the animal inoculations treatment of the specimens with penicillin was omitted. All animals after inoculation were kept in a separate room so that chance exposure to infected stock could be excluded.

The successful isolation was made in mice. Slight pulmonary lesions occurred in one mouse of the third passage and in the fourth passage a scant 2-plus hepatization was produced. These lungs were inoculated into 10-day eggs and on first egg passage the pooled allantoic fluid possessed a CCA titer of 1/640.

This allantoic virus was identified as Type A by means of the agglutinin-inhibition test, using sera produced in rabbits against the PR8 strain of Type A and the Lee strain of Type B influenza virus.

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Initiation of Geological Investigations in the Panama Canal Zone

A letter received by me from Viscount Bryce more than 25 years ago seems to possess more than passing interest. A copy follows:

"Aug. 31, 1920
Hindleap, Forest Row 6, Sussex

"I thank you cordially for sending me the Smithsonian Institution volume relating to the geology & paleontology of the Panama Canal, which I shall read with the greatest interest, though the little geological knowledge I learnt long ago from my father has, in the process of years, left little more than an unabated interest in the subject.

"I may mention that when I visited the Canal in 1910 I found that no proper geological examination of the Isthmus was being made, & wrote at once to President Taft, pointing out the importance of improving the opportunities which the excavation of the Canal afforded. He promptly thereupon had a competent geologist sent there to take the matter up. I have forgotten the name, but it was probably Dr. D. F. Macdonald mentioned in your preface.

"I often think of the pleasant times I had in Washington with the scientific groups at the Cosmos Club & wish the Atlantic were not so wide.

"With our kind regards to Mrs. Vaughan & yourself
Very truly yours
[signed] James Bryce"

The volume to which the letter refers is entitled *Contributions to the geology and paleontology of the Canal Zone, Panama, and geologically related areas in Central America and the West Indies* (*U. S. nat. Mus. Bull. 103,* 1919–20. Pp. xviii + 613. Illustrated). American geologists were aware of the excellent opportunity afforded for a study of the geology of the Isthmus of Panama, but were uncertain as to how to establish contact with the Isthmian Canal commissioners. The effect of the letter from Lord Bryce to President Taft was to establish contact between the commissioners and the U. S. Geological Survey. The "competent geologist" mentioned by Lord Bryce was C. Willard Hayes. After the latter's return to Washington Donald F. MacDonald was recommended and appointed Commission Geologist in 1911. In October and November 1911, I spent a full month in the Canal Zone working with Mr. MacDonald, and after my return to Washington organized, as a cooperative enterprise between the Canal Commission, the Smithsonian Institution, and the U. S. Geological Survey, the studies the results of which appeared in the volume above mentioned.

In this connection another investigation of phenomena exhibited by the Canal should be mentioned. Early in 1915, because of the serious landslides along the sides of and in the Canal, the engineers in charge of the project wished help in understanding the causes of the slides. In response to the desire of the engineers President Wilson referred the matter to the president of the National Academy of Sciences, William H. Welch, who appointed a committee of 13 under the chairmanship of C. R. Van Hise to study and report on the problem. The full report, entitled "Report of the Committee of the National Academy of Sciences on Panama Canal slides," was published in 1924 (*Mem. nat. Acad. Sci.,* Vol. 18). This report is a valuable addition to the literature of engineering geology.

Lord Bryce had many friends in this country, which he understood so well and to whose welfare he was so devoted. The role he played in initiating geological investigations in the Panama Canal Zone has not been generally known. It extends the basis of the high esteem in which our fellow citizens hold him.

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On the Term "Normality Factor"

The term "Normality Factor" is occasioned in a few biochemical texts (laboratory manuals). According to one author, "A normality factor is a number which expresses the strength of a solution in terms of its normality. Thus if a solution is 0.2N, it is 0.2 as strong as a normal solution."

In effect, this statement says that there is no difference between the original term, normality, and normality factor (NF). Then why introduce it? The universal terminology and concept of normality is accepted and used in practically every analytical text published.

It is difficult to see either the logic or convenience in the interpolation of such a term. An example of the calculation of NF is as follows: 25 cc. base : 50 cc. acid : x NF acid : 0.010 N (NF) base

$$x = \frac{25 \times 0.010}{50} = 0.005 \text{ NF acid}$$

In the usual interpretation this is simply the normality of the acid.

In using the NF the following typical formula is employed:

$$\frac{\text{cc. acid} \times \text{NF acid} \times \text{mg. eq. of } x \text{ substance} \times 100}{\text{wt. of sample}} = \text{per cent } x \text{ substance}$$

The use of NF here is similar to using normality—which it would have to be, since it is *the same value.*

The point of this discussion is to bring out the inadvisability of introducing terms into the literature which tend to add confusion where simplicity is not, unfortunately, one of its virtues. If the concept is one of simplifying nature, it should be incorporated into biochemical texts. Can the added advantage (?) of NF over N in quantitative analysis be included in this category?

