

	Nujol
<b>IR:</b> $\nu_{\max}$	1620 $\text{cm}^{-1}$ ( $-\text{C}=\text{N}-\text{O}$ ) 890 $\text{cm}^{-1}$ , 1720 $\text{cm}^{-1}$ ( $-\text{COOMe}$ )
<b><math>^1\text{HNMR}</math> (<math>\text{CDCl}_3</math>):</b>	77 (d, 3H, J=7 Hz) 0.78, 0.86 (d, 3H, J=7 Hz), 0.97, 1.10
<b>Mass:</b>	498,(base peak) 496 m/z 449.7 $[\text{M}-\text{CH}_3]^+$ , 367,271, 259, 245, 231, 206, 191, 163, 149, 123, 121, 109, 95, 81, 55.

### Biocidal work

Details of the experimental procedure have been described in the Experimental section of Part I, Chapter 4.

### References

1. Corey E.J.; Agata I.; Hortnan A.G.; Klein J.; Proskow S. and Upsprung J.J (1965). *J. Org. Chem.* **30**: 1698.
2. Kitagawa I.; Kitazawa K. and Yosioka I.(1965) *Tetrahedron Letts.* 509: 1698.
3. Pradhan B.P.; Mukherjee M.M.; Chakraborty D.K. and Schoolery J.N. (1972). *Tetrahedron* 39:2819.
4. Yadava R. N.and Chakravarti N. (2008). *Journal of Enzyme Inhibition and Medicinal Chemistry.* **23(4)**: 543-548
5. Hayatsu R.; Botto R.E.; Scott R.G.; McBeth R.L. and Winans R.E. (1987). *Organic Geochemistry.* **11(4)**: 245-250.
6. Zhang J.; Cheng Z H.; Yu B.Y.; Geoffrey A. Cordell G. A and Qiu S. X. (2005). NRRL 5646. *Chemistry of Natural Compounds.* **22(3)**: 295-97.
7. Chatterjee P.; Kouzi S.A.; John M. Pezzuto J.M. and Mark T. Hamann M.T. (2000) ATCC 13368. *Applied and Environmental Microbiology.* **66(9)**: 3850-3855.

8. Guirado A.; Martiz B.; Andreu R and Bautista D (2009). *Tetrahedron*. **65(31)**: 5958-5963.
9. Wael F. D.; Muccioli G. G.; Didier M. Lambert D. M.; Sergent T.; Schneider Y.J.; Rees J.F.; Marchand-Brynaert J. (2010). *European Journal of Medicinal Chemistry*. **45(9)**: 3564-3574.
10. Neto F.R.A.; Trendel J.M. and Albrecht P. *Tetrahedron*. **42(20)**: 5621-5626.
11. Parra A.; Rivas F.; Garcia-Granados A. and Martinez A. (2009). *Mini-Reviews in Organic Chemistry*. **6**: 307-320.
12. Yogeewari P. and Sriram D. (2005). *Current Medicinal Chemistry*. **12**. 657-666.
13. Garcí'a-Granados A.; Pilar E. Lo'pez P.L.; Melguizo E. Parra A and Simeo Y. (2003). *Tetrahedron Letters*. **44**: 6673–6677.
14. Kushiro T.; Shibuya M. and Ebizuka Y. (1998). *Eur. J. Biochem*. **256**.238-224
15. Ahmad V.U.; Zubair M.; Abbasi M.A.; Kousar F.; Rasheed M.A.; Rasool N.; Hussain J.; Nawaz S.A. and Choudhary M.I.(2006) Butyrylcholinesterase Inhibitory C-Glycoside from *Symplocos racemosa*. *Polish J. Chem.*: **80**: 403–407.
16. Pomarnacka E.; Bednarski P.J.; Grunert R.; Brzozowski and Lach J. (2006). *Polish J. Chem.* **80**: 429–438.
17. Saha M. R.; Hasana S. M. R.; Aktera R. M.; Hossaina M.; Alamb M. S.; Alam M. A and Mazumder M. E. H. (2008). *Bangl. J. Vet. Med.* **6 (2)**: 197–202.
18. Nishikawa A.; Saito S.; Hashimoto Y.; Koga Y. K and Shirai R. (2001). *Tetrahedron Letters*. 42(52): 9195-9198.
19. Corey and Cantrall (1959). *J. Am. Chem. Soc.*, **81**, 1745
20. Reggel L.; Friedman S. and Wander I. (1958) *J. Am. Chem. Soc.* **23**, 1136.
21. Tyagi B.S; Ghatge B.B. and Bhattattacharya S.C. (1962) *J. Org. Chem.* **27**, 1430.
22. Smith S.; Thompson R. and Wollflock E.C. (1962). *J. Org. Chem.* **27**, 2662.
23. Narula A. S. and Sukhdev (1971) *Tetrahedron*. 119.
24. Sengupta P.; Sen M. and Das S. (198) *Ind. J. Chem.*, 19 B, 721.
25. Barton A.G.M.; Godfrey C. R. A, ; Hollinsheed D.M.; Prokopiou P.A.; Barton D.H.R.; Boat R. B.; Joulkhardar L.; McGhie J. P and Mitra S. C. (1981) *J. Chem. Soc*, 1501.

