

DISCUSSIONS  
IN  
EGYPTOLOGY

13

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A MASTER-PLAN FOR THE THREE PYRAMIDS OF GIZA  
BASED ON THE CONFIGURATION OF THE THREE STARS  
OF THE BELT OF ORION

Robert.G. Bauval

The Pyramid Texts embody the remnants of a well-structured star-cult, the main theme of which was the transfiguration of the dead pharaohs into stars <1>. Examination of the Pyramid Texts reveals that the dominant stars of this cult were those of the constellation of Orion. The special attention given to Orion can be understood in several ways: it is the most striking of the constellations; in the archaic Period, it happened to rise in midsummer at dawn (c.2600 BC), as though a celestial herald of the forthcoming yearly nilotic flood. Consequently, the appearance of Orion after a prolonged period of 'invisibility' was taken as the celestial event prelude to a new season of rejuvenation and growth of nature as a whole. Mythologically, Orion was thus seen as the celestial representation of Osiris, the god of rebirth/resurrection, and with whom all the dead pharaohs, as star-gods, were identified <2>. Thus the Pyramid Texts proclaim: 'Behold, he has come as Orion, behold Osiris has come as Orion...O king, the sky conceives you with Orion, the dawn-light bears you with Orion, you will regularly ascend with Orion from the eastern region of the sky, you will regularly descend with Orion into the western region of the sky...' (pyr.820-822). 'O king, you are this great star, the companion of Orion, who traverses the sky with Orion, who navigates the Netherworld with Osiris, you ascend from the east of the sky, being renewed in your due season, and rejuvenated in your due time.' (pyr.882). 'Live, be alive! Be young beside your father, beside Orion in the sky...' (pyr. 2180).<3>.

The Egyptians knew Orion under the name of 'Sah'. They imagined 'Sah' as a male anthropomorphic figure undoubtedly representing Osiris. Several drawings of 'Sah' dating from the New Kingdom are known, notably from the tomb of Senmut (south hall ceiling), where 'Sah' is depicted as a man standing on a boat, holding the Ankh symbol in one hand and a staff in the other; above his head are three large stars in a row, the topmost star slightly deviated to the left (see plates)<4>. There can be little doubt that these three stars are Zeta, Epsilon and Delta Orionis -the Belt Of Orion- which form the same characteristic pattern at the centre of the constellation <5>. It is to be noted that this pattern has not perceptibly changed since the time of the Pyramid Age (c.2700 BC-2150 BC). This is because these three stars are well-over 1000 light-years away, and consequently no proper motion is normally registered for them. In any case, any undetected annual proper motion would probably be below the 1/1000th of a second level, thus far too small for the span of time considered to cause any perceptible change in the pattern of the three stars <6>. In short,

the characteristic pattern formed by the three stars of the Belt Of Orion appears the same to us as it did to the Egyptians who built the Great Pyramid (c.2600 BC).

However, due to a planetary motion known as the 'precession of the equinoxes' the apparent position of the Belt Of Orion relative to the horizon and the equinoxes has changed since 2600 BC, such that the Right Ascension has increased by about three hours (about  $45^\circ$ ), and the Declination south of the celestial equator has decreased by about  $14^\circ$ . Table 1 shows the change of Declinations between the two epochs considered.

Declinations		
	1987 AD	2600 BC
Zeta Orionis	$-1^\circ 56'$	$-15^\circ 33'$
Epsilon Orionis	$-1^\circ 12'$	$-15^\circ 16'$
Delta Orionis	$-0^\circ 17'$	$-14^\circ 45'$

Table 1.

The Great Pyramid is sited at Latitude North  $29^\circ 58'$ , and the celestial equator, as seen from this latitude, crosses the meridian at an altitude of  $60^\circ 02'$  above the southern horizon. Looking south, the three stars of the Belt Of Orion would have intersected the meridian at the following altitudes above the southern horizon in 2600 BC:

Zeta Orionis  $44^\circ 29'$ ; Epsilon Orionis  $44^\circ 46'$ ; Delta Orionis  $45^\circ 17'$ .

