

# HieroTeX, A L<sup>A</sup>T<sub>E</sub>Xperiment of hieroglyphic typesetting

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December 18, 2016



## 1 License

Sesh Nesout, a TeX package for hieroglyphic typesetting  
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## 2 Introduction

If you use L<sup>A</sup>T<sub>E</sub>X, and want to typeset hieroglyphic texts, this package is for you. If you want to typeset hieroglyphs, and don't know L<sup>A</sup>T<sub>E</sub>X, then have a look at the file `EGypt0.tex`, to get an idea of what L<sup>A</sup>T<sub>E</sub>X 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<sup>A</sup>T<sub>E</sub>X 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<sup>A</sup>T<sub>E</sub>X 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<sub>l</sub>atex**. 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 T<sub>E</sub>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/pdfltex` for `pdflatex`. If things work funny, have a look at the files `pdfltex.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 `pdfltex.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 `pdfltex.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 build<sup>1</sup> 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*, [?] hereafter called *manuel de codage* (in English, French, and German).


To use `sesh`, write your L<sup>A</sup>T<sub>E</sub>X source with hieroglyphic texts in a `hieroglyph` environment. Then, use `sesh` as a filter to obtain a L<sup>A</sup>T<sub>E</sub>Xable result. As any polite program, `sesh` reads stdin and writes on stdout.

**example:** if your L<sup>A</sup>T<sub>E</sub>X file, called `foo.htx`, is:

```
\documentclass{article}
\usepackage{hierog}
\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<sup>A</sup>T<sub>E</sub>X comments between the beginning and the end of the `hieroglyph` environment.

### 4.0.1 The `hierog` package and its options

To use HieroT<sub>E</sub>X, you should include the `hierog` package, like this :

```
\usepackage{hierog}
```

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


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



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.

---

<sup>1</sup>see 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 [?], 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 ending<sup>2</sup> I strongly recommend that you type the word-separation

<sup>2</sup>Note that in the “manuel”, a word ending is *one* space. This is extremely inconvenient for L<sup>A</sup>T<sub>E</sub>X, 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>ʿ</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>s'</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 read<sup>3</sup>.

#### 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 :

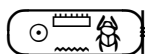
`\package[useGraphicx]{hiero}`

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->`

---


<sup>3</sup>You 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 text<sup>4</sup>: -#-A1-A2-#- writes .

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

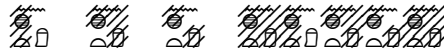
A1#h/ is ; A1#v/ is , and A1#/ is .


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 .

<sup>4</sup>The 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<sup>A</sup>T<sub>E</sub>X 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<sup>A</sup>T<sub>E</sub>X 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<sup>A</sup>T<sub>E</sub>X 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<sup>A</sup>T<sub>E</sub>X 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<sub>E</sub>X 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<sup>A</sup>T<sub>E</sub>X file:

```
\declareHieroGlyphicFont{HIEROTEXFONTNAME}{TEXFONTNAME}
```

### 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: <sup>10</sup> |.

`\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: Lefèbvre'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.



S'il est sourd et que sa bouche ne puisse plus s'ouvrir, 

 tous ses membres deviennent faibles (*Ebers* 99, 20–21).

    dr.in.f  $hms(w)$  à la fin il s'assit (*Leb.* 75).

Comparer l'emploi, comme auxiliaires, devant *sdm.n.f*, de *pri*, *sdr* et *dr*, §331.

2. Il peut qualifier un substantif [...]

## EXERCICE XXII

(a) *Translate into English:*

(1)  (2) 


## Un texte symétrique

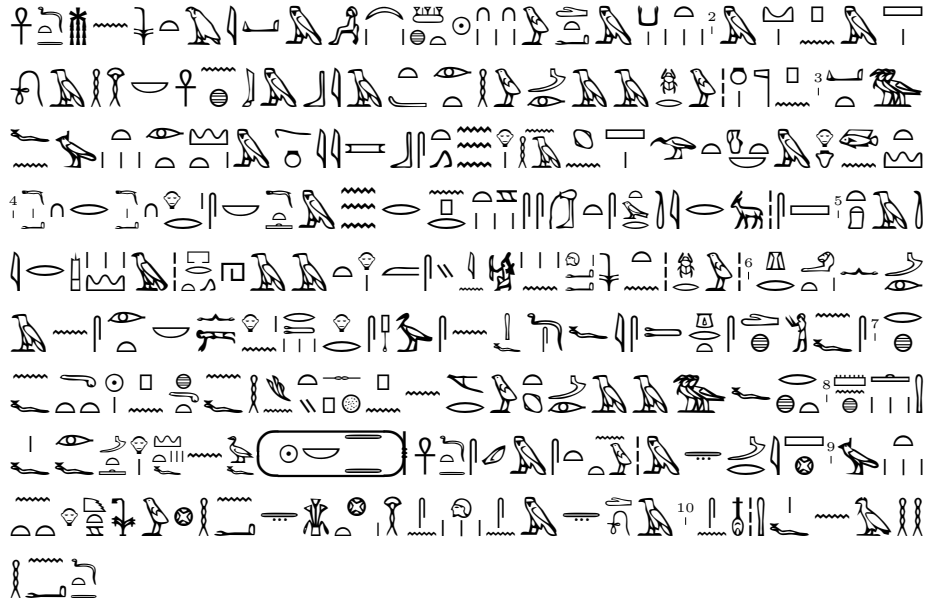
[illegible][illegible]

## Un extrait de Westcar


































[illegible]



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
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



































































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	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

	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





	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

	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

	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

## C Thanks

I want to thanks a few persons, whose help definitely helped improving this package. In 1993, M. Louet and Corler, then students in computer science at Brest University, wrote a X program for editing the fonts, which proved very useful for touching a few signs that were really ugly before. Jürgen Kraus, egyptologist at Mainz university, has provided me with numerous bug reports and suggestions. Helmar Wodtke has sent me numerous ideas, and has published a number of Egyptology books with hieroglyphic texts using both parts of HieroTeX and

software written by himself.