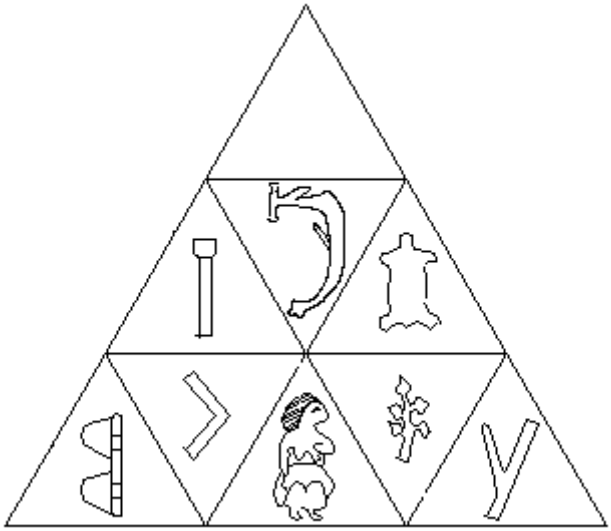
THE MINOAN CALENDAR

By Ole Hagen



STEM-GROUP III

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In cauda venenum

April 23 2000

Prior to trying your strength against the Phaistos disc, you must choose to devote yourself entirely to the subject for several years (1981-87), recognizing that you are up against some eminent persons of the last century as well; just to mention a few: Günther Ibsen, Ernst Sittig and Werner Nahm, who independently have tried to crack this increasingly prestige-loaded riddle, unfortunately without the necessary success.

When, after many years of contemplation, you finally obtain a sure entry to the problem, it becomes vital for you to have your discovery issued, in particular to avoid compilation, as well as other false dispositions, to take place pre print. This is just commonsense - otherwise you are left with a reduced life: no way to justify to your surroundings the years you have spent in vain, no way to use those years for other purposes instead.

Not to mince the matter: if you cannot rely on a regular and honest release of an epoch-making discovery; if you are not the one who gets the experience out of your own efforts, the psychology is gruesome! My result - 'The Minoan calendar' - is indeed a sensation related to this special topic. Not to mention the 22 stem-forms 'never known of before' which apply a measuring tool for the inscription, under the unfurling of its duplicity; or the gnomonical arrangement with its overall present number 22. Or simply the whole method of investigation that I've developed.
This brings me finally to another crucial point; the apology I have to give to all those people who have been devoted to this very same subject. In spite of all my efforts (15 years of continuous attempts) I have failed to establish the necessary cooperation with any publishing house worldwide to give you access to my discovery, and perhaps to have spared some of your time too, if you agreed with my decoding.
I am very sorry, though I have done my best, Entshuldigen mich Bitte, Excusé moi!

Supplementary notes

Reception: If you as an editor of a genuine magazine, see this page, and take interest in my 'discovery' or if someone could recommend an interested publishing house, then please contact me.

Marathon man: hagen@stofanet.dk

Reading 1

Introductory remarks

It is fascinating, when the opportunity occurs to make oneself familiar with a message, passed on by a fellow human being, who lived some 3,500 years ago in a now extinct civilization. This prospect was realized once again by the find of the Phaistos disc on Crete in 1908. The famous object is described brilliantly several times (i). Consequently I shall come straight to the point: how can we penetrate into the secret, which is hidden behind the seal-imprints on the disc? Do we have any other methods to approach the contents, than to ascribe phonetic or numerical values to the signs?

Experimenting by inserting syllables for the signs, has resulted in scores of equilibristic translations; that is why the prevailing opinion is that linguistic interpretations are to be regarded as dubious. Only more and similar findings will certify a correct linguistic solution, if any.

Conversely, how would a complex ideographical system be capable of confirming itself? The setter of the signs has taken the trouble to divide the 244 signs into groups by 60 cross-dividers. My question is therefore: are any further subdivisions of the 61 signgroups to be performed? To attempt this question, I used a relatively simple method as I introduce a stem-concept for the inscription, as two signs in regular order recurring together in a minimum of one more signgroup. I then proceed to enumerate the functions, that follow in the wake of this definition (ii). This shows to be a promising method of investigation, which so to speak provides a fixed framework for the inscription; conceivably even a calendar. In fact: only the succession of the signgroups remains unclear, when the stems are defined (iii).

The 22 defined stem-forms are at the same time introductory and conclusive, as they are not consolidated before the accordances that they bring about, finally turn up as an answer to enumerations. When the signs outside the stems are redoubled (in a way like the stems themselves), it is almost impossible not to see the calendar aspects.

Briefly and to the point, I have designed a dozen figures, these illustrations, together with the legends to match, are the principal part of my investigation. Having introduced the stems, the figures can be studied profitably in themselves. After all I have tried my hand at a subordinated text.

Supplementary notes

No matter what difficulties have preceded, the solution of a genuine riddle must be capable of being entrusted by the instrumentality of very few and extricating theses, so too the key to this old Cretan inscription...

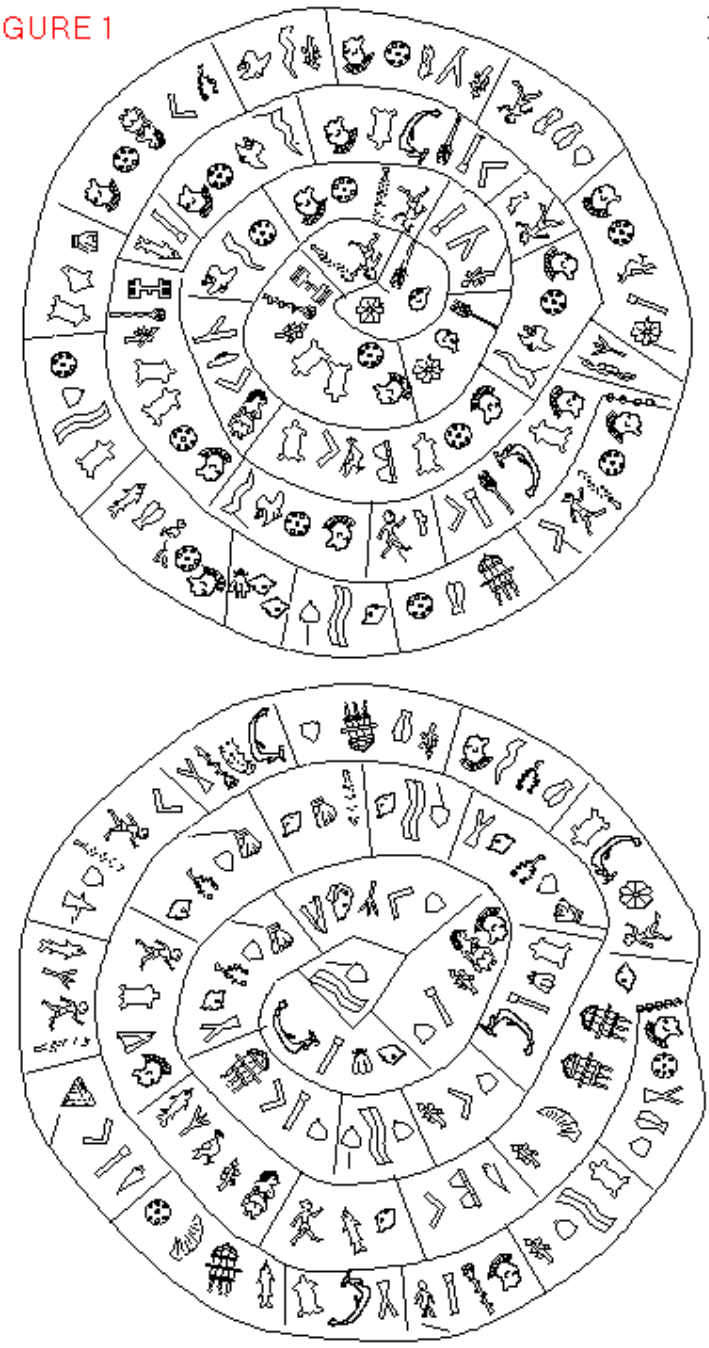
1. Among others objectively by Jean-Pierre Olivier, Le disque de Phaistos, édition photographique (BCH 99 1975), 6-34. A complete treatment of the subject is found in: Kristian Jeppesen, Some remarks on the Archaeological Placing of the Phaistos Disc. (KUML 1962), 180-190.

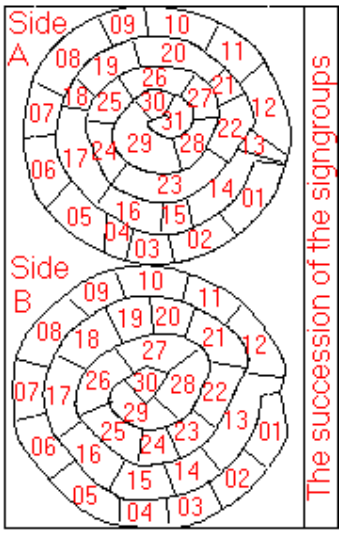
2. In any cryptanalytic problem a single sure entry solves the problem (A quotation from Benjamin Schwartz (JNES XVIII 1959), 108.

3. My analysis is at the same time independent of typology, period of time, origin and direction of reading, whereas linguistic analyses demand an unreserved attitude to these conditions.

FIGURE 1

DISKOS TIS FAESTOS
Museum Inventory
No. EP 1358





Reading 2

Some designations related to signs and signgroups

*** Elementary my dear Watson**

Stem definition

A stem is a sequence of two signs, repeated in a minimum of one more signgroup. The stem is not allowed to overlap any other stem, which can be confirmed with further significance (i).

Elements -containers-

The inscription is constructed by elements, of which the stem is the essential one, it consist of two visible signs, and has the value of two units.

Shortened elements - or reduced elements - These elements only hold the one sign of the stem, the second sign is omitted (by the constructor of the disc), but the shortened element still keeps the value of two units, on a par with the stem in enumerations.
The shortened elements are subgrouped into two sorts: ‘Shortened stems’, as opposed to elements that possess signs not known from the infrastructure of the stems, I call those last units 'remainder-signs'.

The two different cross-dividers (g) ahead of A01 and B01, initialising both sides of the disc as 'pearly gates' into the inscription, and this is new, have the potential as remainder-signs too, and are therefore to be regarded as two shortened elements.

Thorn. The third element (iii), 'the thorn' is a final mark only with the value of one unit, that is to say: Not a shortened, but rather a diminished element.

Signs -days-

Units are applied as a joint designation for signs, absent signs and thorns; all counts as singles.

Stem-signs: The signs that enter into the compositions of the stems. The designation is general for units in shortened stems too. It gives 30 different stem-signs, and so they are recorded alphabetically with the capital letters (iv).

Remainder-signs: The remaining signs, which obviously do not enter into the

constructions of the definable stems, are called remainder-signs, they are only
as shortened elements (the presumed stem-forms from which they derive are not present at the disc). These signs are recorded with small letters from a-p.

Absent unit: The absent sign in a shortform element.

Signgroups -weeks-

The signs around the spiral are separated into 61 signgroups by cross-line-dividers (v). These groups contain from two to seven signs, and the average amount is exactly 4 signs per signgroup.

Stem-signgroups: A designation used for the 50 signgroups, which contain one or more stems, simultaneous presence of shortened elements or thorns do not change the designation.

Reduced signgroups: Signgroups which lack stems; they fully consist of shortened elements, and, as an exception, a single thorn in B03 (vi).

Expansion forms –seasons -

Now when the signs are given values with influence to enumerations, the inscription can be conceived in different ways. Basically these two:

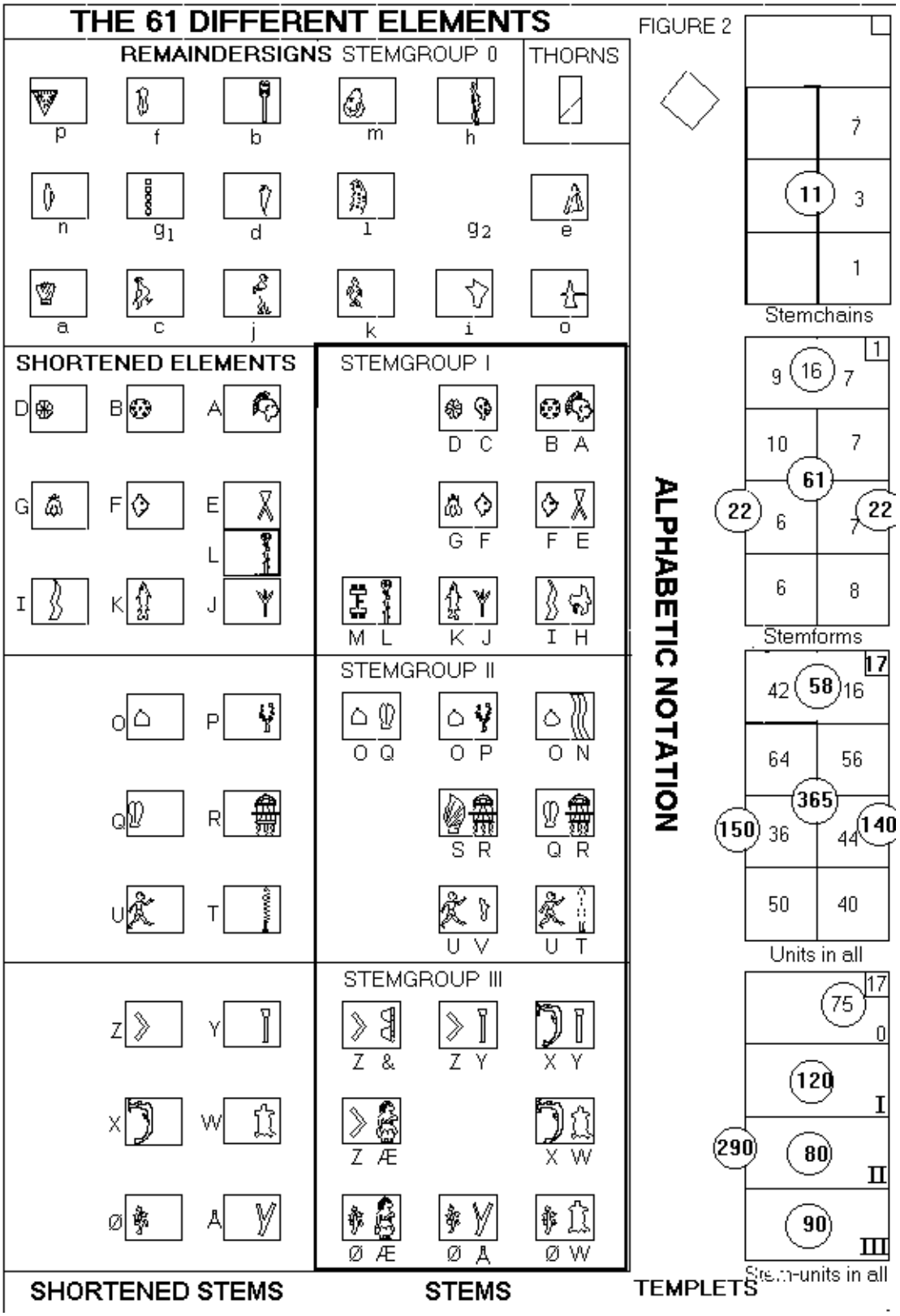
Alfa) The actual inscription ,which is counting 244 signs, is in a way expanded with 70 units because of its 70 stems.

Beta) Conversely you can say, that the actual inscription is reduced by 121 units in comparison with the fully expanded inscription on 365 units. The fully expanded inscription has an average amount of six signs per signgroup (less a thorn).

The insertion of plus or minus to the expansionforms determine, whether the thorns are to be included as units in enumerations or not.

Supplementary notes

1. Extension of the definition: Three converse stem-forms apparently occur, but only 'WX' in B04 is relevant, as further appearances, beside the one in B12 (supposed pair to B04), show in both A14 and A20. The others, not valid converse forms, are 'OY' in B28, B25 (overlaps confirmed stem). And 'OZ' in B23, B27 (no further recurrences).
3. The thorns are not embossed, contrary to the other signs, but scratched into the disc, before the clay hardened. The common opinion is that of seventeen thorns engraved.
4. During an examination of a subject like the Phaistos disc, it is inconvenient to refer continuously to the imagery of the characters, consequently they are numbered from 1 - 45, Sir Arthur Evans, Scripta Minoa vol. 1 (Oxford 1909), but as I am engaged with counting, it is distracting to use arbitrary numerals as notation. Among the 46 (47) dissimilar signs, I especially work with the 30, that make up the stems, and stretching the alphabet to 29 capital letters with the Danish capitals Æ, Ø, Å (together with an ampersand) gives me a more comfortable notation. The 16 dissimilar remaining signs are recorded with the small letters from a - p with the pearl string dividers as g. I have had in view, that the two combining signs in the stems are recorded with adjoining letters.
5. As it will have appeared, the stems are not indicated as enclosed structures in the inscription, contrary to the signgroups.
6. It is significant that the tendency is towards a location of the reduced signgroups on odd signgroup -numbers (10 of 11). An indicium for the stem 'Z&', because B14 is an equal number.


THE 61 DIFFERENT ELEMENTS
REMAINDERSIGNS STEMGROUP 0
THORNS
p f b m h
n g1 d l g2 e
a c j k i o
SHORTENED ELEMENTS
STEMGROUP I
D B A
G F E L
I K J
D C B A
G F F E
M L K J I H
STEMGROUP II
O P
Q R
U T
O Q O P O N
S R Q R
U V U T
STEMGROUP III
Z Y
X W
Ø A
Z & Z Y X Y
Z Æ X W
Ø Æ Ø Å Ø W
SHORTENED STEMS
STEMS
ALPHABETIC NOTATION
TEMPLETS
FIGURE 2
7
11
3
1
Stemchains
1
9 16 7
10 7
61
22 6 7 22
6 8
Stemforms
17
42 58 16
64 56
365
150 36 44 140
50 40
Units in all
17
75
0
120
I
290
80
II
90
III
Stem-units in all

Reading 3

Stem determinations

*** The exception proves the rule.**

Let me by means of an example introduce the reader into how a deduction of a stem is carried out in practice.
I'll choose a signgroup at random "B13", and then I intend to investigate its contents of stems, if any. A stem is a construction of two and only two signs. By this means, there are given three compositions for a signgroup with five signs as B13:
1) ØS RR F. 2) ØS R RF. 3) Ø SR RF.

