Tetrahedron Letters No. 29, pp 2527 - 2528, 1974. Pergamon Press. Printed in Great Britain.

ISOLATION AND STRUCTURES OF 20-DEOXYINGENOL NEW DITERPENE, DERIVATIVES AND INGENOL DERIVATIVE OBTAINED FROM "KANSUI"

Daisuke Uemura, Hiroshi Ohwaki, and Yoshimasa Hirata

Chemical Institute, Faculty of Science, Nagoya University, Chikusa, Nagoya, Japan

Yuh-Pan Chen and Hong-Yen Hsu

Brian Research Institute of Taiwan, 116 Chung-Ching S. Rd., Sec.3, Taipei, Taiwan

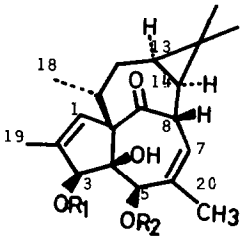
(Received in Japan 27 May 1974; received in UK for publication 11 June 1974)

Previously[1,2], we reported the irritant constituents of Euphorbia millii and E. jolkini.

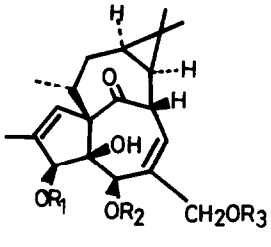
Now we wish to report the components of toxic fractions isolated from the dried roots of Euphorbia kansui Liou. (Euphorbiaceae). The commercially avaiable roots were extracted with ethanol. After ordinary treatment for the soluble compounds in organic solvent, column chromatography by silicic acid afforded 20-deoxyingenol derivatives [(1) and (2)] and ingenol derivative (3).

Compounds (1) and (2) were treated with sodium methoxide followed by the neutralization with IRC-50. New diterpene, 20-deoxyingenol (4), and methyl benzoate were obtained, and the spectral data and physical constants are as follows.

20-Deoxyingenol (4): m.p. 201-203° (decomp.); IR (KBr) 3550, 1705, 1665, 1640 cm^{-1}; NMR (100 MHz, in C_6D_6N) 0.6-0.9 (1H, m, H-13), 1.10 (3H, s) 1.16 (3H, d, J= 8 HZ, H-18), 1.26 (3H, s), 1.90 (3H, br.s, H-19), 1.98 (3H, br.s, H-20), 2.5-2.9 (2H, m, H-11,12), 3.86 (1H, br.s, H-5),



(1) R_1=COPh, R_2= H
(2) R_1= H, R_2= COPh
(4) R_1=R_2= H
(6) R_1=R_2= $COCH_3$

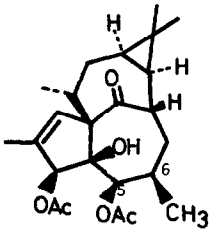


(3) R_1= $CO(CH=CH)_2(CH_2)_4CH_3$
R_2= H, R_3= $COCH_3$
(5) R_1=R_2=R_3= H
(9) R_1=R_2=R_3= $COCH_3$
(10) R_1=R_2= H, R_3= $COCH_3$

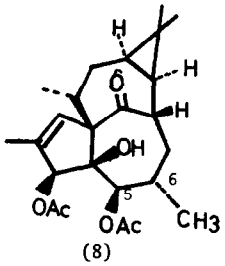
4.60 (1H, d of d, J= 12 and 4 Hz, H-8), 5.02 (1H, s, H-3), 5.0-5.8 (3H, br.s, exchangeable with D_2O), 5.90 (1H, br.d, J= 4 Hz, H-7), 6.22 (1H, q, J= 1 Hz, H-1); Mass 332 (m^+), 314, 296, 278.

The nmr spectrum of 20-deoxyingenol showed the presence of signal of new olefinic methyl group at δ 1.98 and the absence of signal assigned to hydroxy methylene group in the nmr spectrum of ingenol (5). Another signals of 20-deoxyingenol were similar to that of ingenol.
We assumed the structure of 20-deoxyingenol as 4, which was correlated with ingenol by the next reactions. 20-Deoxyingenol gave a diacetate (6) with acetic anhydride in pyridine, which was converted to compounds (7) and (8)[3] by the hydrogenation with Pd-C in ethyl acetate.
The other hand, hydrogenolysis followed by hydrogenation of ingenol triacetate (9) gave a compound (7)[4] with the action of Pd-C as a catalyst in ethyl acetate. Compounds (7) derived from deoxyingenol and ingenol were not distinguishable in all physical and spectral data.

We also obtained the next compound (3) . The observation of the nmr spctrum showed that this compound is ingenol derivative and that hydroxy groups at C-3 and C-20 of ingenol were esterified by a unsaturated fatty acid and an acetic acid. The treatment of compound (3) with sodium methoxide gave ingenol and methyl 2,4-decadienoate. By the partial hydrolysis with a aqueous sodium bicarbonate in methanol compound (3) afforded a monoacetate (10) which was reported[1].



(7)



(8)

REFERENCES

1) D. Uemura and Y. Hirata, Tetrahedron Letters, 3673 (1971).

2) D. Uemura and Y. Hirata, Tetrahedron Letters, 881 (1973).

3) When ethyl acetate was used as a solvent, the ratio of 7 to 8 is 4:3. But in methanol we obtained as in the ratio 3:4. The other hand ingenol triacetate gave almostly the compound (7).

4) The configuration of secondary methyl group at C-20 was deduced by the value of coupling constant between protons at C-5 and C-6 in the nmr spectrum (7: J= 1 Hz and 8: J= 10 Hz).