operate mainly on old culm banks, and an increase of 16 per cent. in the quantity of coal dredged from rivers.

The production in the Lehigh region was 10,929,055 gross tons; in the Schuylkill region, 23,659,448 tons; in the Wyoming region, 43,111,732 tons; and in Sullivan County (Bernice Basin), 494,848 tons.

There was a large decrease in the number of men employed in the production of anthracite in 1916, and the output was maintained only through an increase in the number of working days. The number of men employed in 1914 was 179,679; in 1915, 176,552; and in 1916, 159,869. The average number of days worked was 245 in 1914, 230 in 1915, and 253 in 1916. The average output per man per day in 1914 was 1.84 gross tons; in 1915, 1.96 tons, and in 1916, 1.93 tons. The average output per employee for the year was 451 tons in 1914; 450 tons in 1915; and 489 tons in 1916.

ANIMAL COLLECTIONS FROM AUSTRALIA

THE animal collections of the Zoological Park have been enriched by the arrival of another great "caravan" from Australia. After six months of diligent effort, and generous expenditures of money, Mr. Ellis S. Joseph brought together and successfully transported to New York the largest collection of rare species of mammals, birds and reptiles that ever came to America. The common species, such as for years have been coming to us through the regular European channels, are conspicuous by their well-nigh complete absence.

Naturally, the officers of the Zoological Society feel measurably elated over this coup, at a period of great depression in the wild-animal supply from other sources. The receipts from England are very trifling, and from the continent of Europe nothing whatever comes. In fact, in America the German wild-animal business is thoroughly dead. Our further operations in South Africa must be postponed until after the war.

Encouraged through his previous reception by the Zoological Society, Mr. Joseph redoubled his former efforts to bring to America something worth while. The collection which he landed in Victoria, B. C., a month ago represents a large outlay in money and effort, and great scientific value. Of that importation the Zoological Society has purchased mammals, birds and reptiles to a total cost of about $6,000. The Philadelphia Zoological Society has purchased $3,000 worth, and other purchases are proceeding.

The following list shows the newly acquired mammals:

1 thylacine,
3 hyraxes,
2 water mongooses,
1 echidna,
2 rabbit-eared bandicoots,
2 West Australian rat kangaroos,
1 tree kangaroo,
3 yellow-footed rock wallabies,
2 Woodward kangaroos and young,
1 wallaroo,
1 brush-tailed wallaby,
2 short-tailed wallabies,
1 Paddy Mellen wallaby,
2 rufus-necked wallabies,
2 Tasmanian black phalangers,
6 spotted phalangers,
3 dusky phalangers,
3 gray phalangers,
3 Papuan phalangers,
1 Australian phalanger,
4 marsupial mice,
3 Australian water rats.

The majority of our accessions will be found in the large bird house, the small deer house, the reptile house and the small mammal house, but the thylacine is in one of the small bear dens. Each new species is marked by a red label reading "Recent Accession." Incidentally it is to be noted that our total kangaroo collection is believed by Mr. Joseph to be the most extensive series ever brought together. It will be found in the small deer house.

W. T. HORNADAY,
Director

SCIENTIFIC NOTES AND NEWS

PROFESSOR MILO S. KETCHUM, dean of the College of Engineering of the University of Colorado, was elected president of the Society

for the Promotion of Engineering Education at the annual meeting of the society held recently at Washington.

Major Pearce Bailey, M.R.C., chairman of the committee on furnishing hospital units for nervous and mental disorders to the United States Government, has been asked by the Surgeon-General to serve as adviser in all matters pertaining to psychiatry and neurology.

The Electrical World states that Brigadier General George O. Squier, U. S. A., chief signal officer of the army, has been made a fellow of the Royal Society of England in recognition of his invention of a new system of ocean cabling which, it is believed, will be of the greatest service in the war.

