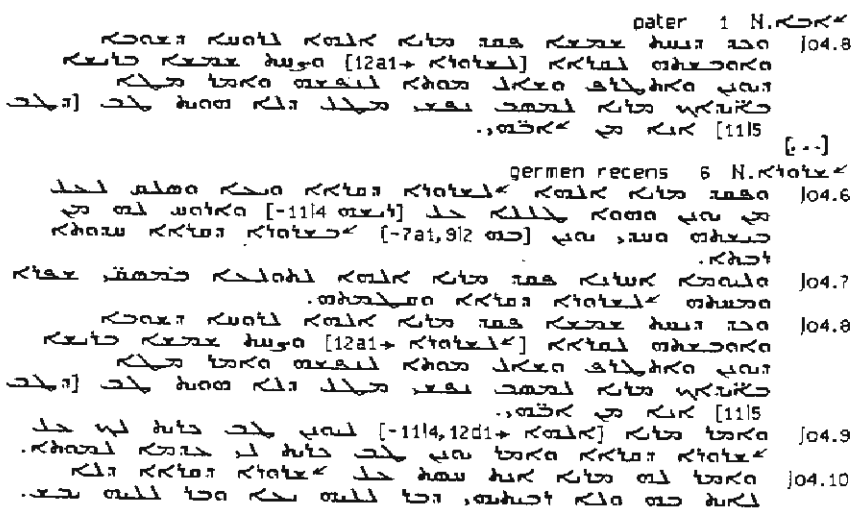
Tavola III

```
1 *='b'.N/ pater;
@Jo4 8 wkd dnHt $m$' pqd mry' 'lh' lrwH' d$wb' w'wb$th lqr'' [l$rwr'
       /12a1>] wSHt $m$' bry$' dywnn w'tTrp w$'l mwt' lnp$h w'mr mT'
       b':yd'k mry' lmsb np$y mTl dl' hwyt Tb [dTb/1115] 'n' mn
       'b:hy=*;

[...]

6 *=$rwr'.N/ germen_recens;
@Jo4 6 wpqd mry' 'lh' l$rwr'=* dqr'' wy'' wslq l'l mn ywnn whw' Tll'
       `l [ry$h/-1114] w'rwH lh mn by$th wHdy ywnn [bh/-7A1,912]
       b$rwr'=* dqr'' Hdwt' rbt';
@Jo4 7 wlywm' 'Hrn' pqd mry' 'lh' ltwl'' bmsq:y $pr' wmHth l$rwr'=*
       dqr'' wqTmth;
@Jo4 8 wkd dnHt $m$' pqd mry' 'lh' lrwH' d$wb' w'wb$th lqr'' [l$rwr'=*
       /12a1>] wSHt $m$' bry$' dywnn w'tTrp w$'l mwt' lnp$h w'mr mT'
       b':yd'k mry' lmsb np$y mTl dl' hwyt Tb [dTb/1115] 'n' mn 'b:hy;
@Jo4 9 w'mr mry' ['lh'/-1114,12d1>] lywnn Tb kryt lk `l $rwr'=* dqr''
       w'mr ywnn Tb kryt ly `dm' lmwt';
@Jo4 10 w'mr lh mry' 'nt Hst `l $rwr'=* dqr'' dl' l'yt bh wl' rbytyhy
        dbr llyh y`' wbr llyh yb$;
```



Corso Moncalieri, 494/12
I-10133 Torino
ITALIA

Pier Giorgio BORBONE

COMPUTERS: INNOVATION AND NEW FUTURE TO SYRIAC STUDIES

by George Anton KIRAZ

This paper shall present techniques for using the personal computer in Syriac studies. Such techniques can enhance, ease and expedite projects such as composing dictionaries, concordances, books, dissertations and all forms of linguistic analysis studies, as well as assisting in discerning ancient manuscripts. In addition, I shall give examples of projects carried out by major universities and institutions on Syriac studies using these techniques. The techniques presented here can be carried out by scholars who have a minimal experience in using personal computers. Those who have never used a personal computer before will find that applying ready software for their studies is very easy and useful, and does not require any programming knowledge.

The primary need of a scholar in creating a Syriac book, dissertation or any other document is a bi– or multi-lingual word processor that can handle Syriac. Some of the major requirements of the word processor must be the capability of handling bi– directional editing (right-to-left and left-to-right), vowels, and diacritical marks. A less important level of requirements is the capability of contextual analysis (one letter per key, the shape of characters changes automaticaly according to their position in a word –initial, middle, final or stand alone), and automatic block justification by elongating the words. A less level of requirements is not important for Syriac word processing, but is important for word processing in general. These are the capabilities of handling headers and footers, footnotes, search and replace, underline as well as others.

