and sucked dry. The filter cake was removed, triturated with 50 ml acetone, and filtered. Yield and other data are given in Table I.

For the preparation of compounds **IVa** and **b**, respectively, pyruvic aldehyde (methylglyoxal) was used as the 40% aqueous solution and phenylglyoxal as the monohydrate. These aldehydes required a reaction time of 30–45 min.

The ir spectra of all compounds agreed with the assigned structures, with secondary amide absorption being noted in the ranges 1530–1580, 1630–1660, and 3280 cm^{-1}. In addition, compounds **IIIe–i** and **IVa** and **b** gave bands characteristic of the respective aromatic substitution. Compound **IVa** showed absorption at 1725 and 1370 cm^{-1}, characteristic of the carbonyl and acetyl groups, respectively. *IVb* gave carbonyl absorption at 1690 cm^{-1}.

Confirmatory proton nmr spectra were obtained as follows: **IVa:** (DMSO-d_6), δ 2.25 (s, CH_3CO), 6.17–5.92 (t, —CH, J = 7 Hz), 8.03–7.40 (m, 10H, C_6H_5), 9.17–9.03 (d, 2H, —NH, J = 7 Hz). **IVb:** (DMSO-d_6), δ 7.15–7.04 (t, —CH, J = 7 Hz), 8.12–7.42 (m, 15H, C_6H_5), 9.30–9.18 (d, 2H, —NH, J = 7 Hz).

Attempts to obtain mass spectral data were unsuccessful because of the instability of the compounds at the required temperature.

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Synthesis of *N*-Aryl-*N'*-2-naphthiazolylguanidines

Wahid U. Malik, P. K. Srivastava, and S. C. Mehra[1]

Department of Chemistry, University of Roorkee, Roorkee, India

The experimental conditions for the synthesis of naphthiazolylguanidines are given.

Because guanidine derivatives possess a high degree of biological activity (*1*, *2*), it was thought worthwhile to synthesize some naphthiazolylguanidines.

Experimental

***N*-Phenyl-*N'*-2-naphthiazolylthiocarbamide.** Phenylisothiocyanate (3 ml) and 2-aminonaphthiazole (5 grams) were refluxed for 2 hr. The excess phenylisothiocyanate and 2-aminonaphthiazole were removed by washing several times with petroleum ether and ether. The thiocarbamide thus obtained was crystallized from EtOH, mp 161°, yield 75%. Similarly, various substituted *N*-aryl-*N'*-2-naphthiazolylthiocarbamides were prepared (Table I).

***N*-Phenyl-*N'*-2-naphthiazolylguanidine.** *N*-phenyl-*N'*-2-naphthiazolythiocarbamide quantitatively formed the corresponding guanidine when heated with yellow lead oxide and ethanolic NH_3 in a sealed tube at 110°C. The product was crystallized from 50% EtOH, mp 185°. Similarly, various aryl-substituted *N*-aryl-*N'*-2-naphthiazolylguanidines and their hydrochlorides were prepared (Table II).

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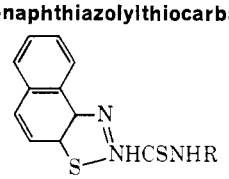
[1] To whom correspondence should be addressed.

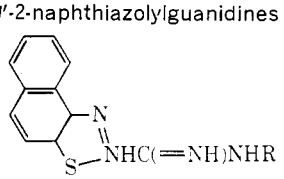
Table I. *N*-Aryl-*N'*-2-naphthiazolylthiocarbamides



S No.	Nature of R	Mp, °C	Molecular formula[a]
1	o-MeC_6H_4	135	$C_{19}H_{15}N_3S_2$
2	m-MeC_6H_4	132	$C_{19}H_{15}N_3S_2$
3	p-MeC_6H_4	158	$C_{19}H_{15}N_3S_2$
4	o-$OMeC_6H_4$	141	$C_{19}H_{15}N_3OS_2$
5	m-$OMeC_6H_4$	135	$C_{19}H_{15}N_3OS_2$
6	p-$OMeC_6H_4$	120	$C_{19}H_{15}N_3OS_2$
7	p-$OEtC_6H_4$	159	$C_{20}H_{17}N_3OS_2$
8	p-ClC_6H_4	164	$C_{16}H_{12}ClN_3S_2$

[a] All compounds analyzed satisfactorily for N,S.

Table II. *N*-Aryl-*N'*-2-naphthiazolylguanidines



S No.	Nature of R	Mp, °C	Molecular formula[a]	Mp, °C, hydrochloride	Molecular formula, hydrochloride
1	o-MeC_6H_4	141	$C_{19}H_{16}N_4S$	253–54	$C_{19}H_{17}ClN_4S$
2	m-MeC_6H_4	177	$C_{19}H_{16}N_4S$	185	$C_{19}H_{17}ClN_4S$
3	p-MeC_6H_4	175	$C_{19}H_{16}N_4S$	204–205	$C_{19}H_{17}ClN_4S$
4	o-$OMeC_6H_4$	175	$C_{19}H_{16}N_4OS$	195	$C_{19}H_{17}ClN_4OS$
5	m-$OMeC_6H_4$	169	$C_{19}H_{16}N_4OS$	180	$C_{19}H_{17}ClN_4OS$
6	p-$OMeC_6H_4$	171	$C_{19}H_{16}N_4OS$	190	$C_{19}H_{17}ClN_4OS$
7	p-$OEtC_6H_4$	165	$C_{20}H_{18}N_4OS$	185	$C_{20}H_{19}ClN_4OS$
8	p-ClC_6H_4	175	$C_{18}H_{13}ClN_4S$	181–82	$C_{18}H_{14}Cl_2N_4S$

[a] All compounds analyzed satisfactorily for N,S.