

I can offer you no better illustration than this of the advance vertebrate palæontology has made during the last decade, or of the important contributions to this progress which our Rocky Mountain region has supplied.

The oldest representative of the horse at present known is the diminutive *Eohippus* from the lower eocene. Several species have been found, all about the size of a fox. Like most of the early mammals, these ungulates had forty-four teeth, the molars with short crowns, and quite distinct in form from the premolars. The ulna and the fibula were entire and distinct, and there were four well-developed toes and a rudiment of another on the fore-feet, and three toes behind. In the structure of the feet and in the teeth, the *Eohippus* indicates unmistakably that the direct ancestral line to the modern horse has already separated from the other perissodactyles. In the next higher division of the eocene another genus (*Orohippus*) makes its appearance, replacing *Eohippus*, and showing a greater, although still distant, resemblance to the equine type. The rudimentary first digit of the fore-foot has disappeared, and the last premolar has gone over to the molar series. *Orohippus* was but little larger than *Eohippus*, and in most other respects very similar. Several species have been found in the same horizon with *Dinoceras*, and others lived during the upper eocene with *Diplacodon*, but none later.

Near the base of the miocene, in the brontotherium beds, we find a third closely-allied genus, *Mesohippus*, which is about as large as a sheep, and one stage nearer the horse. There are only three toes and a rudimentary splint bone on the fore-feet, and three toes behind. Two of the premolar teeth are quite like the molars. The ulna is no longer distinct, or the fibula entire, and other characters show clearly that the transition is advancing. In the upper miocene *Mesohippus* is not found, but in its place a fourth form, *Miohippus*, continues the line. This genus is near the *Anchitherium* of Europe, but presents several important differences. The three toes in each foot are more nearly of a size, and a rudiment of the fifth metacarpal bone is retained. All the known species of this genus are larger than those of *Mesohippus*, and none pass above the miocene.

The genus, *Protohippus* of the lower pliocene, is yet more equine, and some of its species equalled the ass in size. There are still three toes on each foot, but only the middle one, corresponding to the single toe of the horse, comes to the ground. This genus resembles most nearly the *Hipparion* of Europe. In the pliocene we have the last stage of the series before reaching the horse, in the genus *Pliohippus*, which has lost the small hooflets, and in other respects is very equine. Only in the upper pliocene does the true *Equus* appear and complete the genealogy of the horse, which in the post-tertiary roamed over the whole of North and South America and soon after became extinct. This occurred long before the discovery of the Continent by Europeans, and no satisfactory reason for the extinction has yet been given. Besides the characters I have mentioned there are many others in the skeleton, skull, teeth, and brain of the forty or more intermediate species, which show that the transition from the eocene *Eohippus* to the modern *Equus* has taken place in the order indicated, and I believe the specimens now at New-Haven will demonstrate the fact to any anatomist. They certainly carried prompt conviction to the first of anatomists who was the honoured guest of the Association a year ago, whose genius had already indicated the later genealogy of the horse in Europe, and whose own researches so well qualified him to appreciate the evidence here laid before him. Did time permit I might give you at least a probable explanation of this marvellous change, but justice to the comrades of the horse in his long struggle for existence demands that some notice of their efforts should be placed on record.

(To be continued.)

SOCIETIES AND ACADEMIES

PARIS

Academy of Sciences, September 17.—M. Peligot in the chair.—The president requested the meeting to designate one of their fellows to represent the Academy in the annual public meeting of the five academies, which will take place on October 25.—M. Tresca then, in the name of M. Leverrier, presented to the Academy vol. viii. of the "Atlas Météorologique de l'Observatoire de Paris pour l'an 1876."—A note by M. Faye, on the atlas of the superior movements of the atmosphere, by M. H.

