ezuela, India, Australia and Shan-si in China were mentioned.

The necessary connection between the coal fields and any great development of the iron and steel industry was emphasized and the future of the three great producers of to-day forecast as involved in the permanency of the coals. The reserves of coal are greater in Germany and America than in Great Britain. The province of Shan-si, China, having rich stores of both coal and iron, seems to be the one possible new location of the future great iron industry.

After a lengthy discussion, the meeting adjourned.

A. W. GRABAU,
Secretary.

COLUMBIA UNIVERSITY,
NEW YORK CITY.

THE SCIENCE CLUB OF THE UNIVERSITY OF WISCONSIN.

THE third regular meeting of the club for the year 1904–5 was held on December 13 at 7:30 P.M. in the physical lecture room of science hall. The lecture of the evening was delivered by Professor B. W. Snow, head of the department of physics of the university, on the subject, 'Electrons, Radio-activity, and the Electrical Theory of Matter.'

F. W. WOLL,
Secretary.

DISCUSSION AND CORRESPONDENCE.

A BIOLOGICAL STATION IN GREENLAND.

TO THE EDITOR OF SCIENCE: The establishment during recent years of biological stations in various parts of the world has proved to be of the greatest importance in furthering the progress of science. The great station of Naples has now a worthy competitor at Wood's Hole, and the botanical laboratory at Buitenzorg is aptly represented in this country by the Carnegie Desert Laboratory. The already large number of lesser institutions of similar nature is rapidly increasing, both in this country and abroad, and all add to the opportunities available for the working biologist.

Up to the present time the foundation of such stations has been confined, however, to regions with temperate or tropical climate, and no attempt has been made to establish a permanent station for biological research within the Arctic, until recently. A Danish botanist, Morten P. Porsild, has proposed to his government the appropriation of funds for such a station, to be located on the southern coast of Disko Island in North Greenland, not far from the colony Godhavn (lat. 69° 15′ N.). The proposal is well worth the attention and support of American scientists, and I shall here briefly review Mr. Porsild's plan, according to information supplied by himself.

Danish naturalists have, during the last twenty-five years, systematically explored Greenland; more than fifty scientific expeditions have been sent to that country, and the results are comprised in a series of about thirty volumes ('Meddelelser om Grönland'). It is with pardonable pride Mr. Porsild points to the fact that this has been accomplished at a cost not greater than the expense for one of Peary's expeditions.

The estimated cost for the establishment of the proposed station reaches the very moderate amount of $9,400, which would cover the erection of building, purchase of a motor launch, boats, sledges, tents and other material for shorter expeditions, instruments, books, etc. The running expenses, including salary for a resident investigator and native assistants, are estimated at $2,960. Mr. Porsild has asked the Danish government for this sum, and in the interest of science it is sincerely to be hoped that his request will be granted. If that is done, Mr. Porsild expects to have the station in working order before next summer, and its doors will then be thrown open for investigators from any country. The geographical position of Greenland, and the similarity of conditions there with those of the northernmost part of this continent must necessarily appeal to Americans, and until the time arrives when a permanent biological station can be established in a suitable locality in Alaska, those engaged in arctic work will find the now proposed institution a place of interest. For reasons which will be given Greenland will always be the classical ground for certain lines of research, and, as Mr. Porsild says, there is no other place in the Arctic

that offers such favorable conditions as the region in which he proposes to establish his station. The southern coast of Disko has the richest flora and the most luxuriant vegetation in northern Greenland. It is the northernmost point where all the different plant formations of Greenland are represented. Cretaceous and Tertiary formations with rich deposits of fossils occur, and both gneiss and basalt rock formations are here represented. The inland ice and the high mountains are easily accessible, glaciers in all stages, fjords and rivers, and the open sea give an excellent opportunity for investigations. All the main features of arctic climate are found here. The sun does not rise over the horizon for over six weeks, and for a still longer period of the summer it does not go down. The colony Godhavn is the center of commercial life in northern Greenland, and it has regular communication with Copenhagen.

The station will be in charge of a resident investigator, and accommodation will be provided for two visitors, who will have the use of all facilities the laboratory can offer, free of charge. By the establishment of this station the total expense to a visiting scientist will be reduced to about one third of previous cost. It is estimated that a stay for a summer will cost $375, this sum covering the fare both ways between Copenhagen and Greenland. A prolonged sojourn will add proportionally a small sum only.

