

# Forming of an international team of researchers into Astro-Egyptology

by **Karine GADRE**,

*Culture Diff* company-head : <http://www.culturediff.org>

Member of the « History of Science » Commission  
of the French Society of Physics ;

Associate Researcher of the Department of Astrophysics  
of the Midi-Pyrenees Observatory, UMR 5572,

Université Paul Sabatier and CNRS, Toulouse, France ;

Member of the Scientific Comitee of the Instituto Internacional de Egiptología para el Estudio del  
Derecho, Tecnologia y Ciencia en el Antiguo Egipto.

## Abstract :

The publication of articles dealing with ancient Egyptian Astronomy within Egyptological journals like the Cahiers Caribéens d'Egyptologie, my participation as an Astrophysicist in the 2004 and 2005 ARCE meetings, the mixed composition of my PH.D. examining board, can be seen as many steps towards the forthcoming forming of a team made up of both Astronomers and Egyptologists from the whole world, willing to build together an astro-egyptology related database, willing to study together the astronomical orientation of such monument, the astronomical content of some painting or writing dating from ancient Egypt ; finally, willing to jointly publish the results of their interdisciplinary research work on the World Wide Web and within already existing egyptological and astronomical journals.

Participating in the 2005 ARCE Conference has offered the opportunity to fully detail this plan which is also the topic of a paper to be published within the 7th edition of the Cahiers Caribéens d'Egyptologie, and to encourage Egyptologists from to whole world to join the team in the process of forming.

## 1. Introduction

The astronomical orientation of temples and tombs, the astronomical content of bas reliefs and other writings dating from ancient Egypt, have been for long the subject of separate studies by the world wide Astronomers and Egyptologists. Otto Neugebauer and Richard Parker were among the very first to carry out research together into this topic. They bequeathed to us a very well known trilogy entitled « Egyptian Astronomical Texts »<sup>1</sup> which, still today, some forty years later, remains the most extensive source of information into ancient Egyptian Astronomy. They were followed, in the nineties, by two French researchers, the Astrophysicist Eric Aubourg and the Egyptologist Sylvie Cauville, who both studied the astronomical content of the famous round Dendera zodiac and published interesting conclusions.<sup>2</sup>

Such examples of interdisciplinary collaboration, although fruitful, unfortunately are rare. A better knowledge of the astronomical orientation or content of any of the ancient Egyptian remnant however requires both abilities, consequently, such collaborations. As large is his/her knowledge of the ancient Egyptian civilization, an Astronomer will never become an Egyptologist, indeed. In the same way, as

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<sup>1</sup> Neugebauer, Otto and Parker, Richard A., « Egyptian Astronomical Texts », Volumes 1-3, Brown University Press, Rhode Island, 1960-69.

<sup>2</sup> Aubourg, Eric, « La date de conception du temple d'Hathor à Dendérah », Bulletin de l'Institut Français d'Archéologie Orientale du Caire, 1995 ; Cauville, Sylvie, « Le zodiaque d'Osiris », Peeters, 1997.

large is his/her knowledge of the sky, of the objects filling it, of the movements driving them, an Egyptologist will never become an Astronomer. Not only because our respective background differ, but essentially because we do not have the same approach of a given problem nor use the same methods to solve it.

Le zodiaque de Dendérah tel qu'il  
apparut, haut en couleurs,  
à Dominique Vivant Denon.



The idea of developing, on a world scale, a new form of collaboration between Astronomers and Egyptologists, based upon the complementarity of our respective knowledge, abilities and approaches, was the subject of a lecture at Tucson, Arizona, at the time of the 2004 ARCE meeting.<sup>3</sup> The Egyptologists participating in this meeting well received this idea. The soon defending, before an examining board made up for the very first time of both Astronomers and Egyptologists, of my doctoral dissertation entitled « Identification of the stars used to tell the hours of the night under the First Intermediate Period, the Middle and the New Kingdom », should be a further step towards the bringing together of researchers belonging to the one and the other fields.<sup>4</sup>

The next step could consist in forming an international team of researchers belonging to Egyptology and Astrophysics Institutes, willing to build together an Astro-Egyptology related database, willing to study together the astronomical orientation and/or content of the remnants mentioned within this database, willing to jointly publish the results of their interdisciplinary research work on the World Wild Web and within already existing egyptological and astronomical journals.

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<sup>3</sup> Gadré, Karine, « Astro-Egyptology : a new research area involving both Astronomers and Egyptologists », 55<sup>th</sup> ARCE Conference, Tucson, Arizona, 17th April 2004. The content of this lecture is available at : <http://www.culturediff.org/english/astroegypto8.htm>.

