Response to Vandecruys (2006). The Sphinx: dramatising data….and dating. – PalArch, series Archaeology of Egypt/Egyptology 1, 1: 1–13

C.D. Reader
CGeol FGS
54 Rigby Road, Maghull, Merseyside, L31 8AZ. UK.
colin.reader@btinternet.com

ISSN 1567–214X

5 figures

Abstract

In a previous paper (Vandecruys, 2006), the evidence presented by the current author for re–dating the Sphinx of Giza and a number of other structures present within the Giza necropolis has been reassessed. Following this re–assessment, Vandecruys has raised a number of objections to the current author's thesis. The current paper provides a response to the criticism of Vandecruys and presents further arguments in support of Early Dynastic development at Giza, of which the Sphinx is considered to have formed an important element.

Contents

1. Introduction
2. Identifying the deterioration of the rock
3. Structural analysis of Khafre's pyramid complex
3.1. Khafre's causeway
3.2. Khafre Mortuary Temple
3.3. Sphinx Temple
4. Evidence not addressed
5. Conclusions
6. Cited literature

1. Introduction

In his 2006 paper (Vandecruys, 2006) Vandecruys addresses both the case put forward by Robert Schoch (Schoch, 1992) and the separate case made by Reader (2002) for a revision to the conventional dating of the Great Sphinx of Giza. In the following pages, Vandecruys' criticism of Reader's work is reviewed.

The principal thesis put forward by the current author (Reader, 2001, 2002) is that the degradation of the bedded limestones that were exposed by the excavation of the Sphinx, is not uniform. Site inspection clearly shows that the extant degradation is more intense along the western wall of the enclosure and along the adjacent western sections of the southern enclosure wall (figure 1). After considering a range of potential causes for this more intense degradation, Reader has argued that, as they lay at the foot of the sloping Giza Plateau, the western enclosure walls would have been subject to erosion by surface run–off following heavy rains. This process, acting together with a range of other processes of weathering and erosion (*e.g.* chemical weathering, abrasion by windblown sand etc.), is considered to provide the most likely explanation for the features of degradation that are present within the Sphinx enclosure.

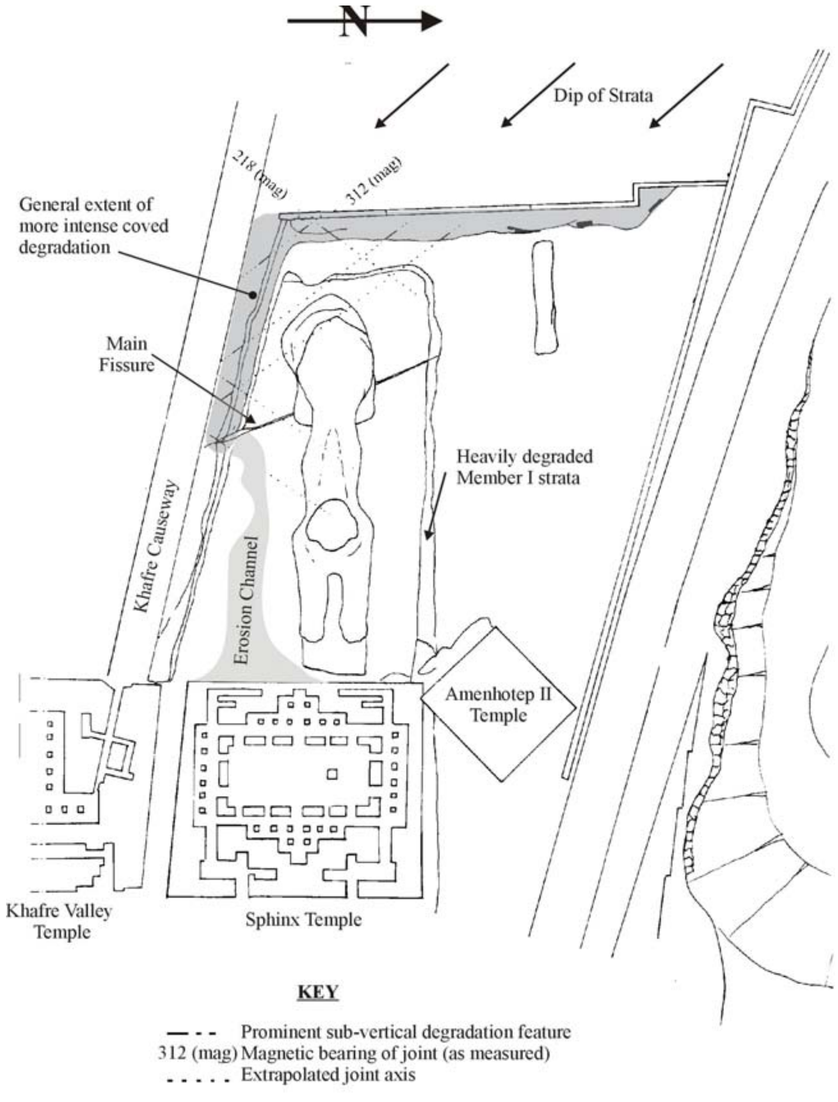

Figure 1. The layout of the Sphinx enclosure. Sketch by the author.

Whilst rainfall events capable of generating significant run–off continue to be experienced in Egypt up to the present, it is the existence of large quarries, excavated for the construction of the 4th Dynasty pyramids of Khufu and Khafre (figure 2), that require the age of the Sphinx to be re–considered. The impact of these quarries on the hydrology of the Giza plateau would have been significant, as their excavation would have prevented any further surface water movement from reaching the Sphinx enclosure. For the western walls of the Sphinx enclosure to have been eroded by run–off, therefore, the Sphinx enclosure must originally have been excavated before this quarrying took place – that is at a time before the 4th Dynasty.

