Balmer series furnishes a means of discriminating between the various possible modes of excitation of the lines. From Hγ to Hη the observations agree best with the Pauli-Schrödinger formula, in which the excitation is assumed to be by direct absorption of radiation in the Lyman series; whereas from Hθ to Hφ, which is the limit of practicable measurements, the intensities follow closely the Menzel-Baker formula, in which the Balmer emission is assumed to be due to recombination of protons with electrons freed by photo-electric ionization of hydrogen atoms by radiation beyond the Lyman series limit.

The partial accomplishment of a very different part of the programme is described by P. A. McNally in the fifth paper of the series. The proposal here was to make accurate determinations of the times of contact by taking 260 photographs of the crescent during the partial phases. Clouds interfered with the completion of this programme, only about one half of the exposures being recorded, and only very few of these were secured within a minute of the times of contact. Nevertheless, the number of pictures taken was much greater than in any previous eclipse, and the paper shows how the observations can be satisfactorily reduced, and gives in tabular form the derived systems of corrections to ephemeris mean anomalies of the sun and moon.

The programme proposed by E. O. Hulburt was to deduce, by means of measurements of the sky brightness during the eclipse, the temperature of the upper air immediately following its illumination by full sunlight. Illuminometer measurements of the zenith sky on days previous to the eclipse had shown that the temperature during morning and evening twilight was $218° \pm 15°$ K. for all altitudes between 20 km. and 60 km. Analysis of a few observations made during the first half of totality in an isolated patch of clear sky shows that, as was expected, the brightness at this early stage was due mainly to light scattered more than once by atmospheric particles in the umbra below 20 km. After mid-totality the clouds closed again, and made illuminometer measurements useless, since there is obviously no point in determining the brightness of the lower sides of clouds, which will doubtless be illuminated mainly by the horizon glow.

In the seventh and last paper of the monograph, T. R. Gilliland describes the radio observations, which were made for the purpose of studying the changes of ion density produced by the optical eclipse in the ionosphere. A self-contained trailer unit comprising a variable-frequency transmitter and receiver and a recording oscillograph was used at the eclipse site to record critical frequencies for the layers E, F_1 and F_2 at quarter-hour intervals on several control days before and after October 1, and at minute intervals during the eclipse. Unfortunately, a breakdown in one of the tuning condensers interrupted all recording shortly after third contact, and it was not resumed until after the eclipse ended. However, much of interest emerges from the ion densities deduced from the observed critical frequencies. In the layers E and F_1 the ionization decreased to 22 per cent of its normal value within a minute or so of second contact, whereas the F_2 ion density was still dropping at third contact and probably reached a minimum of about 50 per cent of normal about an hour after the eclipse maximum. A puzzling feature of the observations is that the recombination coefficient estimated for the E and F_1 layers depends somewhat on whether the depth of minimum or the time of minimum is considered; and a marked rise in the ion density two or three minutes before totality ended is also unexplained. The observations confirm the importance of the part played by solar disturbances in causing upper-air ionization: a distinct decrease in ion density occurred as the moon obscured a large sunspot.

Astronomers and physicists will sympathize with the members of the expedition in their bad luck with the weather, and will congratulate them on making such good use of the observational material they did manage to secure in spite of adverse circumstances.

A. HUNTER.

HENRY FAIRFIELD OSBORN AND THE AMERICAN MUSEUM OF NATURAL HISTORY

By PROF. W. K. GREGORY

ON April 8 the double event of unveiling a bust of the late Prof. Henry Fairfield Osborn and the opening of the new North American Mammal Hall took place at the American Museum of Natural History on the occasion of the annual members day. Mr. A. Perry Osborn, acting president of the Museum, presided at the meeting. In his opening address Mr. Osborn told the members of some of the effects of the War upon the Museum in the loss of men to the army and the reduced operating funds. He spoke also of the assistance the Museum had been able to give to the Government by supplying information on the geography, climate, native diseases, and so forth, of the countries to which the American armies are likely to be assigned. He then introduced to the members Dr. A. E. Parr, who succeeds Dr. Roy C. Andrews as director of the Museum.

