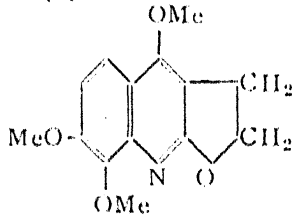
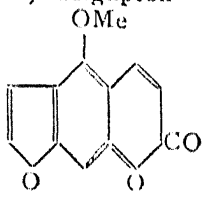
coumarin (m.p. 150°; yield, 0·005 per cent.), the second one is umbelliferone (IV) (m.p. 230°; yield, 0·1 pepr cent.), and the third active principle is a neutral compound, $C_{21}H_{20}O_8$ (m.p. 258-260° C.; yield, 0·02 per cent.) which has been hitherto unknown. This neutral compound has been called laureoline.

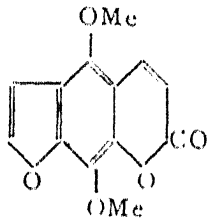
(I) Skimmianine



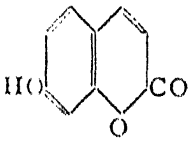
(II) Bergapten



(III) *Iso*pimpinellin



(IV) Umbelliferone



The bark of this species which has not been investigated as yet has also been studied. From the bark all the coumarins, namely, bergapten (II) (m.p. 188°; yield, 0·02 per cent.), *iso*-pimpinellin (III) (m.p. 150°; yield, 0·003 per cent.) and umbelliferone (IV) (m.p. 230°; yield, 0·05 per cent.), and the same alkaloid skimmianine (I) (m.p. 177°; yield, 0·001 per cent.) and laureoline too (m.p. 258-260°; yield, 0·01 per cent.) have been isolated in the pure state. Further work is in progress, the details of which will be published elsewhere.

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June 1947.

1. Roure-Bertrand Fils, *Bull.*, 1920, Oct. 34. 2. Schimmel, *Ber.*, 1926, Apr., 46. 3. Simonsen, *J. Soc. Chem. Ind.*, 1921, **40**, T. 126. 4. Schimmel, I. C., *Constanten*, 1923, 72. 5. Schimmel and Co-Rept., 1932, 5-73. 6. Wienhaus and Rajdhan, *J. Prakt. Chem.*, 1936, **147**, 113. 7. Chopra, Chatterjee, Dey and Ghosh, *Indian J. Med. Research*, 1938, **26**, 481.

ANTIBACTERIAL ACTIVITY OF p-AMINO-BENZENE-PHOSPHONIC ACID (PHOSPHANILIC ACID) AND ITS DERIVATIVES

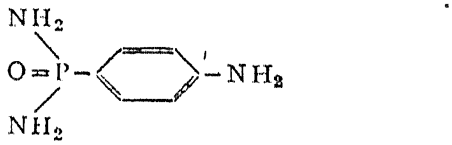
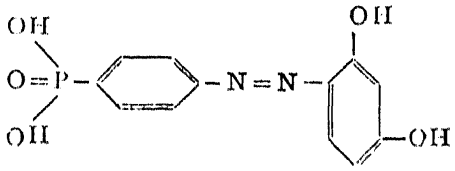
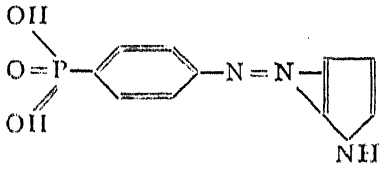
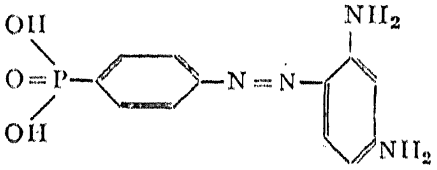
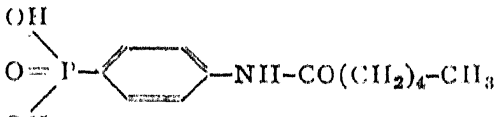
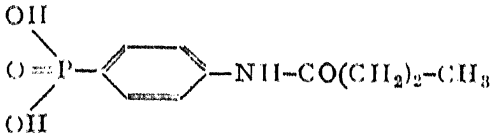
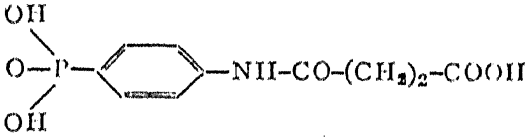
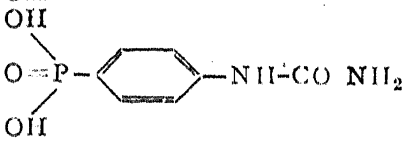
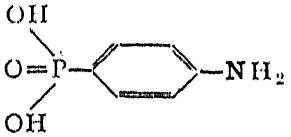
A RECENT note of Klotz and Morrison[1] describes the anti-bacterial activity of *p*-amino-benzene-phosphinous acid on *E. coli*. The activity was found to be slightly less than that of sulphanilamide.