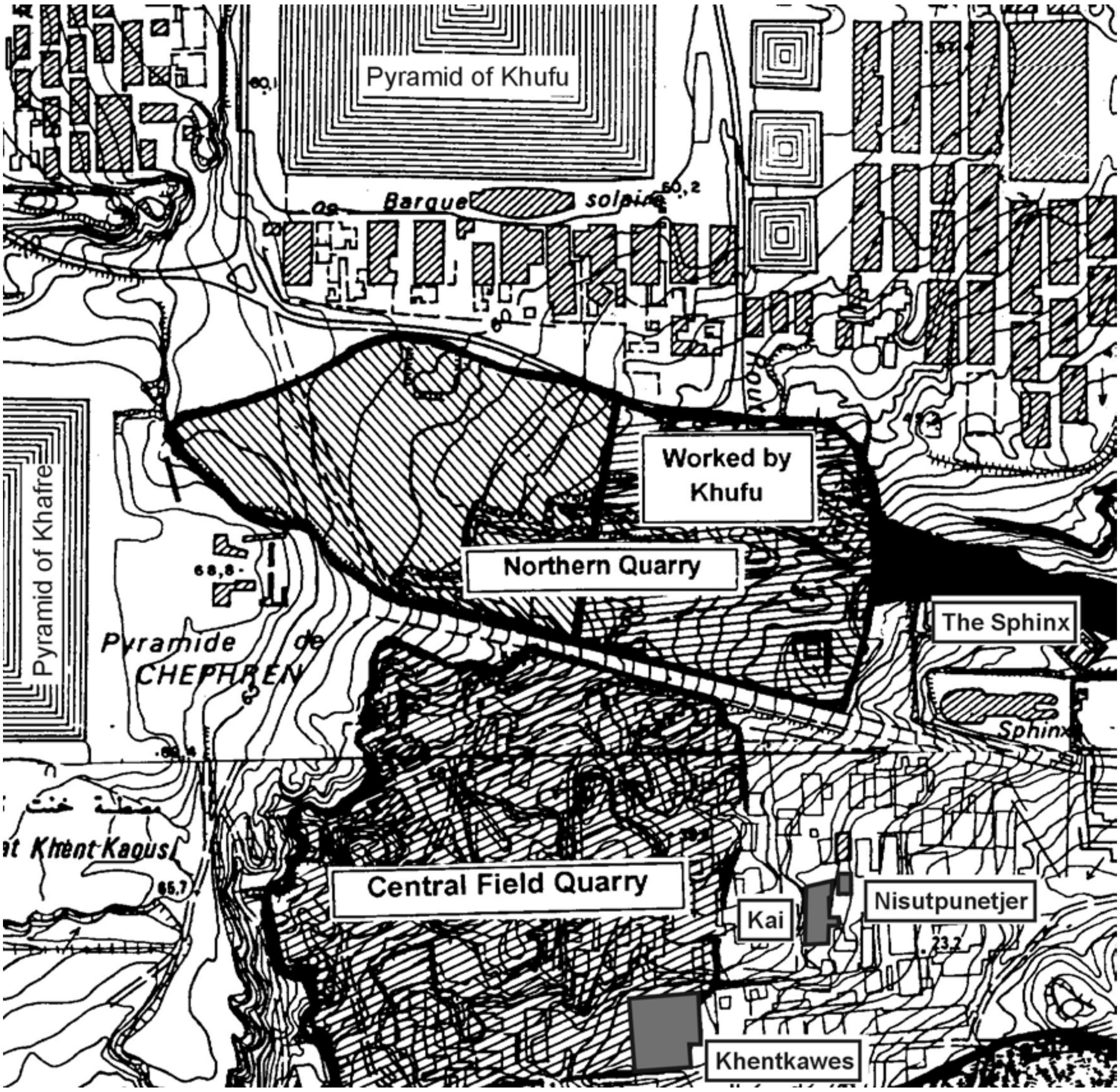

Figure 2. The extent of Old Kingdom Quarrying at Giza and key features of the Central Field Area (all locations are approximate). Drawing by the author.

2. Identifying the deterioration of the rock

In this section of his paper, after commenting on Schoch's rainfall hypothesis, Vandecruys turns his attention to Reader's theory of rainfall run–off. Despite the impression given by Vandecruys' comments (Vandecruys, 2006: 2), throughout Reader's involvement in this debate, the terms 'weathering' and 'erosion' have been consistently used in their proper context, whilst the more general term 'degradation' has been used to refer to features of the exposed limestone that are considered to be the result of the combined action of both weathering *and* erosion. The current author has also consistently maintained the view that no single process of weathering or erosion has acted in isolation on the limestones exposed by the excavation of the Sphinx. Instead, it is evident that a number of distinct processes have acted together to produce the degradation morphology that can be observed today.

As discussed above, whilst a range of processes, such as chemical weathering, abrasion by wind blown sand etc., may have affected the limestones exposed within the Sphinx enclosure, the more intense degradation of the western walls of the Sphinx enclosure is considered by the current author to be attributable to the localised effects of rainfall run–off. It is Vandecruys' view, however, that run–off would not "even reach the [Sphinx] enclosure" (Vandecruys, 2006: 2). This conclusion has been reached despite clear evidence for the action of run–off within the Sphinx enclosure (see figure 1), presented in a paper which has been cited by Vandecruys. The relevant paragraph reads "Remarkably, within the Sphinx enclosure there is unquestionable evidence for erosion by running water, in the form of a shallow erosion channel that appears to issue from the base of the Main Fissure, at the point at which it is exposed in the southern Sphinx enclosure wall." (Reader, 2002: 13).

Despite this clear evidence for the action of run–off, Vandecruys then addresses the possible nature of the surface of the Giza plateau, making reference to a range of karst features that, in his view, would rapidly conduct any surface water to the subsurface leaving "…little scope for significant quantities of surface run–off to reach the enclosure." (Vandecruys, 2006: 2).

As made clear by Reader (2002), there is abundant evidence for surface drainage at Giza, as follows:

- Natural wadis (which are to be dated on a geological timescale rather than an archaeological timescale and, of course, considerably predate the excavation of the Sphinx),
- Run–off damage to other archaeological features at the site, such as the damage noted by Reisner to Menkaure's Valley Temple (Reisner, 1931: 44), and
- The evidence from aerial photographs taken of the site in the late 1920s (probably 1928), which clearly show run–off from unquarried areas, which drain into the sand–filled Old Kingdom quarries at the site. Surface water could not have been conducted towards these infilled quarries if, as Vandecruys argues, there was little scope for surface water at the site.

Notwithstanding this evidence for the presence of surface water drainage across the Giza plateau, Vandecruys rejects surface run–off in favour of the concept of sub–surface groundwater flow – or 'interflow'. Vandecruys' thesis is that, by considering the effects of interflow, the more intense degradation of the western Sphinx enclosure walls can be explained without the need to revise the conventional 4th Dynasty date of the construction of the Sphinx. He argues that, whilst surface water flow may never have been a significant feature of the hydrology of the Giza plateau, interflow increased the moisture content of the western Sphinx enclosure walls, enhancing the effects of chemical weathering along these exposures. He further argues, citing comments by Harrell (Vandecruys, 2006: 4), that as the Old Kingdom quarries "would probably not block such groundwater flows", the more intense degradation of the western Sphinx enclosure walls developed in a conventional timeframe, consistent with the generally accepted attribution of the Sphinx to the 4th Dynasty pharaoh Khafre (ca. 2500 BCE). In this way, Vandecruys is able to assign a period of some 4500 years (*i.e.* from 2500 BCE to the present) for the development of the more intense areas of degradation within the Sphinx enclosure.

