

and dry bulb thermometers, and it is meant to exhibit the amount of error to be expected when the former is compared with the latter in different parts of the scale.

Sections of Scale of Percentage.	Probable Limit of Error.	Error Ordinarily to be Expected.
0 — 10 %	10 %	From 0 to + 6 %
10 — 20 "	6 "	" 0 " + 4 "
20 — 30 "	4 "	± 3 "
30 — 40 "	3 "	± 2 "
40 — 50 "	2 "	± 1 "
50 — 60 "	3 "	± 2 "
60 — 70 "	3 "	± 2 "
70 — 80 "	4 "	± 3 "
80 — 90 "	4 "	± 3 "
90 — 100 "	7 "	From 0 to — 5 "

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*INSTRUCTION IN NATURAL HISTORY AT
THE JARDIN DES PLANTES, PARIS.*

It has been my good fortune to have spent the past winter in carrying on investigations in the paleontological laboratory of the Jardin des Plantes, Paris, and while there I took the opportunity to study the methods of instruction at the Muséum D'Histoire Naturelle. I am especially indebted to MM. Albert Gaudry, Alphonse Milne-Edwards, Henri Filhol and Marcellin Boule. These gentlemen have placed exceedingly valuable material in my hands for study, and I am greatly obliged to them all for their extreme kindness during my stay in Paris.

The instruction at the Jardin des Plantes consists of the 'cours' or lectures, the 'conférences' or practical work in the laboratory, and the 'enseignements specials' or special instruction, generally for the benefit of travelling naturalists. During the year there have been eighteen courses of lectures on various scientific subjects, eleven of which were biological, the remaining being on agriculture, physics, geology, etc. Some of the subjects treated of by the professors are certainly not intimately connected with natural history, but we must

remember that the Jardin des Plantes was previously founded as a school of pharmacy, and in connection with the same there was a large garden for the cultivation of plants for medical purposes. It was not until 1793 that the reorganization of the Jardin des Plantes took place and regular courses of public lectures were opened. It is interesting to note that in this year two brilliant men were added to the faculty of the 'Jardin;' these were the Chevalier de Lamarck and the young Etienne Geoffroy Saint-Hilaire. The latter commenced a course of lectures at this time, and later in 1798 accompanied Napoleon on his Egyptian expedition, as naturalist.

As a rule almost all of the naturalists who have held professorships in the Jardin des Plantes have been men of broad learning and have worked in many fields of biology. This is noticeable in the public lectures given at the 'Jardin,' and I can safely say that even the systematists are well grounded in comparative anatomy. When we consider that the French naturalists have had so great a teacher as Georges Cuvier to follow, it is not strange that the professors at the Muséum D' Histoire Naturelle fully appreciate the fact that the curators, etc., of the Muséum who lecture should be well grounded in the morphological relation of animals.

The numerous lectures on biology given at the Muséum D' Histoire Naturelle are in strong contrast with the few that are held in other natural history museums of the world. The lecture hall of the British Natural History Museum has been given up entirely and there are no lectures now given in this institution. In fact, it is a great question with the trustees of some museums whether a natural history museum is a place for teaching at all or simply a great store-house, in which vast accumulation of specimens are preserved, labelled and placed by the hundreds in glass cases for

exhibition and for the general public, who have had no previous instruction in natural history whatever.

The natural history museum is for the benefit largely of the public, who have had no preliminary training in biology, and if lectures are not held to instruct them, how they can appreciate the specimens which they see by the countless thousands on exhibition in the museums.

I am convinced that the lectures given at the Jardin des Plantes, Paris, do an immense amount of good, and they reach a class of people, like teachers, who are unable to follow the courses given in the colleges and universities. In Paris, as in many other places, there is a considerable amount of feeling as to how much general work in biology should be done at the Muséum, and if the professors or curators make their courses too general, they will encroach upon the work of the learned professors at the Sorbonne or in the universities. In general the courses in natural history in the colleges are more in detail; they are often prepared for students who are going to become professional naturalists. On the other hand, the museum work, owing to the nature of the specimens, is less detailed and more general in its character. Museum lectures on natural history must necessarily be rather superficial, owing to the class of hearers, and these lectures would be rather on the broad facts of general morphology in its bearing on classification and of geographical distribution of animals. Detailed embryological and histological lectures would be of little use in a museum curriculum. At the Jardin des Plantes courses are given in embryology and histology, but I believe there are very few students who take them. The 'cour' in general comparative anatomy is very popular at the 'Jardin' and well attended, and I see no reason why a course of this kind could not be given in museums in this country. At the Jardin

des Plantes there are a number of laboratories for practical work, where the students can go and study the specimens on which the professor lectures. These laboratories for practical work are an absolute necessity, as natural history taught without seeing and studying the specimens is of little benefit.

