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Pyramid shape power as a new halal-compliant food preservation and packaging technique

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Abstract

Halal food production is an integrated process from farm to fork, to produce not only food that is ritually blessed but must be healthy, safe, and innocuous (*tayyib*). As the reduction of some nutrients, vitamins, and quality caused by most current preservation techniques, a search for safer alternative technique is a top priority research in the area of food science. The new technique combines preservation and packaging in one process. This technique is based on the mystery of the dimensional ratio of the Great Pyramid of Giza in Egypt and its effect on the growth of microorganisms when applied on pyramidal food packages and containers. The shape power is the only responsible factor for the preservation effect without any other physical or chemical treatment. This paper also presents the preservation efficacy of the method that will be assessed by various parameters such as pH, odour, colour and bacterial count.

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1. Introduction

Islam looks after the health and comfort of people as well as their religious and cultural beliefs and practices. Halal production process should be an integrated process from farm to fork, to produce not only food that is ritually blessed but must be wholesome, healthy, safe, clean, nutritious, quality and innocuous

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(*Tayyib*). Pyramid shape technique is a Halal-compliant technique. It is compliant with *Sharia* (Islamic law) rules as it doesn't combine any material or component or process prohibited by Islamic law and it does not affect the food *Toyyiban* aspect. Pyramid shape is normally associated with the ancient Egyptian civilization and the advanced knowledge of the ancient Egyptians is represented in the architecture and construction miracle of the pyramids. Pyramid shape preservation and packaging technique is based on the effect of the dimensional ratio of the great pyramid in Egypt (Viegas, 2008). According to the archaeologists specialized in Egyptology, the main purpose of the great pyramid construction was to serve as a tomb for the fourth dynasty Egyptian Pharaoh Khufu in 2560 BC (Shaw, 2003). At present, there is a wide range of published literature including theories regarding the purpose, the construction technique and the unique measurements of the great pyramid (*Shaw*, 2011). In fact, a lot of research and experiments have been conducted on the scientific aspects of the pyramids including the effect of pyramid shape on organic and non-organic materials. A container has been developed for pyramid water production and food products preservation by manufacturing pyramidal packages and containers made of dielectric materials such as fibreglass, plastic and paper using the slope angle and the dimensional ratio of the great pyramid in Egypt, the pyramid shape power is the responsible factor for the preservation effect without any other physical or chemical treatment (Abdelsamie, 2012). This power refers to paranormal, unusual and supernatural properties of the great pyramid in Egypt and similar shape objects, the shape of great pyramid is a square pyramid which is a structure commonly with a square base and four triangular outer surface sides meeting in an apex. Pyramid shape technique creates a unique opportunity for food manufacturers and consumers to package preserve and retain nutrients content in milk, water and other liquid foodstuff. Unlike most of the current preservation and packaging techniques, the power source of the pyramid shape preservation technique is free and inexhaustible. The pyramidal package can be used at home, office or anywhere. It does not require any complex operations or any extra equipment. It is a no-cost food preservation technique and low cost packaging technique. The consumer can do the process of food preservation because it does not require any complex technology; it can be done just by filling the pyramidal packages with the food. The pyramidal package can be used many times for preserving food. It can be used commercially to produce pyramid water as new kind of functional water which has many beneficial effects on the human health, such as treating many diseases as mentioned in the previous studies. This research will be a significant endeavour in developing new *halal*-compliant food preservation and packaging technique in order to overcome the disadvantages of most current preservation techniques such as the short or long term negative effects on human body, the reduction of quality, nutrients and vitamins that may affect the *Toyyiban* aspect of the preserved food. For example, during the drying preservation method, considerable loss of some nutrients occurs while during blanching of vegetables, vitamin C will particularly be destroyed. Also, the content of riboflavin, niacin, thiamine and some minerals may be lost during rehydration (P. Kendall et al., 2012). Ultra high temperature treatment (UHT) preservation method involves rapid heating of food to about 140°C for seconds to kill microbes and then cooled rapidly; also it destroys heat-sensitive vitamins such as vitamin C. Nowadays, chemical preservatives such as salt is widely not accepted due to its effects on blood pressure, sulphites and nitrites can both cause vomiting, headaches, asthma and nausea in some people (Australian Academy of Science, 2012). Irradiation of high protein foods such as dairy products that have sulphur-containing amino acids will result in unpleasant off-flavours due to breakdown in amino acids. Irradiation is also responsible for the softening of vegetables and fruits due to the breakdown of high-molecular-weight carbohydrates into smaller units represented in breakdown of cell wall materials. Some vitamins, such as vitamin B1 and vitamin C will be partially lost. In addition there are undesired changes that will occur in organoleptic characteristics (Kilcast, 1995). It is commonly known that smoked foods may be contaminated by the carcinogenic polycyclic aromatic hydrocarbons (PAHs), which are known carcinogens so; gastrointestinal cancer is likely to be increased by consuming smoked food. Some epidemiological studies revealed that, there is a statistical correlation between the frequent intake of smoked foods and the increase of intestinal tract cancer. In the longitudinal Hungarian study it was shown that a district whose people consumed