In support for his thesis, Vandecruys compares the degradation of the Sphinx with the strata exposed by the excavation of Campbell's tomb, a 26th Dynasty (ca. 600 BCE) square sectioned shaft tomb, located a short distance upslope (and up–dip) to the west of the Sphinx. As Vandecruys correctly notes (Vandecruys, 2006: 3) this tomb "does not show the same intense 'coved' degradation that is found in the Sphinx enclosure". Vandecruys argues that, when considered in the context of his theory of interflow, the general absence of features of intense degradation in Campbell's Tomb is consistent with the more recent construction of this monument, which is some 2000 years younger than the Sphinx.

In his paper, Vandecruys does not provide any discussion of the nature or characteristics of the interflow that he proposes. To have influenced the degradation of the Sphinx this groundwater needs to have been relatively shallow. Groundwater level data for Giza is sparse, however, Vyse (Vyse, 1840: 148) made a repeated series of groundwater observations during his work at the site. Vyse's *shaft 2* is situated between the Sphinx and Campbell's tomb and for 23rd October 1838 (during 'high Nile' – presumably the inundation), he recorded a groundwater level of 149 feet 4½ inches (approximately 45.53 m) below the base of the Great Pyramid. According to recent photogrammetric maps of the site, the base of the Great Pyramid is at a level of 60.2 m amsl (Egyptian Ministry Housing and Reconstruction, Sheet F17), providing a reduced level for Vyse's groundwater data of 14.67 m amsl, more than 5 m *below* the floor of the Sphinx enclosure, which is at approximately 20 m amsl (Sheet F17). After clearing Campbell's Tomb, Vyse also dipped the surrounding fosse, which according to Vyse's report, appears to have been dry. Whilst the data provided by Vyse is dated, its value lies in the fact that it pre–dates the construction of the first Aswan Dam (completed in 1902) and is, therefore, more relevant to discussions over ancient groundwater conditions than modern groundwater data.

The walls of both Campbell's Tomb and the Sphinx enclosure, therefore, sit above the level of *true* groundwater. This leaves *perched* groundwater as the only mechanism for the shallow interflow that Vandecruys describes. We know from Gauri (Gauri *et al*., 1995: 123) that whilst the more durable members of the bedded limestone at Giza are cut by quite distinct near–vertical joints, these joints have not propagated through the interbedded marls. For any groundwater to have influenced the Sphinx or Campbell's Tomb, therefore, it is likely to have taken the form of shallow fissure flow, with water moving along solution widened joints etc., rather than through the less permeable mass of the rock. This *perched* groundwater would be prevented from infiltrating to depth by the underlying less permeable, interbedded marls.

The western wall of the Sphinx enclosure is located at the down–dip, lower lying eastern edge of the palaeoslope – more correctly referred to, perhaps, as the dip of the strata (as shown on figure 1, the dip of the beds at Giza is to the south east – Gauri, 1984: 25).

If, in accordance with Vandecruys' hypothesis, any interflow *was* able to reach the Sphinx, it is clear from figure 1 that the western enclosure walls would certainly be affected. What Vandecruys has overlooked, however, is the fact that much of the western section of the southern enclosure wall, as far east as the Main Fissure (see figure 1), also exhibits the same intense 'coved' degradation as the adjacent western enclosure wall. As discussed in the following paragraphs, however, the more intense degradation of the western end of the southern enclosure wall is not consistent with the action of interflow.

Flow nets provide hydrogeologists with a simple but robust tool with which to model groundwater movement. Each flow net has two components: equipotential lines and flow lines. Under uniform conditions, in which groundwater flow is not influenced by features such as excavations, gullies, wadis etc., a flow net will be represented by two sets of equally spaced lines. Lines running down hydraulic gradient (often parallel to the dip of the strata) are referred to as flow lines and lines drawn perpendicular to the flow lines are referred to as equipotentials. Whilst the interpretation of flow lines is relatively straightforward (they illustrate the direction of water movement) the principle behind equipotentials is less obvious. However, they should be considered as analogous to contour lines on a topographic map.

To construct a flow net for a groundwater body influenced by an excavation, such as the Sphinx enclosure, the equipotential lines should be modified from their 'undisturbed' layout so that they reflect the extent of the feature in question (an 'undisturbed' distribution for the area of the Sphinx is given by the dotted black grid on figure 3). Once the equipotentials are suitably arranged, the 'undisturbed' flow lines are then modified, so that where they cross an equipotential they do so at right angles.

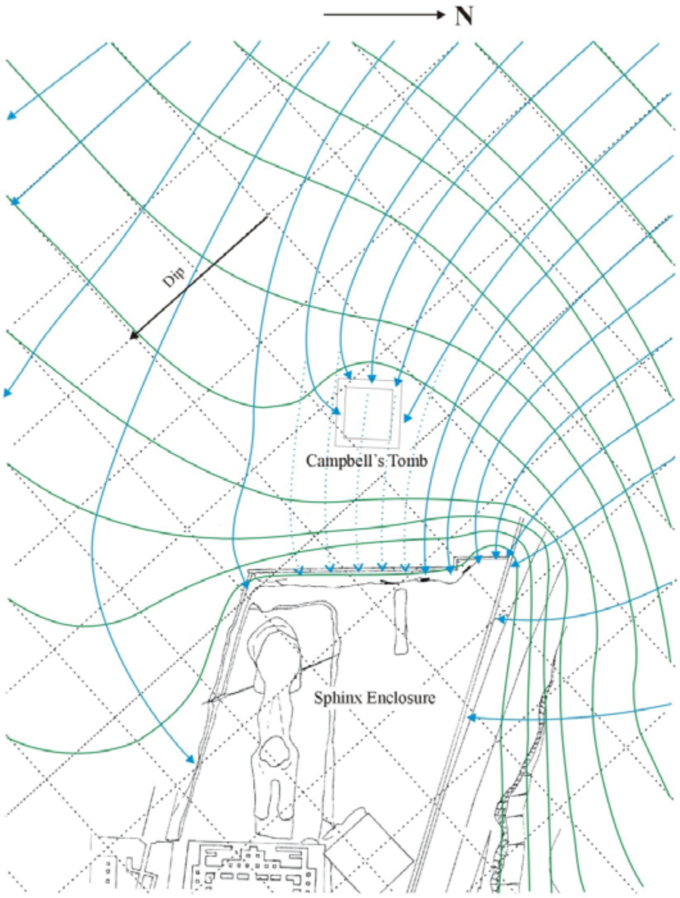

Figure 3. Proposed flow net for shallow groundwater in the vicinity of the Sphinx enclosure. Drawing by the author.