Taking the potential stems in the first composition, beginning with RR, this combination of signs is to be searched for in all 61 signgroups. - It is not found. The search proceeds with ØS - the result is still negative. Only the combination SR in the third composition has a repetition; namely in the signgroup B05.
B05 consist of four signs, and by that it has two compositions: B SR K and BS RK. The stem SR is yet not guaranteed before both compositions of B05 have been tested. The first SR was tried with a positive result. The potential stems in the second composition cannot be recovered. The stem SR is by now determined. On the other hand, if the possible second compositions BS or RK were recovered, but only at one location, just as SR, then the contents of stems in B13 and B05 would have been evasive, cf. B22, B29 and A04. Thus, a majority in favour of the deduced stem is demanded before certainty is attained.
In A17, A29 and A23, the combination WB emerges, but it is overlapping the stem BA, which is present thirteen times in all, by means of which WB is not to be a stem.
The two identical signgroups A17 and A29 must, besides BA, of necessity hold two more pairs of stems, but a search determines that none of the compositions available are found in other signgroups, without which the stems cannot be deduced with certainty. At this point the outcome must be based on an estimate: That the position for a sign in a stem is to be respected, when it is known from a definable stem, due to the definable stems observing these position rules among themselves, e.g.:

B29, B22 XY	B28, B16 ØÆ
A14, A20 ZY	A17, A29 ØW
A08, A24 ZÆ	A14, A20 XW

In which ØÆ represents the defined stem in the signgroups B28, B16, and XW in A14, A20, while ØW is an (evasive) stem in A17, A29. The positions for the two signs of the stems appear moreover to form the basis of a valid subdivision of the stems into three groups (fig. 2 (i).
Eventually I have to comment on the inaccessible stem in A23 and B14. This stem-form positively compromises my definition, for the fact that the two signs in the stem of A23 are not sequentially connected. As it is, I simply have to take the standpoint, that the sign c in A23 is a parenthetic addition, as the enumeration-results, enabled by this conception, for me are beyond any doubt - the exception proves the rule. The twenty-two stem-forms turn out to be an efficient tool during a structural analysis of the inscription.
Other writers as well have directed their efforts to identify stems (ii); however, as far as I see, without fully realizing the momentous request for the absolute amount, which proved to be 70 stems. This, and the conclusion that a stem consists of two and only two signs, is novel.
What succeeds the definition of the stems is an attempt to bring about some qualitative and quantitative possibilities. These are positively self-contradictory or immaterial, but one has to remember that the premises of this riddle are lost: there are no preceding statements accessible such as: cut the Gordian knot or find the quadratur of the (calendar)circle, as normally known from riddles. The initiatives must at this stage be hypothetical until the enumerations finally will be able to confirm themselves or not.

Supplementary notes

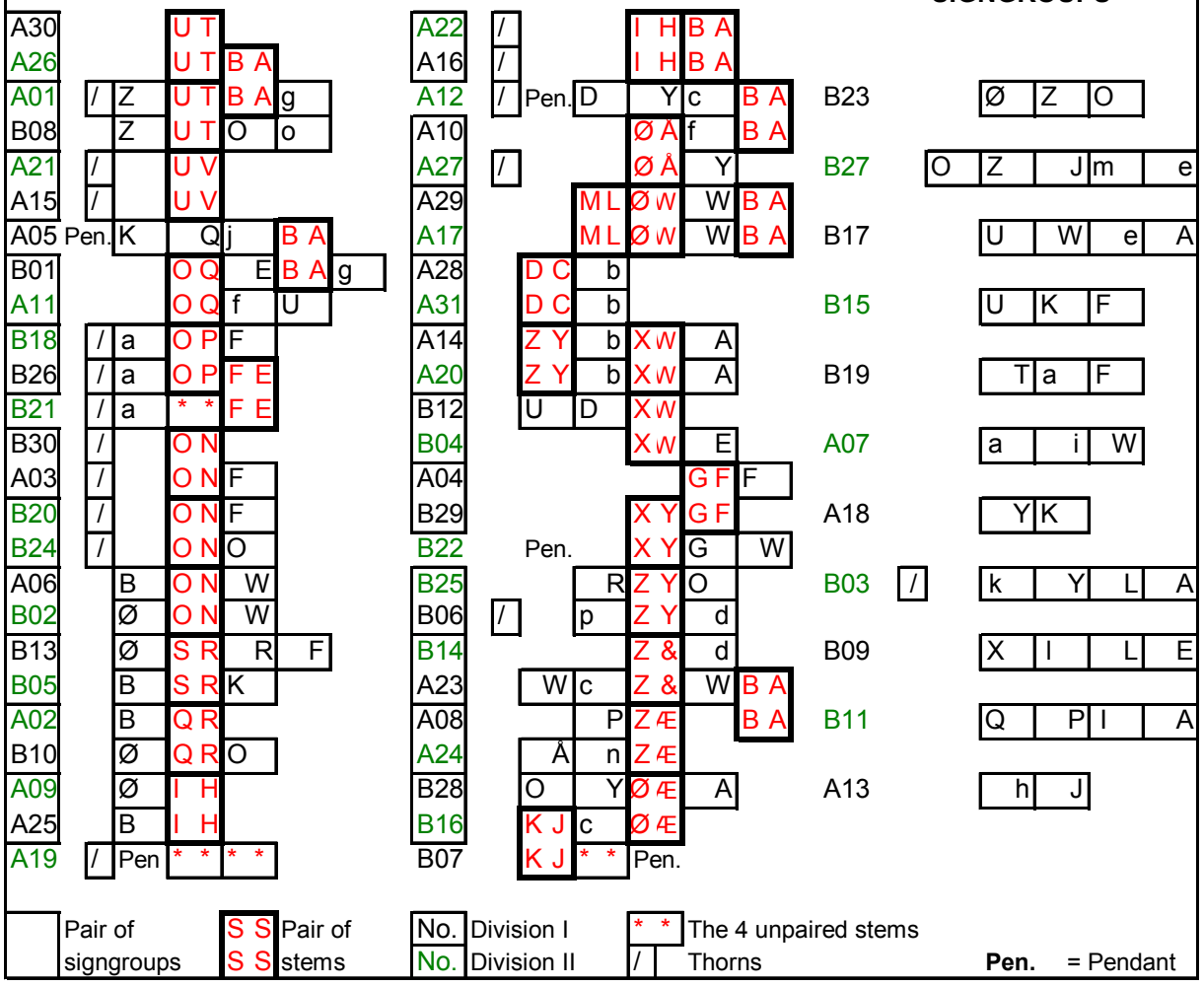
1. The stem-forms can be linked together, on the basis of mutual signs on mutual positions, into eleven stem-chains. The chains invite a further classification into the three stem-groups.
2. Günther Ibsen, Der Diskus von Phaistos, ein Versuch zur Entzifferung. (IF 47 1929) 1-41.

FIGURE 3.
Alphabetic notation.

Appendix A.
Hieroglyphic notation.

THE 50 STEM-SIGNGROUPS

THE 11 REDUCED SIGNGROUPS



	Pair of signgroups	S S S S	Pair of stems	No.	Division I	* *	The 4 unpaired stems
				No.	Division II	/	Thorns

Pen. = Pendant

Reading 4

The consequences of the stems

* The quality mark of the stems.

I have now isolated a total of 70 stems, and have by that process obtained a bisection of the inscription into stems towards the sign material left over. Thereby all 244 signs (261 visible units) are given various functions as stem-signs, stem-group-signs, remainder-signs etc.
A new method of investigation has emerged, in which the signs and signgroups are compared effectively.

First, the already mentioned, differentiation can be made between stem-signs versus remainder-signs. Another immediate distinction, which is now possible, is the one between stem-signs from within the stems towards stem-signs without (shortened stems). The stems in themselves are easily classified with a convincing result: the three stem-groups have 11 stem-chains, 22 stem-forms and the stems make up 33 stem-pairs, as visualized on figure 3; but with the 70 stems there is an excess of four unpaired stems, these four stems are influential in relation to the stem-signgroups too, as they are held neutral (add 4), in the same way as the 11 reduced signgroups sometimes are kept apart from the 50 stem-signgroups in enumerations.

Likewise the stems, the signgroups make up pairs and unpaired as well. In connection with 22 pairs of stem-signgroups, it gives six unpaired signgroups, which I name 'pendants', i. e. they make up a third link with six of the stem-signgroup-pairs. These pendants are, besides B07, B21 and A19, probably A04, A05 and A12. Probably because it is not sufficiently clarified, which signgroups are components and which are pendants to the pairs. It is, after all, not crucial to the enumerations. The foundation of the stems is, in other words, confirmed by the favourable numbers that it causes, as the product or the complementary product of almost every enumeration turns out to be a multiple of eleven. 'The quality mark of the stems', convincingly supported in the gnomonic arrangement, see figure 9. Surprisingly many of the fundamental enumerations gives figures which are fragments of a table over five and six by turns:

(5+6+5+...n) and (6+5+6+...n) =

{5, 6, 11, 16, 17, 22, 27, 28, 33, 38, 39, 44, 49, 50, 55, 60, 61...} (i).

This was an exposition of some of the obvious functions of the stem definition. The schedule below contains more details.

Figure 4, 1 Some Bipartitions.	Dif. AB	Side A*	Side A	Side B	Part I	Part II	Div. I	Div. II	Tot. AB*	Tot. AB
Signgrouppairs	22		9	6	0	0	0	0		22
Stemsigngroups	42	27	28	22	24	26	24	26	49	50
Reduc. signgroups	11		3	8	6	5	6	5		11
Signgroups	53	30	31	30	30	31	30	31	60	61
Stems (twice)	22	80	84	56	70	70	70	70	136	140
Reduced stems	22		26	49	40	35	38	37		75
Remaindersign	16		14	15	12	17	14	15		29
Reduced elements	38	40	40	64	52	52	52	52		104
Thorns	1	8	9	8	8	9	6	11	16	17
Visible signs	46	120	124	120	122	122	122	122	240	244
Visible units	47	128	133	128	130	131	128	133	256	261
All excl. thorns		160	164	184	174	174	174	174	344	348
All units		168	173	192	182	183	180	185	360	365
Formula(5+7+5...n n:			28	29	32		30	31	60	61

Figure 4,1.
Sides: The actual bisection in side A and side B. Partitions: A bipartition based upon an even distribution of the stem-pairs on two parts, corresponding with the grey and white signgroups on fig.5. Divisions: A trial to part the inscription, so that not only the pairs of stems are equally parted, but the pairs among the reduced elements as well (grey and white, fig.3). NB: The column with an asterisk (right hand) shows the new totals, when A19 is regarded as a neutral intercalary week. Asterisk (left hand) Side A minus A19.

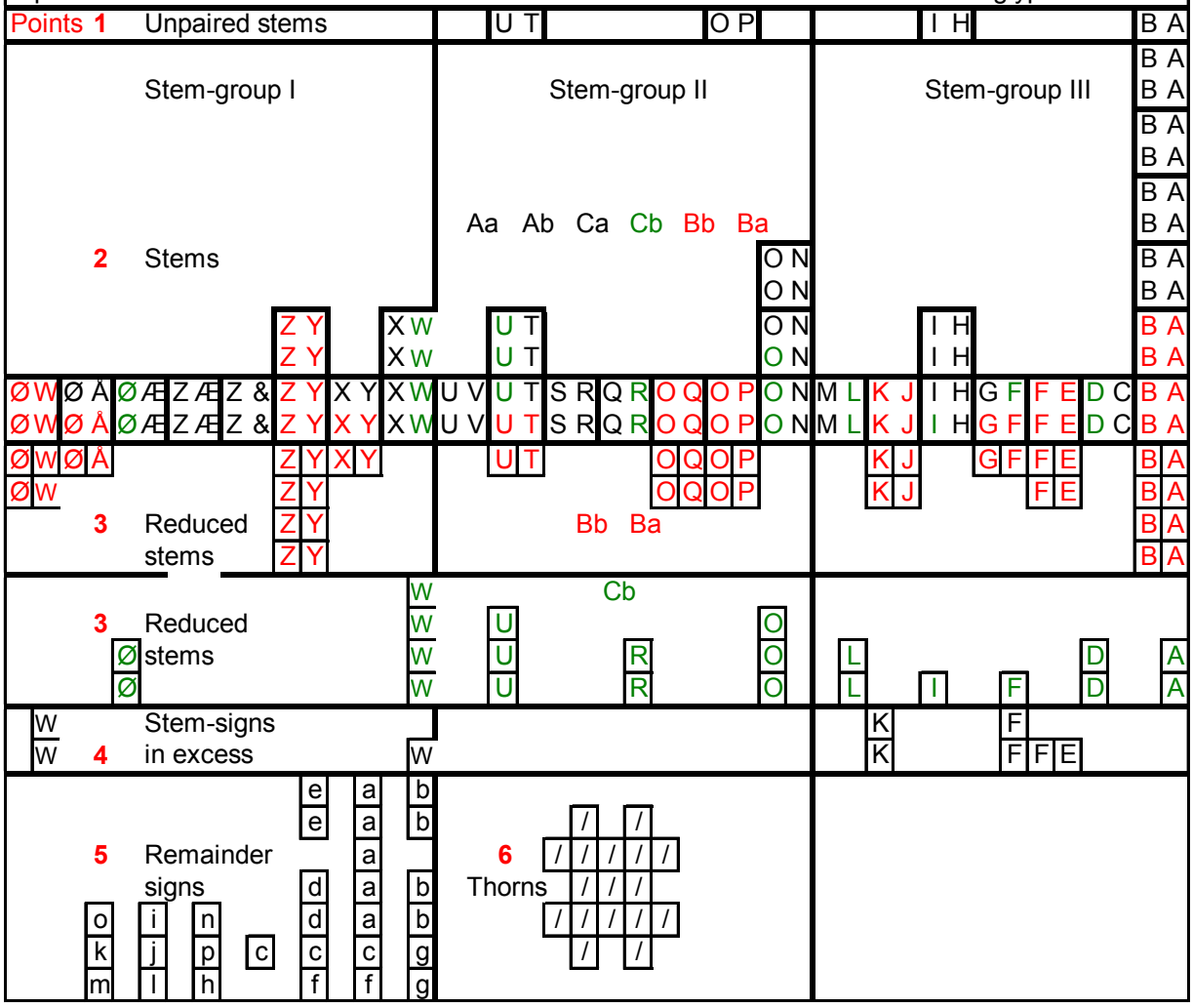
The result of these initial enumerations recounts that the inscription may prove to be a calculation of some kind with an otherwise and more coherent classification than to be expected in a text based on phonology. In this connection one has to take into consideration the immediately disorganized impression that side B in particular leaves. I would have expected a very opposite impression if this numerical harmony really were caused by a linguistic text. Any agreement on the length of the lines has not even been reached (ii).

The great question is subsequently, what is due to the foreshadowed system?

Is it by any means a manifestation of a concealed prosodic text, or is the search for quite different interpretations? What is accounting for the widespread presence of the number eleven in the counting, both in the totals as well as in the amounts of species of signs and signgroups? Is the disc related with a quadratic table (iii). It is certainly tempting to hesitate for figures with relations to the calendar year in the inscription.

FIGURE 4 **DISTRIBUTION OF ALL 261 UNITS** **Appendix A.**

Alphabetic notation. Hieroglyphic notation.



The V orders of the signgroups

The five orders of the signgroups are yet another example of how the signs and signgroups fall into groups, which have divisibility by eleven, again the four unpaired stems are in brackets c.f. figure 3, beyond this, the five orders are not brought into a broader perspective at this stage.

The signgroups are held in (five) V orders, one for each of the three stem-groups, and a IVth order with mixed contents of stems. The final order 0 is identical with the 11 reduced signgroups. The signgroups distribute themselves with 11 in each order except for the 16 signgroups (5+6+5) of order II. The consistent divisibility by 11 is in this situation conditioned by the four unpaired stems being kept neutral. In that way the signgroups B07 "KJ(UT)" and B21 "a(OP)FE" belong to order I and not the mixed order IV as expected, and A19 "(IH)(BA)", which I estimate contains two unpaired stems is without this system of orders.

.

Supplementary notes

1. Commensurable to a 5.5 * n table with an allowed inaccuracy on plus/minus 0.5 sign!, when n is an unequal number.
2. I have been encouraged to repeat my analysis on the basis of another text written in foreknown syllabic characters. A collation of the statistic returns should then give evidence of agreements. In accordance with facts, ancient inscriptions are most often imperfectly preserved; so if the disc had had a truncated corner, if for instance the signgroup A01 was missing, then it ought not to call for any intimate knowledge of my enumerations to comprehend, that the detected system was off its balance, though still the stem-definition would stand its ground. Personally I find, that such cross-analysis is superfluous.
3. In a multiplication table (22x22) the square numbers form pairs across the diagonal e.g.: 1*16, 2*8, 4*4, 8*2, 16*1. C.f. the principle of the stems.

