Table 1. Relative Activities of Choline Theophyllinate, Choline Thiotheophyllinate and M. and B. 5924
(The activity of choline theophyllinate has been expressed arbitrarily as 1)

Compound	Bronchodilator activity (guinea pig)		Coronary dilator activity (dog)	Diuretic activity (rat)
	In vitro	*In vivo*		
Choline theophyllinate	1	1	1	1
Choline thiotheophyllinate	5	1	2-3	< 1
M. and B. 5924	60	2	15	< 1

A full description of the chemical work will be submitted to the *Journal of the Chemical Society* and of the pharmacological work to the *British Journal of Pharmacology and Chemotherapy*.

A. K. Armitage
K. R. H. Wooldridge

Research Laboratories,
May and Baker, Ltd.,
Dagenham, Essex.

Ayapin, Scopoletin and 6,7-Dimethoxycoumarin from *Dendrobium thyrsiflorum* (Reichb. f.)

During the examination of plants for phenolic constituents, the orchid *Dendrobium thyrsiflorum* was found to contain three highly fluorescent constituents (E. C. Bate-Smith, personal communication). The substances were extracted from a leaf hydrolysate with amyl alcohol and chromatographed on Whatman No. 1 paper using several different solvent systems. All the substances concerned fluoresce strongly a light blue-violet colour which is changed to green when the paper is sprayed with 2 *N* sodium hydroxide. The R_F values in toluene/acetic acid/water (supernatant phase from 4 : 1 : 5 vol.) were 0·15, 0·77 and 0·85 and in 6 per cent acetic acid 0·43, 0·54 and 0·61. In Forestal solvent (hydrochloric acid/acetic acid/water) and butanol/acetic acid/water the R_F values were all too high to give good separation.

The reaction with sodium hydroxide strongly resembled that given by coumarin (R_F in toluene–acetic acid 0·9). The first substance, in fact, agreed in every respect with the well-known coumarin scopoletin. The other two substances, from their R_F values relative to those of scopoletin and coumarin, seemed likely to be polymethoxy- or methylenedioxy-coumarins. Samples of ayapin (6,7-methylenedioxycoumarin) and 6,7-dimethoxycoumarin were therefore synthesized, and a sample of the latter and also of 5,6,7-trimethoxycoumarin were obtained from Dr. F. E. King. The dimethoxycoumarin agreed in all particulars with the second unknown substance and ayapin with the third. Trimethoxycoumarin has virtually the same R_F as ayapin in toluene/acetic acid/water but its R_F value in 6 per cent acetic acid is much higher (0·76), and when the paper is sprayed with alkali its fluorescence changes to bright yellow-white. The hydrolysate was chromatographed on Whatman No. 3 paper in 6 per cent acetic acid, the three substances were eluted, and their ultra-violet absorption spectra compared with synthetic standards. All showed closely similar spectra with maxima at 345 mμ and 295 mμ, a shoulder at 260 mμ and minima at 270 mμ and 305 mμ. Since the absorption spectra are quite different from other related coumarins such as herniarin, daphnetin, limetin, it is concluded that 6,7-dimethoxycoumarin and ayapin are the substances present.

In order to determine the form in which these substances occur in the plant, an extract of a leaf was made with cold methanol. This was run on Whatman No. 3 paper in 6 per cent acetic acid. No free coumarins were present, but there were three distinct fluorescent bands which were cut out and eluted. On hydrolysis the slowest-running of these gave the dimethoxycoumarin, the second gave ayapin and the third gave a mixture of these two and scopoletin. It is concluded that these coumarins occur in combination, probably as the glycosides of the corresponding *o*-coumaric acids, and that the dimethoxycoumarin and ayapin both occur in more than one glycosidic form.

I wish to thank Dr. F. E. King for the specimens of dimethoxy- and trimethoxy-coumarins and Dr. E. C. Bate-Smith for helpful advice and the facilities of his laboratory.

T. C. Wrigley*

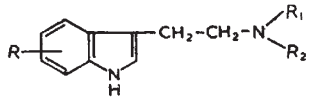
Low Temperature Research Station,
Cambridge.

* Present address: Chemical Research Laboratory, Wellcome Research Laboratories, Langley Park, Beckenham, Kent.

Reserpine Analogues

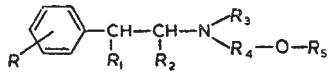
It seems likely that the most interesting pharmacological properties of the natural alkaloid reserpine are mainly determined by three chemical groups in the molecule: (1) the β-indolylethylamine group, which is present in many other natural drugs (serotonine, ergot alkaloids); (2) a tertiary nitrogen atom which is substituted by three carbon chains, one of which (the ethyl group) is attached to the indole nucleus, while the other two form part of a ring system bearing (3) a hydroxyl group which is esterified by trimethoxybenzoic acid. The β-phenylethylamine group, which is very similar to the β-indolylethylamine group, is found in another group of drugs, the adrenaline family.

On the basis of these considerations we have synthesized a number of compounds the structure of which is more or less similar to that of reserpine, in the hope that these would have useful medicinal properties. These compounds fall into two classes: β-indolylethylamine derivatives, having the general formula I:



(I)

where R indicates the absence of substitution, or substitution by one or two hydroxyl or alkoxyl groups, and R_1 and R_2 are alkyl or hydroxy-alkyl groups which may be etherized or esterified; and β-phenylethylamine derivatives, II:



(II)

where R indicates the absence of substitution, or substitution by one to three hydroxyl or alkoxyl