# Beinecke MS 408

# A Transcription Based on a Revised Version of Takeshi Takahashi's Transliteration

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# 1 Introduction

In Section 2, mainly to promote easier readability and comparability, a transcription of Beinecke MS 408 is currently being developed, based on a transliteration by Takahashi (1999). To achieve this, Takahashi's transliteration is obtained in an automatically capitalized version of the European or Extensible Voynich Alphabet (EVA), using the Interlinear Transcription Archive Extractor by Schwerdtfeger (2004). It is then converted back into glyphs using a font by Bettencourt (2019).

Using the manuscript's reproduction in Clemens (2016) and the scans provided by Yale University's Beinecke Rare Book and Manuscript Library (2004), Takahashi's transliteration is compared with what I am able to make out of the manuscript on a best guess basis. In total, I made changes in 685 places of Takahashi's transliteration. Changes to Takahashi's reading are highlighted in orange:

- Glyphs that I interpret in another way than Takahashi or that I add to the corpus are printed in orange, showing my interpretation.
- When a glyph has been deleted by me without replacement, this is indicated by  $\varkappa$ .
- Removed spaces are marked with  $\sim$  and added spaces are indicated by  $\sim$ .
- Added paragraphs are represented by ¶.

Especially the recognition of spaces in running text is, as Takahashi has already noted, sometimes very difficult. As is, in some cases, the distinction of some glyphs (e.g., a and o, a and o, or 7 and 2). Therefore, my adjustments in this—just as in any other—regard should be taken with a certain amount of caution.

Note that places where the writing is interrupted (e.g., by illustrations) are marked by em dashes (—). Each line of the transcription is preceded by a locator, assigning the line a number and informing about the element a line is part of (i.e., paragraph, title, line, label, or circle).

Additionally, in Section 3, some basic analyses are presented. First, in Section 3.1, glyph frequencies are counted. In Section 3.2, then, entropy is calculated.

Of course, this revision would not have been possible without Takeshi Takahashi's incredible work. Hence, I would like to stress that this is not meant as a criticism of his transliteration; I am merely adding a few carefully selected new interpretations. This work is not comparable to the effort he has put in.

<sup>1</sup> Hence, changes that Takahashi made to his transliteration in subsequent versions are not included. Further note that Schwerdtfeger (2004) builds on an online archive of Voynich transcriptions maintained by Jorge Stolfi (1998). For a general overview of transcription efforts, see Zandbergen (2023).

# 2 Transcription

#### Folio 1, Recto

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        980701259
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        to crox todal Italy Icas 808 crosall to Icas
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        StepHo Good to Most of the sound of the solo offe
        8cca? &cotta VI olla VI Ccco Pcco Potos ottos 8aoctta
          forth Gibb Com for lloss
        offox sarriv
22: Paragraph 4]
        cto darry dollarces are thoses of tos tos to to to
        For Pas Pas VIII Fasts Sak ast Coop Barth
        cco*o lavid ctoavid ollog savid tat cttog savid cttogsar
        gas especial source light of the saving of the same as a second s
        Scco dos locas allo office fice for sax cello
         co cook coll collo collo
        8000110
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#### Folio 1, Verso

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Tollog crog strog ctog oldag — sogering croso gog erg etting

To og erocio croog sog etting — glog sog sogo glog so gerosg

To og erocio croog sog etting — glog sog sogo glog so gerosg

Though crog log licerg erog lig — erog etting erosg erog sanni

Though crog sog lig sad — crog serod others sad crosg

Though erothers sag erosg — crosg thog erosad

#### Folio 2, Recto

# Folio 2, Verso

- 01; Paragraph 1
- Moored for Post offarry o sard or sare the
- $\mathbb{Z}$  la fire that Social follows for the first first and so  $\mathbb{Z}$
- offices crop gots cos coso coso  $\overline{\mathcal{G}}_{04}$  offices cos gots for  $\overline{\mathcal{G}}_{04}$ 
  - दे० ८००० ८००० ८००७ ००००
- 05; Paragraph 2
  - "Too? &g 3a111) collog 2 &cg 80? cog 8a11)
- $\tilde{\tilde{g}}$  807 crop crof crop lloop crop crllp 8a  $_{1}$   $_{1}$   $_{2}$   $_{3}$   $_{2}$   $_{3}$   $_{2}$   $_{3}$   $_{3}$   $_{4}$   $_{1}$   $_{2}$   $_{3}$   $_{3}$   $_{3}$   $_{4}$   $_{3}$   $_{4}$   $_{4}$   $_{5}$   $_{6}$   $_{7}$   $_{1}$   $_{2}$   $_{3}$   $_{4}$   $_{4}$   $_{4}$   $_{5}$   $_{6}$   $_{7}$
- $\tilde{\mathbb{Q}}_{08}$  8a11) and the following the solution of the same states of the same state
- ರಾಶಂತಿ ಕಂತು ಕಂತು ನಿನಾಗಿಗಳು

#### Folio 3, Recto

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18; Paragraph 4
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ottoo? og occo? toco? 8a\? totooq to2a\\V — oco? ottoq

occo? ocoq o8a\\V ocoq 2 a\\V ottoqo? ag

#### Folio 3, Verso

OI; Paragraph 1

If oa \ \ \) cto? to flog ca cffcog gloa \ \ \) 2 ogg

da \ \ dg to flog o loco? offor oggffog dog da?

offog cog ctog cccc2 ccog cccgffag offa\

toda? cc2 ccg ffccog offag do ? ccca? cc\

gcca? offccag cco? ca? cffcg

o? ccco? flo? ccodagg ccog

or: Paragraph 2

There of other of energy of the state of other of other of the state of other of other of other other