In order to test Vandecruys' assertions regarding the likely influence of interflow on the Sphinx and Campbell's Tomb, the current author's views on the impact of Old Kingdom quarrying on the hydrology of the site have been set aside and, on figure 3, a shallow (perched) body of groundwater has been modeled by a flow net, with equipotential lines in green and flow lines in blue. The blue dotted lines represent postulated flow lines for the period between the excavation of the Sphinx and the cutting of Campbell's Tomb (*i.e.* the period before Campbell's Tomb was excavated). In those areas of figure 3 that are more distant from the Sphinx, particularly the areas to the west and north west, the flow net proposed by the current author can be seen to approach the idealised or 'undisturbed' conditions that are given by the dotted black lines.

The value of flow nets is that, by initially adopting equal spacings for the flow lines, the way in which an excavation or other feature impacts on the groundwater regime can be readily visualised. As can be seen from figure 3, if the Sphinx had been in a hydrogeological setting in which interflow was a significant feature, the enclosure would have locally modified groundwater flow. The extent of this modification is reflected in the degree to which the spacing of the initially equidistant flow lines is adjusted in the flow net. More closely spaced flow lines, such as those along the western enclosure wall (particularly the northwest corner of the enclosure) indicate enhanced flow, whereas, more widely spaced flow lines, such as those along the southern enclosure wall, indicate reduced flow.

As the hypothetical flow net for the area of the Sphinx illustrates, given the direction of dip and the orientation of the walls of the Sphinx enclosure, if interflow had been a significant factor in the degradation of the Sphinx, the western end of the southern enclosure walls will have been subject to far less groundwater influence than the adjacent western enclosure walls. The fact, then, that significant sections of the southern enclosure wall are as intensely degraded as the western enclosure wall, provides reason to question interflow as a dominant agent of degradation within the Sphinx enclosure.

In addition to modelling the effects of the excavation of the Sphinx on any groundwater movement, the flow net on figure 3 also illustrates the impact of the excavation of Campbell's Tomb on any interflow to the west of the Sphinx. Whereas, before the excavation of Campbell's Tomb, any groundwater flow would have been towards the western wall of the Sphinx enclosure (as shown by the blue dotted flow lines), the shaft tomb can be seen to further modify the flow net, with enhanced flow around the western walls of the tomb (or more strictly speaking the fosse that surrounds the tomb). This raises the separate issue of the fate of any interflow after encountering Campbell's Tomb and the significance of this on the degradation of the western walls of the Sphinx enclosure.

On reaching Campbell's Tomb, any perched fissure flow will have encountered a body of comparatively permeable sand – the fill to the tomb. The nature of flow through the sand will have been very different to the flow through the adjacent fissured bedrock, with the perched groundwater moving in a more dispersed manner through the interstices between the sand grains. The sand infill to Campbell's Tomb, therefore, will have greatly influenced any local groundwater movement by introducing different mass–flow conditions.

As with the Old Kingdom quarries at Giza, although on a smaller scale, the infilled Campbell's Tomb will have modified the hydrology of the site, not only by intercepting any surface run–off that may have been generated but also by interrupting fissure flow through the limestones and by providing a vertical drainage pathway through the less permeable marl beds that make up the limestone sequence. It is argued, therefore, that ancient excavations at Giza disrupted the hydrology of the site in a number of ways, not least by cutting through the marly layers and, therefore, locally removing the potential for shallow perched water tables to be sustained. Given these considerations, it is difficult to conceive of any mechanism by which interflow into the western elements of Campbell's Tomb could be conducted through the infill to the tomb, to then discharge further east and emerge along the western walls of the Sphinx enclosure.

The implications of the postulated flow net go further. As shown by the solid blue flow lines on figure 3, the disturbance to groundwater flow caused by Campbell's Tomb (and, potentially, the other shaft tombs to the west of the Sphinx), can be considered to have cast a groundwater 'shadow' on the Sphinx enclosure. From the 26th Dynasty excavation of Campbell's Tomb, therefore, significant sections of the western Sphinx enclosure wall will have been 'shielded' from the influence of any interflow. This 'shielding' will have reduced the potential timescales for the degradation of the western Sphinx enclosure walls from the 4500 years advocated by Vandecruys, to about 1900 years – that is the time between the generally assumed excavation of the Sphinx (ca. 2500 BCE) and the excavation of Campbell's Tomb (ca. 600 BCE).

From the time of its 26th Dynasty excavation, therefore, rather than the walls of the Sphinx enclosure, it was the western walls of Campbell's Tomb that would have been subject to the degradational effects of interflow – a process which, with no other obvious influence on hydrology, would have continued to the present day. The western exposures of Campbell's Tomb would, therefore, have been influenced by about two thousand six hundred years of interflow – longer than the period for which the Sphinx was similarly affected – and yet as Vandecruys confirms, it is the Sphinx enclosure that is the more heavily degraded.

Like Campbell's Tomb, we know that for significant periods of time, the Sphinx enclosure was also filled with sand. Whilst the exact mode and duration of exposure to degradation can be debated at length, given that under the above assessment, both monuments have been exposed to similar processes for comparable periods of time, we should expect that the two exposures would bear similar degradation morphology. The fact that the nature of the degradation of the two monuments is dissimilar, therefore, gives further justification for the rejection of Vandecruys' case for interflow.

In summary, given the interbedded nature of the geology at Giza, if it were not for the influence of quarries and other excavations on the local hydrology, it would not be unreasonable to expect that interflow would be present. As argued above, however, the existence of coved degradation along sections of the southern Sphinx enclosure wall is not consistent with the mechanisms of interflow described by Vandecruys. Furthermore, as flow nets show, if interflow had been a significant factor in the development of the degradation of the western Sphinx enclosure walls, the excavation of Campbell's Tomb in the 26th Dynasty, would have influenced groundwater movement, such that significant sections of the western Sphinx enclosure walls would have been effectively 'shielded' from the action of interflow. By reducing the period of time that these limestones were exposed to interflow, from the 4500 years argued by Vandecruys, to approximately 2000 years, this groundwater 'shadow' would have led to differential degradation along the western enclosure wall – something that is not present on site. To cast further doubt over the validity of the interflow theory, it is the view of the current author that given it's position to the west of the Sphinx enclosure, from the 26th Dynasty on, it would have been the western walls of Campbell's Tomb that would have become the most heavily influenced by interflow. Despite the similar exposure durations that the flow net study suggests for the two monuments, as Vandecruys has confirmed (Vandecruys, 2006: 3) the degradation of Campbell's Tomb does not exhibit the intense coved degradation of the western walls of the Sphinx enclosure.

There appears, then, to be little support for the action of interflow in this part of the Giza plateau, despite what, superficially, appear to be the favourable geological conditions. These shortcomings of the interflow theory are, therefore, seen to strengthen the long–held view of Reader, that the 4th Dynasty quarries *did* significantly disrupt the hydrology of the plateau and that, contrary to the views of both Vandecruys and Harrell, this quarrying brought an end to both surface run–off and interflow in the vicinity of the Sphinx.

