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W. M. Flinders Petrie
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The Pyramids and Temples of Gizeh

W.M. FLINDERS PETRIE



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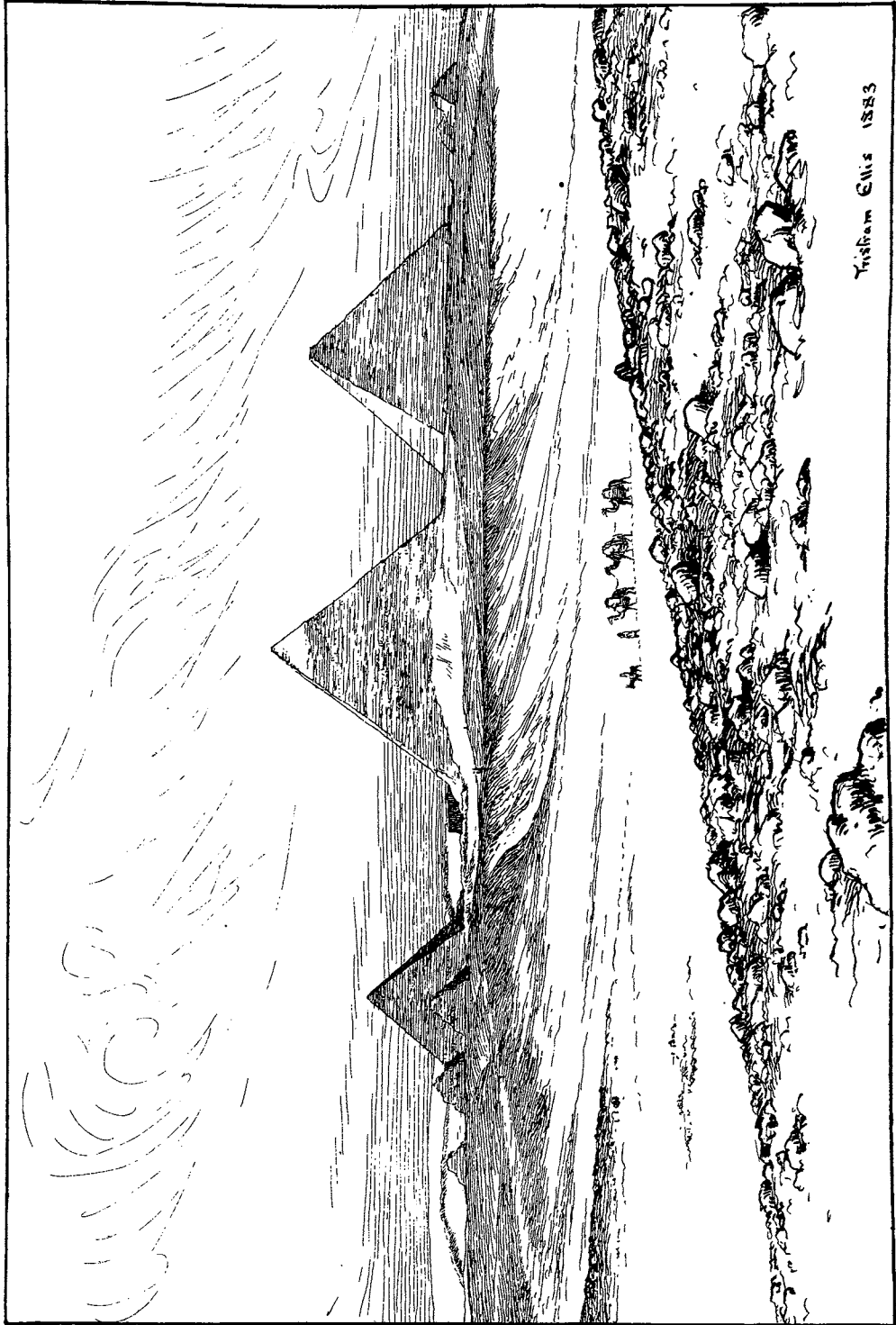
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PERIBOLUS. SMALL PYRAMIDS. THIRD PYRAMID. PERIBOLUS. EXCAVATION. SECOND PYRAMID. GREAT PYRAMID. SMALL PYRAMIDS

THE NINE PYRAMIDS OF GIZEH
FROM THE SOUTH.