26. Ma R.; Zhu J.; Liu J.; Chen L.; Shen X.; Hualiang J. and Li J. (2010). *Molecules*. **15**. 3593-3601.
27. Gaini L.; Cristelia C.; Moldovan C.; Deleanu C.; Mahamoud A.; Barbe J. and Silberg I.A. (2007). *Int. J. Mol. Sci.* **8**. 70-80.
28. Chen J. and Hu Y. (2006). *Synthetic Communications*. **36**: 1485–1494, 2006
29. Wu T.Y.H.; Schultz P.G. and Ding S. (2003). *ORGANIC LETTERS*. **5(20)**. 3587-3590.
30. Raghunandan D.; Mahesh B.D.; Basavraja S.; Balaji S.D.; Manjunath S.Y. and Venkatraman A. (2010). *J Nanopart Res*. DOI 10.1007/s11051-010-9956-8.
31. Bai X.; Qiu A. and Guan J. (2007). *Food Technol. Biotechnol.* **45 (2)**. 174–180.
32. Kad G.L.; Khurana A.; Singh V. and Singh J. (1999). *J. Chem. Research (S)*. 164-165.
33. More D H; Hundiwala D G; Kapadi U R and Mahulikar P P (2006). *J SCI IND RES*. **65**: 817-820.
34. Gopalakrishnan G.; Singh N. D. P; Kasinath V; Krishnan M. S. R.; Malathi R. and Rajan S. S. (2001). *Tetrahedron Letters*. **42(47)**: 6577-6599.
35. Yan C.; Yu J. X; Xing T. and Qing C. X (2008). *J. Chil. Chem. Soc.* **53(2)**: 1518-1522.
36. Azizian J.; Mohammadizadeh M. R.; Zomorodbakhsh S.; Mohammadi A. A. and Karimid A.R.(2007). *ARKIVOC*. **(XV)**: 24-30.
37. Gupta M.; Paul S and Gupta R (2010). *Ind. J. Chem.* **49B(4)**: 175-82.
38. Shanthi G.; Subbulakshmi G. and Perumal T. (2007). *Tetrahedron*. **63**: 2057-2067.
39. More D.H.; Pawar N.S.; Dewang P.M.; Patil S.L. and Mahulikar P.P. (2004). *Russian Journal of General Chemistr*. **74 (2)**. 217-218.
40. Akihisa T; Franzblau SG; Ukiya M; Okuda H; Zhang F; Yasukawa K; Suzuki T and Kimura Y. (2005) *Biol Pharm Bull*. **28(1)**:158-60.
41. Ryu S .Y; Lee C. K; Ahn J. W; Lee S. H and Zee O.K. (2007). *Archives of Pharmacal Research*. **16(4)**: 339-342.
42. Liby K. T; Yore M.M and Sporn M. B. (2007). *Nature Reviews Cancer*. **7**:357-369.