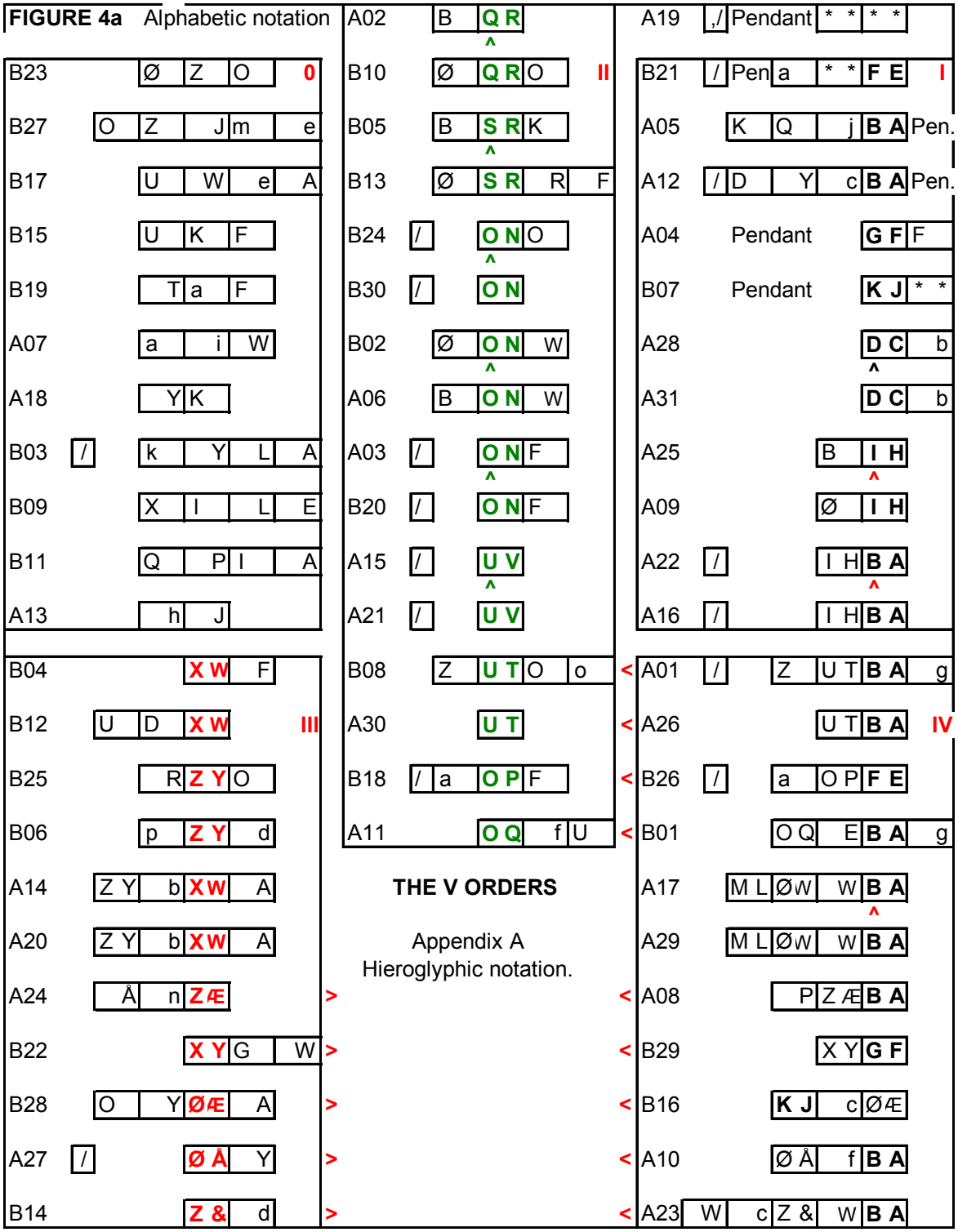


FIGURE 4a Alphabetic notation
THE V ORDERS
Appendix A
Hieroglyphic notation.

Reading 5

The reason for the stems

* Some more bipartitions.

It would be of relevance to examine more closely the viability of a bisection of the inscription with a view to a clarification of its duplicity, which must be suspected to be the primary reason for the stem-phenomenon.

Generally the contents of side A and side B are conceived as more or less independent of one another. It is notable that the sign "O" is dominating side B, while the sign combination BA, which is found thirteen times in total, dominates side A with no less than twelve occurrences. Along with my enumerations and aim of dividing the structure into to halves, I have arrived at the conclusion that the inscription rather has its natural division in the very side A, with the six opening signgroups of side A an extension of the 30 signgroups of side B. These 36 signgroups are called part B1. The remaining 25 signgroups from A07 to A31 are then called part A1, (the first step towards a bisection) (i).

The argument in favour of this bisection is given by the three sequences of stem-signgroups, of which A01 - A06 consist. Those sequences only find recurrences on side B, and they are the three following :

A01, A02 = B08, B10
A03, A04 = B30, B29
A05, A06 = B01, B02

In addition to these sequences, side B in itself has other sequences with recurrence:

B04, B05 = B12, B13

B16, B18, (-----) B20 = B28, B26,(B25) B24

The stem-signgroup B25 frame a pair with B06. Here an interlacement with a third line accordingly is taking place.
At side A as well, you will find concordant series of stem-signgroups :

A14, A15, A16 = A20, A21, A22

Again you find an asymmetric interlacement between two independent sequences in pair :

A08, A09,(---) A10 = A24, A25,(A26) A27

which are in gear with these double sequences :

A26,(A27) A28 = A30,(-----) A31

These observations thus form, in part, an attempt to arrange the inscription in such a way that the cognated pair of signgroups in the two by two sequences are listed immediately above each other without violating the given succession of the signgroups (fig. 5) (ii). In other words, these arrangements are my suggestions to how you, in a reasonable uncomplicated and symmetrical way, may fold up the inscription, and by that process get the components of the 22 pairs of signgroups located above one another.

Fig. 4, 3	Some astronomical reflexions on			
Partitions	subdivisions of the solar year.			
-	**Sun**	**Venus**	**Moon**	**Sirius**
2	**179+186**		**177 x 2**	**Eclipses**
3		**Egyptian calendar**		**120 x 3**
4	**91 x 4**	**Equinoxes and solstices**		
5	**73 x 5**	**73 x 8**	**Periods of revolution**	
6		**Double-**	**59 x 6**	**-months**
52	**7 x 52**	**Modern weeks**		

Heliacal risings and settings of celestial bodies

To accomplish the experiment above, to divide the inscription into two halves, I have to return six signgroups to part A1. B01 and B14 are certain candidates, whereupon 11 pairs of stem-sign groups are stationed in both parts (second step: A2, B2). The interchange is completed by the transfer of four reduced signgroups from part B2 to part A2, e.g. B03, B09, B11, B15, by means of which six signgroups are carried over to part A1 in exchange for A01- A06. These two adduced parts go by the names A3 and B3. Figure 5 gives a comprehensive view of the partitions, especially as the 11 reduced

signgroups are observed neutral. It is open to discussion if B01 is in a pair with B05 in the place of A11, whereas A11 becomes 'the pendant'
Now the only remaining problem is that this bisection is performed in the wrong direction. First of all a true cut through the inscription should imply that the components of the signgroup pairs (as well as the stem-pairs) are distributed within the respective parts, and it would be of no harm, if the given succession of the signgroups were maintained synchronously, as attempted in this proposal:

Partition I

A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29
B01	B02	B03	B04	B05	**A13**	B07	B08	B09	B10	B11
B23	B24	B25	B26	B27	B28	B29	B30			

Partition II -The 31 grey-toned signgroups on figure 5.

B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22
A08	A09	A10	A11	A12	**B06**	A14	A15	A16	A17	A18
A30	A31	A01	A02	A03	A04	A05	A06	A07		

Yet another proposal for a division to be underlined, which moreover will hold, as far as possible, a bisection of all shortened units, that is to say the reduced stems, the remainder- elements and the thorns. This division is on the other hand constructed independently of the natural succession of the signgroups:

Division I

A03	A05	A06	A08	A10	A13	A14	A15	A16	A18	A23	A25	A28	A29	A30
B01	B06	B07	B08	B09	B10	B12	B13	B17	B19	B23	B26	B28	B29	B30

Division II -The grey-toned signgroups on figure 3.

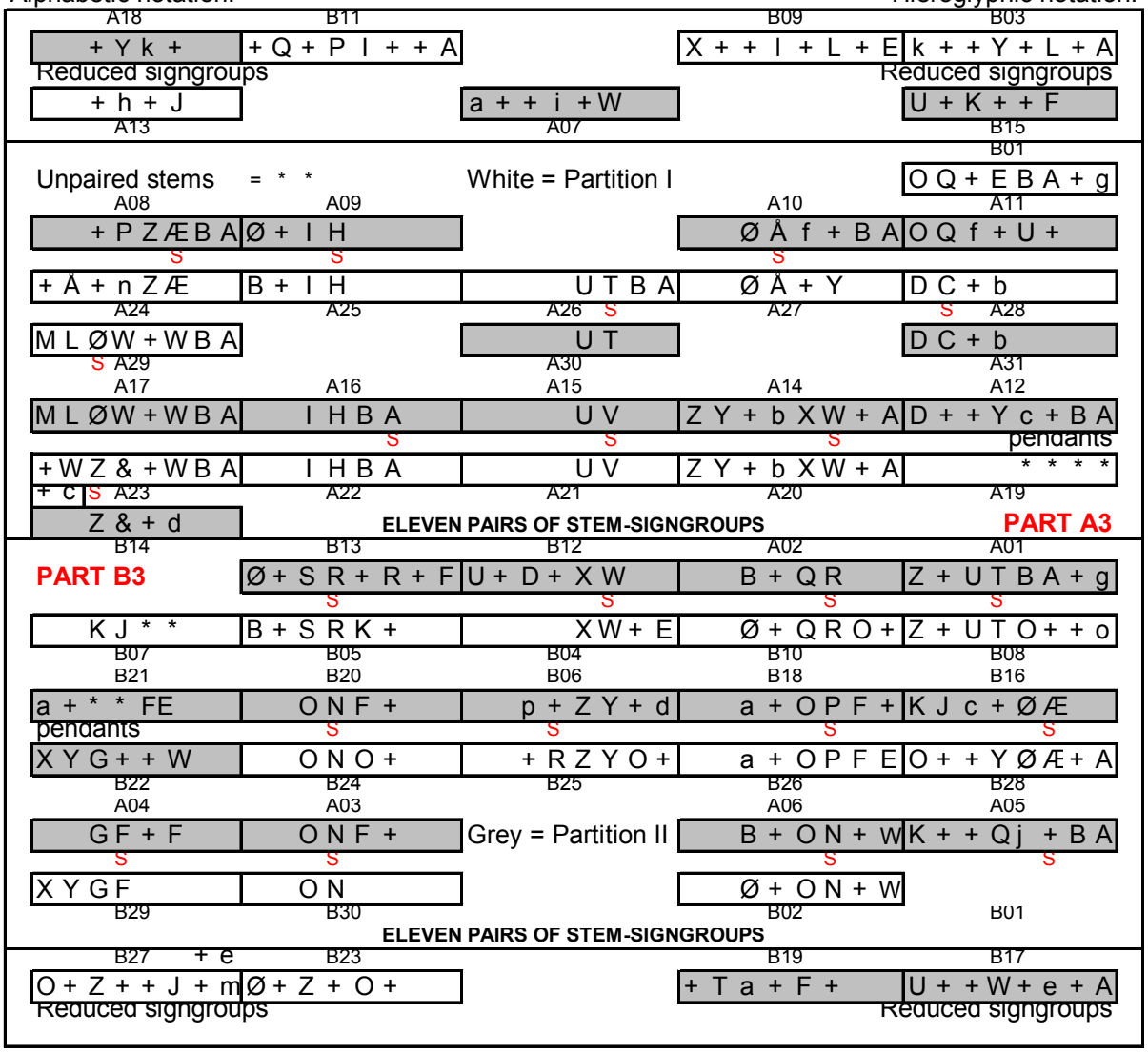
A01	A02	A04	A07	A09	A11	A12	A17	A20	A21	A22	A24	A26	A27	A31	A19
B02	B03	B04	B05	B11	B14	B15	B16	B18	B20	B21	B22	B24	B25	B27	

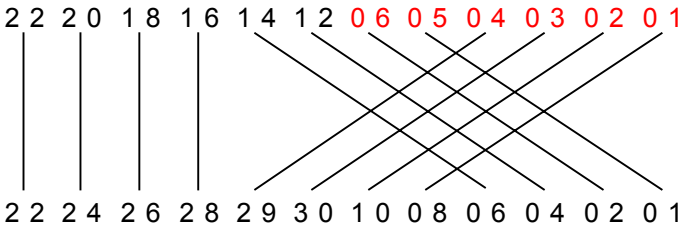
Those two proposals are undeniably rather complicated (after all, it's not my fault!), although symmetrical. Both bisections (see fig.4, 1) accommodate some varieties, but they are in the current forms account sufficiently for the latent duplicity of the inscription, which must be the underlying cause of the stem-phenomenon; but they do not clarify the duplicity of the stem in itself, that is, why the stem consists of just two signs, much less do they clarify the reason of the strict precedence of the signs inside the stem, i.e. the first and second position. There are not linked up either by any cogent bonds to the calendar, which I shall now describe.

Supplementary notes

1. Observe: Part A1 contains 5^2 signgroups and 10^2 signs, part B1, 6^2 signgroups, 12^2 signs. This is due to that the two dotted cross-dividers ahead of A01 and B01 are taken as real signs.
2. Perhaps the inscription originally has been arranged in a similar way, before it was inscribed into the coils of the disc.

FIGURE 5 **THE DUPLICITY IN THE INSCRIPTION** **Appendix A.**





Reading 6

Tracing the full consequences of the stems

*** The initial steps into the presumed Minoan calendar.**

Having unravelled the 70 stems, the next logical step was to arrange the statistics, tabulated below (see also fig.4,1) with the promise that if the stems were the clue to the riddle, most likely those enumerations would disclose the essential nature of the inscription, in excess of the previously observed omnipresent number 11. The issue was not unique, as if say nine groups of 29 units immediately were evidenced, but if that was the case, the Phaistos disc would not have posed the exceptional riddle that it did. The success of the returns was the 'covering function' i.e. that the shortened stems exactly cover half of the stem-pair's signs (see fig. 9), and thereby lay the groundwork for a quadratic arrangement of the 3 stem-groups (i).

After some further quest I realized, that a redoubling of the entire sign material left over, after the stems were isolated was satisfactory (ii). These signs, which are identical to all the reduced elements, are in this view all representatives for stems, e.g. the signgroup B11:

Q P I A = Q(?),(O)P,I(H),(B)A

And by this procedure, the covetable 365 units are obtained. Now the inscription veritably swarms with calendar-ciphers!

Stemgroups	III	II	I	0	/	Tot	Cal	add	
Reduced stems	25	18	32			*75	58	+17	
Absent units, do	--	--	--			--	58	+17	
Subtotal	*50	*36	*64			150			
Signs in stems pos.1	20	22	28			*70	58	+12	
Signs in stems pos.2	20	22	28			*70	58	+12	
Subtotal	*40	*44	*56			140		*58	
Remaindersigns				*29		*29	29		
Absent, do				*--		--	29		
Thorns					17			*+17	
Summa summarum	*90	*80	*120	*58	17	*244	290	*75	365

The wheel has come full circle. Numerically this is a calendar. The disparity between 348 and the solar year on 365 days is equalized by the instrumentality of the 17 thorns. As you will recall, the succession of the signgroups apparently is frustrated, so you cannot draw the inference that the initial 59 units on face A or B make up two synodical months. The probability of the calendar is so far only numerical.

By the way, how is the duplicity of the inscription to be construed compared with this calendar theory? Is it to be interpreted as a bipartitioned construction only, or does it indicate a system with two-folded months?
Through the ages the fractions have been bypassed in calendar systems, for instance in the case of the new moons, by working with months of 29 and 30 days alternately, and not with the real cycle of about 29,53 days. The same procedure has been applied regarding week systems (iii), for instance in the Babylonian custom to
use alternating weeks of five and then seven days (iv), with which 60 weeks got 360 days, and 61 weeks obtained 365 days (fig. 4, 2.). This takes me back to the disc with its 61 signgroups, that fits into such a week system. Those shifting weeks are of particular interest when the inscription is expanded (beta+), however not in such a way that the signgroups methodically contain five and seven units by turns, but as an underlying pattern or prototype that protrudes, especially in the crucial numbers, thrown into relief by side A's 173 units (168+5 epagomens), expressed as (5+7+5+...n) with n=29; and side B's 192 units as n=32. It requires ten shifts to reach the advantageous number of 60 days.

A Persian calendar from the fifth century is known, to have had weeks with seven and eight days alternately plus five intercalary days at the end of the year (v). This system was of 48 (49) weeks, which does not meet that of the signgroup numbers on the disc.

Several ancient nations did choose the convenience of 360 as the basic number of the year. The Egyptians inserted a primordial decade every second year. Even the Aztecs and the Maya used five 'unlucky' days. So it is not beyond the bounds of possibility, that the disc is a calendar consisting of

six two-folded months (somehow corresponding to the system of stem-sign groups in pairs) with an extra five day-week. If the inscription also has an intercalary week, it could by means of experiment be assumed to be A19. You could say, that this signgroup alone is characterized in being identically presented one to many times (A16=A19=A22). If A19 is isolated, all crucial totals (stems, reduced elements and thorns) on both side A and B now possess divisibility by eight (fig.4, 1).