#### Folio 4, Recto

#### Folio 4, Verso

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#### Folio 5, Recto

01; Paragraph 1

1 chosq tag cellog oann oar og2g ceosg slictg sg

occg olicg toliann cho cheog checg cecg olia\*or oflog

toann oflan ceg sann officer ceo cheg officeg tolice sg

offan chosq cean 2 cecor ceocheg

05; Paragraph 2

They does to toller does to toller doller do

# Folio 5, Verso

01; Paragraph 1

floctco? cto? offices thos ctos? ctosally offolly sally

scrop of ctos offally sally office? ctoff? octofforss

toffice offor sally sally officer sally to sarcer so

toffor ctcc? offor offolly ctos sally officer officer flally

ctofficer ctos ctos offor officer sally say ctos ctoffally

offor ctos salross

#### Folio 6, Recto

#### Folio 6, Verso

```
01; Paragraph 1

1 Noa? 9 2a? creella? toa? cho? cratery 2 crea? cra? offerg

02 occ2 cro? cretty toellera? crea? osanni licres cro? cranni

10an? ettes cros oocroettes crelleros ettes ollos ?scro?

9 chettes offeros 2o2 9 sass scro scs olloss — offoss

8an? cha crosas sas ollo? offo sossos
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06; Paragraph 2 160089 coothog coothog 2 goto gotog sarry officer sog goto? cro? offercg toffog S 803th 9000 RDB 0000 tolland garca? las go gooth offay ctory 89 office of tollar office 90 Soso 9000 S potto S cop tollof cros ettos therasoso So Crocyto So So Savo of octo chear chear como 9 ccalle offices offices of 911cto cottog ctc2 ctto9 908 pt Sorl (2000) 8cto? ctog8a? offog 8a110 gocco? coo? octtag

#### Folio 7, Recto

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01; Paragraph 1

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δτιος βίος το δοςδ — δτις βίτις οθτις τιοδο

οιιις τιοδα\\\ λοθτιος σοςδ — οθτιος τοθτις τιοδο

104

τοβτιο το κοπιος δα\\\ λοθτιος στιοδα\\\ λοθτιος στιοδα\\\ λοθτιος — οθα\\\\ λοθτιος — οθα\\\ λο
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#### Folio 7, Verso

- OI: Paragraph 1
  Toggico de flecoso totes offers offers so sand flecososo

  coers effes sand tolls enters sand effect so effes effes

  tolles solles enters lets list of so energy of energy so

  coffeed occar enotes sand do lets dog secce sog

  secosand tolles ences flecos

#### Folio 8, Recto

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01; Paragraph 1
                                 Fass cof officer coty — etcox cosy chy etcoser cor
                               The for the case of the office of the said as
                               10th post of the post of the following sages
                               offeco 80 ? ecces 89 ffg - Zero elfo elfooarro ero ffarro
                               Took officers of the control of the court of the control of the co
                               cross of savi
                               8000 8a118
  09; Paragraph 2
                               Theort to there and the contract the theory that the theory the theory that the theory the the
                               89/108 208 035 To cotto officoso - os lasosoft cosos la 178
                               tog choose offer o
foctobarry collolloso — ctollog 13; Title 2
                               olollcross
  14; Paragraph 3
                               the office they are to the thing sold are the office of the sold are the office of the
                                 Secret effect and area for the secret and the secret area and the secret area.
                               gaco la Garraga Color de Cara de Cara callo con la garaga que con la garaga de Cara de
                               ccog 8ccg folla? ccg - arrive ccar cfg ccar ccarrive
                               olla? Atanno cranno cx - 8anno cro? cra ?cecagera8
                               Ballas Clary Ross Care — Eas Ross Rairy Earlas
                               or college of of of or o
                               Scrox Sa15
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#### Folio 8, Verso

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01; Paragraph 1
             Cos Coocte - Cox cox offer cox offer anno for anno south
              offer of tax of the party for the same of 
             7089 \text{ creak } 29 - \text{cro} 9 - \text{creak } 2000 \text{ crain} 
              8tog tog 8ag cical office? ticago 8a110 cia?o
              crop crop 8a? — officea? cffa//d cffrog 8a?
             Sand officer occo Pand sand as
              to log - 8a? tog tha? tollar
             offerog flot - crog crog crog cttaind sand
              cos ofas — anlas ans allos as
             808 of the conference of the c
             6,0902
              Fical co log sag — tical cicollarry crag sarry
              Saffas passofto chost Gibbon - cho saffas
             2007 ollog golla 110 - tog llog cra? office office
             65 \text{ for all som for } -61
\frac{1}{17} cro? crca? crca? — offices 8cro? cro8c9 cro? \frac{1}{17}
             GIIDB FDSSS GIDB
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#### Folio 9, Recto

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01; Paragraph 1
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               oslicos cos stavio olicosos focollo olicios cos cariò
               Morry cff offos offarry cff offos card — cff os fax
               9th 2018 - 908 Fallo VIII Food & Soft & Good & Good
                8a110 coof 207 cttg collo110 cog 8ctog8g - offcog off 8g
06; Paragraph 2
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Para Coard African of a reposoral as a coard 01/10 Fabors — ollog gollot Follog gossle gossle gossle totlero tollero ettero llozario ollaro-8 - 8ag - 2 - ogeto etteg octo ctto coctos crossfers  $2a \times 10^{3}$  sco  $-8a \times 10^{3}$ 

#### Folio 9, Verso

000,000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |

#### Folio 10, Recto

# Folio 10, Verso

04: Paragraph 2
Tottcofto? coll sall tottcog cetteg ofto? sall

os co oftcog sall tottcog tottog cog sall tottcoglig

coll coll col cetteg tottog tottog tottog coops.

tottog coglig cog cetteg sall sall cetteal

# Folio 11, Recto

01; Paragraph 1

The or zerous etter those with the second the object of the object of the second the sec

05; Paragraph 2

There & 20 & 316 of the sall o

# Folio 11, Verso

# Folio 12

Folio 12 is missing from the manuscript.

#### Folio 13, Recto

01; Paragraph 1
10? 20? ofter 20 80 to tes 20 ofter 30 tes 30 tes

# Folio 13, Verso

#### Folio 14, Recto

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01; Paragraph 1
  Toosann ootox con sand sand
  o gliceg 201110 coll foliceg sa ollog
  98a110 08cc 9 Pcco 8a110 0808
  occlice of log etg sall sofoso
  tollocox 8a? 8ago tollogo
, gccog 017 ollo? ccoo? octleg
  offero sard eretto
```

08; Paragraph 2 Socto Paros coo coo ollario S وه والأمئى — و2 لاردا وحاله وهمحاله وهمت وهم totland and though and so so so of an ollar so 8crollerg 2crop 8g cheg 8at tollg — gliceg lig  $_{13}^{12}$  occed acg food acg for fly — acobard Cosarry ced fleed fleed offcoso

# Folio 14, Verso

OI: Paragraph 1
Togoto NO offodan O offodo do offeco danno llog odano
OI coro deco fleto ollo eso effeco offeco flo eso danno
OI coro do danno eeffeco offanno floro floro danno
OI coro do danno eeffeco offanno danno effeco offodo
OI coro fleto offeco eeffeco danno effeco offodo
OI coro floro effeco eeffeco danno effeco danno effeco danno effeco eeffeco danno effeco eeffeco danno effeco effeco danno effeco effeco danno effeco effeco danno effeco effeco danno effecto effeco effeco effeco danno effecto effeco effeco

#### Folio 15, Recto

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01; Paragraph 1
               The same of the sa
                egoll ex follo — ego formlot formlo
                 tollarry tollars those — sarry cros atto
                Seecall coosall org — Sox ettalld Sax
                toller ? 200? elle — 80110 elle 89
                 See Polla VI Cos — Carrollo Beal
                8arro chlarro cto locatto
                choches los lavis 2 - savo cheoso
                octravo Tollario coo - Osario tello o
                Sozald creffers offers - Sallid Especial
                SSofon For Co - co for Colland
                totto? Loo? Thereof cop — Aller Golfo? Look
                offet for the part of the part of the post of the post of the part of the part
                808 Fob solly — Fath Gillow Box 808
                toffcoo carry cog log sallo
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# Folio 15, Verso

#### Folio 16, Recto

10; Paragraph 3
Tho Po P daggdag of the of the offer of oldag

11
20 long to long the older of the older older

# Folio 16, Verso

OI: Paragraph 1
Terral No offeror enteroy entercy 2 teroeffs

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#### Folio 17, Recto

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O1; Paragraph 1
Thoose saray esarcos offess offes and offers sose exsetting