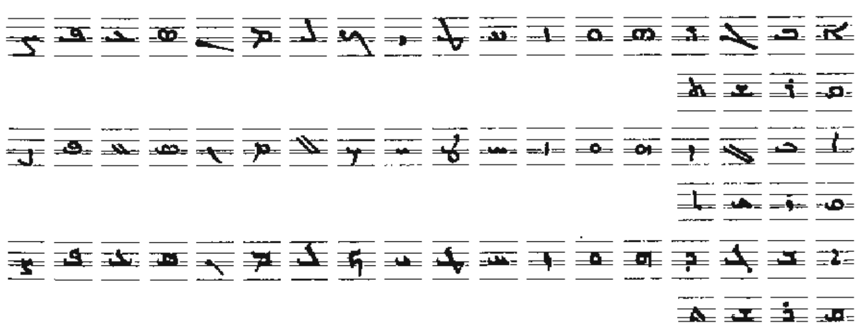
There are few products in the market that can handle some of the above requirements. They mainly support Hebrew or Arabic, but none support Syriac. For the purpose of designing Syriac fonts, I spent almost three years of research and design on the IBM personal comput-

er with many software products. Finally, I found one of the most sophisticated word processors that have all the requirements needed, the Multi-Lingual Scholar (MLS) word processor, by Gamma Productions, California. (MLS comes in Roman, Hebrew, Greek, Cyrillic and Arabic/Farsi alphabets. Syriac and other ancient alphabets – Aramaic, Phoenician, Coptic and Ugaritic – are optional). MLS also comes with *Configurable Text Interchange Utility* (CTIU), a program that converts files saved in the *American Standard Code for Information Interchange* (ASCII) format into MLS format and vice versa using a user-definition tables. For example, if a scholar is using a word processor that cannot handle Syriac (i.e. Word Perfect, Word Star, etc.) and is using A, B, G, and D for the Syriac letters *Olaph, Beth, Gomal* and *Dolath*, respectively, and if the ASCII codes for the first four Syriac letters are 65, 67, 71 and 75, respectively, the following table can be used:

A=\65
B=\67
G=\71
D=\75

The design of the Syriac fonts was a success and the project was carried out by Alaph Beth Computer Systems, Los Angeles, California. These fonts are for the screen and the printer. The screen fonts support CGA, Hercules monochrome, EGA, and VGA. The printer fonts support laser and dot matrix printers (HP LaserJet Plus, Canon, LaserJet, Cordata, Epson, IBM, Okidata, C.Ioth, Toshiba, and NEC or compatibles).

Some of the main points in designing Syriac fonts are discussed here. First, the designer should become familiar with the aspects of Syriac letters. The following diagram shows the Syriac alphabets on five line guidelines (one to five from top to bottom).



The base line (no. 4) represents the line the script is written on. The distance between that line and the line above it (no. 3) is the thickness of the base of characters. This thickness must be the same for all characters. It is noticed that Syriac letters, unlike Roman letters, do not all have the same x– height (the distance between line no. 4 and line no. 2). Similarly, the ascenders in *Teth, Lomath* and *Taw* (and *Olaph* in the Western Script), and descenders in final *Kof,* and *Ṣodhe* do not all have the same length. Every character must have no spaces to its right or left in its frame area, except letters that will not be connected to the letters after them. The following diagram illustrates this point.

The letters *Olaph, Dolath, He, Waw, Zain, Ṣodhe, Rish* and *Taw* have spaces to their left. The space must be three to five pixels in width, depending on the font's point size. All other characters do not have any space to either side.

Some of the techniques that can be helpful for the Syriac studies scholar are presented below.

1. Composing a Book or Dissertation.

Only few scholar (who actually use the Syriac software mentioned above, or those who designed their own software) have experience in Syriac word processing, which is similar to an extend to English word processing. Like all software products, the techniques of using a program (Syriac word processing in this case) can only be learned while using the software on a computer. However, few points can be introduced here. Placing the seyãme sign (¨) on tall letters should be avoided ([illegible], [illegible] not [illegible], [illegible]). In plural words that contain a *Rish*, a *Rish* with two dots should be used ([illegible] [illegible], not [illegible], [illegible]). In Western Syriac, the cursive shape of *Olaph* (use camera ready) should only be used in the initial of words and when it is preceeded by a *Dolath* or *Waw*; otherwise, the straight shape should be used ([illegible], [illegible], not [illegible], [illegible]). Using electronic text can be of a great help to scholars. Alaph Beth Computer Systems has in its *Syriac Electronic Text*

Collection many books on disks. Few are the Syriac gospels (Peshitto and Cureton), liturgies, and others.