more home-smoked meat, the occurrence of stomach cancer was doubled (47 – 50 percent) in comparison to all other cancers (29.9 percent) of the general Hungarian population (Fritz W and Soós K, 1980). In preserving food, there are some costs associated with freezing method including initial cost of freezer, fuel, water used in preparing food, electricity, repair maintenance, packaging materials and the ingredients such as anti-darkening agents or sugar. There are some associated costs in canning method which include purchase of canners, special equipment such as lifters and jar funnels, fuel and water and the ingredients, such as vinegar, spices and sugar (P. Kendall and L. Payton, 2012). As the cost of preserving and storing food varies from one preservation method to the other, there is a need to develop new technique capable of reducing the cost of preservation and storage of food. In addition, the disadvantages of current preservation methods that may affect the food's *toyyiban* aspect such as the reduction of quality, the loss of some nutrients and vitamins and the long or short term negative effects on the human body, a search for safer *halal*-compliant alternative technique has been a top priority research in the area of food science. The main objective of this research is to develop Halal-compliant food preservation and packaging technique for water and milk. The specific objectives are; to determine the effect of pyramidal packages on the growth of microorganisms in milk and to determine the effect of pyramidal packages on water crystal structure.

2. Literature review

In recent decades, the pyramid energy field that was created by the great pyramid in Egypt and the objects with similar shape became a popular field of study. Many claims were made about the effect of pyramid shape on both organic and inorganic materials. The first discovery of pyramid effects was done in 1930 by Antoine Bovis who concerned on the mummification of organic material (Bovis, 1935). There was a debate about the origin of the term "Pyramid Power". Another author Max Toth claimed that he coined the term Pyramid power in his book (Loxton, 2005). In 1976 Patric Flanagan released a book entitled "Pyramid Power" which was similar to the book title Max Toth (Flanagan, 1975). This has led to a lawsuit by Max Toth against Flanagan. However, Sheila Ostrander and Lynn Schroeder had claimed that the term was coined in the 1960s by Czechoslovakian researchers (Ostrander and Lynn, 1970). Many methods and devices have been developed to use the beneficial effects of pyramid energy. For example, in maintaining razor blades, the shape of straight razors has been developed in 1959 using four sides hollow pyramid structure with a square base and made of dielectric material such as hard paper, cardboard and plastic. By placing the razor blade under the hollow pyramid structure in alignment to the earth's magnetic field north-south direction, the razor blades can be reused for more than 100 times (Drbal, 1959). A Pyramidal magnetic field device for the regulation of energy disturbances in the human body or for the continuous material recovery has been developed by using a pyramid made of dielectric material and have the dimensions Cheops pyramid and must be aligned to north-south earth magnetic field (Otto, 1987). Energy pyramid for medical use is a pyramid made of aluminum or aluminum alloy for diseases treatment such as allergies (Armin, 1998).

