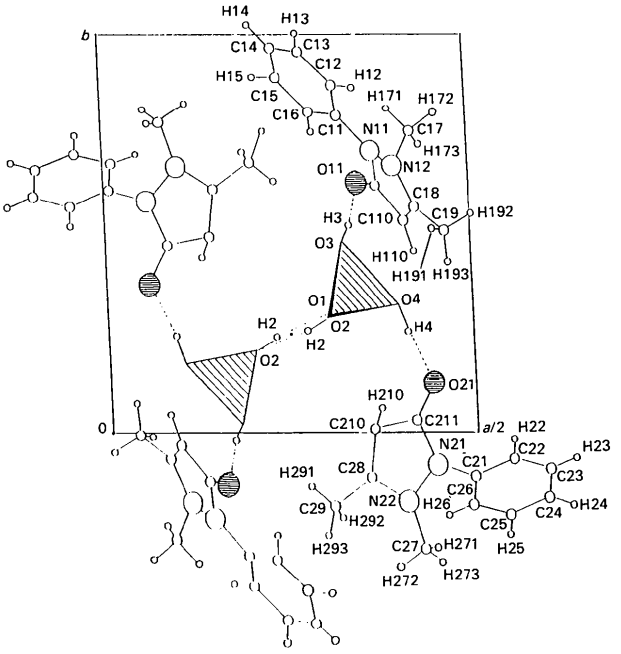

Fig. 1. Projection of the atomic arrangement of $2C_{11}H_{12}N_2O.H_3PO_4$ along the c axis.

The four remaining H atoms of this phosphoric group form hydrogen bonds with the O atoms of the ketonic groups of the four neighbouring antipyrine molecules. Fig. 1 shows a view of this building unit in projection along the c axis.

As expected, in the H_3PO_4 group the three P—OH distances, 1·533, 1·543 and 1·539 Å, are significantly longer than the P—O distance (1·488 Å) and the three P—O—H angles are close to 116° as is commonly observed in acidic phosphoric groups.

Two independent antipyrine molecules coexist in this atomic arrangement. As shown in Table 2 their conformations do not differ significantly.

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1-(Benzylideneamino)-3-hydroxyguanidinium Tosylate

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Abstract. $C_8H_{11}N_4O^+.C_7H_7O_3S^-$, $M_r = 318·3$, monoclinic, $P2_1/n$, $a = 14·539$ (3), $b = 20·551$ (4), $c = 6·062$ (3) Å, $\beta = 103·24$ (2)°, $U = 1763$ (1) Å^3, $Z = 4$, $D_x = 1·20$ Mg m^{-3}, $\lambda = 0·7107$ Å, $\mu = 1·67$ mm^{-1}, $F(000) = 736$, $T = 298$ K, final $R = 0·067$ for 2163 observed reflections with $F > 4\sigma(F_o)$ and 274 variable parameters. The structure consists of a disordered tosylate anion linked to a guanidine cation in the asymmetric unit, with two N···O and one O···O distance < 3 Å. The cationic part of the guanidine moiety is best described by a resonance structure where the equilibrium is shifted towards HO—NH—CR=N$^+$H$_2$, rather than the delocalized HO—NH—C^+R—NH$_2$ structure.

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Introduction. Hydroxyguanidine contains both the amino group of guanidine and the hydroxy group of hydroxyurea. These functional groups are known to be important for antiviral and anticancer activity (Adamson, 1972). It is also known that size and lipophilicity are important contributing factors towards enhanced activity (T'ang, Lien & Lai, 1985). Therefore a number of novel *N*-hydroxy-*N'*-aminoguanidine derivatives were designed, synthesized and evaluated for biological activity. The basic model compound 1-(benzylideneamino)-3-hydroxyguanidinium tosylate was used to study the effect of various electron-donating, electron-withdrawing, hydrophilic and lipophilic groups on activity of the molecule. The tosylate salt was synthesized to stabilize the molecule and to enhance solu-

bility in biological fluids. The X-ray crystallography study was carried out in an effort to investigate the bonding characteristics of the guanidine part of the molecule and to establish the relationship of the tosylate group to the rest of the molecule.

