

OPEN LETTER TO THE SCANPYRAMIDS MISSION
Addressed to its scientific Director, Professor Hany HELAL,
following the
Article published in Nature on November 2, 2017,
« *Discovery of a large void in Khufu's pyramid by the observation of muons* »

A proposal of interpretation, of analysis and of participation in further research by Pierre Crozat¹, Ph.D.

The SCANPYRAMIDS team recently related in Nature the discovery of a great unknown void inside Khufu's pyramid. Many articles in the international media reported this important finding, and there was an appeal to Egyptologists, archaeologists and other researchers in the domain to interpret this discovery.

In a recent interview given to Science et Avenir (15/01/2016, Aline Kiner), Professor Hany Helal² talked about being among the first to recognize the value of engineering studies for archaeology and quotes: "In 2002, a dissertation on a theory³ of construction of the pyramids was defended at the Ecole des Mines in Nancy". I am the author of this dissertation. Indeed, my advisor was Pr. Thierry Verdel⁴ and Pr. Hany Helal was the president of the examining committee.

The area treated in my dissertation, titled "The engineering of the Pyramids" was followed by 15 years of postdoctoral studies and concluded with a 3D simulation of the paleo-topo-stratigraphy of the Giza plateau. It is the result of personal research started in 1990, and is based on scientific, technical and operational approaches:

- scientific: stratigraphic and structural geology, and engineering geology (study of the natural fracture networks of the rocks)
- technical: the art of building and constructive methods, technical continuum of vernacular tumulus type buildings
- operational: know-how of stone building workers (quarry men, stone cutters, assemblers, tools and machines) with the involvement of the Compagnons du Devoir, an age old association of stone builders.

The current state of this research was presented on 26/09/2017 at a conference at the CULTNAT in Cairo, in front of an invited scientific audience. It was followed with an abstract in english on the site academia.edu⁵. The french version can be found on Marc Chartier's french site "Pyramidales"⁶.

Nota: To consult my thesis, see:

thierryverdel.perso.univ-lorraine.fr/recherche/theses/these-crozat.pdf

I knew nothing of the SCANPYRAMID project, and I learnt of its existence, and of the discovery, via the french and international media.

¹ Pierre Crozat, Ph.D (1941- French) Architect-Urban planner trained at the Swiss Federal Institute of Technology Lausanne (EPFL -Switzerland). SIA Prize (1971), Ph.D at the National Polytechnic Institute of Lorraine - INPL / National School of Mines of Nancy / Laego (2002 , summa cum laude. Thesis entitled "The engineering of the pyramids".

Other relevant publications : "Constructive System of the Pyramids" Ed. Canevas - 1997 (ISBN 2-88382-064-3 and "The Genius of the Pyramids" Ed. Dervy - 2002 (ISBN 2-84454-161-5)

² Pr. Hany Helal, Ph.D. in Rock Mechanics, Professor at the Faculty of Engineering of Cairo University, former Minister of Higher Education and Research of Egypt, and President of the Ph.D. Jury of Pierre Crozat.

³ This "machinist" type of thesis, inspired by the text of Herodotus (fifth century BC) and opposed to "rampist" theories inspired by the text of Diodorus Siculus (first century), is probably the only academic thesis dealing with this method.

⁴ Pr. Thierry Verdel, Ph.D. In Rock Mechanics, Professor at Ecole des Mines de Nancy, Rector of Senghor University in Alexandria, Advisor of Pierre Crozat's dissertation.

⁵ <https://independent.academia.edu/PierreCrozat>

⁶ <http://pyramidales.blogspot.com.eg/search/label/Crozat%20%28Pierre%29>

Today, following the articles, interviews and illustrations which appeared in the popular press, and relying on knowledge acquired during many years of research on the topic, I wish to intervene and to respond personally to the appeal launched by the SCANPYRAMID team. I propose the following:

