able IR, NMR and mass spectra. *Spathulenol.* $C_{15}H_{24}O$, liq., 3,5-Dinitrobenzoate, m.p. 148°. Superimposable IR and NMR spectra of the alcohol and IR spectra of the derivative. *Carvomenthol, α-Terpineol, α-* and *β-Pinene, Camphene, γ-Terpinene, Limonene, Cineol.* Identified by gas chromatography, superimposable IR and NMR spectra. *Unidentified compounds.* (*A*) $C_{15}H_{22}O$ (M^+), liq., IR $\nu^{\text{liq.}}$ 3500, 1653, 1060, 888 cm^{-1}, NMR δ^{CDCl_3} 0·5–0·9 (2H,m), 1·08 (6H,s), 1·13 (3H,s), 4·18 (1H,br.s), 4·95 (1H,br.s). (*B*) $C_{15}H_{24}O$ (M^+), liq., IR $\nu^{\text{liq.}}$ 3500, 1660, 1630, 1150, 1010, 770 cm^{-1}, NMR δ^{CDCl_3} 0·80 (3H,d, $J = 6·8$), 0·82 (3H,d, $J = 6·8$), 1·20 (3H,s), 1·65 (3H,s), 5·53 (1H,m). (*C*) $C_{19}H_{34}O$ or $C_{18}H_{30}O_2$ (M^+), liq., IR $\nu^{\text{liq.}}$ 3400, 920 cm^{-1}, NMR δ^{CDCl_3} 0·88 (6H,d, $J = 5·6$), 0·89 (3H,s), 1·28 (6H,s), 5·04 (1H,dd, $J = 10·2$, 1·9), 5·20 (1H,dd, $J = 17$, 1·9), 5·93 (1H,dd, $J = 17$, 10·2). (*D*) $C_{15}H_{22}O$, liq., IR $\nu^{\text{liq.}}$ 3400, 1630, 880 cm^{-1}, NMR δ^{CDCl_3} 0·3–0·8 (2H,m), 1·02 (3H,s), 1·10 (3H,s), 1·23 (3H,s), 4·67–4·73 (2H,m). (*E*) $C_{10}H_{12}O_3$, liq., UV λ_{max}^{MeOH} 254 nm (ϵ 950), IR $\nu^{\text{liq.}}$ 1755, 1633 cm^{-1}, NMR δ^{CDCl_3} 1·23 (3H,s), 1·27 (3H,s), 1·55 (3H,s), 5·65 (1H,s).

Acknowledgements—Thanks are due to Professors M. Terasaka, Tokyo College of Pharmacy; H. Mitsuhashi, Hokkaido University; H. Hikino, Tohoku University; C. Djerassi, Stanford University, and P. R. Jefferies, and Drs. E. L. Ghisalberti, University of Western Australia and K. Sen, East India Pharmaceutical Work Ltd., for the authentic samples of spectral data.

Phytochemistry, 1971, Vol. 10, pp. 3331 to 3332. Pergamon Press. Printed in England.

SAURURECEAE

CONSTITUENTS OF *ANEMOPSIS CALIFORNICA**

LOHIT V. TUTUPALLI and MADHUKAR G. CHAUBAL
Pharmacognosy Division, School of Pharmacy, University of the Pacific, Stockton, Calif. 95207, U.S.A.

(*Received* 7 *June* 1971)

Abstract—Light petroleum extract of the roots and rhizomes of *Anemopsis californica* (Nutt.) Hook and Arn. yielded a compound identified as (+)-asarinin from its spectral and other analytical data.

