

HieroTeX, A L^AT_EXperiment of hieroglyphic typesetting

Serge Rosmorduc
rosmord@iut.univ-paris8.fr

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1 License

Sesh Nesout, a TeX package for hieroglyphic typesetting
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2 Introduction

If you use L^AT_EX, and want to typeset hieroglyphic texts, this package is for you. If you want to typeset hieroglyphs, and don't know L^AT_EX, then have a look at the file `EGypt0.tex`, to get an idea of what L^AT_EX looks like.

You can also use the (ugly, but getting better) fonts for your own programs. There are both a metafont and gsf (postscript type I) fonts. The fonts were made with the GNU fontutils.

3 Installation

As L^AT_EX works on so many machines, I can't really give you detailed informations. So I assume you know a little about it.

3.1 Windows (MiKTeX)

There are a number of L^AT_EX versions available for windows. Most of them are free. The installation procedure described here is for MiKTeX, which you can fetch at:

`http://www.miktex.org/2.1/index.html`

After installing MiKTeX, you need to install the fonts and sty for Hieroglyphs that you got from unpacking the tgz file. Note that Winzip unpacks tgz files.

Put the MF and AUXMF folders in the following directories:

```
MiKTeX\fonts\source\Hierotex\MF
MiKTeX\fonts\source\Hierotex\AUXMF
```

Put the sty files at the following directories:

```
MiKTeX\latex\hierotex\Hierltx.sty
MiKTeX\latex\hierotex\hierosty.sty
```

The next step is to run:

```
MiKTeX\miktex\config\config.bat
```

Then make sure the sesh.exe file is in your path.

3.2 Unix installation with tetex

If you are using Unix and the tetex distribution, the simpler thing to do is:

1. edit variable.mk in the HieroTeX directory. You need to check the variables DESTDIR, BINDIR, TEXROOT are correct for you.
2. type “make tetex-install”. You might need to be root for this to work. That’s all.

What to do if you can’t log as root ? type:

```
mkdir $HOME/bin
mkdir $texmf
```

edit variables.mk and set the following variables:

```
# Destination directory. Usually /usr, /usr/local or $(HOME)
DESTDIR=$(HOME)
# Place where the binary goes
BINDIR=$(DESTDIR)/bin
# Root of the tex tree the files should be installed into.
TEXROOT=$(DESTDIR)/texmf
# Tex Style file directory
TEXSTYLE=$(TEXROOT)/tex/latex/HieroTeX
# Font directory
FONTDIR=$(TEXROOT)/fonts/source/public/HieroTeX
```

Now, get sure that the `texmf.cnf` configuration file for your system defines:

```
TEXMF = {$HOMETEXMF,!!$TEXMFMAIN}
```

If this is not the case, you may define it as an environment variable.

Now, you can type `make tetex-install`

3.3 Installing the postscript type 1 fonts on linux

This is optionnal, but gives nice results for postscript and above all pdf files. Beware : **to get a decent pdf output, you need to use pdf_latex**. At least, that's what I have seen. Using `dvips` and then `ps2pdf` produces a file where the hieroglyphic fonts are still coded in type 3 postscript fonts, which look horrible in acrobat. The version of `ps2pdf` shipped with the 3.0 debian actually produced an file acrobat couldn't read (well, at least on my machine)

I'm afraid this is an area where things can be quite different from one $\text{T}_{\text{E}}\text{X}$ variant to another. There are two ways to go : user install, and system-wide install. I will describe user-specific install here. The system I use runs a Debian 3.0 Linux, with `tetex` installed.

Download the fonts (file `HieroType1-VERSION.tgz`). insert them in the `texmf` hierarchy you used. For instance, I did put them in `texmf/fonts/type1`, in my home directory (get sure the `TEXMF` path is properly defined in `texmf.cnf`). You can simply run :

```
cd ; tar zxvf hieroType1.tgz
```

Now, run `texhash`. The fonts should work with `latex` and `dvips`, and `pdflatex`.

The configuration files are in `texmf/dvips` for `latex` and `dvips`, and in `texmf/pdftex` for `pdflatex`. If things work funny, have a look at the files `pdftex.cfg` and `config.ps` in these directories, and compare them with your system's default. If you want to make a system-wide install, the idea is the same, except that I strongly suggest not to overwrite your system's `config.ps` and `pdftex.cfg` with my own. The important lines to add are :


- in `config.ps` :

```
% This shows how to add your own map file.
% Remove the comment and adjust the name:
p +hierofonts.map
```

- in `pdftex.cfg` :

```
% This shows how to add your own map file.
% Remove the comment and adjust the name:
map +hierofonts.map
map +diacrFonts.map
```

4 Typesetting hieroglyphs

You need a C compiler, to build¹ the `sesh` program, or a compiled version thereof. I intended the software to be called , but it's a little hard to type on a keyboard.

You might also want the *Inventaire des signes hiéroglyphiques en vue de leur saisie informatique*, [1] hereafter called *manuel de codage* (in English, French, and German).