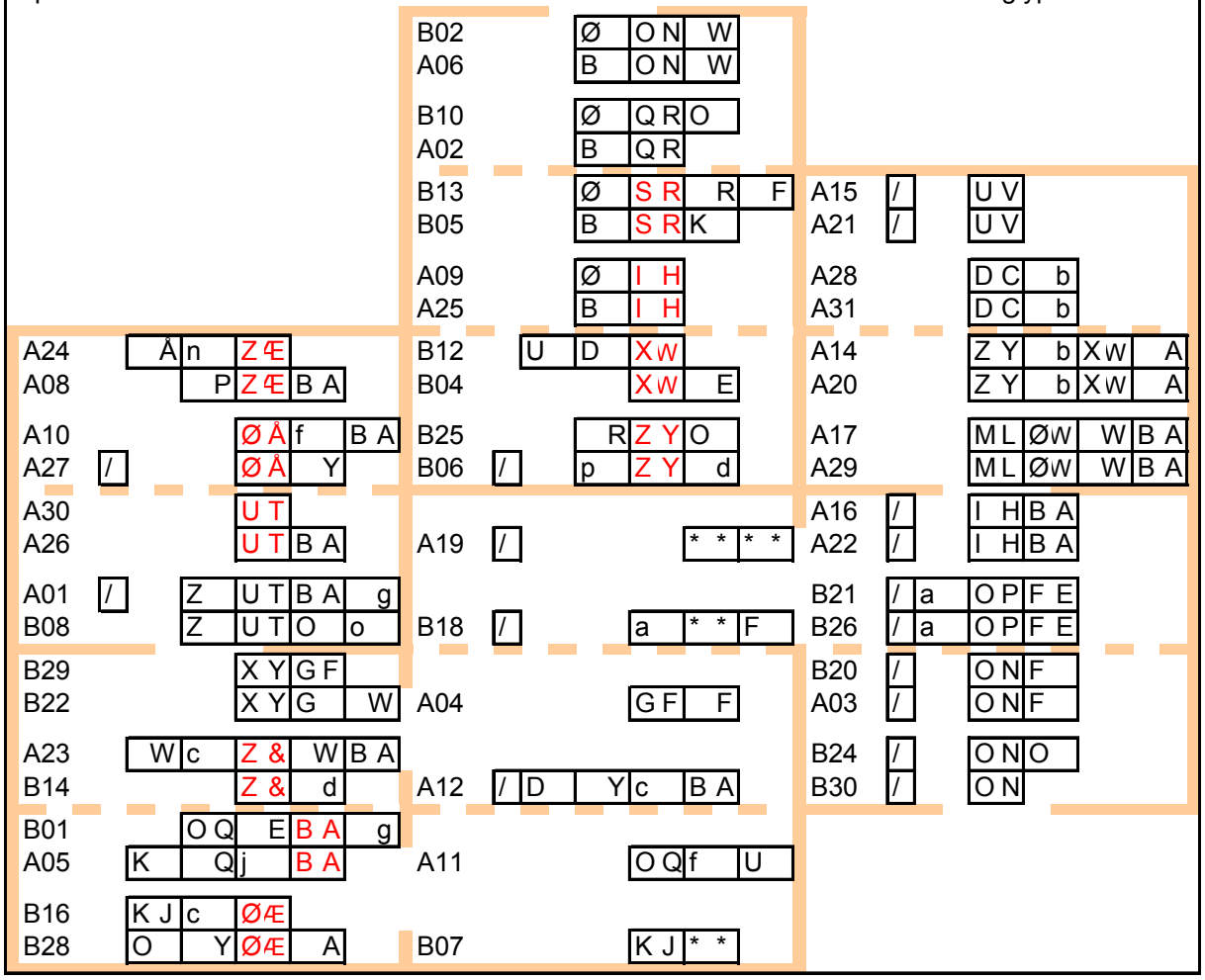
Supplementary notes

You cannot change the eternal circles of the celestial bodies, but the grammar of an extinct language you can easily make up.

1. Ole Hagen, Phaistos-skiven, en strukturanalyse (RUC 1988). Included in the Scandinavian Selection on Harvard College Library (1988). fig.10 substantiates in addition the validity of the three stem-groups.
2. Ottomar und Malte Neuß: Der Diskos von Phaistos 'Kryptogramm eines Kalenders-Interpretation eines Kulttextes aus Kreta', Kurz und Gut heft 1 (Frankfurt 1975) calls attention to this fact: Face B's 119 signs plus twice face A's 123 signs establish 365 signs in total. So too L. Pomerance, The Phaistos Disc. An interpretation of Astronomical Symbols (Göteborg 1976) 34. 'By turning the Disc eleven times and observing it twelve times, the total annual count comes to 366 unit days...'. - Ergo: side A's 31 and side B's 30 signgroups compose two months in this opinion.
3. As far as I know, the weeks do not have any astronomical background (the names of the weeks however are astrological) but they probably originated in a need to divide the month into parts more easy to grasp.
4. Ibid Neuß comment on a Babylonian calendar, during an instructive lesson in the story of calendars: ". . . Die Woche hatte zunächst 5, dann 7 Tage. . ."
5. The story of civilisation (tm). screen 318.
6. It is certain that the most obvious calendar on the structures revealed, would be a proposal with 'twelve' 29-day months (348 days), leaving the 17 thorns as an adjusting period.

FIGURE 6 **THE 22 PAIRS OF SIGNGROUPS** **Appendix A.**

Alphabetic notation. Hieroglyphic notation.



Reading 7

Proposal of a location of the twelve months

*** The calculus of possibilities is hereby reduced to a more human level**

Finally I will round off this article about the disc with a tangible calendar arrangement, (for the reader to take a position on) - one of many proposals on how the months will be sited on the disc. I choose the extension form, named alfa+ as departure. Alfa+ is the visible part of the inscription plus the 17 thorns (succession table). It necessitates a detailed explanation, but figure 8 should be of good assistance. The individual signs and signextensions stand for days...(i).

The initial seven signgroups on side A, A01-A07 contain 29 visible units. The succeeding seven A08-A14 have 31 units, next the signgroups A15-A21, which also contain 31 units. Finally A22- A28 with 30 units.

Signgroups	**Side A**	months:	weeks:	days:
1a	A01-A07	1	7	29
2a	A08-A14	1	7	31
3a	A15-A21	1	7	31
4a	A22-A28	1	7	30
In total		months: 4	weeks: 28	days: 121

Covering side B, the same picture is observed. B01-B07 possess 31 units, B08-B14 have 29 units, B15- B21, 30 units, and B22-B28 with 31 units. Together with side A's four months it gives eight months with 29, 30 and 31 days alternately (ii).

Signgroups	**Side B**	months:	weeks:	days:
1b	B01-B07	1	7	31
2b	B08-B14	1	7	29
3b	B15-B21	1	7	30
4b	B22-B28	1	7	31
In total		months: 4	weeks: 28	days: 121

So far all went smoothly according to this visible material, but the non-visible units, that frame the last four months, are interweaved with one another.

The 29 remainder-signs are, as you'll recall, the signs, that do not enter into the constructions of the stems - they are only present as shortened elements. The absent units (extensions), which of course are 29 units in number too, constitutes a ninth month.

Absent units	**Category 0**	months:	1	days:	29

Among the shortened elements, other 29s stand out among the rest, they are characterized by an unambiguous translation into stems. For example: the only possible reconstruction of the absent unit in the shortened element "A" is the unit "B" into the stem (B)A (iii). Those extensions then represent a tenth month.

Absent units	**Category I**	months:	1	days:	29

Yet another group of signs differs from the stock of shortened elements in being translatable in two alternative ways, because the unique form is not accessible. For example: "U" is interpreted as an abbreviation of either the stem UT or UV. Such extensions occur with the frequency of 30 - an eleventh month.

Absent units	**Category II**	months:	1	days:	30

At last sixteen reduced elements with three alternatives remain. For example: "O" for the stems respectively ON, OQ or OP (Category III). During the division of the visible part of the inscription into eight months (above), I only utilized 28 signgroups (121 signs) from both sides, but side A possesses never the less three more signgroups and side B 2 further signgroups. This material of five signgroups consists of 19 signs, which together with the just described sixteen absent units counts 35 units in total, corresponding to 30 days and five intercalary days. A twelfth month.

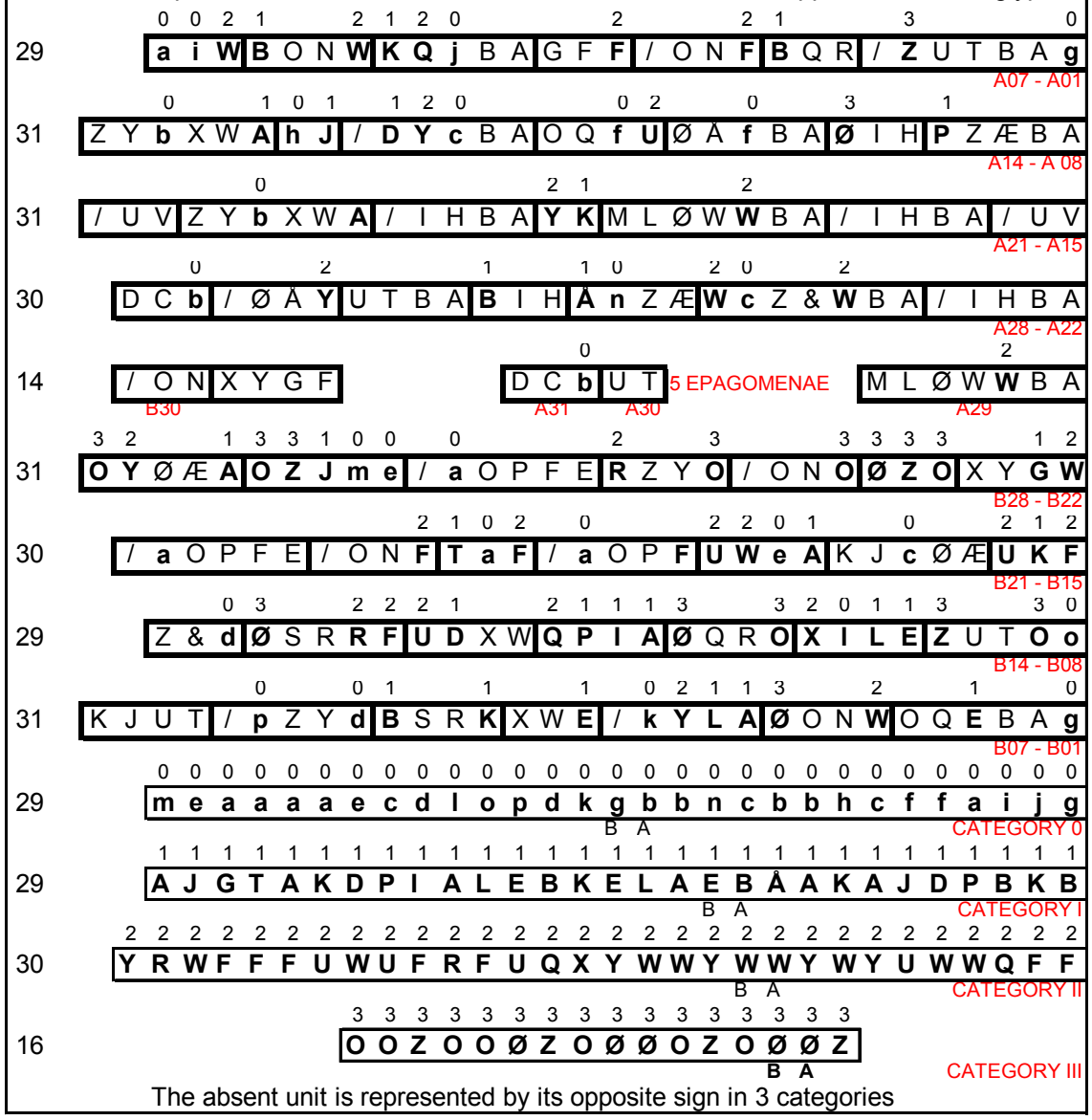
Absent units	**Category III**	months:	16/30 weeks:	days:	16
5a	A29		7/30	1	7
5b	B29-B30		7/30	2	7
In total			1	3	30
5 epagomens	A30-A31	months	1/6 weeks:	2 days:	5

In this situation you may choose A30+A31, instead of A19, as the five epagomens, the material in excess will then be three signgroups, or seven signs from both sides.

Supplementary notes

1. Or if more convenient, the units could be projected into months or even years, as employed in the Metonic and Sothic cycles: (365*4)years + 365 days
2. The official Egyptian calendar was tripartitioned in flooding, sowing and harvest seasons.
3. This is a postulate though logical. It givesthe inscription 29 more signs to calculate with, for free.

FIGURE 8 Alphabetic notation. **CALENDAR ARRANGEMENT.** Appendix A. Hieroglyphic.



The absent unit is represented by its opposite sign in 3 categories

Reading 8

Some data of the disc

* The quadrature of the (calendar) circle

Writers are divided about the numbers of characters on the disc. I have come across the totals: 241, 242 and 243, of which 242 signs (face A:123, face B:119) is the most frequent opinion (i). 242 is written as $11^2 + 11^2$.

As something new, I contemplate the two dotted dividers ahead of A01 and B01 as true signs, and the total amounts are in my view 242 + 2 = 244 signs or $10^2 + 12^2$. As it happens 244 is a multiple of 61, which is of statistical significance, because the disc is divided into exactly 61 ($5^2 + 6^2$) signgroups (as well as 61 dissimilar elements). Accordingly each signgroup holds, an average of four signs.

After this, the calendar prospect gets into the picture, as six multiplied with 61 is equal to 366, corresponding to a leap year, and 365 - 244 = 121, thus the inscription is missing 11^2 signs. $10^2 + (11^2) + 12^2 = 365$ or 366 / 3 = 122 signs This missing third part has no substantial presence in the inscription, but stands implicit, (except for the 17 thorns, which are included in this third part).

The visible inscription (alfa+), with its actual 244 signs, corresponds to two thirds of a year or eight months (ii) in which side A's now 124 signs will make up four months on 31 days each numerically, and side B's 120 are equal to four months on 30 days.

If A19 is isolated in its capacity of being the five epagomens, then the tripartition of the inscription is completed as follows: face A, 120 signs and 30 groups. Face B likewise, 120 signs and 30 signgroups; and the 'shadowed' third, 120 (absent) signs as well.

Postscript

Now when the probability has been made, that the signgroups are not inevitably words, but rather ideographic records of functions with a superior system of arithmetical and ritual nature concerning the calendar year, then new prospects of investigations emerge in relation to rituals drawn from murals and seals from Crete and Egypt in contrast to the thoroughly tested standard references to the linear inscriptions. Rites in conjunction with annual occurrences in nature form a whole study in itself, far outside the scope of this essay. To put an interpretation on pictures from the edge of historic times is very interesting, but also continually reflected by the imperfect documentation, though perhaps there will also be shown to be an analogy to something of common historical property, what concerns the pictorial contents of the signs (iii). Or it will show that the pictorial message of the signs is a sealed chapter in an even higher extent, than e.g. the symbols of the never doubted Maya calendar.

Let me emphasize that my superior objective with this investigation was to attain insight in the regularities, from which the sequences of signs were composed. In other words, I was not occupied with interpretations of the signs in themselves, but with an investigation of the interrelations and the frequencies of the signs; this proved to be the right angle of approach.

The accomplishment of my conception of the inscription implied a good number of disciplines (iv), yet I am still not adept in calendar mathematics, and the continued refining of this calendar I shall leave to the reader. When the publication is effected in a way proportional to the importance of my discovery, then everyone who has tried his hand at this enigmatic disc, amateurs as well as scholars, in this way shall get admission to my discovery. I trust that someone among the readers will take inspiration from my method of investigation and its results to place the last intricate pieces in this extraordinary inscription, or perhaps come up with some counter proposals on the points:

1) Securing of a presumed 'original' succession of the signgroups./ Fig.5
2) Establishing the identity of the absent units from the reduced elements./ Fig.9.
3) Delimitation of the calendar-proposals to the highest priority proposal./ Fig.8.
4) Bringing a connection to a system of records, an X - table (v).

Supplementary notes

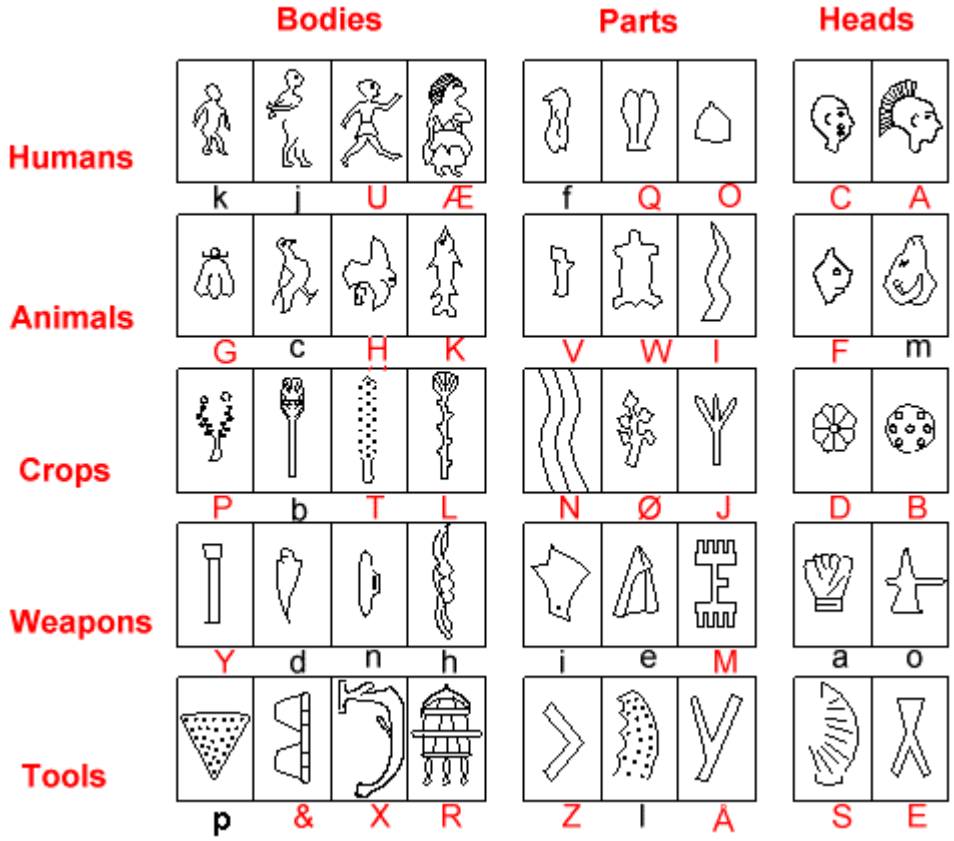
This paper is a revised and expanded version of a little pre-print, which I had issued for about ten years back, but as I feel that my method of investigation and its results deserves some more attention, I have against my objections, used more time to demonstrate more perspectives of my discovery. This paper is pieced together from several unpublished essays on the topic.