Before the uncovering of the memorial bust, Prof. William K. Gregory made a commemorative address on "Osborn, the Scientist", of which the following is the substance:

The unveiling of the bust of Henry Fairfield Osborn and the opening of the new Hall of North American Mammals are appropriately brought together in one meeting. To Osborn's enthusiasm and unconquerable energy we owe this entire memorial building, dedicated to his friend and fellow-naturalist, Theodore Roosevelt. This building in turn forms a perfect setting for the new hall, which is filled with superb mounts of the larger North American mammals in their native haunts—beloved alike by Roosevelt and Osborn.

Osborn's scientific studies on fossil mammals began in 1877, when he and several of his classmates at Princeton, including his close friend and colleague, William Berryman Scott, made their first expedition to the Bridger Eocene basin of Wyoming. Here they discovered enough strange extinct forms of mammalian life to give them an uncontrollable urge to discover more. From this expedition sprang a long and ever-branching system of explorations, at Princeton under Scott and at the American Museum under Osborn. From the Flaming Cliffs of the Gobi Desert and the withering slopes of the Siwaliks in India, to the frozen soil of Alaska, many a "valley of dry bones" has heard the clang of the explorer's pick and yielded up its dead. Under the spell of the prophet the dry bones came together and thus it happened that in our temple of science many an ancient leviathan rears his mighty frame before us.

All this and much more was set in motion by Osborn, who often went into the field himself; but he always gave full credit to his captains and other men whom he had inspired and trained in the science of palæontology. In such a roll of honour he would undoubtedly himself inscribe the names of Matthew, Granger, Brown, Lull, Forster-Cooper, Andrews, Frick. And among the younger men of to-day are several to whom he was happy to entrust the future of palæontology.

As a student of Huxley and a disciple of Darwin, Osborn developed a broad interest in many branches of the biological sciences, as shown in his general work, "The Origin and Evolution of Life"; but his most intensive work was in the field of mammalian palæontology. His first important memoir was a systematic revision and study of the fossil teeth and jaws of the tiny mammals which were the contemporaries of the dinosaurs. Quite early (1888) began his interest in the evolution of mammalian molar teeth.

In his later years Osborn undertook to prepare a series of great monographs on the histories of the families of horses, titanotheres and proboscideans, or mastodons and elephants. In view of the heavy demands on his time from many other directions, his achievements in this field were truly enormous. Two of his great works (on the titanotheres and the proboscideans) stand out among the 940-odd entries in his bibliography and will be consulted as long as palæontology remains a living science.

Osborn's greatness as a man of science depended upon his greatness as a man. His vision, enthusiasm, conviction, persistence, persuasiveness, tolerance and restraint made him successful both as leader and investigator. Indeed, those of us who were close to him as a scientific worker immediately felt and responded to his benign influence as a man.

Dr. James R. Angell, in his personal tribute to Prof. Osborn, said that Osborn is immune to any serious peril of lack of appreciation, although only time will approximate a just evaluation of his accomplishments. His greatest contributions live on in the great institution which he served so long and so brilliantly. As himself an eminent scientific worker, constantly contributing to push forward the boundaries of knowledge, by his example inspiring the members of his staff and men of science everywhere to similar achievements, not less than by his administrative ability and his talent for interesting generous benefactors in the support of this enterprise, he left an indelible imprint upon his time. He put the American Museum of Natural History into the very forefront of the great scientific agencies of the period, stimulating throughout the nation a new understanding of the educational power of such institutions, while serving this great metropolitan community by opening ever wider to its citizens the unrivalled wealth of its superb collections. In all this undertaking he worked side by side with his loyal colleagues in the organization—*primus inter pares*.

In this process his own work came at times under severe attack, for while the well-authenticated fact is reasonably immune to assault, the inferences based upon it, the generalizations arising out of the effort to orient it amid other data and principles, unavoidably lead to corrective interpretation at other hands. The man of sincere scientific spirit is never seriously irked by this experience, provided he be not essentially misrepresented, for much of this kind of rough and tumble is inevitable in all progress. Osborn certainly had his full share of this type of conflict and would unquestionably accept with good grace such corrections and modifications of his own views as with the passing of the years the development of scientific knowledge may involve. Nor does it follow that because his own particular views may in certain cases fail to prevail, his contribution is in any way to be held lightly. Quite the contrary is the fact. Such approximation to truth as the human mind can ever attain is always the result of the clarifying increments made by successive generations of thoughtful men.

