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PATENT OFFICE EXAMINERS WANTED.

Strange to say, there appears to be a greater demand for qualified persons to serve as Patent Office examiners than there are applicants. This probably is beeause the position demands considerable scientifie knowledge, only to be acquired by thorough study, and ability to make intelligent use of such knowledge in the performance of official duties. Applicants for examinerships in the Patent Office must pass examination before the Civil Service Commission, Washington, D. C., who will furnish blanks and instructions. The subjects of the examination are: Physics, technics, mathematics and chemistry, and mechanical drawing. The salary of the position is \$1,200 per annum.

THE AMERICAN ASSOCIATION AT MADISON, WIS. BY H. C. HOVEY.

The recent meeting of the American Association for the Advancement of Science, in the charming capital of Wisconsin, serves to bring to the memory of the older members the familiar name of the late Dr. Increase A. Lapham, who doubtless did more than any other one man in this State to stimulate the scientific zeal of his fellow citizens. His original investigations in archeology won the honor of knighthood for him from the King of Denmark. And his promptness to recognize and encourage younger men of scientific aspirations, and give them a start in life, won what is better than any titular distinction-a place in the hearts of men. Dr. Lapham was eminent in botany, geology, and meteorology, and he was also the founder and first president of the Wisconsin Historical Library, one of the most valuable institutions of its kind in America. Indeed, he was identified so thoroughly with every scientific interest of the State as to make it peculiarly fitting that a tribute should be paid to his memory preliminary to mentioning the words and deeds of other men who, for several days have crowded the corridors of the State University and interchanged their facts and theories.

THE ORIGIN OF MOUNTAIN RANGES.

One of the most interesting and attractive persons in attendance this year, was the retiring president of the A.A.A.S., the veteran geologist, Professor Joseph Le Conte, of California. The subject of his annual address was "The Present Status of Science as to the Origin of Mountain Ranges." Mountains are focal points of geologic interest and theaters of intense igneous, aqueous, and eruptive agencies. Their strata vary in thickness from 10,000 to 50,000 feet at the crest (allowing for erosion), but slope away with diminishing thickness till they vanish in the valleys and plains. Their component materials are fragments of rock, coarse gravels, and sands, and their huge mass rises in folded structure above the general surface of the globe. Sometimes, as in the Uinta Mountains, there is but a single enormous fold; and again there is fold upon fold; and yet again there is occasionally great complexity, the strata being thrust under and over in a vast fanlike form. There are also sinclines and anticlines, which are often greatly appressed, as in the Appalachian range, where nineteen have been counted in a distance of sixty-five miles. Mountain strata are not equally affected by cleavage, some seeming to be very solid, while in the case of others the whole mountain appears to be cleavable from top to bottom. The earth wave sometimes breaks with surprising abruptness, and again it slopes away very gently.

Many theories have been offered in explanation of considerable dispute as to facts. these phenomena. Bare facts are not science. Facts GEOLOGICAL TIME. must be grouped and systematized. But as this work goes on, it is liable to grow daring and speculative, In treating of geological time, as indicated by the until it is necessary to demand a careful discrimination between what may be styled formal and causal theories. It is agreed that mountains were originated by a process of horizontal mashing and vertical uplifting of the earth's crust. But what caused this mashing and uplifting? A true formal theory must advance gradually. Mountains are born of sea-margin deposits. We find by observation that existing off-shore deposits are coarse at the top, shading down to fine, by the same law as that marked in the structure of mountains. But the enormous mountainous deposits would have subsidence of sea bottom. The earth sinks by loading upward: Alexander Winchell, but 3,000,000; McGee, and rises by unloading. Of this the Colorado plateau furnishes an illustration. It was originally 20,000 feet high, but 12,000 feet have been removed by erosion, this wide divergence, all agree in thinking the durawhich has caused the remaining 8,000 feet to rise above tion of the globe so great as to make man's occupancy thegenerallevel. It may be regarded as now proved that of it seem but a span. the cosmic behavior of the earth is that of a rigid solid. A solid globe of glass, six feet in diameter, will change shape by the pressure of its own weight. The earth does the same. But as the earth is not homogeneous, its radial contraction will be unequal, and hence there will be ridges. The contraction theory assumes that the earth was once an incandescent ball, now cooling; and this cooling compels yielding along its lines of of denudation has continued with little interruption. weakness. This is known abroad as the "American theory," and the author of this address was its

but did not really think it necessary. He considered and refuted objections; and he finally returned to the contraction theory, not as demonstrated beyond a doubt, but as furnishing the best working hypothesis vet offered.

