fully $2\frac{1}{2}$ inches deep and the centrum 4 inches long, has no transverse process, and shows no indication of a chevron facet, though the base of the articulation is somewhat thickened behind. A still later vertebra has the centrum 3 inches long, and the articular face $1\frac{1}{2}$ inch deep by $1\frac{1}{10}$ inch wide. The caudal vertebræ continue to diminish in length, and the neural arch becomes compressed from side to side, but remains well developed, and nearly an inch longer than the centrum. The pre-zygapophyses look obliquely upward and forward, and receive the wedge of the posterior zygapophyses between them. There appear to be faint indications of very small chevron bones in these latest vertebræ. It is possible that the smaller caudal vertebræ belong to *Avalonia*.

These vertebral characters indicate an animal closely allied to *Avalonia*, but well distinguished by the lateral compression of the centrum, supported by the singular form of the tooth crown, obliquely serrated at the margin, and ribbed on the inner side.

EXPLANATION OF PLATE I.

Avalonia Sanfordi, Seeley.

- FIG. 1.—Anterior aspect of left femur. *a*, articular head; *b*, ridge representing the trochanter major; *c*, broken base of the inner lateral trochanter; *d*, inner of the larger distal condyle.
 FIG. 2.—Posterior aspect of a dorsal vertebra.
 FIG. 3.—Right side of a dorsal vertebra, showing (*f*) the capitular and (*t*) tubercular facets, and the xygapophyses.
 FIG. 4.—Side view of claw phalange and penultimate phalange of hind foot.
 FIG. 5.—Articular end of claw phalange.

Pterodon Herveyi, Seeley.

- FIG. 6.—Dorsal vertebra, posterior aspect.
 FIG. 7.—Same vertebra, lateral aspect.
 FIG. 8.—Early caudal vertebra, lateral aspect.
 FIG. 9.—Late caudal vertebra.

Rhætic Beds: Wedmore Hill (Vale of Glastonbury), Somerset.

See also note on some Rhætic Foraminifera from Wedmore, by F. Chapman, 1895, *Ann. and Mag. Nat. Hist.*, vol. xvi, p. 305.

II.—RECENT OBSERVATIONS ON EUROPEAN DINOSAURS.

By Professor O. C. MARSH, M.A., Ph.D., LL.D., F.G.S.;
 of Yale College, New Haven, U.S.A.

DURING the past summer, it was my privilege to attend the International Congress of Geologists at St. Petersburg, as an official delegate from the United States, and this gave me an opportunity to see a number of museums and collections in Europe which I had not before visited. I thus had the privilege of inspecting personally many interesting reptilian remains that I had not previously known, and of examining others which were more or less familiar to me from figures and descriptions.

In the present paper, I have only time to speak of the Dinosaurs, in which I have long taken a special interest, and have endeavoured to study all the known specimens of importance, both in this country and in Europe, having in view the preparation of a series

of memoirs on the different groups of this subclass of extinct Reptilia.

London.—I began my investigations in the British Museum in London, a great treasure-house for fossil reptiles, to which I have long made frequent pilgrimages. This time the Dinosaurs were seen to better advantage than ever before, but of new or unknown forms I found that few had been added to the collection since my visit two years ago; and I consoled myself with the other extinct Reptilia, and especially with the new fossil birds and mammals from South America.

St. Petersburg.—In St. Petersburg I hoped to find many Dinosaurian remains, as here had been brought together an abundance of fossil treasures from various parts of the Russian Empire, which I knew must contain many forms of this group. In the four principal museums of the city, however, I could find no bones of Dinosaurs on exhibition, nor could I learn from any of the museum authorities that such remains had been recognized among the specimens received, neither could I find any such fossils myself among the débris of the collections, so often a rich repository for new or inconspicuous specimens. This was true also of the smaller collections visited, and I was at last forced to admit that here, at least, the Dinosaurs of Russia, like the snakes of Ireland, were conspicuous only by their absence.

Moscow.—This opinion was not changed by a visit to the rich geological collections of Moscow, which I examined with care; although other fossil vertebrates, including many reptiles, were abundantly represented. I was assured, moreover, by various Russian palæontologists, that in other museums of the empire or in the known localities they had seen no Dinosaurian remains. This vain quest, however, only proves that the discoveries are yet to be made, and I confidently expect them at no distant day, since in almost every other part of the world Dinosauria have already been brought to light. In Northern Europe west of Russia, and in North America to the east, these reptiles were especially abundant, and the vast territory intervening must contain numerous Dinosaurs, including many new forms of the group.

Vienna.—In Vienna I knew that my friend Professor Suess had a large collection of Dinosaurs in his museum to show me, and I spent several days there in their investigation. This collection was of special interest to me, as it was from the Gosau fresh-water deposits, which, as a student, years ago, I explored mainly in the expectation of finding Cretaceous mammals; and I was not without hope of still detecting such remains during my present visit, as here were the localities where they were, in my judgment, most likely to be found in Europe. The Dinosaurs I examined were from Neue Welt in this formation, and were of great interest. They had all been studied by Bunzel, Seeley, and others, who had recognized ten or twelve distinct genera and many species among them. I could find, however, not more than a quarter of this number, and among these I found no indications of the *Ceratopsia*, which from

the published figures and descriptions I supposed to be represented in this collection. The Dinosaurs with dermal armour which I saw all pertained to the Stegosauria, and two distinct genera among them were more nearly like *Scelidosaurus* of the English Jura and *Nodosaurus* of the American Cretaceous than any others with which I am familiar. This collection contained the only Dinosaurian remains I could find in Vienna.