O2 esarcos offess for a thoose sor offers, too offers, osc

The ose of any tooley too and offess offers, offers, ose offers, ose offers, ose offers, ose offers, offers,
```

offerog effeat offarrid crog sarrid

90000 ರಾಂಗಿಂಳ

#### Folio 17, Verso

01; Paragraph 1 Parosox aro? Paro offgsall osagso gocco los polo pososto fosos osallo ०४८० ०४००१ ० १००० १००० १००० १००० Perox tros oftos oftos gorog crog sogorces florog sa? offig 8 6112th 90 6112th 90 90120 807 celles 3010 ceco? 02 3 a110 tolleg lear og 80 crogsavil 20 gacog dog lagg acoglario 8251108 20110 Follo Follo Follo tollaco tollovi? attacos acos og cog Moarry creffeco og coo? glico? cros cros ctros cros for ccos ogo ? offices crosally offices fforogo gostlo Folto ossa cllss costo Forse offercox crox offcox effect offercoxox toand Ear to Box to Potanid officer Sus 90 For 908 goon go 900000 90tho 8and cred toanno officed crox crox offices offices are to 980110 VILLE FOURT COPPOSTS FO FOROST FOODS tollece 8a7 eeg leco7 eeceog effeces effeg 80sllo 905 Fosllo posllo

### Folio 18, Recto

# Folio 18, Verso

### Folio 19, Recto

# Folio 19, Verso

08; Paragraph 2
1609 16cc9 to 8ccos to 16cc 808

9 9cco? off9 cco? off9 ccos off9 880?

8αιιν cco? 8αιιν φοίο? 9 οίταν

τοίτος 8ο? οίτος 8αιιν οίτος οίταν

12 οίτα οίτο οίτο ο βαιιν ος οίταν ο οίτα

### Folio 20, Recto

01; Paragraph 1

18 cools and go access to flower to flower of access ac

09: Paragraph 3
Tocoscol choso totlocos tollocos toctos collosso

ocoolid cool losso tollocos tollocos collosso collosso tollocos tollocos tollocos collosso tollocos collosso tollocos collosso tollocos collosso tollocos collocos collocos

### Folio 20, Verso

05; Paragraph 2
11 those tosecose offer those the theory offers of the second the second

### Folio 21, Recto

01; Paragraph 1
Toto? occorting of going of totog of totog of all local

22
20/1) october of going of totog of

O4: Paragraph 2

Desparagraph 3
Tocolledge offer according to offer off

# Folio 21, Verso

OI: Paragraph 1
Those of the state of the st

### Folio 22, Recto

- OI; Paragraph 1
  Tox oxcip toxox ctox story offs offox sall offox 2 octos
  ox old ctox o for tollows sall offall offs
  offs sollall offs sall offs tollows sall offs offs
  tollow sollall offs sall

- 10; Paragraph 4

  | The cooperation of the cooperat

### Folio 22, Verso

```
01; Paragraph 1
for 201, Nor of car off flee off so — 207 de to to to to for a for a flee off so — 207 de to to to sand off flee off so flee off so flee off so flee off so off s
```

olleo? tobo coop the op other of serving to lice of serving to lice of serving the open of serving the ollewing the old ollewing the ol

Tollerg ogetgg et og 3a\\\

to ettg er oettg follerg 3029

Sarrjacod gadgadod

### Folio 23, Recto

- O4; Paragraph 2

  tollog89 ollarre ollarre of tolloco of took sard of took of tolloco of took o

### Folio 23, Verso

### Folio 24, Recto

01; Paragraph 1 90 6/1/28 2022 22 92240 902 090904 toffarry cear osard offartheas offg 9 ctar ctar ollos tollar ctar of cectleago etteaf coof cecco 8a tog cro of cros office floog ollot 20stoof 20tho Fosts Sosso gobot goods follow good of tocat sally gos osarid cttas tosarttes sor sar 08 6/10 Plos 80 S 602 Sost Pallot Form Frollo Sossos Follard tolices tolices flog flos effes Soc of Scrop croft Sas top cicco too cear officer S 208 20 Sosso Sossition Eas offcas sas sas sas ollo posts pass offic essos 2 9 crcod crod ga//g crod S 909 log crog cos offarteg Sagczogso

### Folio 24, Verso

```
01; Paragraph 1
 Mcrosa? croctes, ofor toos crotes, oftoos, octobarrollo
 98ag2 ctro? do ao 800? offarre offarre offaros offaros
 octros oscesso Sususso sosto
 Sogs Cristo pollo sollo soso
 090 9001 Pora 9000
06; Paragraph 2
 950 Poss sosoll
 8020 Fab 8128 80208
 Poclo colleg coop Caro
 محمع حدمه مع حدمهم
offoco? effecos ecos ffcos
98a110 ccco? todog oloda110
 loto Poar ello do toller olloleras
 08 050 050 8080000 91108
 ಕಿದ್ದಂತೆ ಕಿದ್ಯೂ ಂದಕ್ಕ
 offccox 080118
```

# Folio 25, Recto

OI; Paragraph 1
Tocopes Cocto sall offices sall occopes offices con solution occopes offices con offices con occopes offices con offices con occopes offices con occoped offices con occoped offices con occoped occop

# Folio 25, Verso

### Folio 26, Recto

```
01; Paragraph 1
The collo osall to to of the os of the os
```

### Folio 26, Verso

OI: Paragraph 1
Tocosa? Tosa? 8\*\\\\) Tocolly Za\? &cosy offees offees to the case

Za?a\\? colless tolless offees are offees of

### Folio 27, Recto

8ccg lcco8 &o—flccg cog offg — ccg flogo

# Folio 27, Verso

```
OI; Paragraph 1
Toccot crot cro do Zogo dog offico? of cro? fico?cro?

3cro crita? offico do sca? croseo cfficoso dasso sca?

1cro fico scolico sdo sca? croseo cfficoso degs

offico cro ficocs cro cros fos — o offico soccoes

tollo difico Zocosa? difico — croffico efficoso

sdo fic??? officoso — scazo — Zofficoso

offico do offico deso — scazo — officoso

offico cro offico deso — scazo — officoso

offico offico fico
```

### Folio 28, Recto

O1: Paragraph 1
Theodor choose coeffes of theose do \nabla \nabl

### Folio 28, Verso

- O4; Paragraph 2
   The O1 \( \) coop coop coop o collo tollog ecog ecop sann tollog
   O5 of of og coop sann collon elland econ tollecop tollecop sann sann collon tollog
   O6; Title 1
   Sann collon \( \)

# Folio 29, Recto

### Folio 29, Verso

### Folio 30, Recto

