

THE GEOLOGICAL HISTORY OF NORTH AMERICA.

BY DR. STEVENS.

Fifth Lecture.

The subject for the evening is one of the most interesting and exciting in the whole range of geological studies. That the North American continent, over a large portion of it, should have been populated with lizards of the most enormous dimensions, while the oceans and lagoons were vexed with similar monsters, might well excite our wonder and raise a doubt as to the genuineness of our deductions from paleontological data.

In the reptilian age, the United States, as represented upon this map, had assumed a contour somewhat similar to its present coast outline, save that the islands along its seaboard and the peninsula of Florida were not then in existence. The strata of rock which compose the system or group known as the reptilian, commence at Martha's Vineyard, and extend in a narrow belt to New Jersey, then rapidly increasing in width, they stretch across this latter State and all the Atlantic States to Georgia, thence broadly across the Gulf States into the Indian country, and the wide savannas of the interior of the continent, through Kansas, Nebraska, the Red River of the North to the Saskatchewan, and probably to the north as far as the continent extends, again west of the Rocky Mountains, filling up the great interior basin of Utah, reaching into California and southwards into Mexico.

The Gulf of Mexico, you perceive is much larger than at the present. There is no peninsula of Florida. The delta of the Mississippi must have been as high up as Memphis if this river was then in existence. We suppose that it was, for at the close of the carboniferous age, and before the age under discussion this evening, the Appalachian mountain ranges had been elevated, and drainage of the continent must have been effected by a river system, much as at the present time. The high plateaus of the carboniferous were cut through by the Ohio and its affluents, on the west, the Potomac, Susquehanna, and Delaware on the east, while the valley of the Hudson, was filled by an estuary of the ocean extending by Lake George and Lake Champlain, into Canada, to meet with another estuary filling the valley of the St. Lawrence.

About the middle of this age the valley of the Farmington river, Connecticut, in part the Connecticut above Middletown to the Vermont line, and the New Haven valley up to the Farmington, was also an arm of the sea, in which the red sandstones were laid down, and on the shores of this estuary walked those strange animals revealed only to us by their

"Footprints on the sand,"

and pictured in our imaginations as birds of gigantic height, kangaroos of enormous dimensions, batrachians of fabulous proportions, and unknown beasts of such strange pedal extremities that comparative anatomy knows not where to find their living analogues.

If some sporting cockney, some city Nimrod, should enjoy a hunting season in the green woods of New Jersey, and return bearing with him as a trophy of his prowess a land lizard the size of a small elephant, which he had successfully bagged—the monster not bagging him—we should all be astonished at this modern wonder of the world; Barnum would be on the *qui vive*, neither sleeping nor resting until it reposed by the side of his whale and river horse. Doctor Leidy made an incursion into the cemeteries of the dead of this era, in this State, and exhumed from the marl beds the entire skeleton of one of these strange and extinct animals. So accustomed are we to these feats of these resurrectionists and the wonderful discoveries they bring to light, we cease to marvel, and with all the composure of modern science proceed to arrange them in their proper position and assign them their appropriate niche in the grand mausoleum of the ancient dead.

The valleys of the Deep and Dan rivers of North Carolina, were also filled with these red sandstones, and the tale they tell is of birds allied to the ostrich, roaming over the sands of the pine-wood State; of vegetable lizards feeding on the zamites and cycades, plants found now only in Australia and the hot climates of the globe. And what is still more significant, they tell of marsupial animals, of which the

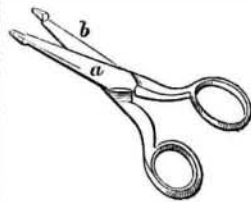
opossum is now our only representative in the United States, sporting in the evening twilight and moonshiny nights, feeding upon the fruit-bearing trees which, in this age, began to adorn the forests of America and enrich them with their luscious productions, thus giving a double promise of higher order in the vegetable kingdom, to be introduced into the "new earth" to be created in the succeeding age, and new and higher types of animal life, to enter upon and enjoy the full fruition of the prophecy.

While the woods and waters of the North were thus strangely tenanted, the savannas and lagoons of the South had, too, their monstrous saurians and crocodiles, and the waters of Alabama were vexed with the zeuglodon, an animal allied both to the lizard and the whale, and rivaling the largest spermaceti whale in length and largeness of its dimensions. A botanical rambler in the woods peopled by these strange reptiles, would have had his senses regaled by spicy breezes from groves of cinnamon and the tulip tree, while fruits of the fig, persimmon and pawpaw would have melted with lusciousness upon his tongue, and satisfied his appetite. He could have gathered nuts from the chesnut, medicines from the willow, poplar and cedar. At night he could have spread his couch with branches of the spruce and made his siesta by day under the shade of the oak or elm as his fancy might choose.

The economic minerals of this age are mainly the coal of Richmond, Va., and of Deep and Dan rivers, North Carolina. The copper and lead ores of Perkiomen, Pa., and Belvidere, N. J., but in general the copper ores are not reliable. Iron ore, as hematite and bog ore, has been found in the Atlantic and Gulf States. The lime rocks of this age in Mexico and South America are silver-bearing. The lignite beds (coal), of the Rocky Mountains and Pacific coasts belong also to this age. The fertilizing green sand marls of New Jersey, Alabama, Mississippi and Tennessee, are the peculiar minerals of the cretaceous period. The rich colored fire stones of Connecticut and New Jersey are from the rocks of this age.

