The general morphologic, cultural and biochemical attributes of the contaminant, when compared with authentic strains, indicated that it was *B. megatherium,* a common non-pathogenic spore-forming aerobic bacillus. It is ordinarily stated that this species is a normal contaminator, but such a conclusion does not hold as regards this laboratory, certainly not to the extent noted. The germs were unquestionably storm-borne.

In order to determine the form in which the organisms were transported, several portions of dust were collected from the tops of the desks in one of the laboratories which had not been in use on the day of the storm. One specimen was mixed with water and examined directly under the microscope. The results, however, were quite unsatisfactory. Another sample weighing about 1 g was suspended in 5 cc of physiological saline and heated at 60° C. for 1 hour to kill vegetative cells if present. Nutrient agar surfaces were subsequently streaked with the suspension, and after incubation colonies identical with the ones originally observed appeared in large numbers. Naturally other varieties of microbic life were present, but no attempt was made to identify the total flora.

It is, therefore, assumed that the organisms in the spore state were swept up by the wind with the dust particles and were transported mechanically for great distances in the upper atmosphere.

It would be interesting to know whether or not this species predominates in the native soil of Nebraska and South Dakota, the alleged origin of the dust particles.

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CAMBRIAN GRAPTOLITES

THE writer has in Bulletin No. 3, Vol. 12 (1933) of the Public Museum of the City of Milwaukee published an account of the Cambrian graptolites as far as they are known. All are Dendroidea. As this is the first time that Cambrian graptolites have been reported from various regions of America (Lower Canada, Vermont, Wisconsin and Minnesota, Tennessee and Dakota) it is of great importance that the record should be correct and no errors introduced into this new field. However, as the paper was several years in printing, some determinations have meanwhile been changed and also some labels have been found to have been misleading.

It is now known that all these graptolites are from the Upper Cambrian only and no Middle or Lower Cambrian graptolites occur. *Dictyonema schucherti* was described as coming from the Lower Cambrian of Vermont (top of Colchester formation) and thus regarded as the oldest graptolite known. Professor B. F. Howell has since found that the form comes from an Upper Cambrian horizon (Russell slate formation). Likewise *Dendrograptus edwardsi major* and *Callograptus antiquus,* which are described as coming from the Elbrook formation of Tennessee, which is Middle Cambrian, according to Dr. Chas. E. Resser, were obtained in the Nolichucky shale, which is latest Upper Cambrian. Dr. Resser also informs me that the form which he collected in an unnamed Upper Cambrian formation on the "North side of the Shoshone Canyon, just above bridge, west of Cody, Wyoming" and which I described and figured as *Dictyonema cf. minnesotense* on pp. 322–323 (*op. cit.*) may now be cited as coming from the "Deadwood series," equivalent to the Upper Cambrian. As it is a new species, distinguishable from *Dictyonema minnesotense* by the more rapid bifurcation, it may be known as *Dictyonema wyomingense.*

As the bulletin on the Cambrian graptolites had been already widely distributed by the Milwaukee Museum before I became aware of the necessary changes in age determinations, the students interested in these faunas are asked to make the changes indicated above in their copies.

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THE MECHANISM OF METHYLENE BLUE ACTION ON BLOOD

THE mechanism of the action of methylene blue as a catalytic agent in CN and CO poisoning[1] has been questioned by various writers.

Wendel[2] claims that in CN poisoning the dye changes hemoglobin to methemoglobin in the bloodstream, that this unites with CN to form a stable compound and that in this way CN is taken out of the blood stream. Henderson[3] and Haggard and Greenberg[4] claim the same action for methylene blue and conclude from this that if, as they suppose, the dye inactivates a certain per cent. of the hemoglobin by forming methemoglobin, its use in CO poisoning is a hindrance rather than an aid to recovery.

Haggard and Greenberg[4] have made experiments on dogs in which the oxygen capacity of blood containing methylene blue was determined, according to the Van Slyke-Hiller method. They found from 8 to 12 per cent. reduction of oxygen capacity, which is supposed to indicate that this proportion of the oxyhemoglobin is transformed to methemoglobin.

The writer has, however, shown by experiments on

[1] M. M. Brooks, *Proc. Soc. Exp. Biol. Med.,* 29: 1228, 1932; 30: 493, 1933. *Amer. Jour. Physiol.,* 102: 145, 1932; 104: 139, 1933.

[2] W. B. Wendel, *Jour. Amer. Med. Assoc.,* 100: 1054, 1933.

[3] Y. Henderson, SCIENCE, 78: 408, 1933.

[4] H. W. Haggard and L. A. Greenberg, *Jour. Amer. Med. Assoc.,* 100: 2001, 1933.

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