```
office29 acg dotacg tacosg deg tag tag act so deg
gaosg acg alleg the fleeof acot deg de tecosog 29
acosg acg alleg the fleeof acot deg de tecosog 29
acosg cosg acg sond as not accg the flees
total total total total total total and
total total total total
acot sold total total
acot sold total
acot sol
```

### Folio 30, Verso

### Folio 31, Recto

- 06; Paragraph 2

  The offeodo toffedo toffedo cetar cedo rain das

  offeedar lain cettero decos toffedo pleedo cedo são

  cetar toffedo cedo toffedo cecos cecateo

  sant deco deteco offeodo

### Folio 31, Verso

01; Paragraph 1
Toda 2 ctccd9 offcd9 offcd9 foffogerco 2 afaf offcc9 dfafaf age

02
9ffcro2 octteg offcco2 ercod9 offcc9 ffccod9 da 1 2 ercod9 ffccd9

9ffcco da 1 2 ctcd9 offcd9 offcd9 offcd9 offccod9 offccd9 offcd9

03
4 a 2 ctfccd9 foffcd9 offcd9 ercda offcd ag octted9 offcd9

9ffco2 erccog af a 12

06; Paragraph 2
Too cost of the cost of th

### Folio 32, Recto

```
01; Paragraph 1
  Paroni deglicos sanos sand — do they off toto
  olfor olfcoor ctcor offin say — scooler follows
  tollow crop officer crop sog — soccosand sann
  2003 Pries — Pres ostilo Fotes Fors
  toffers toffers sand
06; Paragraph 2
  Les faces acces
  offox 80x 0x 8a17
  808 G1108 SOOT
  899 9050 8a79
 8000 Ctto 80110
  too cettos J
12
  ८०८वरारी टी०४
  offco ? og 8a10 8a110 cffc9
  Some foll decay sally cans
  tollog tollog 80117 og
  offers are south
  crolleg scrollg
 ८०११रे ०५० ८५०
  Pos scros sas
```

### Folio 32, Verso

01; Paragraph 1

""" [Γατοβαιιν αιος | Γατος | †0 | Γατιν βαιιοας — ο αιο | Γατοβος βαιιν οδας αιος | Γατος |

07; Paragraph 2

Il to cto? to tecannol officero? san — telleg 2 osad

office, sand sand effect sand—office, sand

toffice, eteg 2lleg croeffe, sand effect, and

to lleg cro? cros sand effect sand

of to co

### Folio 33, Recto

OI: Paragraph 1

11 Hooda? choose chicase chicase offerse offerse offerse offerse salling

9 floces to flar celle offerse tollarse offerse offerse offerse salling

901 offerse offerse chicase chicase offerse offer

### Folio 33, Verso

#### Folio 34, Recto

```
01; Paragraph 1
                         faccoctag ogar og — otoso ollcsoso acos ogogso sar otlco
                       offer tecoso ogas — octtees, offer coand ogter for
Totlc89 cc9119 cc8a89 — 8a7 cc8 offc89 totlog offc89 8089 089 lla8
                       91689 8a110 ccg a110 - cg ccttg 9
                         Tollicoso cooso coso og - olico a? - oglicooso olicoso say cocitios
                     offess acilics acilics ore — access — offecss access offes offer o
                       tolless sax cess - oxces - offce x3 - sand cells tal and agg
                       cholleg tollg — ogli — eccelleg — glicog tollegg 2 at ogdat
                         office of the second of the se
                       organo probably organic
11; Paragraph 3
                     There of the second of the sec
                       folices of lassann — orells offered of other of the same of the s
                       cca? allo olo? a? thos — tolla? cectles cesas thes tolla? a? sallo sas
                       911co 907 occco 099 — ollago licceso toliceso coo? a? a1110 sago
_{16}^{\circ} or ar of lar og ag offg — cross tollar cross cr
                       2a17 aclar aclo della moraces tolleg of accorates
```

### Folio 34, Verso

01; Paragraph 1

06; Paragraph 2
Torceda? care tollowed tollowed comp of ordanni occess of ar occess of areas of and offend

opendanni occess occess flowed on loces of tollowed ollowed ollowed offend

opendanni occess occess flowed occess of tollowed ollowed ollowed occess offend offend

opendanni occess occess offend ollowed occess occess

### Folio 35, Recto

```
OI: Paragraph 1
cffcoo ? cross cffcs croffs cra? 89

tollccand croffand tollcres sand

scrand cffcos tollcres fland cffco?

tollcres check crees sand sand

offcoo? crand crand sand

chocand floor croffs

tollcres fland sand

tollcres fland sand
```

```
09; Paragraph 2

**Ta\\0 σε ca? a\\0 σε ca? δε coσες βα\\0

**O α\\0 σε α\\0 σε ca? α\\0 σε ca? σε coσες βα\\0

**Cσε ca\\0 σε ca\\0 σε
```

### Folio 35, Verso

01; Paragraph 1 Far crop coo<del>ll</del>oor foaring tollar offace laro? offa 8cro? croffs croffs 8a11) offce toffce see offe ಕರಾಗಿದ್ದಾ ರಾಗಿಯಾ ಕ್ರಮಾಹಿ chos flacco allacco acteans Therofferor dog do co log sall oally food on colleg sons 8 tollerand ero leto & erond و90% 9aSon وುುನಾಗಿಂ toffaccanno acosanno S 208 GILDS GILDS GILDS مع حدم که مح حددم ک Morcail des Mas Sail والم حدوم والحرم الحر 980110 01/08 Sand sand cellago ceogo 8a117 tollecco coolleco ? Scrolleg glog crog sall रिठिव १८०० टिन्ड हिन्तु हिन 80110 CC07 CC08

# Folio 36, Recto

01; Paragraph 1

tea to a to a vo ceta con to the control of the

# Folio 36, Verso

05: Paragraph 2

1 fcco? cfco\\) δα\\) cfcca?

6 δα\\) cfco? δα\\) δας δος

7 folio licos olico? oc στο σταν

8 olicto offcos olico? oc στο σταν

9 licto offcos fos στο?

10 olia\\) olicos fos στο?

9 lictolicos δα\\) δα\\ςδ

11 offo στοffco offo?

2 offos licto offo στδ

13 olio στο cffcos offo

2 o\\) στία\\

## Folio 37, Recto

01; Paragraph 1

Thockog cannot tollor of cor off coro sanno offos or

9/10/10 cftcor offano tollon tollor offos tolland co offano

tockog tolland cftcor so cftcor offos

04; Paragraph 2

Tecoffeco sanno cftcor sar cor sanno — 98

facottag 8a110 ctog 8a2 acg 8a110 — 98 ∫ 919 tollag tollag? allog ottogg ∫ aco? acg tollag tottogo89 — 8acog 8a110 − 202 acg 1602 tollo2 8a110

## Folio 37, Verso

14: Paragraph 3
1608aN ctann ctorosc

15 2011N ccollo sann sann

16 tollor sann ccollo sann sann

17 2016cor tollonn osg

18 ootleeg sann sann osg

20 sann tlonn tollar sann

20 occollar o glor sann 2

21 occollar osg sann ctrosc

22 tollor otlonn ccollar

23 otlor osg sann

# Folio 38, Recto

01; Paragraph 1
flogo? ccocffc9 — olf9 cco\\) olfctog ogg olf9
02
olfctc9 cco892 — 9flo\\) offa\\) offa\\) offa\\

† olfo? olfa\\) — offa\\) † olfctog ccolfolfo?

9ccolf ccc9 cceffc — cc9 cclfo? ? osa\\\) sa\\\) 29
05
olfo? ccc9 lfa\\) — cco? effco sa\\) effcogs9
9cto cto lfo? — sa\\\) olfog ccoco? sa\\\)

# Folio 38, Verso