SCISSOR NIPPERS.

Combined tools and instruments have of late years received more attention than formerly, and they are yet destined to receive more attention still. A single instrument, possessing more than one function, when equally simple in construction, is far more convenient than one which can only be used to perform a single operation. The accompanying engraving represents a pair of scissors with the points of the blades formed into nippers, thus combining a cutting and grasping instrument in one. For cutting cloth, pulling out the ends of thread in cloth, &c., its objects and aims will be readily understood. Patented by H. D. Walcott, Boston, Mass., March 13, 1860.



HARDENING AND TEMPERING TOOLS AND METALS.

Number III.

For tempering steel wire a patent was obtained by H. Waterman, of Brooklyn, N. Y., in 1858, embracing the following features:—The wire to be operated is secured upon the circumference of a broad wheel which is provided with a tension brake. This wheel, with its steel wire upon it, is placed at one end of a furnace having a hole in its wall, through which the wire is drawn, passing through the fire, then into a trough containing oil placed on the other side, and from thence it passes to another reel, on which it is wound up. This latter wheel has a screw upon its shaft whereby it receives a lateral combined with its rotary motion, and the wire is thus taken up spirally without being overlaid. The fire for heating the wire must be bright and clear, and the metal should not be raised above a dull-red color. The tension on the brake and take-up reel takes all the crooks out of the wire while passing through the furnace, so that it is wound up evenly. The wheels are now removed from their position at the furnace, and the wire is wound back from the take-up to the delivery wheel, and in doing so it is passed through dry sawdust to remove

the oil from it. After this the wire is tempered by placing it in an oven heated from about 550° to 570° Fah., and here it is kept moving from one reel to the other until the desired uniform temper is secured.

An acquaintance has informed us that he has tempered steel wire without first hardening it. He raised it to a red heat in a clear fire, then plunged it into a bath of hot oil instead of into cold oil, and then heating it afterward to "draw the temper," as by the common mode. This idea may be worthy of more extensive application; it is at least deserving of further experiment.

It is now well known that better chilled surfaces of railroad wheel tires are obtained by pouring the molten metal into heated molds than by the old method of pouring it into cold molds. It was at one time supposed that in order to produce chilled iron the molds were required to be quite cold, but the chilled surfaces thus obtained were frequently crinkled, blistered and uneven. This evil has been completely overcome by the use of heated molds. At the Union Wheel Foundry, Toledo, Ohio, where a great number of railway car wheels are cast, the molds are heated by steam introduced from a boiler, by tubes, to the molds on the floor of the foundry. This is a decided improvement upon the former mode of heating the chills in an oven and then lifting them out on the floor. Kindred results may be obtained in tempering metals with hot instead of cold baths.

CHEMISTRY OF IRON.

Number VIII.

THE ALLOTROPIC STATE.

Of all the wonderful facts embraced in the science of chemistry, there is none more wonderful than that curious property which certain substances have of passing into an allotropic condition. Prof. Youmans compares it to the state of a man when he is asleep. The substance by being subjected to certain manipulations, has its properties so completely changed that it seems to be no longer the same substance. This property has lured some of our most eminent modern chemists into the old dream of the alchemists, of changing iron and other cheap metals into gold.

Perhaps the most valuable use that is made of the power of putting substances into an allotropic state, is in the manufacture of friction matches. Phosphorus takes several allotropic conditions, in one of which it is known as red phosphorus. In this state it does not take fire from friction, nor does it emit the deleterious vapors which have produced such frightful effects upon persons employed in match factories. The phosphorus is, accordingly, by exposure to light under certain conditions, and other manipulations, passed into the allotropic condition of red phosphorus, when it can be transported or handled with impunity. In this state it is used for making matches, and it then slowly returns to its normal condition.

By several processes iron can be thrown into an allotropic condition, which has been called the passive state. In this state it is not acted upon by nitric acid, and its properties vary in several particulars from those which it ordinarily exhibits. If a piece of iron is put into nitric acid of specific gravity of 1.3, it dissolves freely with effervescence, but if a piece of platinum wire be placed in the acid, and then the iron be introduced in contact with the platinum, the acid will not now act upon the iron, even if the platinum is withdrawn. Another piece of iron put into the acid in contact with the previous piece, will become affected in the same way, and so on with a third or more pieces. Another mode of making iron passive is to oxidize one end of the piece in the flame of a lamp. It may also be effected by making it the positive pole of a battery, by a blow, and in other ways. A piece of passive iron can be restored to its normal condition by rubbing it, or by bringing it in contact with active iron.

The allotropic state of substances is a comparatively new and very inviting field for chemical research. It is supposed by some chemists that all of the elements may be subject to this mysterious change, and the investigation of the subject will probably yield some very curious results.

SENATORS Fessenden and Trumbull have been appointed regents of the Smithsonian Institution in the places of Senator Douglas, deceased, and Senator Mason, the secessionist.