Medical treatment device for treating respective kinds of infectious diseases has been made by using pyramid model and utilizing pyramid power generated from that model by placing it under the bed. The model was made of plastic material and the main function was to kill all pathogenic microorganisms, viruses and funnies using the pyramid power (Hideji, 1997). Bovis claimed that a 30-inch pyramid model made of wood using the dimensional ratio of the Great Pyramid in Egypt is capable of mummifying a dead cat and the later experiments conducted by thousands of people on food stuff preservation such as meat, egg, fruits and milk corroborated his assumption (Laigaard, 1999). The influence of pyramid shape on solid bodies and aqueous solutions as well as plants was studied. It was found that the pH value of water kept in the pyramid has changed as compared with the normal value, the loss of moisture by both biological objects and inorganic solids had increased within the pyramid space and there was an increase

in the decomposition rate of aqueous hydrogen peroxide (H₂O₂) by threefold when it was kept in the pyramid (Narimanov AA., 2001). In medical sciences, a research has been conducted to investigate the effect of pyramid on groups of mice that were infected with salmonella typhimurium bacteria. By placing a group of mice inside a pyramid and a control group outside, all mice in control group outside had died after 25 days of observation in comparison with the samples inside the pyramid structures where 35-40 percent survived. This gives a prove that there is a link between the survival percentage with the time that the animals spend in the pyramid structure (DeSalvo, 2003a).

2.1. The determination of pyramid power

Recently a method for treating patients with pyramid energy has been developed using water that has been placed under a pyramid structure in a negative temperature for 24 hours, then the water crystal structure has been observed to determine the energy distribution zones in the pyramid and beyond its borders (Alekseev, 2002). Another study has been conducted to investigate and determine the electrostatic and magnetic field that generated by pyramids made of fiberglass and paper with same dimensions as the great pyramid. The result was determined by fluxgate magnetometer. It was found that no magnetic field was measured from single paper pyramid but 310 Gamma from fiberglass pyramid and 323 Gamma from the stack of 19 paper pyramids. The accuracy of the magnetometer was ± 20 Gamma and it is commonly known that earth magnetic field generating 20,000-50,000 gammas, meaning that the amount generated by pyramid is small but measurable (Davidson, 1997). Other study has been carried out to detect and measure the pyramid energy in the 144 meters Russian Pyramid by a device called Tessy and other devices such as Urga and Demon. These devices were used to map energy fields. The researchers have recorded the intensity of the flow of energy fields inside and outside the pyramid in zones. The pyramid energy relative intensity field was measured in decibels. It was found that the energy at the center of the pyramid was 9 decibels, over the pyramid was between 7 to 11 decibels, beyond the pyramid on East-West line the field was 3 times more intense than along the North-South line and below the pyramid was over 5 decibels (DeSalvo, 2003b).

2.2. The use of magnetic field in the dairy industry

The biochemical and functional activity of certain strains of lactic acid bacteria will be increased by Long-term exposure to the magnetic field, thus, improved quality and a decrease in production costs for cheese and cultured milk products will be improved (Beglarian, 1990). A research has been conducted on the effects of the low-frequency magnetic field on bacteria. There was an immediate decrease in the number of colony-forming units (CFU) after switched on the magnetic field (Fojt et al., 2003). A research has been conducted on the effects of low-frequency magnetic fields on bacteria *Escherichia coli*. The study found that the growth curve of bacteria in the magnetic field was lower than the control. By increasing the intensity of magnetic field and exposure time, the ability of the bacteria to form colonies decreased (Strašák, 2001).

2.3. The pyramid effects on microorganisms in milk

A research has been carried out to determine the effect of pyramids on microorganisms with respect to the pyramid construction material, shape and size. Various parameters were used to assess the effect such as pH, odour, colour and bacterial count. It was found that the growth of microorganisms in milk samples that were kept inside hollow Pyramidal structures was inhibited in comparison to the control sample. The figures below show the inhibition effect of the fiberglass square pyramid model (FGP2) and fiberglass

octagonal model (FGO) on the growth of microorganisms particularly Staphylococci, Bacillus and Corynebacteria in comparison with the other pyramid models FGP1, PWP, PWR and the control sample (Kumar et al, 2005). A research has been conducted to determine the effect of hollow pyramidal structures with respect to material and shape on the preservation of milk to analyze its preservative capability. It was concluded that there were various inhibition levels of bacterial growth in all the samples that were placed inside the hollow pyramidal structures compared with the control sample. The preservation efficacy was determined by various parameters such as color, odor, pH and microorganisms count . Figure 3 to Figure 6 show various levels of inhibition effect in all pyramid models on the growth of microorganisms particularly Lactic Streptococci, Lactobacilli and Bifid bacterium in comparison with the control sample (Gopinath et al, 2008).