To use `sesh`, write your L^AT_EX source with hieroglyphic texts in a `hieroglyph` environment. Then, use `sesh` as a filter to obtain a L^AT_EXable result. As any polite program, `sesh` reads stdin and writes on stdout.

example: if your L^AT_EX file, called `foo.htx`, is:

```
\documentclass{article}
\usepackage{hiero}
\begin{document}
\begin{hieroglyph}
A1 \end{hieroglyph}
\end{document}
```

you should proceed like this:

```
sesh < foo.htx > foo.tex
latex foo.tex
```

and you should get a dvi file containing the sign . Beware that you can't use L^AT_EX comments between the beginning and the end of the `hieroglyph` environment.

4.0.1 The `hiero` package and its options

To use HieroT_EX, you should include the `hiero` package, like this :

```
\usepackage{hiero}
```


If you want to use the hieroglyphic postscript fonts, you should specify the `psfonts` option :


```
\usepackage[psfonts]{hiero}
```

In this case, you should have the postscript fonts installed (see above). Please note that these fonts won't always look good in the dvi output. You have to look at the final postscript or pdf output to get an exact idea of the result. In particular, right-to-left signs won't look correct in dvi.

¹see the file `BUILD.txt`

4.0.2 Hieroglyphs

The “alphabetic” signs can be called like shown in table 1. The Letters A, i, a, w, b, p, f, m, n, r, h, H, x, X, z, s, S, q, k, g, t, T, d, and D are used both for the hieroglyphs and their transliteration. Signs are named, either after their transliterations (for example, **xpr** is ) or after their Gardiner Code. See appendix B for a list of codes. For a complete list, see [1], which intends to be *the* format for encoding hieroglyphic texts.


A few codes are used for signs variants; these are **pA**’ and **k**’ which write  and .


4.0.3 Special signs

You won’t type only hieroglyphs. So:

.. is a space

. is a quater-space

// is 

h/ is 

v/ is 

/ is 

o is 

O is 

4.0.4 Grouping Signs

You can type adjacent signs with ‘-’ , stack signs with ‘:’, group signs with parenthesis, and use ‘*’ to separate signs on the same level.

A few examples:

```
\begin{hieroglyph}
p*t:pt-.-A-.-n:(x:t)*U30-A-xAst-qmA
.end{hieroglyph}
```

gives          

you can type a ‘=’ sign *after* a ‘-’ or a ‘:’ to indicate a grammatical ending. More important, a *space*, or *any number of spaces*, *tabulations*, or *newlines*, indicate a word ending² I strongly recommend that you type the word-separation

²Note that in the “manuel”, a word ending is *one* space. This is extremely inconvenient for L^AT_EX, and, in fact, for the general purpose of directly typing the text.




























| SIGN | TRANS-LITTERATION | CODE |
|---|-------------------|------|
|  | <i>ʔ</i> | A |
|  | <i>i</i> | i |
|  | <i>ʻ</i> | a |
|  | <i>w</i> | w |
|  | <i>w</i> | W |
|  | <i>b</i> | b |
|  | <i>p</i> | p |
|  | <i>f</i> | f |
|  | <i>m</i> | m |
|  | <i>n</i> | n |
|  | <i>n</i> | N |
|  | <i>r</i> | r |
|  | <i>h</i> | h |
|  | <i>h</i> | H |
|  | <i>b</i> | x |
|  | <i>h</i> | X |
|  | <i>z</i> | z |
|  | <i>s</i> | s |
|  | <i>ś</i> | S |
|  | <i>k</i> | q |
|  | <i>k</i> | k |
|  | <i>g</i> | g |
|  | <i>t</i> | t |
|  | <i>t</i> | T |
|  | <i>d</i> | d |
|  | <i>d</i> | D |

Table 1: Alphabetical signs

spaces. The package will then try to cut the lines at word-separations, which is nicer and easier to read³.

4.0.5 Sign Modifiers

`\` after a sign inverts it: `A1-A1\` writes 

`\sn` where n is 1,2,3 or 4, diminishes the sign size:

`A1-A1\s1-A1\s2-A1\s3-A1\s4`


draws 

`\Rn` rotates a figure by the angle n . This exceeds normal dvi capacities, so you must use a suitable graphic driver : `dvips` for postscript, or `pdftex` for pdf. To do this, include:

`\usepackage[dvips]{graphicx}`

or

`\usepackage[pdftex]{graphicx}`

in your headings. `anx\R30-G5` 

Alternatively, you can use the option `useGraphicx` when loading the hiero package :

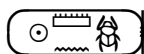
`\package[useGraphicx]{hiero}`

Note that this option also switches on the use of postscript type1 hieroglyphic fonts.

4.0.6 Cartouches and parenthesis

`<-` and `->` draw a cartouche around the embedded text:

`<-ra-mn:n-xpr->`



`<S` and `>` draw a serekh:

`G5 -<S-nTr-X:t->`


³You can use spaces directly to separate words, if you want, without using a ‘-’. but this won’t be conform to the manuel encoding.



<H > draw a *hwt*-sign.

<H-pA-i-i-A1-Htp:t*p>



The letters *b*, *m* and *e*, used after the beginning sign, allow you to draw only the beginning, middle, or ending of construction. So, for example, <Se-nTr-> writes .


The parenthesis are:


[[...]] for {text };




[{...}] for { text };

[&...&] for {text }.

