

X-NUPop-Charset: English
Date: Wed, 4 Mar 1998 16:53:50 -0600 (CST)
From: "emmett bennett" <ebennett@facstaff.wisc.edu>
Sender: ebennett@facstaff.wisc.edu
To: milo.gardner@24stex.com, classicschair@mail.utexas.edu
Subject: the eye of horus, more or less, perhaps too much

EYE OF HORUS ONE

Dear Milo, I've been busied with several projects at once, some imposed on me by well-meaning colleagues, some foolishly embarked upon on my own. Since I use my modem only for email, I'm not as often struck by web-like structures as I might be. What follows was noticed and taken from the Aegeanet (which I did read for a while, but eventually dropped) by a very close colleague, who asked me whether I knew anything about this. So I take the opportunity to address you and him simultaneously. I hope all is well with you, and that I may disentangle myself slowly from more projects than I can manage. So here goes.

Dear Tom, You will remember perhaps the Mycenaean Colloquium in Salzburg? Where I spoke about Minos and Minyas? Since you were there you might have the volume, and probably the offprint too or, at least the handout and manuscript of which I am sure I gave you a copy, you must have noticed that at one point I did mention this Eye of Horus, as an illustration of matters of metrification (word chosed just for jazzification), and how I turned it into a puzzle. I did, I am sure, also send Milo Gardner a copy, somewhat later.

I had, of course, seen the device long before in Encyclopaedias and elsewhere, displayed as a marvellous and mystical bit of Egyptian magic. But when, with Minos and Minyas, I had to pay strict attention to it, I got a plainer notion of its origins, if I still didn't see much of what its practical use might have been. Its character as a practical example of measurement by successive halves is evident. What is not evident is when it was devised. But in looking for signs for fractions and fractional quantities not only in the Aegean but also nearby I discovered that the grand uniformity of shapes of Egyptian signs which is evident in publications of Egyptologists is, to a considerable degree, the creation of the Egyptologists. The various signs for fractions which do appear in the Eye, have in their earlier occurrences some diversity of shape, and I feel sure that those signs were not chosen because they could be fitted into the Eye. Proper Egyptian mathematicians must have enjoyed the benefits of a half-half system for some time without knowing that they were parts of the eye. But the Egyptian scribes certainly did like to make their signs pleasing pictorially and, wherever possible, representative of some object which could suggest a name for what was to be represented by the sign. And when the Eye was invented there was still a good bit of variation, with the parts of the eye only gradually becoming the smooth fitting parts that are now printed by Egyptologists.

I did notice that K. Hatzipolakis was talking about Minoan things, but I very much doubt that the Eye has anything real to do with Minoan things, except that it was a pleasant ornament for my discussion of Minos and Minyas. On the other hand, although I suppose I should know just what Minoan or Mycenaean texts he is describing, I do not know. Whether I should send of to K. Hatzipolakis and find out just what he's trying to do is another question, and I think it would be wise - just to keep quiet. Besides, I must go look up Struik before I say any more. I had got along up to today very quietly in ignorance of that exposition.

The questions, on the Egypt side, that I should like to have answers for are: When was Eye first written in Hierogl? Did it have that, or another, or any name? When (or even whether) the Eye was first written in Hieratic, &c. When (or even whether) the Eye was first written in Demotic. And finally was the Eye known to Champollion? Was it known before that to the excellent Roman Egyptologist? As for Horapollo, I can find my copy and look it up - I don't think it's there; I should remember it it were.

Date: Sat, 28 Feb 1998 15:16:59 +0200 From: xpolakis@hol.gr (Antreas P. Hatzipolakis)
Subject: AEGEANET Minoan fractions (fwd) Sender: aegeanet-owner@acpub.duke.edu X-Sender: xpolakis@mail.hol.gr To: Aegeanet@acpub.duke.edu MIME-version: 1.0 Precedence: bulk

Fwd with sender's permission. Thanks for any suggestions. Antreas

From: milo.gardner@24stex.com Date: Sat, 21 Feb 98 06:32:04 -0800 Subject: Minoan fractions To: xpolakis@hol.gr

Hi Antreas,

As an important aspect of your personal herITage, and the Greek tradition, in general, I'd like to discuss Minoan fractions. Are you interested in the Horus-Eye aspect of these fractions, as the available texts outline?

As an introduction, Struik has written up the basic number aspect of these fraction in *Historia Mathematica*, as you may have know. Struik's article of about 20 years ago mentions Egyptian fractions without first defining Horus-Eye fractions, nor hieratic fractions, as Minoans would have plausibly learned by trading and studying with Egyptians and over the period 2,000 BC to 1600 BC, much as later Greeks studied in Egypt.

Egyptian Horus-Eye fractions derive from the hieroglyphic Old Kingdom tradition of doubling, as the Middle Kingdom continued in the domain of weights and measures, as many math historians associate with Greek *logistica*.

The form was an infinite series, one that used 0 and 1 as an early binary notation, such as stating:

$$1 = 1/2 + 1/4 + 1/8 + 1/16 + 1/32 + 1/64 + \dots$$

with the first 6-terms being classified as the Horus-Eye notation, presenting a rounded off number for everyday calculations, as Middle Kingdom and later Egyptians reserved only for weights and measures. Zero was a limit, as was one, in these series (by Demotic times, zero was an explicit accounting symbol, a point that I'll return to at a later time).

For now, I understand, and would therefore like to discuss one rumored Minoan example of an exact statement of one fraction that may be either hieratic or hieroglyphic. Are you aware of Minoans converting rational numbers p/q into exact series as hieratic fractions detail in the Moscow, Ahmes, and Reisner Papyri, as well as the easy to read 26 $1/p$ and $1/pq$ series of the EMLR, in at least one instance?

That is, were Minoans only interested in the logistical side of Egyptian arithmetic and weights and measures? Or, could Minoans have assisted Egyptians in developing and therefore using the exact statement of rational numbers, such as the Ahmes $2/n$, $2/p$ and $2/pq$, table and other sources detail?

With the appearance of exact series in Minoan script, is not a non-Horus-Eye form of thought 'proven' to have arrived on Crete, before 1500 BC?

Regards,

Milo Gardner
Sacramento, Calif.

And, best wishes, Emmett Bennett, Madison, Wisconsin!