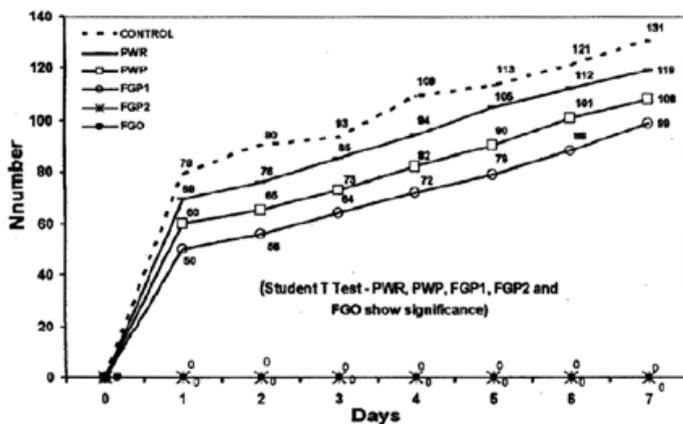


Figure 1. Growth of Microorganism
Source: Kumar et al, (2005)

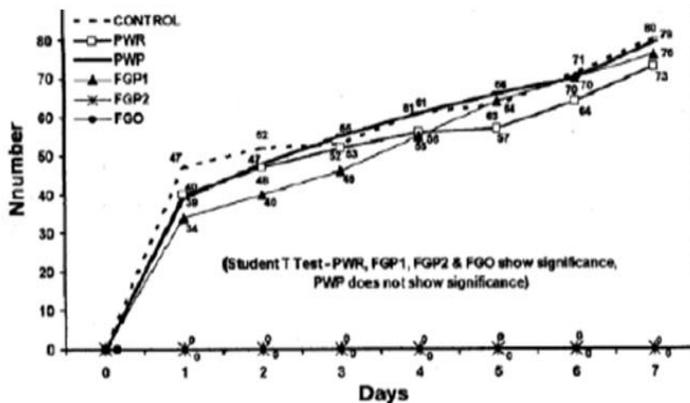


Figure 2. Growth of Microorganism - Bacillus
Source: Kumar et al, (2005)

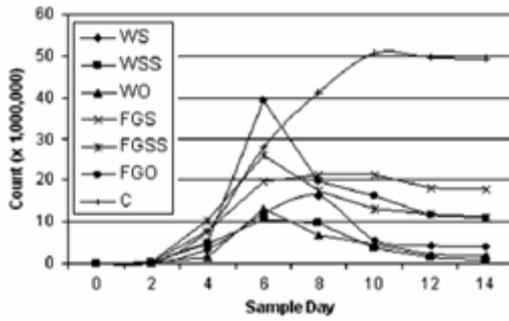


Figure 3. Graph of the Total Bacterial Plate Counts
Source: Gopinath et al, (2008)

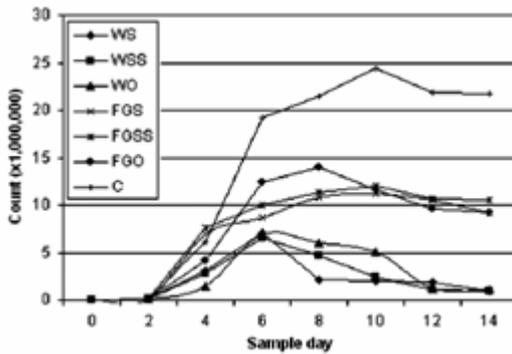


Figure 4. Graph of Bifidobacterium Count
Source: Gopinath et al, (2008)

