

STUDIES IN ANCIENT EGYPT,
THE AEGEAN, AND THE SUDAN





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The Air-Channels of Chephren's Pyramid

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Much has been written about the so-called air-channels of the Great Pyramid at Giza, but their unfinished counterparts in the Second Pyramid have, not surprisingly, received relatively little attention from Egyptologists. The aim of this short study will be threefold: to show that constructional difficulties were not responsible for the abandonment of the work on the channels of the Second Pyramid, to contend that the full significance of the Great Pyramid channels has not hitherto been properly appreciated and, in the light of a more complete understanding of the purpose of those channels, to explain why the channels in the Second Pyramid were not completed. It is intended as a modest, but I hope acceptable, offering to one of the most highly respected Egyptologists of our time, whose friendship I have been privileged to enjoy for more than forty years.

The air-channels in the Second Pyramid are situated in the innermost of its two burial-chambers,¹ long known as Belzoni's chamber.² It is an oblong room with its main axis running East-West, which was hewn as a pit in the rock when the foundations of the pyramid were being prepared. Over the pit a pointed roof was erected, its massive slabs of limestone projecting downwards below the tops of the two side-walls. The channels, which are rectangular in section, were cut in the upper part of those walls, the northern 4'5" west of the entrance to the chamber and the southern approximately opposite.³ They differ slightly in their dimensions, but this disparity is of no consequence for the problems discussed here.⁴ A line, painted in red, extends perpendicularly downwards from the west side of the opening of each channel to a point some five feet below,⁵ where it forms one side of a rectangle, also drawn in red, which corresponds fairly closely in its dimensions with the apertures above. Both Petrie and Borchardt concluded, no doubt rightly, that the rectangles marked the positions in which it was first intended to cut the channels.⁶ Borchardt believed that the change of plan could be explained by the assumption that the original positions involved too long a boring through the solid rock to be practicable with the tools then available, and this explanation was adopted by Hölscher in his description of the pyramid.⁷ Maragioglio and Rinaldi expressed the same opinion, but they also pointed out that cutting air channels in the higher position would have involved an additional difficulty owing to the overhang of the sloping roof-blocks which 'would have to be drilled'.⁸

In view of what they regarded as the insuperable technological problems inherent in tunnelling through the rock, Maragioglio and Rinaldi came to the conclusion that the builders never intended to construct long channels comparable with those of the Great Pyramid and consequently that the existing cavities were either 'symbolic air-channels' or, more probably, simply sockets for the insertion of a cross-beam to support a curtain, thereby dividing the room into two compartments, one for the burial of the king and the other to serve as 'an antechamber, a serdab or a storeroom'.⁹ The first of these suggestions can be refuted on the ground that symbolic channels could have been cut just as easily at the lower level, where they would have corresponded more nearly in position with the channels in the Great Pyramid, and there would have been no need to change the original plan. The second suggestion is no more plausible than the first, because the proper place for such amenities would have been in the mortuary temple. Moreover, if two chambers were required, it is not likely that the partition would have consisted of a fabric curtain with a large gap between it and the ceiling; a wall built of blocks of stone or formed of uncut rock would seem much more probable.

There can be little doubt that the reason for the change in position was a desire to reduce the amount of rock to be cut in the construction of the channels, but is it necessary to suppose that the whole project was eventually abandoned because drills of sufficient length and strength had not then been manufactured? The architect would have known what was technically feasible when he included

1. The reason for the abandonment of the outermost chamber is discussed in the writer's *Pyramids of Egypt*, 2nd ed. (Harmondsworth, 1961), pp. 153-4.

2. G. Belzoni gives a graphic description of the difficulties which he encountered in 1817, when searching for the entrance to the pyramid, in *Narrative of the Operations and Recent Discoveries within the Pyramids, Temples, Tombs and Excavations in Egypt and Nubia* (London, 1821), pp. 257-68.

