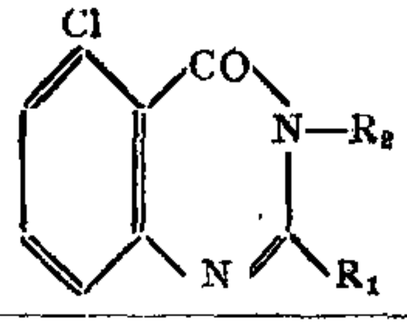
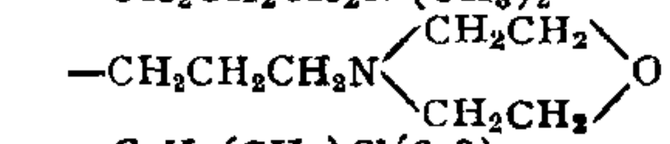
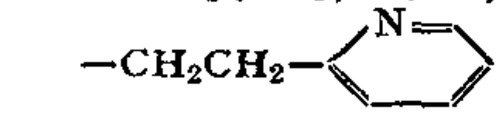
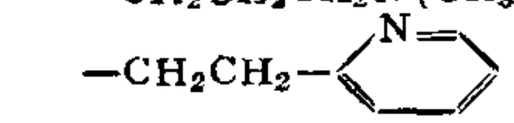
TABLE I



No.	R_1	R_2	m.p. °C.	Lit. m.p. °C.	Nitrogen %	
					Found	Calculated
I	CH_3	$-CH_2CH_2CH_3$	194–95	..	11·63	11·84
II	CH_3	$-CH_2CH_2CH_2CH_3$	176–78	..	10·96	11·18
III	CH_3	$-CH_2CH_2OC_2H_5$	150–51	..	10·27	10·51
IV	CH_3	$-CH_2CH_2CH_2OCH_3$	137	..	10·38	10·51
V	CH_3	$-CH_2CH_2CH_2N(CH_3)_2$	136–38	..	14·78	15·03
VI	CH_3		139–41	..	12·89	13·06
VII	CH_3	$-C_6H_3(CH_3)Cl(2\text{–}3)$	147–49	146–47[2]	8·86	8·78
VIII	CH_3		155–56	..	13·85	14·03
IX	CH_3	$-CH_2CH_2C_6H_5$	151–53	..	9·54	9·38
X	CH_3	$-C_6H_5$	144–45	141–42[2]	9·97	10·35
XI	CH_3	$-C_6H_4OCH_3$ (4)	145–47	..	9·52	9·32
XII	CH_3	$-C_6H_4Cl$ (3)	173–75	176–79[2]	8·92	9·18
XIII	C_2H_5	$-C_6H_4OCH_3$ (3)	164–65	..	8·67	8·90
XIV	C_2H_5	$-C_6H_4CH_2$ (2):H_2O	172–74	..	8·86	8·85
XV	C_2H_5	$-CH_2CH_2-C_6H_5$	164–66	..	8·76	8·96
XVI	C_2H_5	$-CH_2C_6H_5$	172	..	9·16	9·38
XVII	C_2H_5	$-CH_2CH_2CH_2N(CH_3)_2$	132–33	..	14·04	14·31
XVIII	C_2H_5		132-34	..	13·68	13·40

hexane m.p. 132–33°. Found: N, 14·04; *Calculated for* $C_{15}H_{20}ON_3Cl$: N, 14·31%.

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1. Somasekhara, S, Dighe, V. S. and Mukherjee, S. L., *Indian J. of Pharmacy*, 1965, **27**, 12.
2. Yamamoto, H., Sakai, S. and Maruyama, I., *Japanese Pat. No. 13, 749*; Sumitomo Chemical Co., 1965; *C.A.*, 1965, **63**, 11585.

PAPER CHROMATOGRAPHIC STUDIES OF THIAZOLES AND THIAZOLINES

DURING our recent investigation on the synthesis of thiazoles and thiazolines, a new condensing agent bromine was tested if it could replace the conventional use of iodine[1-3] in the synthesis of 2-arylamino thiazoles and 2-arylimino thiazolines from various ketones and mono and diaryl (Sym) thioureas respectively. During the course of synthesis, it was required to test if the final product contained any unreacted thioureas. Paper chromatography suggested itself as the method of choice for this purpose, provided a suitable method could be found out to study the paper chromatographic behaviour of thiazoles, thiazolines, and mono and diaryl thioureas. As not much work has been done in this direction, we took up the problem to find out the conditions under which thiazoles, thiazolines and thioureas respond to the paper chromatographic separation.

n-Butanol, acetic acid and water (4 : 1 : 5) were selected as the most suitable mobile phase. One-dimensional descending chromatogram was run on Whatman No. 1 chromatographic paper. The attainment of equilibrium on the chromatographic system presented no problem unlike that of Kjaer and Rubinstein[4] who used saturated chloroform as the mobile phase. The usual time of run was 18 hours. 0·01 c.c. of 0·4% solution of the substance in ethanol was used for each spot.

