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FLAVONOIDS FROM THE ROOTS OF *TEPHROSIA ELATA*

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Tephrosia elata Deflers (Leguminosae) is a short-lived, bushy perennial that occurs in Kenya on grassland, formerly cultivated land, and thicket margins in the highlands up to 6000 ft. (1). From a study of the seeds of *T. elata*, we have recently reported the isolation of isopongaflavone and tephrosin as feeding deterrents for *Spodoptera exempta*, *Eldana saccharina*, and *Maruca testulalis* larvae, and the identification of certain members of a community of insects associated with the seed pods of *T. elata* (2). Here we report the isolation and identification of six flavonoids from the roots of *T. elata*. They have been identified as the flavanones 8-(3,3-dimethylallyl)-5,7-dimethoxyflavanone and obovatin methyl ether, the flavone warangalone (scandene), the pterocarpan (+)-pisatin and (-)-maackiain, and the rotenoid tephrosin. Although isopongaflavone was found to occur in large quantities (1.2%) in the seeds of *T. elata* (2), we were unable to detect it in the roots.

8-(3,3-Dimethylallyl)-5,7-dimethoxyflavanone has previously been isolated from *Lonchocarpus costaricensis* (3) while obovatin methyl ether has been isolated from *Tephrosia obovata* (4), *Tephrosia praecans* (5), and *L. costaricensis* (3). Warangalone has been isolated from *Derris scandens* (6). (+)-Pisatin is a major phytoalexin of *Pisum sativum* (7), while (-)-maackiain has been isolated as a phytoalexin from several species of Leguminosae (8).

The isolation of pisatin and maackiain from apparently healthy roots of *T. elata* is interesting. Except for hildecarpin, an insect antifeedant 6a-hydroxypterocarpan that we recently isolated from *Tephrosia hildebrandtii* Vatke (9), pterocarpan has been isolated from *Tephrosia* only as phytoalexins, the formation of which has been induced by inoculation of the plants with microorganisms (10).

EXPERIMENTAL

PLANT MATERIAL.—The roots of *T. elata* were collected in March 1983, near Thika, Kenya. A voucher specimen (No. 2357) is deposited in the Department of Botany Herbarium, University of Nairobi, Nairobi, Kenya.

EXTRACTION, ISOLATION AND IDENTIFICATION.—The air-dried roots (1.25 kg) were ground and extracted with MeOH in the cold, and the extract was evaporated in vacuo to give a gummy residue (76.0 g). A portion of this residue (33.0 g) was partitioned between H₂O and CHCl₃ and the latter fraction evaporated in vacuo to yield an oil (22.1 g). The oil was purified by column chromatography using silica gel and a CHCl₃/EtOAc gradient (2-100%) as the eluent. Further purification of the fractions from the column by column and preparative tlc on silica gel using a toluene/EtOAc gradient (2-50%) and toluene-hexane-EtOAc (3:4:3 v/v), respectively, as eluents afforded 8-(3,3-dimethylallyl)-5,7-dimethoxyflavanone (46 mg), obovatin methyl ether (71 mg), warangalone (scandene) (8 mg), (+)-pisatin (7 mg), (-)-maackiain (7 mg), and tephrosin (101 mg). The identification of the flavonoids was based on comparison of spectroscopic data (¹H and ¹³C nmr, ms, ir, uv) with literature values.

Full details of the isolation and identification of the compounds are available on request from the senior author.

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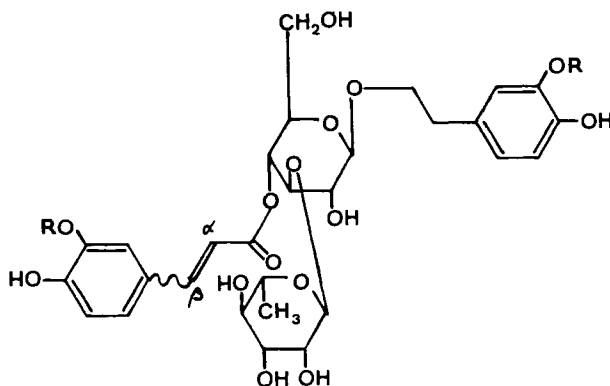
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PHENYLPROPANOID GLYCOSIDES IN *BUDDLEJA DAVIDII*

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The occurrence of verbascoside (**1**), formerly known as orobanchin, in *Buddleja* (Buddlejaceae) has been noted for a long time (1). It was only fairly recently that its complete structure was determined (2). Related phenylpropanoids have been isolated from *Orobanche* (2) and *Cistanche* (3-5). One of these compounds, cistanoside D (**2**), has now been isolated as both the *E* and *Z* isomers from the stems of *Buddleja davidii* Franchet.



- 1** R=H
2 R=CH₃