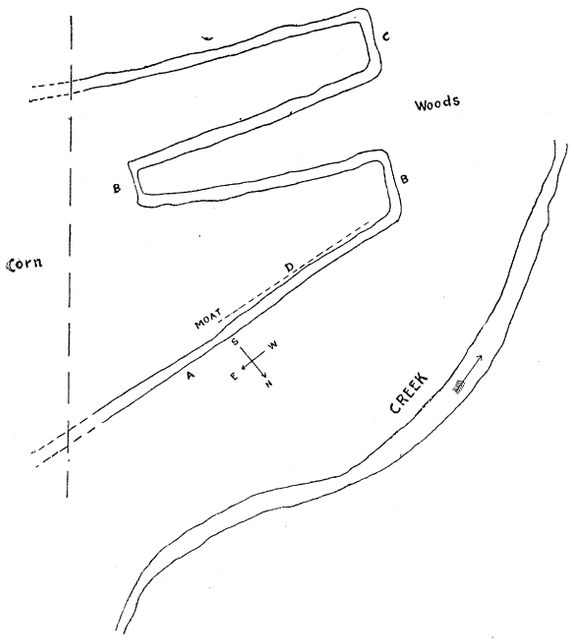
values as they are commonly considered to be. As, for example, the amount of the changes in the length of a chain under the influences of changing temperatures is related to the length of the chain, so we should expect the variability in the growth of large organisms to be on a larger scale than in small ones. There are more cells affected simultaneously by the same environing conditions. The rationale of a connection between the variability and the median may in some cases admit of being clearly made out, and in all cases it deserves more thought than it has hitherto received.

## AN ARCHÆOLOGICAL DELUSION.

BY THOMAS GORDON KING.

THE daily papers have lately published accounts of a new "serpent" effigy. It existed in southern Ohio, in Warren County, and, according to two doctors of the neighborhood, measured some nineteen hundred feet in length. It was said to surpass the famous Adams County serpent.

Professor Putnam's assistant, Mr. H. I. Smith, spent some time surveying the structure, this summer. He trenched the embankment in several places and searched the neighboring fields for traces of a village site. The accompanying rough outline gives an idea of the "serpent" so far as it can be traced. In the cornfield it will be seen that the embankment cannot be distinguished; in the woods it is plain. The part in the woods, which at present is some two feet in height, does not appear to be serpentine in character. It is almost unnecessary to add that if the remaining part of the structure does not represent a serpent, the obliterated portion never did. There is not the slightest grounds for the assumption that this figure in any way resembles the Adams County effigy. The latter is laid out in graceful curves, which *suggest* the character of the effigy. The embankments of the Warren County structure resemble those of Fort Ancient. The long straight line *A*, and the sharp, squared bends *B* and *C* are the exact counterpart (although much smaller) of certain parts of south Fort Ancient.




A live snake could not take the form of this "new serpent" without breaking his back in three places. (I write under the impression that aborigines imitate living and not dead animals). There is a slight moat at the base of the embankment, which, although nearly filled, can still be traced. To one who has seen all the shell, bone, stone, and clay representatives of serpents and serpent-symbols displayed in the museums of this country, the "new serpent" does pot appear serpentine. I cannot see how the angular corners *B* and *C* and the moat *D*, and the embankment *A*, mark other than parts of a peculiar defensive earthwork.

The primitive Americans in drawing, moulding, building, or sculpturing snakes evinced a certain similarity of idea in design, and employed a common mode of execution. Yet this "new serpent" has nothing in common with other serpents! (Read Holmes on "Art in Shell.") As this new serpent is such a poor representative that Professor Putnam and other competent judges dare not place themselves on record in naming it, I have no hesitancy in calling it a rude fortification. The native Americans were sufficiently competent to execute a figure with such distinctness and closeness of resemblance as would allow of no dispute. Those who are interested in following the discussion further will please compare the diagram submitted with Squier and Davis's plan of the Adams County effigy. There are many similar combination works in the Ohio Valley, and it is probable that the thorough exploration of several might furnish evidence as to the purpose for which they were erected.

