REFERENCES

1. Budavari, S., In; The Merck Index, 12th Edn., Merck and Co. Inc., N.J., USA, 1996, 1394.
2. Ito, M., Kuriki, T., Goto, J. and Nambara, T., **J. Liq. Chromatogr.**, 1990, 13, 991.
3. Barbato, F., Marrica, P. and Quaglia, F., **Farmaco,** 1994, 49, 457.
4. Ranadive, S.A., Chen, A.X. and Serajuddin, A.T., **Pharm. Res.**, 1992, 9, 1460.
5. Aboul-Enein, H.Y. and Bakr, S.A., **Drug Dev. Ind. Pharm.**, 1992, 18, 1013.

Chemical Examination of the Flowers of *Couroupita guianensis* Aubl

JAYASHREE B. RANE, SEVERINA J. VAHANWALA, SUPRABHA G. GOLATKAR, R.Y. AMBAYE* AND B.G. KHADSE

Department of Biochemistry, Haffkine Institute for Training, Research and Testing, Parel, Mumbai-400 012

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From the flowers of *Couroupita guianensis* Aubl, an aliphatic hydrocarbon and stigmasterol have been isolated. The structure of stigmasterol has been established on the basis of spectral data and by chemical means.

Couroupita is a small genus of trees from the Tropical America and the West Indies[1]. One of its species, *Couroupita guianensis* Aubl is widely cultivated for its large showy flowers and reddishbrown woody capsular fruits upto 20 cm in diameter (cannon balls). The plant belongs to the family Lecythidaceae and is locally known as Kailaspati and in English as cannon ball tree[2]. It is grown in Indian gardens as an ornamental tree. Its leaves are used in skin diseases[2]. We have observed that the petroleum ether extractives of flowers, leaves, bark and fruits of *C. guianensis* possess promising antibacterial activity[3], particularly against *Gram-negative Salmonella typhi* NCTC 786. In all these extractives, MIC of 10 µg/ml was observed which prompted us to undertake the chemical examination of the plant. This communication presents exploratory chemical examination of the flowers of *C. guianensis*.

The flowers of *C. guianensis* (2 kg) were collected from a tree in the Haffkine Institute's garden, Mumbai - 400 012. They were sun-dried, powdered and extracted in a Soxhlet with petroleum ether (60-80°, 6l) and then with methanol (5l) in succession. Petroleum ether extract yielded an orange-coloured oily residue (14 g). Preliminary TLC study using benzene:ethyl acetate (95:5) as a solvent system indicated the presence of four spots. Petroleum ether extract (8 g) was chromatographed over Silica gel G (80-120 mesh, BDH 80) and the column was washed with petroleum ether (60-80°), benzene, chloroform and ethanol in succession. Collected fractions were subjected to rechromatography. Petroleum ether eluted fraction gave a faint yellow-coloured waxy compound. It was crystallized (norit) from ethyl acetate to get a compound, (yield 50 mg), M.P. 79-80°, UV λmax (MeOH) 209nm (ε 1533), IR υmax (KBr), 2917 cm^{-1} and 2849 cm^{-1} (alkyl groups, C-H stretch), 1738 cm^{-1} -1650 cm^{-1} (aliphatic aldehydes/ketones), 1378 cm^{-1}, 1018 cm^{-1}, 887 cm^{-1}, 1018 cm^{-1}, (C-H bending). Mas spectrum of the compound, M.P. 79-80°, showed peaks at 239, 218, 175, 135, 107 and 95 and a molecular ion peak at 257. The compound appears to be an aliphatic long chain hydrocarbon.