4.0.7 Shading and stacking

-#- ...-#- shades a text⁴: -#-A1-A2-#- writes .

You can shade a part of a group with #//, #h/, #v/, and #/: A1#// is .

A1#h/ is ; A1#v/ is ; and A1#/ is .


It is possible to specify which quarters of a cadrat will be shaded. This is done by writing # after the cadrat, and the numbers of the cadrat quarters to shade. The quarters are numbered this way:

| | |
|---|---|
| 1 | 2 |
| 3 | 4 |

The following example demonstrates the system:

n:(x:t)*U30#13-...-n:(x:t)*U30#124-...-n:(x:t)*U30#14-...-n:(x:t)*U30#1234



on his own allows to stack signs: m#a is .

⁴The previous versions of sesh allowed one to do without the '-'. but I decided to revert to the manual, to be able to use the # to stack signs.

4.0.8 Text Orientation


If you use a version of TeX-Xet (a patch designed to allow you to type right-to-left text as well as left-to-right, with the benefit of the line-cutting system), It is possible to reverse a whole part of the text. Simply type `+dg` right-to-left, and `+gd` for left-to-right (this is *not* part of the *manuel*).

BEWARE !!!! this file was not compiled with TeX-Xet, so the example bellow is false. You should have gotten a dvi version of this file (called doc.dvi), without this message.

Example: , made like that:

```
+dg G7 E1:D40 xa:a m wAs-t:niwt nbty +gd anx G7 E1:D40 xa:a m
wAs-t:niwt nbty
```

Testing compatibility with ‘\’ 

, made like that:

```
+dg A4\C2-x*t:f-w-b:n-N8:f-m-Axt:t*1-iAb-t:t -+gd
A4\C2-x*t:f-w-b:n-N8:f-m-Axt:t*1-iAb-t:t
```

There is a more general right-to-left builtin, but it won’t allow line-cutting: ‘+rl’ and ‘+lr’. example:

```
+rl G5 -nTr-ms-w-t:Z2 +lr anx G5 -nTr-ms-w-t:Z2
```

. It will work in any case.

Finally, if your ultimate output is postscript, you can use packages like `pstricks` to invert left-to-right text and make it into right-to-left.

For Column-writing, the L^AT_EX macro `\EnColonne` can be used. Its first argument is the column width. The one given in the following example isn’t bad.

```
\EnColonne[1.2\Htm]{
\begin{hieroglyph}
#def wAt N31# sw*(t:di) -Htp -wp-wAt-wAt-wAt-!
E16-nb-tA:idb\s2*Z1-Dsr-r-xAst-!
\end{hieroglyph}
}
```



It is often necessary to use the `\s` construct to tune the sizes of the signs in column writing.

4.0.9 Some text

+l .. +s allows inserting of L^AT_EX text; |...- allows the insertion of super-script text:


<-+l Ramses II +s-> -A1-|1,2-di-anx

Ramses II 

4.0.10 kerning

A non-manual feature of the present system allows to kern the signs. the sequence \! is a negative space that can be used both in horizontal context:

zA-\!\!ra:.

 and in vertical one:

nD-D:\!\!\!\!Hr\s1




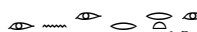

4.0.11 Size

The size of signs is controled by various L^AT_EX macros:

- \DisplayHieroglyphs write the hieroglyphic texts in its scope in a big size, with a large spacing between lines so that the reading is easy.
- \TextHieroglyphs does the contrary. It is better for in-text text.
- \EnPetit{} writes its argument in the same format as \TextHieroglyphs does.
- \SmallerText lowers the size of the signs.

\DisplayHieroglyphs This is an example:



looks good. \TextHieroglyphs  is better if you are in the bulk of the text. And \SmallerText  is smaller and \SmallerText  is even smaller

4.0.12 Macros

There is a limited macro facility (again, not part of the *manuel*). To define a macro, type

```
#def MACRONAME Body#
```

Note the second ‘#’ sign. MACRONAME can be any unused sequence of letters, simple quote, and point.

This can be useful if a name appears often.

Example:

```
\begin{hieroglyph}  
#def 'tA tA:N23*Z1#  
tr-t:r-n-w:n:n-k-tp-Z1-'tA  
\end{hieroglyph}
```



Note that, once defined, these macros can be used in all subsequent `hieroglyph` environment.

A few useful definitions:

```
#def Hm' N42#  
#def bdS A7#  
#def bin G37#  
#def arm D40#  
#def knife T30#  
#def copper N34#  
#def di' D37#  
#def hrw h-r:W*ra-Z1#  
#def ink nw:k':A1#  
#def inr O39#  
#def iw' D54#  
#def k' V31A#  
#def nn M22-M22-n:n#  
#def nxt A24#  
#def rmn D41#  
#def king A42#  
#def sxA A2#  
#def wnn wn:n:n#
```

4.1 L^AT_EX macros

If you want the small signs to be on the baseline, type `\SurLigne` out of a `hieroglyph` environment; the default is to center signs. To switch back to centered signs, type `\Centrer`. In a cartouche, the text is always centered. You can handle the line-cutting algorithm by changing the two T_EX macros `\Hrp` and `\Hitmts`; the first rules what is inserted between signs, the second between

words. The default values tend to protect you from cutting a word, at the cost of some white space.