Virginia Trimble and Alexander Badawy have highlighted the fact that the southern 'ventilation' shaft in Cheops' pyramid, which is inclined  $44^\circ 30'$  to the horizontal, would have pointed to one of the stars of the Belt Of Orion when it culminated at the meridian about the epochs 2800-2600 BC (9) (see fig.). In view of the religious association between the dead pharaoh and Orion in the Pyramid Texts, both Trimble and Badawy convincingly argued that the southern shaft had a symbolic significance (10), and suggested it was intended as a means for the pharaoh's 'soul' to reach the place of Orion-Osiris in the sky.

The above calculations show that in 2600 BC the star closest to the line projected by the southern shaft was Zeta Orionis. Could the shaft have been specifically intended to point at Zeta Orionis?

In 1983 the present writer drew attention (11) to the fact that the characteristic pattern of the three stars of the Belt Of Orion matched, with striking similarity, the pattern defined by the three

Great Pyramids of Giza. Apparently such a correlation had hitherto escaped notice. In such a correlation, Zeta Orionis links up with Cheops' pyramid (see fig. and plates). The pattern of the three stars and the three pyramids compare as follows:

Belt Of Orion	Giza Pyramids
1.The three stars are aligned in a southwesterly direction as they cross the meridian.	The three pyramids are aligned in a southwesterly direction and are each orientated meridionally.
2.The uppermost star, Delta Orionis, however, is offset slightly to the east of the diagonal line projected by the two other stars.	The southernmost pyramid, Mycerinus', is offset slightly to the east of the diagonal line projected by the two other pyramids.
3.Delta Orionis is also much less bright than the other two stars which are of quasi-similar magnitude (magn. 2.20 compared to 1.70 & 1.79)	Mycerinus' pyramid is also much smaller than the other two pyramids which are of quasi-similar heights (65 m. compared to 146 m. & 143 m.)
4.The middle star, Epsilon, is almost equidistant the two other stars.	The Middle pyramid, Chephren's, is almost equidistant to the two other pyramids. <12>

Table 2.

A Masterplan with intent to correlate the Great Pyramids of Giza with the pattern of the Belt Of Orion appears very likely indeed. A question which must follow is: does this Masterplan include a wider correlation between the geomorphy of the sky landscape about Orion and the landscape about the Giza Necropolis? Raising this question is justified, for the Pyramid Texts indeed confront us with a complete celestial topography onto which actual terrestrial natural and man-made features are imagined to exist. There is a major river called the 'Winding Waterway' (pyr.340,600,802,1253), several waterways (pyr.1102,1084,1716), Canals (Pyr. 1141, 1293, 1634), lakes (pyr.519, 885, 1704), swamps (pyr. 130,340,1475), islands (265,1216), mounds (574,915,1364) and pastures (910,1035), all seemingly relate to earthly counterparts. Even some major cities, such as Abydos (pyr.794,1716), Heliopolis (pyr.14, 207, 318) and Busiris (pyr.288,2010), are mentioned in passages having astronomical connotations. This celestial and mythological landscape of the royal dead appeared so real to the ancient Egyptians that they readily intermingled fantasy with reality when

reading the funerary texts, almost giving a tangible nature to both.

A most sacred location in the Afterworld was 'Rostau', the dominion of a mortuary deity called Sokar who, during the Pyramid Age, was assimilated to Osiris as Osiris-Sokar<sup>(13)</sup>. In later times, Rostau was believed to be the 'Gates of the Afterworld', a sort of cosmic access to the star-world, and was closely associated to a strip of land in the western desert on the fringe of the Nile Valley near Giza which, undoubtedly, had the Giza Necropolis as its epicentre <sup>(14)</sup>. In short, a cosmic counterpart of the burial zone originally reserved for royalty was a vivid reality in the minds of the Egyptians of later epochs.

A major feature of the Afterworld often mentioned in the Pyramid Texts is the 'Winding Waterway', which was, in all probability, seen as a celestial counterpart of the Nile: 'I ferry across on the Winding Waterway... I am ferried over to the eastern side of the sky...' pyr.340. 'The Winding Waterway is flooded.' pyr.343,352. 'Hail to you, O Ra (the sun-god), you who traverse the sky and cross Nut, having traversed the Winding Waterway...' pyr.543. 'I travel the Winding Waterway.' pyr.1138. 'He goes aboard the bark like Ra at the banks of the Winding Waterway.' pyr. 1345. '...Osiris the king, the Winding Waterway is flooded...Awake, stand up at yonder eastern side of the sky at this place where the gods are born...the king will be born on yonder eastern side where the gods are born...' pyr. 1182-3. 'may you lift me and raise me up to the Winding Waterway, may you set me among the gods the imperishable stars...' pyr.1759. '...be firm O king, on the underside of the sky with the beautiful star upon the bends of the Winding Waterway...' pyr. 2061.