<sup>4</sup> This doctoral dissertation is prepared at the Observatoire Midi-Pyrénées, Toulouse, France, under the co-direction of Sylvie Roques, Director of Research at the CNRS, Director of the Astrophysics Department of the Observatoire Midi-Pyrénées ; and Robert Nadal, Astronomer at the Observatoire Midi-Pyrénées.

## 2. Making up of an astro-egyptological database

The excavations carried out in Egypt since the beginning of the XIXth century brought to light several monuments, writings and paintings showing a specific astronomical orientation or content. Let's quote, by way of examples, the cardinal orientation of the Old Kingdom's pyramids ; the solar or stellar orientation of temples dating from the Middle and the New Kingdom ; several bas reliefs and astronomical ceilings detailing the celestial imagery associated with the rising of the Sun, the succession of the day and the night ; a few texts mentioning the heliacal rising of the star of Sirius in the past of Egypt ; funerary texts relating to the successive phases of the creation of the world, and so on.

La déesse du Ciel, Nout, apparaît séparée de Geb, la Terre, par le dieu de l'Air, Chou, sur cette vignette funéraire datant de la Troisième Période Intermédiaire.



Listing every one of these vestiges, inserting them in a database, could be the first task of the Astronomers and Egyptologists making up the forthcoming team. The second stage would consist in drawing up an inventory of the works which researchers into Egyptology and Astronomy eventually published concerning the one or the other vestiges listed : articles, books, thesis, and so on. The third stage would consist in the creation of a search engine within this database, in order to facilitate the access to the informations which it contains :

- a search by keywords (star names, constellation names, texts, monuments, pharaohs, and so on) ;
- a search by period (predynastic era, protodynastic era, dynastic period, ptolemaï c and roman periods) ;
- a search by place (Lower Egypt, Middle Egypt, Upper Egypt, Nubia, Sinai ) ;
- a search by genre (architecture, iconography, litterature) ;
- a search by author (of articles, books, thesis), ...

should be available.

The relationships between each member of the team and excavation missions, their access to specialized publications (articles, books, thesis, and so on), would allow to regularly update this database to be hosted on a Webserver at the Midi-Pyrenees Observatory and available on the single presentation of a password. Sooner or later, the establishment of partnerships with archaeological institutes like the *Institut Français d'Archéologie Orientale du Caire*, the *American Research Center in Egypt*, would be necessary to real-time process the data collected in situ – the azimuth of orientation of a monument, new hieroglyphic inscriptions, and so on.

## 3. The data processing

Each one of the vestiges making up the database could next be the subject of a detailed analysis by both the Egyptologists and the Astronomers belonging to the team, according to these three main phases :

1. first of all, the Egyptologists could bring their archaeological (*geographical, topographical, geological characteristics of the considered excavation area*), historical (*context in which such monument was erected, such text was written, such star list was conceived*), linguistic (*translation and comprehension of the written sources*) and mythological (*content of the funerary texts*) knowledge necessary to determine the study parameters of the vestige considered. For example, the egyptological study of a text relating to the heliacal rising of the star of Sirius like the *el-Lahun papyrus* leads to determine, even approximately, the time and place of observation of this astronomical event ;



Transcription hiéroglyphique du *papyrus el-Lahoun*<sup>5</sup>

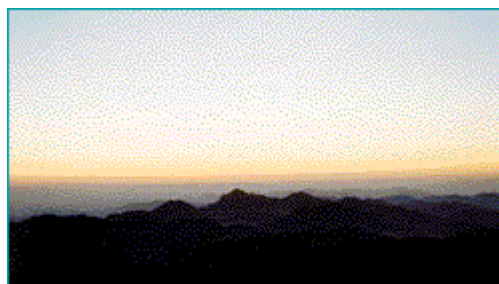
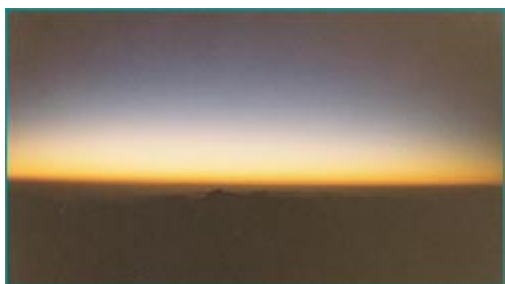
2. the Astronomers would then use or conceive numerical models necessary to process the data in question – to study the visibility of a celestial object on the twilight or night sky background, for example ; more accurately, to determine the day of heliacal rising of a star<sup>6</sup>, the astronomical source of orientation of a monument<sup>7</sup>, the last day of visibility of the lunar crescent, and so on. The creation, during my doctoral dissertation, of a software determining the day of heliacal rising of any star visible with the naked eye, combined with the study of several texts mentioning the occurrence of the heliacal rising of the star of Sirius in the past of Egypt (*el-Lahun papyrus, Ebers calendar, Elephantine text, Canopus decree, inscription at Aswan, De Die Natali of Censorinus, texts of foundation of the temple of Hathor at Dendara*), thus led to determine the visual acuity of the ancient Egyptian Astronomers, as well as to update the dates of the beginning of the reign of the pharaohs *Sesostris III, Amenhotep I and Thutmosis III.*<sup>8</sup>

