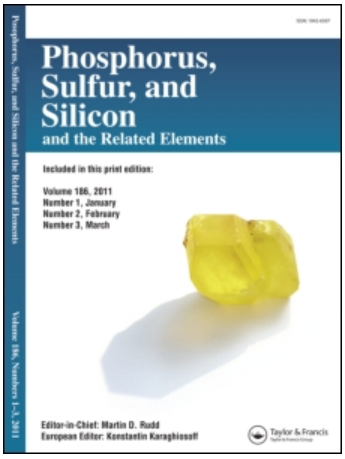

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SYNTHESIS OF SOME NEW HETEROCYCLIC COMPOUNDS CONTAINING THIENO[2,3-b]QUINOLINE MOIETY

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2-Cyano-3-amino-4-aryl-5, 6, 7, 8-tetrahydro-thieno[2,3-b]quinoline (**1**) reacted with carbon disulfide to give compound **2**. Alkylation of **2** with different reagents gave the corresponding thioethers **3–7**. Diazotisation of **1** furnished chloro derivative **8** which reacted with thiourea to give mercaptotriazine **9**. Methylation of **9** yielded **10**. On treatment of **8** with hydrazone hydrate, the expected hydrazino-compound **11** was obtained. Reaction of **11** with aromatic aldehydes, acetylacetone, acetic acid, acetic anhydride, carbon disulfide and nitrous acid gave compounds **12–17**, respectively. The structures of all synthesized compounds were confirmed by elemental and spectral analysis.

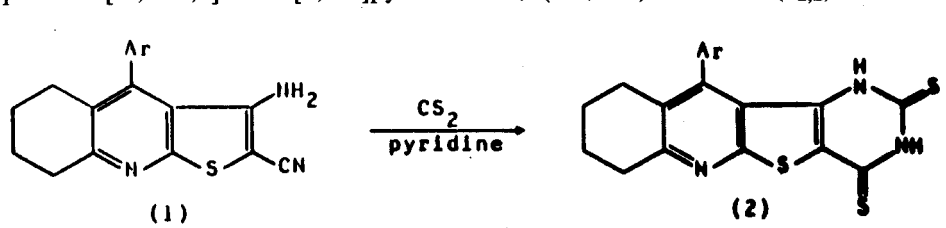
Key words: Thienoquinolines; pyrimidine-dithiones; pyrimidine-dithioethers; chlorotriazines; mercaptotriazines; hydrazinotriazines and pyrazolyltriazines.

INTRODUCTION

It has been reported that some quinolines possess antimalarial and antifilarial and antihypertensive activity.[1–4] Also, the biological activity of many heterocyclic compounds containing thiophene ring has been reviewed.[5,6] On the other hand, the survey of the literature revealed that only few thieno[2,3-b]quinolines are known.[7–10] These observations prompted us to synthesize some new heterocyclic compounds containing a thieno[2,3-b]quinoline moiety.

RESULTS AND DISCUSSION

Reaction of $\mathbf{1}_{a,b}$ with carbon disulfide in pyridine gave 11-aryl-7,8,9,10-tetrahydro-quinolino[3′,2′:4,5]thieno[3,2-d]pyrimidine-2,4(1H, 3H) dithiones ($\mathbf{2}_{a,b}$).[11]



Ar
a, C_6H_5
b, C_6H_4-Cl(p)