3. Belzoni, *op. cit.*, pl. 12, shows the apertures in a rough drawing of the chamber. W. M. F. Petrie, *The Pyramids and Temples of Gizeh* (London, 1883), p. 106, gives the following measurements for the space between the tops of the walls and the base of the aperture: N. 53.6 inches, S. 55.2 inches. V. Maragioglio and C. Rinaldi, *L'Architettura delle Piramidi Menfite* (Rapallo, 1966), vol. 5, pl. 10, fig. 7, are roughly in agreement with Petrie (1.36m) for the northern aperture, but do not show the southern. J. S. Perring, *The Pyramids of Gizeh* (London, 1840), Part 2, pl. 3, fig. 2, seems to show a space of about 8 feet between the top of the wall and the northern aperture, but the plan may not have been drawn to scale.

4. See Petrie, *loc. cit.*

5. Maragioglio and Rinaldi, *loc. cit.*, give the measurement as 1.59 m. It is to be noted that they show two parallel lines extending downwards from each side of the apertures, and they mention them in their description (p.58), but I could not see the second line when I visited the chamber recently and it is not visible on coloured photographs kindly given to me by Mrs. Del Nord of Boston. Dr. Manfred Bietak, who has made a further inspection of the walls in response to my request, has confirmed that there is no second line.

6. Petrie, *loc. cit.*; Borchardt, *ZÄS* 35 (1897), pp. 90-91.

7. U. Hölscher, *Das Grabdenkmal des Königs Chephren* (Leipzig, 1912), pp. 62-3.

8. *Op. cit.*, p. 110.

9. *Op. cit.*, p. 110. Perring, in H. Vyse, *Operations carried on at the Pyramids of Gizeh* (London, 1840), vol. I, p. 178, n. 3, is quoted as having suggested that the holes were used in the construction of the roof without explaining how they could have been so employed.

10. See n. 3 above.

11. H. Vyse, *op. cit.*, vol. I, p. 287; Petrie, *op. cit.*

12. E.g., J. Vandier, *Manuel II*, p. 38; Maragioglio and Rinaldi, *op. cit.*, vol. 4, pp. 129-30.

13. Alexander Badawy, "The Stellar Destiny of Pharaoh and the so-called Air-Shafts of Cheops' Pyramid," in *Mitteilungen des Instituts für Orientforschung der deutschen Akademie der Wissenschaften zu Berlin*, Band 10, Heft 2-3 (1964), pp. 189-206; Virginia Trimble, "Astronomical Investigation concerning the so-called Air-Shafts of Cheops' Pyramid," *Ibid.*, pp. 183-7.

14. For references to the Pyramid Texts, see R. O. Faulkner, *JNES* 25 (1966), pp. 153-61, and Badawy, *op. cit.*, pp. 195-8 and 199-203.

15. Trimble, *op. cit.*

16. See Elizabeth Thomas, "Air Channels in the Great Pyramid," in *JEA* 39 (1953), p. 113.

17. See Badawy, *op. cit.*, p. 192.

the channels in his design and consequently it must be asked whether a more practical method than drilling could not have been adopted. It certainly could, and the technique employed in constructing the burial-chamber could also have been used for the channels. Open trenches with their floors sloping downwards at the requisite angles could have been cut in the rock from the surface to points at a distance of five or six feet from the chamber and continued thereafter horizontally in line with the existing cavities as far as the roof-slabs. Holes could then have been cut in the slabs from the outer sides and the penetration of the remaining thickness of rock by drilling from both sides would not have been a very difficult operation. In order to allow enough space for manoeuvre, the trenches would have had to be about 3 ft. wide, but this width would have been reduced to that of the cavities by the insertion of a lining of wall-blocks to support a stone roof. Channels so constructed would have been very similar to those in the Great Pyramid, except that the floors would probably have consisted of the bare rock. Finally, the trenches would have been filled with rubble to ground-level. Since the cavities are less than 5 ft. below the tops of the walls of the chamber,¹⁰ the total volume of rock to be cut in making both trenches would have been far less than the amount extracted in hollowing out the pit for the chamber. It is by no means inconceivable that work on the trenches had already been begun, and it may have progressed far beyond the initial stages when the decision was taken to dispense with the channels.