Experimental. The title compound was formed by reacting benzaldehyde with the primary amine (*N*-hydroxy-*N'*-aminoguanidinium tosylate) to form the corresponding Schiff base 1-(benzylideneamino)-3-hydroxyguanidinium tosylate. Recrystallization of this compound from an ethanol solution yielded diffraction-quality single crystals. Crystal size 0·26 × 0·22 × 0·19 mm; Enraf–Nonius CAD-4 diffractometer, graphite-monochromated Mo $K\alpha$ radiation; unit cell from 25 reflections ($7 < \theta < 16°$); 4342 reflections for $3 < \theta < 28°$ in the range $0 < h < 19$, $0 < k < 27$ and $-8 < l < 8$, using ω:2θ scans (ratio 3:2) where ω changed as $(0{\cdot}65 + 0{\cdot}34\tan\theta)°$ with a variable but maximum speed that corresponds to 5·49° min^{-1}. Three standard reflections varied less than 3%, measured every hour; Lorentz–polarization correction. 2163 unique reflections were observed [$I > 2\sigma(I)$]. Structure solved using *MULTAN*80 (Main, Fiske, Hull, Lessinger, Germain, Declercq & Woolfson, 1980) and refined using *SHELX*76 (Sheldrick, 1976), all H atoms attached to C atoms in calculated positions (C—H = 1·08 Å, H—C—H = 109·4°), F magnitudes, H atoms attached to O and N atoms were located and refined in experimental positions (these were the first five peaks of the difference map), $\sigma^{-2}(F)$ weights, all non-H atoms were refined anisotropically, H atoms isotropic with a common thermal parameter that refined to $U_{iso} = 0{\cdot}099$ (8) Å^2, 274 variables refined, $\sum w|\Delta F|^2$ minimized. Final $wR = 0{\cdot}039$, $R = 0{\cdot}067$, $(\Delta/\sigma)_{max} = 0{\cdot}2$, maximum residual electron density = 0·39 e Å^{-3}. Scattering factors from *International Tables for X-ray Crystallography* (1974, Vol. IV).

Discussion. Final fractional atomic coordinates with equivalent isotropic thermal parameters are given in Table 1. The geometry of the molecule showing the atomic numbering scheme used is depicted in Fig. 1; selected bond lengths and angles are given in Table 2.* The disordered tosylate was modelled by refining two sets of *ortho/meta* C atoms with fixed site occupancy of 50%, after the refined site-occupancy factor indicated this value to be approximately 50%. The least-squares planes for the two sets of rings form an angle of 57 (2)°, with C(2*A*)—C(1)—S—O(1) and C(2)—C(1)—S—O(1) torsion angles of 1 (1) and 51 (1)°, respectively. All three O atoms of the tosylate anion are involved in very short inter- and intramolecular contacts *i.e.* O(1)···N(2) [intra, 2·929 Å, with O(1)···HN(2*A*) 1·983 Å], O(1)···N(3) (inter, 2·775 Å), O(2)···O(4) [intra, 2·740 Å, with O(4)···HO(4) 2·047 Å], O(2)···N(2) [inter, 2·900 Å, with O(2)···HN(2*B*) 2·444 Å] and O(3)···N(1) (inter, 2·841 Å). The S—O bond distances are very similar – varing between 1·456 (3) and 1·471 (3) Å.

Table 1. *Fractional coordinates* ($\times 10^4$) *and equivalent thermal factors* (Å$^2 \times 10^3$) *for* 1-(*benzylideneamino*)-3-*hydroxyguanidinium tosylate*

$U_{eq} = (1/3)\sum_i\sum_j U_{ij} a_i^* a_j^* \mathbf{a}_i.\mathbf{a}_j$.

