

# Mechanical Engineering in Ancient Egypt, Part IX: Pottery Industry (Predynastic to Old Kingdom Periods)

**Galal Ali Hassaan**

Department of Mechanical Design & Production, Faculty of Engineering,  
Cairo University, Giza, Egypt

## Abstract:

This is ninth paper in a series of research papers exploring the history of mechanical engineering during the Ancient Egypt era. The paper investigates the industry of pottery in Ancient Egypt over periods from Predynastic to Old Kingdom. The paper presents samples of pottery ware and tries to analyze each sample showing its characteristics and location if known. The designs of each pottery ware is outlined. The decorations of the pottery ware are outlined with emphases on the innovations in the pottery industry during the studied periods. The manufacturing technique of pottery ware is stresses from point of view of mass production.

*Keywords* — Mechanical engineering history, Ancient Egypt, pottery industry, Predynastic to Old Kingdom periods.

## I. INTRODUCTION

Pottery industry is one of the evidences about the civilization of ancient Egypt. This industry could survive for thousands of years and still in application till now. The ancient Egyptians could produce pottery vessels for various applications with outstanding design and manufacturing. In this research work we will trace the pottery industry since the predynastic to the Late Periods of the ancient Egypt history.

Garstang (1904) studied the pottery vessels in the 3<sup>rd</sup> dynasty of ancient Egypt. He described the 3<sup>rd</sup> dynasty pottery vessels, outlined their characteristics and their positions [1]. Firth (1912) presented a number of plates supporting volume I of his book about the archaeological survey of Nubia. The graves demonstrated a number of pottery products of different sizes and from different periods [2]. In the conference of the University of California about the Egyptian Pottery, Friedman (1990) presented a research paper about the regional diversity in the predynastic pottery of Upper Egypt settlements. Lacovara presented a paper in the same conference about the deposit of domestic pottery at Kerma [3].

Gallorini (1998) described the pottery types with marks at the Middle Kingdom settlement of Kahun. He compared with the contemporary pottery corpus of the Eastern Delta and Memphis/Fayum region. He/She proposed a chronological sequence for the pottery and the marks and checked whether the marks are characteristic of a limited range of pottery types or are widespread [4]. Teeter (2003) in his book about ancient Egypt presented a potter statue using a potter's wheel from the Old Kingdom [5].

Allen (2004) declared that pottery miniature vessels were cheap and easy mass produced and suitable for repeated or daily offerings. She said that the miniature pots were quickly made using a turning device in the 4<sup>th</sup> dynasty [6]. Mawdsley (2006) analysed an Egyptian pottery storage jar from the 1<sup>st</sup> dynasty located in the Australian Institute of Archaeology. The jar length is 0.65 m and its maximum diameter is 0.12 m. The manufacturer labelled the jar [7]. Bard (2007) studied the history of Egyptology and Egyptian archaeology starting from the Palaeolithic to the Greco-Roman Periods. She presented the sequence dating chart of Petrie's predynastic pottery classes [8].

Baba (2009) discussed the archaeological context of pottery pit-kilns dating to Naqada II period. He presented the results of both laboratory analyses and in-depth observations on pottery from Hierakonpolis and proposed reconstruction of the firing technique [9]. Wodzinska (2009) compiled a large corpus of Egyptian ceramics from all periods of Egyptian history. She presented some important vessels in her manual of Egyptian pottery. She presented useful information about the shape-terminology of jars and bowls and the shapes of the body, base and rim [10]. Teeter (2011) presented the chronology of ancient Egypt before the pyramids period. The contributors studied the predynastic pottery of Upper Egypt and presented a catalog of objects from the Nile Valley including some potteries [11]. Gallorini and Giuliani (2012) gave an overview of the Egyptian pottery from the WK11 in the area of Nag el-Qarmila and suggested a chorological framework for the site [12]. Sacco (2014) analysed the pottery unearthed in the Nile Delta including Tel el-Yahodiyeh pottery. She concluded that during the Second Intermediate Period, pottery became regionally diverse and the new style used in Lower Egypt mixed features from both Egyptian and Near Eastern types [13].

## II. PREDYNASTIC PERIOD

The ancient Egyptians were so clever an genius in using the Nile River mud in producing household units required for their daily life. This was so clear even from their old periods of Badarian (5000-4000 BC), Naqada I (4400-3500 BC), Naqada II (3500-3200 BC) and Naqada III (3200-3000 BC). Samples of the ancient Egyptian pottery during those periods will be presented with some efforts to illustrate their characteristics.