4.2 New Sign Definition

It is now possible to define new signs for HieroTeX. The difficult part is that you have to create a font which TeX can use, which is a bit TeXnical. The font editor for tksesh can be used for such tasks. Another option is to create postscript type 1 font, which can be used by TeX.

Once the font is created and installed in TeX, you must declare both the font and the character to use it.

4.2.1 Character Definitions

First, you must create a file which describes the codes for the characters in the font. The file format is rather simple: on each line, you should have:

SIGNCODE SPACE TEX_NAME FOR THE FONT SPACE SIGN_NUMBER_IN_FONT

at the time being, note that the fonts for HieroTeX contain both left-to-right and right-to-left sign (it would be possible to reverse the signs with postscript, but it wouldn't appear correctly in dvi files). So, restrict yourself to the first 128 character codes. For reversal to work, character $128 + n$ should be character n reversed.

The file which contains new character definitions may be:

- /usr/local/lib/sesh/fontDef.txt
- \$HOME/fontDef.txt
- specified when starting sesh, with the -def option:

`sesh -def mydefs.txt <toto.htx >toto.tex`

4.2.2 Font Declaration

Second, the font must be declared in your L^AT_EX file:

```
\declareHieroGlyphicFont{HIEROTEXFONTNAME}{TEXTFONTNAME}
```

4.2.3 Example

The files `testNewSigns.tex`, `titi.mf` and `titi_font.mf` contain a complete example. The `bzr` font is not needed, but it might be edited using `fontedit.tcl`, a program which is available with tksesh. The latest version of `fontedit.tcl` is able to create metafont (and postscript type 1) sources. Note that postscript type 1 fonts are not very easy to integrate in a latex environment.

5 Typesetting transliterations and references

The commands here described are defined in the `egypto.sty` file.

5.1 Settings

`\Montitre{...}` allows you to define the document's title (To be used in Cross-references)

`\eg` to use the transliteration font

`\def\SourceTexte{Name of the text}` to tell LaTeX what text you are typing

`\def\EXEMPLE{example}` To use this style in English

5.2 Transliteration

There are currently three ways to write some transliteration (apart from `\eg`)

1. the `translit` environment: it takes 3 arguments:

- name of the text
- page number or recto/verso (exxs `{4}` or `{recto}`)
- line number(s) (could be column number) (exxs. `{4}` `{4-9}`)
- an alternative (possibly empty) reference in free text.

One important thing is that TeX “understands” these numbers. i.e. there are commands to change the line number and the page number. such things are useful for cross-references

you can type a transliteration, and use “`\traduction`” to start typing the translation.

Example:

```
\begin{translit}{O. foobar XIV}{verso}{10-15}{LES 12,2-5}
  iw.i rx.kw mdw nTr
\traduction
  I know the hieroglyphs
\end{translit}
```

O. FOOBAR XIV, verso 10-15

LES 12,2-5

iw.i rḫ.kw mdw nṯr

I know the hieroglyphs

2. the `exemple` environment. a `translit` environment with the word “Exemple” in front of it, and numbered. To write “example”, use `\def\EXEMPLE{Example}`

these two environments write a line in “*.dic” where * is the name of your TeX file.

“translit” writes:

```
\Citation{name of the source}{references}{document's title}{
           page number in document}
```

“exemple” writes:

```
\Exemple{name of the source}{references}{document's title}
        {example number}{page number in document}
```

(all on the same line)

3. the `\traduction{}{}{}` macro. It takes two arguments, the first being a transliteration, the second a translation. you have separates footnotes and, by default, the text is given in two columns which can spread over pages, which is useful to translate poetry. If you want the translation under the transliteration, you can type

```
\def\EcritTraduction{\EcritTraductionEnLigne}
```

and

```
\def\EcritTraduction{\EcritTraductionEnColonne}
```

to switch back. In the column version, the second column is a verse-like environment

5.3 Varia

`\affligne` shows the line number above a vertical line: ¹⁰ |.

`\affpage` shows the page number in a cartouche: verso.

`\|` increases the line number and shows it.

`*` increases the page number and shows it. (the line number becomes 1)

`\numligne{VALUE}` gives a value to the line number and shows it

`\numpage{VALUE}` the same for page number.

`\dico{Y}{translation}{comments}` Can be used to make an index of terms.
ex:

```
\dico{XAa}{to free}{transitive verb}
```

writes in the .dic file:

```
\DicoIndex {XAa}{ to free }{transitive verb }{P. Leyde I 350}
{verso,13}{name of the text}{2}
```

that is, what you wrote, plus the references. It is to be used inside an environment. The first argument may contain a `hieroglyph` environment.

5.4 Grammatical signs and al.

The zero-subject (i.e. the empty set) is bound to `\zero`

There is an environment for typesetting grammatical rules: its name is `gramrule`. a word typed there appears in slanted font, and ‘`~X_`’ writes X in transliteration (the space is mandatory).

The `possib` environment allows to type different cases, with an accolade in front of them. (`\\` to part the cases)

The `pile` environment allows to write some text in a column.