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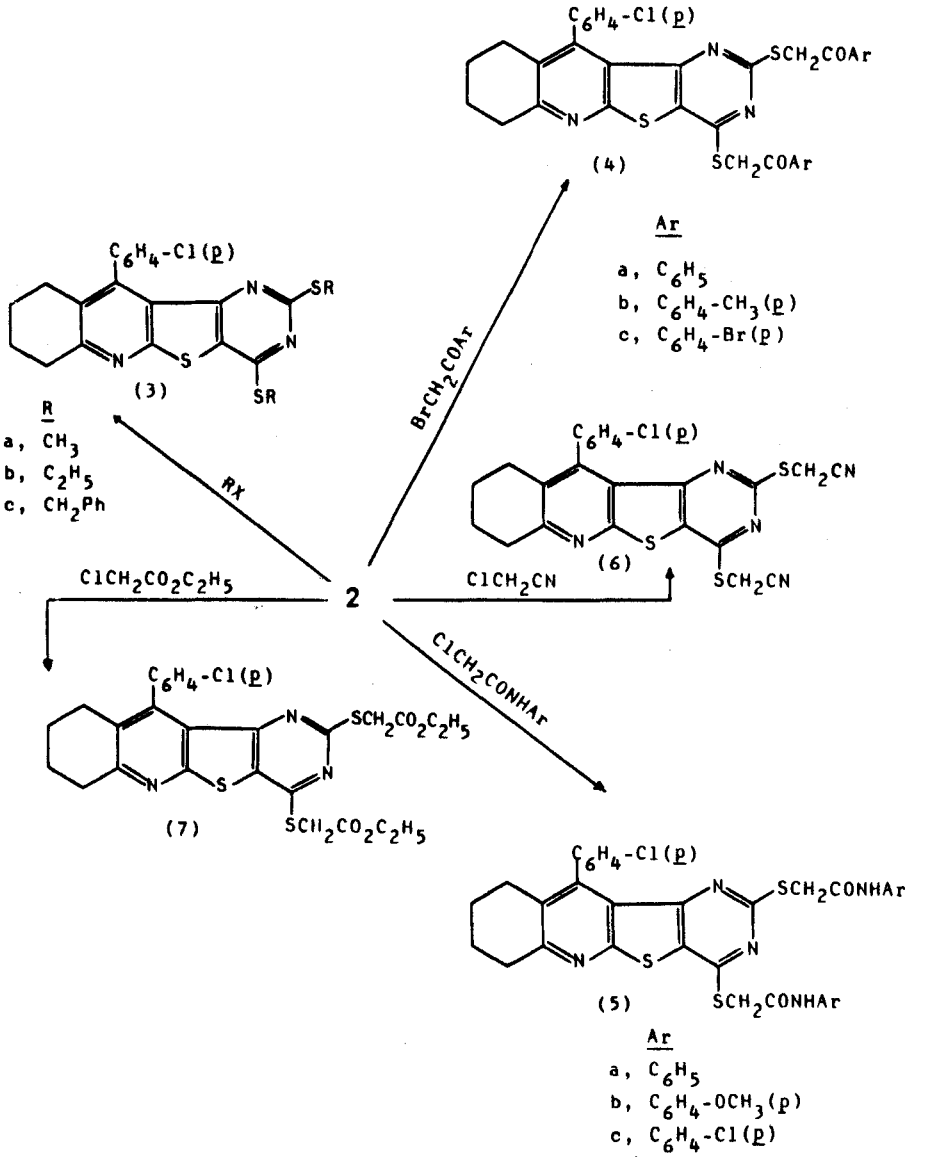
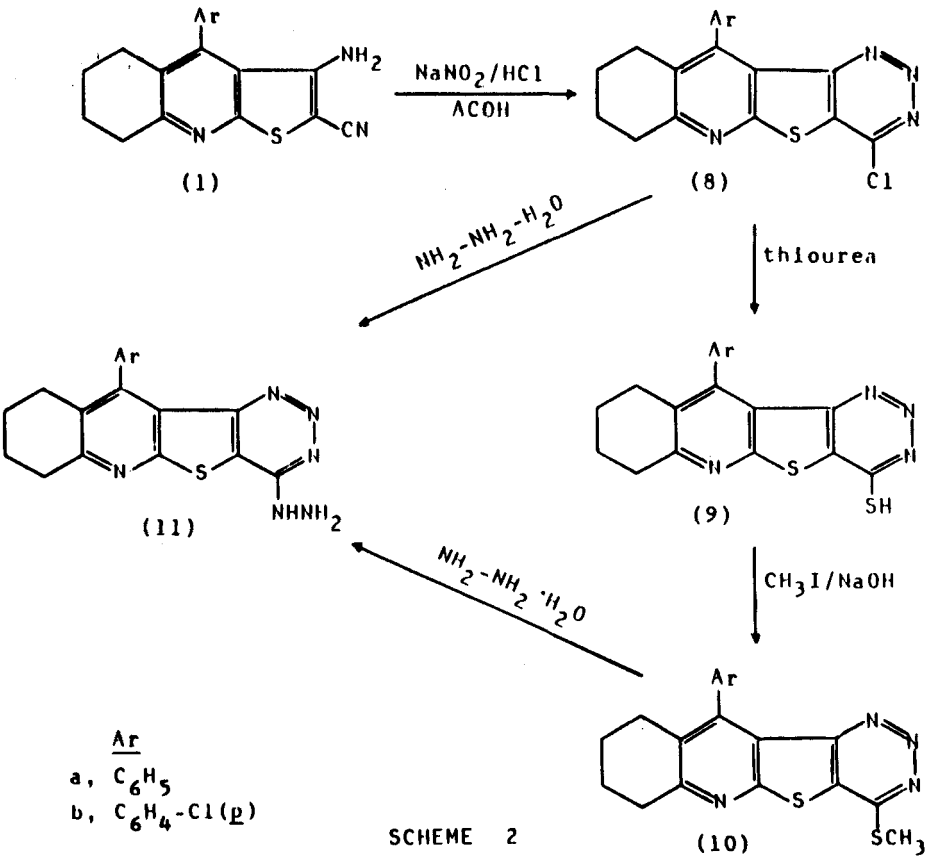
Compound $\mathbf{2_b}$ underwent further reactions with different alkylating agents namely, alkyl (aralkyl) halides, ω-bromoacetophenones, chloroacetanilides, chloroacetonitrile and ethyl chloroacetate to afford the corresponding 2,4-di(substituted thio)-11-*p*-chlorophenyl-7,8,9,10-tetrahydro-quinolino[3′,2′:4,5]thieno[3,2-d]pyrimidines ($\mathbf{3_{a-c}}$), ($\mathbf{4_{a-c}}$), ($\mathbf{5_{a-c}}$), (**6**) and (**7**) in good yields (Scheme 1).



