polarization, 6) for the mixture of fluorescein and rose bengale (Fig. 2B). These may be due to the predominant contribution from eosin and fluorescein respectively. (*b*) Between 545 nm–570 nm (average % polarization, 16·5) for eosin–erythrosin mixture and between 554 nm–570 nm (average % polarization, 9·5) for fluorescein–rose bengale mixture. These correspond to contribution from erythrosin and rose bengale respectively. Between 532 nm–545 nm (Fig. 1B) and between 530 nm–550 nm (Fig. 2B), the variation in percentage polarization is due to the simultaneous emission from both the species of the mixture.

Thus the present work suggests the possibility of qualitative analysis of binary mixtures by the use of fluorescence polarization spectrum. This method can be extended to study the effect of aggregation of molecules at higher concentration[4].

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STUDIES ON ELECTRICAL RESISTIVITY OF PALLADIUM-SILVER BIMETALLIC THIN FILMS

PALLADIUM and silver are completely missible in the solid state[1,2]. This enables the process of interdiffusion between the layers of Pd and Ag even at 250° C. The mechanism as interdiffusion is exploited to prepare the bimetallic films of Pd and Ag by sandwiched evaporation in which a film of Ag is deposited between the Pd films. The present communication includes the method of preparation of samples and their electrical resistivity.

The samples were prepared on clean glass substrates of 4 × 2 cm.^{2} by vacuum evaporation at less than 10^{-4} Torr, using the conventional high vacuum system. The substrate was cleaned by a suitable detergent, rinsed with isopropyl alcohol and heated for 3 hours at 180° C.

In the sandwiched type of deposition, for preparing the Pd/Ag bimetallic films, the components were deposited in the order: Pd, Ag, Pd, from a tungsten filament. Each film of Pd/Ag/Pd was then annealed at 250° C in a furnace until the resistance attained a stable value; thus indicating that the interdiffusion phenomenon had ceased. The thickness of each layer was determined by differential weighing in a microbalance. The bulk density was assumed to calculate the thickness of each metal[3]. The percentage concentration of Ag was determined from the known weights of each substance. The electrical resistance was measured by standard four probe method[4] at 303° K under atmospheric conditions.

Figure 1 shows the change of resistance of the deposits with the annealing time. The interdiffusion at the beginning is rapid and then becomes almost steady, after 1 h of annealing. The values of resistivity of some samples with different percentages of Ag by wt. are given in Table I. The thickness of the samples is nearly the same (~800 Å).

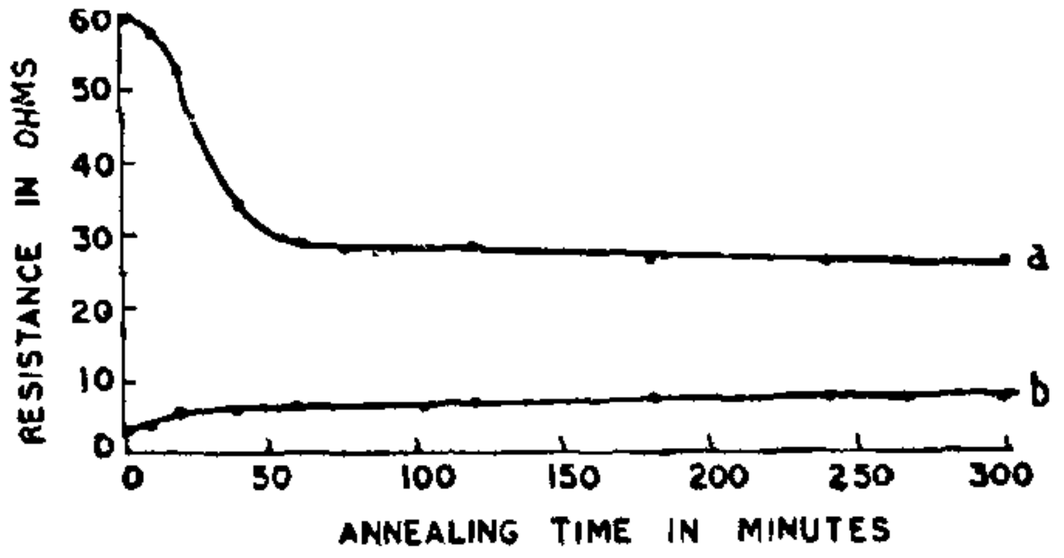

FIG. 1. Change in resistance during annealing at 250° C, the thickness of Pd–Ag–Pd layers being in the order:
(*a*) 235 Å, 27 Å and 493 Å and
(*b*) 570 Å, 163 Å and 46 Å.