Hildebrandsson. The author bases his work on the observation of cirrus clouds.—A note by M. G. de Saporta on the discovery of fossil plants in the tertiary strata in the vicinity of the North Pole.—On an erratic block of granite situated in the neighbourhood of Geneva, by M. de Marignac. It appears that the block in question is a mass of about 300 cubic metres of granite, and that the prefect of the Department, Haute Savoie, has given permission to a Railway Company to take possession of it and to cut it to pieces. M. de Marignac, who is the owner of the ground upon which it lies, now recommends the preservation of the block and offers it to the Academy together with the area it lies upon, under the sole condition that it shall be preserved. M. Dumas spoke in favour of M. de Marignac's proposition.—On the spontaneous disappearance of phylloxera, by H. Marè.—M. P. de Tchihatcheff then presented to the Academy his translation of M. Grisebach's work, "The Vegetation of the Globe," and made some remarks on the same.—M. Alluard read a memoir on a new condensation-hygrometer, invented by himself.—A letter from M. E. Stephan announcing the discovery of a new comet by M. Coggia was read. (Of this we gave the details in the Astronomical Column of our last number, p. 442.) The letter further contained details of an observation of one of the satellites of Mars, by M. Borrelly, made at Marseilles.—M. Leverrier transmitted to the Academy details of MM. Paul and Prosper Henry's observation of the same satellite, made with the equatorial in the garden of the Paris Observatory.—M. P. H. Boutigny pointed out that in a passage in his work, "Études sur les corps à l'état sphéroïdal," published some thirty years ago, he expressed his belief in the existence of satellites of Mars and pronounced the hope of their future discovery.—New researches on the ammoniacal fermentation of urine and spontaneous generation, by MM. P. Cazeneuve and Ch. Livon.—On the physiological action of salicylate of soda, by MM. Bochefontaine and Chabbert.—A note by M. V. Duram on a luminous meteor observed on September 11 at Boën (Loire), and on a shock of earthquake felt at the same place on September 12. The meteor was of unusual brilliancy; it appeared in the east of the sky at 7.45 P.M.; its elevation above the horizon was but small; it left a long curved trail, and its appearance was marked by a slight detonation; the direction of its path was from north to south. The shock of earthquake was felt at 6h. 52m. true time, and lasted several seconds.—M. Faye then drew the attention of the Academy to a memoir just published by M. P. de Saint Robert, on the spherical movement of the pendulum, with regard to the resistance of the air and the rotation of the earth.

CONTENTS

PAGE

URBAN J. J. LEVERRIER	453
RECENT BOTANICAL BOOKS	453

OUR BOOK SHELF:—

Mault's "Natural Geometry; an Introduction to the Logical Study of Mathematics, for the Use of Schools and Technical Classes, with Explanatory Models"	455
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LETTERS TO THE EDITOR:—

The Cycle of Sun-spots and Rainfall.—Dr. W. W. HUNTER	455
The Discovery of the Satellites of Mars.—Prof. SIMON NEWCOMB	457
The Satellites of Mars.—The EARL OF ROSSE, F.R.S.; Rev. HENRY COOPER KEY	455
A Good Suggestion.—Dr. J. W. MALLETT	457
Some of the Troubles of John O'Toole respecting Potential Energy, II.—X.	457
New Electric Lights.—W. MATTIEU WILLIAMS	459
Serpula Parallela.—Dr. JOHN YOUNG	460
HYDROGRAPHIC SURVEY OF THE BALTIC	460

OUR ASTRONOMICAL COLUMN:—

The Saturnian Satellite Hyperion	460
The New Comet (1877, IV.)	460
FAMINES AND SHIPWRECKS. By Prof. BALFOUR STEWART, F.R.S.	461
PROF. ADAMS ON LEVERRIER'S PLANETARY THEORIES	462
NOTES	464
THE DIRECT PROCESS IN THE PRODUCTION OF IRON AND STEEL. By Dr. C. WILLIAM SIEMENS, F.R.S.	467
THE AMERICAN ASSOCIATION AT NASHVILLE	469
INTRODUCTION AND SUCCESSION OF VERTEBRATE LIFE IN AMERICA, II. By Prof. O. C. MARSH	470
SOCIETIES AND ACADEMIES	472