3. Structural analysis of Khafre's pyramid complex

In this section of his paper, Vandecruys addresses the complex of pre–4th Dynasty features that Reader has argued were associated with the early Sphinx. This complex includes the Sphinx, the Sphinx Temple, the Proto–Mortuary Temple and the alignment of Khafre's causeway. Please note that Khafre's roofed causeway construction has never been considered as part of this pre–4th Dynasty development at Giza – simply the alignment on which the causeway structure was later built.

The discussion of the 'ditch' that allegedly runs along the north side of the Khafre causeway (Vandecruys, 2006: 8), is not included in Reader (2002), however, this issue was addressed in early self–published papers by Reader which have been available for some time on the internet (*e.g.* http://www.ianlawton.com/as1.htm) and from which the following paragraphs are quoted: "A number of authors have made reference to a ditch which reportedly runs parallel to "Khafre's" causeway and enters the Sphinx enclosure in the south west corner. Currently, only a short stretch of the eastern end of this ditch is exposed and the only evidence for the continuation of the ditch beyond this point, is a slight depression in the accumulated sand. Although this depression can possibly be identified on the 1:5000 scale topographic maps of the site, running parallel with the causeway, it appears to extend no more than 35 m from the Sphinx enclosure. There is no consensus on the function of the ditch, it being variously described as a drainage ditch and a boundary marker. To support the established sequence of development for the site, a number of Egyptologists refer to this ditch as a drainage feature and argue that it indicates that the Sphinx was excavated after the ditch was cut, as the ancient Egyptians would not deliberately have discharged run–off into the Sphinx enclosure. However, when the surface hydrology of the area is considered (under the conventional sequence of development) the drainage function of the ditch has to be questioned. The quarrying undertaken by Khufu and Khafre would limit the available catchment to the north of the ditch. To the south, the only area from which rainwater could be shed is from the roof of the causeway structure. If we assume that Khafre's causeway resembled that of Unas, a central light–slot would have resulted in the need for a second drainage ditch on the southern side of the causeway. The published literature makes no reference to such a second ditch and none is apparent from site inspection. Given these reservations regarding the drainage function of any ditch at this location, I have investigated its other proposed function – that of a boundary marker. As stated above, available published information has been unable to confirm that the ditch runs the full length of Khafre's causeway. The only location at which inspection of the flank of the causeway is currently possible is at a point, approximately halfway along, where an underpass has been cut through the limestone. Although the accumulated sand has been removed from this location, inspection undertaken in May 1998 and July 1999 failed to establish any evidence for the continuation of the ditch up to or beyond this point. Given the uncertainties surrounding the purpose and the true extent of this ditch, I consider that without further investigation, it has limited value in support of any argument for the sequence of development of Khafre's mortuary complex."

3.1. Khafre's causeway

Vandecruys' then undertakes a lengthy assessment of Reader's published comments on the alignment of Khafre's causeway and the possible spatial relationships between this feature and adjacent Old Kingdom quarries. Whilst it is accepted that the precise sequence of quarrying at the site is difficult to reconstruct, the interpretation set out by Reader (2002, and previously by Reader, 2001) was based on publications by Lehner (1985a) and Kemp (1991). Whilst Vandecruys appears to suggest that Reader (2002) does not accurately represent the extent of Khufu's quarrying, as discussed below, it is considered that Reader's previous publications *do* accord with the work of Lehner and Kemp in all significant respects.

Figures 4 and 5 of Vandecruys' paper are extracts from Lehner (1985a: figures 3B and 3C) and use an arcuate boundary (the area between the label 'D' and the vertical arrow on Vandecruys' figure 4) to define the northern and western limits of the area worked by Khufu to the north of the Khafre causeway. This arcuate feature cannot be based on any actual evidence and must, therefore, be seen as speculative. Similarly, the eastern limit of the Central Field Quarry (the quarry is identified by the label 'F' on Vandecruys' figure 4) is marked on Lehner's original figure as a line of partly isolated quarry blocks – again the detail of this boundary can only be a result of speculation on Lehners' part but in the absence of actual data, speculation of this kind is essential in order to develop an understanding of the development of the plateau.

Given the obvious difficulties in determining the detailed limits of Khufu's quarrying, when preparing figures for previous publications, the current author merely adopted simple linear boundaries for these features. As discussed below, however, the most significant of these linear boundaries do not deviate in any respect from the limits of quarrying advocated by Lehner, Kemp or Vandecruys:

- If, on Vandecruys' figure 4, the western limit of Khufu's northern quarry (identified by Vandecruys by a vertical arrow) is projected northward, this projection extends under the eastern foot of Khufu's pyramid
- If, on the same figure, the eastern limit of the Central Field Quarry is projected northward, this projection passes between Khufu's main pyramid and the satellite pyramids immediately to the east.

Projecting Vandecruys' eastern and western quarry limits in this way, results in a distribution of quarrying that does not differ in any significant way from that identified on figure 2 in Reader (2002, see also figure 2 of the current paper). It is clear, then, that the western limit of the Khufu quarry, north of Khafre's causeway, and the eastern limit of the Central Field Quarry overlap, confirming earlier comments made by Reader that there is a section of the plateau between these two quarries that remained unquarried during the reign of Khufu. Furthermore, as highlighted by Reader (2002: 16), the western section of Khufu's Central Field Quarry, also appears to 'respect' the presence of the ridge of rock along which the causeway was later built ("At the N, the floor of the quarry appears to slope up to the Khafre causeway.." – Lehner, 1985a: 121, note B10).

Out of over fifteen pages of text and figures, the discussion on the causeway alignment by Reader (2002 : 16) occupied less than half a page of text. The reason for this is that, *when assessed in isolation*, the spatial relationship between the quarries and the causeway alignment, although interesting, is not of huge significance. It is only when this spatial relationship is considered in the wider context of the Giza plateau, and such issues as the anomalous degradation of the Sphinx and Sphinx Temple are considered, together with the apparent influence of the topography of the site on the location of a number of the proposed pre-4th Dynasty structures, does the alignment of the 'Khafre' causeway become more significant.

These topographic influences on the location of some of the pre–4th Dynasty features, can be summarised as follows:

- The presence of a natural *wadi* to the north of the Sphinx, together with the preservation of the original sloping surface of the plateau in tombs to the south, clearly indicate that the Sphinx was carved from a natural limestone promontory on the eastern edge of the Giza plateau (Reader, 2002: 6)
- The Proto–Mortuary Temple (see below) was built at a topographically elevated location – one of the most prominent sites in the west of the plateau (Reader, 2002: 16).