ONLY TWO reports on the natural occurrance of (+)-asarinin are available.[1,2] Previously our laboratory reported on the chemical constituents of the essential oil from the roots and rhizomes of *Anemopsis californica.*[3,4] This paper is a part of the continuing study of the Saururaceae and reports the isolation and identification of (+)-asarinin from *A. californica.*

Of the powdered plant material 300 g[3,4] were extracted in a soxhlet with light petroleum. The crude crystals obtained from the concentrate were recrystallized from cyclohexane. (240 mg, 0·08% yield), m.p. 120–121° (capillary, uncorrected) and $[\alpha]_D^{20}$ +122°(*c* 0·1, $CHCl_3$). Mol. wt. 354 (Mass spectrum). (Found: C, 68·05; H, 4·68; O, 27·15; $C_{20}H_{18}O_6$ requires: C, 67·8; H, 5·1%.) UV: (nm) 236, 288; IR:(nm) 2853, 1501, 1442, 1375, 1365(sh), 1360, 1255, 1190–1180(doublet), 1074, 1035, 935. Mass: *m/e* 354 (parent peak), 203, 178,

---

* Part III in the series "Constituents of Anemopsis Californica".

[1] J. B. DENVERPORT and M. D. SUTHERLAND, *Australian J. Chem.* **1**, 384 (1954).

[2] K. HISAYUKI, K. SCHOICHI, O. AKIO and K. MUNIO, *Nippon Kagaku Zassi* **89**, 717 (1968).

[3] R. N. ACHARYA and M. G. CHAUBAL, *J. Pharm. Sci.* **57**, 1020 (1968).

[4] D. R. SANVORDEKAR and M. G. CHAUBAL, *J. Pharm. Sci.* **58**, 1213 (1969).

NMR: (ppm, δ) 2·89(multiplet), 3·38(multiplet), 4·02(multiplet), 4·46(doublet), 6·02 and 6·85(doublet). These satisfactorily compare with the published spectral data for (+)-asarinin: UV,[1] IR,[5] Mass,[8,7] NMR.[8,9] The isolated sample was identical with an authentic sample; no m.p. depression of mixture and superimposable IR.

Childs and Cole[10] reported the isolation of a crystalline product from the petroleum ether extract of *Anemopsis*, but did not identify the compound.

Acknowledgements—The authors wish to thank Dr. G. S. Rao, (NIH) and Dr. G. J. Kapadia, College of Pharmacy, Howard University, for their help in identification, Dr. E. D. Becker (NIH) and Dr. M. Beroza (USDA) for providing the authentic sample, and Dr. D. K. Wedegaertner, Department of Chemistry, University of the Pacific for help in the discussion of spectral data.

[5] K. FREUDENBERG and G. S. SIDHU, *Chem. Ber.* **94,** 851 (1961).
[6] A. PELTER, *J. Chem. Soc.* **15,** 1376 (1967).
[7] A. M. DUFFIELD, *J. Heterocyclic Chem.* **4,** 16 (1967).
[8] E. D. BECKER and M BEROZA, *Tetrahedron Letters* 157 (1962).
[9] K. WEINGES, *Chem. Ber.* **94,** 2522 (1961).
[10] R. F. CHILDS and J. R. COLE, *J. Pharm Sci.* **54,** 789 (1965).

Phytochemistry, 1971, Vol. 10, p. 3332. Pergamon Press. Printed in England.

STAPHYLEACEAE

FLAVONOL GLUCOSIDES OF *EUSCAPHIS JAPONICA*

NARIYUKI ISHIKURA
Department of Biology, Kumamoto University, Kumamoto, Japan

(*Received* 12 *January* 1971, *in revised form* 4 *April* 1971)

Plant. Euscaphis japonica (Thunb.) Kanitz.

Previous work. Kaempferol 3-glucoside and quercetin 3-glucoside in the ratio 1:4 and cyanidin 3-xylosylglucoside in the red capsule.[1]

Present work. Leaf yielded kaempferol 3-glucoside and quercetin 3-glucoside in the ratio 4:1. Compounds identified by spectral and chromatographic comparison with authentic samples, by hydrolysis and by alkaline fusion of the aglycones.

Acknowledgement—The author is grateful to Professors M Shibata and M. Hasegawa for providing the authentic samples.

[1] N. ISHIKURA, *Bot. Mag. Tokyo* **84,** 1 (1971).