

X-RAY ANALYSIS OF AN ANTIBIOTIC, T-2636 A (BUNDLIN B).

K. Kamiya, S. Harada, Y. Wada, M. Nishikawa and T. Kishi

Research and Development Division, Takeda Chemical Industries, Ltd.

Higashiyodogawa-ku, Osaka, Japan

(Received in Japan 29 March 1969; received in UK for publication 29 April 1969)

T-2636 A, $C_{27}H_{35}NO_8$, is an antibiotic produced by a strain of Streptomyces rochei var. bolubilis. In collaboration with the chemical study reported in the preceding paper¹⁾, the X-ray analysis of the antibiotic was attempted so as to clarify its stereochemical structure as well as the absolute configuration. Yellow crystals of p-bromophenylhydrazone (I) of T-2636 A, obtained from a methanolic solution, $C_{33}H_{40}N_3O_7Br$ (m.p. 207-209° (decomp.)), were used for the analysis.

The unit-cell of the crystals is monoclinic with cell dimensions, $a=26.46$, $b=6.32$, $c=21.44\text{\AA}$ and $\beta=114^\circ 25'$. It contains four molecules of (I). The space group was derived to be C2 from the systematic extinctions (hkl for $h+k=2n+1$). Intensities of 2060 reflections were measured with $MoK\alpha$ radiation on Hilger & Watts' linear diffractometer. The co-ordinates of the bromine atom (0.09, 0.00, 0.78) were determined uniquely from the three-dimensional sharpened Patterson map computed as usual.

For the detection of the positions of light atoms, a three-dimensional minimum function method and a heavy-atom method were carried out. Alternating applications of the least-squares treatments and Fourier syntheses facilitated the structure elucidation. The structure having a seventeen-membered carbon ring, thus obtained, was further refined by applying 7 cycles of least-squares treatment with isotropic temperature factors. The R-value at the present stage was 0.166.

