THE MYSTIC NUMBER NINE.

BY WILLIAM BENJAMIN SMITH.

MY eye has just fallen on "The Necromancy of Numbers and Letters" in *The Open Court* of February, 1909, and I am moved to steal a few seconds in which to clear away a little of the mystery that seems to hang over 3 and 9. It really may not be worth while, so *kindisch einfach* is the matter, yet it seems to have puzzled not a few.

The trouble is all due to the lamentable fact that we are *pentadactyles* instead of *hexadactyles*. *Nine* is merely 10 less 1, and also the square of 3. If we had had twelve fingers and had accordingly adopted twelve instead of ten as the base of our number system, then the Great Giant Arithmos would have been shorn of half of his terrors, two years would have been saved to human life just where they are most needed, in the 'teens, and we should now be a century or so ahead of where we are now. In that case we should have twelve digits (counting 0) instead of ten; 10 would mean *twelve* and we should count thus: one, two, ... ten, eleven, twelve, telone, teltwo, telthree, telfour, ... telten, tellen, twentel, twentel-one, ... thirtel, ... fortel, ... ninetel, tentel, lentel, Dipo, ... Tripo,...... Everything would thus be done according to apostolic precept, in decency and in order.

We should need two new symbols, for ten and for eleven. In this sketch we will represent ten by Θ and eleven by +. The numbers would then be written:

1, 2, 3, 4, 5, 6, 7, 8, 9, Θ, +, 10,
11, 12, 13, ...19, 1Θ, 1+, 20,
21, 22, ...2Θ, 2+, 30,
+1, +2, +3, ...+Θ, ++, 100, ...

The number *Dipo* (100) means simply *second power* of the base twelve (10); so *Tripo* (1000) means third power, and so on.

They correspond to our present 144 and 1728. Fractions become immensely simplified. Thus there is no chasm between common fractions and duodecimals, as there is between common fractions and decimals. For $\frac{1}{2}=.6$, $\frac{1}{3}=.4$, $\frac{1}{4}=.3$, $\frac{1}{6}=.2$, $\frac{1}{12}=.1$. The multiplication table becomes much simpler and easier. All our present cumbrous armor of tables falls away, the spirit steps forth as an athlete eager for the victorious fray. The metric system passes away with a great noise, like the Petrine heavens, but a new system and new notation take its place, the symmetric *Duodenary,* wherein dwells rationality. The year, the circle, the clock, the coin—all are divided simply, consistently, intelligibly, for all earth and for all time. Consummation devoutly to be wished!

But what has all this to do with the mysteries of 9 and 3? Much every way. Chiefly, that the properties of 9 would then pass over to the now dishonored eleven (+), because it would be twelve *minus* one (10—1). Regard for a moment these "curious facts," as that in any multiple of 9 the sum of the digits is itself a multiple of 9. Why not? Write the number backwards, thus: $a+b(9+1)+c(9+1)^2+\ldots.+l(9+1)^h$, where each coefficient, a, b, $\ldots.l$, is one of the ten digits, 0, 1, ...9. Now multiply by 9, that is by 10—1; we do so by increasing each exponent of $(9+1)$ by 1, and then subtracting the original number.

$$\text{Thus } 347285\times9 = \begin{array}{r} 3472850 \\ 347285 \\ \hline 3125565 \end{array}$$

The sum of the digits is $27 = 3\times9$.

In getting the digits of the remainder we do in each case one of two things: we subtract one digit from the next following in the number either with or without adding 10; and whenever we add 10 we increase the next digit (to the left) in the subtrahend by 1; hence in this latter case, we increase the mere absolute value of the minuend figure by 9. Hence then, so far as this absolute value of the minuend figures is concerned, we increase each by 9 or not all and then subtract each unincreased; of course then there is left a multiple of 9, namely as many 9's as the times we increased the minuend figure. Thus in the example we increased the 0, the 5, and the 2, —three increases, hence the sum of the digits in the remainder is 3×9. The general formula would be

$$a—a+b—b+c—c+\ \ldots\ldots\ +l—l+m\times9$$

where m is the number of times we increased the digit in the minuend. It is seen that the digits destroy each other so that the sum is just $9m$. Once more, reverse this number and take the difference, thus:

$$a+b(9+1)+c(9+1)^2+ \ldots\ldots +l(9+1)^h$$
$$l+k(9+1)+ \ldots\ldots \qquad +a(9+1)^h$$

We see that on expanding these powers of (9+1) we should obtain in each term $1+m9$, i. e., 1 + some multiple of 9; adding all of these we should get the sum of the digits (S) plus some other multiple of 9, in case of the minuend S+M9, and of the subtrahend S+M′9. On subtracting, the S's annul each other, and there is left (M—M′)9, i. e., some multiple of 9, positive or negative.

Consider this other "vagary of the nimble nine," e. g.:

$$1234567\times9+8=11111111.$$

Remember that $9=10-1$; hence we multiply by 10, add 8, and then subtract the original number, thus:

$$\begin{array}{r} 12345678 \\ 1234567 \\ \hline 11111111, \end{array}$$

Not so strange after all!

We shall not insult the reader's intelligence by further explanations.

The superstition as to the number Thirteen goes back millenniums behind the Last Supper. In the ancient Zodiac there were (and still are) 12 Signs (animals), to each a month corresponding. In calendars using lunar months (of 29 or 30 days) there would accumulate an excess of a month every few years, which had to be corrected by inserting a thirteenth intercalary month. This month would of course not appear the next year; it would be *absent* from the circle or Table Round of the Zodiac. Hence its number Thirteen became the unlucky number, and its sign (the *Raven*) the unlucky Bird, symbol of Death: He who sat Thirteenth at the table, as supernumerary, would not reappear in that circle the next year. So at least thinks Winckler, who teaches all men on the subject of *Die babylonische Kultur.*