The 'winding' characteristic of this celestial-Nile perfectly describes the gyrations of the Milky Way about the earth, surely the only feature of the sky which can be regarded as a 'winding waterway'<sup>(15)</sup>. It is worth noting, therefore, that the relative position of the Belt Of Orion to the Milky Way also correlates to the relative position of the Giza pyramids to the Nile. Both triads are immediately west of their corresponding 'Niles'. Indeed, the 'southwesterly' alignment of the three stars relative to the Milky Way's axis matches the 'southwesterly' alignment of the three pyramids relative to the Nile's axis. Even the 'distance' of the stars to the Milky Way's axis can be said to matched -on an equal scale- the distance of the pyramids to the Nile's axis (see plates).

The above strongly points towards a deliberate correlation between the central stars of the Orion-Osiris sky-figure and the Giza Pyramids... and, consequently, the existence of a Masterplan for the Necropolis instigated by Cheops and his architects. Irrespective of the prevailing wariness the Egyptological profession has of new 'theories' on the pyramids, such a conclusion cannot be ignored, for it dovetails with smooth precision into the astronomical matrix of the Pyramid Texts and the astronomical features of the pyramids themselves.



It cannot be denied that monumental pyramids are proof that human capacity was strained to its very limits in order to satisfy the egocentric desire of pharaohs to 'establish' themselves after death as 'star-gods' near Orion-Osiris. Clearly the pyramids bear witness to an epoch when the conviction in such a transfiguration was thought of in tangible and real terms when assisted by magical rites performed in an symbolic setting. All the extant funerary paraphernalia -mummies, artifacts, statues, furnitures, drawings, texts and, of course, the huge stone monuments themselves- emphatically attest to the existence of this conviction. Thus a Masterplan for Giza based on the pattern of the Belt Of Orion and its relation to the Milky Way, when allocated to pharaohs who believed in a stellar transfiguration after death near Orion-Osiris, is a very real possibility indeed <16>.

notes:

1. Faulkner, R.O: 'The King And The Star-religion In The Pyramid Texts', in Journal Of Near Eastern Studies, 1966, pp.153-161. Selim Hassan also discussed the stellar destiny of the kings in the Pyramid Texts in much detail as early as 1946 ( Excavations At Giza, Vol.6, part 1, Egyptian Government Press, 1946).
2. Rundle Clark, R.T, Myth & Symbol In Ancient Egypt, London 1978, pp.122-3.; Hart, G., A dictionary Of Egyptian Gods And Goddesses, London 1986 ed., p. 153.
3. Quotations here are as translated by R.O.Faulkner (The Ancient Egyptian Pyramid Texts. Aris & Philips. Wiltshire.).
4. Neugebauer, O. & Parker R: Egyptian Astronomical Texts. Vol.1. Brown University Press. Providence 1964, p. 25 for the identification of Sah with Orion. See Vol.111, Plates 4,6,8,9,14,19,21,24 (Senmut).
5. See V. Trimble's paper reference in footnote 9 herebelow.
6. Sky Catalogue 2000 Vol.1 (Cambridge University Press 1982) gives the proper motion adjustment coefficients for RA and Declination of the Belt stars as 0.000". Astronomer Dr. J. Obyrne of the University Of Sydney (see fn.8 below) informed me that even if one assumes a small value of proper motion, rather than zero, the result would not be greater than 65 seconds of arc (just under 2 percent of a degree), which, in his opinion, is probably unrealistically large.
7. The coordinates of stars viz. their Right Ascensions and Declinations, perceptibly change from century to century (as a 'rule of thumb', the RA increases by 5' per century) due to this planetary motion. This motion is a slow gyration of the earth -a full cycle takes about 26000 years- which causes the earth's polar axis to define a circle about a fixed point (the ecliptic pole) in the sky. This, of course, is an 'apparent' motion as opposed to a 'proper' motion of the stars in space.
8. Precessional calculations were done on Casio Scientific Calculator Fx-8000G. Also A sample-result for 2500 BC was provided by Dr. J. O'Byrne of the Chatterton Department Of Astronomy,

University Of Sydney, NSW. The modern 'rigorous' formula for such calculations can be found in Sky Catalogue 2000.0 Vol.1, op. cit., p. xiii.