	x	y	z	U_{eq}
S	1367 (1)	8335 (1)	2161 (2)	49 (1)
O(1)	1228 (2)	7926 (1)	4049 (5)	49 (1)
O(2)	2283 (2)	8210 (2)	1657 (4)	63 (1)
O(3)	588 (2)	8282 (2)	151 (5)	62 (1)
C(1)	1374 (4)	9140 (2)	3055 (9)	51 (1)
C(2)	1887 (10)	9357 (8)	4909 (30)	89 (5)
C(2*A*)	1265 (14)	9255 (9)	5307 (29)	121 (7)
C(3)	1875 (11)	10014 (12)	5691 (36)	93 (6)
C(3*A*)	1261 (16)	9905 (10)	5974 (36)	128 (7)
C(4)	1337 (7)	10421 (3)	4543 (14)	90 (3)
C(5)	1294 (5)	11119 (3)	5394 (12)	133 (3)
C(6)	708 (12)	10203 (9)	2292 (28)	120 (6)
C(6*A*)	1614 (11)	10254 (8)	2667 (27)	94 (5)
C(7)	759 (12)	9578 (7)	1609 (23)	93 (5)
C(7*A*)	1622 (11)	9611 (7)	1904 (23)	77 (4)
O(4)	3094 (3)	7136 (2)	4000 (6)	63 (1)
HO(4)	2865 (38)	7365 (27)	3137 (88)	99 (7)*
N(1)	3897 (3)	7348 (2)	5576 (6)	51 (1)
HN(1)	4398 (31)	7169 (23)	5417 (77)	99 (7)*
C(8)	3765 (3)	7623 (2)	7460 (7)	46 (1)
N(2)	2937 (3)	7813 (2)	7687 (7)	53 (1)
HN(2*A*)	2368 (35)	7820 (23)	6556 (83)	99 (8)*
HN(2*B*)	2848 (46)	8130 (27)	8167 (101)	99 (8)*
N(3)	4545 (2)	7702 (2)	9125 (6)	49 (1)
HN(3)	5163 (34)	7443 (22)	9249 (83)	99 (8)*
N(4)	4477 (2)	8091 (2)	10925 (6)	50 (1)
C(9)	5244 (3)	8167 (2)	12444 (7)	53 (1)
C(10)	5300 (3)	8581 (2)	14414 (8)	52 (1)
C(11)	6142 (4)	8603 (3)	16033 (9)	78 (2)
C(12)	6229 (5)	8989 (3)	17930 (10)	108 (2)
C(13)	5488 (6)	9355 (3)	18251 (10)	107 (2)
C(14)	4632 (4)	9324 (3)	16644 (10)	94 (2)
C(15)	4533 (3)	8944 (2)	14727 (8)	68 (2)

* Isotropic temperature factor.

Table 2. *Selected bond lengths* (Å) *and valence angles* (°)

S—O(1)	1·471 (3)	S—O(2)	1·456 (3)
S—O(3)	1·446 (3)	S—C(1)	1·740 (5)
O(4)—N(1)	1·398 (5)	O(4)—HO(4)	0·72 (5)
N(1)—C(8)	1·327 (6)	N(1)—HN(1)	0·84 (5)
C(8)—N(3)	1·345 (5)	C(8)—N(2)	1·302 (7)
N(2)—HN(2*B*)	0·74 (6)	N(2)—HN(2*A*)	0·95 (5)
N(3)—N(4)	1·375 (5)	N(3)—HN(3)	1·03 (5)
C(9)—C(10)	1·453 (6)	N(4)—C(9)	1·283 (5)

O(1)—S—O(2)	111·0 (2)	O(1)—S—O(3)	112·7 (2)
O(2)—S—O(3)	112·5 (2)	O(1)—S—C(1)	107·1 (2)
O(2)—S—C(1)	107·0 (2)	O(3)—S—C(1)	106·1 (2)
HO(4)—O(4)—N(1)	118 (4)	O(4)—N(1)—HN(1)	113 (3)
O(4)—N(1)—C(8)	117·2 (4)	HN(1)—N(1)—C(8)	126 (3)
N(1)—C(8)—N(2)	122·6 (4)	N(1)—C(8)—N(3)	115·7 (4)
N(2)—C(8)—N(3)	121·7 (4)	C(8)—N(2)—HN(2*A*)	127 (3)
C(8)—N(2)—HN(2*B*)	124 (5)	HN(2*A*)—N(2)—HN(2*B*)	94 (6)
C(8)—N(3)—HN(3)	124 (3)	C(8)—N(3)—N(4)	117·6 (4)
HN(3)—N(3)—N(4)	118 (3)	N(3)—N(4)—C(9)	115·5 (4)
N(4)—C(9)—C(10)	122·5 (4)	C(9)—C(10)—C(11)	118·4 (5)