- **Badarian Period:** During this early period the pottery technician new how to producer pottery units with multi-colours through burning. Fig.1 shows a pottery pot of this kind [14]. The top half is black and the bottom is brown. The surface is polished and it has very shining surface. The body is ovaloid , it has no neck and the rim is round.

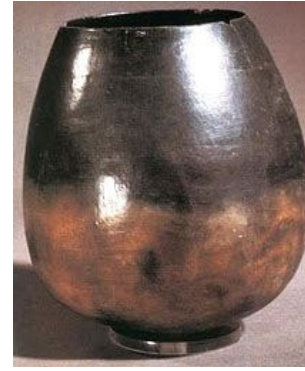


Fig.1 Pot from Badarian [14].

The second model from Badarian period is a bowl number UC9240 located in Petrie Museum of UK. It is shown in Fig.2 [15]. It has conical body, flat base and flat rim. The top half is blacked and its polished from inside and outside.



Fig.2 Bowl from Badari [15].

The third model from Badarian period is a bowl with a special design. It is shown in Fig.3 [15]. It has an spherical body, slight flat base and round rim. Its surface is roughened from internal and external by parallel lined grooves.



Fig.3 Special bowl from Badari [15].

The last models from Badari reflect the decoration of their pottery products and the high level of their imagination and fine art. This is illustrated in the line diagrams shown in Fig.4 [16].. The bowls are highly decorated through painting.

The decoration scenes take different design reflecting the broad mind of the pottery designers in this early period of ancient Egypt history.

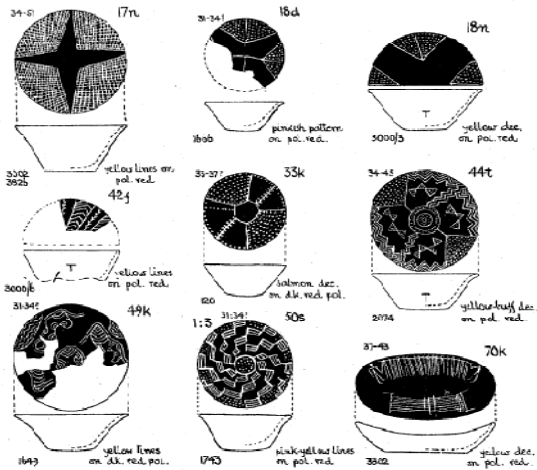


Fig.4 Decorated bowls from Badari [16].

- **Naqada I Period:** This is the period following the Badarian one. We will follow up the development of the pottery industry in this period through some models available in the World's Museums. Fig.5 shows a bowl from this period decorated from inside [17]. The decoration is from inside the bowl and represents two persons making a net to fish a crocodile and a W shape decoration at the left side. This technique was originated in the Badarian period and continued in Naqada I.



Fig.5 Decorated bowl from Naqada I [17].

The second model reflects the technology of blacked pottery top through burning originated in Badari. A model of this technique from Naqada I is shown in Fig.6 which is displayed in the North Carolina Museum of Art [18]. The body is ovaloid, the rim is small and round (or flat), the base is round. The black colour covers about 40 % of the height.



Fig.6 Deep bowl from Naqada I [18].

The third model from Naqada 1 represents an innovation in the pottery industry in ancient Egypt. It is a bowl with human feet as shown in Fig.7 which is displayed in the Metropolitan Museum of Art[19]. The body is spherical and polished, the rim is round and the base is flat. There is no decorations either from inside or external.



Fig.7 Bowl with human feet from Naqada I [19].

- **Late Naqada I - Early Naqada II Period:** This is a transition period between Naqada I and Naqada II. The pottery products in this period have some remarkable characteristics. The first characteristic is decorating the pottery ware by animals on the rim. This is depicted in the bowl shown in Fig.8 using crocodile and hippopotami figures as displayed in the British Museum [20]. The rim is flat and wide to carry the figures.



Fig.8 Figures decorated bowl [20].

Another innovative model of new characteristic is for a bowl having the shape of a turtle as shown in Fig.9 [21], which is in display in the Metropolitan Museum of Art. Its body is spherical, its rim is round and its base has a special design as it rests on two legs of the turtle. The turtle head is at the rim. It is not decorated and has one brown colour.



