

ontology the magnificent limbs of four monstrous dinosaurs commanded special attention.

Similarly in Zoology the beautiful new case illustrating the nesting habits of the brown pelican rather out ran in popular favor other objects of great scientific interest.

As may be inferred even from the above brief and unsatisfactory sketch, the exhibition was as wide in its scope as it was scientifically interesting in its details. It must have been seen to be appreciated, and the thanks of those who did see it are due to the zeal of the exhibitors, especially those out of town, among whom should be mentioned Princeton, Harvard, Johns Hopkins and Chicago Universities, Lick and Yerkes Observatories, the United States, Maryland and New York Surveys.

WILLIAM HALLOCK,  
*Chairman of Committee.*

#### SCIENTIFIC BOOKS.

*Lectures on the Evolution of Plants.* By DOUGLAS HOUGHTON CAMPBELL, PH.D., Professor of Botany in the Leland Stanford Junior University. New York, The Macmillan Company. 1899. 12mo. Pp. viii + 319.

Professor Campbell is probably the foremost of the small group of what may be termed the philosophical botanists in America, and he is, no doubt, better prepared to discuss the questions taken up in this book, at least in so far as they deal with the archegoniates and seed plants, than any other of our students of plants. Some years ago he brought out his book 'The Structure and Development of the Mosses and Ferns,' in which he treated the subject in such a modern way as to give new meaning to what had to too great a degree been mere dry detail. In no uncertain words he traced the genetic relationship of group to group, and the student following him was made to feel that the fact of relationship was real and necessary, and not doubtful or shadowy.

In the little book before us the author discusses, in succession, the conditions of plant

life, the simplest forms of life, algæ, fungi, mosses and liverworts, ferns, horsetails and club-mosses, gymnosperms, monocotyledons, dicotyledons, geological and geographical distribution, animals and plants, influence of environment, and at the end brings together his results in a chapter entitled 'summary and conclusions.'

We can do no better in endeavoring to give our readers an idea of the author's treatment and conclusions than to quote a sentence here and there from his final chapter, as follows: "All plants agree closely in their essential cell structure, the typical cell having a cellulose membrane and a single nucleus." "The lowest plants are mainly aquatic, and it is exceedingly probable that this is the primitive condition of plant life." "The peculiar group of motile green algæ, the Volvocineæ, probably represents more nearly than any existing forms the ancestral type of all the higher green plants. These ciliated algæ are also probably related to certain colorless flagellate Infusoria, which in turn may represent the starting-point for the whole group of Metazoa among animals. It is not unlikely that the separation of the two great branches of organisms, plants and animals, took place among the Flagellata." "Starting with this primitive motile unicellular organism, there have evidently arisen a number of independent lines of development resulting in very divergent types of structure." "In these lowly organisms there is no clearly marked line between vegetative and reproductive cells."

"The increasing complexity of the plant body has been accompanied by a corresponding specialization of the reproductive parts." "The origin of the Phæophyceæ, or brown algæ, from free-swimming brown flagellate organisms, is by no means unlikely, and if this be shown to be the case they must be considered as a line of development parallel with the Chlorophyceæ, rather than an off-shoot from these." "The relationship of the fungi is still an open question." "The ancestors of the higher green plants must be sought among the simple fresh-water green algæ. The genus *Coleochaete*, the most specialized of the Confervaceæ, is the form which shows the nearest analogy with the lower

Bryophytes." "In the mosses \* \* the persistence of the motile spermatozoid indicates the derivation of the Archegoniates from aquatic ancestors." "The Pteridophytes, also, show traces of an aquatic ancestry in the development of spermatozoids, which require water in order that they may reach the archegonium."

"Of the Spermatophytes the Gymnosperms are obviously the lowest types, *i. e.*, they show more clearly their derivation from the Pteridophytes." "The Angiosperms are preeminently the modern plant type. These have largely crowded out the other earlier types of vegetation, and at present comprise a majority of existing species." "It is among the Angiosperms that the plant body reaches its highest expression. In the keen struggle for existence among the manifold forms of plants the Angiosperms have shown themselves to be extraordinarily plastic, and have developed every possible device to enable them to survive this fierce competition."

We need quote no more from this very suggestive and very readable book. Every botanist and every earnest botanical student will read it with interest and profit.

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*Die Spiele der Menschen.* Von KARL GROOS. Jena. 1899.

Professor Groos follows up his work on Animal Play with his promised book on Human Play. He divides this last work into two sections, the first discussing the facts of play under headings, Touch Plays, Temperature, Hearing, Sight, Motor Plays of various kinds, and purely psychic plays; the second, discussing theories of play under headings, Physiological, Biological, Psychological, Aesthetic, Sociological and Pedagogical. The general grouping of facts is, as regards biological results, into activities which serve as exercise and those which serve as display in impressing others—that is in the two divisions, where individual significance is dominant, or social significance. Of course, this is a quite objective classification; the child not consciously taking exercise—this being really work—but continuing the activity for its immediate pleasurable-

ness. The showing-off play is largely consciously such; there is here more of the subjective and teleological factor.

Under Hearing and Sight Plays Professor Groos is quite full and interesting, really giving in outline the evolution of these senses in the race and individual. We might ask why he divides Hearing Play into passive and active, and not other sense plays. The child is, indeed, diverted either by your singing, or by his singing to himself, but also both by your passing things before his eyes and himself passing things before his own eyes. Later he both looks at pictures in books and draws pictures for himself. Indeed, it is plain that gratification of any sense may be either active or passive, the active side leading off into art activity and art work.

Professor Groos's account of Motor Plays is hardly as full and satisfactory as that on Sense Plays. We find here, as elsewhere, too often a heaping-up of facts and of quotations with very cursory interpretation. Thus (p. 95) he rather hastily lumps the American habit of gum-chewing with betel-chewing, and with the habit of chewing bits of sticks and grass, as motor plays for jaws and tongue. But while it is plain that the gum-chewer may use a piece of gum as a mouth-plaything, yet to a large extent gum chewing is merely a morbid nervous habit, or a means of gratifying sense of taste, and in both these ways not play. So also the athlete who chews gum or other articles during a football game is not in this playing. Chewing is only play when it is chewing for chewing's sake, and not as a mere relief from nervous tension, or for taste pleasure or to help endurance and grit.

Professor Groos rightly regards the psychological mark of play not as imitation, but as direct pleasurable. The mere biological activity comes first as outcome of bare physiological impulse; thus the infant grasping indefinitely feels something soft, experiences pleasure and keeps handling the object. Objectively and biologically all this activity is play, but psychologically only the later half (p. 95). As to physiology, "Es sind zwei Hauptprincipien, die eine psychologische Theorie des Spiels beherrschen müssen, das der Entladung über-