mental stations for the establishing of which the sum of $75,000 was appropriated by the last Congress. The two other stations have been located at Minneapolis, Minn., for the study of iron and manganese problems, and at Columbus, Ohio, for research connected with the ceramic and clayworking industries. The selection of Bartlesville was due to its location in the heart of the great mid-continent oil and gas field. The selection was influenced also by the offer of a free site and by the raising of $50,000 by the citizens of the town. This sum of money will be applied to the building of offices and laboratories and the purchase of engineering and chemical equipment. The technical staff of the new experimental station will study various problems having practical commercial application to the petroleum and natural gas industries, including questions of production, transportation, storage and refining of petroleum and various problems connected with the technology of natural gas. One of the greatest needs of the petroleum industry has been the coordination of scientific research with the practical side of the industry, for compared with other mineral industries it has been singularly backward in this respect. The station is aimed to act an intermediary between the facts evolved by scientific investigations and the needs of the oil industries. That is, men will be employed who will be able to gather scientific data and find out how they may be applied to the practical needs of the industry.

JACOB T. BOWNE, librarian of the Young Men's Christian Association College, has given his anthropological collection to the Springfield Museum of Natural History. The collection consists of some thousands of objects with complete catalogue giving the history of each object and the conditions under which it was found, with many bibliographical references to further sources of information. Mr. Bowne has spent fifty years in the study of primitive man, laying special emphasis upon the North American Indian, and the greater part of the collection is made up of relics of the Indians of the Connecticut Valley within twenty miles of Springfield. The specimens of Indian handiwork in stone, bone, shell and pottery were gathered from sites of ancient camps and burial places in this immediate vicinity. In addition to the objects. Mr. Bowne's gift includes several hundred books on anthropology, some of them very rare, together with archeological cabinets, manuscripts, maps and diagrams. The collection will remain in Mr. Bowne's keeping for the present. In accepting the collection for the museum, the directors passed the following resolution:

Resolved, That the directors extend to Mr. Jacob T. Bowne the hearty and appreciative thanks of the City Library Association for the gift of his extensive and finely organized anthropological collection, which is the result of many years of assiduous and discriminating study. The collection, relating especially to the North American Indian type and more particularly to the Indian of the Connecticut valley within 20 miles of Springfield, including the remains of aboriginal handiwork in stone, bone, shell and pottery, gathered from the sites of ancient camps and burial places in this immediate vicinity, forms a most desirable accession for the museum of natural history. The citizens of Springfield are deeply indebted to Mr. Bowne for his generosity in making this public gift.

UNIVERSITY AND EDUCATIONAL NEWS

THE Carnegie Corporation has presented McGill University with $1,000,000 in recognition of the institution's "devoted service and sacrifice towards Canada's part in the war."

IN the State University of Iowa this year, not a single undergraduate in the College of Liberal Arts qualified for the Sigma Xi. Although students are taking their studies more seriously than in former years the records show that the ablest students have been drawn into war service.

DR. RUSSELL A. HIBBS, of the University of Louisville, has been appointed professor of orthopedic surgery in the college of physicians and surgeons of Columbia University. Dr. Eugene W. Caldwell, of Bellevue Hospital Medical College, has been appointed to the newly established chair of roentgenology. Dr. Vera Danschakoff, formerly of Moscow, has been promoted to be assistant professor of

anatomy and Dr. I. H. Goldberger, has been appointed special lecturer of child hygiene in the school for oral hygiene.

MR. ARTHUR C. WALTON, M.A. (Northwestern '15), M.A. (Harvard '16) has been made acting professor of biology in the chair made vacant by the death of Professor Umbach. Mr. Walton holds a Harvard traveling fellowship and had planned work in Sweden but was prevented by the war.

FRED G. ALLEN, of Erie, Pa., a graduate of the University of Toronto, has been appointed assistant professor in electrical engineering at Lafayette College to take the place left vacant by the resignation of E. D. Tanzer, who has become assistant professor of electrical engineering at the Georgia Institute of Technology.

EARLY in January Miss Margaret Heatley, instructor in botany at Wellesley College, sailed for South Africa to take charge of the botanical department in Huguenot College of Cape Colony during the absence on sabbatical grant of Dr. Bertha Stoneman. Miss Alice M. Ottley, who was absent on leave, has returned to Wellesley College to fill the vacancy in the botany department caused by Miss Heatley's absence.

DISCUSSION AND CORRESPONDENCE

NOTE ON THE GEOMETRICAL MEAN AS A B. COLI INDEX

IT is always a beneficial means of grace for a scientist to wander into paths outside his own domain; such excursions often reveal too the lack of coordination between the various sciences, although happily there has been great progress within the past two decades in this respect. These remarks are evoked by a reading of the note by William Firth Wells: "The Geometrical Mean as a *B. Coli* Index" in SCIENCE for January 11.

The first impression gained is the lack of a clear presentation of the method. The notion of a geometric mean is purely mathematical, but it must be said that to a mathematician, even to one fairly conversant with the theory and methods of bacteriological analysis, the theory on which this method rests is not at all in evidence, save only perhaps in the remark that "the ordinary bacteriological dilution scale is in reality a logarithmic scale." It does not, however, follow necessarily that the most probable number of *B. coli* is the geometric mean as obtained by Mr. Wells. In support of this contention, see a thoroughly mathematical treatment of the whole question by M. H. McCrady,[1] of the laboratories of the board of health of the Province of Quebec; the formulas there derived show that the logarithmic function is more complicated than Mr. Wells perhaps has in mind. His experimental data may, on the other hand, show that his proposed method will serve well as a "first approximation."

The second impression coming from a study of the article is the feeling that this method merits a mathematical treatment. It seems to be essentially as follows: Five sets of twenty tubes each, containing portions of the sample in powers (not "multiples") of ten, are tested for the presence of gas, indicating the presence of *B. coli*. For the dilutions 10 c.c., 1 c.c., .1 c.c., .01 c.c., .001 c.c., graded with the scale numbers 0, 1, 2, 3, 4, respectively, the number of tubes showing presence of *B. coli* was 20 18, 8, 1, 0, respectively, the experiment having been extended from a dilution at which all tubes gave positive results to one in which no tube gave such a result. In going from the weakest dilution to the next higher there was a *gain* of one tube, next a gain of 7, then of 10, then of 2. The scale numbers, which appear to correspond to the logarithms of certain hypothetical most probable numbers of *B. coli* for the separate dilutions, are averaged with the foregoing gains used as weights, *i. e.*, 2, 10, 7, 1, 0; and the weighted mean thus found corresponds to the logarithm of the desired most probable average number of *B. coli*. In other words, the weighted geometric mean of the above-mentioned hypothetical numbers of *B. coli* is taken as the desired average.

An immediate consequence of the mathematics involved is that the same result is

[1] M. H. McCrady, "The Numerical Interpretation of Fermentation-Tube Results," *Journal of Infectious Diseases*, Vol. 17, No. 1, January, 1915, pp. 183–212.