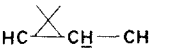
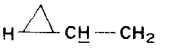
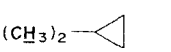
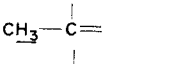
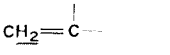
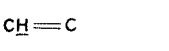
TABLE 1. NMR AND MS DATA FOR β-SPATHULENE

δ	No. of protons	Type	Hz	Inference
0·423*	1	$d \times d$	≃10·09	
0·755*	1	*m*	—	
1·02*	3	*s*	—	
1·05*	3	*s*	—	
1·59	3	*s*	—	
4·49*	2	*bs*	—	
5·15	1	*bs*	—	

m/e = 159, 131, 105, 91 and 202 m.u.
* These peaks are also found in NMR of spathulenol.

Isolation of β-spathulene. After $AgNO_3$–Al_2O_3 column chromatography on the sesquiterpene hydrocarbon fraction,[7,8] β-spathulene was isolated from the appropriate fraction by preparative GC over Carbowax 6000.

Dehydration of spathulenol to β-spathulene was done with pyridine–$SOCl_2$ using a procedure described previously.[9]

Spectroscopy. IR spectrum was run as a thin film (0·05 mm spacer), μ = 3·25, 3·30, 6·13, 7·29, 8·49, 9·67, 9·90, 10·32, 11·30, 12·55, 13·02 and 15·70 μ. The NMR was run as a 1% soln in $CDCl_3$ on a Varian Aerograph 220 MHz spectrometer.

[7] LAWRENCE, B. M., TERHUNE, S. J. and HOGG, J. W. (1971) *Flavour Industry* 2, 173.
[8] LAWRENCE, B. M. (1971) *Can. Inst. Food Technol. J.* **4**, A44.
[9] HOGG, J. W., TERHUNE, S. J. and LAWRENCE, B. M. (1971) *Am. Perfum. Cosmet.* **86**, 33.

Phytochemistry, 1974, Vol. 13, pp. 866 to 867. Pergamon Press. Printed in England.

N-METHYLTYRAMINE FROM *OPUNTIA CLAVATA**

RANDALL L. VANDERVEEN, LESLIE G. WEST and JERRY L. MCLAUGHLIN
Department of Medicinal Chemistry and Pharmacognosy, School of Pharmacy and Pharmacal Sciences, Purdue University, West Lafayette, IN 47907, U.S.A.

(*Received* 12 *September* 1973. *Accepted* 26 *October* 1973)

Key Word Index—*Opuntia clavata*; Cactaceae; cactus alkaloids; *N*-methyltyramine; hordenine; tyramine.

Plant. Whole plants of *Opuntia clavata* Eng. Living specimens are being maintained in our greenhouse. *Source.* Collected near Albuquerque, New Mexico; identification confirmed by Dr. Harold A. Mackay†. *Previous work.* Unidentified alkaloids detected in

* Part XXIV in the series "Cactus Alkaloids". For Part XXIII see WEST, L. G., VANDERVEEN, R. L. and MCLAUGHLIN, J. L. (1974) *Phytochemistry* **13**, 666.
† Department of Biology, University of New Mexico, Albuquerque.

sister species from Argentina[1] and hordenine identified (GC–MS) in sister species from Uruguay.[2]

Present work. TLC screening[3] detected alkaloids. Chloroform extraction of 1·04 kg of freeze-dried, pulverized, and defatted material yielded 5·278 g of *N*-methyltyramine HCl (m.p. 148–149°, m.m.p. 147–149°, reference m.p. 146–147°, IR, 0·51% yield) from fractions A and C without using the ion-exchange column.[4] Traces of tyramine and hordenine were identified via two-dimensional cochromatography[5] in the mother liquors. *N*-methyltyramine was, by far, the major alkaloid observed in three different collections of this species. This is the first report of the crystallization of an alkaloid from the *Opuntia* genus. A previous report[6] regarding the isolation of mescaline from *O. cylindrica* erroneously utilized *Trichocereus pachanoi.*[7]

Acknowledgements—The authors thank Mr. J. F. West for a large collection of the plant material. This work was supported by grants from the National Institutes of Health (GRS Grant No. RRO-5586) and the Cactus and Succulent Society of America. L. G. West acknowledges the support of the James F. Hoge Memorial Fellowship from the American Foundation for Pharmaceutical Education.

[1] FALCO, F. and HILBUG, S. (1946–47) *Rev. Facultad Quim. Ind. y Agr. (Univ. Nacl. Litoral,* Santa Fe, Arg.) **15/16,** 71; (1949) *Chem. Abstr.* **43:** 1530i.
[2] DE VRIES, J. X., MOYNA, P., DIAZ, V., AGURELL, S. and BRUHN, J. G. (1971) *Rev. Latinoamer. Quim.* **2,** 21.
[3] DINGERDISSEN, J. J. and MCLAUGHLIN, J. L. (1973) *Lloydia* **36** (in press).
[4] DINGERDISSEN, J. J. and MCLAUGHLIN, J. L. (1973) *J. Pharm. Sci.* **62,** 1663.
[5] MCLAUGHLIN, J. L. and PAUL, A. G. (1966) *Lloydia* **29,** 315.
[6] TURNER, W. J. and HEYMAN, J. J. (1960) *J. Org. Chem.* **25,** 2250.
[7] CROSBY, D. M. and MCLAUGHLIN, J. L. (1973) *Lloydia* **36** (in press).

Phytochemistry, 1974, Vol. 13, pp. 867 to 868. Pergamon Press. Printed in England.

ELLAGIC ACIDS FROM *EUPHORBIA CORNIGERA* AND *E. WALLICHII*

S. F. HUSSAIN
Drugs Research Division, P.C.S.I.R. Laboratories, Peshawar, Pakistan

(*Received* 4 *August* 1973. *Accepted* 27 *September* 1973)

Key Word Index—*Euphorbia cornigera*; *E. wallichii*; Euphorbiaceae; ellagic acid; 3,3'-di-*O*-methylellagic acid.

Plants. Euphorbia cornigera Boiss. (Peshawar Herbarium No. 4374) and *Euphorbia wallichii* Hook. f. (Herbarium No. 48) collected from Murree Hills, Rawalpindi. *Uses.* Medicinal properties have been reported from sister species.[1] *Previous work.* Sister species.[2]

Euphorbia cornigera. Alcoholic extract of the roots of *E. cornigera* deposited crystals of *ellagic acid,* m.p. 360° (dec) (Found: C, 55·92; H, 2·22. $C_{14}H_6O_8$ requires: C, 55·64; H,

[1] CHOPRA, R. N., NAYAR, S. L. and CHOPRA, I. C. (1956) *Glossary of Indian Medicinal Plants,* p. 113, CSIR, New Delhi.
[2] SHINODA, J. and KUN, C. P. (1931) *J. Pharm. Soc. Japan* **51,** 502; SHARMA, R. C., ZAMAN, A. and KIDWAI, A. R. (1964) *Indian J. Chem.* **2,** 254; GUPTA, R. K. and MAHADEVAN, V. (1967) *Indian J. Pharm.* **29**(5), 152.