SCHEME 1

Diazotisation of $\mathbf{1_{a,b}}$ with sodium nitrite in concentrated hydrochloric acid led to the formation of 4-chloro-11-aryl-7,8,9,10-tetrahydro-quinolino[3′,2′:4,5]thieno-[3,2-d]-1,2,3-triazines ($\mathbf{8_{a,b}}$). Compounds $\mathbf{8_{a,b}}$ were reacted with thiourea to give the corresponding mercaptotriazine derivatives $\mathbf{9_{a,b}}$. Methylation of $\mathbf{9_{a,b}}$ with methyl



SCHEME 2

iodide yielded 4-methylthio-11-aryl-7,8,9,10-tetrahydroquinolino[3′,2′:4,5]thieno-[3,2-d]-1,2,3-triazines ($\mathbf{10}_{a,b}$). Condensation of $\mathbf{8}_{a,b}$ with hydrazine hydrate furnished 4-hydrazino-11-aryl-7,8,9,10-tetrahydroquinolino[3′,2′:4,5]thieno[3,2-d]-1,2,3-triazines ($\mathbf{11}_{a,b}$). Also, the latter compounds ($\mathbf{11}_{a,b}$) were confirmed by another synthetic route through hydrazinolysis of methylthioderivatives $\mathbf{10}_{a,b}$ (Scheme 2).

Condensation of 4-hydrazino-11-*p*-chlorophenyl-7,8,9,10-tetrohydro-quinolino-[3′,2′:4,5]thieno[3,2-d]-1,2,3-triazine ($\mathbf{11}_b$) with aromatic aldehydes yielded the expected hydrazones $\mathbf{12}_{a,b}$. Also, compound $\mathbf{11}_b$ was smoothly reacted with acetylacetone to give 4-(3,5-dimethylpyrazol-1-yl)-11-*p*-chlorophenyl-7,8,9,10-tetrahydroquinolino[3′,2′:4,5]thieno[3,2-d]-1,2,3-triazine (**13**) in excellent yield.

Reaction of $\mathbf{11}_b$ with acetic acid at refluxing temperature gave acetic acid, 2-(11-*p*-chlorophenyl-7,8,9,10-tetrahydro-quinolino[3′,2′:4,5]thieno[3,2-d]-1,2,3-triazin-4-yl) hydrazide (**14**) while its interaction with acetic anhydride affording the triacetyl derivative **15**.

Also, $\mathbf{11}_b$ was reacted with carbon disulfide in pyridine and/or with nitrous acid to furnish the promising pentacyclic compounds **16** and **17** respectively.

The structure of all synthesized compounds were elucidated on the basis of their elemental analysis (Table I) and spectroscopic data (Tables II, III).