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Rockets vs. Meteoroids

Rockets used for exploration of the atmosphere and possibly of interplanetary space must run the risks of destruction through collision with meteor-forming particles. As it is now possible to send rockets into the upper atmosphere, where collisions may occur, it is of some importance to survey the chances of such collisions.

A meteor, or more popularly a "shooting star," occurs when a small solid particle, or meteoroid, weighing a few milligrams dashes into the atmosphere with a velocity between 20 and 70 km./sec. When at these velocities an atmospheric atom or molecule collides with the meteoroid, a few atoms of the particle are chipped off and fly out with considerable kinetic energy which, through successive collisions with other atoms, is transformed into radiation. When collisions between the particle and atmospheric atoms become sufficiently frequent, the cylindrical cloud of hot gas formed around the path of the particle is observed as the "meteor." The great majority of meteors are first visible at heights between 100 and 115 km. How deeply they penetrate the atmosphere before being consumed varies with the mass of the particle; few, however, remain visible below 65 km.

At heights below 65 km. the chances of collision between a meteoroid and a rocket are very small, for few meteoroids are present. Above 85 km., however, a rocket is exposed to possible collision with the steady hail of particles. If a particle is checked abruptly, it will vaporize, explode, blow a hole in the rocket, and very likely destroy it.

The earth's daily catch of particles producing meteors bright enough to be seen by the unaided eye is usually estimated as around 24,000,000. Counts of telescopic meteors too faint to be observed with the unaided eye indicate that the total number of meteoroids impinging daily upon the atmosphere is much greater. The results of the Arizona Meteor Expedition (*Harvard Observ. Ann.*, 1937, **105**, No. 32) and my own observations (*Proc. Amer. phil. Soc.*, 1939, **81**, 493) indicate that down to the ninth magnitude the daily total is about a billion: 10^9. Even this figure, which does not include very faint meteors, is certainly too small, but it can be used for some enlightening calculations.

The total area of the earth's atmosphere is about 5×10^8 sq. km. If 10^9 meteors enter it each day, the frequency per square kilometer is about two particles daily. Let us assume that the cross section of a typical rocket is 5 sq. m. Then, on the average, one meteor will pass through a "rocket-sized area" once in 10^5 days; or such a patch of atmosphere will be pierced by a meteor sometime during one day in each 300 years.

It is probable that the total number of meteoroids entering the atmosphere daily is at least a thousand times greater than 10^9. Even so, at a daily rate of 10^{12} particles, a rocket-sized area will be pierced by a meteoroid only once each 100 days. Inasmuch as a rocket used for high-altitude soundings will be exposed to collision at the top of the atmosphere for only a short time, there is very little chance that such a rocket will be struck.

Rockets fired toward the moon will be traveling for some time. Let us assume that the fuel capacity of a rocket limits its extra-atmospheric velocity to 1 km./sec. As the average distance to the moon is 384,000 km., a rocket traveling the shortest path would require nearly four and one-half days for the trip. It seems, therefore, that some appreciable fraction of rockets shot toward the moon (4 per cent for the conditions assumed here) would be destroyed.

Interplanetary travel constitutes the most hazardous journey for the rocket enthusiast. Of all the planets, Venus comes the closest to the earth, reaching a minimum distance of 42,000,000 km. If an interplanetary rocket traveled a mere kilometer per second in space, it would require nearly 500 days to reach Venus. While existing information on the space density of meteoroids is uncertain within rather wide limits, it seems probable that a sizable proportion of space ships would not survive exposures of several hundred days to the hazards of collision with meteoroids. By the time space ships are built and the other details of interplanetary travel are settled we may have means of fending off or of dodging the oncoming particles. Certainly by then more precise information should be available on the total number of particles striking the atmosphere daily.

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Rediscovery in the Vitamin C Field

Apropos of the series of articles dealing with rediscovery in the vitamin A field (*Science*, 1946, **103**, 175, 281, 404), it is with bowed head that we report the existence of a similar situation in the vitamin C field. At the February 1945 meeting of the Société Belge de Biologie, in Brussels, G. Barac and one of the undersigned (Roseman) reported what we believed to be a new color reaction between vitamin C and titanium salt, similar to that obtained (and well known) with hydrogen peroxide and titanium salt. Work dealing with this and related observations (*C. R. Soc. Biol. Paris*, in press) was done in the laboratory of L. Brull at the Bavière Hospital of the University of Liége, during the period December 1944 to February 1945. Liége was being rocked and destroyed by flying bombs, and there were the menacing days of the enemy's Ardennes break-through. We regret that, despite our general knowledge of the chemical literature on titanium and vitamin C and our actual search of the literature available to us at the time, we