Controlled by the topography of the site, the ancient builders had little influence in the location of either the Sphinx or the proto–Mortuary Temple. It is remarkable, therefore, that the alignment of Khafre's causeway connects these two distant topographic features and, without making any directional changes, passes in a straight line, directly between the abandoned quarries of Khufu (note that Khufu's causeway changed direction a number of times to negotiate features of the terrain). Under the conventional sequence of development, it is considered unlikely that Khafre's workmen could have benefited from such an improbable set of circumstances. Under a revised sequence of development, in which the Sphinx and associated structures pre–date the 4th Dynasty, the spatial relationship between the unquarried ridge of limestone that was later used for Khafre's causeway, and the quarries worked by Khufu, becomes far less problematic.

3.2. Khafre Mortuary Temple

Next, Vandecruys addresses Reader's views regarding the development of the Khafre Mortuary Temple, arguing that this structure exhibits a number of features, such as the open courtyard and the five statue chapels, which are typical elements of the well established evolution of Old Kingdom Mortuary Temples (Vandecruys, 2006: 10). Vandecruys considers it unlikely that the proposed Early Dynastic builders of the Mortuary Temple could so accurately have predicted the precise form of later features of 4th Dynasty temple architecture.

Vandecruys also makes the point that the south east corner of the three principal pyramids at Giza all appear to lie on a common northeast–southwest alignment and that it is highly unlikely that this alignment could have been achieved if Khafre's pyramid had to take account of some pre–existing structure, such as an Early Dynastic 'mortuary temple'.

Superficially, these are valid points, however, the thesis set out by Reader appears to be misrepresented. Reader considers that the Khafre's Mortuary Temple was built in two phases (for instance Reader, 2002):

- Like the Sphinx, the earliest phase of the Khafre Mortuary Temple was built some time before the Fourth Dynasty. This early, or Proto–Mortuary Temple, is represented by the easternmost remains which are constructed from cyclopean masonry and occupy one of the most prominent positions on the plateau.
- The second phase of the temple (the western section) was built as part of Khafre's 4th Dynasty mortuary complex, and consists of smaller, well squared masonry which occupies most of the 60 m or so between the eastern foot of Khafre's pyramid and the Proto–Mortuary Temple itself.

The features which Vandecruys identifies as being characteristic of 4th Dynasty temple architecture are all within the western, 4th Dynasty section of the temple, which, therefore, over–turns Vandecruys' objections. Furthermore, there are a number of references in published literature to suggest that, far from being typical of the 4th Dynasty, the eastern, cyclopean portion of the Mortuary Temple is quite unusual. As shown by Stadelmann (1997: figure 10) the inclusion of a large masonry element to the east of the open court, as is the case with Khafre, is not a typical feature of 4th Dynasty mortuary temples. Edwards (1993: 130) states that the two narrow east–west oriented chambers which penetrate deep into the masonry of the Proto–Mortuary Temple are "without any known parallel in royal mortuary architecture".

Regarding Vandecruys' comments on the existing northeast–southwest alignment of the corners of the three principal Giza pyramids, given that the current author has argued only that the eastern, cyclopean portion of the Mortuary Temple pre–dates the Khafre pyramid, the ancient builders would have had no difficulty in maintaining this alignment. The pyramid could have been positioned at any point to the west of the cyclopean masonry, with the 4th Dynasty element of the temple built within the available space between the foot of the pyramid and the earlier structure.

Given that, at the time when Khafre's pyramid was being planned, there existed only one position on this 'alignment' (the southeast corner of Khufu's pyramid) there is considered to be good reason to question the relevance of this alignment for the current discussion. Edwards (1993: 136) discusses the possibility that in an early stage of its development, it may have been the intention to provide Khafre with a larger pyramid, which may have been extended both to the north and to the east. It is perhaps worth noting that, if the foot of the Khafre pyramid lay 200 ft (61 m) further east (a dimension suggested by Edwards in the above referenced text), it would closely approach the rear (western) wall of the Proto-Mortuary temple (see Wilkinson, 2000: 117).

3.3. Sphinx Temple

On page 11, Vandecruys addresses the Sphinx Temple and specifically the evidence cited by Reader for two–stages of Sphinx temple construction, with the second of these phases attributable to the 4th Dynasty. This evidence was originally provided by Ricke (Lehner, 1985b: 147). At this point, however, Vandecruys fully misinterprets the present author's case.

Reader (2002: 15) compares an undegraded section of Member I limestone cutting, dated by Lehner & Hawass (Lehner & Hawass, 1994: 37) on archaeological evidence, to the 4th Dynasty and an adjacent section of the same Member I limestones that continues westward, a short distance north of the Sphinx, beyond the limit of the 4th Dynasty excavation.

The relatively undegraded state of the 4th Dynasty cutting when compared with the heavy degradation of the same beds to the west, is considered by the current author to present a strong basis on which the two sections of exposed limestone can be relatively dated. As the undegraded exposure has been dated to the 4th Dynasty, the excavation of the adjacent more heavily degraded sections can only date from an earlier time. Given that this degraded face is only a few tens of metres north of the Sphinx, these two features must have been formed as part of the same excavation (figure 1).

In his critique, however, Vandecruys' attempts a comparison between the 4th Dynasty excavation and the adjacent 4th Dynasty masonry and, in turn, with masonry features of the adjacent Valley Temple. In so doing, Vandecruys fails to address the key point of Reader's thesis. Furthermore, in an attempt to link the undegraded sections of the Member I cutting with work undertaken in the New Kingdom, Vandecruys appears to mistakenly identify modern restoration to part of the Amenhotep II temple, (Vandecruys, 2006: 12, figure 6) as a section of the Member I cutting.

4. Evidence not addressed

There is one section in Reader (2002) that Vandecruys does not address, yet the current author considers this to provide some of the most compelling evidence for activity at Giza before the 4th Dynasty. This evidence is the remains of 'panelled–' or 'niched' facades along the southern (Kai and Khentkawes) and eastern (Kai only) walls of two rock–cut tombs in the Central Field area: the tombs of Khentkawes and Kai (figure 2).

As discussed (Reader, 2002: 19), the typical Early Dynastic architectural features of the niched façade have clearly been exposed to weathering and/or erosion, such that a large proportion of the projecting elements of the façade are now poorly defined (figure 4). The lower–lying sections of the eastern face of the tomb of Kai, however, are better preserved than elsewhere, as these areas have been protected from degradation by the presence of a series of masonry–built tombs, such as the mastaba of shaft 559 (Hassan, 1941), that have been built against the façade.