Publishers started using the Syriac software system mentioned above in publishing Syriac books. Sheffield Academic Press, for example, has published my book, *The Syriac Primer: Reading, Writing Vocabulary and Grammar with Exercises and Cassette Activities*, which is entirely written in English, Syriac, Hebrew and Arabic using the mentioned software system. Bar Hebraeus Press in Holland just started using this system for publishing all their books.

2. Composing Dictionaries.

Composing a dictionary requires using a database system. A database is a large collection of useful information that has been coded and stored in a computer in such a way that it can be extracted under a number of different category headings, and is organized in a specific manner. For example, a telephone list can be viewed as a database:

George A. Kiraz	(213) 465-1443
Adai Narsai	(555) 222-8888
Ephraim Barsoum	(222) 777-4444

This is a listing of names and telephone numbers arranged randomly. It can be arranged in a different manner using a database system. For instance, the computer can sort the items in alphabetical order:

Ephraim Barsoum	(222) 777-4444
George A. Kiraz	(213) 465-1443
Adai Narsai	(555) 222-8888

Before discussing the usage of database systems in Syriac studies, a database file must be defined. A database file is a collection of data (information) stored in a computer. It is usually defined by assigning fields. For example, in a mailing list database file, the fields would be:

Last Name:
First Name:
Street:
City:
Country:

Postal Code:
Telephone Number:

For every record, the information will be coded into the computer in a similar manner. Since the field names (Last Name, First Name, . . .) are defined by the user, a database consisting of any field can be initiated. As an example, I am using dBASE III PLUS (a database program, by Ashton-Tate Company, available in the market) to compose an English-Syriac dictionary. The following fields were defined:

FIELD	DESCRIPTION
ENGLISH:	English word
SYRIAC:	Syriac word
ORIGIN:	origin of Syriac word (Greek, Latin, etc.)
REFERENCE:	reference as from where the item was taken

A brief listing of the data is given here:

ENGLISH	SYRIAC	ORIGIN	REFERENCE
Air	AoAaR	GRK	12
Book	KToBo		69
Father	AaBoA		89

Since Syriac characters cannot be used with dBASE III PLUS, a special transliteration was used. Using the CTIU program, a list of the transliteration codes was made and the file was converted into MLS format. The result is given in this list:

ENGLISH	SYRIAC	ORIGIN	REFERENCE
Air	ܐܘܝܪ	GRK	12
Book	ܟܬܒܐ		69
Father	ܐܒܐ		89

The Comprehensive Aramaic Lexicon (CAL) project at John Hopkins University is beeing done using computers. After the data is stored in the computer, a database will be created, and the lexicon will be produced. Other fields for grammatical analysis can be added to the database file. For example, fields for gender, number, suffixes, parsil, etc. can be created. A more detailed example is discussed in the next section.

3. Concordances.

As in dictionaries, composing concordances requires the usage of a database system. The best way to explain this is by giving a simplified example of a Syriac database system, developed by the Way International, New Knoxville, Ohio. (This is a modified structure of the Way's database. For simplicity, only the main two files are mentioned and some fields were omitted).

The first file is the text input file. It consists of the following fields:

FIELD	DESCRIPTION
BOOK:	book number: 1 for Gen., 2 for Exo. etc.
CHAPTER:	chapter number
VERSE:	verse number
NUMBER:	word number in the verse
WORD:	Syriac word in a transliterated form
PLURAL FLAG:	if the word is plural, a '*' is placed

A listing of Matthew 1: 1-2 follows. (The transliteration code here is different from the one used in the dictionary example above).