Dr. Charles J. Bartlett, New Haven, director of the pathologic laboratory, Yale University, has been appointed director of the bureau of laboratories of the state department of health, succeeding the late Professor Herbert W. Conn. P. E. Bransfield, Ira D. Joel, Ira V. Hiscock and George E. Stookey, who were assistants to Professor Conn, have been appointed to similar positions by the new director. It has been decided to remove the laboratory from Middlebury to the Agricultural Experiment Station, New Haven.

Dr. Soca, professor at the University of Montevideo, former president of the republic of Uruguay, and Dr. Couto, professor of internal medicine at the Faculté de Rio-de-Janeiro, the former president of the Academy of Medicine of Brazil, have been elected members of the Paris Academy of Medicine.

The Russian Geographical Society at its annual meeting elected as honorary members Mr. Douglas Freshfield and Sir Aurel Stein, and as corresponding members Sir Ernest Shackleton and Mr. G. G. Chisholm.

One hundred Japanese physicians are said to be on the way to Roumania in charge of Dr. Motegi, chief of the Saiseikai Hospital and head of the surgical department of the Keio University.

Dr. Oliver Fassig has gone to San Juan on a special mission to extend and reorganize the Weather Bureau service in the West Indies. In the Virgin Islands a station is to be established, two stations are to be started in Haiti and one at Puerto Plata, Santo Domingo. The station in San Juan will probably be designated as the station in charge of the West Indies Service.

Professor E. W. Gudger, of the State Normal College, Greensboro, N. C., spent June and July at the American Museum of Natural History, in work on the "Bibliography of Fishes," of which Professor Bashford Dean and Dr. C. R. Eastman are editors.

Dr. Burton J. Lemon, formerly instructor in the department of chemistry of Cornell University, and during the last two years a chemist with the United States Rubber Company in New York, has received a commission as captain in the Quartermaster Officers' Reserve Corps.

Dr. H. B. North has recently resigned his professorship in chemistry in Rutgers College in order to become director of the research laboratories of the York Metal Alloy Co., of York, Pa.

Charles H. Tuck, professor of extension teaching in the New York State College of Agriculture, Cornell University since 1910, has resigned from the faculty. He has been absent on leave since January, 1916, when he went to Manchuria, and he is still there, engaged in agricultural investigations for an American syndicate. Maurice C. Burritt, extension professor and state director of farm bureaus in the college, has been elected to succeed Professor Tuck.

O. C. Charlton, until recently a teacher of biology, has been appointed city forester for Dallas, Texas.

Dr. Leon I. Shaw, of Northwestern University, has been advanced to the position of assistant professor of chemistry on leave of absence of one year for service with the United States government. He has received the appointment of first lieutenant of the Ordnance Officers' Reserve Corps.

According to the *Cornell Alumni Bulletin*, G. Harold Powell, general manager of the

California Fruit Growers' Exchange, has accepted an invitation from Herbert C. Hoover, to take charge of the distribution of all perishable goods in the United States. Mr. Powell is now in Washington. For many years he has made his specialty the study of the problems of food storage and transportation. From 1901 till 1911 he was in the bureau of plant industry of the U. S. Department of Agriculture.

DR. A. J. CARLSON, professor of physiology in the University of Chicago, recently delivered an address on "The recent advances in the physiology and pathology of the alimentary tract," before the faculty and students of the graduate summer quarter in medicine of the University of Illinois.

PROFESSOR ALBERT FREDERICK GANZ, of the Stevens Institute of Technology, known for his investigations on electricity, died by suicide on July 27, aged forty-five years.

DR. L. E. RUSSELL, formerly president of the American Medical Association, a physician and surgeon known nationally, died suddenly at his home in Springfield, Ohio, on August 2, aged sixty-six years.

WILLIAM WALLACE TOOKER, an authority on Indian nomenclature and archeology, died on August 1, after a long illness at his home in Sag Harbor, L. I., at the age of sixty-nine years.