Among the researches which should be carried on partly by the resident investigator, partly by visiting biologists, Mr. Porsild draws attention to the following general problems: What environmental factors cause the peculiar aspect of arctic plants and plant communities? What internal and external qualities make it possible for arctic plants to exist under conditions too severe for any other plants? These two headings necessarily include a great number of special inquiries into structure, nutrition, growth, respiration, transpiration, variation and adaptation, flowering and propagation of plants, development, competition and succession of plant communities, problems for the solution of which the conditions in the arctic regions are especially favorable, but which require detailed experiments and observations, covering a long period of time. In the preface to his principal work, 'Plant Geography upon a Physiological Basis,' the late Professor A. F. W. Schimper (1898) suggests the foundation of a botanical station such as now proposed by Mr. Porsild, when he says: "It is to be hoped that a counterpart to Buitenzorg may soon be established in the arctic zone; for an arctic laboratory, with a modest equipment corresponding to the poverty of the flora and the relative simplicity of the problems to be solved would be of great service." Only a few problems of plant physiological interest may here be mentioned as subjects for investigation at a botanical laboratory in the Arctic. It has recently been shown that a great number of arctic plants are supplied with mycorrhiza. The question has arisen to what extent ready prepared food material is absorbed by means of this symbiotic relation under the prevailing light conditions in the arctic region. The process of photosynthesis in green plants must necessarily be retarded by the insufficient light. It is generally supposed that the long arctic day is a compensation to the plants for the short period of growth. This has not yet been proved, however, by real evidence. We do not know, as yet, how small amount of light is necessary to bring about absorption of carbon-dioxide in the green plants of the Arctic. We have no data, except occasional observations by travelers, as to the peculiar results on vegetation of the Arctic temperatures. Such facts as willows flowering and budding as soon as they reach over the surface of the snow, while their lower parts are still frozen, are, as yet, unexplained. Similarly the phenomenon of plants growing and flowering on steep mountain sides, where they are exposed to a temperature of 30° C. in daytime and several degrees under zero at night, and to extremely low temperatures in winter without any snow-covering. The adaptations in arctic plants for conservation of the water supply or minimizing the transpiration are still imperfectly known. The ecology of roots of arctic plants is hardly studied at all. The succession of plant communities on new soil, left bare by

the ice, is a problem which can not be studied to advantage anywhere better than in Greenland, where similar conditions now prevail as once obtained in the glaciated area of both the northern and the southern hemisphere. These are only a few of the most important botanical questions which have to be solved at an arctic station.

The resident investigator should make detailed meteorological observations. Near the proposed site for the laboratory are mountains 2,000 to 3,000 feet high, and easily accessible. Mr. Porsild proposes to place self-registering instruments in a hut on the top of the mountain, so that simultaneous readings could be had from near sea level and from the high mountain—a matter of great consequence. In this connection also phenological observations would be taken.

Among the problems of geological interest, for the study of which Greenland offers special advantages, may be mentioned the study of glaciation, and of the extremely rapid erosion, that takes place in the northern part of the country. Certain parts of the coast are known to be sinking, in the basaltic regions of north Greenland earthquakes are not infrequent, and a trained observer, living in the country the whole year round and supplied with necessary instruments, could do good service by obtaining data on these phenomena. Large collections of plant fossils have already been brought home from these regions, but still much remains to be done in paleontological research.

Of zoological subjects especially plankton studies could be undertaken, and a series of observations of the periodicity of plankton, together with data on salinity and temperature of the sea water would be of considerable interest for an understanding of the animal life in the high arctic seas.

Mr. Porsild, who is now connected with the botanical department of the University of Copenhagen, has already done good work in the study of arctic plant life, and if he undertakes the work of the resident investigator, it can be taken for granted that results of permanent value to biological science will follow the founding of the new institution. The plan of establishing an arctic biological station in north Greenland, as proposed by Mr. Porsild, has received the endorsement of all the scientific institutions in Denmark, and the hearty approval of scientists in northern Europe. It now remains to be seen whether the Danish government is aware of the importance of this proposal and willing to take the necessary steps for its realization.

PEHR OLSSON-SEFFER.

STANFORD UNIVERSITY, CAL.,
December 5, 1904.

SPECIAL ARTICLES.

THE DEXTER, KANSAS, NITROGEN GAS WELL.*

DURING the first half of 1903 parties drilling for oil or gas at Dexter, Kansas, came into a gas sand at a depth of about 400 feet which yielded a large amount of gas. It was soon closed in and an attempt was made to burn it, as natural gas is usually burned, for generating steam for drilling purposes. Much to the surprise of parties interested, it would not burn. Later it was found that when a fire was already kindled in a fire box or an engine and the gas turned on, as is usually done with natural gas, it would begin to burn, and would develop sufficient heat to generate steam moderately well. But as soon as the coal or other fuel in the fire box was consumed the gas would no longer burn. A cylinder of the gas was shipped to the University of Kansas later during the summer and was partially examined by different members of the chemical and geological departments.

This peculiar gas obtained from the ground in a manner similar to the way natural gas is ordinarily obtained, and in a region where gas might reasonably be expected, at once became an object of great interest. The owners of the well, who had spent their money in developing it, did not wish it given great publicity. But newspaper men wrote it up and oil and gas men generally spoke of it as a well of 'hot air.' Accordingly, the state geologist deemed it of sufficient interest to warrant a careful investigation. On his advice the well

* Presented in abstract at the meeting of the Geological Society of America at Philadelphia, December 30, 1904.