MAMMALIAN PALEONTOLOGY.

An elaborate an important address was given by Prof. H. F. Osborne, of New York, on recent progress in the study of ancient forms of mammalian life. A new era was opened twenty years ago by Kowalevski's memoirs on the hoofed mammals. At about the same time Leidy, Marsh, and Cope began to explore the ancient lake basins and found them rich in life. The first ten years of these twenty revolutionized our ideas of mammalian descent, and also brought data for the work of the next decade. Then came Marsh's law of brain evolution in relation to survival; Cope's proof of ungulate derivation from a simple ancestral foot resting on the sole, and with the conical ancestral molar tooth; and also Cope's demonstration of the tri-tubercular molar as the central type in all mammalia. We have learned that the fossil quadrupeds are now to be treated biologically, and not merely as petrified skeletons. The imagination must clothe them with flesh and behold them as living, moving, and feeding. New discoveries produce new conditions. There is nothing more obstructive than reverence for old ideas and systems after they have outlived their usefulness. Paleontology is no longer a science apart, as it was formally regarded. It must keep abreast with geology, historical geography, paleobotany, osteology, and embryology. All structures should be studied with reference to their homologies. Every animal should be regarded as a whole and in its relations. How many toes an animal, has is of less importance than how those toes are being displaced and reproduced. Our five

mals cluster around a simple reptilian type. General faunal succession of Mesozoic and Cenozoic time is marked by the sudden appearance and disappearance of certain series and the rise and fall of great groups. One of the most decided reforms in classification is in the use of the family division. It used to be the idea that families must be grouped as if in circles. But now they are regarded as in vertical lines, giving off branches. A horse, dog or lion is such from the moment he clearly appears to be such. In other words, we deal not with great separate lines of descent, but with stages of evolution in the same or parallel lines. The evolution of a family is simply an uninterrupted march in one direction. A certain trend leads to a final issue; but extinction or survival of the fittest exerts no influence en route. These changes en route lead us to believe either in predestination or in kineto-genesis. The trend of evolution is not the happy result of many trials: but it is heralded in structures of the same general form the world over, and in age after age by changes advancing irresistibly from inutility to utility. It is an absolutely definite and lawful progression. Fortuity is precluded.

fingers are a reptilian legacy; and the teeth of all ani-

Several papers will now be reported that had a bearing on the age of the globe and the length of time it bas been inhabited ; and the excited and animated discussion of these topics may be regarded as the most marked feature of this meeting of the A. A. A. S. The discussion was indeed originated at least a year ago, that is in its present form, and there is evidently a wide divergence of opinions, as well as

sedimentary rocks of North America, Professor C. D. Walcott, of Washington, D. C., conceded, at the outset, that it is uncertain and is in conflict with the teachings of some other sciences. The physicist, for instance, requires us to bring terrestrial time within the extreme limit of twenty or thirty million years. The geologist replies that he cannot bring his facts within such narrow limits. Sir Charles Lyell, basing his estimate on modifications of certain species of marine life, assigned 240,000,000 years as the required length of geologic time. Darwin claimed 200,000,000 been possible only where there was a corresponding years; Crowell, about 72,000,000; Geikie, from 73,000,000 Upham, and other recent authorities claim from 100,000,000 up to 680,000,000 years. Notwithstanding The attempt in Professor Walcott's paper was to throw light on the problem from ascertained facts as to the evolution of our continent, which was outlined in the Archean period and has not materially changed since. Its areas were more clearly outlined in Algonkian time, since which the changes have all been above the level of the deep seas. Sedimentation as the result During the Upper Cambrian time the broad Mississippi area was worn down and the mass removed was caroriginator. In conclusion, Prof. Le Conte said he was ried into the ancient Cordilleran Sea. The processs ready, if need be, to sacrifice "the child of his brain," then was rapid, as compared the similar work in

without Alcohol.-By M. KROUCHKOLL.-Full descrip-XV