DR. ROBERT BELL, F.R.S., formerly chief geologist of the Geological Survey of Canada, has died at the age of seventy-six years.

EDWARD STANFORD, F.R.G.S. (son of the founder of Edward Stanford, Limited, London, cartographers to the king) a well-known publisher and geographer of London, died on June 6. His life was one of continued activity in advancing the science of geography and map-making. He had charge of all the ordnance maps of the United Kingdom, and issued numerous atlases, monographs, and maps of all the countries of the world.

WE learn from *Nature* of the death of Professor K. R. Birkeland, of Christiania, which occurred in Tokyo on June 18. Professor Birkeland was largely interested in the extraction of nitrogen from the atmosphere and other industrial work, and is known to scientific men for his observation and theories on cosmical phenomena.

THE Fourth Annual Conference of the Society for Practical Astronomy will be held August 16, 17 and 18, at the University of Chicago. Professor F. R. Moulton, of the university, and Professor W. D. MacMillan will lecture at the sessions and there will be papers presented by other members of the society. The sessions are open to the public, and visitors from other cities, whether members of the society or not, are invited to attend.

SURGEON GENERAL GORGAS has issued a statement that medical students are not to be exempt from draft, but will be given conditional and limited furloughs to continue their medical studies. This furlough is intended to furnish an opportunity for the student to complete his studies and obtain his required year of hospital experience, so as to fit him for service in the medical department of the army. The Surgeon General, through the medical section of the Council of National Defense, is endeavoring to prevent the undue depletion of the civilian hospital staffs for service at the front.

A BILL has been introduced into the House of Representatives, providing that there shall be established one additional division each of mental hygiene and rural sanitation in the United States Public Health Service, and said divisions shall be in charge of commissioned medical officers of the United States Public Health Service, detailed by the Surgeon General, which officers, while thus serving, shall be assistant surgeons general within the meaning of section three of the act approved July 1, 1902, entitled "An act to increase the efficiency and change the name of the United States Marine Hospital Service." Sec. 2. That the duties of the division of mental hygiene shall be to study and investigate mental disorders and their causes, care and prevention. The duty of the division of rural sanitation shall be to investigate improved methods of rural sanitation, and the prevention and suppression of communicable diseases.

The *Journal* of the American Medical Association states that the Academy of Medicine of Toronto has adopted a resolution calling for one united medical service in Canada to take the place of the present arrangements of a Canadian Army Medical Corps and a Canadian Hospitals Commission. The academy urges that medical care of all soldiers be placed directly under a surgeon general, to be known as Surgeon General of Canada, who should be directly responsible to the minister of militia, who should have a seat in the militia council. He will perform the duties of director of medical services, invalids and be chief medical officer of the hospitals commission and of its executive. The academy recommended Surgeon-General John Taylor Fotheringham, C.M.G., Toronto, recently returned from overseas, for this position.

The emperor of Austria, according to the *Journal* of the American Medical Association, has organized a new state department, the chief of which is to be known as the minister of hygiene and social welfare.

The yacht *Anton Dohrn,* of the department of marine biology of the Carnegie Institution of Washington, has been offered to and accepted by the United States Navy for the period of the war.

The board of managers of the New York Botanical Garden announces plans to expend $500,000 in developing the garden. Three of the largest works projected are the construction of a museum laboratory wing which will cost $100,000, the building of a wing to the east museum to cost $100,000, and a central display greenhouse to cost $75,000. An orchid greenhouse will cost $24,000, and a like sum will be spent in building an economic plant greenhouse. Two tropic plant greenhouses, a garden school greenhouse, experimental and investigation greenhouses also are to be constructed. In a report of the garden's endowment committee it is announced that a contribution of $2,000 has been made by Mrs. Robert E. Westcott for the construction of the new rose garden stone stairway, and a gift of $4,000 has been made by Mrs. Frederick F. Thompson for the construction of the school garden shelter on the eastern bank of the Long Lake at the southern end of the new school garden.