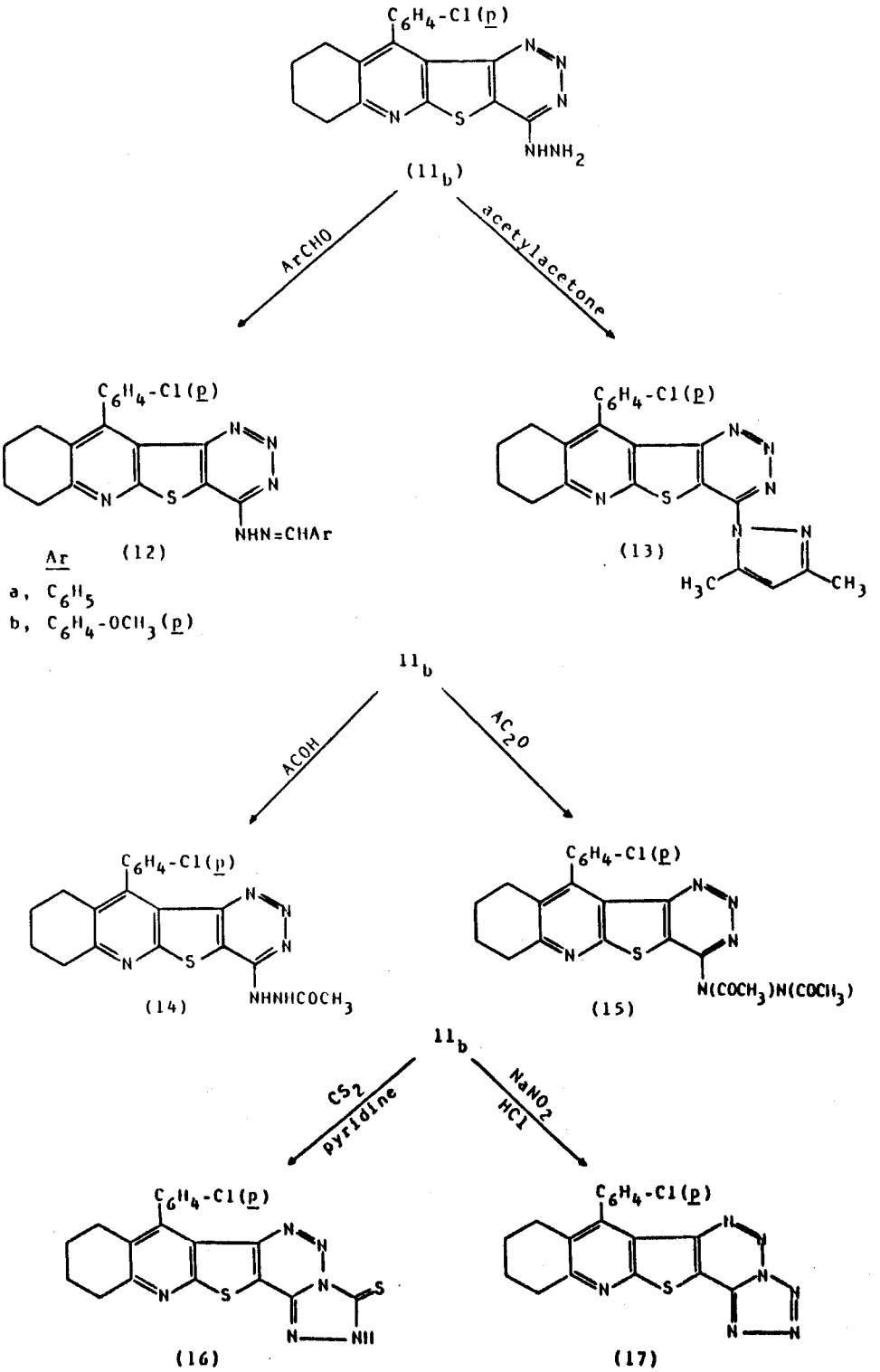


TABLE I

Physical and analytical data of all newly synthesized compounds (2–17)