Men possessing such a combination of qualities as those of Osborn are all too rare. The good administrator is a familiar figure, the eminent man of science has many exemplars, even the man of science of deeply religious convictions, such as Osborn held, is by no means unknown; but it is extremely rare to find these gifts combined in one man, and when they are conjoined with a remarkable charm of personality and sterling integrity of character, we are confronted with one of the most unusual of the benefactions of a generous providence.

The bust of Prof. Osborn was unveiled by his daughter, Mrs. Jay Coogan. The bronze is of heroic size mounted on a rectangular plinth of polished Bois Jourdan marble. Below the name the following inscription is carved:

"For him the dry bones came to life
And giant forms of ages past
Rejoined the pageant of the living."

Dr. Harold E. Anthony, head of the Department of Mammals, described the long, almost twenty-year period of planning the new Hall of North American Mammals. The new hall is much more than a collection of mammals. It is a series of vistas into the ecology of North America. It offers to the visitor a grand tour of outstanding regions of the continent. The mammals have the limelight, but the exhibits portray the geology and the botany of places which are properly the home of the animals as well as noteworthy for many other features.

The hall would attract attention if it had no mammals at all in it. It is a hall of realities, not of fancies. Each group is an actual reconstruction of a definite place, at a given date and time of day, and no detail is left to guesswork. The accessories not only look natural, they are natural. These very items were found at the place where the group was collected.

Mr. Newbold Morris, president of the Council of the City of New York, spoke of the value of the Museum in showing the earth in its past history and bringing before us again the lives of animals and peoples long gone. "If you spend enough time here you begin to place less value on your own life or the lives of those who are very close to you, because you realize you are only part of a never-ending stream. . . . Every one of us is only part of a long process and here we get a feeling that perhaps human hatreds and human passions are not so important. This museum, like our city, represents an ideal, something which we are always reaching for and will never attain, but we are secure in the happiness that we are still reaching for it. . . . Hatreds and passions will disappear and some day, perhaps, we will know what it is to live in a world without passion and fear"

The new Hall of North American Mammals, although far from completed, is yet an imposing example of the blending of many arts, many sciences, and the most modern methods of museum architecture, exhibition and lighting. It is 140 ft. in length by 73 ft. in width and built in the form of an 'I' with parallel aisles flanking each side of the central corridor, which extends the length of the hall. The habitat groups are recessed along the corridor and at both ends. The lighting represents the result of careful study to relieve eye-strain and to provide a restful atmosphere, with the illumination directed towards the exhibits and away from the visitor.

The backgrounds of the exhibits present a panorama of the North American continent, from Ellesmere Land, 700 miles south of the North Pole, to Mexico, and from New York State to the west coast of Alaska, with the mammals characteristic of each region. The skilled preparation of both backgrounds and specimens was the work of many artists and taxidermists under the direction of Dr. James L. Clark, head of the Museum's Department of Preparation.

The achievement of the Hall itself was due to Dr. Anthony's continuous and enthusiastic efforts, to the sympathetic understanding and aid of President F. Trubee Davison, and to the co-operation of the officials of the City of New York. The magnificent animals were collected and presented by friends of the Museum, and when all groups are installed there will be a complete series of the most characteristic mammals of the entire continent of North America. The finished groups include the Alaska brown bear, the largest carnivorous land mammal in existence, the bighorn sheep, white (mountain) sheep, Grant caribou, muskox (collected by Admiral Peary), mountain goat, Osborn caribou, Alaska moose, grizzly bear and mountain lion (puma). Nineteen groups remain to be installed, eight of these to be opened in the near future, including the bison, wapiti, Virginia deer, jaguar and various small mammals, which are also to be represented in the hall.

