rat, rabbit and dog that these investigators neglected to consider one important difference between experiments done with methylene blue *in vivo* and *in vitro*, namely, the *presence of a constant supply of glucose in vivo* as compared with the strictly limited amount available in experiments *in vitro*. When methylene blue in doses equivalent to the clinical dose was injected into animals and samples of blood taken at intervals from 15 minutes to 24 hours later and analyzed by the spectrophotometer, no methemoglobin was found. The ratio $\varepsilon_{540\ m\mu}/\varepsilon_{560\ m\mu} = R$ was found to be 1.63, indicating, according to Ray, Blair and Thomas,[5] that only oxyhemoglobin was present. This method requires but a few minutes for an accurate determination and is capable of detecting less than 2 per cent. methemoglobin in oxyhemoglobin.

The same conclusions have been reached by Williams and Challis[6] and Geiger,[7] using spectrographs of the blood of human cases. These conclusions have, however, been doubted because of the insensitivity of the method, the minimum surely detectable proportion of methemoglobin being about 25 per cent.

The explanation is quite simple. Warburg, Kubowitz and Christian[8] have shown that there is no appreciable amount of methemoglobin formed when methylene blue is added to red blood cells *in vitro* in the presence of an adequate amount of glucose, because the cycle hemoglobin $\rightleftarrows$ methemoglobin is continuous as long as the supply of glucose remains. Since methylene blue is a reversible oxidation-reduction indicator, this process of forming methemoglobin, which in turn is reduced by glucose to hemoglobin and again reoxidized by methylene blue, goes on in a continuous cycle. This is what takes place *in vivo*. When only a small amount of glucose is present, it is quickly used up in the presence of methylene blue and then methemoglobin heaps up. This is the condition under which the writers quoted have worked.

When nitrite is added to hemoglobin a stoichiometric equivalent of methemoglobin is formed which when once reduced by glucose is not reformed. This differs from the action of a catalyst such as methylene blue.

Therefore the above-mentioned writers have made their objection to the use of methylene blue in CN and CO poisoning on a false basis; for the demonstrated absence of methemoglobin in the blood after methylene blue therapy is conclusive disproof of their indirectly arrived at results.

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[5] G. B. Ray, H. A. Blair and C. I. Thomas, *Jour. Biol. Chem.*, 98: 63, 1932.

[6] J. R. Williams and F. E. Challis, *Jour. Lab. and Clin. Med.*, 19: 166, 1933.

[7] J. C. Geiger, *Jour. Amer. Med. Assoc.*, 101: 269, 1933.

[8] O. F. Warburg, Kubowitz and W. Christian, *Biochem. Zeit.*, 227: 245, 1930.

THE TIME CONSTANT

"THE Time Constant" was the title of a discussion which appeared in SCIENCE for May 25 (page 479), having been communicated by Professor Joseph O. Thompson, of Amherst College. In it Professor Thompson called attention to the fact that if the rate of increase

$$\frac{di}{dt} = \frac{r}{l} i_o$$

in the current strength "should be maintained for l/r seconds the current would reach its final value i_o. This ratio l/r, generally called the time constant, is therefore numerically equal to the number of seconds required for the current in reaching its final value if the initial rate of rise should be maintained."

While agreeing with Professor Thompson that this way of regarding the time constant appears to be unusual, the writer has thus regarded it for many years and demonstrated it on pages 245 and 246 of his book "Magnets," published in 1924. The book also contains calculated tables, originally published by the writer in *Electrical World* (Vol. 78, p. 872, 1921), by means of which numerous examples, showing the quantity of electricity displaced, the amount of magnetic energy stored, the amount of energy stored in dielectrics and as heat in coils or resistors, in various circuits and during any time interval, are worked out easily and quickly by simple algebra.

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A FORGOTTEN TREE RING RECORD

THE intensive study of tree rings in timbers from ruins in our Southwest is known favorably to all archeologists. Dr. A. E. Douglass, considered the authority in tree ring studies, through his labors and those of other archeologists has been able to date accurately many of the Pueblo sites.