## LETTERS TO THE EDITOR.

### Man and the Glacial Period.

I ACKNOWLEDGE with pleasure the courtesy with which Dr. Brinton, in his review of "Man and the Glacial Period," has dealt with the question of the genuineness of the reported discoveries of implements in the glacial gravels of the United States. This, of course, was the first question to be settled, Were implements of human manufacture really found in undisturbed strata of gravel which was deposited during the glacial period? If this question is settled in the affirmative, then all glacial geology has direct bearing upon the question of archæology. If it is decided in the negative, glacial geology remains the same, but it ceases to have interest in connection with archæology. I am glad to have the issue so clearly made by Dr. Brinton, and thereby to have occasion to present more specifically my reasons for belief in the genuineness of these discoveries.

The evidence naturally begins with that at Trenton, N. J., where Dr. C. C. Abbott has been so long at work. Dr. Abbott, it is true, is not a professional geologist, but his familiarity with the gravel at Trenton where he resides, the exceptional opportunities afforded to him for investigation, and the frequent visits of geologists have made him an expert whose opinion is of the highest value upon the question of the undisturbed character of the gravel deposit. The gravel banks which he has examined so long and so carefully have been exposed in two ways: 1st, by the undermining of floods on the river side, but principally by the excavations which have been made by the railroad and by private parties in search of gravel. For years the railroads have been at work digging away the side of the banks until they had removed a great many acres of the gravel to a depth of twenty or twenty-five feet. Anyone can see that in such conditions there has been no chance for "creep" or landslides to have disturbed the stratification; for the whole area was full of gravel, and there was no chance of disturbance by natural causes. Now Dr. Abbott's testimony is that up to the year 1888 sixty of the four hundred palæolithic implements which he had found at Trenton had been found at recorded depths in the gravel. Coming down to specifications, he describes in his reports the discovery of one (see "Primitive Industry," 492) found while watching the progress of an extensive excavation in Centre Street, which was nearly seven feet below the surface, surrounded by a mass of large cobble stones and boulders, one of the latter overlying it. Another was found at the bluff at Trenton, in a narrow gorge where the material forming the sides of the chasm had not been displaced, under a large boulder nine feet below the surface (ib. 496). Another was found in a perpendicular exposure of the bluff immediately after the detachment of a large mass of material, and in a surface that had but the day before been exposed, and had not yet begun to crumble. The specimen was twenty-one feet from the surface of the ground.

In all these and numerous other cases Dr. Abbott's attention was specially directed to the question of the undisturbed char-

acter of the gravel, having been cautioned upon this point in the early part of his investigations.

Nor is he the only one who has found implements which were clearly in those undisturbed gravel deposits. Professor Shaler (Report of the Peabody Museum at Cambridge, Vol. II., p. 45) found two of the implements twelve feet below the top of the bank, where he says that it was difficult for him to believe that they could have travelled down from the superficial soil, and he expresses it as his opinion, after having gone over the ground with Dr. Abbott, that the implements which Dr. Abbott had found occurred under conditions that make it "quite unquestionable that they were deposited at a depth of many feet below the soil, and are really mingled with the drift matter that forms the section before described." This is the description which I have quoted in my volume (p. 242). Professor Putnam, also, personally found implements in position which he decided to be certainly undisturbed gravel (see 14th Annual Report of Peabody Museum, p. 23, and Proc. Boston Society of Natural History for Jan. 19, 1880).

The question of the occurrence of these implements in undisturbed gravel was so thoroughly discussed by the scientific men in Boston who visited the region about 1880 that I had supposed there was no longer any reasonable doubt concerning the facts, and I feel sure that anyone who goes through the records of the Peabody Museum and the Boston Society of Natural History about that time will be convinced. At the same time I would say that I have been unable myself to find any implements in place, though I have frequently examined the bank. But I have not felt at liberty on that account to doubt the abundant testimony of others who have. If we are limited to believing only what we ourselves have seen, our knowledge will be unduly circumscribed; and though I might be more certain of the facts if I had seen them myself, I do not see how I could increase the confidence, in the facts, of other people who could disregard the testimony already in hand.