9. Badawy, A: 'The Stellar Destiny of Pharaoh and the so-called Air-Shafts of Cheop's Pyramid', in *Mitteilungen der Instituts Fur Orientforschung (Akademie der Wissenschaften zu Berlin)* Band 10, 1964, pp.189-206.; Trimble V: 'Astronomical Investigations concerning the so-called Air-Shafts of Cheop's Pyramid', *ibid.*, pp.183-7. There is also a northern shaft allegedly pointing to the then-polar star Alpha Draconis which Badawy and Trimble relate to the so-called 'circumpolar' destiny of the pharaohs. I have dealt with the polar shafts in detail in an article (yet unpublished) entitled "The seeding of the star-gods" -hopefully to appear in print during the latter part of 1989.

10. Previously discussed by Steindorff G., *Egypt (Baedeker)*, 1929, p.140.; Capart J., *Etudes Et Histoire*, I, Brussels 1924, p.182.; and Edwards I.E.S., *The Pyramids Of Egypt*, Pelican Books, 1961, p. 126. Edwards also discussed the Cheops shafts in 'The Air-channels in Chephren's Pyramid', in *Studies in Honor of Dows Dunham*, Boston, 1981, in which the unfinished shafts in the second pyramid are discussed. The present writer draws attention to the observation that the causeway of Chephren's pyramid is directed to about azimuth  $73^{\circ}30'$ , which was the rising point of the Belt Of Orion in 2600 BC -a fact unnoticed so far.

11. A paper (unpublished) was circulated to several authorities in Egyptology during 1983-86.

12. Petrie, Sir W.M.F., *The Pyramids And Temples Of Gizeh*, London 1883, p.125.

13. Edwards, op. cit., p. 27.

14. Lichtheim, M., *Ancient Egyptian Literature vol. 1*, UCLA 1975 ed., p. 204, note 2.; Hart, G., *A Dictionary Of Egyptian Gods And Goddesses*, London 1986, p. 152.; Erman, A., *A Handbook of Egyptian Religion*, London 1907, p. 15. In New Kingdom depictions of 'Rostau', a curious subterranean zone is shown surmounted by a 'pyramid' and protected by two gigantic sphynxes, the latter appearing half-covered in sand; a depiction very reminiscent of the Giza plateau and the Great Pyramid as seen from the south of the great sphynx.

15. Faulkner ( see footnote 1 above. p. 154, fn.7) briefly linked the Milky Way with the 'Winding Waterway'; this was also discussed by V. L. Davis of Yale University (Davis, V.L, ' Identifying Ancient Egyptian Constellations' in 'Archeoastronomy' Vol. No. 9, JHA, xvi 1985, p.S102). Many other ancient races saw the Milky Way as a celestial-River: the Chinese 'Silver River', the Akaddian 'River Of The Divine Lady', the Arab 'Al Nahr' (river), the Hebrew 'River of Light' (see Allen, R.H: *Star Names -Their Lore & Meaning*, Dover Publ. New York, 1963, p. 474).

16. I have refrained from discussing the symbolism embodied in the shape of the pyramids and their capstones, as this is discussed in length in my forthcoming article in DE 14 "Investigation On The Benben Stone: was it an iron meteorite ?".