1. These differing opinions are all about, whether the only illegible character on the disc, the outlying sign in A08, is obliterated by design, or failing that, if two signs were in its place. I accept any sign , but I prefer a stem-sign of stem-group II, and the sign "P" is the best match in my view.
2. It is worth notice, that the glossary of linear B contains eight words only, which are considered to be names of months. John Chadwick, Documents in Mycenaean Greek (Cambridge 1956).
3. An unmistakable frame of reference with the so-called Chaldean tradition, as known from Babylonian zodiacs and the Egyptian Dendera ceiling, is difficult to detect. See Leon Pomerance (above note) 33., fig 12.
4. Primary the discipline of excluding disciplines not essential for the final conclusion.
5. X = Astronomical-. Genealogical -. Creation account -. Double entry book-keeping -. Bridge notation :-) Et cetera. All with a connection to the calendar.

- Mare liberum -

FIGURE 7

PROPOSAL: **SIGN-CATEGORIES.**



Reading 9

The gnomonic arrangement

*** - Bingo -.**

Comparing fig.4 with a picture-lottery seems significiant, in which the pair of stems, subsidiary all stems, are playing squares (point 1, 2), and all other signs are pieces. It is a familiar situation, that one or more pieces are missing. Let us imagine conversely, that we have had a mingling together with some outside pieces. We therefore charge ourselves with the task to sort out the pieces, that are in excess. The remainder-signs (point 5) have no correspondence with the playing squares, and are therefore to be sorted out without further ado. Putting down the pieces (point 3x), where they fit into the squares, will finally leave us with nine pieces (point 4), which were represented in the squares, but they are now in excess, because the playing squares are already occupied. The dolphin (sign K) for instance is present in two stems, but it occurs four times independently, there are so to say two uncovering dolphins in excess. Those nine stem-signs are to be sorted out too, like the remainder-signs. So are the thorns (point 6).

Stem-groups	III	II	I	0	/	Tot	Pair	Ex
Uncovered signs inside stems	18	22	26			66	58	8
Covered signs in stems	22	18	26			66	58	8
Covering shortened stems	22	18	26			66	58	8
Absent units in reduced stems	22	18	26			66	58	8
Unpaired stems		2	2			4		4
Reduced stems in excess	3		6			9		
Absent units do	3		6			9		18
Subtotal	6	2	14			22		
Epagomens A19		2	2			4		4
In total						290	232	58
Remainder-signs				29				
Absent remainder-signs do				29		58	58	
Thorns					17	17		17
Summa summarum	90	80	120	58	17	365	290	75

Of cause, this is not an argument in favour of the inscription as a picture-lottery, I just want to indicate, that a principle of a similar kind can be applied

with success; that some complicated, but symmetrical proportions, between the signs on the basis of their functions, are unveiled.

By observing the numbers 18, 22 and 26, it struck me, that square-sides on respectively 10, 12 and 14 hold circumferences, which are related to these numbers. This compels an almost unambiguous way, in which figure 6 is to be arranged, as the signs of the 33 pairs of stems are to be set up as circumferences in a quadratic framework (fig.9). The upper half of the framework is uncovered (components in) stems, and the lowest part is those stems, which have cover from the shortened stems (point 3x). As it shows, the covering signs not only make up a germination of the lowest part of the framework, they keep themselves within the areas in their half, which are marked out by the three stem-groups. I have divided the frame into six zones, each containing 22 signs. The six zones are symbolized by Aa, Ab, Ba, Bb and Ca, Cb. (fig. 9a). Bb for instance is those 22 signs in second position, which are gathered in the bottom left-hand corner of the frame. Together with Ba, Bb is able to establish 22 covering stems, of which 11 are dissimilar. As regards positions, (the right sign in a stem holds first position and vice versa) the covering stem-signs (Bb, Cb, Ba) consist of 33 signs in first position and 33 signs in second position (fig. 9c). The upper half (Aa, Ca, Ab) then get the same bisection of the positions, obviously. The zones Ca and Cb each hold 11 signs in both the first and second position. Together they comprise 22 stems (11 dissimilar) crosswise of the median line. It is seen, that multiples of eleven are reflected in a lot of new facets, although there are some limited ways to castle the signs, within those by positions and stem-groups restricted areas. This gnomonic arrangement I believe, is the most ideal way to illustrate those symmetrical proportions, which are unquestionably available in the inscription. The arrangement especially substantiate the legitimacy of the three stem-groups. There are however irregularities to be mentioned: Stem-group II holds 18 covering and 18 covered, but 22 uncovered signs; While stem-group III has 22 and 22, but 18 signs. If you consider the inscription as a numerical system, it would probably have made a more convincing impression, if the equal conditions had been respectively: 18, 18 and 18 plus 22, 22 and 22, together with the 26, 26 and 26 signs of signgroup I; though the very irregularities may be promising for a

more complex application, than a mere ornamental play with some imprints and their quantities, on the part of the designer of the Phaistos disc.

With this I have reverted to the calendar possibility. Each of the four halves, the fourth half being the absent units in the reduced stems, are systems of 29 well-organized pairs of signs (58 components) and eight immediately unpaired characters, present in the knots (see fig. 9). There is but one condition for this complete symmetrical arrangement: that the obliterated final character in A08 unambiguously is set to be the sign "P". Thus the Gnomonic arrangement compels the identity of the missing final character in A08.

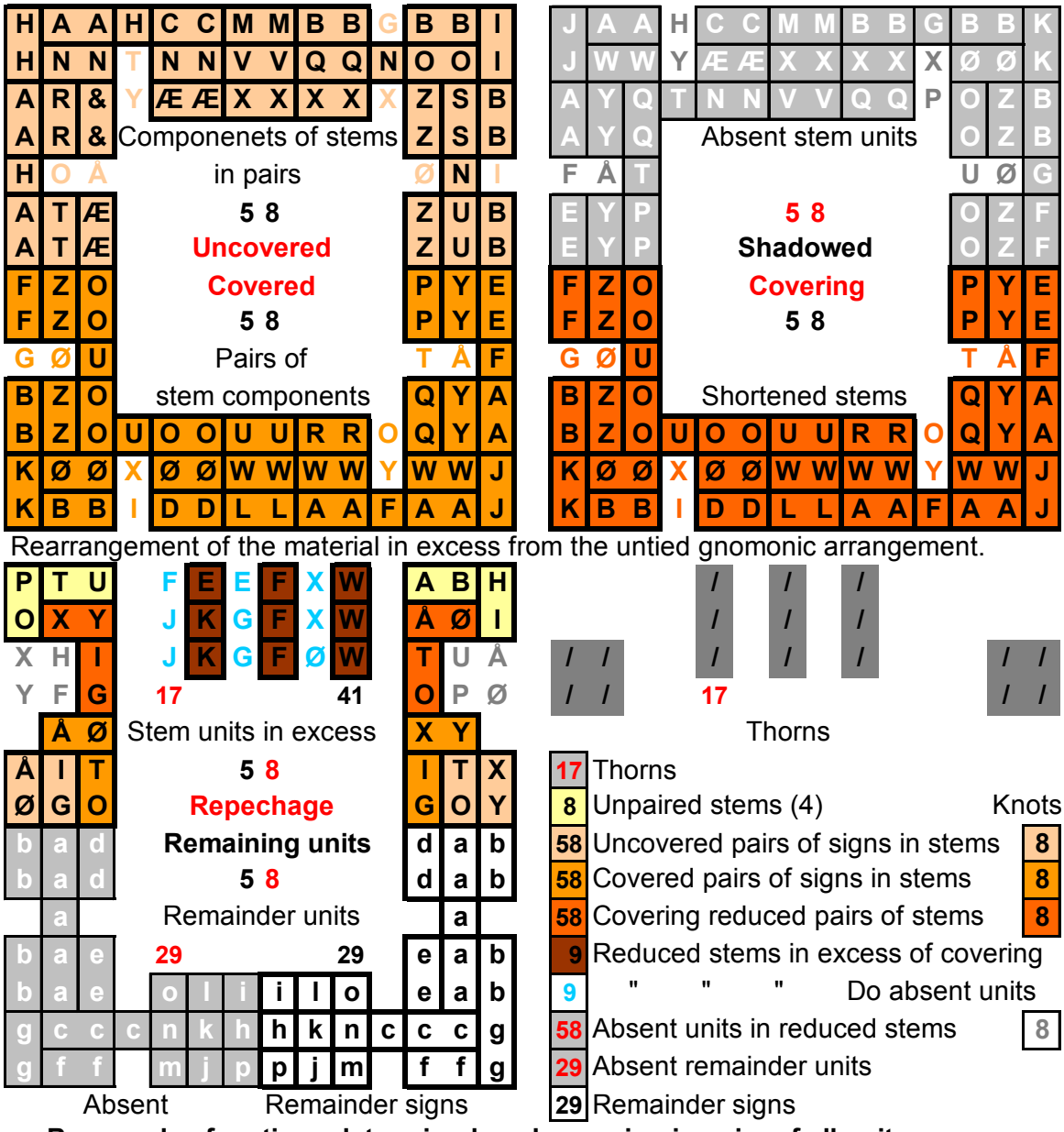
Supplementaty notes

Perhaps it is under the process of trying to reject the Minoan calendar, that one professes my deciphering instead.

1. Recieve my message well. Marathon man.

FIGURE 9. Alphabetic notation.

58 x 6 +17 units



By complex functions determined, subgrouping in pairs of all units

APPENDIX A. Hieroglyphic notation

29 x 9 visible units

APPENDIX A

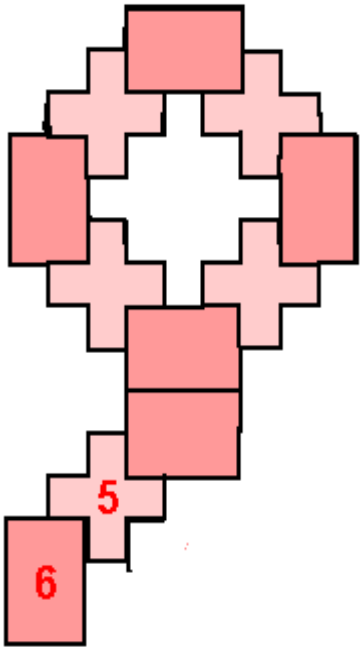


FIGURE 2c

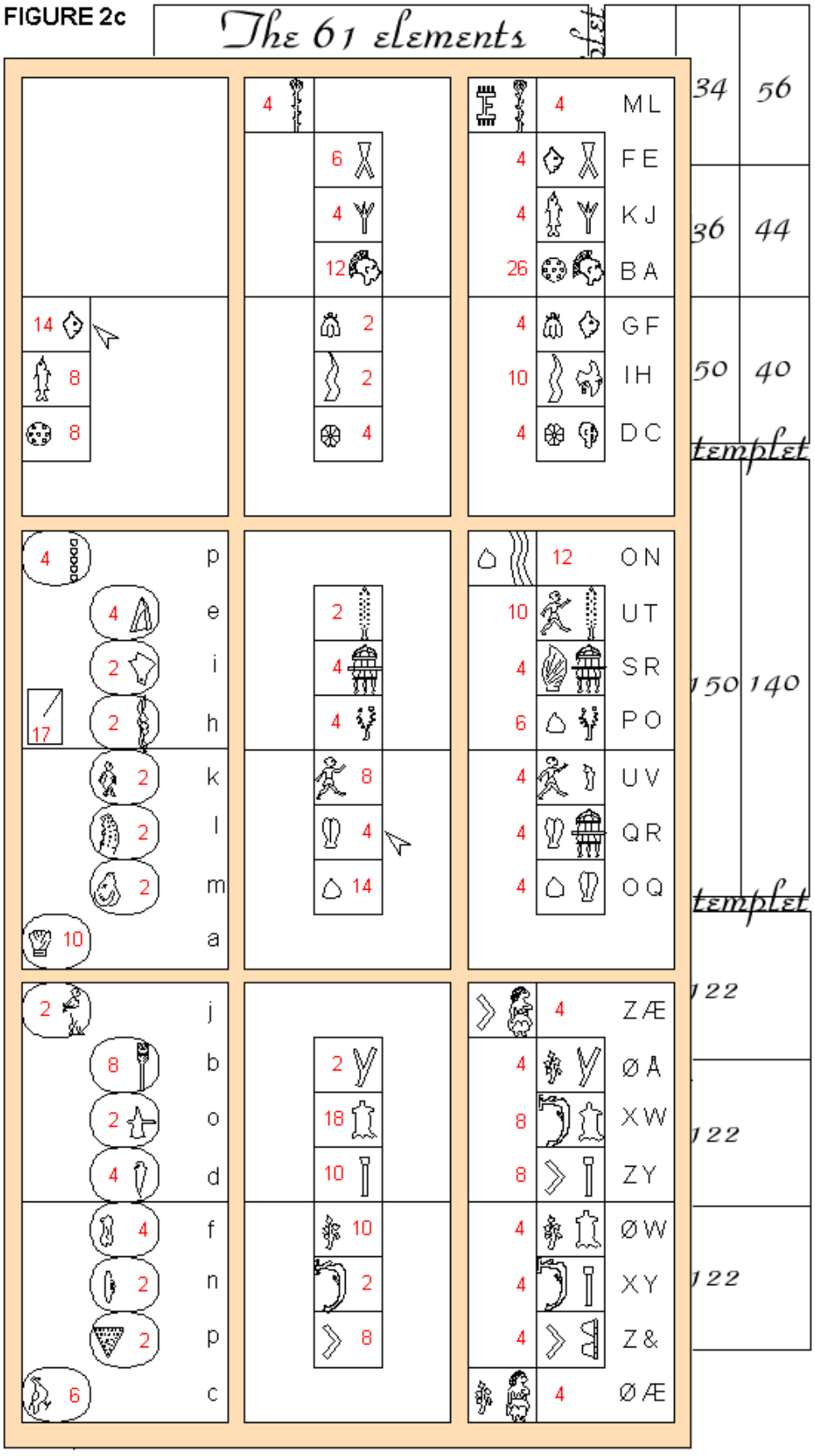

The 61 elements
34
56
36
44
50
40
templet
150
140
templet
122
122
122

FIGURE 3a

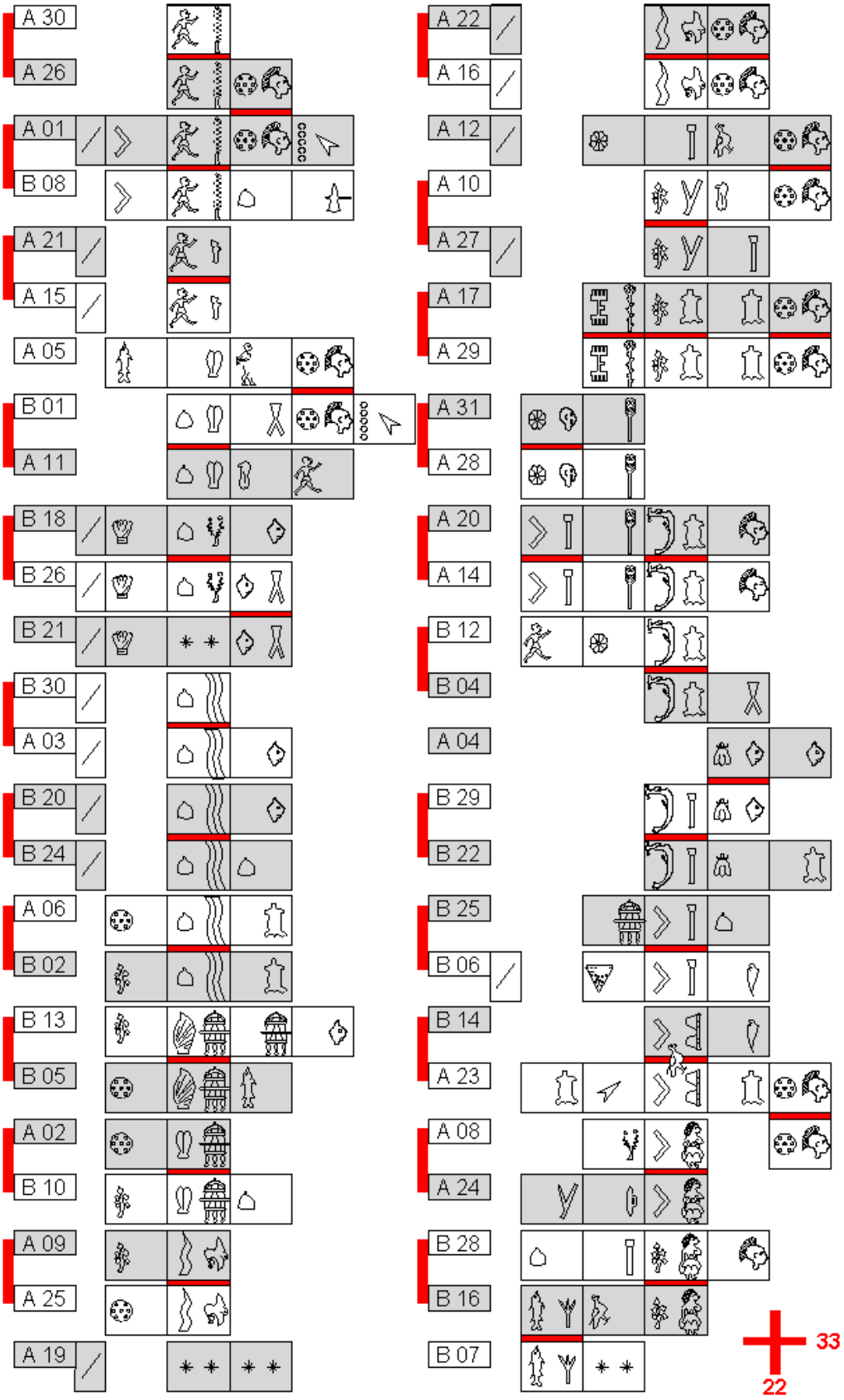

A 30
A 26
A 01
B 08
A 21
A 15
A 05
B 01
A 11
B 18
B 26
B 21
B 30
A 03
B 20
B 24
A 06
B 02
B 13
B 05
A 02
B 10
A 09
A 25
A 19
A 22
A 16
A 12
A 10
A 27
A 17
A 29
A 31
A 28
A 20
A 14
B 12
B 04
A 04
B 29
B 22
B 25
B 06
B 14
A 23
A 08
A 24
B 28
B 16
B 07
33
22