After development, the paper was taken out of the bath and was dried in air. The dried chromatogram was sprayed with different visualizing agents.

For monoaryl thioureas, Grote's reagent as well as Feigl's reagent were used. But Feigl's reagent proved better than Grote's reagent as opposed to the observation of Kjaer and Rubinstein.[4] Twelve monoaryl thioureas were

TABLE I
R_f values of the products

Time—18 hours. Solvent—*n*-Butanol : acetic acid : water = 4 : 1 :5

Sl. No.	Name of the product	R_f value	Visualizing agent	Colour of the spot
1	Monophenyl thiourea ..	·86	Feigl's reagent	Colourless spot on a bluish background
2	Thiocarbanilide ..	·94	Ammonical silver nitrate solution	Grey spot
3	2-Amino 4-phenyl thiazole ..	·90	Diazotised sulphanilic acid	Orange red spot
4	2-Phenylamino 4-phenyl thiazole	·95	do.	do.
5	2-Phenylimino 3 : 4 diphenyl thiazoline	·93	Acidified $KMnO_4$	Colourless spot in a purple background

detected by Feigl's reagent, when colourless spots in a bluish background were obtained. Nitrophenyl thioureas do not require any visualizing agent as they are coloured yellow and give yellow-coloured spots on dried chromatogram.

2-Amino thiazoles and 2-arylamino thiazoles having 5-position free were detected by spraying the dried chromatogram lightly first with 5% aqueous sodium carbonate and then, while the paper was still damp, with diazonium spray[5] (25 c.c. of freshly prepared 5% sodium nitrite is slowly added at 0° C. to 5 c.c. of a sulphanilic acid *plus* 9 c.c. of concentrated HCl, diluted to 100 c.c. with distilled water). 2-Arylamino and 2-amino thiazoles appeared as orange red spots.

Sym-diaryl thioureas did not respond to either Grote's or Feigl's reagent satisfactorily, and were detected by spraying the dried chromatogram with ammoniacal silver nitrate[6] (5 N NH_4OH : 0·1 N $AgNO_3$ V/V) solution when gray spots appeared immediately.

2-Arylimino thiazolines were detected by spraying the dried chromatogram with 0·5% solution of $KMnO_4$ acidified with H_2SO_4,[7] when the spots appeared immediately as colourless in a purple background.

The R_f values obtained in each of the class of the compound were quite reproducible with not much of variation as experienced by Kjaer and co-worker. As the visualizing agents are specific in nature, it was very easy to detect whether thiazoles and thiazolines are respectively free from mono and diaryl thioureas. It is needless to mention that many of the thiazoles and thiazolines did not contain mono or diaryl thioureas, showing that the reaction went to completion with the new condensing agent. R_f values of a few products are given in Table I.

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Cuttack, *July* 8, 1966. G. N. MAHAPATRA.

1. King, L. C. and Hlavacek, R. J, *J Amer. Chem. Soc.*, 1950. **72,** 3722.
2. Mahapatra, G. N. and Rout, M. K., *J. Ind. Chem. Soc.*, 1953, **30, 398.**
3. —, *J. & Proc. Inst. Chem.*, 1959, **31,** 113.
4. Kjaer, A. and Rubinstein, K., *Nature*, 1953, **171,** 840.
5. Ames, B. N. and Mitchell, H. K., *J. Amer. Chem. Soc.*, 1952, **74,** 252.
6. Hinman, R. L., *Anal. Chim. Acta*, 1956, **15,** 125.
7. Prochazka, Z, *Chem. Listy.*, 1950, **44,** 43 : *Chem. Abstr.*, 1951, **45,** 5561.

HISTOCHEMICAL STUDIES ON THE INTERRENAL TISSUE OF THE COMMON INDIAN MURREL, *OPHICEPHALUS PUNCTATUS*

IN teleost, interrenal tissue around the posterior cardinal vein in the head kidney is homologous to the avian or mammalian adrenal cortex. Some reports are available concerning the histochemically demonstrable entities of the teleost interrenals. Thus, Krauter[1] showed the presence of black granular droplets in the gold fish interrenals by Sudan black. In addition to sudanophilic lipid, Chavin and Kovacevic[2] demonstrated cholesterol, glycogen and phospholipid in the same fish. They could detect the presence of ascorbic acid only when the fishes were asleep. In *Carassius auratus*, Mahon *et al.*[3] traced interrenal ascorbic acid by the freeze-drying technique. The present study is based on some of the histochemical studies of the interrenal tissue of an Indian murrel, *Ophicephalus punctatus* (fam. Ophicephalidæ). The different methods used and the findings have been incorporated in Table I.

A perusal of Table I reveals that the interrenal tissue contains abundance of sudanophilic lipids and acetal phosphatides. Whether these substances *in situ* represent site of biologically active ketonic steroid hormones is very much