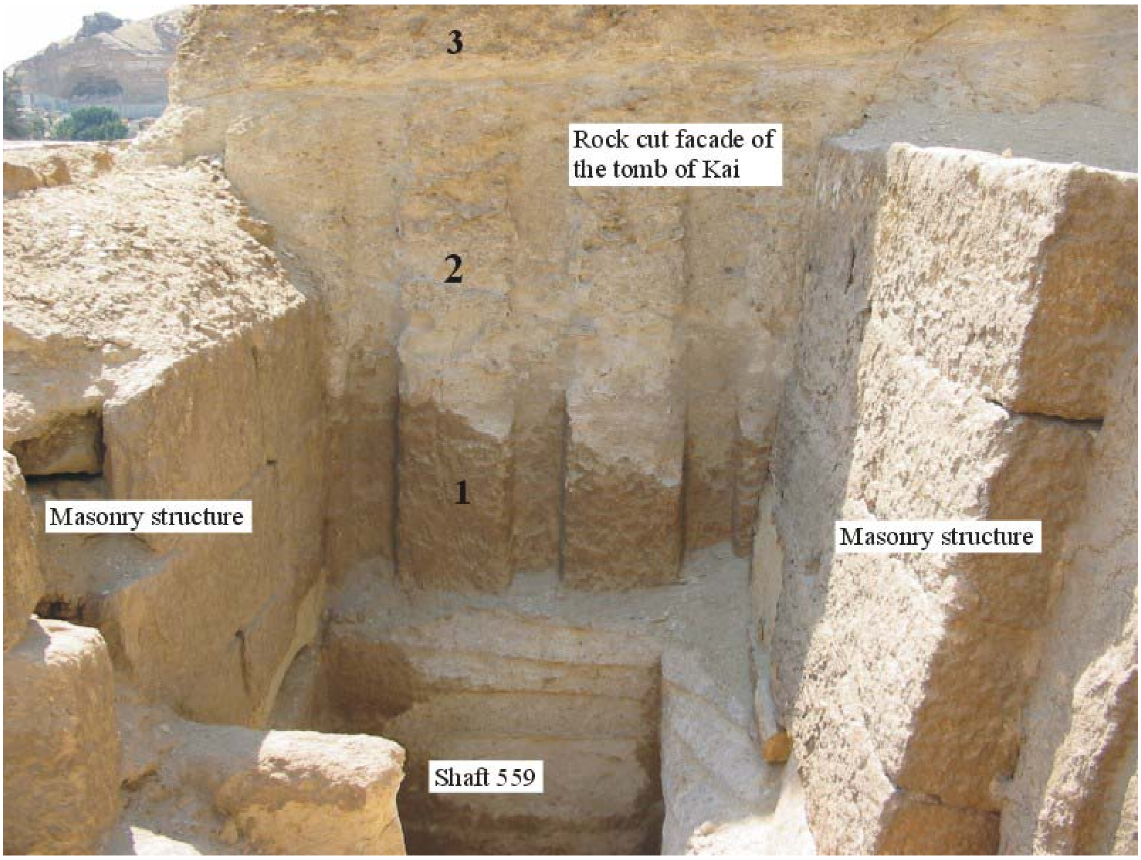

Figure 4. Remains of the niched façade along the eastern face of the tomb of Kai howing the three states of degradation: 1: the lower–lying patinated areas; 2: the intermediate moderately degraded sections; 3: the upper heavily degraded sections. Photograph by the author.

The significant feature, however, is that whilst the better preserved elements of the niched façade do appear to respect the extent of the overlying masonry, the distribution of a dark patina that has developed on the lowest sections of exposed limestone, closest to ground level, does not (figure 4). What this pattern of degradation appears to suggest is that, soon after the excavation of the niched façade, the lowest lying sections of the rock cut façade (zone 1 on figure 4) were protected from degradation, perhaps by the accumulation of wind blown sand. Whilst under these somewhat protected conditions, the dark patina developed, the higher, more exposed sections of the façade were subject to more aggressive degradation, which removed the thin patina and degraded the niched panels (zone 2, figure 4). This more aggressive degradation was halted, at least for the lower two metres of so of the façade, by the construction of the adjacent masonry structures, which were built in direct contact with the rock cut façade of the older tomb. Above the masonry structures, degradation of the niched façade continued, such that little remains of the decoration along the higher parts of the rock cut tomb (zone 3, figure 4).

This interpretation suggests a clear sequence in development for this area of the Central Field, with rock cut niched facades undergoing a period of sand accumulation (during which the patina developed) and degradation of the more elevated sections of the façade, before the construction of the adjacent masonry tombs.

Unfortunately, at the time the paper (*i.e.* Reader, 2002) was written, it had not been possible to establish a date for any of the adjacent masonry tombs and, therefore, although a relative sequence of construction could be identified, no absolute dating was possible, despite the typically Old Kingdom appearance of the masonry elements and the typically Early Dynastic character of the niched façade.

During a recent site visit, however, this lack of dating evidence was overcome. Amongst the masonry elements that have been built against the eastern niched façade of Kai, is a wall belonging to the early 5th Dynasty tomb of Nisutpunetjer (http://www.gizapyramids.org – the main sections of this tomb were masonry–built, a short distance east of Kai's tomb). At the positions where the masonry wall of Nisutpunetjer meets the façade of Kai, the masonry actually projects into one of the rock cut niches in which the characteristic degradation of the limestone of the rock cut façade, complete with the preserved patina, is evident (figure 5). As elsewhere, the degradation within the niche clearly indicates that a period of time separated the excavation of the niched façade from the construction of the adjacent masonry.