Fig.9 Turtle-shaped bowl [21].

- **Naqada II:** The development of the pottery industry in the Naqada II period will be investigated through a number of existing models. Fig.10 shows a pottery jar from Naqada II displayed in the Museum of Fine Arts at Boston [22]. The body is ovaloid, the mouth is wide, the neck is short, the rim is flat and the base flat. It is externally decorated by paintings for plants and a boat scene. It has 2 small hanging hands near its top.



Fig.10 Decorated jar from Naqada II [22].

An innovative pottery vessel from Naqada II took the shape of a fish as shown in Fig.11 and displayed in the Ashmolean Museum of UK [23]. The mouth is wide, the rim is flat, it has two small hands for hanging. It is decorated by crossed red lines and the fish eyes and mouth are drawn.



Fig.11 Fish-shaped vessel from Naqada II [23].

- **Late Naqada II - Early Naqada III Period:** This is a transition period between Naqada II and Naqada III. The first model presented here is a new pottery design consisting of two similar jars connected to each other as shown in Fig.12 [24]. Each one has an ovaloid shape, medium mouth, small round rim and small flat base. It has one colour without any decorations.

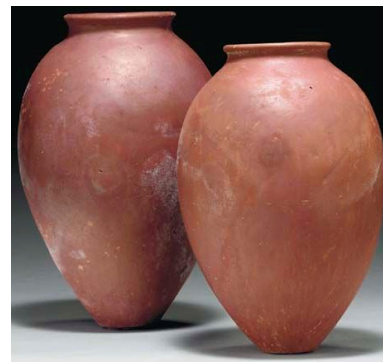


Fig.12 Dual-pottery jars from Naqada II-III [24].

- **Naqada III Period:** One of the characteristics of Naqada III period is having the pottery vessels decorated from external by scratching inclined-crossed lines as shown in Fig.13 for a jar displayed in the Fitzwilliam Museum of UK [25]. It has a wide mouth, short neck, round rim, double conical body and flat base.



Fig.13 Decorated vase from Naqada III [25].

Another model from Naqada III for a jar without any decorations is shown in Fig.14 [26]. It has medium mouth, short neck, ovaloid body, and flat base. It has a new design for the hands what is called wave hands. This design makes it easy to put the fingers of the carrier in the slots of the wavy handle.



Fig.14 Wavy hands jar from Naqada III [26].

A third model from Naqada III is a pottery vase of large mouth and point base as shown in Fig.15 [27].



Fig.15 Large mouth pottery jar from Naqada III [27].

### III. EARLY-DYNASTIC PERIOD

This period of the ancient Egypt history covers the first and second dynasties. The pottery technology during this period was deteriorated that this in the predynastic period. Here are samples supporting this conclusion:

- Fig.16 shows a pottery jar from the first dynasty located in the Metropolitan Museum of Art [28]. The jar has medium mouth, ovaloid body, round small rim and round base. There is no decoration or multi-colours.
- Fig.17 shown another model from the rein of King Narmer of the first dynasty located in the Metropolitan Museum of Art [29]. It has a medium mouth, an ovality body, short neck, medium rim and medium flat base. It has 3 wavy handles and labelled under one of the hands.



Fig.16 Pottery jar from the 1<sup>st</sup> dynasty [28].



Fig.17 Pottery jar from rein of Narmer [29].

- The third model is from the rein of King Hor Aha of the first dynasty which is displayed in the Kestner-Museum of Hannover and shown in Fig.18 [30]. The vessel has a unity colour, cylindrical body except near its top where the diameter increases gradually, wide mouth. No neck, round rim, flat base of almost the same cylinder diameter. It is inscribed by the name of the King on the outside surface in the bottom half of the vessel.



Fig.18 Cylindrical vessel from rein of King Hor Aha [30].

- A fourth model from the first dynasty is shown in Fig.19 which is displayed in the Metropolitan Museum of Art is shown in Fig.19 [31]. The body is nearly cylindrical, the surface is rough, the mouth is wide, the base is flat and there is a hanging flange near the vessel top.



Fig.19 Short cylindrical vessel from 1<sup>st</sup> dynasty [31].