Munich.—I next went to Munich, which, under Professor von Zittel, has become a great centre for palæontology. I found that the gem of the collection is still the unique *Compsognathus*, which in several previous visits I had studied with care. A re-examination impressed me even more with the fact, that this is one of the most perfect and interesting vertebrate fossils yet discovered, and no other example of the genus is known. It was in this unique specimen that years before I had detected the embryo, and this fossil still affords the only known evidence that Dinosaurs were viviparous. I could find no other Dinosaurian bones of interest in the Munich collection, the new features being mainly numerous fine specimens of Mosasauria from America, and some interesting remains of *Hesperornis* and *Baptornis* from the same horizon in Kansas.

I was much pleased to see here the new Jurassic fossils collected by Nansen in 1896, at Cape Flora, in Franz Josef Land. These interesting remains are now under investigation by Dr. J. F. Pompeckj, assistant in the Munich Museum. I could detect no vertebrate fossils among them, although various indications favour their presence in this fauna.

Paris.—My limited sojourn in Paris gave me no opportunity for a careful examination of the museums there, but I could learn of no recent additions of Dinosaurian remains since my last visit.

Caen.—I next went to Caen, in Normandy, to see the famous Dinosaur *Poikilopleuron*, so well described by Deslongchamps many years ago. Through the kindness of my friend Professor A. Bigot, I had a good opportunity to study this unique specimen, which of late has been regarded as identical with the *Megalosaurus* of Buckland, the first genus of Dinosaurs described, and one about which little is yet known.

Among the undetermined material of this museum, I was greatly pleased to find the genus *Pleurocælus* well represented by characteristic fossils, and from a well-defined Jurassic horizon in the vicinity of Havre. The species appears to be a new one, somewhat smaller than *Pleurocælus suffosus* from the Kimmeridge of Swindon, England.¹ It resembled still more closely *Pleurocælus nanus*, which I have described from the Potomac formation of Maryland.

Pleurocælus is one of the most characteristic genera of the Sauropodous Dinosauria, and its value in marking a geological horizon should therefore have considerable weight. It is now known from the two European localities mentioned above, both in strata of undoubted Jurassic age. The same genus is well represented in

¹ Lydekker records a Wealden species, *Pleurocælus valdensis*, in Quart. Journ. Geol. Soc., 1890, vol. xlv, p. 182, pl. ix.

the Potomac deposits of Maryland, and has been found also in the *Atlantosaurus* beds of Wyoming, thus offering, with the associated fossils, strong testimony that the American and European localities are in the same general horizon of the Upper Jurassic.

Havre.—The last day at my disposal before sailing for America, I spent in Havre, in the Muséum d'Histoire Naturelle, where the director, M. Lennier, showed me many vertebrate fossils of interest, from the well-known localities near the city. Here, again, among the fragmentary specimens not yet investigated, I found the bones of another Dinosaur, also one of the Sauropoda, but considerably larger than the *Pleurocalus* at Caen. The remains were very similar to those of *Morosaurus*, and the horizon was in the Kimmeridge, which is here well defined.

From Havre, I crossed the Channel to Southampton, and with a parting look at the Wealden cliffs of the Isle of Wight, which have furnished the remains of so many interesting Dinosaurs, I sailed for home.

III.—NARRATIVE OF A GEOLOGICAL JOURNEY THROUGH RUSSIA.

1. FINLAND.

By GEO. F. HARRIS, F.G.S., M.S.G.F., etc.

THE meeting of the International Geological Congress at St. Petersburg towards the end of August last year was about as successful in promoting the main objects the Congress has in view as any of its predecessors. There was a marked absence of anything like a serious radical programme, and in that sense the meeting may be said to have been progressive. The majority of the papers read were commonplace, the few exceptions being mostly in the domain of petrology. Every geologist who attended the meeting was grateful to the Organizing Committee for getting together such a nice little exhibition of specimens, maps, and models for the occasion. It was full of interest.

The official Russian geologists did everything in their power to assist their visitors. They caused certain scientific institutions in St. Petersburg to remain open longer than usual, and were never tired of explaining the rich collections stored in the geological and mineralogical museums in the Imperial University, and in kindred museums. During the week of meeting they organized a day's excursion to the Czar's palace at Peterhof, and another to the renowned falls of Imatra—a long distance off, in Finland, but distance counts as nothing in the Russian Empire. Then there were the inevitable receptions, though, fortunately, these were not carried out to the same extent as at the Washington Meeting.

But it was not of the actual Congress meetings, nor of the papers read or mumbled before them, nor of the wonderfully preserved mammalian remains in the temporary museum, nor of the unvarying courtesy of the Russian officials, that I desire to write in these articles. Neither may I say anything in the GEOLOGICAL MAGAZINE concerning the social aspects of our visit to the other side of Europe