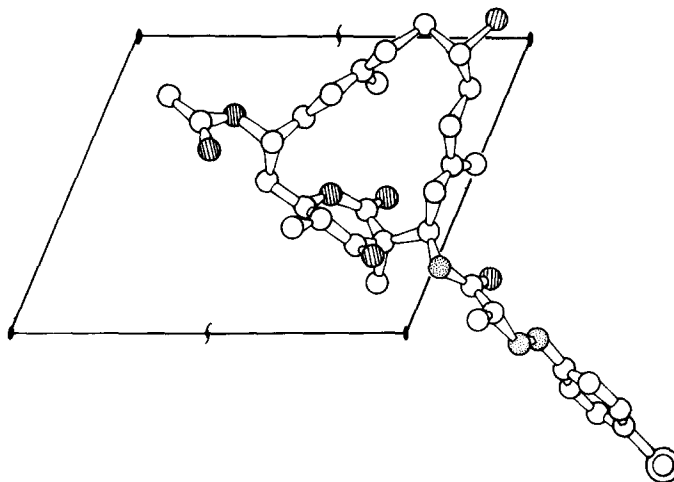


Fig. 1

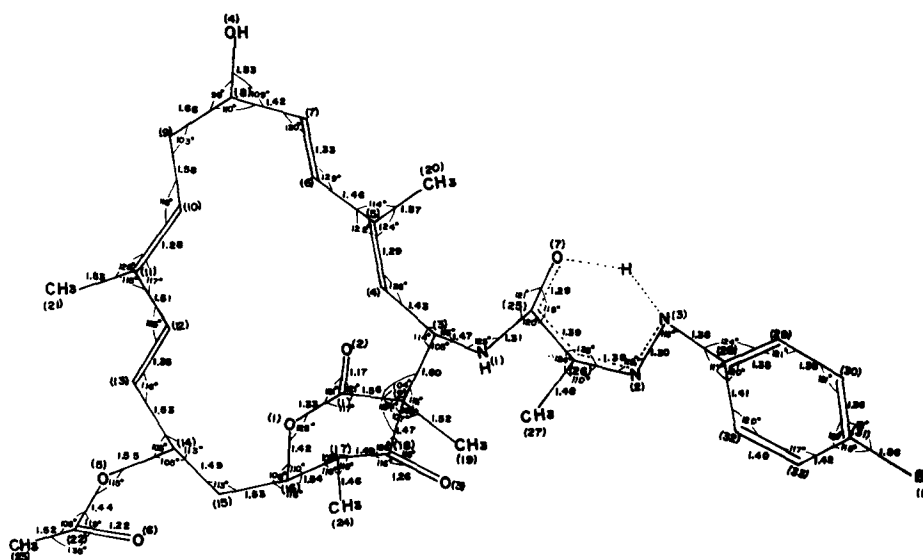


Fig. 2

Table 1. The Atomic Co-ordinates and Temperature Factors

Atom	x/a	y/b	z/c	B
Br (1)	0.4084	0.9954	0.7196	6.73
O (1)	0.1689	0.0074	0.7384	4.31
O (2)	0.0941	0.8418	0.7304	4.64
O (3)	0.0828	0.4853	0.6198	5.05
O (4)	0.0560	0.2876	0.0282	8.65
O (5)	0.3340	0.2084	0.8708	6.24
O (6)	0.3491	0.5037	0.8186	10.52
O (7)	0.0847	0.0678	0.4102	5.83
N (1)	0.0137	0.3012	0.3839	3.95
N (2)	0.1558	0.3533	0.5096	4.50
N (3)	0.1760	0.1645	0.5109	3.29
C (1)	0.1142	0.9787	0.7117	2.86
C (2)	0.0777	0.1405	0.6563	3.01
C (3)	0.0259	0.1829	0.6748	3.15
C (4)	0.0399	0.2821	0.7397	3.33
C (5)	0.0307	0.2047	0.7898	4.70
C (6)	0.0507	0.3080	0.8567	4.01
C (7)	0.0514	0.2334	0.9153	5.00
C (8)	0.0818	0.3406	0.9779	7.23
C (9)	0.1430	0.2235	0.0190	5.62
C (10)	0.1776	0.3044	0.9786	5.13
C (11)	0.1908	0.1708	0.9432	4.33
C (12)	0.2227	0.2518	0.9039	4.24
C (13)	0.2443	0.1293	0.8696	3.78
C (14)	0.2710	0.2468	0.8287	4.62
C (15)	0.2586	0.1474	0.7609	3.75
C (16)	0.1968	0.1538	0.7133	3.20
C (17)	0.1685	0.3723	0.7032	3.51
C (18)	0.1090	0.3331	0.6576	4.04
C (19)	0.0635	0.0384	0.5867	4.87
C (20)	0.0018	0.9860	0.7871	6.88
C (21)	0.3263	0.4380	0.0696	6.09
C (22)	0.3699	0.3575	0.8582	7.33
C (23)	0.4288	0.2832	0.9016	8.94
C (24)	0.1979	0.5331	0.6819	5.52
C (25)	0.0661	0.2502	0.4183	3.28
C (26)	0.1026	0.3969	0.4619	3.52
C (27)	0.0866	0.6150	0.4717	3.98
C (28)	0.2302	0.1329	0.5575	2.80
C (29)	0.2681	0.2901	0.5817	3.36
C (30)	0.3207	0.2496	0.6304	3.82
C (31)	0.3371	0.0496	0.6535	3.88
C (32)	0.2461	0.9220	0.5785	2.46
C (33)	0.2988	0.8786	0.6303	4.15

The absolute configuration of the antibiotic was also determined unambiguously by the use of the anomalous dispersion of bromine atom due to $\text{MoK}\alpha$ radiation.

In Fig. 1 is given the stereo-model of the molecule seen down the b axis. The structure of T-2636 A was fully consistent with the results obtained by the chemical study. It also coincided, at least two-dimensionally, with the structure of an antibiotic, bundlin B, elucidated independently by Uramoto, et al.²⁾

Bond distances and angles are shown in Fig. 2. The atomic co-ordinates and temperature factors are listed in Table 1.

REFERENCES

- 1) S. Harada, E. Higashide, T. Fugono and T. Kishi, Tetrahedron Letters, in press.
- 2) M. Uramoto, N. Otake and H. Yonehara, Abstract paper of the Annual Meeting of Agricultural Chemical Society of Japan, page 141, 1969.