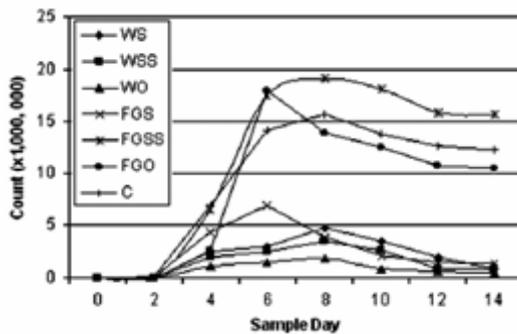


Figure 5. Graph showing count of Lactic Streptococci
Source: Gopinath et al, (2008)

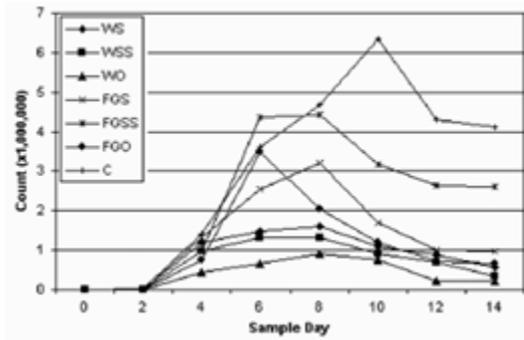


Figure 6. Graph showing count of Lactobacilli
Source: Gopinath et al, (2008)

2.4. The pyramid effects on water

Crystal structure in crystallography and mineralogy occur when the molecules or atoms arranged uniquely in a crystalline liquid or solid (Hook, 2010). Water placed inside, above and under a pyramid is water whose crystal structure is altered by the influence of pyramid power and can be observed as filament-shaped structures in frozen water (Alekseev, 2002). A study has been conducted on the effect of water that was placed in the pyramid on a group of mice that introduced to some different carcinogens. Pyramid water was given to some of mice while the rest were given normal water. The swellings of the control group were seen more obvious than the mice that were given water placed in the pyramid (DeSalvo, 2003c). Another research was conducted on the influence of distilled water and glucose solutions on 20 newborns with low indexes. The glucose solutions were injected to new borne intravenously while the distilled water was given orally after placing both of them under the pyramid. The indexes of all new borne mice had increased to normal as opposed in the control (DeSalvo, 2003d).

3. Methodology

The objectives of this research are two-fold; to determine the effect of pyramidal packages on microbial content of milk and to determine the effect of pyramidal packages on the crystal structure of water. In doing so, the pyramidal packages were filled with samples of fresh milk and water and align it to the earth's north-south magnetic field to compare their condition with control milk and water samples kept inside rectangular prism packages.

Four packages will be manufactured using plastic injection molding machine where two of them are pyramidal plastic packages with a square base of length 157 mm and height 100 mm with slope angle about 52 degrees. The volume of the pyramidal packages can be calculated by the formula: $\text{volume} = 1/3 Bh$ where b is the area of the base and h the height from the base to the apex. Two rectangular prism packages with nearly the same volume as the pyramidal packages, the volume of a rectangular prism packages can be calculated by the formula: $\text{volume} = l w h$ where l is the length, w the width and h the height of the package. The reason for selecting pyramidal and rectangular prism shapes is to compare the outcomes of the two types of packages.

All the four pyramidal packages will be kept in a single room. The distance between each package and between the room walls will be 2 meters. All packages will be placed on four surfaces identical in height, size and shape. Before the start of each trial, the room will be fumigated to kill any airborne organisms, the door and windows will be kept closed for at least 24 hours before the start of each trial. The four pyramidal packages will be placed on the surfaces with one of the sides being oriented in the magnetic North-South direction using compass.

In order to determine the influence of Pyramidal packages on the growth of microorganisms in milk, a research will be conducted on fresh un-boiled cow's milk samples, the reason for using cow's milk is due to the highest ratio of world's production and consumption, the milk will be put in ice during transportation from the source to the experimental area to decrease the multiplication ratio of the microorganisms, the samples will be used in the pyramidal packages and as a control in the rectangular prism packages. After determination of fat content all packages will be filled by the same milk samples till reach 75% of the total volume of every package. The determination of fat content will be done by lactometer on the first and the last day only. The following data: colour, odour, state of the sample (whether curdled or not), pH value and microorganism count will be collected every day from the milk samples from both pyramidal and rectangular packages. The determination of microorganisms count will be done by automatic counting device or by the commonly known standard procedures, pH value will be determined by pH meter and the odour, colour, and state of the sample (curdled or not) will be determined by visual observations. All results will be subjected to a statistical analysis. The experiments will consist of three independent trials, each lasting ten days to make the statistical analysis more meaningful by generating enough data.

