THE GEOLOGICAL HISTORY OF NORTH AMERICA.

BY DR. STEVENS.

Sixth Lecture.

At the era treated of in our last lecture, the lizards and other reptiles were the most abundant of any class of animals, and they were the highest type of animals upon the earth. Next after them were created those animals which suckle their young. These are called mammals from the Latin word, *mamma*, breast.

The characteristic feature of the mammalian era was the introduction of many species of large animals now extinct, some of them allied to existing genera, but most of them having no living analogues.

Animals now only found within the tropics—as the elephant, rhinoceros, and tapir—had their feeding grounds as far north as Canada. While the Mastodon roamed still farther north, and his limits reached from the Rocky Mountains to New England and Long Island. In the rivers of Nebraska, swam the hippopotamus, now only found in the waters of the warm regions of Africa. Several species of rhinoceros wallowed in the cane brakes of the same State.

In Virginia and Kentucky, the mammoth sloth, *Megalodon Jeffersoni*, browsed on the forests of poplar, willow and trees of other genera that have come down to our day. Animals of the camel order trod the sandy deserts, the hog wallowed in his mire, the horse skimmed over the plains, the ox fed on the broad prairies and ruminated in the shade of forests growing by the water courses.

About the middle of this era, carniverous animals were introduced, to feed upon the increasing multitudes of the ruminants, thus fulfilling the great law of the animal kingdom, that the enormous power of reproduction given to lower animals should not increase so vastly as to fill the earth to the exclusion of others, but that the Malthusian fear of the danger of overpowering reproduction, should be removed by an order of animals destined by habit, dentition, physiology and design, to feed upon their fellow animals, and keep within limits the number of individuals.

A very significant feature of the close of this era, is the increase of animals allied to our domestic and mals, milk and flesh-producing—with burden-bearing —while at the same time there was an increase of fruit bearing trees, bread-producing cereals and grasses clothing the plains, not necessary for the old type, and prophetic of a higher type in the succeeding age.

In the latter part of this era appear the monkey tribes—men of the woods—earlier upon the European, later upon the American continent. According to the development school, these are the progenitors of the human race, but according to a more rational school, and to which geology lends all its testimony, they are the ante-type of man; just as the closing years of each preceding age gave promise of newer and higher types in the eras following.

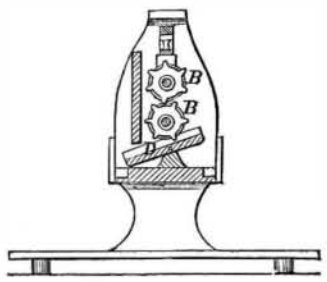
Our continent received additions in this age along its sea-board line from Lubec, in Maine, to Florida, the Gulf slopes of the Gulf States, the valley of the Hudson, Lakes George and Champlain, and the St. Lawrence received deposits. We think also that the blue and yellow clays of the lake region belong to the same age. A large inland body of fresh water filled the eastern part of Nebraska, and with many interruptions, this or similar bodies extended by the Red river of the north, west of Lake Winnipeg, perhaps up to the Arctic continent. Greenland also had additions to its sea-board line. Disco Island and the main land have coal or lignite of this age. The desert of Utah, and south of it, along the Colorado, and large patches in California were covered by waters of the Gulf of California and the Pacific Ocean.

We have no valuable minerals added to our mining treasures in this age, but what is quite equivalent to it, the gold of the Pacific slope of the continent was washed from the mother veins and deposited in placers for the miners of the present time.

THE export trade of Great Britain and Ireland has suffered a great reduction this year. For the last nine months, commencing January 1st, ending October 1st, it amounted in value to £93,795,332, against £101,724,346 in 1861. The entire falling off for the year will amount to about $53,000,000.

WRINGING MACHINE--WASHING MACHINES FOR THE ARMY.

A correspondent writing to us from Philadelphia, says "we have army stores, army chests, why not army washing machines?" Yes, why not? This is a good suggestion, and as an accompaniment to washing machines why not army wringing machines? Clothes out of which the water is very thoroughly pressed, will dry in one-fourth the time of clothes which are imperfectly wrung. Dispatch in wringing and drying clothes is very desirable, and the accompanying figure represents a combined wringing machine for extracting the water from washed clothes. B B are two rollers covered with india rubber, and meshing with teeth into one another. Below them is an oscil-



lating guide board, D. This machine can also be used for washing clothes as well as wringing them, as the roller will rub the clothes upon the oscillating board, D, while it squeezes out the water. The journal of the upper roller is graduated by a screw box to exercise any degree of pressure necessary. The course of the water is directed by the board, D, to pass into the tub at the one side. By passing the clothes between the rollers, the water is pressed out of them in proportion to the pressure on the journals.

Patented by S. A. Bailey, March 17, 1860.

HARDENING AND TEMPERING TOOLS AND METALS.

Number VI.