The fourth meeting of the Conjoint Board of Scientific Societies of Great Britain was held on June 13 at the Royal Society, with Sir J. J. Thomson, F.R.S., in the chair. The report of the executive committee for the past half year showed that a number of questions of scientific and industrial importance have come before the board. Among these are the need for an anthropological survey of the British people, the maintenance of the international catalogue of scientific literature and the desirability or otherwise of adopting the metric system throughout the British Isles.

An opportunity for research work in sociology with some time for other graduate work if desired awaits a suitable applicant at the University of Chicago and for this $1,200 has been set aside for each of the two years it is expected the investigation will require. By this announcement it is hoped to secure some one already specializing in sociology. Inquiry for further details may be addressed to Professor Albion W. Small, University of Chicago, or to Dr. E. R. LeCount, Rush Medical College, Chicago.

The Bureau of Economic Geology of the University of Texas has just issued a report on the Thrall Oil Field by J. A. Udden, H. P. Bybee, E. P. Schoch and W. T. Read. This field was discovered three years ago, in Williamson County, and it proves to be unique for the United States, the greater part of the production coming from a metamorphic chlorite derived from an extremely basic igneous rock. This rock apparently represents a submarine eruption in the Cretaceous sea.

The *Medical Record* states that the Rockefeller Institute for Medical Research, through the research work of Dr. Carroll G. Bull and Miss Ida W. Pritchett, will undertake to supply the allied armies with a serum which is believed to be an effective antitoxin for the gas bacillus producing gangrene. Cultures of the gangrene bacillus were obtained in Europe last year and these investigators have experi-

mented upon animals and produced the hoped-for results.

UNDER the direction of Dr. Roger Adams, of the division of organic chemistry of the University of Illinois, a group of graduate students is engaged in preparing chemicals that are being sold to as many as fifteen different university laboratories, to the Bureau of Chemistry at Washington, to large distributing houses, and commercial firms. One chemical, for which there has been a shortage ever since the work began, is now being supplied from this laboratory in sufficient quantities to meet all demands of the country.

THE annual meeting of the Incorporated Society for Extending the Rothamsted Experiments in Agricultural Science was held on November 6. According to the report in the London *Times* Lord Crawford, president of the British Board of Agriculture, moved a resolution declaring that the work of the society was a matter of national importance deserving wide public support. He said that much would be expected from agriculture after the war, and much more, therefore, would have to be drawn from the knowledge, experience and guidance of such societies as that of Rothamsted. It would be really deplorable if any single branch of its activity had to be dropped during the war. It was at Rothamsted that the first practical demonstration of the value of artificial manures was consummated. He was fully conscious of the urgent necessity for the comprehensive treatment of this great subject, but the time was not yet ripe for any public announcement. Meanwhile, he trusted that the work of Rothamsted would continue and, in spite of the war, extend in the sphere and scale of its operations. In any future scheme he was certain that Rothamsted would take a high and honorable place, and would contribute to the research which was essential to the future of British agriculture. Dr. E. J. Russell, the honorable secretary and director of the Rothamsted Station, stated that the ordinary work at Rothamsted had been curtailed, but it was not being allowed to drop. Women had been brought in, and when peace came the men would come back to find the experiments a stage more developed than when they left. They could see the possibility of using to the great advantage of agriculture some of the machinery which was now being used for non-agricultural purposes. They hoped for some well-considered scheme for agricultural development in which the research stations, colleges, agricultural institutes and similar organizations would play a definite part.

