Miscellaneous.

THE WONDERFUL PROPERTIES OF FIGURES.

Curious Calculations.

Though figures constitute a universal language among the civilized nations of the earth, and maintain such an exalted character for honesty and truth that it has passed into a proverb that "figures never lie;" yet they are treated as the mere slaves of calculation, without any regard for that respect and consideration to which their peculiar qualities entitle them. To rescue them from the degradation of being looked upon as mere convenience, let us see if they are not possessed of certain intrinsic properties which shall excite our wonder and admiration.

"A million of dollars," which we hear expressed on every side, wherever the cost of this "cruel war" is under discussion. Let us make a very simple mental calculation, and see if we are not astonished at the result. Mr. Longworth, who recently died at Cincinnati, was said to be worth fifteen millions of dollars, How many days would it take to count that sum at the rate of fifty dollars a minute, working steadily ten hours each day? While some are guessing four or five days, another a week, another two weeks or a month, the operation may be carried on mentally by saying fifteen millions between guessing and thinking.

The powers of human understanding are limited. The increase of figures has no limits. Our knowledge of numbers, therefore, must necessarily be limited. But like every other subject, the more we study and think about it the more we shall know.

The child who has learned to count as far as three, has an idea of that number; but the number thirteen is quite beyond his comprehension. The savage gets along very well with his arithmetic so long as he is not required to go beyond the numeration of his fingers and toes; but any greater number quite bewilders his imagination, and, in despair, he refers to the hairs of the head, the leaves of the forest, or the sands on the sea-shore, to express his overwhelming sense of its magnitude. Every young student of history has laughed at the extreme simplicity and ignorance of the Indian whom Powhattan sent to England to see the country and find out how many people where there. As soon as the shores of England were reached, the "poor Indian" procured a long stick and commenced to cut a notch on it for every one he saw. Of course he was soon obliged to stop.

On his return, Powhattan, among many questions, asked how many people he had seen? "Count the stars in the sky," was the reply, "the leaves on the trees, or the sands on the shore, for such is the number of the English." Perhaps this untutored child of the forest was not so far astray after all; for the stars in both hemispheres visible to the naked eye do not exceed the number of ten thousand. The hairs of the head and the leaves of the trees may be easily counted, and the sands on the sea-shore are by no means innumerable.

The enlightened man may have a clear understanding of thousands, and even millions, but much beyond that he can form no distinct idea. A simple example, and one easily solved, will illustrate the observation. If all the vast bodies of water that cover nearly three fourths of the whole surface of the globe were emptied, drop by drop, into one grand reservoir, the whole number of drops could be written by the two words "eighteen septillions," and expressed in figures by annexing twenty-four cyphers to the number 18. (18,000,000,000,000,000,000,000,000.) Man might as well attempt to explore the bounds of eternity as to form any rational idea of the units embodied in the expression above; for although the aggregate of drops is indicated by figures in the space of only one inch and a half of ordinary print, yet if each particular drop were noted by a separate stroke like the figure 1, it would form a line of marks sufficiently long to wind round the sun six thousand billions of times!

Now observe, if you please, the marvellous power or value which the cyphers or "naughts"—insignificant by themselves—give to the significant figures 18. The young reader will be surprised to learn that the use of the cypher to determine the value of any particular figure, which is now practised by every school-boy, was unknown to the ancients. Therefore, among the Greek and Romans, and other nations of antiquity, arithmetical operations were exceedingly tedious and difficult. They had to reckon with little pebbles, shells, or beads, used as counters, to transact the ordinary business of life. Even the great Cicero, in his oration for Roscius, the actor, in order to express 300,000, had to make use of the very awkward and cumbrous notations (ccciooo ccciooo ccciooo), which may admit of the very liberal translation: Three c's one I, three inverted c's; three c's, one I, three c's inverted; three c's one I, three c's upside down. How very odd this looks in the year of our Lord MDCCCLXIII—1863!

Many very curious and interesting things might be said concerning the history of numerical characters used in ancient and modern times; but, not to prolong this article, they must be reserved for some future occasion.

The simple interest of *one cent*, at 6 per cent. per annum, from the commencement of the Christian era to the close of the present year 1863, would be but the trifling sum of 11 dollars, 17 cents, and 8 mills, but if the same principal, at the same rate and time, had been allowed to accumulate at compound interest, it would require the enormous number of 84,840 billions of globes of solid gold, each equal to the earth in magnitude, to pay the interest; and if the sum were equally divided among the inhabitants of the earth, now estimated to be one thousand millions, every man, woman and child would receive 84,840 golden worlds for an inheritance. Were all these globes placed side by side in a direct line, it would take lightning itself, that can girdle the earth in the wink of an eye, 73,000 years to travel from end to end. And, if a Parrott gun were discharged at one extremity while a man was stationed at the other—light travelling 192,000 miles in a second; the initial velocity of a cannon ball being about 1,500 feet per second, and in this case supposed to continue at the same rate; and sound moving through the atmosphere 1,120 feet in a second—he would see the flash after waiting 110,000 years; the ball would reach him in 74 billions of years; but he would not hear the report