Example of use:

```
\begin{gramrule}
~ir + \begin{possib}
      infinitive\\
      prospective ~sDm.f \\
      ~mrr.f \\
    \end{possib}
    + \pile{this is not\\to \\be taken seriously\\}
\end{gramrule}
```

$$ir + \left\{ \begin{array}{ll} \textit{infinitive} & \textit{this is not} \\ \textit{prospective } \textit{sdm.f} + & \textit{to} \\ \textit{mrr.f} & \textit{be taken seriously} \end{array} \right.$$

6 To Do

- Capital letters for transliteration (currently, it is quite hard to type “R”).
- fully and strictly implement the “manuel de codage”. (but waiting for a possible new version.)

7 Recently Done

- A right-to-left font, and a support for tex-xet.
- Improved sesh — I now use an hash table for the signs. The *manuel* is more or less supported, and should be so very quickly.
- Hieroglyphic typesetting improved. The sizes are better choosed, the signs can be merged with text, and are now centered on the base line.













- Can use NFSS2 now. (but still support the old system.)
- Added hieroglyphs in `\dico....`;
- Added a possibility of reversed text in normal latex.
- 2000AD. long time after. fixed rotation stuff.
- cleaned up a new error for text in column.
- 2001. The monolith on the moon hasn't been found nor is HAL operational, yet there are two bugs less in HieroTeX: subgroup scaling is now correct, and a bug has been fixed in right-to-left text. Space (.) and quater-space (..) used to be swapped. New shading system. New signs can now be added without recompiling. The internal signs encoding was changed and simplified. To keep old dvi files usable, we decided to change the fonts names.
- 2002 : a few days of work have : (a) fixed the shading system which works more or less perfectly in horizontal mode ; (b) fixed the “philological signs” system ([]) so that it scales well when in subgroups (it was simply a matter of adding `\scriptscriptstyle` in front of the TeX commands). Large shaded areas are now shaded group by group, which means the line-breaking algorithms work on them. Last but not least, postscript type 1 fonts have been made for the hieroglyphs, and the whole system works now with `pdflatex`.

A Examples


Here are a few examples, taken from various texts: Lefebvre's *Grammaire de l'Égyptien Classique*, Gardiner's *Egyptian Grammar*, and Westcar.

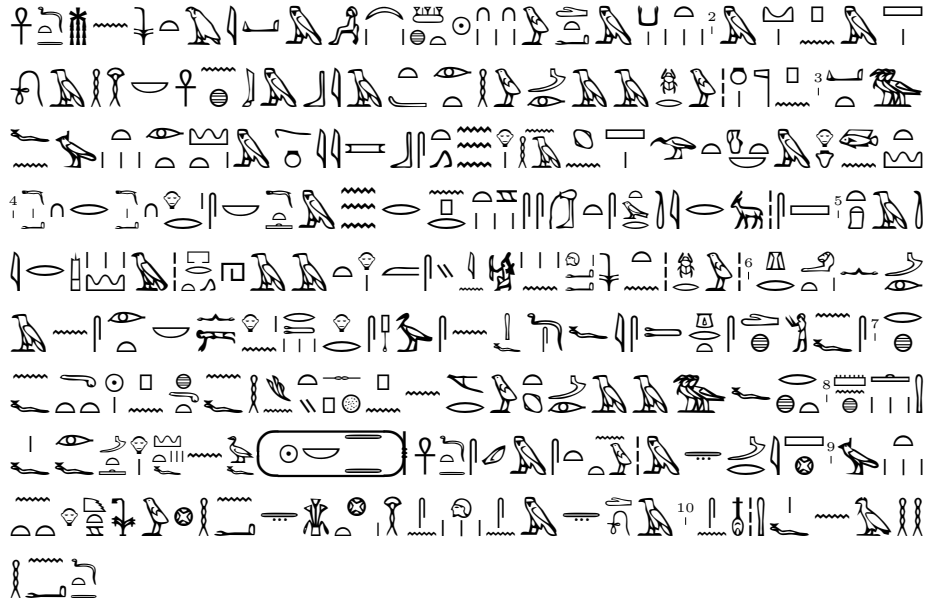
Le pseudoparticipe

Il exprime particulièrement l'état ou la **condition** de qqn, ou de qq.ch. Deux cas sont à distinguer, selon que le substantif (ou pronom) auquel est apposé le pseudoparticipe est sujet ou objet du verbe de la phrase.


































1. le pseudoparticipe peut qualifier un substantif (ou pronom) *sujet* de certains verbes, comme   *wrs* “ passer tout le jour à ”,   *sdr* “ passer toute la nuit à ”,  *pri* au sens de “ devenir ” ;  *dr* “ finir ” (par faire telle ou telle chose). Ex.:       *n sdr s hkrw r dmi.i* jamais un homme ne passa la nuit à avoir faim dans ma ville (*Menthuw.* 11). Litt. à l'état d'avoir faim.