Nature remarks: "The science of economic aviculture has probably reached a higher standard in the United States than in any other part of the world. This work is carried on by the Department of Agriculture, which, for years past, has spared no pains to enact laws and formulate schemes for the conservation of bird-life, whether for purely economic ends or for esthetic reasons. As a consequence, it has now available a mass of evidence as to the status and value of every species within its realms. The latest evidence of its enlightened policy takes the form of a bulletin—No. 465—on the propagation of wild-duck foods. The haunts and food values of no fewer than nineteen groups of plants, comprising sixty species, are here described, together with instructions as to stocking water in need of bait for these valuable birds. The characteristics of wild rice, wild celery, pondweeds, arrowheads, chufa, wild millet and water-lilies are all carefully set forth, and this information is accompanied by carefully collected data as to their attractiveness in regard to particular species of wild ducks. Had we followed its lead years ago our own Board of Agriculture would now be able to speak with authority when called on to sift the value of the crudely formed opinions of local agricultural chambers as to the usefulness or otherwise of our native birds in relation to our food supply. The latter is of vital importance, and the clamor for legislation is sometimes insistent. This war has done much for us already; perhaps it may yet bring into being a bureau of ornithology, such as is to be found now in

many Continental states, as well as in America."

According to *Nature* the newly formed Russian Botanical Society held its annual, and also a special, meeting at Moscow on December 16–19, 1916, and its organization was then completed. The following officers were elected: *Honorary President,* A. S. Famincyn; *President,* I. P. Borodin; *Vice-presidents,* V. I. Palladin and S. G. Navašin; *Chief Secretary,* N. A. Buš; *Treasurer,* V. N. Suchačev; *Members of the Council* in Petrograd, V. L. Komarov, S. P. Kostyčev and V. A. Tranšel. In addition, the following were elected on the council as representing cities containing a minimum of five members of the society: M. I. Golenkin (Moscow), E. F. Votčal (Kiev), V. M. Arnoldi (Charkov), B. B. Grineveckij (Odessa), V. V. Saponžnikov (Tomsk), Ja. S. Medvědev (Tiflis) and V. M. Arcichovskij (Novočerkassk). The number of the acting members of the society now exceeds 280. Notwithstanding the present unfavorable conditions, more than eighty members attended the four days' meeting in Moscow, and, in addition to the discussion and settlement of various questions of organization, sixteen scientific reports were read. The next extraordinary meeting is fixed for December, 1919, again in Moscow. Thanks to a subsidy of 3,000 roubles received from the Ministry of Public Instruction, it was possible towards the end of the year 1916 to proceed with the publication of the *Journal* of the Russian Botanical Society, and the first issue was placed before, and approved by, the Moscow meeting. The second issue is in the press and finishes the year 1916. For this year a subsidy of 10,000 roubles is being applied for, and it is intended to publish eight numbers of four to five sheets each. Thus the scientific amalgamation of Russian botanists, for which they have long striven, may be considered as achieved, and the formation under the auspices of the Imperial Academy of Sciences of the first all-Russian learned society is an accomplished fact.

Nature states that under the title of "Science in Russia" a new reference-book will be published in the present year, composed of two parts: (*a*) an index of all scientific institutions, societies, and higher schools in Russia; (*b*) an index of all persons working in these institutions and of private scientific workers. It will thus include in the first part the particulars hitherto supplied (but very incompletely as to Russia) by the "Minerva Jahrbuch"; while the second part will be similar to "Who's who in science," but will give, at least for 1916, not so much information about each individual. The difficult task of collecting the necessary material is already well in hand. The undertaking has been brought, through the Russian newspapers, to the knowledge of all those interested, and special forms are being supplied to the institutions and societies, many of which have already been returned with the necessary particulars. The work has been taken in hand by the Academy of Sciences of Petrograd and the scientific periodical *Priroda* (Nature) of Moscow. "Science in Russia" for 1916 will be edited by Professor V. N. Beneševič, and published conjointly by the Academy and the Journal *Priroda* in the latter part of this year. It will be issued annually. This publication will supply a long-felt need, as up to the present the only work of reference containing any information about the scientific institutions of Russia as a whole has been "Minerva." "Science in Russia" will help towards an exact evaluation of Russian scientific forces and activity, and will constitute an important step towards the promotion of closer scientific relations with the Allied countries.