Theo' Hall & Son, Photo-Lith., 40, King St, Covent Garden.

THE
PYRAMIDS AND TEMPLES
OF GIZEH.

BY
W. M. FLINDERS PETRIE,
Author of "Inductive Metrology," "Stonehenge," &c.



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„	65	...	„	34	„	±3.	...	„	±3
„	157	...	„	12	„	dozen	...	„	dozens.
„	212	...	„	1	„	tweve	...	„	twelve.
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Plate xiv., fig. 7, the lithographer has drawn the lines wavy, whereas they really form a true spiral, as described p. 174, and in Anthropological Journal.

INTRODUCTION.

I. THE nature of the present work is such that perhaps few students will find interest in each part of it alike. The ends and the means appeal to separate classes: the antiquarian, whose are the ends, will look askance at the means, involving co-ordinates, probable errors, and arguments based on purely mechanical considerations; the surveyor and geodetist, whose are the means, will scarcely care for their application to such remote times; the practical man who may follow the instrumental details, may consider the discussion of historical problems to be outside his province; while only those familiar with mechanical work will fully realize the questions of workmanship and tools here explained.

An investigation thus based on such different subjects is not only at a disadvantage in its reception, but also in its production. And if in one part or another, specialists may object to some result or suggestion, the plea must be the difficulty of making certain how much is known, and what is believed, on subjects so far apart and so much debated.

The combination of two apparently distinct subjects, is often most fertile in results; and the mathematical and mechanical study of antiquities promises a full measure of success. It is sometimes said, or supposed, that it must be useless to apply accuracy to remains which are inaccurate; that fallacies are sure to result, and that the products of such a method rather originate with the modern investigator than express the design of the ancient constructor. But when we look to other branches of historical inquiry, we see how the most refined methods of research are eagerly followed: how philology does not confine itself to the philological ideas of the ancient writers, but analyzes their speech so as to see facts of which they were wholly unconscious; how chemistry does not study the chemical ideas, but the chemical processes and products of the ancients; how anthropology examines the bodies and customs of men to whom such inquiries were completely foreign. Hence there is nothing unprecedented, and nothing impracticable, in applying mathematical methods in the study of mechanical remains of ancient times, since the object is to get behind the workers, and to see not only their work, but their mistakes, their

amounts of error, the limits of their ideas ; in fine, to skirt the borders of their knowledge and abilities, so as to find their range by means of using more comprehensive methods. Modern inquiry should never rest content with saying that anything was "exact ;" but always show what error in fact or in work was tolerated by the ancient worker, and was considered by him as his allowable error.

2. The materials of the present volume have been selected from the results of two winters' work in Egypt. Many of the points that were examined, and some questions that occupied a considerable share of the time, have not been touched on here, as this account is limited to the buildings of the fourth dynasty at Gizeh, with such examples of later remains as were necessary for the discussion of the subject. All the inscriptions copied were sent over to Dr. Birch, who has published some in full, and extracted what seemed of interest in others ; Dr. Weidemann has also had some of them ; and they do not need, therefore, further attention on my part. Papers on other subjects, including the Domestic Remains, Brickwork, Pottery, and travellers' *graffiti*, each of which were examined with special reference to their periods, are in course of publication by the Royal Archæological Institute. The mechanical methods and tools employed by the Egyptians were discussed at the Anthropological Institute, and are more summarily noticed here. A large mass of accurate measurements of remains of various ages were collected ; and these, when examined, will probably yield many examples of the cubits employed by the constructors. Of photographs, over five hundred were taken, on $\frac{1}{4}$ size dry plates, mainly of architectural points, and to show typical features. Volumes of prints of these may be examined on application to me, and copies can be ordered from a London photographer. The lesser subjects being thus disposed of, this volume only treats of one place, and that only during one period, which was the main object of research. The mass of the actual numerical observations and reductions would be too bulky to publish, and also unnecessary ; the details of the processes are, in fact, only given so far as may prove useful for comparison with the results obtained by other observers.