43. Tamura Y; Hattori M; Konno K; Kono Y; Honda H; Ono H and Yoshida M.(2004). *Chemoecology*. **14(20)**: 113-118.
44. Reddy K. P; Singh A. B; Puri A; Srivastava A. K and Narender T (2009). *Bioorganic & Medicinal Chemistry Letters*. **19(15)**: 4436-4446.
45. Meng Y. Q; Zhaol X; Wang Z; Liu D and Jing Y. K (2005) .Chines Chemicals Letters. **16(7)**: 867-870.
46. Woldmichael and Wink (2001). *J. Agric. Food Chem.* **49**. 2327-2332.
47. Tolstikov G. A.; Flekhter O. B.; Schultz E.E.; Baltina L. A. and Tolstikov A. G. (2005). *Chemistry of Sustainable Development*. **13**: 1-29.
48. Sun I.C.; Wang H. K.; Kashiwada Y.; Shen J. K.; Consentino L. M.; Chen C. H.; Yang L. M. and Lee K. H. (1998). *J. Med. Chem.* **41**: 4648.
49. Schuhly w.; Heilmann J.; Callis I. and Sticher O. (1999) *Planta Med.* **65**: 740.
50. Kashiwada Y.; Chiyo J.; Ikeshino Y.; Nagao T.; Okabe H.; Cosentino L.M.; Fowke K. and Leek H. (2001) *Biorg. Med. Chem. Lett.***11**: 183.
51. Su Q.; Xu X.; Zhou L. (2008). *Moleculer Simulation*. **34(7)**: 651-659.
52. Suh N.; Wang Y.; Honda T.; Gordon W. Gribble G. W.; Dmitrovsky E.; Hickey W. F.; Maue R. A.; Place A. E and Sporn M. B. (1999). *Cancer Res.* **59**: 336.
53. Baltina L. A; Flekhter O.B.; Nigamatullina L.R.; Boreko E.I.; Pavlova N. I.; Nikolava S.N; Savinova O.V. and Tolstikov G.V. (2003) *Bioorg. Med. Chem. Lett.* **13**: 3549.
54. Mustafa J; Anis E; Ahmed S; Anis I; Ahmed H; Malik A; Shahzad-ul-Hassan S and Choudhary M. (2000) *J. Nat. Prod.* **63**: 881-886.
55. Gao H; Wu L; Kuroyanagi M; Harada K; Kawahara N; Nakane T; Umehara K and Nakamura Y. (2003) *Chem. Pharm. Bull.* **51**: 1318-1321.
56. Krasutsky P A (2006). *Nat Pro Rep*. **23**:919-942.
57. (a) Wheeler G P, Bowden B J, Temple C, Adamson D J (1983). *Can Res* .**43(8)**: 3567-3575. (b) Sahu D P (1998), *Ind J Chem*, **37B**, 1149-1152.  
(c)Shanmugasundaram K, Prasad K J R(1998), *Ind J Chem*, **37B**, 1133-1135.
58. Grimmett M R, In *Advances in Heterocyclic Chemistry*, 1<sup>st</sup> Ed.; Katritzky A R, Boulton A J, Academic Press: New York, America (1972); **12**: 15-136.
59. Muehlmann F L, Day A R, *J Ame Chem Soc* (1956) **78**:242-244.

