

**Isolation of Insect Moulting Substances from *Pteridium aquilinum* var. *latiusculum***

As part of our study on the insect-moulting substances from plant sources, we have undertaken analysis of the constituents of the whole plant of *Pteridium aquilinum* KUHN var. *latiusculum* UNDERW.<sup>1)</sup> (Pteridiaceae) grown in Japan, whose methanol extract has been revealed to show insect-moulting hormone activity in the screening tests. Although this survey is still in progress, the recent publication on the isolation of  $\alpha$ -ecdysone (ecdysone) and 20-hydroxyecdysone (ecdysterone) from *Pteridium aquilinum* KUHN grown in North America by Kaplanis, *et al.*<sup>2)</sup> has prompted us to report our results obtained so far.

The polar fraction of the methanol extract was submitted to column chromatography resulting in the isolation of ponasterone A, mp 257.5—259.5°, pterosterone, mp 231.5—232.5°, and a novel steroid with moulting hormone activity, mp 278—279.5°, for which we now give the term warabisterone. The isolation of ecdysone and ecdysterone, whose occurrence was indicated by thin-layer chromatography, has not been successful due to the coexistence of a large amount of a bitter substance with similar polarity.

Kaplanis, *et al.* suggested the presence of three unidentified substances with moulting hormone activity in the American bracken.<sup>2)</sup> Since it is described that those substances have the polarities similar to ecdysone, one or two of them may be identical with ponasterone A and/or pterosterone presently isolated as the major moulting components from the Japanese bracken.

In the insect (*Sarcophaga*) bioassay, warabisterone exhibits the high moulting hormone activity. Warabisterone, as with the other insect-moulting substances (*i.e.*, ponasterone A, pterosterone, ecdysterone, inokosterone, cyasterone,<sup>3)</sup> and lemmasterone<sup>4)</sup>) shows also the high stimulating effect on the protein anabolism in mouse liver.

A view has been expressed that the presence of insect-moulting substances in plants makes them resistant to insect attack.<sup>2,5)</sup> However, this view is not always true, since the larvae of *Bombyx mori* and *Milionia basalis pryleri*, live on the leaves of *Morus* sp. and *Podocarpus macrophyllus*,<sup>6)</sup> respectively, which are now known to contain considerable quantities of insect-moulting substances.<sup>7,8)</sup>

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