<sup>5</sup> Borchardt, Ludwig, « Der zweite Papyrusfund von Kahun und die zeitliche Festlegung des mittleren Reiches der ägyptischen Geschichte », ZAS, Vol. 37, 1899.

<sup>6</sup> Gadré, Karine, « Software leading to determine the date of heliacal rising of every star visible with the naked eye », Culture Diff', 2003, available at : <http://www.culturediff.org/english/software1.htm>.

<sup>7</sup> Gadré, Karine, « Software leading to determine the astronomical source of orientation of any monument », Culture Diff', 2003, available at : <http://www.culturediff.org/english/software3.htm>.

<sup>8</sup> Gadré, Karine, « The heliacal rising of Sirius : a source of dating », Cahiers Caribéens d'Égyptologie n°6, 2004. Also available at : <http://www.culturediff.org/english/astroegypto5.htm>.



A mesure que le Soleil s'approche de l'horizon, la brillance du ciel crépusculaire augmente ; le nombre d'objets célestes visibles à l'œil nu diminue donc.<sup>9</sup>

3. Each one of the results obtained by way of this joint study could next be the subject of discussions between the Astronomers and the Egyptologists concerned. Several astronomical and egyptological criteria would be applied to them, in order to determine together the probability that each result gives a plausible explanation of the observed or measured reality. The most probable result would naturally have to be favoured. By way of example, the astronomical study of the orientation of nine Old Kingdom's pyramids allowed to favour a few candidate stars. The sighting of one of them, of large brightness, satisfied, at the time and place considered, to the criteria stated within the texts of foundation of the ancient Egyptian monuments – the so-called *Stretching of the Cord ceremony*, in this case. In the present state of our knowledge, the probability that this star was chosen to align these monuments is higher than the probability associated with any other star. It therefore must be favoured.<sup>10</sup>

Sur l'une des parois de sa chapelle à Karnak, la reine Hatchepsout procède, en compagnie de la déesse Seshat, à l'extension du cordeau.



#### 4. Publishing and spreading the results of research works

Each one of the results obtained could next be the subject of a jointly publication by the Astronomers and the Egyptologists forming the team which studied together the astronomical orientation or content of the vestige considered.

There already exists numerous academic journals with a reading panel specialized in the field of Egyptology or History of Astronomy. No one of the editors of the journals in question however submit, before publication, the reading of articles dealing with ancient Egyptian Astronomy, to both Egyptologists and Astronomers. As a consequence, the one or the other side of the article – its

<sup>9</sup> Photographies prises au sommet du Mont Moï se, dans le Sinäi .

<sup>10</sup> Gadre, Karine, « The astronomical orientation of the pyramids of Egypt », Culture Diff', 2003, available at the following address : <http://www.culturediff.org/english/astroegypto2.htm>.

astronomical or egyptological content depending on whether the author is an Egyptologist or an Astronomer, depending on whether the article is published within an egyptological or an astronomical journal – is likely to include certain mistakes.

Within the context of the astro-egyptological network, the number of mistakes should be rather restricted since the writing of each article would be the responsibility of both the Astronomers and Egyptologists who studied the astronomical orientation or content of the vestige considered. But for all that, the content of each article could also be submitted, before publication, to the other Astronomers and Egyptologists making up the team who did not take part in the research work in question. The risk of publishing one or several mistakes would thus be still restricted.

These articles could next be published in the electronic format (pdf or html) on the website of the *Culture Diff* company specialized, since its creation in July 2000, in the spreading of the scientific knowledge – more particularly, in the spreading of the most recent results of research work into ancient Egyptian Astronomy. Their publication in the paper format within already existing academic journals specialized in Egyptology or the History of Astronomy is also conceivable, even desirable.

Finally, the participation of the members of the team into egyptological and astronomical meetings would be another way of promoting the results of their research work and extending the interdisciplinary network to other researchers – in one word, to create a real, a human, world-wide web.

#### **5. Interested in the forming of the team ? Want to join it ?**

If you are interested in the forming of the team, would like further informations or even join it, feel free to contact me at one of the following addresses :

**karine@culturediff.org**

**Karine.GADRE@ast.obs-mip.fr**

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