It is commonly known that the formation of hydrogen bonds between adjacent oxygen and hydrogen atoms are responsible of controlling most of physical properties of water and ice. Although it is a weak bond but it plays a significant rule in controlling the structure of water and ice. To determine the effect of Pyramidal packages on the alteration of water molecular structure, a research will be conducted with the same methodology as the first objective except the step of the sample preparation and variable determination of the first objective. The experiment will be conducted on commercial distilled bottled water; the reason for using distilled bottled water is due to purification process that removes nearly all contaminants from the water. The water samples will be filled in the pyramidal packages and as a control in the rectangular prism packages. Firstly 20mL of the distilled water will be collected to determine the alteration of water molecular structure by examining the molecular structure and the ice crystals before filling all the packages. The molecular structure will be examined by scanning electron microscopy (SEM) by using a 10mL water sample and the ice crystal formation will be examined by stereo optical microscope as follows: A 0.5 mL of water will be placed into each of 20 Petri dishes then a lid will be placed on each dish then will be placed into freezer at -25 to -30°C for a minimum of 3 hours. After that the ice crystals will be examined by using a stereo optical microscope .The same process will be done every 24 hours. The duration of the experiment will be 7 days and will consist of three independent trials.

4. Conclusion

The novelty of the present research is to conduct experiments on the pyramid shape in form of a Pyramidal packages in order to develop halal-compliant food preservation and packaging technique for both commercial and personal purposes in comparison of the previous experiments that has been conducted on a hollow pyramid shape. Additionally it is the first research to be conducted on the alteration of water molecular structure using pyramidal packages in order to commercially produce

pyramid water as a new kind of functional water products. It will thus create a unique opportunity for both food manufacturers and consumers to produce new functional water and to preserve milk and other liquid food products. The Pyramidal packaging technique may cause a revolution in food industry in the nearest future. Nowadays, Halal food is described as a kind of food that meets the highest level of quality and safety standards. Developing the pyramidal packages as *halal*-compliant food preservation and packaging technique may increase the halal food acceptance level among non-Muslims people around the world especially in multicultural countries such as Malaysia.

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References

- Abdelsamie, Maher A. A. (2012). EG Patent Application No. 2012050945. Cairo, Egyptian Patent Office.
- Alekseev, Perepelkin I. (2002). Russian Patent No. 2184574. Russian patent office. Translation by <http://worldwide.espacenet.com>. Retrieved June 30, 2012
- Armin, C Bauer (1998). German Patent No. 19717053. German patent office. Translation by <http://worldwide.espacenet.com>. Retrieved June 30, 2012.
- Australian Academy of Science. (2008) . When bugs have you on the run. In Box 2 - Food preservation. Retrieved 20/06/2012, from <http://www.science.org.au>.
- Beglarian R. A, (1990). Brief communications and abstracts of posters of the XXIII International Dairy Congress, Montréal, October 8-12, 1990. Ottawa: The Congress = Le Congrès, 1990. Print.
- Bovis, Antoine, (1935). Excerpt from Exposé de M.A. Bovis au Congrès International de Radiotellerie à Nice. (Nice: Bovis, c. 1935). Translation by Jean-Paul Buquet. *Skeptic.com*. Retrieved June 30, 2012.
- Davidson, D. (1997). Shape power: the fundamental discovery of how shape modifies undifferentiated universal aether into electricity, magnetism, and nuclear forces. Sierra Vista, AZ: RIVAS Pub.
- DeSalvo, J, (2003a). The Complete Pyramid sourcebook. 1st Book Library. 137.
- DeSalvo, J, (2003b). The Complete Pyramid sourcebook. 1st Book Library. 146.
- DeSalvo, J, (2003c). The Complete Pyramid sourcebook. 1st Book Library. 138.
- Drbal, Karel, (1959). *Patenti Spis c. 91304*. (Prague: 1959). English translation hosted at www.amasci.com. Retrieved June 2012.
- Flanagan, Patrick (1975). Pyramid Power (Santa Monica: Pyramid Power – V, Inc, 1975).