- 1) The void above the Great Gallery cannot be accidental; the edifice would collapse if it were.
- 2) Taking under account the skill and quality of the interior installations of Khufu's pyramid (the King and Queen chambers, the Great Gallery, except for the underground, unfinished chamber), this void had to be constructed
- 3) As early as 1996 I gave in my first book "Constructive system of the Pyramids" (P. Crozat, Frasnes (F) / Saint-Imier (CH) -2006 – Canevas Ed. © - ISBN 2-88382-064-3), a "utilitarian" interpretation of the Great Gallery, and of its function as "an extraordinary oblique elevator" that served to glide upward, in the open air, the 52 granite monoliths and their limestone rafters above the King's chamber, at a height comprised between 45 and 65 meters, all the way to their place in the pyramid. Everything is useful, nothing is random, all is technically very well made.
- 4) This void, found fortuitously, cannot be there randomly and must have a useful and functional purpose, not as a tomb, but as a means to ensure the stability and the durability of the ensemble.
- 5) The pyramid *is* the tomb of Khufu, his body was not in some "secret" chamber, nor under the pyramid on an island "surrounded with water", like the priests of Ptah told falsely to Herodotus, who reported it twice in the same chapter (a lie that survived for 4500 years). The pharaoh's body was in its sarcophagus, in the King's chamber, where the Khalif Al Ma'Moun found it, probably pillaged it and moved it in 832. The Khalif's men went around the buffer blocks of the ascending corridor, then around the three portcullis of the King's anteroom. These three portcullis, hanging under the three roller trees, do not serve only to obstruct the passage toward the chamber, they serve to refit the counterweight (made of the five or six buffer blocks that will be used, in fine, to obstruct the ascending corridor) of the "extraordinary oblique elevator" that is, in fact, the Great Gallery:
- 6) I think there is only one possible and logical interpretation of the void, considering the imperatives of the construction: this empty space would correspond to a corridor of relieving arches, i.e. rafters placed in a herringbone shape, a voussoir creating a triangular void. This void is probably quite large, situated over the Great Gallery, following its slope and sufficiently high to redistribute laterally the vertical weight of the upper part of the pyramid on each side of the Great Gallery, inside the mass of constructed stones.
- 7) The blocks forming the ceiling of the Great Gallery are slightly slanted toward the North, according to the German Egyptologist Rainer Stadelmann⁷ ("Die grossen Pyramiden von Giza" (" Graz - Austria – 1990 – Akademische Druck- u. Verlagsanstalt) It is as if the herringbone shaped relieving arches above the King's Chamber pushed those blocks toward the empty space, all the more so than the arches cracked opened a little on their underside.

Jean Kérisel⁸ gave a reliable interpretation of the cracks in the granite monoliths of the King's Chamber in his book ("La pyramide à travers les âges" – Paris – 1991 – Presses de l'École Nationale des Ponts & Chaussées ISBN 2-85978-166-8): a collapse of the abutment of the south wall of the Chamber should have opened the top of the South herringbone formations, and closed them at the bottom. But they are opened at the bottom, which suggests that the collapse on the South side was largely offset by sliding toward the North, with the effect of opening the North herringbone formation toward the bottom.

⁷ Rainer STADELMANN, (1933, German Egyptologist Archaeologist

⁸ Jean KERISEL (1908 - 2005, French) General Engineer of the Ponts & Chaussées, expert in soil mechanics.

My research can bring some light on the construction mode of the pyramid from a builder's point of view. I relied at first on the text by Herodotus (V° century BC), and I devised a model that I called "pyramidal growth" (see the Abstract 2017, in French and in English). With the same vision in mind, in order to further study the void discovered by Scanpyramids, I wish to propose the creation of a research team composed of specialists in Geology, Engineering, Architecture and know how in stone cutting and building. Such a team could analyze properly the inner organization of Khufu's pyramid and could provide a logical and rational answer to the question posed by the existence of the void.

I deposited on 09/23/2017 a complete document (Power Point presentation with 224 pictures) at the CULTNAT, with Ms. Amera Seddic, who works with Pr. Fathi Saleh⁹) This document proposes the gathering of an ad hoc international team, and specifies the procedures necessary to the verification of my research on the construction of the pyramids. Such a work, combined with the findings of the scientists of SCANPYRAMID, could bring a coherent answer to the question posed by "the great void in Khufu's pyramid,, observed by muons ».

For these reasons, I seek to solicit from Prof. Hany Helal, Chief scientist of the Mission Scanpyramids, the possibility to present my research on "The engineering of the pyramids" and my integration into the debate and the research team occasioned by this discovery.

Pr. Fathi Saleh, CULTNAT founder, Pr. Thierry Verdel, my thesis advisor, Pr. Hany Helal, president of its supervising committee and Pr. Omar Cherif¹⁰, geologists at the NARSS and my precious collaborator, who all speak French, are the recipients of this open letter to the SCANPYRAMID mission addressed to Pr. Hany Helal. With this letter, I invite them to represent me and to defend this positive and constructive proposal of my interpretation, since they all know my research very well. Written, signed and recorded¹¹ on Nov. 13 2017.



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⁹ Pr.. Fathi SALEH, Founder of CULTNAT (Center for Documentation of Cultural and Natural Heritage), former Ambassador to UNESCO, Professor at the Faculty of Engineering of Cairo University, former Cultural Advisor of the Egyptian Embassy in Paris (first person to whom I presented my research in 1998, and who invited me since 2007 to come to give a Conference at CULTNAT on 09/26/2017);

¹⁰ Pr. Omar CHERIF, geologist emeritus, University of Ain Shams, and the National Authority for Remote Sensing and Space Sciences - NARSS, Cairo / Egypt.

¹¹ Deposits for ampliation on the digital sites: Academia.edu and "Pyramidales" by Marc CHARTIER, the date of deposit as proof.