The department of comparative anatomy is one of the strongest, if not the best at the Muséum. Prof. Filhol, who is so well known for his extensive investigations in vertebrate paleontology, is at the head of this department. The material which M. Filhol has at his command for teaching is immense, and the osteological collection alone is the largest in the world. The collection of skeletons was largely made by Cuvier and used by him for comparison with the extinct fossil vertebrata, which he so ably described in his 'Ossemenes Fossiles.' M. Filhol is now having prepared a beautiful collection of the internal organs of the vertebrata, which are injected and colored to immitate the hues of the living viscera. This collection will be of immense value in laboratory work and in the lecture room.

Prof. Gaudry's department of paleontology is about to be greatly enlarged, owing to the new museum which is rapidly approaching completion. This new building is for the department of comparative anatomy, including under this term the anatomy of recent and extinct types. Vertebrate paleontology has suffered too long being placed under geology, and most naturalists who are workers in vertebrate paleontology realize that the true position of this division of biology is under comparative anatomy and not geology. Vertebrate paleontology as studied by the methods of anatomy is now making great progress, the old and dry geological methods as applied to paleontology only prevented the progress of this science from a morphological and phylogenetic standpoint.

The new museum at the Jardin des Plantes for comparative anatomy will have the paleontological specimens placed on the second floor. The fossils will be well arranged for study and the gallery is splendidly lighted. Immediately at the end of the building is Prof. Gaudry's lecture room and a working laboratory for students. Here you have the ideal museum, well arranged specimens, not too many of them so as to be a burden to the student's mind, a laboratory for studying the objects, and lastly, a well planned lecture room for the 'cour.'

Vertebrate paleontology has at least one great advantage over recent mammalogy and ornithology; there is no danger of exhibiting too many specimens of vertebrate fossils, especially mammals, as these specimens themselves are exceedingly rare and very costly in procuring. In most museums the hundreds of grinning owls and the forty eleven species, illustrating the forms of the *Muridae* for example, are only a hindrance to the appreciation by the public of what an owl or a mouse is. Synoptical collections, I believe, do a great deal more good for general exhibition purposes than all the species representing the numerous genera of the animal kingdom. Let us have on exhibition the complete life-histories of a number of well selected types of animals, as illustrated by the metamorphosis of an arthropod or the changes in plumage of a bird. I believe the beautifully arranged collection of comparative osteology and the cases illustrating adaptation of birds and mammals to their environment in the British Natural History Museum, London, do more good in the way of educating the public than miles of so-called species arranged in cases. I have always particularly noticed, in passing through the central corridor of that great Natural History Museum in South Kensington, that many people were collected around the

cases in this main hall, whose specimens illustrate the structure and variation of the animal kingdom.

A great innovation was introduced in biology by the publication of Huxley and Martin's 'Practical Biology,' taking up the study of animal types, and placing aside for the time being the old method of hammering at species all the time, which leads to small results in getting at the real affinities of animals. I think if, in arranging museums, this idea of illustrating the structure and life-history of animals were more followed, better results in educating the public would be attained.

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CURRENT NOTES ON ANTHROPOLOGY.

THE IRON AGE IN AMERICA.

IN the *American Anthropologist* for June, Prof. Otis T. Mason has a well-prepared article on the introduction of the iron age into America. Of course, this was post-Columbian, but its history is important and has never before been presented. The use of the metal extended rapidly, and often reached tribes long before the first white men wandered to their abodes. The influence of this new material was felt immediately, and not always to the best advantage. "The technique may be better, but the motive, the underlying conception and the composition may be incalculably worse." The author most judiciously insists on the truth that "the unadulterated aboriginal product reveals to our gaze the living processes by which men have always progressed to higher life."

The article closes with a strong and a much needed appeal to those who have in charge public and private collections to cultivate coöperation and to show greater liberality to students in the same field. Some very pointed statements of facts could be made in this connection. There