A CONFERENCE on the possibilities of oil and gas power will be held as the second national meeting of the Oil and Gas Power Division of the American Society of Mechanical Engineers at Pennsylvania State College in conjunction with the third annual oil and power conference of the college from June 24 to 27. One of the features will be an exhibition of oil engines, parts and accessories. Over twenty companies participated in the exhibit last year, the first of its kind ever held in the United States, the total attendance being over 500. Practically every representative manufacturer of Diesel-engines is expected to attend the conference. Another feature will be a discussion of uniform fuel-oil specification standards.

A SPECIAL program is being arranged for geological members of the British Association for the Advancement of Science in connection with the South African meeting next summer that they may cooperate with the International Geological Congress, which will be meeting in Pretoria concurrently with the association in Johannesburg. The agricultural members will be afforded opportunity for meetings with their colleagues in the Pan-African Agricultural and Veterinary Congress, which is to be sitting in Pretoria at the same time. After the meetings the majority of the visiting members, expected to number about 400, are to divide into three main parties. Each of these visits the Victoria Falls, and two subsequently make extended journeys through the Union territory, visiting the eastern Transvaal and Lourenço Marques, Portuguese East Africa, and ending their journeys at Durban and Cape Town, respectively. The third main party is to proceed from the Victoria Falls to Beira, visiting *en route* the ruins at Great Zimbabwe, where it is hoped that Miss Caton-Thompson will have brought to a successful issue the investigation of the ancient remains which she is about to undertake at the instance of the association.

CABLE advices from the *Carnegie* after her arrival at Callao on January 14 state that on January 8 a new submarine ridge, which has been named Merriam Ridge, was discovered. At the point of crossing, Merriam Ridge is ten miles wide and rises 3,000 meters above the 4,000-meter depth on either side. The top of the ridge, in latitude 24° 57′ S. and longitude 82° 15′ W., is at 1,168 meters, this value being checked by three sounding methods, namely, sonic, wire and thermometer, to within 20 meters. When 60 miles west of Callao, the surface temperature, which had been at 21.5° C., dropped to 19° C. and remained at that value until arrival at Callao. Captain Ault's report shows that the activities in the various observational programs are being successfully continued, the work between Easter Island and Callao (December 12, 1928, to January 14, 1929) including 38 declination stations, 15 horizontal-intensity and inclination stations, 17 oceanographic stations, 72 sonic depth stations, 12 pilot balloon flights, 25 complete photographic 24-hour potential-gradient records, 4 24-hour series of other atmospheric-electric observations, 20 biological stations, 6 evaporation series. The vessel is expected to leave Callao about February 3 *en route* to Papeete, Tahiti, Society Islands, where she is due to arrive early in March.

THE Premier of Ontario, Mr. Ferguson, at a luncheon attended by one hundred members of the Ontario Research Foundation, announced that he would ask the Provincial Legislature to vote a dollar for each dollar subscribed privately toward the foundation funds. Private subscriptions already amount to $1,600,000 (£320,000). The Dominion government also has been considering the recommendations of Mr. J. H. Grisdale, deputy minister of agriculture, who represented Canada on the Empire Research Agricultural Committee, that it should participate in an empire-wide scheme of agricultural research, involving the establishment of eight new bureaus. It is understood that the government is ready to seek the necessary financial authority from Parliament for the Dominion's contribution.

## UNIVERSITY AND EDUCATIONAL NOTES

A NEW Science Building at University and Exposition Park, Los Angeles, housing the departments of physics, botany and zoology on its first three floors, respectively, has been completed at the University of Southern California, at a cost of approximately $350,000. Ample space on the fourth floor of the building has been given over to experimental marine biology and survey work, with installation of running sea-water aquaria, research laboratories and other appropriate facilities promoting course and graduate work. Invertebrate zoology and marine survey courses for credit are included in the summer school offerings, and space and facilities for research may be had by a limited number of independent investigators who have definite problems in hand. Inquiries should be addressed to Professor Francis Marsh Baldwin, director of experimental biology, in care of the university.

MRS. HELEN M. A. BALDWIN, widow of Mr. C. Kemble Baldwin, who was vice-president of the Robins Conveying Belt Company, has presented to Lehigh University the sum of $10,000, to be supplemented on her death by an additional $15,000, for the

establishment of the C. Kemble Baldwin Foundation for Research and Instruction in Aeronautics. Under the terms of the gift the income of the fund may be employed for research in any field of technology having a bearing on aeronautics.

