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THE MISSISSIPPI RIVER.

The lands in the Mississippi Valley are so subject to the increase of exposure, that we may hazard the assertion with safety, that there is not by twenty or twenty-five per cent as much water now passes down the Mississippi annually as there was twenty-five years ago. This conclusion is not arrived at hastily, but by patient observation of the circumstances in connection therewith during all that lengthy period, at whose beginning there were annual inundations of almost all the lower bottom lands and for very lengthy periods of submergence of almost all the bottom lands, from the Bluffs or Highlands on one side of the river bottom to those on the other side, and in such a degree that but little or no hopes were entertained of the practicability of their redemption by any artificial means, that is, on any scale. But such has been the diminution in the annual quantity of water discharged from the Valley, that those lands have been progressively and rapidly redeemed from overflow, until very great portions of them are now in the highest state of cultivation, and with but comparatively slight assistance from art, in the way of embankments, and these such as would not have been at all available against the overwhelming effects of former floods, and the length of time of their continuance; then there were lengthy and annual inundations; both deep and expansive, of the waters over almost all the bottom-lands; but now the River seldom rises in the same elevation as formerly, and when it does it is of much shorter duration, and the waters are almost exclusively confined to the channel of the River, in place of being spread over almost all the bottom-lands the whole Spring and early part of Summer. All the advantages are progressively but as rapidly extending themselves, while the causes remain unsuspected or overlooked, but none the less secure. As a farther evidence of the altered condition of this River, we may mention the circumstance, that in former times the steamboats ascending or descending the River were detained about half their time by dense fogs, now hardly any such obstructions prevail—so that packets succeed in making their trips to an hour with no fears of such retardation. Assuming that the diminution of the water will continue in somewhat the same ratio they have recently done, the time cannot be very far distant when all apprehension from inundation will have in a great measure passed away. We will farther remark, as an evident change, that the quantity of floating timber or drift wood passing annually down the river has diminished in a far greater ratio than that of the water, so that the aggregate quantity cannot now be over 50 per cent. of that which formerly passed down.

We will now give you the quantity of soily matter with which the waters of the Mississippi are annually charged, together with its effects in the formation of lands or filling up of depressions. In order to arrive at these required facts, the following methods were adopted: first, a series of glass vessels of cylindrical form were procured, to one end of which was attached a tin tube of the same cylindrical diameter as that of the glass vessels to which it was attached in the tin tube; immediately above its junction with the glass cylinder there was inserted a small brass cock, by which the tin tube could be conveniently discharged of its contents at pleasure without causing disturbance to the contents of the glass vessels below—this tin tube was in length 48 inches. This tube was charged with water from the Mississippi River, and this water allowed time to deposit its contents into the glass vessel below; that being accomplished, the water was drawn off, and the tube recharged by water from the river, each particular charge being noted This was successively repeated from the different conditions and stages of the river's height and velocity, which very materially affects the quantity of suspension, this by a succession of such changings and dischargings of the tin tube, amounting in all to 484 times, or, in the aggregate, to a column of water of 1,936 feet from which column of water there was deposited a column of sediment inclosed in three tubes of 44 inches. Assuming that, therefore, to be the true quantity and the true product of a column of river water of 23,232 inches, it necessarily follows that as 44 is to 23,232, so is the quantity of sedimentary matter contained in the water to the volume of the river or, in other figures and words, the mean proportional quantity of sediment to the river is as 1 to 528.

We have already ascertained the quantity of water annually discharged by the Mississippi River to be, 14,883,360,636,880 cubic feet, there must then be deposited from that quantity of water, 28,188,083,892,1-6 cubic feet of solid matter.

Being in possession of the data by which may be computed with some approximation to certainty, the effects of the Mississippi deposits in the formation of land, or in filling up the Gulf into which it is emptied, we will avail ourselves of such data, and endeavor to present the quantites deducible therefrom. In estimating the Delta of the Mississippi, we have adopted for it the superfices assumed by Dr. Lyell, in his investigation of this subject, and will say with that gentleman that the Delta of the Mississippi River comprehends all that great alluvial plain which lies below or to the south of what until recently, was the first branching off or highest arm of the river called the Achafalaya. This Delta is computed to contain a superficial area of 13,600 square miles.