If it is accepted that practical difficulties were not the cause of the abandonment, some other reason must have been responsible for it. A clue to the solution of the problem seems to be offered by the channels in the two upper chambers of the Great Pyramid. Early Egyptologists supposed that they were constructed for purposes of ventilation,¹¹ and they would certainly have had that effect if their outer apertures were left open, but it is at least possible that they were covered by the limestone casing of the pyramid and consequently sealed. This theory has not been entirely discarded by some more recent writers,¹² while others have maintained that the channels were intended to serve as passages through which the spirit of the king could make its ascent to the astral regions, a view which is also favoured by the present writer.¹³ The Pyramid Texts frequently allude to the king's association in his afterlife with the stars and, in particular, with the circumpolar stars and with Orion and Sothis.¹⁴ Scientific study has shown that, at the time when the Great Pyramid was built, the northern channel, which sloped upwards at an angle of 31° with the horizontal, was in almost exact alignment with what was then the Pole Star (α Draconis), around which the circumpolar stars revolved, while three stars in Orion's belt passed each day at culmination directly over the southern channel, whose slope is 44.5°. ¹⁵ To suppose that such a setting of the channels had no magical significance seems highly improbable. Nevertheless, critics have rightly pointed out that the stars in question could not have been observed through the channels because, even apart from their appreciable deviation from a straight line, the lower ends of the channels run horizontally for about 5 ft. from the walls of the chambers before turning sharply upwards.¹⁶ In this respect their design conforms with that of the regular entrance-corridors of pyramids, one of whose functions is also believed to have been to serve as a symbolical channel of approach to the circumpolar stars.¹⁷ Viewed from the burial-chambers, these corridors begin with a horizontal section and then turn upwards to emerge in the northern face of the pyramid. The Great Pyramid too, as it was first planned, with its burial-chamber below ground, followed this pattern, but when the internal plan was changed and the two chambers were built in the body of the pyramid, at a higher level than the entrance, the angle of the corridors was necessarily reversed so that they ran downwards from the chambers instead of upwards. It would have been possible to maintain the upward slope only by making a new entrance high in the superstructure of the pyramid, as indeed was done in the western corridor of the Bent Pyramid, but experience had probably shown that raising the heavy blocks to plug a corridor at such a height after the pyramid was completed caused great difficulties. The northern channel, in the opinion of the present writer, was devised by the architect in order to avoid a

repetition of this problem: it was a substitute for the regular upward sloping corridor, a model representation of it, but no doubt considered equally effective as a magical element. It was a simple solution, which not only satisfied the supposed requirements for the king's passage to the northern stars, but also made possible the introduction of a second channel as a means of approach to the constellation of Orion in the south, for which no special provision had previously been included in the architecture of a pyramid.

When the Second Pyramid was planned its architect obviously intended to equip it with similar channels to those of the Great Pyramid, but work on their construction came to an abrupt end, though, it has already been maintained, no practical difficulties prevented their completion. The reason, however, is not far to seek: the burial-chamber was mainly below ground and the approach to it was by a corridor sloping downwards from the entrance and running horizontally to the chamber. The purpose of the northern channel was therefore covered by the corridor: a channel from the northern wall of the chamber would have been merely a functional duplicate and consequently superfluous. Egyptian funerary architecture is certainly not without examples of the retention of earlier elements after they had lost their original utility, the reproduction of the pre-dynastic grave-tumulus in the body of the early dynastic brick mastabas at Saqqara being perhaps the clearest example, but they did not duplicate the functions of other elements and, moreover, they were long-established, whereas the channels from the burial-chamber were recent innovations intended to meet exceptional circumstances in the Great Pyramid which did not exist in the Second Pyramid. The abandonment of the plan did, however, involve the loss of a special way of approach to the southern stars, the absence of which in the earlier pyramids suggests that its inclusion in the Great Pyramid was less essential than that of the northern channel. Its function must previously have been performed by some, as yet, unknown means to which resort was again made when the plan of the Second Pyramid was changed. It may not be far from the truth to suppose that it was this prospective loss which led the architect to reproduce the channels when he first planned the burial-chamber of the Second Pyramid.