Watch springs are both hammered and rolled out of steel wire until they are reduced to fit a gage which determines their equality in thickness. After being trimmed on the edge and punched at the end they are tied up in a loose open coil with a binding wire and placed upon a revolving iron plate which is situated over a charcoal fire. When they attain to a dull red color they are lifted off and plunged into a cold oil bath, which hardens them; they are then run through the fire and the oil "blazed off," which operation tempers them. Each spring is now distended upon a long metal frame, like that of a saw blade, and polished with emery and oil placed between two blocks of lead. This polishing operation completely destroys the elasticity of the spring, when it may be bent like a piece of iron, but the elasticity is again restored by hammering it upon a polished anvil. After this the springs are colored blue by placing them upon a flat plate of iron covered with a hood which is heated by a spirit lamp placed under it. The spring is continually drawn backward and forward, a few inches at once, in this small oven, until it assumes the deep blue color desired. The coloring of these springs is not really essential, but most people have a different opinion. Each spring, after being colored, is coiled into spiral form with a small tool which winds it upon an axis.

The hair springs for the balance wheels of watches are frequently left very soft, but the best are hardened and tempered in the coil placed round a small cylinder. After this they are curled spirally between the blunt edge of a knife and the thumb of the operative, in the same manner that a strip of paper and the filament of an ostrich feather are frequently curled. The art of manipulating balance springs requires great practice, and a fine touch of the hand. These delicate articles are really triumphs of mechanical skill, as it takes about three thousand of them to weigh one ounce.

Bow springs for carriages and railway trucks are hardened by first heating them in a clear hollow fire on a hearth until they are red hot, then they are dipped in water. After this the temper is given by heating them until a piece of wood drawn across the surface emits a sparkle, when they are removed and cooled in the air. An oven heated to 600° may be used as a superior substitute for tempering in the open fire.

Much diversity of opinion exists respecting the cause of elasticity or spring in steel and some other metals. The thin blue skin upon the surface of a steel spring is supposed to be the principal part which sustains the elasticity, as when this is rubbed off the elasticity is always impaired. But swords are polished as bright as mirrors and some of them are so elastic that they may be wound upon a cylinder and will spring back to their original set. It is not the blue skin then which contains the essence of the elasticity in springs.

The principles and practice in hardening and tempering steel consist in first heating the metal or tool until it becomes red hot, then plunging it into a cold solution, which hardens it. It is now tempered (rendered softer and made elastic) by reheating it, but not up to the previous heat which was used before hardening. Cold water, salt brine and various preparations of oils and grease are used for hardening baths. Almost every cutler and blacksmith has some little hidden secret which he thinks is better than that of every other person. We apprehend that many nonsensical ideas prevail among mechanics and other on the subject. We have records of several experiments in tempering steel, but there exists a necessity for a new set to be undertaken, and we hope some judicious mechanic will undertake them, and furnish the public with the results through our columns.

CHEMISTRY OF IRON.

Number IX. and Last.

CHEMICAL NOMENCLATURE.

No other science has so perfect and simple a nomenclature as chemistry. When any elements enter into combination, this combination is expressed in the name. A substance formed by the combination of oxygen with iron is called the oxide of iron, and one formed by the combination of sulphur and iron is called the sulphide of iron; the name of the metal, when one is a metal, being placed last, and the non-metallic element taking the termination *ide*; thus we have phosphides, bromides, iodides, &c.

Oxygen in combining with other elements in many cases forms acids, and when this is the case the substance is simply called an acid with the termination *ic*, as sulphuric acid, nitric acid, phosphoric acid, &c. If oxygen combines with an element in two proportions forming two acids, the one having the least oxygen takes the termination, *ous*, as nitrous acid, sulphurous acid, &c.

When an acid combines with a base to form a salt the compound is expressed by the termination *ate*. Thus carbonic acid and soda form the carbonate of soda. But if the acid ends in *ous* the salt takes the termination *ite*. Sulphuric acid and lime form the sulphate of lime, while sulphurous acid and lime form the sulphite of lime.

When elements combine in several proportions these are distinguished from each other by a few Greek and Latin prefixes: *protos*, first; *per*, through or to the end; *hypo*, less; *sub*, under; *bi* or *deu*, two; *tri*, three; and *sesqui*, one and a half.

This may be illustrated in the combination of the two gases that form atmospheric air. Oxygen combines with nitrogen in five different proportions; in the proportions respectively of one atom of nitrogen to one, two, three, four, and five atoms of oxygen; expressed in symbols

$$N\,O$$
$$N\,O_2$$
$$N\,O_3$$
$$N\,O_4$$
$$N\,O_5$$

Two of these compounds, $N\,O_3$ and $N\,O_5$, have acid properties, hence the $N\,O_5$ is called nitric acid and $N\,O_3$ nitrous acid; leaving us three substances to be called oxides. From the principles laid down we shall have no difficulty in naming them. N O is the protoxide of nitrogen, $N\,O_2$ the deutoxide (the t being introduced for euphony) and $N\,O_4$ the peroxide.

TWELVE miles south of Chicago, the Illinois Central Railroad Company are engaged in building a continuation of corn cribs, said to be eleven miles in length, along the line of the road, with a total capacity exceeding 3,000,000 bushels.