Compound No.	m.p. (°C)	Yield %	Molecular formula	% Calcd. C	H	N	S	Cl	% Found C	H	N	S	Cl
2a	338-40	71	$C_{19}H_{15}N_3S_3$	59.81	3.96	11.01	25.21	-	60.00	3.71	11.43	25.00	-
b	385-90	73	$C_{19}H_{14}ClN_3S_3$	54.86	3.39	10.10	23.12	8.52	55.32	3.48	10.23	23.48	8.11
3a	240	80	$C_{21}H_{18}ClN_3S_3$	56.80	4.09	9.46	21.66	7.98	56.49	4.16	9.92	21.46	8.35
b	160-2	76	$C_{23}H_{22}ClN_3S_3$	58.52	4.70	8.90	20.37	7.51	58.63	4.81	8.48	20.11	7.20
c	165-6	79	$C_{33}H_{26}ClN_3S_3$	66.48	4.40	7.05	16.13	5.95	66.03	4.45	7.46	16.50	6.00
4a	198-200	75	$C_{35}H_{26}ClN_3O_2S_3$	64.45	4.02	6.44	14.75	5.44	63.99	3.93	6.22	15.02	5.82
b	205-7	81	$C_{37}H_{30}ClN_3O_2S_3$	65.33	4.44	6.18	14.14	5.21	64.90	4.32	6.50	14.06	5.00
c	220-3	78	$C_{35}H_{24}Br_2ClN_3O_2S_3$	51.90	2.99	5.19	11.87	-	51.51	2.85	5.34	12.09	-
5a	270-2	78	$C_{35}H_{28}ClN_5O_2S_3$	61.62	4.14	10.26	14.10	5.20	61.23	4.19	10.37	14.55	5.60
b	250-2	73	$C_{37}H_{32}ClN_5O_4S_3$	59.87	4.34	9.43	12.96	4.78	60.00	4.25	9.30	12.50	4.43
c	265-7	72	$C_{35}H_{26}Cl_3N_5O_2S_3$	55.97	3.49	9.32	12.80	14.16	55.49	3.70	9.48	13.22	14.55
6	178-80	86	$C_{23}H_{16}ClN_5S_3$	55.92	3.26	14.18	19.47	7.18	55.46	3.18	13.94	20.00	7.35
7	125-6	85	$C_{27}H_{26}ClN_3O_4S_3$	55.14	4.46	7.14	16.35	6.03	54.87	4.66	6.71	16.00	6.31
8a	170-3	52	$C_{18}H_{13}ClN_4S$	61.27	3.71	15.88	9.09	10.05	61.50	3.90	15.78	9.47	10.50
b	203-5	60	$C_{18}H_{12}Cl_2N_4S$	55.82	3.12	14.47	8.28	18.31	55.39	3.18	14.33	8.00	18.01

TABLE I (continud)

Compound	m.p.	Yield	Molecular	% Calcd.					% Found				
No.	(°C)	%	formula	C	H	N	S	Cl	C	H	N	S	Cl
9a	170-3	85	$C_{18}H_{14}N_4S_2$	61.69	4.03	15.99	18.30	-	61.31	4.10	16.08	18.00	-
b	215-7	91	$C_{18}H_{13}ClN_4S_2$	56.17	3.40	14.56	16.66	9.21	56.37	4.52	14.33	17.06	9.15
10a	254-6	82	$C_{19}H_{16}N_4S_2$	62.61	4.42	15.37	17.59	-	63.06	4.50	15.07	18.08	-
b	235-7	83	$C_{19}H_{15}ClN_4S_2$	57.21	3.79	14.04	16.07	8.89	57.22	3.90	14.26	16.45	8.68
11a	210-2	86	$C_{18}H_{16}N_6S$	62.05	4.63	24.12	9.20	-	62.00	4.49	23.87	8.96	-
b	246-7	94	$C_{18}H_{15}ClN_6S$	56.47	3.95	21.95	8.37	9.26	56.03	4.16	22.12	8.52	9.21
12a	244-5	96	$C_{25}H_{19}ClN_6S$	63.76	4.07	17.84	6.81	7.53	63.35	3.92	17.41	6.50	8.00
b	242-3	95	$C_{26}H_{21}ClN_6OS$	62.33	4.22	16.77	6.40	7.08	62.09	4.25	17.08	6.59	7.21
13	225-6	90	$C_{23}H_{19}ClN_6S$	61.81	4.28	18.80	7.17	7.93	62.03	4.40	19.25	7.00	7.66
14	145-7	76	$C_{20}H_{17}ClN_6OS$	56.54	4.03	19.78	7.55	8.34	56.10	4.12	19.93	7.13	8.08
15	152-4	80	$C_{24}H_{21}ClN_6O_3S$	56.64	4.16	16.51	6.30	6.97	56.45	4.00	16.31	6.78	7.11
16	280-3	72	$C_{19}H_{13}ClN_6S_2$	53.71	3.08	19.78	15.09	8.34	53.98	3.00	20.09	15.37	8.06
17	276-8	65	$C_{18}H_{12}ClN_7S$	54.89	3.07	24.89	8.14	9.00	54.75	2.88	24.79	8.20	9.41

TABLE II

Important IR bands of the synthesized compounds (2–17)

Assignment	νC=O	νNH	νC=N	νCH ali.
$2_{a,b}$*	-	3360-3350	1570	2940
3_{a-c}	-	-	1600	2940,2860
4_{a-c}	1690-1680	-	1600	2940
5_{a-c}	1660-1655	3290-3270	1600	2940
6**	-	-	1600	2940
7	1740	-	1600	2980,2940
$8_{a,b}$	-	-	1590	2940
$9_{a,b}$	-	3100	1590	2940
$10_{a,b}$	-	-	1600	2940
$11_{a,b}$	-	3300,3200	1650,1600	2940,2860
$12_{a,b}$	-	3200-3180	1610,1590	2940,2840
13	-	-	1590	2940,2860
14	1670	3480,3250	1600	2940,2860
15	1730,1690	-	1590,1570	2940,2860
16	-	3380	1590	2940
17	-	-	1600	2940

*A band at 1220 cm^{-1} for νC=S.

