MUNICIPAL ENGINEERS, CONTRACTORS AND MATERIALS

THE PROPORTIONS OF THE GREAT PYRAMID.

The conclusion has been drawn from the angle of slope of the casing stones discovered by Colonel Vyse that the builders of the Pyramid were acquainted with the ratio of the circumference of a circle to its diameter, a piece of knowledge they were desirous to embody in its dimensions. In fact, the slope of the original faces of the Pyramid comes out from Vyse's (or Perring's) measurement of the linear dimensions of these stones, 51° 52′ 15½″, and by Brettel's measurement of their angle, 51° 50′, the mean of which differs only by a single second from the angle whose contangent is the length of an arc of 45° of the circle, so as to make the whole periphery of the base all but mathematically equal to the circumference of a circle described with the height for a radius. So stated, the coincidence is certainly very striking. It by no means follows, however, that the ancient Egyptians were in possession of any calculus by which they could have arrived at a theoretical knowledge of the true ratio. It should be observed that the linear measures above mentioned are given only to entire inches, and those inches of a scale which may or may not have been verified with extreme precision, and therefore can lay no claim to minute accuracy. Computing, moreover, on these measures alone, the ratio of the periphery to the height comes out 6.2784, while that resulting from the direct measure of the angle is 6·2878, the true ratio being 6·2832. The individual results differ by 1-640th part of the whole quantity, and as we do not know with what instruments or what precautions the angle was measured, and it is given only to the nearest minute, it seems but reasonable to admit an equal proportional latitude of uncertainity in the original workmanship and in the numerical relation to which it was intended to conform. Now this is a very considerable approximation, much better than that of Archimedes a thousand years later. Still it would be easy for people in possession of such appliances as they must have had at command to ascertain ratio in question to this or even to a greater degree of precision, by tracing, for instance, on a flat pavement a circle of 100 feet in diameter, and actually measuring the circumference. This they certainly might have done to the nearest ½-foot, which, on a length of 314 feet, would correspond to such a latitude of error. If aware of the importance of the problem, they might have gone much further. But, again, it by no means follows from anything which the dimensions of the Pyramid indicate, that they did possess a knowledge of the ratio of the circumference of a circle to its diameter, even approximately. By a very remarkable coincidence, which Taylor has the merit of having pointed out, the same slope, or one practically undistinguishable from it (51° 49′ 46″), belongs to a pyramid characterized by the property of having each of its faces equal to the square described upon its height. This is the characteristic relation which, Herodotus distinctly tells us, it was the intention of its builders that it should embody, and which we know now that it did embody, in a manner quite as creditable to their workmanship as the solution of such a problem was to their geometry. There is another, and a remarkable relation, viz., that the height of the Pyramid, including the casing, and measured from base to apex, supposed to terminate in a point, is one two hundred and seventy thousandth part (1-270,000th) of the earth's circumference. Taking the equatorial circumference as unity, the error of this aliquot is one part in 736, but if the polar, only one in 3,506, the former error being in defect, the latter in excess, so that there exists somewhere or other on the globe a diametrical section whose circumference is exactly 270,000 times the original height of the building. Though not a meridiant it is not very remote from one.