- Fritz W, Soós K., (1980). Smoked food and cancer. *Bibl Nutr Dieta*. 29; 57-64.
- Gopinath R K, Prem Anand Nagaraja & Nagendra H R, (2008). The effect of pyramids on preservation of milk, *Indian J Traditional Knowledge*. 7 (2) 233-236
- Hideji, Kasai (1997). Japanese Patent No. 9313624. Japanese patent office. Translation by <http://worldwide.espacenet.com>. Retrieved June 30, 2012.
- Hook J.R., (2010). *Solid State Physics (2nd Edition)*. H.E. Hall, Manchester Physics Series, John Wiley
- Kilcast, D., (1995). Food irradiation: Current problems and future potential, *International Bio deterioration & Biodegradation*, 36(3–4).
- Kumar I. R., Swamy NVC & Nagendra HR, (2005). Effect of pyramids on micro-Organism. *Indian J Traditional Knowledge*. 4 (4); 373–379.
- Laigaard, Jens. “excerpt from Chapter Eight of *Pyramideenergien – kritisk undersøgelse* (1999).” Translated by Daniel Loxton and Jens Laigaard. *Skeptic.com*. http://www.skeptic.com/junior_skeptic/issue23/translation_Laigaard.html (accessed June 28, 2012).
- Loxton, Daniel. “A Conversation with Max Toth(2005).” *Skeptic.com*. http://www.skeptic.com/junior_skeptic/issue23/interview_Toht.html (accessed July 1, 2012)
- Ludek Strašák, Vladimír Vetterl, Jan Šmarda, Effects of low-frequency magnetic fields on bacteria *Escherichia coli*, *Bioelectrochemistry*, Volume 55, Issues 1–2, January 2002, Pages 161-164, ISSN 1567-5394, 10.1016/S1567-5394(01)00152-9.
- Lukáš Fojt, Luděk Strašák, Vladimír Vetterl, Jan Šmarda, Comparison of the low-frequency magnetic field effects on bacteria *Escherichia coli*, *Leclercia adecarboxylata* and *Staphylococcus aureus*, *Bioelectrochemistry*, Volume 63, Issues 1–2, June 2004, Pages 337-341, ISSN 1567-5394, 10.1016/j.bioelechem.2003.11.010.
- Narimanov AA. [Pyramid effect]. *Biofizika*. 2001 Sep-Oct;46(5):951-7. Russian. PubMed PMID: 11605404.
- Ostrander, Sheila, and Lynn Schroeder. *Psychic Discoveries Behind the Iron Curtain*. (New Jersey: Prentice-Hall, 1970). 339-348.
- Otto, Kausch (1987). German Patent No. 3525521. German patent office. Translation by <http://worldwide.espacenet.com>. Retrieved June 30, 2012.
- P. Kendall and L. Payton (2012): Cost of Preserving and Storing Food– Fact Sheet No. 8.704- From: Online Database of Colorado State University Extension - EXT.COLOSTATE www.ext.colostate.edu, Date of access 20/06/2012.
- P. Kendall, P. DiPersio and, J. Sofos (2012): Drying Vegetables – Fact Sheet No. 9.308- From: Online Database of Colorado State University Extension - EXT.COLOSTATE www.ext.colostate.edu, Date of access 20/06/2012.

Shaw, I. (2011) Building the Great Pyramid. *BBC*.

http://www.bbc.co.uk/history/ancient/egyptians/great_pyramid_01.shtml

Shaw, Ian (2003). *The Oxford History of Ancient Egypt*. Oxford University Press. 89.

Toth, Max, and Greg Nielson, (1976). *Pyramid Power*. New York: Warner Destiny.

Viegas, J., (2008). Pyramids packed with fossil shells. ABC News in Science, www.abc.net.au/science/articles/2008/04/28/2229383.htm