THE N. V. Potash Export My., New York and Amsterdam, Holland, have established a five-year fellowship at the Massachusetts Agricultural College Experiment Station for investigations on the relation of fertilizers to asparagus culture. The work will be under the direction of Professor V. A. Tiedjens at the Market Garden Field Station at Waltham, and will be conducted on four definite soil types.

MRS. GEORGE E. WARREN, of Boston, who was recently elected a trustee of Rollins College, and her sister, Mrs. Homer Gage, of Worcester, have made a gift of $100,000 to the college for construction of a college building.

WILLIAM D. ENNIS, director of research of the Technical Advisory Corporation of New York, has been appointed to fill the newly established chair of economics and engineering at Stevens Institute. The chair is a memorial to the late president, Dr. Alexander D. Humphreys. Gifts amounting to $50,000 toward its endowment have been recently announced.

DR. A. N. BANTA, of the Carnegie Institution of Washington, at Cold Spring Harbor, Long Island, is acting professor of experimental biology for the present semester at Brown University, in place of Professor J. Walter Wilson, who is on leave of absence in New Mexico.

## DISCUSSION

### THE SPECTRUM OF THE AURORA BOREALIS

ACCORDING to the hypothesis proposed by Cario and the writer, the $\alpha$ bands of the nitrogen molecule that arise in the nitrogen afterglow can be accounted for by ascribing their excitation to collisions between metastable molecules of nitrogen and metastable atoms in the $^2D$ and $^2P$ levels. By using similar considerations it has been possible to account for some of the radiation of the aurora for which no satisfactory explanation has as yet been given. Although the spectra that can be explained in this manner are among the weakest in the aurora, they are of interest because of the remarkable similarity between the processes by which they are excited and those by which the $\alpha$ bands in the nitrogen afterglow are excited. In this short note only two of these unexplained lines will be considered, although some of the remaining lines readily fit a similar explanation. Their discussion will, however, be postponed until a full account of this work is published.

The formation of metastable molecules of nitrogen in the aurora can be readily accounted for. The second positive bands of nitrogen, corresponding to the transitions C–B, are quite strong in the aurora. The first two or three B levels are the final levels of the molecule corresponding to the strongest of these bands. The first positive bands that are radiated with these B levels as the initial states, will have as their final levels the first two or three A levels. These first positive bands lie so far in the red that their observations in the aurora would be a very difficult task. In the above manner we have accounted for the presence in the aurora of nitrogen molecules in the $A_1$ and $A_0$ levels, these levels being metastable.

Now the energy of the nitrogen atom in the $^2D$ and $^2P$ levels differs from the energy in the $^4S$ ground state by 2.37 and 3.56 volts respectively. Granting the presence in the aurora of metastable nitrogen atoms in the $^2P$ level, it is seen that most of these should radiate in a transition from the $^2P$ to the $^2D$ level, and only a few of these $^2P$ atoms should give up their energies by collision. Radiation corresponding to these transitions will fall at about 1.04 $\mu$ so that its observation, either in the aurora or in active nitrogen, is practically impossible with our present methods. Similar arguments can be applied to atomic oxygen. Here, however, the line corresponding to the transition $^1S_0$–$^1D_2$ is now known to be the aurora green line. We can conclude from the behavior of atomic oxygen in the aurora that the transition between the $^2P$ and $^2D$ levels in nitrogen should be much more probable than the transitions between the $^2P$ and $^4S$ or the $^2D$ and $^4S$ levels. In discussing the results of collisions between nitrogen molecules it is necessary therefore to consider only the $^2D$ metastable atoms. A similar argument will of course apply to collisions between atomic oxygen and metastable nitrogen molecules.

The difference $B_6$–$A_0$ in the nitrogen molecule corresponds to an energy of 2.38 volts. One should therefore expect transitions in the aurora having $B_6$ as their initial level. Two weak lines having wavelengths of 5176 A and 5149 A have been observed in the aurora by early investigators. The transition $B_6$–$A_0$ gives rise to a band of which the first head lies at 5178 A. The transition $B_7$–$A_1$ yields a band having its first head at 5152. It is therefore proposed that these bands are excited in the aurora by collisions of the second kind between $^2D$ nitrogen atoms and metastable nitrogen molecules in the $A_0$ and $A_1$ levels. This explanation is in complete