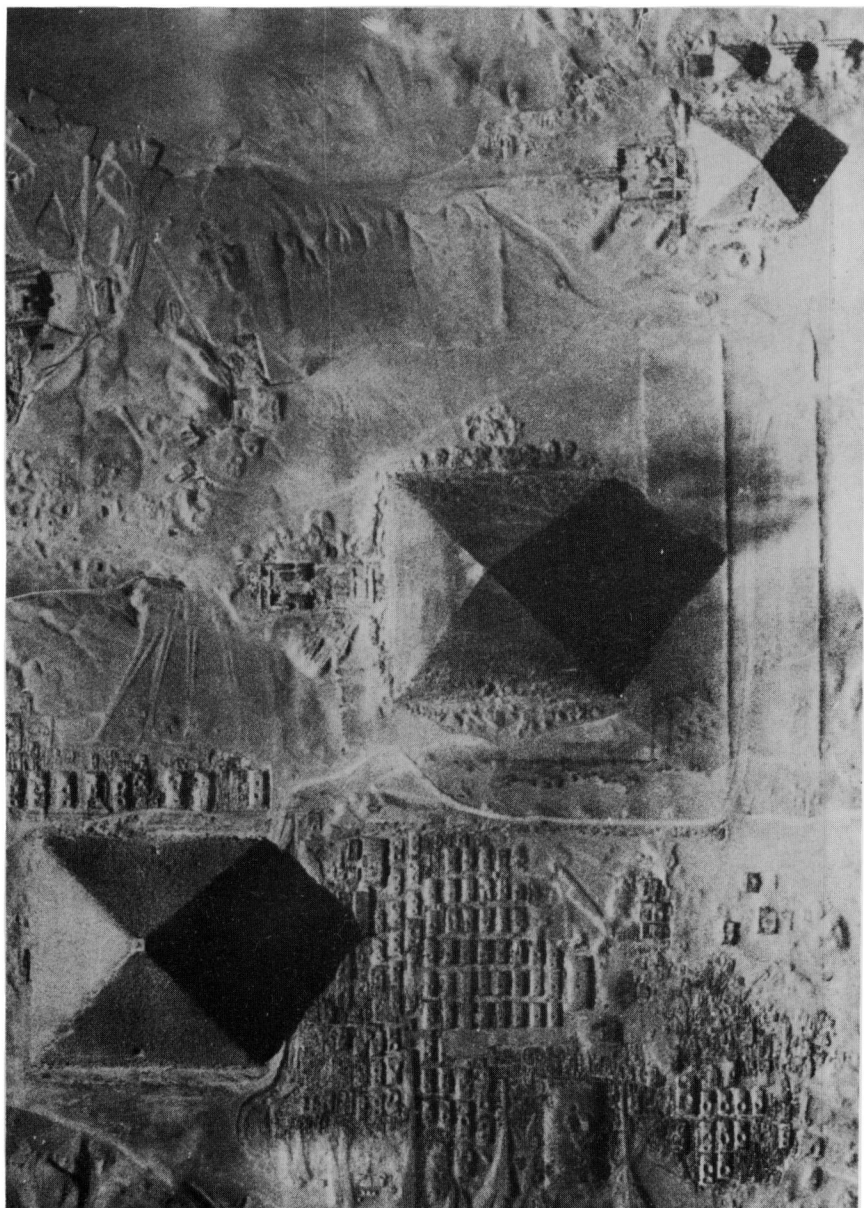


Plate 1: Aerial View Of The Giza Necropolis

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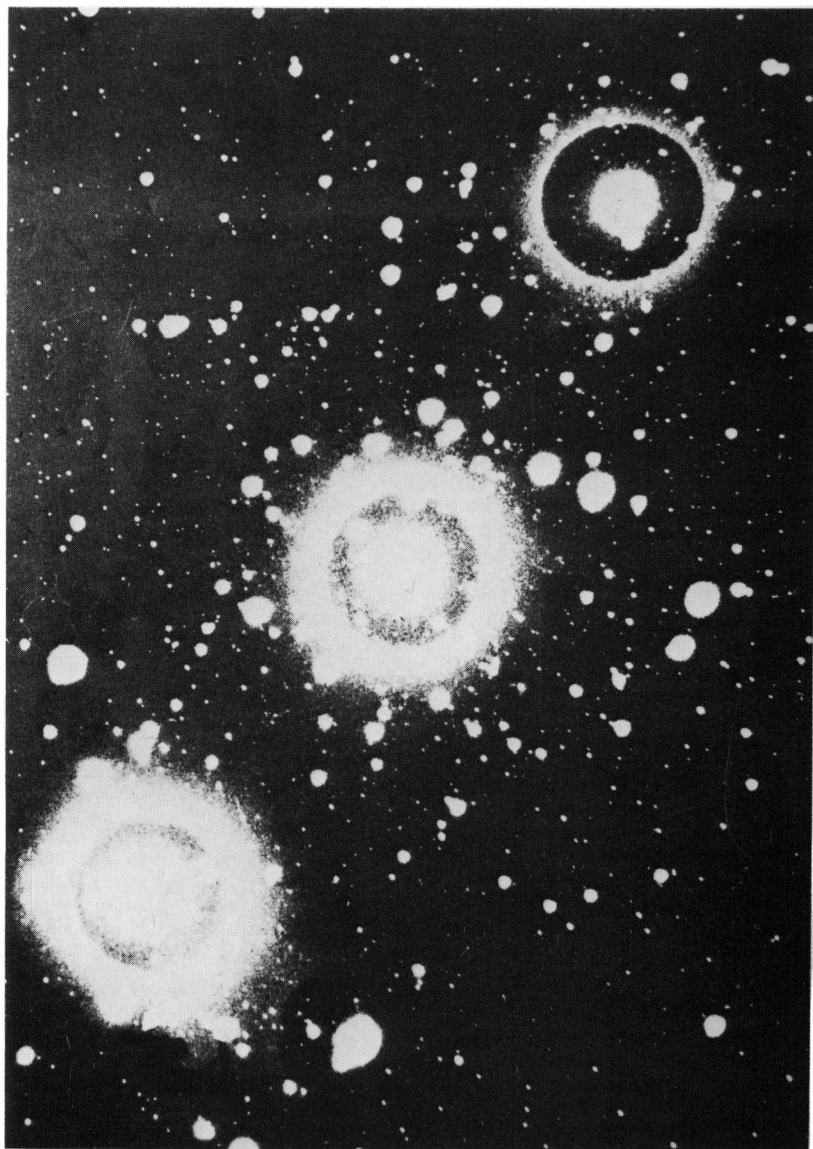


Plate 2: The Belt Of Orion. By courtesy of DOVER PUBLICATIONS Inc.  
From Burnham's Celestial Handbook, by Robert Burnham Jr.  
Vol. ii -1978 (sheet 1304).



Plate 3: The constellation Of Orion and The Milky Way.  
 The Belt stars at the centre of the constellation  
 are slightly blurred due to long exposure of film.  
 By courtesy of Wandsworth Publishing Inc. From  
 'Astronomy : the cosmic journey', by W.K. Hartmann  
 (c) 1982, p.355.