I think it is no more than fair to bring to the attention of readers that as far as I can ascertain the first mention of tree ring study occurred in my book, "Fort Ancient," published at Cincinnati in 1890. This volume is devoted to a survey and description of Fort Ancient by the late Mr. Gerard Fowke, a competent authority, Mr. Clinton Cowen, an engineer, and myself. On page 34 of that book is presented the result of tree ring counting on a large walnut stump located in the southern part of Fort Ancient. This tree was famous in that part of the country because of its size. It had been cut nineteen years before the survey. The lower part of the stump was fairly well preserved. At the suggestion of a botanist, our men sawed the stump close to the ground, and Cowen and Fowke carefully counted the rings. The total was 255 years. Thus we found that the tree sprouted in 1615.

A stone grave was found under this stump, and the tree roots extended over and down upon all sides. How many years previous to the growing of the sapling the burial was made, no man may know.

It is fortunate this record was set down at the time of our exploration.

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QUOTATIONS

A FAMILY OF DOCTORS

DR. WILLIAM HENRY WELCH, the illustrious pathologist, was laid to rest last May in the "buryal-yard" of the Connecticut village where he was born. An article by Dr. Harvey Cushing on "The Doctors Welch of Norfolk," reprinted from *The New England Journal of Medicine,* has just appeared in pamphlet form. The author's sense of atmosphere and form, the restraint and delicacy of his literary art, may stir professional writers to envy or humility. He makes the reader want to go to unspoiled Norfolk, to its village green, rich in stately trees. People fortunate enough to live there stay long. In two years the average age of six persons who died was 93. In comparison the Welches are cut off in the flower of youth, in their early eighties.

Hopestill Welch, William Henry's great-grandfather, came to Norfolk in 1772. In three generations there were "at least ten Doctors Welch." As was not uncommon in New England, the profession was hereditary. "Ask the aged apothecary in the village which of the Doctors Welch was the more celebrated, he would certainly say William Wickham, the father of this William Henry." Ask him why, he would probably reply:

"If you don't believe me, just ask any middle-aged person you may chance to meet up with for thirty miles around, and see if they don't agree. Most of 'em will remember when they used to put a light in the window for him should be happen by in the dead of night. He was never known to send out any bills—pretended to forget that people owed him money—and those who paid had to press it on him."

This is a type that lingers in old Yankee memories. The Doctor was the son of a doctor, sometimes the son-in-law of a doctor. Cheerful, indulgent, wise, a good diagnostician, familiar with heredity before it was talked about, he was a sage, a friend, often a "character." He might be highly skilful, even if his medical science was antiquated. Thus of Benjamin Welch, Jr., Yale M.D., 1823, who practiced for fifty-four years, it was said in reference to his expertness as a surgeon: "Don't give up hope before you've sent for Dr. Benjamin." There is a tablet to William Henry on William Wickham Welch's house, where he was born. The drinking fountain in front, built in memory of the father, bears the inscription so singularly prophesying the son: "Fons sum solati talis et ipse fuit."

Obscure or famous, here was a tribe of bringers of relief to men. It is good to think of the world-renowned physician sleeping among his fathers in the burying ground on the old Canaan road, "in the shadow and solitude of great trees."—*The New York Times.*

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A HEAD CLAMP FOR OPERATIONS ON CATS

THE head clamp here described, modified from one originally designed by Dr. Dusser de Barenne, has proved very efficient in a large number of operations on cats. It consists of four vertical bars, A, B, C, D, six transverse bars, E, F, G, H, I, J, and six screws, K, L, M, N, O, P. The height of the clamp from E to J is 5 inches; the width from A to D is $2\frac{3}{4}$ inches.

The vertical bars A and D are threaded; B and C are not. All four are firmly fixed into the transverse pieces E and J. Bar J is extended laterally into two prongs. Bar G is fixed; F, H and I are movable, and slide on the smooth uprights B and C. The ends of the movable pieces are made U-shaped, so as to fit half around the threaded uprights A and D without touching them. They can be retained in any desired position by the screws K, L, M, N, O, P. Screws M and N are thinner than the others to permit of close approximation of G and H.

In use, G and H are set close together; F and I are separated some distance from them. G and H are inserted into the anesthetized animal's mouth behind the canine teeth. They are then separated a small amount by screwing down M and N. This keeps the mouth open, through which the animal breathes, and through which ether may be administered. Bar F is screwed down on the nose by K and L; bar I is screwed up under the lower jaw by O and P. The