TABLE I

The values of resistivity of some samples with different percentage of silver by wt.

% of Ag by wt. in Pd-Ag bimetallic films	Resistivity in μ ohm cm
3·0	82·62
13·2	63·90
25·0	59·34
55·0	48·07

The values of the resistivity are higher than those reported by Jackson *et al*[3]. The higher values of resistivity may be due to the formation of oxide layer over the films which are heated in air. Further, as the films are taken out of vacuum for weighing

after the deposition of each layer, an ultrathin oxide layer may also be formed which may be an important factor in increasing the resistivity.

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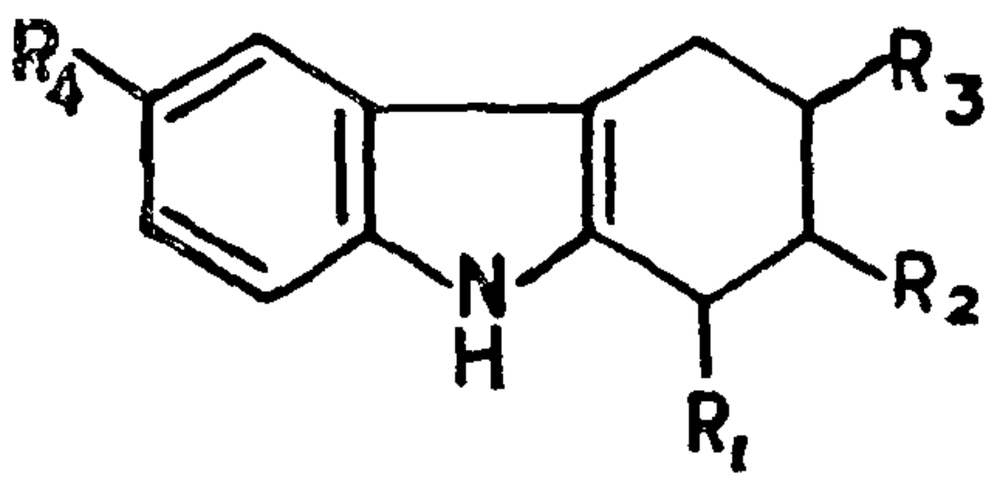
STUDIES ON THE INSECTICIDAL AND ANTIMICROBIAL PROPERTIES OF SOME CARBAZOLE DERIVATIVES

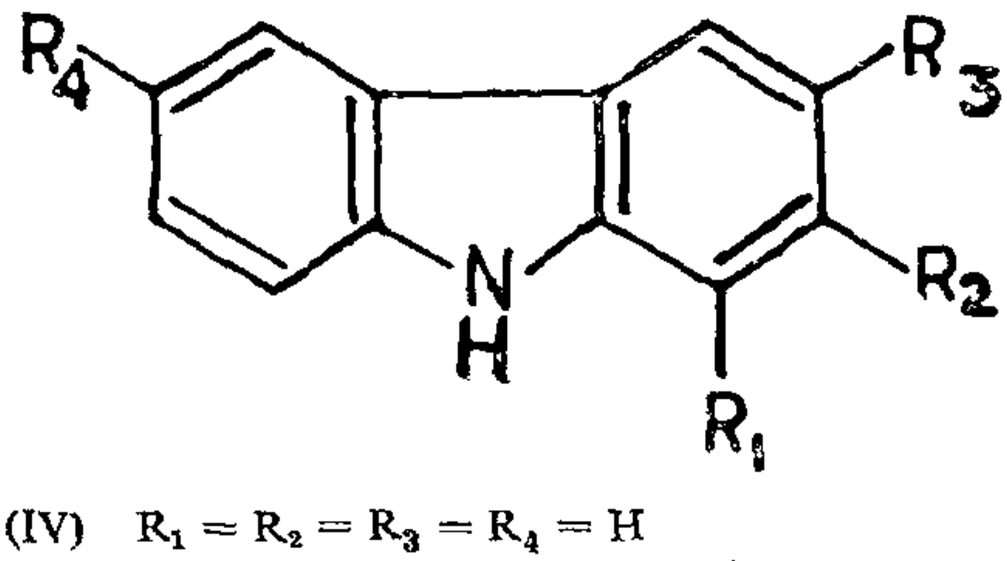
CARBAZOLE derivatives are biologically active displaying antibacterial and antifungal activities[1,2]. These were synthesised by Borsche method[3] and Japp-Klingemann reaction[4]. According to the Borsche's modified method of Fischer Indole Synthesis, the condensation of phenyl hydrazine hydrochloride with appropriate cyclohexanone derivatives, in the presence of sodium acetate, yielded the corresponding hydrazones, which on cychlisation in presence of aqueous sulphuric acid, afforded the corresponding tetrahydrocarbazole derivatives (I, II, and III). The tetrahydrocarbazole derivatives, on chloranil dehydrogenation, furnished the appropriate carbzole derivatives (IV, VI and VII). Compound (V) was prepared in the same way, but the corresponding tetrahydrocarbazole had not been isolated in the pure state.