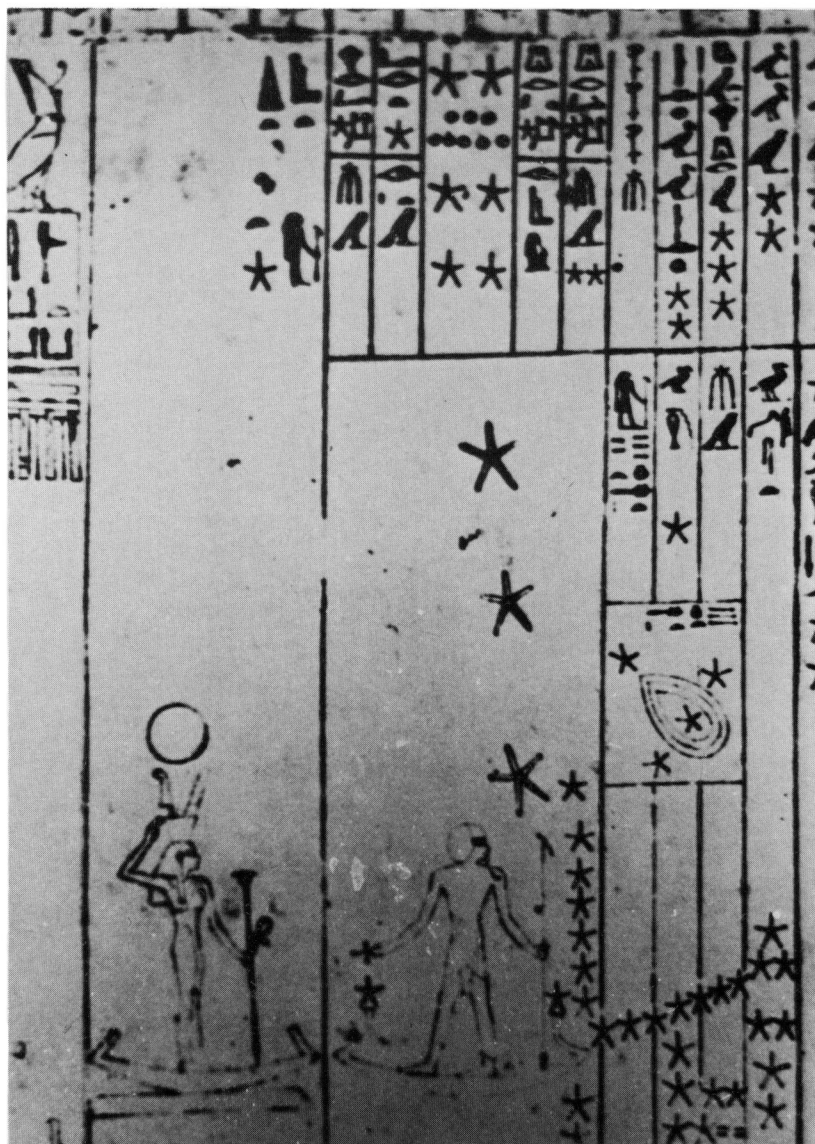
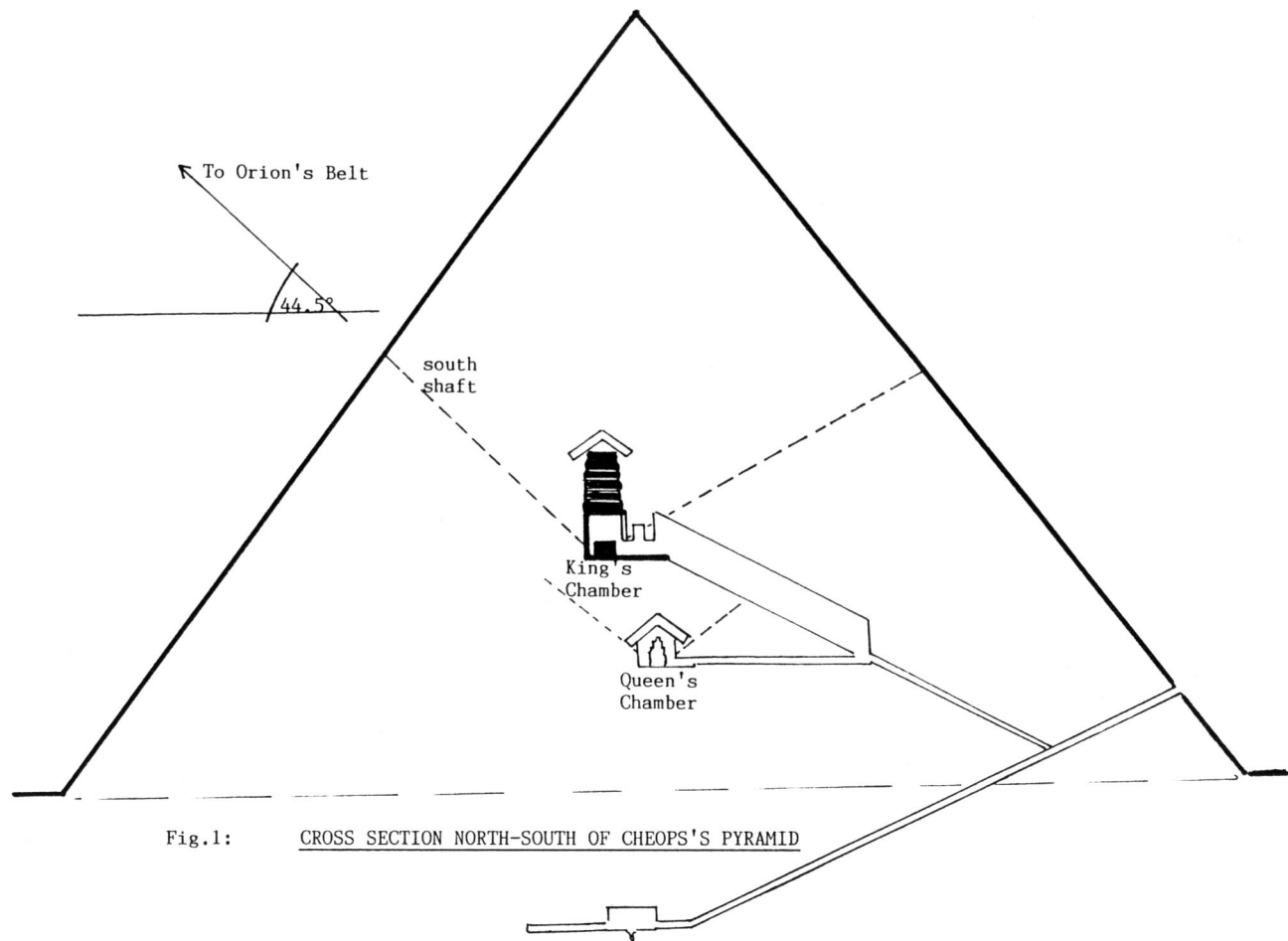