```
01; Paragraph 1
    office of the control office of the control of the control
```

### Folio 39, Recto

01; Paragraph 1

11c80 crcts ctrots creaved creaved creaved creaved creater creaved cr

Total control of the control of the

## Folio 39, Verso

01; Paragraph 1 ffant cego ffaglland of ant degllanned of cop llat of ann gog llg octog 208 ctg 1607 ctog tottg 16ctg og 16g 807 ctg glas og 16g 1/20 ctg 8arry coof offard offarry coops carry of arry offarry offosarry offos والئ لارده حوده ودعال ودعالو ودعال ودعال ودعال ودعال ودعاله ودعال ودعاله offic sollo glicos olícios costos las co effectes or ago coos

07; Paragraph 2 Parso cesso tollar ceceso orago — ogarre ollar ar octa? and option of the safe and and are the follows safe and 8a? a? glla? o? gllg ce8g tco? — tollar) a? ccc8g ogccet 20 Foges eather country of the pollet gases Parry again offag out offa? at offa? out offag 8ard orthicog officog — officog goodg offarrd 8arring obosos Grand offan

## Folio 40, Recto

```
01; Paragraph 1

Tecco licosa? axsoso — tollo ollax etso oxlicso ofece a? orsanno

tollar ollar olles sar — olleco lianno ollor eceso ollar araxor

et o tollar eeso ecettes — offor anno olloreco tollar ollar

or anno ecelloso sar — tollor ollanno ollar ollo ollores ox

sollar tollar ollar — ollor ox eceso tollecs ar ar or sax

flor or ar ecollor ox — oxeceso tollar ecso liar oranno

ganno ecellanno ollo — oceceo
```

# Folio 40, Verso

```
OI: Paragraph 1

Tocceda No occtanno ogego

Tooda? tollanno og arag

2 anr and ollanno ollag

4 tlaranno ollanno occtag

2 oganno ollar ogg occtag

4 toccedanno og occeda eanno

4 toccedanno occeda eanno

4 coedanno occeda eanno

4 coedanno occeda eanno

8 coedanno occeda eanno

10 tlocedanno occeda eanno

11 coccedanno tloceda tollanno oranno

12 coccedanno occeda eagor antica

9 occelloca eanno ollanno

12 occedanno ollanno

13 occeda tollog occeda eagor antica

9 occelloca eanno ollanno
```

13; Paragraph 2

Thocco cross licos of cross tolloss— sand crotand

14

2and o garce licross offer tollows so— tolloco as aresp

tollows toss of anni offer tollows so— tolloco as aresp

tollows toss of anni offer tollows tollows

tollows tollows tollows tollows tollows tollows

thocos tollocos tollocos tollows offer aresp

2and offer offer offer offer aresp

2and offer offer offer offer aresp

taces are the offer aresp

## Folio 41, Recto

01; Paragraph 1
The proof of the state of th

06; Paragraph 2
checked forces tolled checked office — celled officed officed checked checked officed folled checked officed folled checked officed folled checked officed folled checked officed checked officed checked chec

## Folio 41, Verso

## Folio 42, Recto

```
01; Paragraph 1
           Lo otalle otto otalle offices
            20x Marry craft officerry sarry
           Todo cellar collar can sag
            Cor cellar collars sar cteann
tollar croctly crotlor crop llarg
           808a10 cca8
07; Paragraph 2
             र्रैन्ट० ८, १८ वर्षा के वीवर्ष के वर्ष
           office office for for the Sun gorge
             followof officers color for south
            colfg 80g licico ctto? offog cttog cog — ctog 8avi
            totol cro crosg sarry tog officeg sal - cro sarres
            Screeg crop chor crollann croelly sc^{+}9 — sand sag
tofor tog toff tog tog sall sall 2- ecas
           to the configuration of the same of the configuration of the configurat
            Possos 035516 08055
16; Paragraph 3
            Tosally coso cally the occo coso
           Lottog Log cello sand colleg celland
           toso como offarro do líceo coo? ard
           So S offer of the 
           tog tog tolly ollog to tog tog tag
           टि०६० ८०० टि०१ ती०११० देवर
            Personal Report Report Real Sons Real Sons
           Sunspell soft soft
```

## Folio 42, Verso

```
OI; Paragraph 1

There offe decey force than it decos? — cros cro? dand

decey there of the decey cetters offe dan — dand offer dand

do crothody crothor offer cros cros — ds crether offer

tothers criters 2a? ds — odans — glices offer dd

collect cres crethad — 2 a? — offer crethand

offer collect creentar — 29 — 2and offer dand

collected feeces d — crether dand

208as 2and
```

10 Paragraph 2
Tockco? Lo car cultury tollos— Lo ctuco Purg
2007 offices and coultury tollos— Lo ctuco Purg
11 to and tollous llang areas offices—8— Lug fleand 8
12 another one of anni officent offices fland 9
13 co area fleor chec area fland — another fland 9
14 tollous area fland after a fland — as a collous area offices area fland — as a collous area offices of

### Folio 43, Recto

01; Paragraph 1

Tarosanno offices of offices of offices offices offar offices offar and offices office

07; Paragraph 2

ftec29 offc9 lit39 offc89 lic89? offc89 ce89 toctteg 89ff989 ftc89 lic89 8a8 g offce89 ce89 ceco89 te9 toxxxx teccelly ce89 8axx te9 9flogo? offaxxx og8 8te89 toffc89 80? cece9 o8axx

10; Paragraph 3

Tabar ces oso totleso oferso toetherso oferso sarry tolleso sososo totlar tables and the central solution of the central solution of the central solutions are the central solutions.

#### Folio 43. Verso

01; Paragraph 1 foseoft—o-costle civil saves select of aloos stee field alooted Follo obsollo office of 16089 16x89 toll crootheg cellg ollg cellg olleg glann crog olg barg 8cho glicos coco and to forthers coco follar coothes all tolleredg of agodg offedog ereffedg ertleg

06; Paragraph 2 Toglice 39 olicog tolicog tecos olicog tecos ofico 8000 olico Sollo Give to the partie of the position of th offer 80 2020 all oction

Foto count counter count of in Francisco Con Fasza Fa Fon Fall 9 &cco 97-a17 offices accoss at acco toos acettes aces acousts files 9 Lec 1689 8a7 cecy totlesg ellarry cecso effecy offcox of arry osary 862089 Tc89 ctrc89 collected 89 Mco89 offc89 collected agast 809ooflo coag coago officed as officed coago coago officed Sorbit cos toglicos plagos cos saros, tolicos los 8aros 1608 Saros os ccco allo Graso Graso go

## Folio 44, Recto

- os; Paragraph 2

  flog chocks toffices cool circles checks office sall volume

  school offices check toffices cool circles toffices offices sall volume

  toffice of school toffices ooffs cool
- 08; Paragraph 3
  They offers offers offers fores of cos of sliens

  offers offers offers follow tollow tollows

  tolleror offers follow erolls erolls eros sas

  offers foether offers

## Folio 44, Verso

01; Paragraph 1
The to tother effect sero? offog dog flog tother offogs

90g flog ereog tother dags offerog sall described tother a?

10g offero? deffes offog sall effects

04; Paragraph 2
go Magod Larry Loo? Loo? 20089 Llo Loo offices officed officed

The cost of the series of the

## Folio 45, Recto

- OI; Paragraph 1
  follosas carthes offs cico tot cra? ofcras ofcra? ofcra?

  cco? offs tollos tollarry cros cros slarry sar of

  to crothes locos sarry toarry offs crarry slarry sarry

  go? of larry sloos sloos craf
- 05; Paragraph 2
  logato teol leco 16 oterasso otes tolleco sossavi
  offeral offeral savid offeroso flecosos otes salvo
  genal tol 9 lal sal

# Folio 45, Verso

02 cco2 offccg 80110 8ccox89