In deciding on the depth of this quantity we will adopt that which was assumed by Prof. Riddell on this subject, and say that it is of the average depth of one fifth of a mile or 1,055 feet, inferred from that being the average depth of the Gulf of Mexico, from the Balize to the point of Florida.

We find by computation, agreeable to the above data that it would require a quantity not less than 400,378,429,440,000 cubic feet, or 2,720 cubic miles solid matter to constitute this Delta, having ascertained the quantity of solid matter annually brought down by the Mississippi river to be 28,188,083,892 cubic feet, which would be equal to one square mile of the depth of 1,056 feet in 381 1-5 days or one cubic mile in 5 years and 81 days—it therefore follows that it would require a series of 14,203 4-5 years for the river to effect the final formation of the present delta.

We are not disposed to consider that great alluviar plain, stretching with the river from the above designated *Delta*, as far up as Cape *Gerardian* in *Missouri*, as any other part of the delta proper, nor can it ever have been any continuation of the Gulf of Mexico. The evidences are vastly against any such conclusion, inasmuch as the deluvial which constitutes the highlands bordering on each side of this alluvial plain, by its general distribution would have been equally deposited in such gulfs or arms of the sea, which in reality could not have been the case, for the river has excavated through this diluvial and exposed it in many places, resting on what is evidently of another formation; and such is not only found to be the case at the base of the diluvial hills, but the same formation is found also to constitute the bed of the river at many other points detached for very considerable distances from any highlands.

This bed of the river is a substance of entirely different character from the composition of any part of the diluvial bluffs, and possesses all the characteristics of a well formed rock, which requires a pick to effect its reduction. The superficial area of the valley has been found to be about 16,000 square miles, bounded by highlands on either side, ranging from 50 to 250 feet high above the level of the plain. Should this space therefore have been reduced or excavated by the river as we assumed, it must have transported the diluvial matter, and caused it to form part of its delta. Now assuming the average height of the highlands above the plains to be 150 feet, we would therefore obtain 454½ cubic miles, or 66,908,160,000,000 cubic feet of matter, as its proportionable contribution in the formation of the Delta; the balance required being 332,470,269,440,000 cubic feet to be derived from the reduction of other lands; the two sources being to each other as 1 to 5.98, or by giving another expression to the same quantities, there is in the Delta 2,720 cubic miles of matter; 454½ of which would be derived from the diluvian in the excavation of this valley, the other portion would consist of 2,265½ cubic miles to be derived from other sources or the reduction of other lands.

We have now traced this great river through a period of 14,204 years, but how it was occupied before that time or what was the condition of the country over which its waters passed, is more than we can safely venture to say—but on particular examination of the bluffs, which bound its present plain, it will be very difficult to resist the conviction that the river has great agency in depositing the upper and loamy stratum which varies from a few feet to upwards of fifty in thickness, in all of which stratum there is abundance of land and pluriatile shells, such as those now found in the present deposit from the river.

We have found the age of that deposit to be not less than 14,204 years, through all of which time the waters have been actively engaged in changing the face of the country and transporting 2,720 cubic miles of its matter to a far distant location. The above may be said to comprehend all the required particulars with respect to the waters of the Mississippi River or its deposits.

Gunpowder and Greek Fire.

M. Renaud has lately discovered an Arabian MS. of the thirteenth century, which proves that compositions identically with gunpowder in all but the granulations, were and had been for a long time previously, in the possession of the Arabs; and that there is every probability they had obtained them from the Chinese, in the ninth century.—Many of these were called "Greek fire;" and comparing the account of Joinville, of the wars on the Nile in the time of St. Louis, with the Arabic recipes, there can be little doubt that we are now in possession of what was then termed "Greek fire." Mr. Groves F.R S., who has investigated the subject experimentally as well as historically, concludes that the main element of Greek fire, as contradistinguished from other inflammable substances, was nitre, or a salt containing much oxygen; that Greek fire and gunpowder were substantially the same thing; and that the development of the invention had been very slow and gradual, and had taken place long antecedent to the date of Schwartz, the monk of Cologne, A. D. 1320, to whom the invention of gunpowder is generally attributed; thus adding to the innumerable it not unexceptionable cases, in which discoveries commonly attributed to accident, and to a single mind, are found upon investigation to have been progressive, and the result of the continually improving knowledge of successive generations.

Tortoise Shell.