- A fifth model belongs to King Den, the 6<sup>th</sup> King of the first dynasty is displayed in the British Museum and shown in Fig.20 [32]. It is a wine jar sealed by mud seal. It has an ovaloid body, one colour, small flat base and no handles. It is labelled and has no decorations.

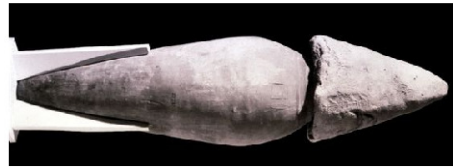


Fig.20 Wine jar of King Den [32].

#### IV. OLD KINGDOM

The generous old Egyptians produced their fantastic pottery unit without any pottery wheels up to the old kingdom. In the old kingdom (4<sup>th</sup> dynasty), they authorised using the pottery wheel through a model of a potter using a pottery wheel found in the mastaba of Ny-kau-Inpu, a cemetery official in the old kingdom. The model is shown in Fig.21 [33].

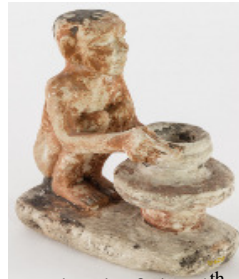


Fig.21 Pottery wheel of the 4<sup>th</sup> dynasty [33].

Whilst, the old kingdom is the kingdom of the pyramids, there were no much improvements of the pottery design and quality during the old kingdom except the invention of the pottery wheel for mass production. This is clear from the models we present here:

- Fig.22 shows a miniature pottery vessel from the 4<sup>th</sup> dynasty displayed in the Petrie Museum of UK [34]. This vessel with others were found in the foundation deposits of the pyramid temple of King Snefru at Meydum. It has a double-conical body, wide mouth, big flat base and a lid. The surface is rough.



Fig.22 Miniature vessel from dynasty 4 [34].

- Fig.23 shows a miniature pottery ware extracted from the pyramid temple of King Raneferef of the 5<sup>th</sup> dynasty at Abusir [35]. They are miniature jars and plates reflecting the designs of the exact pottery ware used during this period. There is a great variety in the shape of the body and the thickness of the unit-body. The base is flat in all the models and it is expected that they are produced using the potter's wheel..

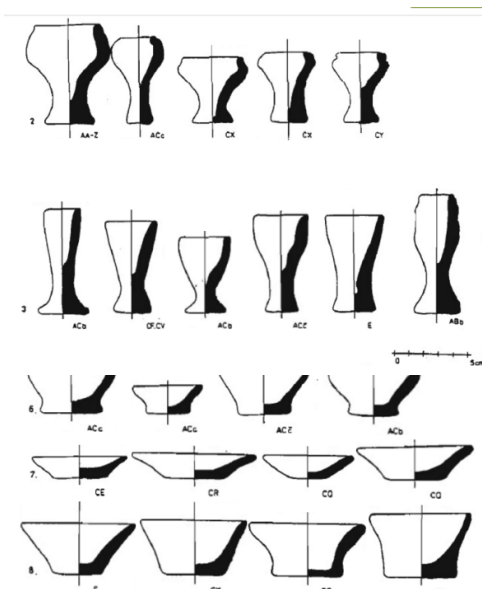


Fig.23 Pottery ware from the 5<sup>th</sup> dynasty [35].

- Fig.24 shows a high quality pottery plate from Meydum ware located in the Petrie Museum of UK [36]. The plate is highly polished from inside and outside. It has an inverted V-shape rim to prevent splashes of the plate contents.

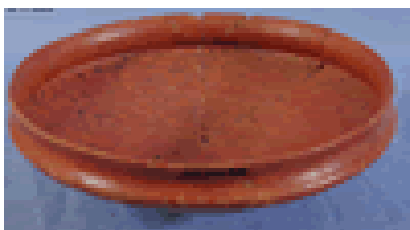


Fig.24 High quality pottery plate from the old kingdom [36].