Passing now from the discoveries at Trenton, N. J., to those in gravels of corresponding age in Ohio, we do not come to the subject with the same amount of incredulity with which we first encountered the evidence at Trenton. Dr. Metz has been for years co-operating with Professor Putnam in various investigations, and the discovery of a flint implement by him in excavating for a cistern in his own yard was such that no reasonable question can be raised as to its having been undisturbed since the deposit was made, and there can be no reasonable question that the deposit was made during the continuance of glacial conditions in the State. I have described the conditions in a report to the Archæological Society of Ohio for December, 1887.

The discovery of a palæolithic implement at New Comerstown, Ohio, by Mr. W. C. Mills, is an equally well-attested case. Mr. Mills, like Dr. Abbott, resided in close proximity to an extensive glacial terrace to which the railroad was resorting for ballast. Many acres of the gravel have been removed. During the progress of these excavations Mr. Mills repeatedly visited the pit, and after a fresh excavation discovered this implement in a perpendicular face of the bank fifteen feet below the surface. The facts were recorded in his diary and the implement placed in the general collection of Indian relics which he was making. Mr. Mills was at that time engaged in business in the place, but he had been a pupil of Professor Orton in geology, and was well qualified to judge of the undisturbed character of the gravel in which this implement was found. As anyone can see by consulting the photographic illustrations on pp. 252 and 253 of my volume, the implement itself is an exact duplicate, so far as form is concerned, of one which I have in my own collection, from Amiens, France, and which came to me, through Professor Asa Gray, directly from the collection of Dr. Evans in London. The New Comerstown implement was submitted to Professor Haynes of Boston and to others at a meeting of the Boston Society of Natural History, and by them pronounced to have all the essential characteristics of palæolithic age. The full report upon this is found in Tract No. 75 of the Western Reserve Historical Society, Cleveland.

As to Miss Babbitt's discoveries at Little Falls, Minn., I have nothing further to say than that up to the present year no serious question had been raised concerning the glacial age of the gravel in which her implements were found. But as questions have now been raised in view of recent examinations, I will not attempt to discuss the matter until the facts are more fully published. But the removal of this case from the category would not disturb confidence in the evidence connecting man with the glacial period in New Jersey and Ohio.

The statement of Dr. Brinton that a well-known government geologist had recognized the Nampa image "as a clay toy manufactured by the neighboring Pocatello Indians" is news to me, and it is due to the public that this official's knowledge of the subject should be more specifically detailed. The facts as I have brought them out by prolonged and minute inquiry do not warrant any such flippant treatment of the evidence. Professor Putnam, to whose inspection the image was subjected when it first came into my hands, at once pronounced it an antiquity of some sort, unlike anything which he knew to be in existence among the aboriginal tribes. I need not say that Professor Putnam's opinion upon a question of that sort is of the very highest value. There were upon the image patches of the anhydrous oxide of iron, which to him and other experts were indubitable evidence that it had lain for a long time in the earth. Subsequently I ascertained, while on the ground at Nampa, that the shade of color in this iron oxide upon it corresponded exactly to that which had formed upon the clay concretions which came up in large quantities from the same stratum in which the image was alleged to have been found. I have also, I think, made it evident that the burying of human relics even to the great depth of 320 feet in the Snake River Valley may not be much more surprising than the burial of the remains of man in Pompeii and Herculaneum, and that the date of this burial may not have been very many thousand years ago. The direct evidence to the fact that this little image, an inch and a half long, came up from the depth reported is about as convincing as we can have for any fact which depends for credence upon human testimony. There has been nothing with regard to the appearance of the parties suggesting fraud. Mr. Cumming, the superintendent of that division of the Union Pacific Railroad, whose attention to the facts was called the day after the discovery, is a Harvard College graduate, of extended legal education and wide practical experience, who knew all the parties and was familiar with the circumstances, and investigated them upon the ground. Charles Francis Adams emphatically affirms that Mr. Cumming's evidence in this matter is entitled to as much consideration as the evidence of any scientific man would be. Anyone who wishes to get my detailed report of the evidence will find it in the Proceedings of the Boston Society of Natural History for Jan. 1, 1890, and Feb. 18, 1891.