BOOK	CHP	VER	NO	WORD	PL	SYRIAC
40	1	1	1	CTBA		ܟܬܒܐ
40	1	1	2	D;L;DOTH		ܕܠܕܘܬܗ
40	1	1	3	D;WOE		ܕܥܘܐ
40	1	1	4	MW;KA		ܡܘܟܐ
40	1	1	5	BRH		ܒܪܗ
40	1	1	6	DDO;D		ܕܕܘ̈ܕ
40	1	1	7	BRH		ܒܪܗ
40	1	1	8	DABRHM		ܕܐܒܪܗܡ
40	1	2	1	ABRHM		ܐܒܪܗܡ
40	1	2	2	AOLD		ܐܘܠܕ
40	1	2	3	LA;SKX		ܠܐܣܟ
40	1	2	4	A;SKX		ܐܣܟ
40	1	2	5	AOLD		ܐܘܠܕ
40	1	2	6	L;EXOB		ܠܐܚܘܒ
40	1	2	7	;EXOB		ܐܚܘܒ
40	1	2	8	AOLD		ܐܘܠܕ
40	1	2	9	L;HODA		ܠܐܗܘܕܐ
40	1	2	1	OLAKOH;	*	ܡܠܟܘܗ

The first column designates Matthew (the 40th book counting the Old Testament). The second column designates chapter one. The third column designates the verse (1 or 2). The fourth column designates the word number in each verse. The fifth column designates the Syriac word in a transliterated form. Finally, the sixth column designates whether the word is plural or not by placing a '*' if the word is plural as in ,ܡܠܟܘܗ. For convenience, the transliterations were converted into Syriac form using CTIU and are listed in column seven.

A second file that was created for the same study was the parsil file which contains grammatical information about every word. The fields of this file are:

FIELD	DESCRIPTION
WORD	The Syriac word in transliterated form.
PLURAL	If a word is plural, a '*' is placed.
PERSON	1 for first, 2 for second and 3 for third.
NUMBER	S for singular, P for plural.
GENDER	M for masculine, F for feminine, C for common.

As an example, few data items are listed below. For clarity, the Syriac words were converted into Syriac using CTIU and are listed in the last column.

WORD	PL.	PER.	NO.	GEN	SYRIAC
AAR			S	C	ܐܥܪ
ABA			S	M	ܐܒܐ
ABD		3	S	M	ܐܒܕ
ABDN	*		P	F	ܐܒܕܢ
ABDT		3	S	F	ܐܒܕܬ
ABHT		1	S	C	ܐܒܗܬ
ABHTA	*		P	M	ܐܒܗܬܐ

The user can instruct the database program to output a document depending on the data given. The database program, for example, can write 'm.' or 'f.' after a Syriac word depending on the data in the gender column. Another example would be instructing the database to place the seyāme sign (̈) above words that have '*' in the second column as in ܐܒܗܬ̈ܐ. With the same token, a whole concordance or dictionary can be produced from the database. After the document is produced from the database, the output file can be converted using CTIU into Syriac form and printed with the MLS program.

4. Ancient Manuscripts and Calligraphy.

Computers can be of a great help in studying Syriac manuscripts. Pictures of manuscripts can be scanned (read by a machine) into the computer and graphically analyzed. The best example is studying the Syriac Bible of St. Catherine's Monastery in the Sinai desert. The Bible was written in the fourth century. It is extremely difficult to read because the original text was covered over with the writing of another text. A team of scholars in Los Angeles scanned pictures of the manuscript and cleaned the new text using a program, leaving the old text. The program removed all parts of the pictures where it found high density (new writing). The text became easier to read.

In studying either Syriac calligraphy or the development of Syriac scripts, the images of the characters at any historical stage can be scanned and used as a separate font. When published with the scanned fonts, the exact shapes of the Syriac letters can be presented, instead of a hand drawing.

What is presented here is a brief discussion on using computers to advance Syriac studies. All the techniques discussed do not require any programming knowledge from the user. The market is full of software programs that are easy to use, even for someone who never used a computer. The more scholars become familiar with the usage of computers, new ideas emerge and new techniques develope.

P.O. Box 7428
Los Angeles, Ca 90004
U.S.A.

George Anton KIRAZ

INDEX SCRIPTURAIRE

Système de référence:

79 (n. 10) = note 40 à la page 79
79 (+ n. 10) = texte et note 40 de la page 79.

ANCIEN TESTAMENT

ORIENTALIA CHRISTIANA ANALECTA

All correspondence concerning manuscripts should be addressed to the Editor; all other correspondence to the Managing Editor

ORIENTALIA CHRISTIANA ANALECTA
236

V SYMPOSIUM SYRIACUM 1988

Katholieke Universiteit, Leuven, 29-31 août 1988

edited by

René Lavenant, S.J.

PONT. INSTITUTUM STUDIORUM ORIENTALIUM
Piazza S. Maria Maggiore, 7
00185 ROMA
1990