Wadi Hammamat text M191, sent to me by J. KRAUS: 





















































































B Table of signs















| | | | | | |
|---|---------|---|---------|---|----------|
|  | A1 |  | A2 |  | A3 |
|  | A4 |  | A5 |  | A6 |
|  | A7 |  | A8 |  | A9 |
|  | A10 |  | A11 |  | A12, mSa |
|  | A13 |  | A14 |  | A14A |
|  | A15, xr |  | A16 |  | A17, Xrd |
|  | A17A |  | A18 |  | A19 |
|  | A20 |  | A21, sr |  | A22 |
|  | A23 |  | A24 |  | A25 |
|  | A26 |  | A27 |  | A28 |
|  | A29 |  | A30 |  | A31 |





















































































| | | | | | |
|--|------------|--|-----------|--|-----------|
| | A32 | | A33, mniw | | A34 |
| | A35 | | A36 | | A37 |
| | A38, qiz | | A39 | | A40 |
| | A41 | | A42 | | A43 |
| | A44 | | A45 | | A46 |
| | A47, iry | | A48 | | A49 |
| | A50, Sps | | A51, Spsi | | A52 |
| | A53 | | A54 | | A55 |
| | A59 | | B1 | | B2 |
| | B3, msi | | B4 | | B5 |
| | B6 | | B7 | | C1 |
| | C2 | | C3, DHwty | | C4, Xnmw |
| | C5 | | C6, inpw | | C7, stX |
| | C8, mnw | | C9 | | C10, mAat |
| | C11, HH | | C12 | | C17 |
| | C18 | | C19 | | C20 |
| | C98 | | D1, tp | | D2, Hr |
| | D3, Sny | | D4, ir | | D5 |
| | D6 | | D7 | | D8 |
| | D9, rmi | | D10, wDAt | | D11 |
| | D12 | | D13 | | D14 |
| | D15 | | D16 | | D17 |
| | D18 | | D19, fnd | | D20 |
| | r, D21, rA | | D22 | | D23 |
| | D24, spt | | D25, spty | | D26 |
| | D27, mnD | | D27A | | D28, kA |
| | D29 | | D30 | | D31 |
| | D32 | | D33 | | D34, aHA |





















































































| | | | | | |
|--|------------|--|----------|--|-----------------------|
| | D34A | | D35 | | a, D36 |
| | D37 | | D38 | | D39 |
| | D40 | | D41 | | D42 |
| | D43 | | D44 | | D45, Dsr |
| | d, D46 | | D46A | | D47 |
| | D48 | | D49 | | D50, DbA |
| | D51 | | D52, mt | | D53 |
| | D54 | | D55 | | D56, rd, sbq, gH, gHs |
| | D57 | | b, D58 | | D59, ab |
| | D60, wab | | D61, sAH | | D62 |
| | D63 | | E1 | | E2 |
| | E3 | | E4 | | E5 |
| | E6, zzmt | | E7 | | E8 |
| | E8A | | E9 | | E10 |
| | E11 | | E12 | | E13 |
| | E14 | | E15 | | E16 |
| | E17, zAb | | E18 | | E19 |
| | E20 | | E21 | | E22, mAi |
| | E23, rw, l | | E24, Aby | | E25 |
| | E26 | | E27 | | E28 |
| | E29 | | E30 | | E31 |
| | E32 | | E33 | | E34, wn |
| | F1 | | F2 | | F3 |
| | F4, HAt | | F5, SsA | | F6 |
| | F7 | | F8 | | F9 |
| | F10 | | F11 | | F12, wsr |
| | F13, wp | | F14 | | F15 |
| | F16, db | | F17 | | F18, Hw, bH |





















































































| | | | | | |
|--|-------------------|--|---------------|--|--------------------------|
| | F19 | | F20, ns | | F21, idn, msDr, sDm, DrD |
| | F22, pH, kfA | | F23, xpS | | F24 |
| | F25, wHm | | F26, Xn | | F27 |
| | F28 | | F29, sti | | F30, Sd |
| | F31, ms | | X, F32 | | F33, sd |
| | F34, ib | | F35, nfr | | F36, zmA |
| | F37B | | F37 | | F38 |
| | F39, imAx | | F40, Aw | | F41 |
| | F42, spr | | F43 | | F44, iwa, isw |
| | F45 | | F46, pXr, qAb | | F47 |
| | F48 | | F49 | | F50 |
| | F51 | | F52 | | A, G1, A |
| | G2, AA | | G3 | | G4, tyw |
| | G5 | | G6 | | G7 |
| | G7AA | | G7A | | G8 |
| | G9 | | G10 | | G11 |
| | G12 | | G13 | | G14, mwt |
| | G15 | | G16, nbty | | m, G17 |
| | G18, mm | | G19 | | G20 |
| | G21, nH | | G22, Db | | G23, rxyt |
| | G24 | | G25, Ax | | G26 |
| | G26A | | G27, dSr | | G28, gm |
| | G29, bA | | G30, bAw | | G31 |
| | G32, baHi | | G33 | | G34 |
| | G35, aq | | G36, wr | | G37 |
| | G38, gb | | G39, zA | | G40, pA |
| | G41, xn, pA', pA' | | G42, wSA | | w, G43 |
| | G44, ww | | G45 | | G46, mAw |