The discoveries of human implements under Table Mountain in California are in close analogy with this discovery at Nampa, in the Snake River Valley, and the same remarks have been made respecting them that Dr. Brinton reports concerning the Nampa image, namely, that they are modern implements at present in use among the local tribes of Indians. But no such offhand opinion as this can break the force of the evidence which has accumulated in support of their having been found in deposits which have been undisturbed since the great lava outflows which constitute what is called the Sonora Table Mountain. The evidence concerning the Calaveras skull has been exhaustively discussed by Professor Whitney of Harvard College, who pronounces the facts to be beyond all reasonable doubt. At the meeting of the Geological Society in Washington in January, 1891, three independent discoveries of human implements in conditions similar to those assigned to the Calaveras skull were presented. I had myself obtained information at Sonora of the discovery of a stone-mortar in the tunnel of the Empire mine of which the evidence was satisfactory beyond reasonable doubt. The discovery was made by the assistant surveyor of the county in the tunnel of a mine under Table Mountain, which was owned by his father and where work is still prosecuted. The mortar had been given away to another person, but it has since come into my hands and is preserved in the Museum of the Western Reserve Historical Society of Cleveland.

At the same meeting Mr. George H. Becker of the U. S. Geol. Survey presented a similar mortar found under Table Mountain some years before by Mr. Neale, a mining engineer. Mr. Neale signed an affidavit detailing the particulars, and his remembrance of the situation was so minute that there could be no question of the undisturbed character of the deposits. Mr. Becker well remarks that Mr. Neale's judgment as mining-engineer concerning the undisturbed character of the deposit is the highest evidence that can possibly be obtained, for that is a point to which the miner's attention is constantly directed, on account of the danger attending the opening of any old excavation.

The third new evidence offered was that of Mr. Clarence King, who had just presented to the Smithsonian Institution a fragment of a pestle which he had taken with his own hands, in the vicinity of the two previous places mentioned, from the undisturbed gravel beds underlying Table Mountain. I need not say that Mr. Becker and Mr. King are two geologists of the very highest standing in the country, and that they both have unusual familiarity with the phenomena of that region, and they both, together with Professor Marsh, Professor Putnam, and W. H. Dall, express their unqualified belief in reference to the Calaveras skull that it was found in place in the gravel beneath this same stream of lava.

But I have already made my communication too long. I trust, however, upon your forbearance in publishing it, since the facts are too numerous to be compressed into less space of description, and a volume would be required to give all the evidence in detail. In my book upon "Man and the Glacial Period" I was called upon to discuss a very broad subject in a very small volume, and so could not enter into details. I endeavored, however, to limit myself to facts of which there was abundant proof, if they should ever be called in question. And I would repeat that I am glad of the revival of interest in the subject which will be created by the expression of such doubts as still remain in Dr. Brinton's mind. I have no question but full discussion will dispel the uncertainty that may exist. G. FREDERICK WRIGHT.

Oberlin, Ohio, Nov. 1, 1892.

### The Rattlesnake of the Bottom-Lands of Mississippi.

ON August 8, 1891, I received, in a box whose base was about two feet square and whose height was about one foot, a rattlesnake which had been sent by express from Greenville, Miss. The snake was of a stout build, fierce looking and ready to rattle and strike. Through this wooden box had been bored a number of auger holes to supply the serpent with air; these had so weakened the box as to cause a split that afforded some chance of escape.

I thought from its appearance the snake was about four feet long; but after death actual measurement showed four feet five inches in length and eight inches in circumference at the largest part of the body. I had made a longer box with glass top and with a sliding door; through this without much difficulty the snake was transferred from the old box.

The color was an alternation of black spots and light brown ground. The black spots were larger than those of the Mountain Rattler, while the brown was not so bright. This snake had only three rattles when I received it; a careful examination showed that some of the rings had been broken off. I afterwards learned that eight of them were broken off in the express car between Greenville and Winona on the Georgia Pacific road. If this information be correct, the snake had at that time eleven rattles.