**A band at 2250 cm^{-1} for νC≡N.

TABLE III

^{1}H-NMR spectra of representative examples of the synthesized compounds (chemical shifts in δppm)

Compound No.	Aromatic protons	$-CH_2$-at C-7 (t)	$-CH_2$-at C-10 (t)	$-(CH_2)_2$-at C-8,9 (m)	Other signals
2a (CF_3CO_2H)	7.20-7.80(m,5H)	3.20-3.45	2.50-2.75	1.70-2.20	
3a ($CDCl_3$)	7.00-7.50(q,4H)	3.00-3.25	2.30-2.55	1.50-1.90	2.65(s,3H,SCH_3 at C-2). 1.80(s,3H,SCH_3 at C-4).
4a ($CDCl_3$)	6.90-8.00(m,14H)	3.00-3.25	2.30-2.55	1.50-2.00	4.75(s,2H,SCH_2CO at C-2). 3.80(s,2H,SCH_2CO at C-4).
5b ($CDCl_3$)	6.60-7.55(m,12H)	3.05-3.30	2.35-2.60	1.60-2.10	4.00(s,2H,SCH_2CON at C-2). 3.50(s,2H,SCH_2CON at C-4). 3.70(s, 6H, two OCH_3).
7 ($CDCl_3$)	7.00-7.50(q,4H)	3.05-3.30	2.35-2.60	1.60-2.10	4.05(s,2H,SCH_2COO at C-2). 3.40(s,2H,SCH_2COO at C-4). 4.10-4.40(q,4H, two $COOCH_2$). 1.20-1.45(t,6H, two CH_3).
8a ($CDCl_3$)	7.10-7.60(m,5H)	3.05-3.30	2.50-2.75	1.60-2.10	
10b ($CDCl_3$)	7.15-1.60(q,4H)	3.05-3.30	2.50-2.75	1.65-2.15	2.85(s,3H,SCH_3).

TABLE III (continued)

Compound No.	Aromatic protons	$-CH_2$-at C-7 (t)	$-CH_2$-at C-10 (t)	$-(CH_2)_2$-at C-8,9 (m)	Other signals
11b (DMSO)	7.20-7.60(q,4H)	3.00-3.20		1.40-1.90	5.00(s,2H,NH_2) 9.50(s,1H,NH).
13 ($CDCl_3$)	7.15-7.60(q,4H)	3.05-3.30	2.50-2.75	1.60-2.10	2.30(s,3H,CH_3) 2.80(s,3H,CH_3) 6.10(s,1H,CH).
14 ($CDCl_3$)	7.10-7.60(m,4H)	3.00-3.25			1.50-2.60[m,9H,CH_3,CH_2 and $(CH_2)_2$]
15 ($CDCl_3$)	7.00-7.50(m,4H)	3.05-3.30			1.50-2.50[m,15H;3CH_3, CH_2 and $(CH_2)_2$]
16 (CF_3CO_2H)	7.25-7.65(q,4H)	(3.20-3.40)*	(2.40-2.60)**	(1.65-2.10)***	
17 (CF_3CO_2H)	7.20-7.60(q,4H)	(3.20-3.40)*	(2.55-2.80)**	(1.60-2.15)***	

* $-CH_2$-at C-11
** $-CH_2$-at C-8
*** $-(CH_2)_2$-at C-9,10

EXPERIMENTAL

All melting points were determined on a kofler melting point apparatus and are uncorrected. IR spectra were obtained using a Pye-Unicam SP3-100 infrared spectrophotometer. NMR spectra were recorded by a Varian EM-390 MHZ spectrometer using TMS as internal standard.

The physical and analytical data of all newly synthesized compounds are depicted in Table I.

2-Cyano-3-amino-4-aryl-5,6,7,8-tetrahydro-thieno[2,3-b]quinolines ($\mathbf{1_{a,b}}$). These compounds were prepared according to the literature method.[10]

11-Aryl-7,8,9,10-tetrahydro-quinolino[3',2':4,5]thieno[3,2-d]-pyrimidin-2,4-(1H,3H) dithiones ($\mathbf{2_{a,b}}$). A mixture of $\mathbf{1_{a,b}}$ (0.01 mol) and carbon disulfide (5 ml) in dry pyridine was heated on a water bath for 6 hrs. The solvent was removed by distillation under reduced pressure and the residue was crystallized from pyridine to give $\mathbf{2_{a,b}}$ as orange plates.

