the period when they reckoned on their two hands alone, so calculus means a pebble, and points back to the period when they reckoned with little heaps of stones or cowries. To calculate is merely to heap up pebbles, and the differential calculus itself is the way we manipulate the small marbles in order to produce certain high mathematical results. Even the very phrase "to carry one," "to carry two," still used by our school children, retains a memory of the time when ten pebbles were taken from the heap of units as soon as it reached ten or more, and one of them was added in compensation to the other pile immediately above it.

The abacus is a device for making the pebble system more systematic and more respectable. By stringing coloured balls on a wire frame, and making the white mean units, the red tens, the green hundreds, and the brown thousands, it is possible to add or multiply large numbers in a way practically all but impossible with the Roman numerals. Besides, this plan had the advantage of being, so to speak, automatic. You added tens and hundreds and thousands to the various rows without counting at all; and then at the end you read off the total according to the number of brown, green and white balls on the different courses. The abacus substituted a mechanical device for a mental process: it made arithmetic an affair of the eye, not an affair of the brain or the intellect.

Still, no great advance in the mysteries of mathematics could ever be expected from arithmeticians who had to use such very rough-and-ready methods of procedure as these. The Greek notation was even clumsier than the Roman, consisting, as it did, of the letters of the alphabet, mostly in their alphabetical order, as if in English A meant one, B two, C three, and U twenty-one. The first step towards the establishment of the simple modern decimal system was made by the Romans, who at last bethought themselves of writing the letters standing for the unit, the ten, the hundred, and the thousand, with the number of units, of tens, of hundreds, and of thousands—the coefficient, as mathematicians playfully term it—written small on top of the significant letters. Thus, 2459 would be represented on this system by $\overset{ii}{M}\overset{iv}{C}\overset{v}{X}\overset{ix}{I}$. The man who saw his way to this great improvement was well on the track of the Arabic system.

But a fatal difficulty stood in the way of his further progress. If we write $\overset{2}{M}\overset{4}{C}\overset{5}{X}\overset{9}{I}$, it soon becomes apparent to the meanest understanding (after which remark the judicious reader will hardly venture to pretend he doesn't see it) that we may safely omit the M, the C, the X and the I, and leave the 2459 to stand on their own legs, their position alone sufficiently expressing their value as units, tens, hundreds and thousands. As the mathematician would put it once more, we may neglect the serial terms and let the coefficients alone stand in their places. But when we write $\overset{ii}{M}\overset{iv}{C}\overset{v}{X}\overset{ix}{I}$ we cannot thus abbreviate into iiivvix, because each digit of units, tens, hundreds, and thousands is not represented by a single symbol. We might, indeed, get over that difficulty somewhat by putting points between each series, thus: ii. iv. v. ix.; and the number so expressed might be read 2459. But this is at best a clumsy device, and in practice the points would be always going wrong, and reducing our arithmetic to the same hopeless muddle as the weekly books in the hands of our wives and daughters.

What is really needed, then, is that each unit from one to nine should be separately expressed by a single sym-