Stanford University, spoke at the Iowa State College on September 28 on "Bacterial Photosynthesis."

THE Hepsa Ely Silliman Lectures will be given at Yale University, beginning on December 4, by Dr. Richard Goldschmidt, professor of zoology at the University of California. The subject of the lectures will be "The Material Basis of Evolution." There will be eight lectures as follows: December 4, "The Neo-Darwinian Conception and its Taxonomic and Genetic Background"; December 5, "Microevolution within the Species"; December 7, "Are Subspecies Incipient Species?"; December 8, "The Species"; December 11, "Macroevolution by Large Steps"; and December 12, 14 and 15, "Evolution and the Potentialities of Development, I."

THE Conference on Methods in Philosophy and the Sciences, in celebration of the eightieth birthday of Professor John Dewey, has arranged a symposium on his contributions to method in the philosophy of the arts and sciences, which will be followed by a discussion. This meeting will be held at the New School for Social Research, 66 West 12th Street, New York City, on October 22, at 1:30 P.M. The program is as follows: Professor Arthur E. Murphy, University of Illinois, "Dewey's Work in Philosophy and Logic"; Dr. Hu Shih, Chinese Ambassador to the United States, "Some Further Aspects of Dewey's Philosophy"; Dr. Albert Barnes, the Barnes Foundation, "Dewey's Esthetics," and Professor Walton Hamilton, Yale Law School, "Dewey and the Social Sciences."

THE 1939 convention of the Association of Land-Grant Colleges and Universities will meet on November 15, 16 and 17 at the Willard Hotel, Washington, D. C.

THE annual meeting of the Carolina Geological Society will be held at Spruce Pine, N. C., on October 21 and 22, under the presidency of Professor L. L. Smith, of the University of South Carolina. J. H. Watkins, the Citadel, Charleston, S. C., is vice-president, and Professor Willard Berry, of Duke University, is secretary-treasurer. The pegmatites and associate mineral deposits of that area will be visited under the direction of B. C. Burgess, of the Tennessee Mineral Products Corporation of Spruce Pine.

A SYMPOSIUM on Temperature, its Measurement and Control in Science and Industry will be held in New York City at the Pennsylvania Hotel, on November 2 to 4, by the American Institute of Physics, with the cooperation of the National Bureau of Standards, the National Research Council and officers and committees of many technical societies. The program is in charge of representative committees of authorities in various fields, who have arranged for a program of a hundred or more papers on scientific and technical subjects, which will be presented in concurrent sessions of selected groups. All those active in science or engineering are cordially invited to attend the sessions and to take part in the discussions of papers. A complete program containing full abstracts of the papers to be presented will be mailed in advance on request to the institute. It is suggested that those who expect to attend will inform the institute and make their hotel reservations early. There will be a registration fee of $1.00. The chairmen of the committees are Gustav Egloff, A. W. Ewell, C. O. Fairchild, J. D. Hardy, H. F. Mullikin, F. H. Norton, R. B. Sosman, C. B. Veal, H. T. Wensel and G. B. Wilkes. H. A. Barton, director of the institute, is chairman of the main committee.

ACCORDING to the *British Medical Journal* delegates from all parts of Scotland are being invited to attend a conference, dealing with nutrition and education, which is to be held at the rooms of the British Medical Association in Edinburgh on Saturday, October 14, under the auspices of the Scottish Committee against Malnutrition. There will be an afternoon and evening session. Sir John Boyd Orr, director of the Rowett Research Institute, Aberdeen, will be one of the speakers. It is expected that about forty organizations will be represented at the conference. The afternoon session will be devoted to a discussion of "Existing Nutritional Conditions as Compared with Minimum Health Requirements." The evening session will deal with "Malnutrition as it Affects Education."

THE Council of the American Chemical Society has announced that "Alpha Chi Sigma having presented to the society a definite pledge to sponsor the Award in Pure Chemistry in 1940, and having pledged $1,000 therefor with the expectation that they would shortly be able to assume the obligation for a period of three years, it was moved, seconded and carried that their offer be accepted with thanks and appreciation, and that the regulations heretofore used be continued with the additional proviso that there should be no restrictions as to the 'status of employment of the candidates under consideration.'"

DISCUSSION

ATMOSPHERIC CONTAMINATION

THE purpose of this discussion is to present physical methods for evaluating the concentrations of certain gases and vapors when admixed with atmospheric air. These methods are limited to compounds such as CO_2, CO, CH_4, etc., which have characteristic absorption bands in the infrared. In view of the fact that some time must elapse before portable apparatus suitable

for use in mines, tunnels, etc., shall have been developed, it seemed advisable to present a preliminary account of the work. Due acknowledgements will be made in a later, more detailed, publication.