Tortoise-shell, or rather scales, a horny substance, that covers the hard strong covering of a bony cohtexture, which encloses the *Testudo imbricata*, Linn. The lamellæ or plates of this tortoise are 13 in number, and may be readily separated from the bony parts by placing fire beneath the shell, thereby they start asunder. They vary in thickness from one eight to one quarter of an inch, according to the age and size of the animal, and weight from 5 to 25 pounds. The larger the animal, the better is the shell. This substance may be softened by the heat of boiling water; and if compressed in this state by screws in iron or brass moulds, it may be bent into any shape The moulds being then plunged in cold water, the shell becomes fixed in the form imparted by the mould. If the turnings or filings of tortoise-shell be subjected skilfully to gradually increased compression between moulds immersed in boiling water, compact objects of any desired ornamental figure or device may be produced. The soldering of two pieces of scale is easily effected, by placing their edges together, after they are nicely filed to one bevel, and then squeezing them between the long flat jaws of hot iron pinchers, made somewhat like a hair dresser's curling-tongs. The pinchers should be strong, thick, and just hot enough to brown paper slightly without burning it. They may be soldered also by the heat of boiling water, applied along with skillful pressure. But in whatever way this process is attempted, the surfaces to be united should be made very smooth, level, and clean: the least foulness even the touch of the finger, or breathing upon them, would prevent their coalescence.

Gypsum Mounds in Western New York.

Throughout the Onondago Salt Group it is known that in the limestone beds of this formation, dome-shaped masses of gypsum occur, which have raised up the superior strata, fracturing them, while a large portion of the rock has disappeared. These masses vary from small lumps one or two feet in diameter, to hillocks of 200 feet base and 50 height; the testimony of the residents in this portion of the country unites in proving that these are yet in progress of formation, several instances having occurred where a gradual elevation of the earth has fractured walls and raised the foundations of houses, where an examination has disclosed one of these gypsum mounds, a few feet below the surface.

The Acid Springs, which belong to these rocks are peculiar as containing a large amount of free sulphric acid, besides portions of sulphates of lime, magnesia, iron and alumina. They have been observed in the townships of Byron, Elba, and Warren, N. Y. and also near Brantford, in Western Canada. That near Brantford contains, by analysis, about 5 parts in 1,000 of sulphuric acid. The amount of baser materials is very small,—while an examination of the same spring, three years since, shows that although the water was less acid it contained as large an amount of sulphates as at present, and was a saturated solution of gypsum. It evolved large quantities of carbonic acid gas. The spring was situated on a small hillock, near the roots of a large pine tree now in decay—while the earth around was barren for several rods. These facts show that the spring has burst out, within a very recent period, and that from some cause or other it is rapidly changing. The decrease in the amount of lime, while the amount of free acid is increased, plainly indicates that it no longer acts on the limestone rocks which here underlie; and lead to the conclusion, which must be regarded as at least very probable, that by this action on the calcareous rock it has formed a mass of gypsum, which by its crystalization and expansion has raised the mound and at length formed such a mass as to protect the limestone from its farther action.

On Some Properties of Alumina.

It has been observed by Wittstein that the precipitate which is obtained from the persulphate or per-chloride of iron, if kept for a great length of time in water, loses almost entirely the property of being soluble in acetic acid. Mr Phillips noticed a similar phenomenon with alumina, arising without doubt from the action of the cohesive forces. Whereas the sesquioxide of iron requires one, or probably two years for the production of the effect; alumina undergoes the change partially in a very short time:—the precipitated alumina does not, however, assume a crystalline appearance, stated to be the case with cohering sesquioxide of iron. If the precipitated alumina is kept for two days moist, and in the solution from which it was precipitated, even sulphuric acid does not immediately dissolve it.

Antimony.

It is to a monk that we are indebted for the discovery of Antimony as a metal. Antimony, although known for a long time, had exercised the untiring patience and researches of the most zealous and ardent alchemists, who deceived by its lustre, had entertained the hope of converting it into a more perfect metal, the ideal of all their operations, that is to say, silver or gold. Antimony was long used in a most queer manner for certain diseases in which this metal was thought beneficial, by being administered only in small doses. To obtain this result, small balls of this metal were made and were known under the name of perpetual pills, because of their being transmitted from generation to generation, without having lost any of their purgative properties.