| | | | | | |
|---|----------|---|----------|--|----------|
|  | G47, TA |  | G48 |  | G49 |
|  | G50 |  | G51 |  | G52 |
|  | G53 |  | G54, snD |  | H1 |
|  | H2, wSm |  | H3, pAq |  | H4 |
|  | H5 |  | H6, Sw |  | H6A |
|  | H7 |  | H8 |  | I1, aSA |
|  | I2, Styw |  | I3, mzH |  | I4, sbk |
|  | I5, sAq |  | I5A |  | I6, km |
|  | I7 |  | I8, Hfn |  | f, I9 |
|  | D, I10 |  | I11, DD |  | I12 |
|  | I13 |  | I14 |  | I15 |
|  | K1, in |  | K2 |  | K3, ad |
|  | K4, XA |  | K5, bz |  | K6, nSmt |
|  | K7 |  | L1, xpr |  | L2, bit |
|  | L3 |  | L4 |  | L5 |
|  | L6 |  | L7, srqt |  | M1, iAm |
|  | M2, Hn |  | M3, xt |  | M4, rnp |
|  | M5 |  | M6, tr |  | M7 |
|  | M8, SA |  | M9, zSn |  | M10 |
|  | M11, wdn |  | M12, xA |  | M13, wAD |
|  | M14 |  | M15 |  | M16, HA |
|  | i, M17 |  | M18, ii |  | M19 |
|  | M20, sxt |  | M21, sm |  | M22 |
|  | M23, sw |  | M24, rsw |  | M25 |
|  | M26, Sma |  | M27 |  | M28 |
|  | M29, nDm |  | M30, bnr |  | M31 |
|  | M32 |  | M33 |  | M34, bdt |
|  | M35 |  | M36, Dr |  | M37 |

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|---|-----------|---|---------------|---|-----------------|
|  | M38 |  | M39 |  | M40, iz |
|  | M41 |  | M42 |  | M43 |
|  | M44 |  | N1, pt |  | N2 |
|  | N3 |  | N4, iAdt, idt |  | N5, ra, zw, hrw |
|  | N6 |  | N7 |  | N8, Hnmmt |
|  | N9, pzD |  | N10 |  | N11, Abd, iaH |
|  | N12 |  | N13 |  | N14, dwA, sbA |
|  | N15, dwAt |  | N16, tA |  | N17 |
|  | N18, iw |  | N19 |  | N20, wDb, idb |
|  | N21 |  | N22 |  | N23 |
|  | N24, spAt |  | N25, xAst |  | N26, Dw |
|  | N27, Axt |  | N28, xa |  | q, N29 |
|  | N30, iAt |  | N31 |  | N32 |
|  | N33 |  | N33A |  | N34 |
|  | n, N35 |  | N35A, mw |  | N36 |
|  | S, N37 |  | N38 |  | N39 |
|  | N40, Sm |  | N41, id, N42 |  | O1, pr |
|  | O2 |  | O3 |  | h, O4 |
|  | O5 |  | O6, Hwt |  | O7 |
|  | O8 |  | O9 |  | O10 |
|  | O11, aH |  | O12 |  | O13 |
|  | O14 |  | O15, wsxt |  | O16 |
|  | O17 |  | O18, kAr |  | O19 |
|  | O20 |  | O21 |  | O22, zH |
|  | O23 |  | O24 |  | O25, txn |
|  | O26 |  | O27 |  | O28, iwn |
|  | O29, aA |  | aAv, O29v |  | O30, zxnt |
|  | O31 |  | O32 |  | O33 |

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|---|-----------|---|---------------|--|----------------|
|  | z, O34 |  | O35, zb |  | O36, inb |
|  | O37 |  | O38 |  | O39, inr |
|  | O40 |  | O41 |  | O42, Ssp, Szp |
|  | O43 |  | O44 |  | O45, ipt |
|  | O46 |  | O47, nxn |  | O48 |
|  | O49, niwt |  | O50, zp |  | O51, Snwt |
|  | P1 |  | P1A |  | P2 |
|  | P3 |  | P4, wHa |  | P5, TAww, nfw |
|  | P6, aHa |  | P7 |  | P8, xrw |
|  | P9 |  | P10 |  | P11 |
|  | Q1, st |  | Q2, wz |  | p, Q3, p |
|  | Q4 |  | Q5 |  | Q6, qrsww, qrs |
|  | Q7 |  | R1, xAwt, xAt |  | R2 |
|  | R3 |  | R4, Htp |  | R5, kAp, kp |
|  | R6 |  | R7, snTr |  | R8, nTr |
|  | R9, bd |  | R10 |  | R11, dd, Dd |
|  | R12 |  | R13 |  | R14, imnt |
|  | R15, iAb |  | R16, wx |  | R17 |
|  | R18 |  | R19 |  | R20 |
|  | R21 |  | R22, xm |  | R23 |
|  | R24 |  | R25 |  | S1, HDt |
|  | S2 |  | N, S3, dSrt |  | S4 |
|  | S5 |  | S6, sxmty |  | S7, xprS |
|  | S8, Atf |  | S9, Swty |  | S10, mDH |
|  | S11, wsx |  | S12, nbw |  | S13 |
|  | S14 |  | S14A |  | S15, tHn, THn |
|  | S16 |  | S17 |  | S17A |
|  | S18, mnit |  | S19, sDAw |  | S20, xtm |