FIGURE 4b


2 elements
All the stems
All shortfoum stems
epagomenae
66
44
22
9
1
2
3
4

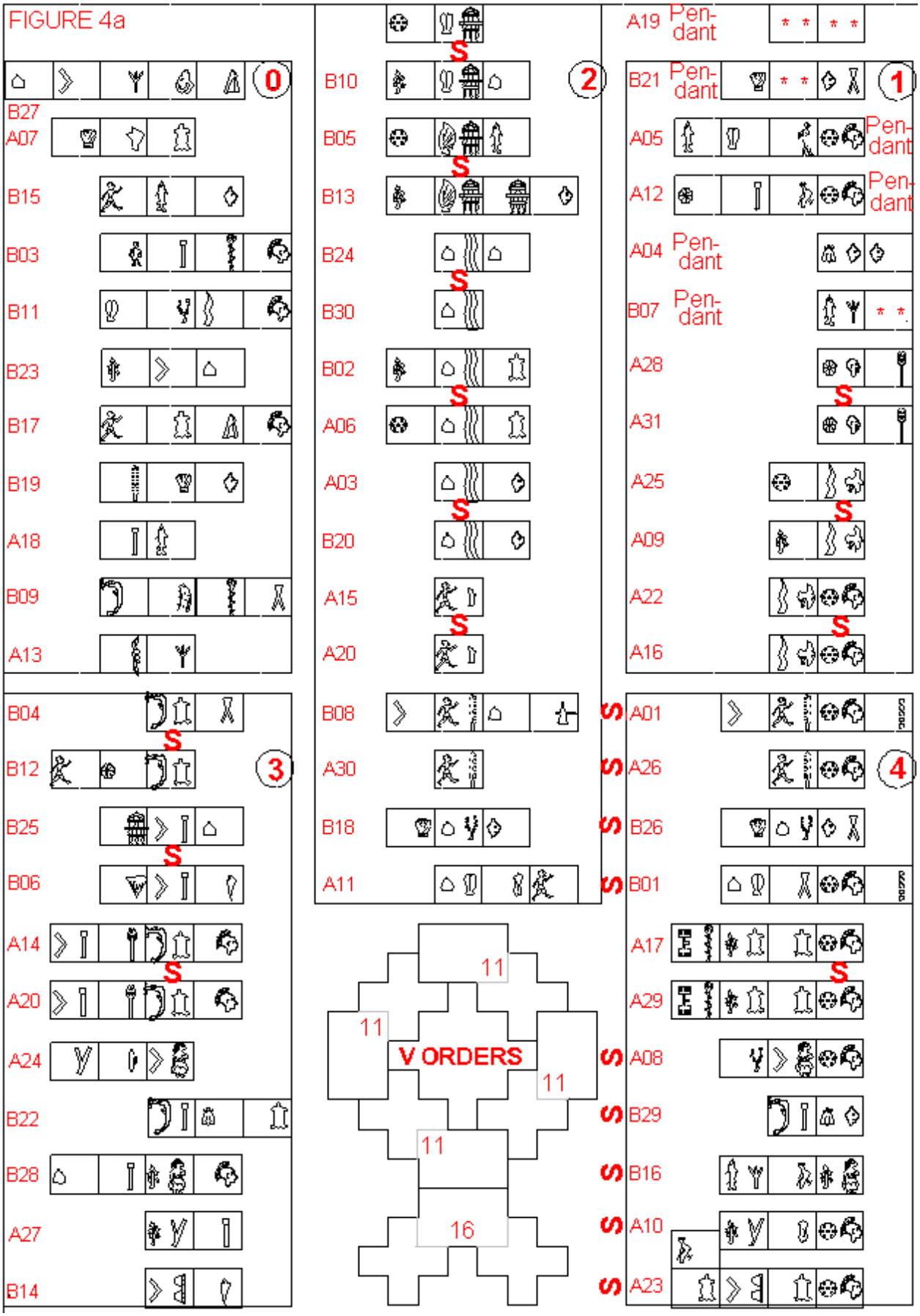
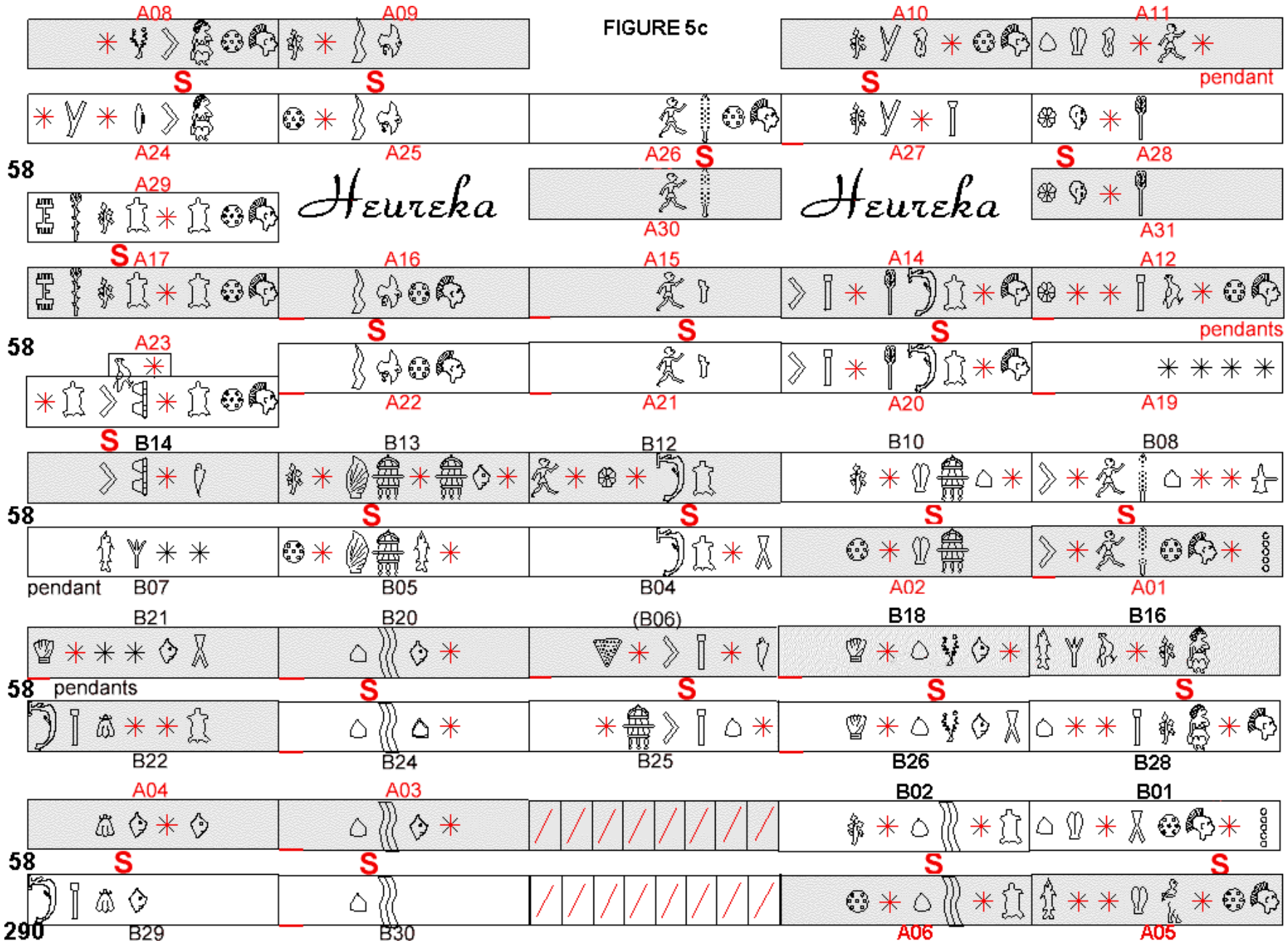


FIGURE 4a
0
B27
A07
B15
B03
B11
B23
B17
B19
A18
B09
A13
B10
2
B05
B13
B24
B30
B02
A06
A03
B20
A15
A20
B08
A30
B18
A11
A19 Pen-dant
B21 Pen-dant
1
A05 Pen-dant
A12 Pen-dant
A04 Pen-dant
B07 Pen-dant
A28
A31
A25
A09
A22
A16
B04
B12
3
B25
B06
A14
A20
A24
B22
B28
A27
B14
A01
A26
4
B26
B01
A17
A29
A08
B29
B16
A10
A23
11
11
V ORDERS
11
11
16

FIGURE 5c


A08
A09
A10
A11
pendant
A24
A25
A26
A27
A28
58
A29
Heureka
Heureka
A30
A31
A17
A16
A15
A14
A12
pendants
58
A23
A22
A21
A20
A19
B14
B13
B12
B10
B08
58
pendant
B07
B05
B04
A02
A01
B21
B20
(B06)
B18
B16
58
pendants
B22
B24
B25
B26
B28
A04
A03
B02
B01
58
290
B29
B30
A06
A05

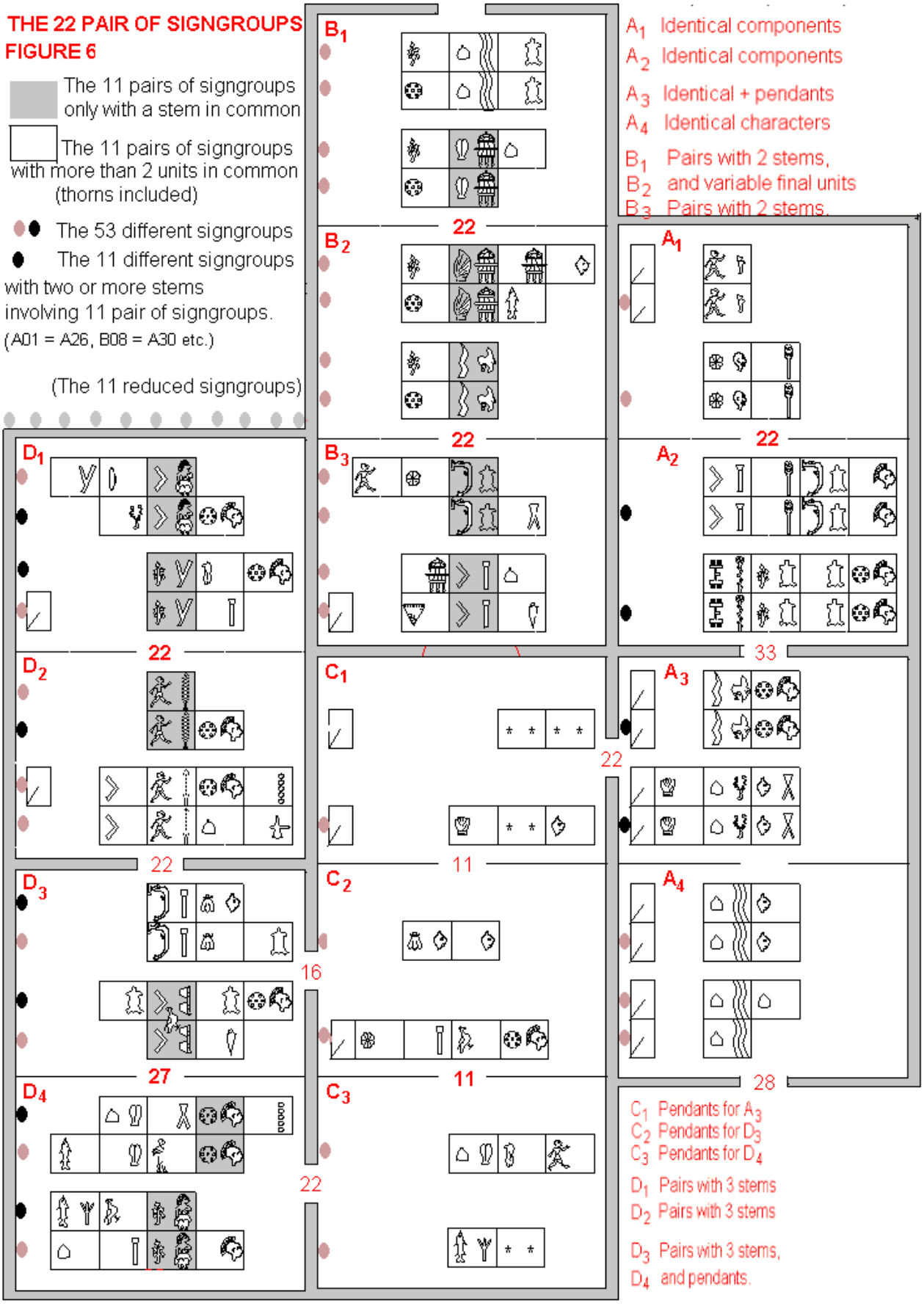
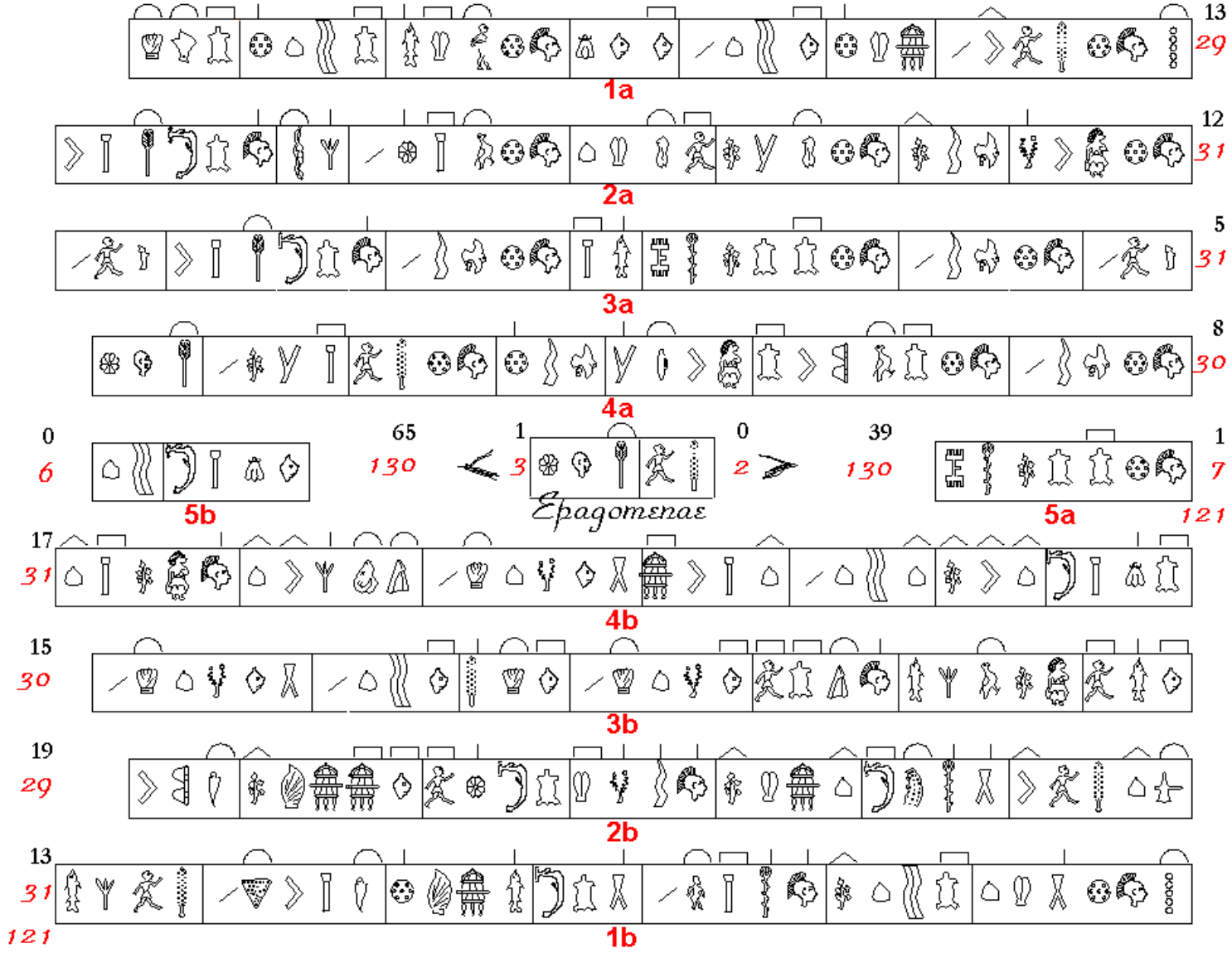
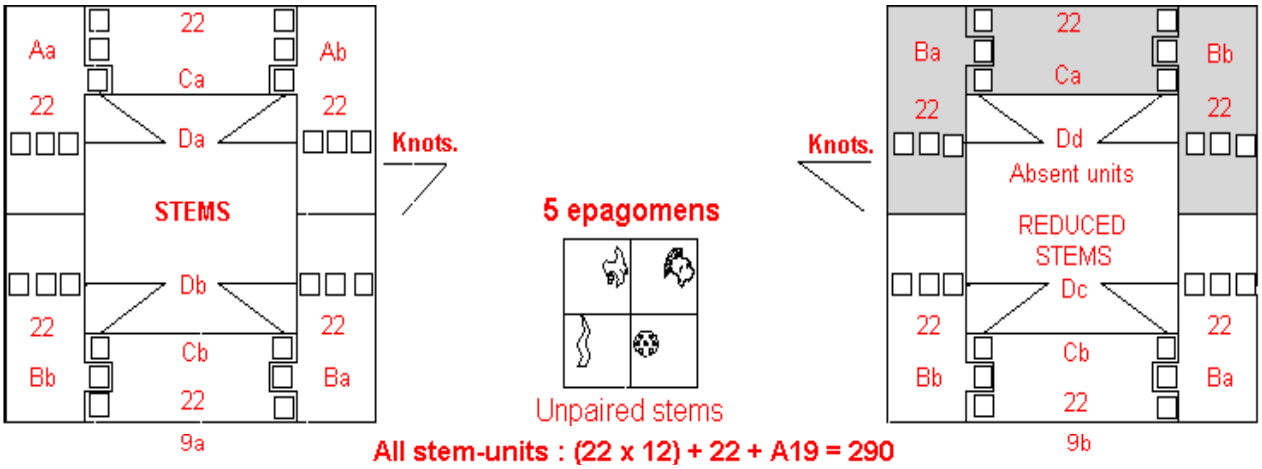

