LETTERS TO THE EDITOR

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The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Arithmetic Notation of Kinship

MANY writers have endeavoured to devise a simple method of describing the various forms of kinship, which, when expressed verbally, are cumbrous and puzzling in the highest degree. I suspect, however, that if we had always been as familiar with the binary system of arithmetic as we are with the decimal, that the facilities afforded by a numerical system of notation of kinship would have been so obvious that it would have been adopted as a matter of course. The notation I am about to propose is numerical, but it is not binary. It however contains implicitly, as we shall see, owing to the laws that govern numbers, the most important advantages of the binary notation, and it seems better to begin to explain it from the latter point of view.

The number of direct ancestors that a person has in successive generations is . . . 2^4, 2^3, 2^2, 2^1, followed by 2^0 for himself, the corresponding binary notations being 10,000, 1000, 100, 10, 1 respectively. We also see on a little reflection that, this being the case, every direct ancestor in the nth degree admits of being specified by a particular number, consisting of $n + 1$ places of figures. Thus the two parents may be represented by 10 and 11, the four grandparents by 100, 101, 110, 111, and so on. Let us draw up two schemes of ancestral roots, identical in arrangement, but using in the one the symbols of *f* for "the father of," and *m* for "the mother of," and employing binary notation in the other:—

child

f *m*

ff *mf* *fm* *mm*

fff *mff* *fmf* *mmf* *ffm* *mfm* *fmm* *mmm*

&c. &c.

1

10 11

100 101 110 111

1000 1001 1010 1011 1100 1101 1110 1111

&c. &c.

We see (*a*) that if we disregard the child, and speak only of his or her ancestry, all the even numbers apply to one sex and all the odd ones to the other; (*b*) that each term is derived from its ancestral terms in so simple a way that it carries on its face every step in the line of descent, however long it may be, through which each ancestor is related to the child. Therefore, as I began by saying, if we were familiar with decimal notation, we should long since have described each form of ancestry by it. Instead of saying that "B was a grandmother, namely, a father's mother of A," we should have said "B was 101 of A." Or again, instead of saying that "C was first cousin once removed to D, the father's father's parents of C being the mother's parents of D," we should have said "the 1000-1 of C are the 110-1 of D." The case might have been one of half-blood, say by the father's side, then "the 1000 of C would be the 110 of D," a notation which grows in simplicity as the verbal equivalent grows in complexity.

Being, however, unfamiliar with binary notation, we fall back on the decimal, and translate the above numbers into their equivalents, which are those I propose for the arithmetic notation of kinship, as entered in the table below.

Table of Ancestral Roots

Grade of kinship.	Father's side.				Mother's side.			
Child	1							
Parents	2				3			
Grandparents ...	4		5		6		7	
Great-grandparents &c.	8	9	10	11	12	13	14	15
	&c.				&c.			

The sex of 1 is unspecified, it is equivalent to the word "child," but all other odd numbers refer to females, and all even numbers refer to males. If n is the register number of any ancestor, the register numbers of his parents are $2n$ and $2n + 1$. We can thus construct or analyse any register number with great facility. It is not worth while giving an example of construction, but I may give one of analysis. I write down the number and append to it a series of successive halvings, so far as the numbers are, or come out, even; otherwise I substract 1 before taking their halves. Then I write *f* (= father of), or *m* (= mother of), as the case may be, below each entry. Let 253 be the number, then I get—

253	126	63	31	15	7	3	child
m	*f*	*m*	*m*	*m*	*m*	*m*	child

For purposes of exhaustive inquiry into the antecedents of a family, this notation has the advantage of an index, and of showing very compendiously how much has been done, and how much remains to do.

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