```
Olis Paragraph 1

If or ary citle log cree the open the
```

### Folio 46, Recto

- 01; Paragraph 1

  \*\*Teccoeffeg folless exells so exelfer oftenls ocarro dece folless sarro dece so sago
- <sup>02</sup> Posall &ccoso toop toop acolleoso aclies sall telescal acso xop all telescal accepts accept
  - ್ಯೂ ಕ್ರಾಗ್ನ ಕ್ರಿನ್ ಕ್ರಿನ್ ಕ್ರಿನ್ ಕ್ರಿನ್ ಕ್ರಿನ್ ಕ್ರಿನ್ ಕ್ರಿನ್ನ ಕ್ರಿನ್ನ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕಿಕ್ಕಿಕ್ಕಿಕ್ಕಿಕ್ಕಿಕ್ಕಿಕ್ಕ್ ಕ್ರಿನ್ನಿಕ್ಕ್
- 06; Paragraph 2
  The of object of the object
- 09; Paragraph 3
  The 30 the 30
- 11; Paragraph 4

  Total Paragraph

## Folio 46, Verso

Todg xecod gitag etcod gitag dann tolledge ofter gitag gitag ofter gitag gitag dann gitag ditag dann gitag d

## Folio 47, Recto

## Folio 47, Verso

```
01; Paragraph 1
                  Pércott occo? occopers occo Pag — Pago
                  8tcc9 to the office 8a1189 co79 - 8a119
                  tog ca? offcog 80? offcog celleg — 8a11)
                  tollog charage log cho lacare tollo - alla
                  و٩٥٥ — و٥ وځه وهه ١٥٥ خيځ وومځه
                  \cos - 8000 - 71/8
07; Paragraph 2
                   Poosarry sart soffen
                  8a11) ccolla? cco8agg Sag
                  tofferces erells cros cros sand
                  For every \gamma the contraction of the state of the contraction of the 
                  offices are also are less than the state of 
                 \text{cr}_{9} and \text{flee2}_{9} and \text{cr}_{19} and \text{cr}_{19} and \text{cr}_{19} and \text{cr}_{19}
                  820 8ann coscilo canno — 8ccco ollaga
                  cros effecto
```

## Folio 48, Recto

The sand of the sand of the sand of the sand the sand the sand of the sand of

## Folio 48, Verso

```
OI: Paragraph 1

The coders deceds the code for a vivi officed deceds officed deceds offave of the code officed for a vivi offave offa
```

07; Paragraph 2
Tools and office of the control of

### Folio 49. Recto

<sup>2</sup> There is a curlicue above  $\uparrow \circ$  as used in  $\mathcal{L}$ .

<sup>3</sup> There is a curlicue above the first c as used in  $\mathcal{A}$ .

<sup>4</sup> There is a curlicue above to as used in &.

<sup>5</sup> There is a curlicue above  $a_{\lambda}$  as used in  $\mathcal{A}$ .

<sup>6</sup> There is a curlicue above  $\uparrow \circ$  as used in  $\mathcal{Z}$ .

### Folio 49. Verso

01; Marginalia 1 02; Paragraph 1 Proposition of the sock of the tollar tollaros do atto color coloollco3-to colltog 8a89 Log Losa IV toffca 210 toffers exolfers exolfs  $^{11}$ ट्यीट्य ट्यारिज 208 (11/28 022 S222/10th ೦೮೦೪ ಕೇಂಡಿ ಗಿಕೇಂತ್ರಿ fo fc  $osa <math>10^{12}$  cc fc  $osa <math>10^{12}$ Scrop officer sarry crolls occollecg offices barry collogo tollog crollocoso offog loco? crog sall 15: Paragraph 2 Parlica — oSas secosar officers 800 8 crog crollerosarry crollery flerog — offerollog The office of the party office and the state of the state chos osh (vio osos folia acos acos acos acos acos — acollacoso colleo do aco? aco! lact ao? 8 arry 80 — 8arry toll8 oally org sall bear organished - organished tollcarry aco acof acollect laccox sary — aco sarrry collarry co 8x2 crazrry sarry crary 89 — creffco 89 S of S only S only S only S on S of Stoffacos aco aco acollaso aco sas — acollos Orrab posts 9 ostlostle

<sup>7</sup> This line is preceded by a 1.

<sup>8</sup> This line is preceded by a 2.

<sup>9</sup> This line is preceded by a 3.

<sup>10</sup> This line is preceded by a 4.

<sup>11</sup> This line is preceded by a 5.

<sup>12</sup> There is a curlicue above  $\uparrow \circ$  as used in  $\mathcal{A}$ .

## Folio 50, Recto

## Folio 50, Verso

11: Paragraph 1
11 They so sea? collects tollects offeres tollos cor ofar tareas
12 Theosand occes olland coes tolles tollass energy offeres olland illose energy olland
13 Toeres tolloss energy collects agos ollects ollar energy or
14 Sar toand osand osand osand os ollects ollects ollar energy or
15 generally energy tolland tosand ose ellects ollects ollar energy ollects
16 Sand lesand ollar enosy tolles ollar ollects olles ollar energy
16 Sand ollar ollar enosy tolles ollar ollects olles ollar energy
16 Sand ollar ollar enosy tolles ollar energy osland ollar energy
16 Sand ollar ollar ollor tolles ollects ollar energy
16 Sand ollar ollar ollor tolles ollects ollar energy
16 Sand ollar ollor tolles ollects
16 Sand ollar ollor tolles ollects
16 Sand ollar ollor tolles ollects
16 Sand ollar ollor ose oscos ollar ollar ollor
16 Sand ollar ollar ollects
17 Sand ollar ollar ollects
18 Sand ollar ollar ollects
18 Sand ollar olla

<sup>13</sup> There is a curlicue above  $\circ$  as used in  $\mathcal{A}$ .

## Folio 51, Recto

01; Paragraph 1 16 Passers tollers offered offeress Sccosa vo checoso cheoso coso 9-800039 cttcg offg cttco8a? tolfg 8a11) office offox occopy office occopy ffccoog tosand effcg toeffcg ffand goodarid ocollarid gloco-darid glags goto Par crotheg loto tollog tollag octog osall checo checoso tollog offoso Those sand sand tocosas sas toso tocthas offerox 807 decy tolleg forcy dox offat Therosally effects of tollog offers gocco officeg flog occas officed footficeg focosage oall ottog glocog offereg etcosall glogsg 8axxteg + 68axx 16axxx8ag - cto8ag - 7 ag - 8agtollog croof offices 2 of asso - offer

## Folio 51, Verso