Plate:4

Depiction of "SAH-ORION" in the tomb of Senmut, New Kingdom. Note the pattern of the three large stars above the head of 'Sah-Orion', and the slight deviation to the left of the topmost star relative to the line going through the other two. These three stars are undoubtedly the representation of The Belt Of Orion, formed by three stars having the same pattern.



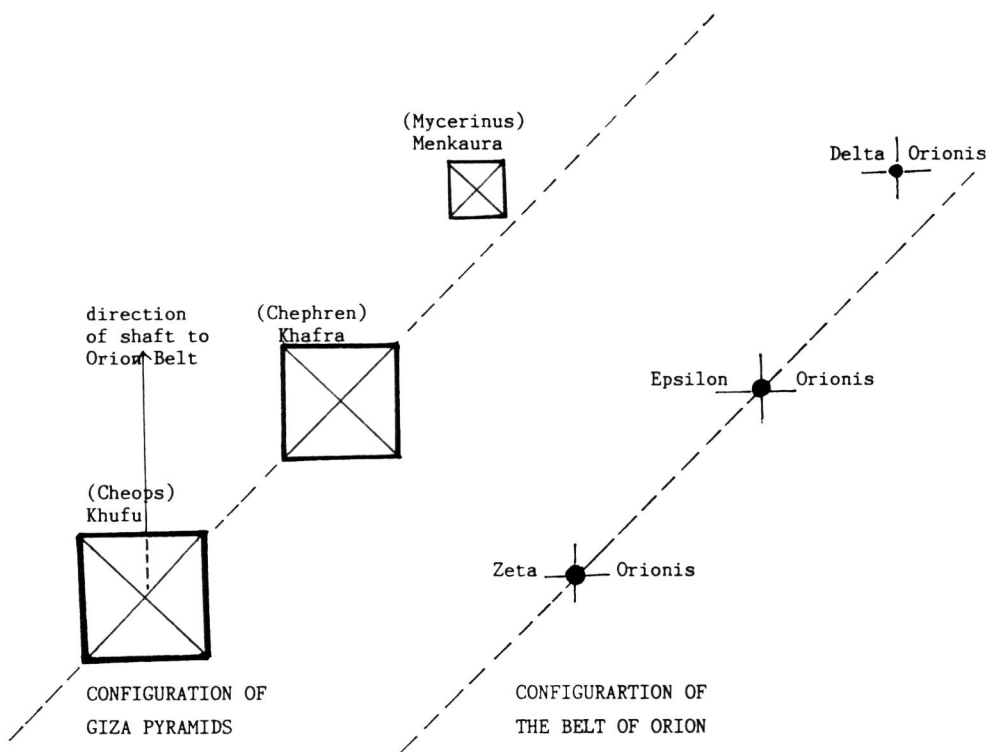


Fig.2 : Correlation on an equal-scale basis the southwesterly direction of the pyramids relative to the axis of the Nile correlates to the axis X-X' of the Belt Of Orion relative to the axis of the Milky Way.