Alkylation of compound $\mathbf{2_b}$.

General procedure.

A mixture of $\mathbf{2_b}$ (0.01 mol), alkylating agent (0.022 mol) and anhydrous sodium acetate (2 g) in ethanol (60 ml) was refluxed for 1 hr. The resultant product was crystallized from ethanol.

The following compounds (**3–7**) were prepared as in the above general procedure.

a) 2,4-Di(alkyl/aralkyl) thio-11-p-chlorophenyl-7,8,9,10-tetrahydro-quinolino[3',2':4,5]thieno[3,2-d]-pyrimidines ($\mathbf{3_{a-c}}$). These compounds were prepared by using the corresponding alkyl (aralkyl) halides.

b) 2,4-Di(aroylmethylthio)-11-p-chlorophenyl-7,8,9,10-tetrahydro-quinolino [3',2':4,5] thieno [3,2-d]pyrimidines ($\mathbf{4_{a-c}}$). These compounds were prepared by using phenacyl bromide and its derivatives.

c) 2,4-Di(N-arylcarboxamidomethylthio)-11-p-chlorophenyl-7,8,9,10-tetrahydro-quinolino[3',2':4,5]thieno[3,2-d]pyrimidines ($\mathbf{5_{a-c}}$). These compounds were prepared by using N-chloroacetylated aromatic amines.

d) 2,4-Di(cyanomethylthio)-11-p-chlorophenyl-7,8,9,10-tetrahydro-quinolino[3',2':4,5]thieno[3,2-d]pyrimidine (**6**). This compound was prepared by using chloroacetonitrile.

e) 2,4-Di(ethoxycarbonylmethylthio)-11-p-chlorophenyl-7,8,9,10-tetrahydro-quinolino[3',2':4,5]thieno-[3,2-d]pyrimidine (**7**). This compound was prepared by using ethyl chloroacetate.

4-Chloro-11-aryl-7,8,9,10-tetrahydro-quinolino[3',2':4,5]thieno[3,2-d]-1,2,3-triazines ($\mathbf{8_{a,b}}$). To a cold solution of $\mathbf{1_{a,b}}$ (0.011 mol) in 30 ml of acetic acid and 15 ml of concentrated hydrochloric acid, was added a solution of 0.95 g (0.014 mol) of sodium nitrite in 10 ml of water. After completion of addition, the ice bath was removed and stirring continued for 2 more hours. The crude product was crystallized from ethanol to give $\mathbf{8_{a,b}}$ in the form of faint pink needles.

4-Mercapto-11-aryl-7,8,9,10-tetrahydro-quinolino[3',2':4,5]thieno[3,2-d]-1,2,3-triazines ($\mathbf{9_{a,b}}$). A mixture of $\mathbf{8_{a,b}}$ (0.01 mol) and thiorea (0.012 mol) in dry methanol (40 ml) was heated under reflux for 3 hrs. The separated yellow crystalline solid was collected, washed with ethanol and heated with 10% aqueous sodium hydroxide (15 ml) at 50°C for 15 min. On cooling and acidification with acetic acid, compounds $\mathbf{9_{a,b}}$ were obtained as yellow powders and were crystallized from ethanol-chloroform as yellow needles.

4-Methylthio-11-aryl-7,8,9,10-tetrahydro-quinolino[3',2':4,5]thieno[3,2-d]-1,2,3-triazines ($\mathbf{10_{a,b}}$). To a solution of 0.02 mole of $\mathbf{9_{a,b}}$ in 40 ml of 5% sodium hydroxide was added 5 ml of methyl iodide, and the mixture was stirred for 2 hrs. The solid thus formed was collected and crystallized from ethanol in the form of colourless plates.

4-Hydrazino-11-aryl-7,8,9,10-tetrahydro-quinolino[3',2':4,5]thieno[3,2-d]-1,2,3-triazines ($\mathbf{11_{a,b}}$).

Method A.

A mixture of $\mathbf{8_{a,b}}$ (0.01 mol) and hydrazine hydrate (3 ml) in ethanol (40 ml) was refluxed for 1 hr. The white solid thus obtained was crystallized from ethanol-chloroform mixture.

Method B.