60. Akiyama A, Enomoto Y, Sibamoto T, *J Agric Food Chem* **1978**, *26*, 1176-1179.
61. Anastas P T, Beach E S, *Green Chem Lett and Rev* **2007**, *1(1)*, 9-24.
62. Michael D, Mingos P, Baghurst D R, *Chem Soc Rev* **1991**, *20*, 1-47.
63. Caddick S, *Tetrahedron* (1995). **51**: 10403-10432.
64. Lidstrom P, Tierney J, Wathey B, *Tetrahedron* (2001) **57**: 9225-9283.
65. Shastri R A, Pedgaokar S V, Selukar S S, Jadhav S B (2008), *J Ind Chem Soc*, **85**: 574-576.
66. Landge S M, Torok B (2008). *Catal Lett*. **122**: 338-343.
67. Liu Z, Ding L, Zhang H, Hu X, Bu F (2006). *J Liq Chrom & Related Technologies*, **29**: 719-731.
68. Martinez-Garcia A, Martinez R (2008), *Synth Comm*. **38**:1917-1925.
69. Porter A E A (1984), In *Comprehensive heterocyclic chemistry*, 1<sup>st</sup> Ed.; Katritzky A R, Rees C W, A. Wheatson Co Ltd, Great Britain,; **3(2B)**: 157-197.
70. (a) Weighert F J, Hauser J, Roberts J D (1973), *J Org Chem*, **38**:1313-1316. (b) Turner C J, Cheesman G W H (1974), *Org Magn Reson*, **6**: 663-666. (c) Matsuo S, Matsumoto S, Kurihara Y, Akita T, Ohta A (1980), *Org Magn Reson*, **13**: 172-179.
71. Simonson J and Ross W C J (1957), In *The Terpenes volume IV*, 1<sup>st</sup> Ed.: Cambridge University Press: New York,; p 328.
72. Simonson J and Ross W C J, In *The Terpenes volume IV*, 1<sup>st</sup> Ed.; Cambridge University Press: New York, 1957; p 298.
73. Lee K H, Morris-Natschke S L(1999). *PureAppl Chem*, **71(6)**, 1045-1051.
74. Ghosh P, Ph. D Thesis, University of North Bengal, India, 1991.
75. Pradhan B P, Dutta S, Ghosh R K, Ghosh P(1991), *Ind J Chem*, **30B**. 7-12.
76. Ganguly A K, Govindachari T R, Mohammed P A, *Tetrahedron* **1966**, *22*, 3597-3599.
77. Suleman P, Al-musallam A, Menezes CA(2002). *Bio-control* **47**: 207-16
78. Srikrishna L.P; Vagdevi H.M.; Basavaraja B.M.; Vaidya V.P. (2009). *Green Pharmacy*. **2(3)**: 159-161.
79. Audu J. A.; Kela S.L. and Unom V.V. (2001). *Journal of Economic and Taxonomic Botany*. **24(3)**: 641-650

80. Ragasa C.Y.; Morales E. and Rideout J.A. (2001). *Philippine Journal of Science*. **128(1)**: 21-29.
81. Kumar VP; Chauhan NS ; Padh H and Rajanj M (2006). *JEthnopharmacol.* **107(2)**: 182-8.
82. Mbwambo Z H.; Moshi M J.; Masimba P J.; Kapingu M C. and Nondo R S. (2007). *Oxford Journals.* **3(2)**: 261-265.
83. Jindal, D. P., Yadav, M. R., Sharma R. K., Agarwal, V. R., Singh H. K.(1987). *Ind. J. Chem* 26B 100.
84. Singh H. K., and Paul D (1982), *Chem Ind* 329.
85. Yadav M. R. and Jindal D. P (1991), *Ind. J. Chem* 30B 473.
86. Burnett P.C (1963), *J. Am. Chem. Soc.* 11:979.
87. Singh B. and Dubey M.M. (2001). *Phytotherapy Research.* **15(3)**: 231-234.
88. Takeoka G.; Dao L.; Taranishi R.; Wong R.; Flessa S.; Harden L. and Edwards R. *J. Agric. Food Chem.* **48(8)**: 3437-3439.
89. Simonsen J. and Poss W. C. J (1957). Cambridge University press. New York **4**. p 336.
90. Simonsen J. and Poss W. C. J (1957). Cambridge University press. New York. **4**. p 298.
91. Simonsen and Ross (1957). The Terpenes. *Cambridge University Press.* **4**: 300-332.
92. Finucane B.W. and Thomson J. B (1969). *Chem.Com*: 1220.
93. Simonsen J. and Poss W. C. J (1957). Cambridge University press, New York. **4** p 468.
94. Corey E.J. and Upsprung (1956) *J. Am Chem Soc.* 5041.
95. Ghosh Pranab, Ph. D. Thesis, North Bengal University, 1991.
96. Forest A.R. and Richardson (1972) *Can.J.Chem.* **50**: 2326.
97. Khan M. S. Y.; Ahmed S.; Yadav M. R. and Jindal D. P (1991) **67**: 330
98. Pradhan B P and Ghosh P. (1993), *Ind J Chem*, **32B** :590-591.