THE 22 PAIR OF SIGNGROUPS
FIGURE 6
The 11 pairs of signgroups only with a stem in common
The 11 pairs of signgroups with more than 2 units in common (thorns included)
The 53 different signgroups
The 11 different signgroups with two or more stems involving 11 pair of signgroups.
(A01 = A26, B08 = A30 etc.)
(The 11 reduced signgroups)
A1 Identical components
A2 Identical components
A3 Identical + pendants
A4 Identical characters
B1 Pairs with 2 stems,
B2 and variable final units
B3 Pairs with 2 stems.
C1 Pendants for A3
C2 Pendants for D3
C3 Pendants for D4
D1 Pairs with 3 stems
D2 Pairs with 3 stems
D3 Pairs with 3 stems,
D4 and pendants.
22
33
11
16
27
28

FIGURE 8b


13
29
1a
12
31
2a
5
31
3a
8
30
4a
0
6
65
130
1
3
0
2
39
130
1
7
5b
Epagomenae
5a
121
17
31
4b
15
30
3b
19
29
2b
13
31
121
1b


Aa
22
Ca
Ab
22
22
Da
22
STEMS
Knots.
Db
22
22
Cb
Bb
Ba
22
9a
5 epagomens
Unpaired stems
All stem-units : (22 x 12) + 22 + A19 = 290
Ba
22
Ca
Bb
22
22
Dd
22
Absent units
REDUCED
STEMS
Knots.
Dc
22
22
Cb
Bb
Ba
22
9b

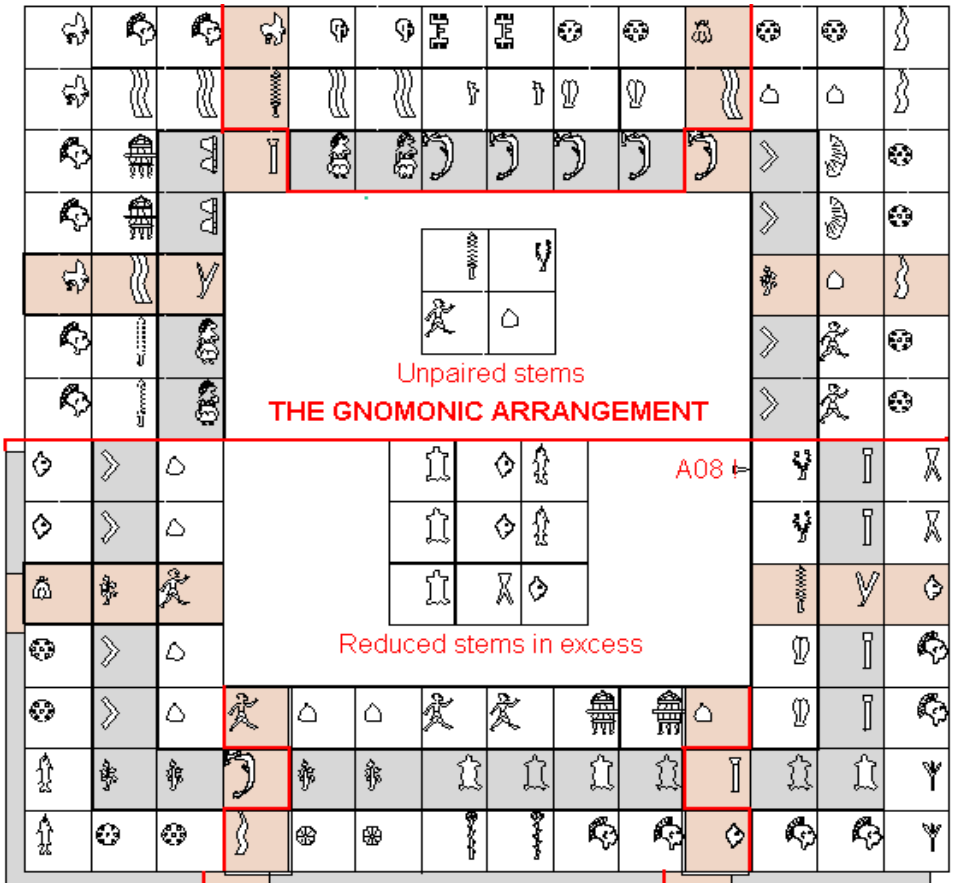
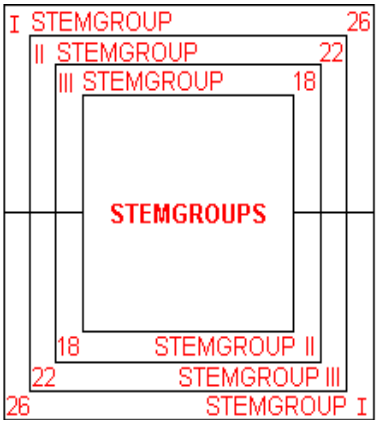
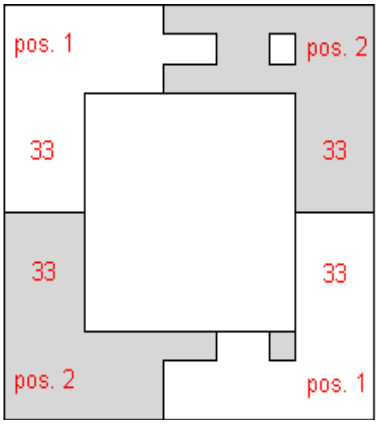
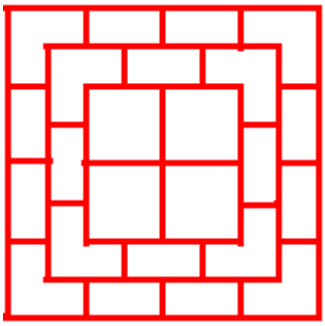

Unpaired stems
THE GNOMONIC ARRANGEMENT
A08
Reduced stems in excess

FIGURE 9


I STEMGROUP
26
II STEMGROUP
22
III STEMGROUP
18
STEMGROUPS
18
STEMGROUP II
22
STEMGROUP III
26
STEMGROUP I


pos. 1
pos. 2
33
33
33
33
pos. 2
pos. 1

APPENDIX B



FREQUENCY COUNTS — APPENDIX B

Subtle differences on 1 unit between pre-Euclidian and modern ways of doing fractions?

A	19	**N**	6	**W**	15	**a**	5
B	17	**O**	18	**X**	7	**b**	4
C	2	**P**	5	**Y**	11	**c**	3
D	4	**Q**	6	**Z**	12	**d**	2
E	5	**R**	6	**Æ**	4	**e**	2
F	11	**S**	2	**Ø**	11	**f**	2
G	3	**T**	6	**Å**	3	**g**	2
H	5	**U**	11	**&**	2	**h**	1
I	6	**V**	2	**8**	65	**i**	1
J	4	**9**	62			**j**	1
K	6					**k**	1
L	4					**l**	1
M	2	**INT(365 / 8) + 1 = 46**				**m**	1
13	88					**n**	1
		Tot.	**Dif.**			**o**	1
		215	**30**			**p**	1
		244	**46**			**16**	29

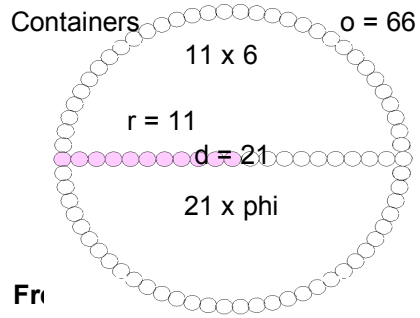
Frequency count for the 46 individual symbols.

I		**II**		**III**		**0**		
BA	13	**ON**	6	**XW**	4	**a**	5	
DC	2	**OP**	3	**XY**	2	**b**	4	
FE	2	**OQ**	2	**ZY**	4	**c**	3	
GF	2	**QR**	2	**Z&**	2	**d**	2	
IH	5	**SR**	2	**ZÆ**	2	**e**	2	
KJ	2	**UT**	5	**ØÆ**	2	**f**	2	
ML	2	**UV**	2	**ØÅ**	2	**g1**	2	
(				**ØW**	2			
7	28	**7**	22	**8**	20	**7**	20	**29**
		Stems						90

I		**II**		**III**		**0**		
A	6	**O**	7	**W**	9	**h**	1	
B	4	**P**	2	**X**	1	**i**	1	
D	2	**Q**	2	**Y**	5	**j**	1	
E	3	**R**	2	**Z**	4	**k**	1	
F	7	**T**	1	**Ø**	5	**l**	1	
G	1	**U**	4	**Å**	1	**m**	1	
I	1					**n**	1	
J	2	**INT(365 / 6) + 1 = 61**				**o**	1	
K	4					**p**	1	
L	2	**Shortened stems**				**/**	17	**1**
10	32	**6**	18	**6**	25	**9**	9	**31** 84
	60		40		45		46	**61** 174

A01			1	**B01**		1
A02			1	**B02**		1
A04			1	**B03**		1
A05			1	**B04**		1
A06			1	**B05**		1
A07			1	**B06**		1
A08			1	**B07**		1
A09			1	**B08**		1
A10			1	**B09**		1
A11			1	**B10**		1
A12			1	**B11**		1
A13			1	**B12**		1
A14	**A20**		**2**	**B13**		1
A15	**A21**		**2**	**B14**		1
A16	**A19**	**A22**	**3**	**B15**		1
A17	**A29**		**2**	**B16**		1
A18			1	**B17**		1
A23			1	**B18**		1
A24			1	**B19**		1
A25			1	**B20**	**A03**	2
A26			1	**B21**	**B26**	**2**
A27			1	**B22**		1
A28	**A31**		**2**	**B23**		1
A30			1	**B24**		1
24				**B25**		1
⇩				**B27**		1
INT(365 / 7) + 1 = 53				**B28**		1
	Repechage			**B29**		1
	container			**B30**		1
53	⇦			**29**		
61	⇦	30		⇦		31

Frequency count for the 53 individual signgroups.



Fr
individual elements (contain

MULTIPLICATION TABLES WITH SHIFTS **APPENDIX B**

Shift over 5+6 In use, when A19 is withdrawn (when 60 signgroups).

No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab
1	**5**	9	**49**	17	93	25	137	33	181	41	225	49	269	57	313	65	358
2	**11**	10	**55**	18	99	26	143	34	187	42	231	50	275	58	319	66	363
3	**16**	11	**60**	19	**104**	27	148	35	**192**	43	236	51	280	59	324	67	365
4	**22**	12	66	20	110	28	154	36	198	44	**242**	52	286	60	330		
5	**27**	13	71	21	115	29	159	37	203	45	247	53	291	61	335		
6	**33**	14	77	22	121	30	165	38	209	46	253	54	297	62	341		
7	**38**	15	82	23	126	31	170	39	214	47	258	55	302	63	346		
8	**44**	16	88	24	132	32	176	40	220	48	264	56	308	64	352		

Shift over 6+5

No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab
1	**6**	9	**50**	17	94	25	138	33	182	41	226	49	270	57	314	65	359
2	**11**	10	**55**	18	99	26	143	34	187	42	231	50	275	58	319	66	363
3	**17**	11	**61**	19	105	27	149	35	193	43	237	51	281	59	325	67	365
4	**22**	12	66	20	110	28	154	36	198	44	242	52	286	60	330		
5	**28**	13	72	21	116	29	160	37	204	45	248	53	292	61	336		
6	**33**	14	77	22	121	30	165	38	209	46	253	54	297	62	341		
7	**39**	15	83	23	127	31	171	39	**215**	47	259	55	303	63	347		
8	**44**	16	88	24	132	32	176	40	220	48	264	56	308	64	352		

Shift 5+7

No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab	No.	Tab
1	5	8	48	15	89	22	**132**	29	**173**	36	**216**	43	257	50	300	57	341
2	12	9	53	16	96	23	**137**	30	180	37	221	44	264	51	305	**58**	**348**
3	**17**	10	**60**	17	101	24	144	31	185	38	228	45	269	52	312	59	353
4	24	11	65	18	108	25	**149**	32	**192**	39	233	46	276	53	317	**60**	**360**
5	**29**	12	72	19	113	26	156	33	197	40	240	47	281	54	324	**61**	**365**
6	36	13	77	20	120	27	161	34	204	41	245	48	288	55	329		
7	41	14	84	21	125	28	**168**	35	209	42	252	49	293	56	336		

Shift (5)+7+8

No.	Tab	No.	Tab	No.	Tab	No.	Tab
1	**5**	9	65	17	125	25	185
2	12	10	72	18	132	26	**192**
3	20	11	80	19	140	⇩	⇩
4	27	12	87	20	147	35	260
5	35	13	95	21	155	⇩	⇩
6	42	14	102	22	162	39	290
7	50	15	110	23	170		
8	57	16	117	24	177	⇩	⇩
						49	365

Shift 8+7+(5)

7+8	No.	Tab	No.	Tab	No.	Tab
⇩	1	8	9	68	17	128
	2	15	10	75	18	135
	3	23	11	83	19	143
	4	30	12	90	20	150
	5	38	13	98	21	158
45+1	6	**45**	14	105	22	165
52+1	7	**53**	15	113	23	**173**
60+1	8	**60**	16	120	⇩	⇩
					48	360
					49	365

To be continued . . . ⇩

Addition tabel over alfa- **APPENDIX B**

Side No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab
01+	6	6	08+	32	34	15+	59	61	22+	88	89	29+	119	118
02+	9	10	09+	35	38	16+	63	66	23+	95	92	30+	121	120
03+	12	14	10+	40	42	17+	70	70	24+	99	95	31+	124	
04+	15	17	11+	44	46	18+	72	74	25+	102	99			
05+	20	21	12+	49	50	19+	76	77	26+	106	104			
06+	24	25	13+	51	55	20+	82	80	27+	109	109			
07+	27	29	14+	57	58	21+	84	85	28+	112	114			

Addition tabel over alfa+ (Figure 8.)

Side No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab
01+	7	6	08+	34	36	15+	63	63	22+	96	94	29+	**128**	125
02+	10	10	09+	37	40	16+	68	68	23+	103	97	30+	130	**128**
03+	14	15	10+	42	44	17+	75	72	24+	107	101	31+	133	
04+	17	18	11+	46	48	18+	77	77	25+	110	105			
05+	22	22	12+	52	52	19+	82	80	26+	114	111			
06+	26	27	13+	54	57	20+	88	84	27+	118	116			
07+	**29**	**31**	**14+**	**60**	**60**	**21+**	**91**	**90**	**28+**	**121**	**121**			

Addition tabel over beta-

Side No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab
01+	8	8	06+	34	38	11+	62	72	16+	88	102	21+	114	132	26+	142	160
02+	12	14	07+	40	42	12+	70	78	17+	96	110	22+	118	138	27+	146	170
03+	16	22	08+	46	50	13+	74	86	18+	100	116	23+	128	144	28+	150	178
04+	20	26	09+	50	58	14+	82	90	19+	104	122	24+	134	148	29+	158	182
05+	**28**	**32**	10+	**56**	**64**	15+	**84**	**96**	20+	**112**	126	25+	138	154	30+	160	184
															31+	164	

Addition tabel over beta+.

