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NATIONAL SURVIVAL THROUGH SCIENCE[1]

By Dr. HARRY N. HOLMES

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WHEN I speak of national survival through science I refer not only to the vital aid of science in winning this war, but also to its great service in the difficult years that follow. To the pessimists who believe that the Allies will lose and that the United States will finally be forced, by economic strangulation, to yield to Hitler's orders I am compelled to say that under such throttling our chief hope of survival as a free nation will lie in the resourcefulness of our scientists.

The profound influence on our civilization of anesthetics and antiseptics, the steam engine, the electric dynamo and motor, the telegraph, telephone and wireless, the cotton gin, Portland cement, the pig-iron furnace and steel mill, refrigeration and the motor car convinces every thoughtful person that this is a scientific civilization. To be truly cultured you must have some understanding of the achievements, the methods and the possibilities of scientific research.

Centuries ago recovery from great disasters such as plague, famine, flood, war and oppression was slow —fatally slow for some nations.

Medical science can now check pestilence in most of its forms, although it did not check the world epidemic of virulent flu in 1918 until millions of lives were lost. The encouraging fact to-day is that science learns from every disaster, be it yellow fever, typhus, the bubonic plague, an earthquake or a great flood on the Yellow River in China or on our own Mississippi.

Typhus fever has killed 200,000,000 people in

[1] Presidential address delivered at the one hundred and fourth meeting of the American Chemical Society, Buffalo, September 7, 1942.

above freezing to 90° F and never noted any significant change in the pattern of the markings. At low temperatures the color of the animal as a whole is quite dark, but the pigment spots are still clearly outlined.

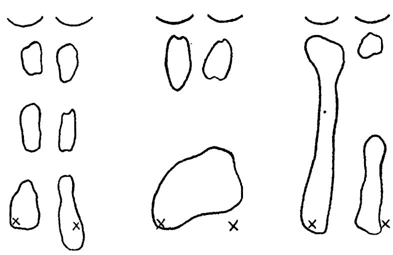

FIG. 2

We have used this method of identification for three years in several hundred frogs and have found it to be consistently satisfactory.

H. G. SCHLUMBERGER
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MONOTHIOGLYCOL

MONOTHIOGLYCOL,[1] CH_2OHCH_2SH (also designated thioglycol, monothioethylene glycol and β- or 2-mercaptoethanol), is a useful non-nitrogenous sulfhydryl reagent for protein investigations. It is a colorless liquid (b.p. 69–70°(28 mm)),[2] completely soluble in water and most organic solvents. Smythe[3] showed that monothioglycol resembled cysteine and glutathione in its reaction with iodoacetate and iodoacetamide, although the reaction time for monothioglycol was slower. Fischer[2] measured the normal oxidation potential and found it approximately equal to that of cysteine (0.44 volt).

The sulfhydryl content of monothioglycol solutions can be determined readily by iodine titration. As with other SH compounds, dilute solutions in acid are more stable than those in the neutral or alkaline pH range (Table I). Monothioglycol can be added to buffer solutions without appreciably changing pH or ionic strength (Table II). It gives a deep red nitroprusside test. The disulfide oxidation product, in contrast to cystine, is soluble in water in all proportions.

TABLE I
PERCENTAGE LOSS OF SH FROM 0.1 M MONOTHIOGLYCOL SOLUTIONS IN BUFFER SOLUTIONS[a]

Days	Citrate (0.1 M) pH 3.92	Phosphate (0.067 M) pH 6.74	Phosphate (0.067 M) pH 7.89
1	0.4	3.3	4.6
2	1.5	5.6	7.3
3	2.1	7.7	10.6
5	3.1	13.0	18.7
14	9.0	46.0	51.0

[a] In half-filled glass-stoppered clear glass bottles, diffuse light, 25–30°.

TABLE II
CONDUCTANCE OF MONOTHIOGLYCOL

Solute	Solvent	Specific Conductance[a] reciprocal ohms
0.1 M Monothioglycol	0.001 M Acetate buffer (pH 6.5)	5.2×10^{-5}
0.1 M Thioglycolic Acid	0.001 M Acetate buffer (pH 6.5)	3.4×10^{-3}
None	0.001 M Acetate buffer (pH 6.5)	4.4×10^{-5}
0.125 M Monothioglycol	0.1 M Acetate buffer (pH 6.5)	3.4×10^{-3}
None	0.1 M Acetate buffer (pH 6.5)	3.5×10^{-3}
0.125 M Monothioglycol	0.1 M Glycine–NaOH buffer (pH 11.8)	3.6×10^{-3}
None	0.1 M Glycine–NaOH buffer (pH 11.8)	3.8×10^{-3}

[a] Measured at 0.8° C. with freshly prepared solutions.

That monothioglycol is a reducing agent for the disulfide linkages in proteins is indicated by its effect in increasing the solubility of keratins, decreasing the viscosity of enzyme-free wheat gluten dispersions and activating papain. It should be found useful in providing a suitable environment for preventing the air oxidation of reduced proteins during dialysis without interfering with subsequent mobility determinations. Details of the experiments mentioned will be described in later publications.

Dr. C. B. Jones studied the keratin solubilities and Dr. Hans Lineweaver performed the papain assays.

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[1] The Carbide and Carbon Chemicals Corporation kindly furnished a generous sample.
[2] E. K. Fischer, *Jour. Biol. Chem.*, 89: 753, 1930.
[3] C. V. Smythe, *Jour. Biol. Chem.*, 114: 601, 1936.

BOOKS RECEIVED

FISHER, EDNA M. *The Osteology and Myology of the California River Otter.* Illustrated. Pp. vi + 66. Stanford University Press. $1.50.

FLEXNER, WILLIAM W. and GORDON L. WALKER. *Military and Naval Maps and Grids.* Illustrated. Pp. 96. The Dryden Press, New York City. $1.00.

O'NEALE, LILA M. *Textile Periods in Ancient Peru: II. Paracas Caverns and the Grand Necropolis.* Illustrated. 5 Plates. Pp. vi + 201. University of California Press.

Ore Deposits as Related to Structural Features. Edited by W. H. NEWHOUSE. Illustrated. Pp. xi + 280. Princeton University Press; Oxford University Press, London. $6.50.

Pirotechnia of Vannoccio Biringuccio. Translated by CYRIL STANLEY SMITH and MARTHA TEACH GNUDI. Illustrated. Pp. xxvi + 476. The American Institute of Mining and Metallurgical Engineers, New York City.

SPOTT, ROBERT and A. L. KROEBER. *Yurok Narratives.* Vol. 35, No. 9. Pp. 143–256 + vii. University of California Press.

TANNER, JAMES T. *The Ivory-Billed Woodpecker.* Illustrated. Pp. xii + 111. National Audubon Society, New York City. $2.50.