According to the *Journal* of the American Medical Association, plans have been taken up with the government for the establishment of an outpatient department at Camp Admiral by the officers of the Maryland Psychiatric Base Hospital Unit, of which Dr. A. P. Herring is chairman, and Dr. W. R. Dunton, secretary. The chief object of this department will be to examine soldiers for mental and nervous disorders and to arrange for their treatment, but specialists of various sorts of physical disease will also volunteer their services. The purpose is to have volunteers go to

the cantonment at stated intervals and with army surgeons conduct thorough mental tests and physical examinations. The new psychopathic building at the Spring Grove State Hospital, designed for acute cases of mental disease, has been offered to the government, and if it is accepted, patients from Camp Admiral will be treated there. The psychopathic building will also be useful in treating soldiers returned from the front, 18 to 20 per cent. of whom, it has been found in England, are suffering from mental breakdown, temporary or permanent.

UNIVERSITY AND EDUCATIONAL NEWS

AUSTIN C. DUNHAM, of Hartford, has offered as a gift to the Connecticut Agricultural College at Storrs, his Newington farm, which he has made into one of the best equipped farms in the state. Mr. Dunham has spent about $50,000 in improving the property and offers it to the college simply on the condition that it be used for school purposes. The farm consists of 130 acres and has at present forty head of cows and heifers and sixty-five pigs. Four silos have been built, housing 150 tons of silage, and eighty tons of hay have been gathered.

ACCORDING to a decision handed down by the Supreme Court of Connecticut, Yale University must pay to the state inheritance taxes amounting to about $34,000. The university inherited about $750,000 from the estate of Justus B. Hotchkiss. The Probate Court decided that it was not liable to taxation on the ground that Yale, being exempted by law from paying taxes on property in this city, was thereby constituted a public institution receiving state aid.

TWO members of the faculty of Cornell University who retired this year have been elected to emeritus professorships. They are George S. Moler, emeritus professor of physics, and R. C. Carpenter, emeritus professor of experimental engineering.

DR. VICTOR C. ALDERSON, consulting engineer of Boston, has been tendered the presidency of the Colorado School of Mines at Golden, Colo. Dr. Alderson served as president of the school for four years, retiring three years ago. He has not yet indicated whether he will accept.

PROMOTIONS in the faculty of the New York State College of Agriculture have been made as follows: Assistant professors promoted to the grade of professors: J. R. Schramm, botany; R. H. Wheeler, extension teaching; H. O. Buckman, soil technology.

PROFESSOR V. ASCOLI, of the chair of medical pathology of the University of Pavia, has been appointed professor of clinical medicine at Rome to succeed Bacelli.

DISCUSSION AND CORRESPONDENCE

CLIMATIC INDEX OF BONNEVILLE LAKE BEDS

BECAUSE of the fact that they have been thought to furnish undoubtable stratigraphic testimony in support of the conception of the duality of the Glacial Epoch the lacustral deposits of the Great Salt Lake basin of Utah hold at this time an especial interest. Where best exposed these beds occupy a vertical space of about 100 feet; but their total thickness is without question considerably greater than this figure. The main body of the formation comprises fine laminated calcareous materials, of uniform texture and yellow color. An upper section, of irregular thickness, from 2 to 20 feet, is notably limy, white and more or less indurated in certain layers. The white marly upper capping is sharply separated from the yellow lower beds by an irregular line of juncture which has every appearance of being a marked plane of unconformity.

The common historical interpretation of the general section is briefly this: The lower yellow beds are regarded as representing river silts deposited in the lake over a very long period of time when the early Bonneville water-level was nearly as high as the later Bonneville shore-line. The white marly beds are depositions of a shorter high-water stage of the lake. The irregular line between the white and yellow sections are viewed in the