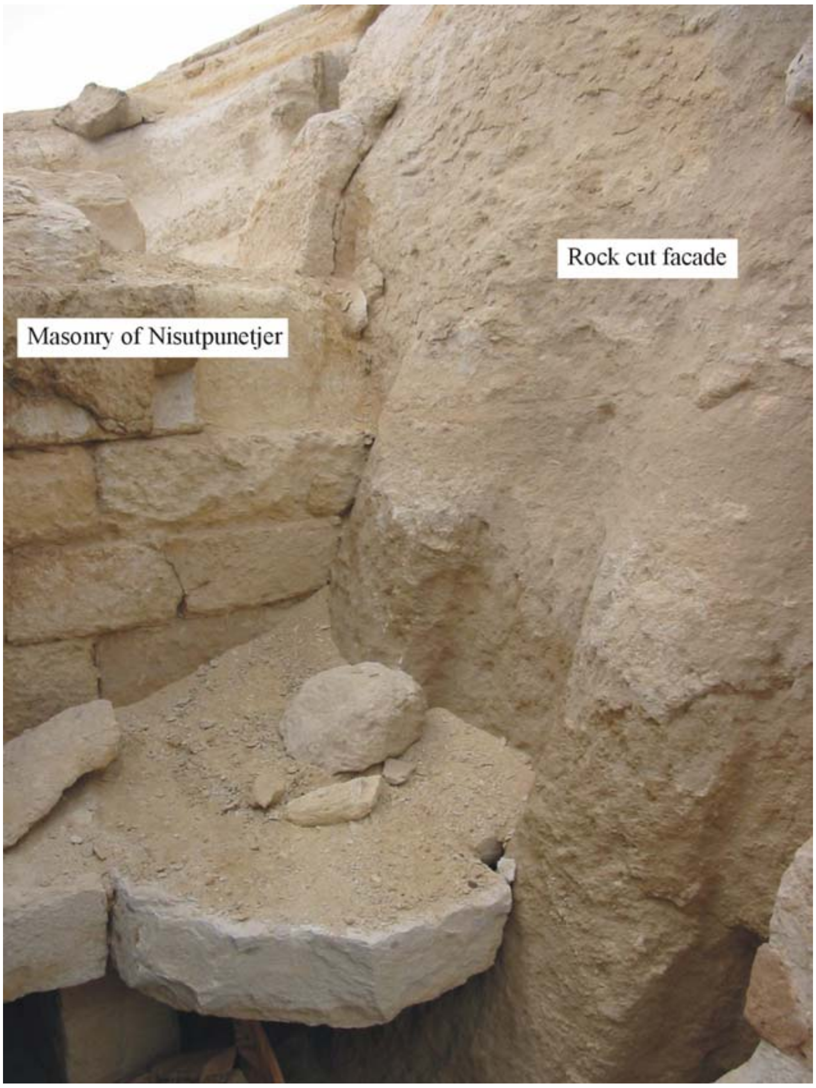

Figure 5. The niched façade of Kai and the adjacent masonry of the tomb of Nisutpunetjer. Photograph by the author.

On the basis that the projecting masonry is early 5th Dynasty and a period of time was required for the degradation and patina to develop, the tomb of Kai must have been excavated somewhat earlier. Yet the tomb of Kai has been dated to the early *to mid* 5th Dynasty (http://www.gizapyramids.org), ostensibly a little later than the tomb of Nisutpunetjer. Based on the nature and extent of the degradation, together with the Early Dynastic style of the architecture, it is considered reasonable to date the original excavation and decoration of the tomb of Kai to the Early Dynastic period.

Under this revised dating, the early to mid–5th Dynasty burial of Kai and, by association given the presence of niched facades, Khentkawes, must be considered as secondary burials, with these tombs representing the re–use of pre–existing structures.

5. Conclusions

In respect of Vandecruys' assessment of the processes responsible for the degradation of the Sphinx enclosure, for the reasons set out the second part of this paper, the processes of sub–surface groundwater movement (interflow) are considered not to offer an explanation for the features of degradation that are presented by both the Sphinx enclosure and Campbell's Tomb. Furthermore, the failure of the interflow theory to account for the existing degradation (particularly the coved degradation of the western end of the southern Sphinx enclosure wall) is considered to reinforce the views of the current author, that the Old Kingdom quarrying to the west of both the Sphinx and Campbell's Tomb, brought an end to surface run–off (and shallow interflow) in this part of the Giza plateau.

It is evident from these considerations that it is not simply the age of the features at Giza that must be considered in our discussions on the hydrology of the site. In order to understand the complex geo–archaeology of this site, there also needs to be careful consideration of the effects of each stage of development on the subsequent site conditions and also how each phase of development may have changed the dominant agents of degradation. To achieve this not only requires a thorough understanding of the geological processes but also requires an understanding of the site – not only from site inspection but also by understanding the structures that have been lost as the archaeological investigation of the site progressed during recent centuries.

With regard to the criticisms leveled at Reader's discussion of other features of the Giza necropolis that are considered, like the Sphinx, to date to a time before the 4th Dynasty (*i.e.* the Khafre causeway alignment, the Sphinx temple and Proto–Mortuary temple), Vandecruys appears to misrepresent Reader's published comments on these features. As a consequence, the current author can only refer interested parties to the discussions on these issues that have been published previously and have been further elaborated in this paper.

Giza is generally regarded as an entirely 4th Dynasty site, however, this Old Kingdom context has led to errors in the past (Mortensen, 1985). As discussed by Reader (2002: 18), there is increasing evidence for activity at Giza before the 4th Dynasty and it is considered that the Sphinx, in its original form, may have been an important element of this activity.

6. Cited literature

Edwards, I.E.S. 1993. The Pyramids of Egypt. – London, Penguin.

Egyptian Ministry of Housing and Reconstruction. 1978. Photogrammetric map, 1:5000 Scale. Sheet F17. Cairo.

Gauri, K.L. 1984. Geologic study of the Sphinx. – Newsletter of the American Research Centre in Egypt 127: 24–43.

Gauri, K.L. J.J. Sinai & J.K. Bandyopadhyay. 1995. Geological weathering and its implications on the age of the Sphinx. – Geoarchaeology 10, 2: 119 – 133.

Hassan, S. 1941. Excavations at Giza (1931 – 1932). Volume 3. – Cairo, Government Press.

Kemp, B.J. 1991. Ancient Egypt. Anatomy of a civilization. – London, Routledge.

Lehner, M. 1985a. The development of the Giza Necropolis. The Khufu project. – Mitteilungen des Deutschen Archaologischen Instituts Abteilung Kairo 41: 109–143.

Lehner, M. 1985b. A contextual approach to the Giza Pyramids. – Archiv fur Orientforschung 32: 136–158.

Lehner, M. & Z. Hawass. 1994. Remnant of a lost civilisation? – Archaeology 47, 5: 32–47.

Mortensen, B. 1985. Four jars from the Maadi Culture found at Giza. – Mitteilungen des Deutschen Archaologischen Instituts, Abteilung Kairo 41: 145–147.

Reader, C.D. 2001. A geomorphological study of the Giza Necropolis, with implications for the development of the site. – Archaeometry 43, 1: 149–159.

Reader, C.D. 2002. Giza before the Fourth Dynasty. – Journal of the Ancient Chronology Forum 9: 5–21.

Reisner, G.A. 1931. Mycerinus, the temples of the Third Pyramid at Giza. – Chicago, Harvard University Press.

Schoch, R.M. 1992. Redating the Great Sphinx of Giza. – KMT 3, 2: 53–59 & 66–70.

Stadelmann, R. 1997. The development of the Pyramid Temple in the Fourth Dynasty. In: **Quirke, S. Ed. 1997.** The temple in ancient Egypt. – London, British Museum Press.
Vandecruys, G. 2006. The Sphinx: dramatising data….and dating. – PalArch, series Archaeology of Egypt/Egyptology 1, 1: 1–13
Vyse, H. 1840. Operations carried out at the Pyramids of Gizeh. – London, James Frazer.
Wilkinson, R.H. 2000. The complete temples of ancient Egypt. – London, Thames and Hudson.

Submitted: 6 January 2006
Published: 1 April 2006