```
To to 39 to 10 32? to 30 to 10 32? to 30 to 10 32 to 30 to 10 32 to 30 to 10 32? to 30 to
```

## Folio 52, Recto

OI: Paragraph 1

180 Nocetto 90th 10 911a 2 da? to 193a 2 2 office office 8a? 9119

Office do? 9110 839 to 119 Nogdag office 2 dag 2 — offa? 3g

16 to office 9 to 119 office 9 through the object of 9110 8ag — 9th 939

g do the to 110 to 110 to 110 9 ag 2 off 9 dag — 9th 939

office 9 office 9 office 9 offog 911a 2 — 911ct 8ag

office 9 to 110 to 100 ag 39 to 11ag office 939 — office 930

to 110 to 2 office 9 dag 2 do 2 dag 3 through 3039 — 911ct 9 dag 3g

office 9 do? deg 11og 2 through 3030 — 911ct 9 dag 3g

office 9 do? deg 11og 2 through 3030 — 911ct 9 dag 3g

office 9 do? deg 11og 2 through 3030 — 911ct 9 dag 3g

## Folio 52, Verso

07: Paragraph 2
Teccos cosonn effect and

108 flosand effect to flees 2 or

209 sand effects eros to floos sand

10 solles to floss eros 2052 and

11 sand cor tosand effect 2 as

12 tockar effect silves silves sand

13 silves offers silves sand

14 osar ercollor effects

# Folio 53, Recto

## Folio 53, Verso

Olices dann decilies efter offices dann to fores

olices dann decilies efter offices dann fores

olices dann decilies efter efter dann dann decilies

offices dann decilies effers dann dann decilies

offices dann decilies decilies effers dann dann decilies

offices dann decilies dann effects

offices dann decilies

offices of eccal eccos eclips

offices dann decilies

offices decil

## Folio 54, Recto

## Folio 54, Verso

```
01; Paragraph 1
  Percosar cetax oxovid effecy sar tolleg effeccaixo Zax
  8cccarx ctarry C ar cccor tosarry cttargs oftcag
  9a18 9lla Pollo craz cross oflossas cross axs
  8a? co? cello coop ollarry ceoso ceop 80
  osallo Grasof tollar cco 2 as
  Thos cros croctes tosain locoss
  8all chos foothers all tollers
  8arro 8arg tollarro offcas offas og
  98a117 tockers today offax offax 89
  log clarry dellas das toothes
  oarry toether tollar
100 cros officos S
  goog offag gofficg
  Passas Pall Costs Fall
  of agerg offag 80g cro80g89
  8a11) ccox ox8a11)
```

#### Folio 55, Recto

07; Paragraph 2
There 30? eccogife 39 ecosy lice 39 toller 39 toller 39 ogifa? 3 and see office of a cecific 3 and tollor 3 and 5 and

## Folio 55, Verso

07: Paragraph 2
office 8 far 20 eccolleg of art — co feets feets at asso safe safe

100 eccs follarid offat for — offat! eco effeat flagosg offatg

9 flatig folleg offar eccs of — of arid offarid offatig

10 oarid or o arid offario offat or

11 glarid eccolleg ors — arid offat or

12 glarid eccolleg ors — arid offat or

13 sarid of ecclleg or feeter of a arid offat

## Folio 56, Recto