Side No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab	No.	A Tab	B Tab
01+	9	8	06+	36	40	11+	64	74	16+	93	104	21+	121	137	26+	150	167
02+	13	14	07+	42	44	12+	73	80	17+	101	112	22+	126	143	27+	155	177
03+	18	23	08+	48	52	13+	77	88	18+	105	119	23+	136	149	28+	159	185
04+	22	27	09+	52	60	14+	85	92	19+	110	125	24+	142	154	29+	167	189
05+	30	33	10+	58	66	15+	88	98	20+	118	130	25+	146	160	30+	169	192
															31+	173	

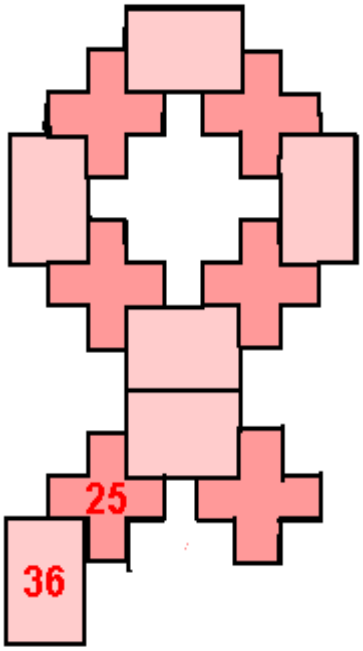
To be continued . . . ⇩

	4 single months				1a,3a		Appendix B				**Statistics for figure 8.**
Side A	1a	2a	3a	4a	2a,4a	5a		5epa			
Cat. I	3	4	2	2	11	0	11	0		11	
Cat. II	5	2	2	3	12	1	13	0		13	
Cat. III	1	1	0	0	2	0	2	0		2	
I+II+III	9	7	4	5	**25**	1	**26**	0		**26**	Absent units
Cat 0	4	5	1	3	13	0	13	1		14	
0+I+II+III	13	12	5	8	**38**	1	**39**	1		**40**	
Thorns	2	1	4	2	9	0	9	0		9	
Cat.+	15	13	9	10	**47**	1	**48**	1	*	**49**	
Group I	6	8	12	12	38	4	42	2		44	
Group II	8	2	4	2	16	0	16	2		18	
Group III	0	8	6	6	20	2	22	0		22	
Stems	14	18	22	20	**74**	6	**80**	4	*	**84**	Signgroups
SubTotal	**29**	**31**	**31**	**30**	**121**	**7**	**128**	**5**	*	133	7 7 7 7

	4 single months				1b,3b						
Side B	1b	2b	3b	4b	2b,4b	5b		0epa			
Cat. I	6	6	3	3	18	0	18	0		18	
Cat. II	2	5	7	3	17	0	17	0		17	
Cat. III	1	5	0	8	14	0	14	0		14	
I+II+III	9	16	10	14	**49**	0	**49**	0		**49**	Absent units
Cat 0	4	3	5	3	15	0	15	0		15	
0+I+II+III	13	19	15	17	**64**	0	**64**	0		**64**	
Thorns	2	0	3	2	7	1	8	0		8	
Cat.+	15	19	18	19	**71**	1	**72**	0	*	**72**	
Group I	4	0	4	2	10	2	12	0		12	
Group II	8	6	6	4	24	2	26	0		26	
Group III	4	4	2	6	16	2	18	0		18	
Stems	16	10	12	12	**50**	6	**56**	0	*	**56**	Signgroups
SubTotal	**31**	**29**	**30**	**31**	**121**	**7**	**128**	**0**	*	**128**	7 7 7 7

Side A	1a,4a	2a	1a	4a	3a	2a3a	5a			**Bipartitions & quatropartitions**				
Side B	1b,4b	3b	1b	4b	2b	2b3b	5b	5epa		Four shadowed months				
Cat. I	14	7	9	5	8	15	0	29	0	29	<			
Cat. II	13	9	7	6	7	16	1	30	0	30	<	1b	2a	3a	4b
Cat. III	10	1	2	8	5	6	0	16	0	16	<	**31**	**31**	**31**	**31**
I+II+III	**37**	17	>18	>19	>20	**37**	1	**75**	0	**75**		5a,5b			
Cat 0	14	10	8	6	4	14	0	28	1	29	<	C II	CIII	3b	4a
0+I+II+III	**51**	27	<26	<25	<24	**51**	1	**103**	1	**104**		30	30	**30**	**30**
Thorns	8	4	4	4	4	8	1	17	0	17					
Cat.+	**59**	31	<30	<29	<28	**59**	2	**120**	1	**121**		1a	2b	C 0	C I
Group I	24	12	10	14	12	24	6	54	2	56		**29**	**29**	29	29
Group II	22	8	16	6	10	18	2	42	2	44					
Group III	16	10	4	12	10	20	4	40	0	40			Signgroups		
Stems	**62**	30	30	32	32	**62**	12	**136**	4	**140**		14	14	14	14
SubTotal	**121**	**61**	**60**	**61**	**60**	**121**	14	**256**	**5**	**261**	Total		28		28

APPENDIX C



365 units **Plate I, a** (Appendix c) **Total**

Part	A1	Part	B1	B1	
Alfa -	100	24	120	144	$10^2 12^2$
Alfa +	107	26	128	154	
Beta -	130	34	184	218	
Beta +	137	36	192	228	12x19

Part	A4	Part	B4	B4	
Alfa -	121	3	120	123	
Alfa +	130	3	128	131	
Beta -	160	4	184	188	
Beta +	**169**	4	192	**196**	$13^2 14^2$

Side	A	AB	B
Alfa minus	124	244	120
Alfa plus	133	261	128
Beta minus	164	348	184
Beta plus	173	365	192

a) A1- A1-6 +B 12x11+5 b) A - A31 + B =

Stems	35	7	28	35	70
pos.2	35	7	28	35	70
Re.Ste	18	8	49	57	75
Absent	18	8	49	57	75
Rem.	12	2	15	17	
Absent	12	2	15	17	75
Thorns	7	2	8	10	

Stems	41	1	28	29	70
pos.2	41	1	28	29	70
Re.Ste	26		49	49	75
Absent	26		49	49	75
Rem.	13	1	15	16	
Absent	13	1	15	16	75
Thorns	9		8	8	

Stems	42	70	28
pos. 2	42	70	28
Reduced St.	26	75	49
Absent	26	75	49
Remainders	14	29	15
Absent	14	29	15
Thorns	9	17	8

365 quinquepartition (: Venus) 365

Alternatives

	A		B	AB	
Alfa -	120	4	120	240	122
Alfa +	128	5	128	256	128
Beta -	160	4	184	344	174
Beta +	**168**	5	**192**	360	180

fig.3	Division I		Division II		
Alfa -	60	62	64	58	122
Alfa +	63	65	70	63	133
Beta -	80	94	84	90	174
Beta +	83	97	90	95	185

fig.5	Partition I		Partition II	
Alfa -	49	73	75	47
Alfa +	53	77	80	51
Beta -	62	112	102	72
Beta +	66	116	107	76

d) A - A19 - B =

Stems	40	2	28	68	35
pos.2	40	2	28	68	
Re.Ste	26		49	75	38
Absent	26		49	75	
Rem.	14		15	29	14
Absent	14		15	29	
Thorns	8	1	8	16	6

e) A B A B

Stems	20	15	22	13	
pos.2	20	15	22	13	35
Re.Ste	14	24	12	25	
Absent	14	24	12	25	37
Rem.	6	8	8	7	
Absent	6	8	8	7	15
Thorns	3	3	6	5	11

f) A B A B

Stems	18	17	24	11
pos.2	18	17	24	11
Re.Ste	8	32	18	17
Absent	8	32	18	17
Rem.	5	7	9	8
Absent	5	7	9	8
Thorns	4	4	5	4

bipartition (: solstices,eclipses)

	Reduced signgroups			
Alfa -	117	37	90	207
Alfa +	126	38	97	223
Beta -	150	74	124	274
Beta +	159	75	131	**290**

fig.4a		Pendants		
Alfa -	107	17	9	111
Alfa +	114	19	10	118
Beta -	140	24	10	174
Beta +	147	26	11	181

fig.6		Pendants	
Alfa -	108	16	8	112
Alfa +	115	18	9	119
Beta -	142	22	10	174
Beta +	149	24	11	181

g) A AB B AB

Stems	42		28	70
pos.2	42		28	70
Re.Ste	22	28	25	47
Absent	22	28	25	47
Rem.	11	9	9	20
Absent	11	9	9	20
Thorns	9	1	7	16

h) A A B B

Stems	37	5	4	24
pos.2	37	5	4	24
Re.Ste	21	5		49
Absent	21	5		49
Rem.	12	2	1	14
Absent	12	2	1	14
Thorns	7	2	1	7

i) A A B B

Stems	37	5	3	25
pos.2	37	5	3	25
Re.Ste	22	4	1	48
Absent	22	4	1	48
Rem.	12	2	1	14
Absent	12	2	1	14
Thorns	7	2	1	7

366 units, A07+ **Plate I, b** (Appendix C) **Total**

Part	A1	Part	B1	B1
Alfa -	100	24	120	144
Alfa +	108	26	128	154
Beta -	130	34	184	218
Beta +	**138**	**36**	**192**	**228**

Part	A4	Part	B4	B4
Alfa -	121	3	120	123
Alfa +	131	3	128	131
Beta -	160	4	184	188
Beta +	170	4	192	196

Side	A	AB	B
Alfa minus	124	244	120
Alfa plus	134	262	128
Beta minus	164	348	184
Beta plus	**174**	**366**	192

a) A1- A1-6 +B =

Stems	35	7	28	35
pos.2	35	7	28	35
Re.Ste	18	8	49	57
Absent	18	8	49	57
Rem.	12	2	15	17
Absent	12	2	15	17
Thorns	8	2	8	10

b) A - A31 + B =

Stems	41	1	28	29
pos.2	41	1	28	29
Re.Ste	26		49	49
Absent	26		49	49
Rem.	13	1	15	16
Absent	13	1	15	16
Thorns	10		8	8

Stems	42	70	28	
pos. 2	42	70	28	
Reduced St.	26	75	49	
Absent	26	75	49	
Remainders	14	29	15	
Absent	14	29	15	
Thorns	10	18	8	

ALTERNATIVES

Side	A		B	AB
Alfa -	120	4	120	240
Alfa +	129	5	128	257
Beta -	160	4	184	344
Beta +	169	5	192	361

fig.3	Division I		Division II	
Alfa -	60	62	64	58
Alfa +	63	65	71	63
Beta -	80	94	84	90
Beta +	83	97	91	95

fig.5	Partition I		Partition II	
Alfa -	49	73	75	47
Alfa +	53	77	81	51
Beta -	62	112	102	72
Beta +	66	116	108	76

d) A - A19 - B =

Stems	40	2	28	68	35
pos.2	40	2	28	68	
Re.Ste	26		49	75	38
Absent	26		49	75	
Rem.	14		15	29	14
Absent	14		15	29	
Thorns	9	1	8	16	6

e)

	A	B	A	B	
Stems	20	15	22	13	
pos.2	20	15	22	13	35
Re.Ste	14	24	12	25	
Absent	14	24	12	25	37
Rem.	6	8	8	7	
Absent	6	8	8	7	15
Thorns	3	3	7	5	12

f)

	A	B	A	B
Stems	18	17	24	11
pos.2	18	17	24	11
Re.Ste	8	32	18	17
Absent	8	32	18	17
Rem.	5	7	9	8
Absent	5	7	9	8
Thorns	4	4	6	4

fig.5	Reduced signgroups			
Alfa -	117	37	90	207
Alfa +	126	39	97	223
Beta -	150	74	124	274
Beta +	159	76	131	290

fig.4a		Pendants		
Alfa -	107	17	9	111
Alfa +	115	19	10	118
Beta -	140	24	10	174
Beta +	148	26	11	181

fig.6		Pendants		
Alfa -	108	16	8	112
Alfa +	116	18	9	119
Beta -	142	22	10	174
Beta +	150	24	11	181

g)

	A	AB	B	AB
Stems	42		28	70
pos.2	42		28	70
Re.Ste	22	28	25	47
Absent	22	28	25	47
Rem.	11	9	9	20
Absent	11	9	9	20
Thorns	9	2	7	16

h)

	A	A	B	B
Stems	37	5	4	24
pos.2	37	5	4	24
Re.Ste	21	5		49
Absent	21	5		49
Rem.	12	2	1	14
Absent	12	2	1	14
Thorns	8	2	1	7

i)

	A	A	B	B
Stems	37	5	3	25
pos.2	37	5	3	25
Re.Ste	22	4	1	48
Absent	22	4	1	48
Rem.	12	2	1	14
Absent	12	2	1	14
Thorns	8	2	1	7

361 units
Initial pearl-dividers omitted

Plate II, a
(Appendix C)

-361 -240 **-119** 2 **123** **244** **365**
-363 -242 -121 0 121 **242** 363
Multipla (X * 121) +2 **Total**

Part	A1	Part	B1	B1
Alfa -	100	23	119	142
Alfa +	107	25	127	152
Beta -	130	32	182	214
Beta +	137	34	190	224

a)	A1-	A1-6	+B	=
Stems	35	7	28	35
pos.2	35	7	28	35
Re.Ste	18	8	49	57
Absent	18	8	49	57
Rem.	12	1	14	15
Absent	12	1	14	15
Thorns	7	2	8	10

Part	A4	Part	B4	B4
Alfa -	120	3	119	122
Alfa +	129	3	127	130
Beta -	158	4	182	186
Beta +	167	4	190	194

19x 9

b)	A -	A31	+ B	=
Stems	41	1	28	29
pos.2	41	1	28	29
Re.Ste	26		49	49
Absent	26		49	49
Rem.	12	1	14	15
Absent	12	1	14	15
Thorns	9		8	8

Side	A	AB	B
Alfa minus	123	242	119
Alfa plus	132	259	127
Beta minus	162	344	182
Beta plus	171	361	190

19x10

	Stems	pos. 2	Reduced St.	Absent	Remainders	Absent	Thorns
A	42	42	26	26	13	13	9
AB	70	70	75	75	27	27	17
B	28	28	49	49	14	14	8

Alternatives

	A		B	AB
Alfa -	119	4	119	238
Alfa +	127	5	127	254
Beta -	158	4	182	340
Beta +	166	5	190	356

d)	A -	A19	- B	=
Stems	40	2	28	68
pos.2	40	2	28	68
Re.Ste	26		49	75
Absent	26		49	75
Rem.	13		14	27
Absent	13		14	27
Thorns	8	1	8	16

fig.3	Division I		Division II	
Alfa -	60	61	63	58
Alfa +	63	64	69	63
Beta -	80	92	82	90
Beta +	83	95	98	95

e)	A	B	A	B
Stems	20	15	22	13
pos.2	20	15	22	13
Re.Ste	14	24	12	25
Absent	14	24	12	25
Rem.	6	7	7	7
Absent	6	7	7	7
Thorns	3	3	6	5

fig.5	Partition I		Partition II	
Alfa -	49	72	74	47
Alfa +	53	76	79	51
Beta -	62	110	100	72
Beta +	66	114	105	76

f)	A	B	A	B
Stems	18	17	24	11
pos.2	18	17	24	11
Re.Ste	8	32	18	17
Absent	8	32	18	17
Rem.	5	6	8	8
Absent	5	6	8	8
Thorns	4	4	5	4

	Reduced signgroups			
Alfa -	116	37	89	205
Alfa +	125	38	96	221
Beta -	148	74	122	270
Beta +	157	75	129	286

g)	A	AB	B	AB
Stems	42		28	70
pos.2	42		28	70
Re.Ste	22	28	25	47
Absent	22	28	25	47
Rem.	10	9	8	18
Absent	10	9	8	18
Thorns	9	1	7	16

fig.4a		Pendants		
Alfa -	106	17	9	110
Alfa +	113	19	10	117
Beta -	138	24	10	172
Beta +	145	26	11	179

h)	A	A	B	B
Stems	37	5	4	24
pos.2	37	5	4	24
Re.Ste	21	5		49
Absent	21	5		49
Rem.	11	2	1	13
Absent	11	2	1	13
Thorns	7	2	1	7

fig.6		Pendants		
Alfa -	107	16	8	111
Alfa +	114	18	9	118
Beta -	140	22	10	172
Beta +	147	24	11	179

i)	A	A	B	B
Stems	37	5	3	25
pos.2	37	5	3	25
Re.Ste	22	4	1	48
Absent	22	4	1	48
Rem.	11	2	1	13
Absent	11	2	1	13
Thorns	7	2	1	7

To be compared with plate I,a

Plate II, b (Appendix C)

364 units, B30 -

A	AB	B
124	244	120
133	**260**	127
164	348	184
173	**364**	191

Part	A1	Part	B1	B1
Alfa -	100	24	120	144
Alfa +	107	26	127	153
Beta -	130	34	184	218
Beta +	137	36	191	227

a)	A1-	A1-6	+B	=
Stems	35	7	28	35
pos.2	35	7	28	35
Re.Ste	18	8	49	57
Absent	18	8	49	57
Rem.	12	2	15	17
Absent	12	2	15	17
Thorns	7	2	7	9

Part	A4	Part	B4	B4
Alfa -	121	3	120	123
Alfa +	**130**	3	127	**130**
Beta -	160	4	184	188
Beta +	**169**	4	191	**195**

b)	A -	A31	+ B	=
Stems	41	1	28	29
pos.2	41	1	28	29
Re.Ste	26		49	49
Absent	26		49	49
Rem.	13	1	15	16
Absent	13	1	15	16
Thorns	9		7	7

ALTERNATIVES

	Alfa +	A4	B4	Beta +	
12	Coil 4	52	_ 52	73	80
9	Coil 3	39	38	48	57
6	Coil 2	27	X 26	33	40
3	Coil 1	12	11	15	14
1	A31		< 3		4
	c)	**130**	**130**	**169**	**195**

		Stem	Red.	Rem.	Tho.
	Coil 4	28	14	7	3
	Coil 3	26	6	3	4
A	Coil 2	18	5	2	1
	Coil 1	10	2	1	
	Coil 4	22	22	6	2
	Coil 3	16	13	6	3
B	Coil 2	10	11	3	2
	Coil 1	8	3	0	
	A31	2		1	

	A		B	AB
Alfa -	120	4	120	240
Alfa +	128	5	127	255
Beta -	160	4	184	344
Beta +	168	5	191	359

d)	A -	A19	- B	=
Stems	40	2	28	68
pos.2	40	2	28	68
Re.Ste	26		49	75
Absent	26		49	75
Rem.	14		15	29
Absent	14		15	29
Thorns	8	1	7	15

fig.3	Division I		Division II	
Alfa -	60	62	64	58
Alfa +	63	64	70	63
Beta -	80	94	84	90
Beta +	83	96	90	95

	f)	A	B	A	B	
35	Stems	20	15	22	13	
	pos.2	20	15	22	13	35
38	Re.Ste	14	24	12	25	
	Absent	14	24	12	25	37
14	Rem.	6	8	8	7	
	Absent	6	8	8	7	15
5	Thorns	3	2	6	5	11

fig.5	Partition I		Partition II	
Alfa -	49	73	75	47
Alfa +	53	76	80	51
Beta -	62	112	102	72
Beta +	66	115	107	76

e)	A	B	A	B
Stems	18	17	24	11
pos.2	18	17	24	11
Re.Ste	8	32	18	17
Absent	8	32	18	17
Rem.	5	7	9	8
Absent	5	7	9	8
Thorns	4	3	5	4

	Reduced signgroups			
Alfa -	117	37	90	207
Alfa +	126	38	96	222
Beta -	150	74	124	274
Beta +	159	75	130	289

g)	A	AB	B	AB
Stems	42		28	70
pos.2	42		28	70
Re.Ste	22	28	25	47
Absent	22	28	25	47
Rem.	11	9	9	20
Absent	11	9	9	20
Thorns	9	1	6	15

fig.4a		Pendants		
Alfa -	107	17	9	111
Alfa +	114	19	10	117
Beta -	140	24	10	174
Beta +	147	26	11	180

h)	A	A	B	B
Stems	37	5	4	24
pos.2	37	5	4	24
Re.Ste	21	5		49
Absent	21	5		49
Rem.	12	2	1	14
Absent	12	2	1	14
Thorns	7	2	1	8

fig.6		Pendants	
Alfa -	108	16	8	112
Alfa +	115	18	9	118
Beta -	142	22	10	174
Beta +	149	24	11	180

i)	A	A	B	B
Stems	37	5	3	25
pos.2	37	5	3	25
Re.Ste	22	4	1	48
Absent	22	4	1	48
Rem.	12	2	1	14
Absent	12	2	1	14
Thorns	7	2	1	6