Though, in describing various features, reference has often been made to the publications of Colonel Howard Vyse* (for whom Mr. Perring, C.E., acted as superintendent), and of Professor C. Piazzi Smyth,† yet it must not be supposed that this account professes at all to cover the same ground, and to give all the details that are to be found in those works. They are only referred to where necessary to connect or to explain particular points ; and those volumes must be consulted by any one wishing to fully comprehend all that is known of the Pyramids. This work is, in fact, only supplementary to the previous descriptions,

* "Operations at the Pyramids," 3 vols. 1840.

† "Life and Work at the Great Pyramid," 3 vols. 1867.

INTRODUCTION.

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as giving fuller and more accurate information about the principal parts of the Pyramids, with just as much general account as may be necessary to make it intelligible, and to enable the reader to judge of the discussions and conclusions arrived at on the subject, without needing to refer to other works. Colonel Vyse's volumes are most required for an account of the arrangements of the Second and smaller Pyramids, of the chambers in the Great Pyramid over the King's Chamber, of the negative results of excavations in the masonry, and of various mechanical details. Professor Smyth's vol. ii. is required for the measurements and description of the interior of the Great Pyramid. While the scope of the present account includes the more exact measurement of the whole of the Great Pyramid, of the outsides and chambers of the Second and Third Pyramids, of the Granite Temple, and of various lesser works; also the comparison of the details of some of the later Pyramids with those at Gizeh, and various conclusions, mainly based on mechanical grounds.

The reader's knowledge of the general popular information on the subject, has been taken for granted; as that the Pyramids of Gizeh belong to the first three kings of the fourth dynasty, called Khufu, Khafra, and Menkaura, by themselves, and Cheops, Chephren, and Mycerinus, by Greek-loving Englishmen; that their epoch is variously stated by chronologers as being in the third, fourth, or fifth millennium B.C.; that the buildings are in their bulk composed of blocks of limestone, such as is found in the neighbouring districts; that the granite used in parts of the insides and outsides was brought from Syene, now Assouan; and that the buildings were erected near the edge of the limestone desert, bordering the west side of the Nile valley, about 150 feet above the inundated plain, and about 8 miles from the modern Cairo.

3. One or two technical usages should be defined here. All measures stated in this volume are in Imperial British inches, unless expressed otherwise; and it has not been thought necessary to repeat this every time an amount is stated; so that in all such cases inches must be understood as the medium of description. Azimuths, wherever stated, are written + or -, referring to positive or negative rotation, *i.e.*, to E. or to W., from the North point as zero. Thus, azimuth - 5', which often occurs, means 5' west of north. Where the deviation of a line running east and west is stated to be only a few minutes + or -, it, of course, refers to its normal or perpendicular, as being that amount from true north.

The probable error of all important measurements is stated with the sign \pm prefixed to it as usual. A full description of this will be found in any modern treatise on probabilities; and a brief account of it was given in "Inductive Metrology," pp. 24-30. Some technical details about it will be found here in the Appendix on "The Rejection of Erroneous Observations"; and I will only add a short definition of it as follows:—The probable error is an amount on

each side of the stated mean, within the limits of which there is as much chance of the truth lying, as beyond it; *i.e.*, it is 1 in 2 that the true result is not further from the stated mean than the amount of the probable error. Or, if any one prefers to regard the limits beyond which it is practically impossible for the true result to be, it is 22 to 1 against the truth being 3 times the amount of the probable error from the mean, 144 to 1 against its being 4 times, or 1,380 to 1 against its being as far as 5 times the amount of the probable error from the mean result stated. Thus, any extent of improbability that any one may choose to regard as practical impossibility, they may select; and remember that 4 or 5 times the probable error will mean to them the limit of possibility. Practically, it is best to state it as it always is stated, as the amount of variation which there is an equal chance of the truth exceeding or not; and any one can then consider what improbability there is in any case on hand, of the truth differing from the statement to any given extent.

It should be mentioned that the plans are all photolithographed from my drawings, in order to avoid inaccuracy or errors of copying; and thence comes any lack of technical style observable in the lettering.

As to the results of the whole investigation, perhaps many theorists will agree with an American, who was a warm believer in Pyramid theories when he came to Gizeh. I had the pleasure of his company there for a couple of days, and at our last meal together he said to me in a saddened tone,—“Well, sir! I feel as if I had been to a funeral.” By all means let the old theories have a decent burial; though we should take care that in our haste none of the wounded ones are buried alive.