## V. CONCLUSIONS

- The paper presented pottery ware industry in Ancient Egypt during the period from Predynastic to Old Kingdom.
- Old Egyptians produced high quality pottery ware since more than 6000 years ago during the Badarian Period.
- They could produce two colors pottery pots in Badary using the burning technique.
- They produced polished pottery products that could sustain its shine for thousands of years..
- During Badarian Period they succeeded to produce bowls with various decorations using the painting technique.
- Naqada I Egyptians continued to produce decorated pottery ware through painting and burning.
- A unique innovative design of a pottery bowl appeared in Naqada I for a bowl base in the form of a human feet.
- In Naqada I – Naqada II transition period, new design ideas appeared such as decorating the pottery products by animal figures or giving the pottery unit the shape of an animal or a bird.
- In Naqada II, they decorated the pottery jars externally by drawing boats, plants or cross-lines. They continued to produce animal-wise pots.
- In Naqada II – Naqada III transition period, dual pottery designs appeared.
- In Naqada III, scratched decorations on the external surface appeared, wavy hands designs took place and large mouth pottery ware designs appeared.
- During the Early Dynastic Period, authorization was given to the pottery industry through marking the pot by the King's stamp (name).
- They sealed some of the pottery jars by mud-labeled seals.
- The pottery decorations of the predynastic periods disappeared in the Early Dynastic Period.

- The pottery industry was manual up to the 4<sup>th</sup> dynasty of the Old Kingdom where the potter's wheel appeared.
- In the Old Kingdom, the pottery industry continued with large quantities using the potter's wheel for domestic and funeral use without decorations. They polished some of the pottery products and applied various designs for pottery vessels and plates.