When I was endeavoring to make the snake go out of the old box into the new, the glass of the latter was at the side. The snake showed evidence of great irritation and anger; it rattled almost incessantly. Some children were a few feet in front of the glass; at the instant of passing into the new box it struck at the children with all its force, striking against the glass and spattering against it some white, thick, frothy liquid. The snake evidently did not understand glass, not having lived before in a box or house provided with that article. Twice afterwards, when it had been angered, it struck at persons standing a little way in front of the glass; after this it refused to strike, seeming to understand that the glass presented a barrier too great for its strength. The head of the snake trembled from the effects of the blow against the glass. A match struck and lighted in front of the glass seemed to irritate and anger it more than anything else.

I took the precaution to have in the cage a wooden saucer. In this I blew at various times water and sweet milk. I put into the box living frogs, rats, mice, young flying-squirrels, chickens, etc. I also offered to it frequently fresh butcher's meat; but it refused all food; it evidently had no appreciation whatever of any attention or effort to be kind. A young chicken was bitten by it and was dead in twenty seconds; it fell instantly on being struck by the serpent's tooth. Two toads at different times died in the box after remaining therein about six days each. Several times I poured clean water into the box and on the snake; this made it move restlessly; it pushed its nose tremulously against the glass, and, slid it along the glass as if trying to break the glass or find an opening for escape. It seemed to reject water as indignantly as it did food. When lying in the box it seemed to be the perfect expression of sullen disdain.

During October it shed its skin partially. The work of shedding began in the night but it was never perfectly done, parts of the old skin adhering to the sides of the body. During its confinement a new rattle was formed between the former rattles and the body proper, showing thereby that the terminal rattle of the rattlesnake is the oldest.

As time went on the snake became poorer, but the skin was so thick and scaly that the ribs were not visible, and when it was irritated the body was distended to its full former size, either by the drawing and rigidity of the muscles or by inflation. Without food, without water, confined in a box and subject to some considerable variations of temperature, it lived from August 8, 1891, to April 15, 1892, eight months and seven days. During the winter the room in which it was kept often grew cold, but I never allowed it to be cold enough for water to freeze. When in the cold, it coiled closely and seemed torpid; but, on my moving the box into a warm room, it would very slowly uncoil and stretch itself in its box almost straight.

I have heard many extravagant stories about the length of time a rattlesnake could live without food, but I was not prepared to believe that it could live as long as eight months and seven days, until the fact was demonstrated as I have narrated above. Mr. W. W. Stone, the Auditor of Mississippi, who sent this snake to me, informed me it was without food at least a week before I received it. In feats of fasting this animal excels Dr. Tanner and all other human aspirants for that kind of distinction so far as to make their boasts futile. R W. JONES.

University of Mississippi.

### Preliminary Note on Sleep.

THAT there is a relative anæmia of the brain during sleep is well established, but the hypotheses advanced to account for this or any other of the sleep phenomena are unsatisfactory. In "Comparative Physiology and Psychology," 1884, I treated the subject briefly, and since then have been gradually accumulating and arranging data for a theory which I have finally adopted, and which appears to me to be fairly complete as enabling the major phenomena to be accounted for.

Briefly stated, where there is physiological waste there is, normally, repair, and the activities of the brain demonstrably are kept up by renewed nutrition derived from a blood supply adjusted to the ordinary needs. When there is cerebral anæmia, as in chlorosis, then there is increased desire to sleep, the brain does not receive the necessary quantity to compensate waste, and it rests, just as any commercial activity will cease with withdrawal of means to continue it. Those who are familiar with my nutrient reflex theory, mentioned in the book referred to (Professor C. K. Mills of the Pennsylvania University, and Professor C. L. Herrick of the Denison, Ohio, University, have written approvingly thereon), will understand that with cessation of sensory stimulation there will be less blood attracted to the brain and other nerve-centres, the heart-beats lessen in vigor and num-