Scavengers; Nitric Oxide, 10102-43-9; Plant Extracts

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References:

1. Yu, F., Li, N., Yu, S.S., (2005) *J. Asian Nat. Prod. Res.*, 7, p. 19
2. Cronlund, A., (1973) *Planta Med.*, 24, p. 371
3. Robert, W.B., John, R.K., Dan, H.R., (1991) *Tetrahedron*, 47, p. 7951
4. Verotta, L., Aburjai, T., Rogers, C.B., Dorigo, P., Maragno, I., Fraccarollo, D., Santostasi, G., Carpenedo, F., (1995) *Planta Med.*, 61, p. 271
5. Blessington, B., Mathieson, D.W., Karim, A., (1970) *J. Chem. Soc. Comm.*, p. 1703
6. Griffin, W.J., Phippard, J.H., (1971) *Phytochemistry*, 10, p. 2793
7. Loder, J.W., Culvenor, C.C.J., Nearn, R.H., Russell, G.B., Stanton, D.W., (1972) *Tetrahedron Lett.*, 50, p. 5069
8. Takahisa, N., Yoshiko, M., Hideharu, E., Yoko, A., Kazuo, M., Akihito, T., Hiroyuki, A., Osama, B.A., (2002) *Chem. Pharm. Bull.*, 50, p. 1273
9. Kuo, P.C., Chiu, C.C., Shi, L.S., Li, C.Y., Wu, S.J., Damu, A.G., Wu, P.L., Wu, T.S., (2002) *J. Chin. Chem. Soc.*, 49, p. 113
10. Toshihiro, A., Ryuichi, H., Kazuo, K., Yumiko, K., Tamotsu, N., (1999) *Chem. Pharm. Bull.*, 47, p. 1157
11. Naoto, S., Toshihiro, I., Massao, S., Taro, M., (1984) *J. Org. Chem.*, 49, p. 709
12. Ilias, M., Khalid, A.S., Jaber, S.M., Mansour, S.S., Farouk, S.F., Alice, M.C., Charles, D.H., Alejandro, M.S.M., (2000) *J. Nat. Prod.*, 63, p. 605
13. Hisham, A., Kumar, G.J., Fujimoto, Y., Hara, N., (1995) *Phytochemistry*, 40, p. 1227
14. Mayunga, H.H., Nkunya, H.A., Christian, R., Reiner, W., Hugo, W., (1990) *Phytochemistry*, 29, p. 1261
15. Virinder, S.P., Kirpal, S.B., Abha, M., Amitabh, J., William, E., Oliver, W.H., Om, D.T., Carl, E.O., (1995) *Phytochemistry*, 38, p. 951
16. Toshihiro, A., Kazuhiro, Y., Toshitake, T., Yumiko, K., Takashi, I., Toshio, N., Frederic, C.C., (1992) *Chem. Pharm. Bull.*, 40, p. 789
17. Chen, K.S., Chang, F.R., Chia, Y.C., Wu, T.S., Wu, Y.C., (1998) *J. Chin. Chem. Soc.*, 45, p. 103
18. Chang, M.H., Wang, G.J., Kuo, Y.H., Lee, C.K., (2000) *J. Chin. Chem. Soc.*, 47, p. 1131
19. Lee, C.K., Lu, C.K., Kuo, Y.H., Chen, J.Z., Sun, G.Z., (2004) *J. Chin. Chem. Soc.*, 51, p. 437

20. Chang, M.H., Wang, G.J., Kuo, Y.H., Lee, C.K., (2000) *J. Chin. Chem. Soc.*, 47, p. 1131
21. Yumiko, K., Toshihiro, A., Ken, Y., Michio, T., Toshitake, T., (1995) *Chem. Pharm. Bull.*, 43, p. 1813
22. Herbert, L.H., Perter, R.P.D., Gregg, J.T., (1978) *Can. J. Chem.*, 56, p. 3121
23. Naomasa, O., Katsutoshi, S., Mitsuru, N., Hiroyuki, K., Masakazu, U., (1994) *Phytochemistry*, 37, p. 281
24. Wang, P.H., Lee, S.S., (1999) *J. Chin. Chem. Soc.*, 46, p. 215
25. Sunil, K.T., Sudipta, K.M., Asis, B., Susmita, M., Paramita, K., Amarendra, P., Bani, T., (2001) *J. Indian Chem. Soc.*, 78, p. 773
26. Alessandra, B., Matteo, P., Rokia, S., Haby, S., Ivano, M., Cosimo, P., Nunziatina, T., (2003) *J. Agric. Food Chem.*, 51, p. 6689
27. Peter, M., Jozsef, D., Erzsebet, O., Ferenc, Z., Miklos, S., Gyula, T., (2004) *Helv. Chim. Acta*, 87, p. 2159
28. Hidehiko, K., Hideaki, O., Toshinori, I., Choei, O., Eui, H., Anki, T., Yoshio, T., (1996) *Phytochemistry*, 42, p. 723
29. Lovina, A.C.N., Siegfried, E.D.S., Anne, H., (1992) *Phytochemistry*, 31, p. 3929
30. Wang, R.F., Yang, X.W., Ma, C.M., Shang, M.Y., Liang, J.Y., Wang, X., Cai, S.Q., Yukihiro, S., (2003) *Phytochemistry*, 63, p. 475
31. Dringen, R., (2005) *Antioxid. Redox Signaling*, 7, p. 1233
32. Li, J., Baud, O., Vartanian, T., Volpe, J.J., Rosenberg, P.A., (2005) *Proc. Natl. Acad. Sci. U.S.A.*, 102, p. 9936
33. Pacher, P., Beckman, J.S., Liaudet, L., (2007) *Physiol. Rev.*, 87, p. 315
34. Wang, Y.H., Wang, W.Y., Chang, C.C., Liou, K.T., Sung, Y.J., Liao, J.F., Chen, C.F., Shen, Y.C., (2006) *J. Biomed. Sci.*, 13, p. 127
35. Di Rosa, M., Radomski, M., Carnuccio, R., Moncada, S., (1990) *Biochem. Biophys. Res. Commun.*, 172, p. 1246
36. Worm, E., Beukelman, C.J., Van den Berg, A.J., Kroes, B.H., Labadie, R.P., Van Dijk, H., (2001) *Eur. J. Pharmacol.*, 433, p. 225. , Van den
37. Lin, L.C., Wang, Y.H., Hou, Y.C., Chang, S., Liou, K.T., Chou, Y.C., Wang, W.Y., Shen, Y.C., (2006) *J. Pharm. Pharmacol.*, 58, p. 129
38. Liou, K.T., Shen, Y.C., Chen, C.F., Tsao, C.M., Tsai, S.K., (2003) *Eur. J. Pharmacol.*, 475, p. 19