To a suspension of $\mathbf{10_{a,b}}$ (0.01 mol) in ethanol (30 ml), 3 ml hydrazine hydrate was added. The reaction mixture was refluxed on a water bath for 3 hrs. Cooling yielded white products which upon recrystallization were identical to those described in method A.

Aromatic aldehydes, (11-p-chlorophenyl-7,8,9,10-tetrahydro-quinolino[3',2':4,5]thieno[3,2-d]-1,2,3-triazin-4-yl) hydrazones ($12_{a,b}$). A mixture of 11_b (0.01 mol) and the required aromatic aldehyde (0.01 mol) was refluxed in ethanol for 3 hrs. The solid product was filtered off and recrystallized from dioxane to give $12_{a,b}$ in the form of yellowish white needles.

4-(3,5-Dimethylpyrazol-1-yl)-11-p-chlorophenyl-7,8,9,10-tetrahydro-equinolino[3',2':4,5]thieno[3,2-d]-1,2,3-triazine (**13**). Compound 11_b (0.002 mol) and acetylacetone (2 ml) were refluxed in ethanol (30 ml) for 3 hrs. The product was collected and recrystallized from ethanol as pale yellow needles.

Acetic acid, 2-(11-p-chlorophenyl-7,8,9,10-tetrahydro-quinolino[3',2':4,5]thieno[3,2-d]-1,2,3-triazin-4-yl) hydrazide (**14**). Compound 11_b (0.5 g) and acetic acid (20 ml) were refluxed for 5 hrs. The cooled reaction mixture was diluted with water and the precipitate was collected and recrystallized from benzene-pet. ether to give pale yellow needles.

1,2,2-Triacetyl-1-(11-p-chlorophenyl-7,8,9,10-tetrahydro-quinolino [3',2':4,5] thieno [3,2-d]-1,2,3-triazin-4-yl) hydrazine (**15**). A mixture of compound 11_b (0.5 g) and acetic anhydride (30 ml) was refluxed for 5 hrs. The reaction mixture was cooled and diluted with water, the solid thus obtained was filtered off and crystallized from benzene-pet. ether (40–60) as white needles.

7-P-chlorophenyl-8,9,10,11-tetrahydro-quinolino [3',2':4,5] thieno [2,3-e]-s-triazolo[4,3-c]-1,2,3-triazin-4 (3H) thione (**16**). A mixture of compound 11_b (0.5 g) and carbon disulfide (2 ml) in dry pyridine (10 ml) was heated on a water bath for 5 hrs. The reaction mixture was concentrated, diluted with water and neutralized with acetic acid whereby a yellow solid precipitated. It was crystallized from ethanol as yellow needles.

7-P-chlorophenyl-8,9,10,11-tetrahydro-quinolino[3',2':4,5]thieno[2,3-c]tetrazolo[1,5-c]-1,2,3-triazine (**17**). Sodium nitrite solution (7 ml, 10%, 0.01 mol) was added dropwise to a solution of compound 11_b (0.002 mol) in concentrated hydrochloric acid (5 ml) at 0°C with stirring. The solid product was crystallized from ethanol as white needles.

REFERENCES

1. L. J. Bruce-Chwatt, Chemotherapy of Malaria. II Edn (World Health Organisation, Geneva), (1981).
2. T. R. Sweeney and R. E. Strube, Burger's Medicinal Chemistry, Part II. 4th Edn., edited by M. F. Wolff (John-Wiley, New York), 333 (1979).
3. E. F. Elslager, *Prog Drug Res.*, **18,** 99 (1974).
4. T. H. Cronin and H. J. E. Hess, South African Patent 6, 706, 512; *C. A.*, **70,** 68419 (1969).
5. J. K. Chakrabarti, L. Horsman, T. M. Hotten, I. A. Pullar, D. E. Tupper and F. C. Wright, *J. Med. Chem.*, **23,** 878 (1980).
6. V. J. Ram, H. K. Pandey and A. J. Vlietinck, *J. Heterocyclic Chem.*, **18,** 1277 (1981).
7. R. Hull, *J. Chem. Soc. Perkin Trans.*, I, 2911 (1973).
8. Yu. A. Sharanin, A. M. Shestopalov, W. K. Promonenkov, L. A. Rodinovskaja, *Zh. Org. Khim.*, **20,** 1539 (1984).
9. Neelima, B. Bhat and A. P. Bhaduri, *J. Heterocyclic Chem.*, **23,** 925 (1986).
10. H. Vieweg, S. Leistner and G. Wagner, *Pharmazie,* **43,** 358 (1988).
11. E. C. Taylor, A. McKillop and R. N. Warrener, *Tetrahedron,* **23,** 891 (1967).