Bhide and Limaye[2] prepared a number of derivatives of phosphanilic acid, whose anti-bacterial activity is briefly given in this note.

The method of testing was the Heatley cup method.[3] As the substances used were insoluble in water, their solutions in sodium bicarbonate were used. Laboratory cultures of the following organisms were used: (*i*) *E. coli*, (*ii*) *Staphilococcus aureus*, (*iii*) *Typhi murium* (O), (*iv*) *Corynebacterium xerosis* and (*v*) Boyd II. The results are given in Table I.

TABLE I

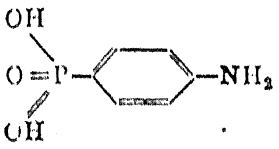
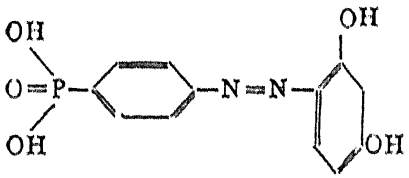
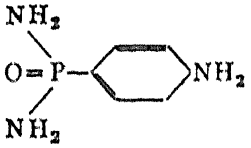
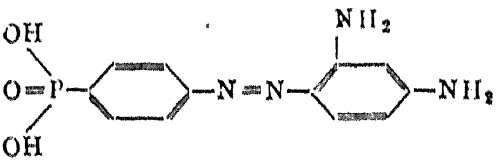
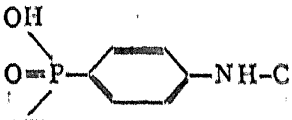
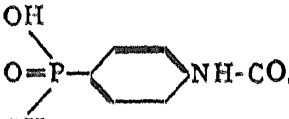
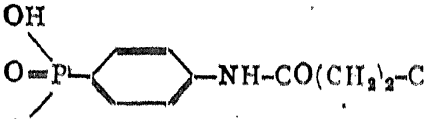
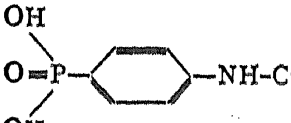
Inhibitory activity of some derivatives of Phosphanilic Acid at 1 per cent. concentration of the compound

Compound	Zone of inhibition in mms.	
	E. coli	*Staphylococcus aureus*
	5	12
	6	6
	2	0·0
	2	0·0
	1	1
	2	0·0
	4	1
	2	0·0
	No clear zone: very little growth for 12	12

Further experiments were carried out with a concentration of 0·1 per cent. Table II gives the results.

TABLE II

Inhibitory activity of some Phosphanilic Acid derivatives at 0·1 per cent. concentration of the compounds

Compound	Zone of inhibition in mms				
	E. coli	*Staphylococcus aureus*	*Typhi murium*	*C. xerosis*	Boyd II
	1·0	10·0	7·0	0·0	10·0
	1·0	1·0	0·0	0·0	10·0
	..	..	7·0	0·0	0·0
	..	..	0·0	0·0	0·0
	..	..	0·0	0·0	0·0
	..	..	0·0	0·0	0·0
	..	..	1·0	0·0	0·0
	..	..	0·0	0·0	0·0

It will be seen from these tables that phosphanilamide and phosphanilic acid are active in varying degrees against *E. coli*, *Staphylococcus aureus*, and *Typhi murium* (O) in 0·1 per cent. solution. All these compounds are practically inactive against *C. xerosis*. Phosphanilic acid was found to give, in another experiment, a 5 mm. with a concentration of 0·01 per cent.

As phosphanilic acid was found to be the most active substance it was tested for bacteriostatic activity in peptone and peptone broth at various concentrations with *Typhi murium* (O), *E. coli*, *Staphylococcus aureus* and Boyd II. The following table gives the results :—

Klotz and Morrison[1] mention that Kuhn, Moller and Wendt[4] have tested the antibacterial activity of phosphanilic acid but unfortunately the details of this work have not been available to us uptil now.