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|---|-----------------------|---|-----------|--|--------------------|
|  | S21 |  | S22, sT |  | S23, dmD |
|  | S24, Tz |  | S25 |  | S26, Sndyt |
|  | S27, mnxt |  | S28 |  | s, S29 |
|  | S30, sf |  | S31 |  | S32, siA |
|  | S33, Tb |  | S34, anx |  | S35, Swt |
|  | S36 |  | S37, xw |  | S38, HqA |
|  | S39, awt |  | S40, wAs |  | S41, Dam |
|  | S42, abA, sxm, xrp |  | S43, md |  | S44, Ams |
|  | S45, nxxw |  | T1 |  | T2 |
|  | T3, HD |  | T4 |  | T5 |
|  | T6, HDD |  | T7 |  | T7A |
|  | T8 |  | T8A |  | T9, pd |
|  | T9A |  | T10, pD |  | T11, zin, zwn, sXr |
|  | T12, Ai, Ar, rwd, rwD |  | T13, rs |  | T14, qmA |
|  | T15 |  | T16 |  | T17, wrrt |
|  | T18, Sms |  | T19, qs |  | T20 |
|  | T21, wa |  | T22, sn |  | T23 |
|  | T24, iH |  | T25, DbA |  | T26 |
|  | T27 |  | T28, Xr |  | T29, nmt |
|  | T30 |  | T31, sSm |  | T32 |
|  | T33 |  | T34, nm |  | T35 |
|  | U1, mA |  | U2 |  | U3 |
|  | U4 |  | U5 |  | U6, mr |
|  | U7 |  | U8 |  | U9 |
|  | U10, it |  | U11, HqAt |  | U12 |
|  | U13, hb, Sna |  | U14 |  | U15, tm |
|  | U16, biA |  | U17, grg |  | U18 |
|  | U19 |  | U20 |  | U21, stp |

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|---|--------------|---|-----------|---|--------------------|
|  | U22, mnx |  | U23, Ab |  | U24, Hmt |
|  | U25 |  | U26, wbA |  | U27 |
|  | U28, DA |  | U29 |  | U30 |
|  | U31, rtH |  | U32, zmn |  | U33, ti |
|  | U34, xsf |  | U35 |  | U36, Hm |
|  | U37 |  | U38, mxAt |  | U39 |
|  | U40 |  | U41 |  | V1, St, Snt, 100 |
|  | V2, sTA |  | V3, sTAw |  | V4, wA |
|  | V5, snT |  | V6, Ss |  | V7, Sn |
|  | V8 |  | V9 |  | V10 |
|  | V11 |  | V12, arq |  | T, V13, T |
|  | V14 |  | V15, iTi |  | V16 |
|  | V17 |  | V18 |  | V19, mDt, XAr, TmA |
|  | V20, 10, mD |  | V21 |  | V22, mH |
|  | V23 |  | V24, wD |  | V25 |
|  | V26, aD |  | V27 |  | H, V28 |
|  | V29, wAH, sk |  | V30, nb |  | k, V31 |
|  | V31A, k' |  | V32, msn |  | V33, sSr |
|  | V34 |  | V35 |  | V36 |
|  | V37, idr |  | V38 |  | V39 |
|  | W1 |  | W2, bAs |  | W3, Hb |
|  | W4 |  | W5 |  | W6 |
|  | W7 |  | W8 |  | W9, Xnm |
|  | W10, iab |  | W10A |  | g, W11, nst |
|  | W12 |  | W13 |  | W14, Hz |
|  | W15 |  | W16 |  | W17, xnt |
|  | W18 |  | W19, mi |  | W20 |
|  | W21 |  | W22, Hnqt |  | W23 |

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| | W24, nw | | W25, ini | | t, X1 |
| | X2 | | X3 | | X4 |
| | X5 | | X6 | | X7 |
| | X8, rdi, di | | Y1v | | Y1, mDA _t |
| | Y2 | | Y3, zS, mnhd | | Y4 |
| | Y5, mn | | Y6, ibA | | Y7 |
| | Y8, zSSt | | Z1, 1 | | Z2, 3 |
| | Z3 | | Z3A | | Z4, y |
| | Z5 | | Z6 | | W, Z7 |
| | Z8 | | Z9 | | Z10 |
| | Z11, imi, wnm | | Z12 | | ‘, Z98A |
| | spd, Z99A | | x, Aa1 | | Aa2 |
| | Aa3 | | Aa4 | | Aa5, Hp |
| | Aa6 | | Aa7 | | Aa8, qn |
| | Aa9 | | Aa10 | | Aa11, mAa |
| | Aa12 | | M, Aa13, im, gs | | Aa14 |
| | Aa15 | | Aa16 | | Aa17, sA |
| | Aa18 | | Aa19 | | Aa20, apr |
| | Aa21, wDa | | Aa22 | | Aa23 |
| | Aa24 | | Aa25 | | Aa26 |
| | Aa27, nD | | Aa28, qd | | Aa29 |
| | Aa30, Xkr | | Aa31 | | Aa32 |

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