INTERNATIONAL TABLE OF STABLE ISOTOPES

THIS Table, together with the Fifth Report of the Committee on Atoms, was last published, in Paris, by the Union Internationale de Chimie just before the occupation of France. After that event Prof. E. Briner of Geneva very kindly offered to undertake the correspondence necessary to continue the work of the Committee. With his help I was able, as chairman, to draw up a Sixth Report which I submitted to him for publication early in 1941. Later in that year he informed me that unfortunately he had been unable to arrange for its publication, and requested me to draw up a modified report brought up to date for 1941–1942. This I did, and in February 1942 he wrote that I might soon expect the proofs of this. I have heard nothing from him since, and as I think further delay would be unfortunate, the report is appended. There has been very little published on the subject since it was drawn up and, so far as I have been able to ascertain, the other members of the Committee approve of all the alterations embodied in it. F. W. ASTON.

Trinity College,
Cambridge.
Oct. 5.

Sixth Report of the Committee on Atoms of the International Union of Chemistry

Chairman: F. W. Aston. *Members*: N. Bohr, O. Hahn, W. D. Harkins, F. Joliot, R. S. Mulliken, M. L. Oliphant.

Owing to the impossibility of publication during 1941, this report covers double the normal period. The following changes in the Table of Isotopes are recommended:

Helium. Evidence has been obtained by means of the cyclotron that a stable isotope of mass 3 exists in Nature[1]. The abundance is very small and is estimated at about 10^{-7} per cent.

Sulphur. The parentheses indicating doubt in the existence of the very rare isotope 36 are to be removed.

Nickel. Two complete electrometric analyses have now been published, by Straus[2] and Valley[3]. Their results are given below together with those obtained in the original photometric observations[4]:

Mass numbers	58	60	61	62	64
Aston (1935)	67·5	27·0	1·7	3·8	?
Straus	62·8	29·5	1·7	4·7	1·3
Valley	67·4	26·7	1·2	3·8	0·88

Valley's work is approved by Bainbridge. His figures are in better agreement with the photometric results, and also with the chemical atomic weight, than are those of Straus. Both observers agree that 61 is 1·3 times more abundant than 64. This is in good accord with the mass spectra previously obtained by Dempster[5] and also with the original ones of Aston (re-examined) upon which the previous figures were based, but contradicts the evidence of the parabolas from which Lub[6] deduced that 61 is "with regard to 64 as 1 : 10". Valley's figures are now adopted.

Cobalt. In consequence of doubts expressed on many grounds as to the existence of a stable isotope 57, Mitchell, Brown and Fowler[7] have analysed $CoCl_2$ with a mass spectrometer. Their results show that 57 cannot be present even to 1 in 30,000 of 59. As in mass spectrometry evidence of absence is much more cogent than that of presence, cobalt is now to be regarded as a simple element.

Molybdenum. Electrometric measurements on this element have been carried out by Valley[8]. The following percentages, which he considers accurate to one per cent, are recommended:

Mass numbers	92	94	95	96	97	98	100
Abundances	14·9	9·40	16·1	16·6	9·65	24·1	9·25

They show a satisfactory small divergence from the photometric ones of Mattauch and Lichtblau, adopted in the previous report, and the original ones of Aston, and lie roughly between the two.

Rhodium. The rare isotope 101 of rhodium is subject in considerable degree to the same objections as that of cobalt above mentioned. It will therefore be regarded as doubtful, and given in parentheses, until further experimental evidence is available.

[1] Alvarez, L. W., and Cornog, R., *Phys. Rev.*, **56**, 379 (1939).
[2] Straus, H. A., *Phys. Rev.*, **59**, 430 (1941).
[3] Valley, G. E., *Phys. Rev.*, **59**, 836 (1941).
[4] Aston, F. W., *Proc. Roy. Soc.*, A, **149**, 396 (1935).
[5] Dempster, A. J., *Phys. Rev.*, **50**, 98 (1936).
[6] Lub, W. A., *Proc. Roy. Soc. Amsterdam*, **42**, 253 (1939).
[7] Mitchell, J. J., Brown, H. S., and Fowler, R. D., *Phys. Rev.*, **60**, 359 (1941).
[8] Valley, G. E., *Phys. Rev.*, **57**, 1058 (1940).