Carbazole compounds were also prepared by Japp-Klingemann reaction. The reaction of aniline hydrochloride with 2-hydroxymethylene cyclohexanone derivatives furnished the corresponding substituted hydrazones, which on indolisation in acidic medium afforded the corresponding 1-oxo-1, 2, 3, 4-tetrahydrocarbazole derivatives (VIII, IX and X). On Wolff-Kishner reduction (Huang-Minlon modified method) the oxo-derivatives furnished the corresponding tetrahydrocarbazole derivatives (I, II and III), which on chloranil dehydrogenation afforded carbazole derivatives (IV, VI and VII).

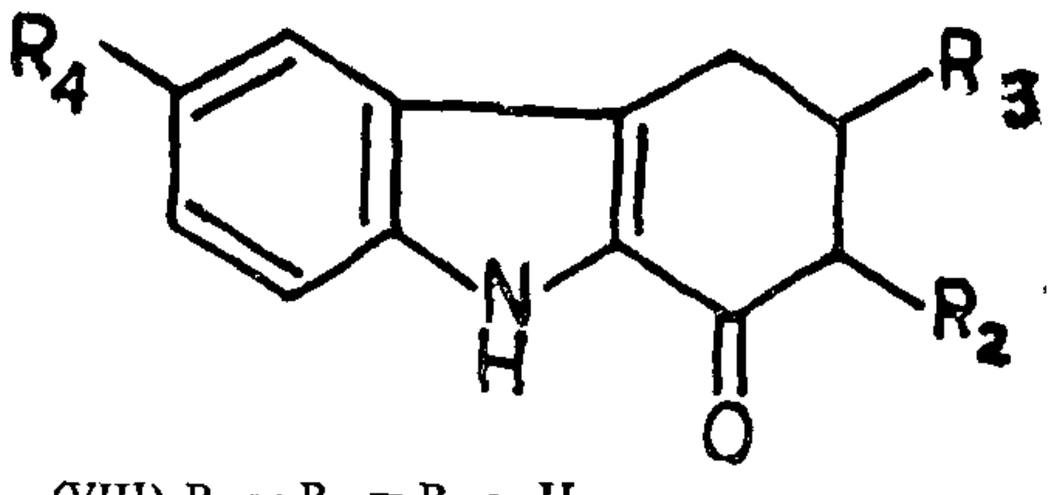
Two carbazole alkaloids glycozoline[5] (XI) and glycozolidine[6,7] (XII) were isolated from the root-bark of *Glycosmis pentaphylla* (Retz.) DC. Glycozoline (XI) on demethylation by HBr furnished 3-methyl-6-hydroxy-carbazole[5] (XIII) and glycozolidine on similar treatment furnished 2-methoxy-3-methyl-6-hydroxy-carbazole[6,7] (XIV).



(I) $R_1 = R_2 = R_3 = R_4 = H$
(II) $R_1 = R_3 = R_4 = H$, $R_2 = Me$
(III) $R_1 = R_2 = R_4 = H$, $R_3 = Me$



(IV) $R_1 = R_2 = R_3 = R_4 = H$
(V) $R_2 = R_3 = R_4 = H$, $R_1 = Me$
(VI) $R_1 = R_3 = R_4 = H$, $R_2 = Me$
(VII) $R_1 = R_2 = R_4 = H$, $R_3 = Me$
(XI) $R_1 = R_2 = H$, $R_3 = Me$, $R_4 = OMe$
(XII) $R_1 = H$, $R_2 = R_4 = OMe$, $R_3 = Me$
(XIII) $R_1 = R_2 = H$, $R_3 = Me$, $R_4 = OH$
(XIV) $R_1 = H$, $R_2 = OMe$, $R_3 = Me$, $R_4 = OH$



(VIII) $R_2 = R_3 = R_4 = H$
(IX) $R_2 = Me$, $R_3 = R_4 = H$
(X) $R_2 = R_4 = H$, $R_3 = Me$

Insecticidal properties of these fourteen carbazole derivatives in comparison with DDT were studied by spraying directly 10 ml ethanolic solution of each compound at 0·5% concentration on house-flies (*Musca domestica* L.) collected in wire-cages. In a separate cage house-flies were sprayed with 10 ml