The principles involved may, perhaps, be set forth more clearly by considering CO_2 as the contaminating gas. It is well known that CO_2 has narrow regions of strong absorption and emission near 2.7 and 4.4 μ in the infrared. According to the first procedure tried, radiations from a jet of hot CO_2 are passed through an absorbing chamber and are focused on a thermopile. Since the radiations from hot CO_2 are largely absorbed only by cold CO_2, it is evident that CO_2 in the absorbing chamber would reduce the intensity of the radiations falling on the thermopile—other gases and vapors in the chamber being ignored. The actual apparatus is sketched in Fig. 1, where J is a small

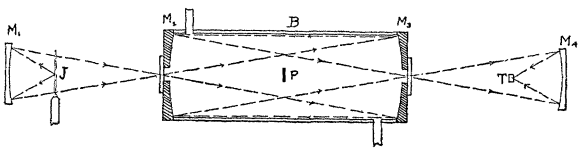

FIG. 1.

jet of hot CO_2 whose radiations, after leaving the concave mirror M_1, are focused on the absorbing chamber B. This consists of a brass tube (30 cm long and 6 cm in diameter) whose ends are closed by the concave mirrors M_2 and M_3—each supplied with a central hole 1 cm in diameter. As is evident, these mirrors make it possible to send the radiation through the tube three times. Direct transmission through the tube is prevented by the introduction of a small baffle at P. The system is made gas-tight by waxing windows of fluorite or rock-salt over the holes in the mirrors. The mirror M_4 focuses the emergent radiations on a thermopile T, which is connected to a sensitive galvanometer.

The results obtained are confined largely to CO_2. Using as source the radiations emitted by the hot CO_2 found in the non-luminous portion of a small gas-jet (burning in a water-cooled jacket) it was found that less than one part of CO_2 in a million of air could be detected. By employing a jet of hot CO_2 as the source, water-vapor in the absorbing chamber was completely ignored.

This procedure was soon found to suffer from a number of serious defects such as (1) lack of constancy of the source, (2) inability to heat all gases and vapors to a sufficiently high temperature without bringing about decomposition, (3) lack of exact agreement of the spectral regions of emission of the hot gas and of absorption of the cold gas.

Accordingly, a second procedure was evolved. Here, radiations from an incandescent nichrome spiral at J are passed through the absorbing chamber and are allowed to fall on a closed but (infrared) transparent receiver T filled with CO_2. As long as the absorbing chamber is free from CO_2, the gas in the receiver will be heated, due to the selective absorption of the radiations near 2.7 and 4.3 μ. If, however, some CO_2 be admitted to the absorbing chamber, this gas will absorb, prematurely, some of the radiations which, previously, had heated the receiver. As a result, the temperature of the latter will drop. The first of these selective receivers consists of a brass capsule whose ends are closed with plates of rock-salt. After filling with CO_2 through a suitable side tube, this is connected to an improvised stethoscope. By mounting a phonic wheel at M_2 and raising the rate of interruption to about 200 per sec. a fairly loud sound is heard by applying the stethoscope to the ears. Evidently the CO_2 in the receiver is periodically heated by the direct absorption of radiant energy. Eventually this sound is to be amplified so that, upon replacing the loudspeaker by a portable galvanometer, sound-intensity may be translated into galvanometer deflections.

A second and more immediately useful receiver was constructed on the idea that if a polished thermopile were introduced into an infrared-transparent receiver filled with CO_2 and if the thermopile junctions were shielded from direct radiation, then the adjacent CO_2 would be heated by radiation and would, by diffusion, heat the junctions of the thermopile.

This receiver showed high sensitivity as well as selectivity. Having filled the receiver with CO_2, ordinary illuminating gas, free of CO_2, was allowed to fill the absorbing chamber to atmospheric pressure. In spite of the fact that illuminating gas contains methane and carbon monoxide, both to the extent of 20 per cent. or more, no measurable absorption could be detected. When, on the other hand, the receiver was filled with CO_2-free illuminating gas, the effect was enormous.

Obviously, the highest degree of selectivity is achieved by using as source a jet of hot gas or vapor x whose radiations fall on a selective receiver filled with x; the presence of x between source and receiver will be recognized decisively.

A. H. PFUND

JOHNS HOPKINS UNIVERSITY

OXIDATION-REDUCTION POTENTIALS AND THE MODE OF ACTION OF SULFANILAMIDE

THE report by Shaffer[1] concerning a possible relationship between the potentials developed by certain

[1] SCIENCE, 89, 547–50, June 16, 1939, and Cold Spring Harbor Symposia on Quantitative Biology, 7, 1939, to be published.