(10) McCleary, R.F., Degering, E.F., *Ind. Eng. Chem.* **30**, 64-7 (1938).
(11) Nef, J.V., *Ann.* **280**, 264 (1894).
(12) Nightingale, D.V., Reich, D.A., Erickson, F.B., *J. Org. Chem.* **23**, 236 (1958).
(13) Noland, W.E., *Chem. Rev.* **55**, 136 (1955).
(14) Noland, W.E., Sundberg, R.J., *Tetrahedron Letters* **1962**, p. 295.
(15) Shechter, H., Kaplan, R.B., *J. Am. Chem. Soc.* **75**, 3980 (1953).
(16) Shechter, H., Williams, F.T., *J. Org. Chem.* **27**, 3699 (1962).
(17) van Tamelen, E.E., Thiede, R.J., *J. Am. Chem. Soc.* **74**, 2615 (1952).

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Synthesis of a New Analog of Chloramphenicol

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DL-*threo*-2-Dichloroacetamido-1-(4-methylsulfonyl-3-fluorophenyl)-1,3-propanediol and its *erythro*-isomer were synthesized. 4-Methylsulfonyl-3-fluoroacetophenone, α-bromo-4-methylsulfonyl-3-fluoroacetophenone and its hexamethylenetetramine salt, α-amino-4-methylsulfonyl-3-fluoroacetophenone hydrochloride, α-dichloroacetamido-4-methylsulfonyl-3-fluoroacetophenone, and racemic α-dichloroacetamido-β-hydroxy-4-methylsulfonyl-3-fluoroacetophenone were new intermediates for this synthesis.

AMONG the analogs of chloramphenicol, DL-*threo*-2-dichloroacetamido-1-(4 - methylsulfonylphenyl)-1,3-propanediol (*3*) has significant antifungal activity. DL-*threo*-Dichloroacetamido-1-(4-methylsulfonyl - 3-fluorophenyl)-1,3 - propanediol was synthesized by using general methods of syntheses of chloramphenicol and its analogs (*1*, *3*), with some modifications which are described in the footnote of Table I.

The starting materials for this synthesis, *o*-fluorothiophenol, *o*-fluorothioanisole, and 4-methylmercapto-3-fluoroacetophenone were reported previously by two of the authors (*2*). The antimicrobial activity of the analog of chloramphenicol obtained are under investigation. Preliminary assays showed antibacterial activity against some pathogenic and nonpathogenic strains. The chloramphenicol analog and the intermediates and congeners which were synthesized are listed in Table I.

LITERATURE CITED

(1) Long, L.M., Troutman, H.D., *J. Am. Chem. Soc.* **71**, 2469, 2473 (1949).
(2) Sharghi, N., Lalezari, I., J. CHEM. ENG. DATA **8**, 276 (1963).
(3) Suter, C.M., Schalit, S., Culter, R.A., *J. Am. Chem. Soc.* **75**, 4330 (1953).
(4) Suzuki, Minoro, Shindo, Hideyo, *J. Pharm. Soc. Japan* **76**, 927 (1956).

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Table I. Synthesis and Analysis of Chloramphenicol Analogs

Compound	M.P., °C.	Yield, %	Formula	Analyses, % Carbon Calcd.	Carbon Found	Hydrogen Calcd.	Hydrogen Found
4-Methylsulfonyl-3-fluoroacetophenone	90	95	$C_9H_9FO_3S$	50.00	49.85	4.16	4.18
α-Bromo-4-methylsulfonyl-3-fluoroacetophenone	95	92	$C_9H_8BrFO_3S$	35.93	36.07	2.71	2.80
Hexamethylenetetramine salt of α-bromo-4-methylsulfonyl-3-fluoroacetophenone[a]	198	90	$C_{15}H_{20}BrFN_4O_3S$	41.37	41.70	5.59	4.63
α-Amino-4-methylsulfonyl-3-fluoroacetophenone hydrochloride[b]	...	80	$C_9H_{11}ClFNO_3S$	...	...	...	...
α-Dichloroacetamido-4-methylsulfonyl-3-fluoroacetophenone	115	36	$C_{11}H_{10}Cl_2FNO_4S$	38.59	38.46	2.92	3.06
Racemic α-dichloroacetamido-β-hydroxy-4-methylsulfonyl-3-fluoroacetophenone	103	23	$C_{12}H_{12}Cl_2FNO_5S$	38.70	39.02	3.22	3.41
DL-*threo*-2-Dichloroacetamido-1-(4-methylsulfonyl-3-fluorophenyl)-1,3-propanediol[c]	206	44	$C_{12}H_{14}Cl_2FNO_5S$	38.50	38.62	3.74	3.62
DL-*erythro*-2-Dichloroacetamido-1-(4-methylsulfonyl-3-fluorophenyl)-1,3-propanediol[c]	80	11	$C_{12}H_{14}Cl_2FNO_5S$	38.50	38.71	3.74	3.90

[a] This salt was made in chlorobenzene at a temperature below 5° C. and, after being retained at this temperature for 2 hours, was kept overnight at room temperature. At higher temperatures, orange gummy materials were obtained. [b] The α-amino-4-methylsulfonyl-3-fluoroacetophenone hydrochloride, obtained by acid hydrolysis of the hexamethylenetetramine salt, contained a large amount of ammonium chloride and, being water soluble, was dichloroacetylated without previous purification. [c] The assignment of *threo*- and *erythro*- configurations was made by analogy with a large number of synthesized chloramphenicol analogs, supported by the infrared spectroscopy (*4*).