## REFERENCES

1. J. Garstana, "The third Egyptian dynasty at Saqqarah and Bet Khallaf", Westminster Archibold and Co. Ltd, 1904.
2. C. Firth, "The archaeological survey of Nubia – report for 1908-1909", vol.II: Plates and plans accompanying vol.I, Government Press, Cairo, 1912.
3. C. Redmount, "Egyptian pottery", Proceedings of the 1990 Symposium at the University of California, Berkeley, Regents of the California Archaeological Research Faculty, University of California, USA, 2003.
4. C. Gallorini, "Incised marks on pottery and other objects from Kahun", Ph.D. Thesis, Institute of Archaeology, University College London, June 1998.
5. E. Teeter, "Ancient Egypt", The Oriental Institute of the University of Chicago, Oriental Institute Museum Publication Number 23, 2003.
6. S. Allen, "Miniature and model vessels in ancient Egypt", Proceedings of the Conference held in Prague on the Old Kingdom Art and Archaeology, pp.19-24, May 31 – June 4, 2004
7. L. Mawdsley, "A first dynasty Egyptian wine jar with a pot mark in the collection of the Australian Institute of Archaeology", Buried History, vol.42, pp.11-16, 2006.
8. K. Bard, "An introduction to the archaeology of ancient Egypt", Blackwell Publishing, 2007.
9. M. Baba, "Pottery production at Hierakonpolis during the Naqada II period", British Museum Studies in Ancient Egypt and Sudan, vol.13, pp.1-23, 2009.
10. A. Wodzinska, "A manual of Egyptian pottery", Ancient Egypt Research Associates Inc., 2009.
11. E. Teeter (Editor), "Before the pyramids: The origins of Egyptian civilization", The University of Chicago, 2011.
12. C. Gallorini and S. Giuliani, "Pottery from the Pan-Grave cemetery at Nag el Qarmila", in Handbook of pottery of the Egyptian Middle Kingdom, vol. II, Edited by R. Schiestl and A. Sieler, Verlag der Österreichischen Akademie der Wissenschaften, pp.321-328, 2012.
13. A. Sacco, "People and pots: Uncovering the identity of the Hyksos", Conference on Current Research in Egyptology XV, King's College, London, University of London, 9-12 April 2014.
14. "Pinterest, [www.pinterest.com/pin/426082814717070015/](http://www.pinterest.com/pin/426082814717070015/)
15. N. Math, "Die Badarikultur", Master of Arts, Wien University, Berlin, p.372, 2014.
16. G. Bructon and B. Quaritch, "The Badarian civilization", British School of Archaeology in Egypt, p.XXXVIII, 1928.
17. A. Hegab, [www.pinterest.com/pin/405886985139679545/](http://www.pinterest.com/pin/405886985139679545/)
18. A. Hegab, "Jar black topped redware", [www.pinterest.com/pin/405886985139679489/](http://www.pinterest.com/pin/405886985139679489/)
19. A. Hegab, "Bowl with human feet", [www.pinterest.com/pin/405886985139679487/](http://www.pinterest.com/pin/405886985139679487/)
20. O. Kinsman, "Bowl with applied figures", [www.pinterest.com/pin/264017582355860964/](http://www.pinterest.com/pin/264017582355860964/)
21. A. Hegab, "Bowl in the form of a turtle", [www.pinterest.com/pin/405886985147208000/](http://www.pinterest.com/pin/405886985147208000/)
22. C. Marshall, "Predynastic jar with painted boats", [www.pinterest.com/pin/535928424381070080/](http://www.pinterest.com/pin/535928424381070080/)
23. P. Hagler, "Naqada II pottery vessel in the form of a fish", [www.pinterest.com/pin/405886985146277271/](http://www.pinterest.com/pin/405886985146277271/)
24. A. Hegab, "Two Egyptian red-polished pottery jars" , [www.pinterest.com/pin/405886985146263983/](http://www.pinterest.com/pin/405886985146263983/)
25. A. Hegab, "Fitzwilliam museum collections", [www.pinterest.com/pin/405886985139679458/](http://www.pinterest.com/pin/405886985139679458/)
26. K. Brown, "An Egyptian predynastic wavy-handled pottery jar", [www.pinterest.com/pin/521854695543059425/](http://www.pinterest.com/pin/521854695543059425/)
27. Ancient Egypt, [www.ancient-egypt.co.uk/metropolitan/pages/Metropolitan%20NY-2005%200044.htm](http://www.ancient-egypt.co.uk/metropolitan/pages/Metropolitan%20NY-2005%200044.htm) , 2005.
28. Pinterest, "Jar, Period: Early dynastic", [www.pinterest.com/pin/517421444665657270/](http://www.pinterest.com/pin/517421444665657270/)
29. A. Hegab, "An Egyptian pottery wavy handled jar", [www.pinterest.com/pin/40588698140884748/](http://www.pinterest.com/pin/40588698140884748/)
30. E. Schutze, "Cylinder vessel of King Hor Ahu from Saqara", [http://common.wikimedia.org/wiki/File:cylinder\\_vessel\\_of\\_king\\_Hor\\_Ahu\\_from\\_Saqqara\\_1st\\_dynasty\\_Kestner Museum\\_Hannover.jpg](http://common.wikimedia.org/wiki/File:cylinder_vessel_of_king_Hor_Ahu_from_Saqqara_1st_dynasty_Kestner_Museum_Hannover.jpg)
31. A. Hegab, "Short cylindrical jar", [www.pinterest.com/pin/405886985140507780/](http://www.pinterest.com/pin/405886985140507780/)
32. S. Eulgem, "Pottery wine jar with a mud seal", [www.pinterest.com/pin/358739926538049947/](http://www.pinterest.com/pin/358739926538049947/)
33. "Highlights from the collection pottery", <http://ci.uchicago.edu/collections/highlights/highlights-collection-pottery>
34. A. Stevenson, "Reinventing the potter's wheel", <http://blogs.ucl.ac.uk/museums/tag/festival-of-pots/> , 2014.
35. M Barka, "Pottery inventory and the beginning of the IVth dynasty", Gottinger Miscellen, vol.149, pp.15-24, 1995.
36. University College London, "A guided tour:Old Kingdom", [www.ucl.ac.uk/museums-static/digitalegypt/main/guidedok.html](http://www.ucl.ac.uk/museums-static/digitalegypt/main/guidedok.html), 2000.



## **BIOGRAPHY**



### **Galal Ali Hassaan**

- Emeritus Professor of System Dynamics and Automatic Control.
- Has got his B.Sc. and M.Sc. from Cairo University in 1970 and 1974.
- Has got his Ph.D. in 1979 from Bradford University, UK under the supervision of Late Prof. John Parnaby.
- Now with the Faculty of Engineering, Cairo University, EGYPT.
- Research on Automatic Control, Mechanical Vibrations , Mechanism Synthesis and History of Mechanical Engineering.
- Published more than 170 research papers in international journals and conferences.
- Author of books on Experimental Systems Control, Experimental Vibrations and Evolution of Mechanical Engineering.
- Chief Justice of the International Journal of Computer Techniques.
- Member of the Editorial Board of some international journals.
- Reviewer in some international journals.
- Scholars interested in the authors publications can visit:

<http://scholar.cu.edu.eg/galal>