The chromatographic column, on further elution with benzene, gave three coloured fractions. One of them was a solid compound. Repeated crystallization (norit) from methanol furnished a compound in fine needles (yield: 285mg), M.P. 170-71°. It analyzed for $C_{29}H_{48}O$ (Found C:84.38%, H:11.95%; requires C:84.4%, H:11.72%). The compound gave positive Liebermann-Burchard test for

*For correspondence

sterols, UV max 188 nm (ε 21700) indicating the presence of a diene system. IR υmax (KBr): 3418 cm^{-1} (broad, OH stretch), 2995 cm^{-1} and 2870 cm^{-1} (CH stretching), 1638 cm^{-1} (C=C alkene, weak), 1456 cm^{-1}, 1382 cm^{-1} (gem-dimethyl), 1050 cm^{-1} (broad C=O stretch secondary alcohol) and 970 cm^{-1} (strong trans C_{22} disubstituted). On the basis of the presence of five main methyl signals at δ 0.69 (C.19-H_3), 0.82 (C.18-H_3), 1.01 C.26-H_3 and C.27-H_3) and 1.03 C.21-H_3) in its ^{1}HNMR (100 MHz $CDCl_3$)[4] and also methyl signals at δ 12.5 (C.19-H_3), δ13.6 (C.18-H_3), δ 22.2 (C.26-H_3), δ (22.8 and δ26.4 (C.21-H_3) in the ^{13}C NMR spectrum, the compound, M.P. 170-71° agrees with the structure of stigmasterol. Its acetate, M.P. 145° was also identical with that of stigmasterol acetate. Mass spectrum of the parent molecule, M.P. 170-71° showed peaks at m/e 125 and 139 due to side chain positive ions[5], characteristic of unsaturated stigmasta-5,22-diene structure and a molecular ion peak at 412.

Stigmasterol and other phytosterols commonly occur in several plant species. Stigmasterol is known as an antistiffness factor[6]. This phytosterol is also reported to have antitumour and antiinflammatory effects on the skin[7]. It seems that flowers of *C. guianensis* are rich in stigmasterol (yield, 150 mg/kg). It could be used as a template for developing antitumour/anti inflammatory agents. Earlier chemical work on *C. guianensis*[8-12] has shown that it contains eugenol, linalool, (E-E)-farnesol, nerol, typtanthrine, indigo, indirubin, isatin, linoleic acid, ∝, β-amyrins, carotenoids, sterols and some acidic and phenolic compounds.

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REFERENCES

1. Heywood, V.H. and Chant, S.R. In; Popular Encyclopedia of plants, Cambridge University Press, Cambridge, London, 1982, 103.
2. Satyavati, G.V., Raina, M.K., Sharma, M., Eds., In; Medicinal Plants of India, ICMR Vol. I, Cambridge Printing Works, New Delhi, 1976, 286.
3. Vahanwala, S.J., Golatkar, S.G., Rane, J.B., Pawar, K.R., Ambaye, R.Y. and Khadse, B.G., **Indian Drugs,** 2000, 37, 343.
4. Sasaki, S. In; handbook of proton NMR spectra and Data. Vol. 5, Academic Press Inc, Tokyo, 1985, 381.
5. Schiller, H. and Fette, S., **Anstrl Chem.,** 1985, 87, 64.
6. Lecoq, R., **Compt. Rend.,** 1958, 246, 3287.
7. Yasukawa, K., Takido, M., Matsumoto, T., Takeuchi, M. and Nakagawa, S., **Oncology,** 1991, 49, 72.
8. Wong, K.C. and Tie, D.Y., **J. Essential Oil Res.,** 1995, 7, 225.
9. Lego, R.C.A., Pareira, D.A., Sequeira, F.A.R., Szpiz, R.R. and DeOliveira, J.P., **Acta Amazonica,** 1986, 16, 369.
10. Row, L.R., Sastry, C.S.P. and Murthy, P.S., **Curr. Sci.,** 1966, 35, 146.
11. Bergman, J., Lindotroem, J.O. and Tilstan, U., **Tetrahedron** 1985, 41, 2879.
12. Sen, A.K., Mahato, S.B. and Dutta, N.L., **Tetrahedron Lett.,** 1974, 7, 609.