PHYTOECDYSONES FROM PLENASIUM BANKSIAEFOLIUM AND BOLBITIS SUBCORDATA[1]

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Abstract

From the Formosan ferns, Plenasium banksiaefolium and Bolbitis subcordata, the phytoecdysones ponasterone A and ecdysterone, respectively, have been isolated.

According to our earlier experience in surveying vegetable materials for the insect moulting hormone activity, the probability of finding the activity is higher in ferns than in the other plant groups (Hikino et al., 1973; Yen et al., 1974). Since, during the screening tests, the Formosan ferns, Plenasium banksiaefolium Presl (Osmundaceae) and Bolbitis subcordata Ching (Aspidiaceae), have been revealed to show remarkable activity towards the insects, we have carried out a chemical examination of the active principles of these ferns, monitored by the hormone activity by means of the bioassay, the Sarcophaga test (Ohtaki et al., 1967), to obtain the phytoecdy sones, ponasterone A and ecdysterone, respectively.

Experimental

TLC was performed on Si gel G plates.

Isolation of ponasterone A from Plenasium banksiaefolium

The whole plants (8.0 kg) of P. banksiaefolium, collected at Yang-ming-shan, Taipei, Taiwan, were extracted with refluxing EtOH (25 l, for 5 hr each, 3 times). The EtOH extract (310 g) was diluted with water and continuously extracted with AcOEt to afford an extract (60 g). The AcOEt extract was repeatedly chromatographed over alumina and Si gel to give ponasterone A as colorless needles (30 mg) (mp 258-260°. MS m/e: 465(M^+ + 1). IR ν_{max}^{kbr} Cm^{-1}: 3400(OH), 1640 (enone). TLC (AcOEt-MeOH (20:1)): Rf 0.37; TLC ($CHCl_3$-MeOH (7:1)): Rf 0.58) which was identical with an authentic ponasterone A (TLC, mass, IR and H NMR spectra).

Isolation of ecdysterone from Bolbitis subcordata

The whole plants (4.0 kg) of B. subcordata, collected at Wu-lai, Taipei, Taiwan, were extracted and fractionated in a similar manner as above to yield ecdysterone as a colorless amorphous mass (1 mg)

1 Part XXXI in the Tohoku University series on Steroids.

[MS m/e: 480 (M^+), TLC (AcOEt-MeOH (15:1)): Rf 0.25; TLC ($CHCl_3$-MeOH (6:1): Rf 0.44] which was identical with an authentic ecdysterone (TLC and mass spectrum). The phytoecdysone (0.5 mg) was treated with Ac_2O (0.5 ml) and Py (1 ml) at room temp overnight to furnish an acetate (0.5 mg) [MS m/e: 528 (M^+-78). TLC (benzene - AcOEt (1:2)): Rf 0.14] which was identical with an authentic ecdysterone 2,3,22-triacetate (TLC and mass spectrum).

References

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[Published in Planta Medica, Bd. 31, 71-72 (1977)]