* Lists of structure factors, anisotropic thermal parameters, H-atom parameters and further bond distances and angles, and a cell-packing diagram have been deposited with the British Library Document Supply Centre as Supplementary Publication No. SUP 53195 (17 pp.). Copies may be obtained through The Technical Editor, International Union of Crystallography, 5 Abbey Square, Chester CH1 2HU, England.

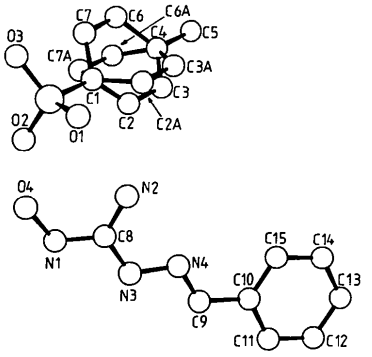

Fig. 1. Perspective view with atomic numbering scheme.

The C(8)—N(2) distance of 1·302 (7) Å is indicative of the double-bond character, when compared with the distances for C(8)—N(1) and C(8)—N(3) of 1·327 (6) and 1·345 (5) Å, respectively. A ^{15}N NMR spectroscopic study in solution also confirmed the presence of one N group, two NH groups and one NH_2 group. The O(4)—N(1)—C(8)—N(2) and N(2)—C(8)—N(3)—N(4) torsion angles are −13·7 (7) and −11·1 (6)° respectively.

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Structure du Sulfate Dihydrate du 6′H^+ Didéhydro-3′,4′ Désoxy-4′ Nor-C' Vincaleukoblastine (Nor-5′ Anhydrovinblastine), Sulfate Dihydrate de la Navelbine

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Abstract. 6′H^+-3′,4′-Didehydro-4′-deoxy-C'-norvincaleukoblastinium sulfate dihydrate, $C_{45}H_{55}N_4O_8^+.HO_4S^-.2H_2O$, $M_r = 913{\cdot}04$, monoclinic, $P2_1$, $a = 10{\cdot}778$ (2), $b = 20{\cdot}574$ (3), $c = 11{\cdot}326$ (2) Å, $\beta = 103{\cdot}94$ (2)°, $V = 2437{\cdot}6$ Å^3, $Z = 2$, $D_x = 1{\cdot}244$ g cm^{-3}, λ(Cu $K\alpha$) = 1·5418 Å, $\mu = 11{\cdot}3$ cm^{-1}, $F(000) = 984$, $T = 293$ K, final $R = 0{\cdot}079$ for 3072 independent reflections [$I > 3\sigma(I)$]. One proton from the sulfuric acid is transferred to the N atom of the Δ^2-azonine ring. Hydrogen bonds, O—H···O and two N—H···O, participate in the cohesion of the structure.

Introduction. La navelbine est un nouvel analogue hémisynthétique des alcaloïdes antimitotiques de la série vinblastine.

Après couplage entre le *N*-oxyde de catharanthine et la vindoline suivant la réaction de Polonovski modifiée par Potier, le groupement 'tryptamine' de l'anhydrovinblastine obtenue est transformé en 'gramine' (Mangeney, Andriamialisoa, Langlois, Langlois & Potier, 1979).

Les structures moléculaires des dérivés naturels, vinblastine et vincristine, sous forme d'iodométhylates, ont été déterminées par Moncrief & Lipscomb (1966).

La structure moléculaire de la navelbine (base) a été présentée au 7ème Congrés Européen de Crystallographie à Jérusalem; cependant il n'est pas possible d'effecteur une comparaison: les coordonnées atomiques n'étant pas à ce jour publiées (Leroy, Riche, Mangeney, Langlois & Langlois, 1982).

L'étude cristallographie de la navelbine a été entreprise dans le but de préciser la géométrie de cette molécule, afin d'expliquer les différences d'activité observées par rapport aux composés naturels.

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