```
OI; Paragraph 1

offices accilly offy cices any gar office anot any any acollected and acollected a
```

glicor olicig acoligii aco r oliarini
de facice sarri attor aco r collor

de facice sarri attor

olicis acolicis folicis

tanda acolicis folicis

folicis acos acotos acos attor

folicis acos attor

colicis folicis care care sarri so

de colicis folicis care care sarri so

de colicis folicis acor acos acos sarri so

de colicis folicis acor acos acos sarri so

de colicis folicis acor acos acos sarri

offecco floog Barry

## Folio 56, Verso

Or: Paragraph 2

| The offers of the operation of the op

## Folio 57, Recto

OI; Paragraph 1

Tocco cffice osand accoff acoso acoffice so accoff acoso gosan

8ant and accoff acco cffice accoffice accoffice accoffe accos accords accords.

06; Paragraph 2
The coday of any exertices of every so the sand of or any

8 and every to the code every solution of every solution of or any

8 and every to the code every e

## Folio 57, Verso

01; Title 1 8a \ 209

<sup>14</sup> Apparently, R2 repeats the sequence "o g & ? A x If % If % \*\* 9 c \*" four times.

#### Folio 58. Recto

01; Paragraph 1 162 crosts totago offoragers colors cops offago 8ag ~3 8chosag of office ogcical craft flag offas ogciollag S offers barages offer flag collo offers source 8ctor crogar and charge charge sagers offcos sag choragas 407 ScravPag offar offar crar ar ar crar araro offarar crag Potato ossilo forces alla escolto esperio costas Zavv) croslico sax cos costigos gostos coso o fico Mogcoctag ogcoas 8ago? org offcooling offco plag 89 agas Pagas Gilb Coop office front Gilbs! ooffe coops Gilbsoop flag at ag char criftereg offat agog offag creag tollarid offe 20 toctcoso tollagas craveag toctlario otlagas sagor orar toa? a? crossas offascras sas crosso offasos av?asso ta? offar Local crooped officer croad croop crax cravil or ogo Laray ollar collarid officiaso sas cras ollas ollasas oso cras 8all case totally crosses 80 ccos

16, Paragraph 2
16 Paragraph 2
16 Paragraph 2
16 Paragraph 2
17 gtogto ar ar offacto toffocto feeto stage fossage collo offo
17 gtogto toffoge sarrow offage sageness toffo sage offeeds a collo offo
18 sarar toge ceograsse ceograry osarrow offage sages are are octage
19 flosage toffee ceage sage toffages offare sages offagear are arosary
10 gtocoffee ogeoco ogeoco ogarro ogfoge sarrow ogfoge offagear are arosary
11 flocoo occor toge sage toger toffare sages floor offagear ceoffor ogfoge offo
12 scoop offar ceog sage toger toffare offagear ceoffagear
12 ceage offar ceog sage toger toffare ceoffor offagear
12 ceoffagear
12 ceoffagear
13 ceoffagear
14 flamar officeo officeo offagear
15 offagear
16 offagear
16 offagear
16 offagear
17 ceoffagear
18 flamar offagear
19 flamar offagear
19 flamar offagear
19 f

Posar tolg officea ofasard officegarry offsarry gh for Good Franch graft grafts of the Fallspare ofto Foothg osospilo osasas osas cos osasso osasso osasso 0802 crcof Saf agog 8agg crcof crof af agsaf crag crcag Sosg offor ar agon tollagor crop gard crops offogces offagog obtcoop flarry ollago coop opellar offarcoop coop flag tollag otoffago tollarry cellages tollo ear as ceogliago tollages 26 Fallot example of collections Social Spores conflictions 92 toog tollog sagog tollagog follago lagsog offartog offor the facos to 160? the factor that the state of the Starry collar coeffer tollo coeffer officets toellar ofostico? oscocto ctor cosos cosos culavià ostcas polizolle Gilas Sa Folie este Sosso explio Sossogs office soffax offax ogos choos toothey tollagy lagor sagar 9709ccc9 a7ar7agg fco89 tlcagg agog2 glagg la? a7a8 Scrop crollag Zarry sag ollagZagcrcg

## Folio 58, Verso

01; Paragraph 1 They tolker ofand ofand cooling ofar ofar ofar ofarson offso soza sa Siation oscallo Civis oscallot o siati Civisas so sias flosag totlavy co-ctleccy tollegg olleg tollagerag sagg af avg of allo offato gallo pollot offatot as offato offato tarre otarar totlarre togg totlarre gtollagg ollag tollagg ollagg tollars of ago coof sarry copy sax offarry off faces offago offg g Barry tollog tollar goods tollagor occope officer arry ffarry cffcco gaggo tollard agad offag arry offarry offarry offarry Zagag togallo cootheco florogo tollallo tollalloo ofcecco ogago 98av7 2co 18co cffcogo toffago? toffavvo olfag olfageso org Spatto Vilabous Filair ofos Vilairo o Fofiatot Follaria ofices of celles occas tolles occas so flogant offoces floags often focca? aglicand offag coo soo olfag coeffeg flag cffceg lla? ta? are sold coop occar to totlag crop thagar that ar oftag tolloring agas S and toas flagoros ollag or oflag 8ag offarrollar offaso tollar crass crocettics orass flarear as Barry agag Bag tolling offag crosog tolliag croop cros officas Marry cras car tockes sar and ockers tokers toand aras ollar crollag coops tollor ogliag croop sar crolleg ollagerg Thosald as offically follows office coop office as creeky colleged of oparo Posaso Follar gollo Svalto Giveso Gosaso Graso ospollos coos Follox

23; Paragraph 2
Tocoto accopilico acotagación accopilicas tolla? assavió tollaga? sas

tollas savió tollas acas tollasación ollo? avas ollo? avas ollo? saso

tollavó olloo? accopitos olloso tollaso tollavó? tollavó? tollavó? tollavó?

glaso tollas os as tolloos olloso ollos as acilar tollavó asas

tollar ollos ollos ollos tollaso tollaso osavió tollar accor osavió os

gacco allos ollos ollas otlaso ollaso ollos? acco

19: Paragraph 3
Togag licco ogcectlecg saga? gliccosg ceoa? ctea? gtan? agag
30
sann ceontleg glicg cellig tollag tollecg olland ollar og sag
31
Tileccor ceor liar ollag tollecg tollag ceog tolland ar octlageeg
32
Tileccor tollig tollar tolleg lig gliar cecag ollag liog ogcecsg
33
toan2 ceog~ar cecg

34; Paragraph 4

Thoreco lico!a? totecor sa? artico oferar coeffe ollars

sann offand olland eco olleco tollecod ora? cto sors sarperd

fleecos olleo? oeffes tollar ollar cholles tolles sara?

orleco olla? a? ecollo offan? offor ecolles ecollo sara?

ollecos tolla? tollo lices tollor ollo? ecollo 2989

octo? tolland ollar cto? ecc? Za?or2

# Folios 59-64

Folios 59–64 are missing from the manuscript.

# Folio 65, Recto

01; Label 1
offarg-8ag agag

## Folio 65, Verso

01; Paragraph 1
ctop forcottog 89 — socitary collo toto for cottog
80 to toto foto for cottog 80 aras
916 of collo foto foto foto foto fotog 80 aras

04: Paragraph 2
1 flocc89 offo? &c89 — office9 &co89 folic28 offece9
05 &cc89 offco89 folis — &cette9 coolig coolico89 offc9 89
10 offece9 &cette ct9 — offece89 cc89 &cette89

#### Folio 66, Recto

```
01; Label 1
    2959
02; Label 2
    SapS
03; Label 3
109
04; Label 4
    895
05; Label 5
    91609
06; Label 6
    Sabd
07; Label
    Sast
08; Label 8
    ťa?o
09; Label 9
1011c29
9 0 0 0 11; Label 11 8 0 0 9 9 12; Label 12
3; Label 13
70 lag
14; Label 14
25; Label 15
    PaPag
```

16; Marginalia 1 9 ο 2 & 9 8 ο 1 ⊂ π α \ 2 8 & 9 1 1 9 ο 8 2 1 σ \* π 11 ο \* π 2 11 ο π 1 8

24; Paragraph 2
Thoctices son liceosy tolicosy tolicity totally sale offosal oligs

3 took sale san lightly tolightly tolightly tolightly tolightly sale olices they glione

4 took sale sale sale sale tolightly toligh

34; Paragraph 4

37; Paragraph 5

Thoseccy theosy case theosy decise delicety case decox deox these sages and the decise the decise of the decise of

49; Label 16
offeco of anno college of colle

#### Folio 66, Verso

01; Paragraph 1
offcodoff ccool occords offcodoff offcod

06; Paragraph 2
The cost of th

## Folio 67, Recto 1

```
OI; Paragraph 1

The cooling of the
```

08: Label 1 offax89 09; Label offolfo 10; <u>L</u>abel 3 911005 11; Label 4 9 1 c 2 a 2 a 12; Label 5 305a115 13: Label 6 905 posto 14; Label 7 910 8a119 15: Label 8 8DS0055 16; Label 9 9/cc089 olcos Sas 18; Label 11 olicco Sa? 808089

```
Folio 67, Recto 2
```

```
oli; lite 1
olico2 olico2
02; Paragraph 1
  98 6128 G112801
03
  6111
04
ccoccy ?ag

808a\\
808a\\
106: Label 1
06; Label 1
  Sasollo
07; Title 2
9/1009 aPas
08; Paragraph 2
  ofoscios Savy asso
20cc9 80110 0889
809cc2089
  9asollot
12; Title 3
  offccc9 So!2a112 89
toteg sann sag
  900008
17; Title 4
209 22 011a?
ccocteg SaPax
20 20 08 08 08 08 21; Label 5
  ollag
22; Label 6
  Sassas
  Follos poollos
  Ox 105205 passofos
  90 90 90 PBOS
26
98a8
27; Label 7
  208016
9/10089 0/1009
29; Paragraph 6
9/10007 9/10 9/107
28; Title 6
  80 6110 Footho
31; Label 8

offard ad

32; Label 9
  fox sariv
```

```
33; Title 7
   8ccc1189
34; Paragraph 7
91089 2a110
   octod odod
36; Label 10
of CC 0 9 8 9
37; Label 11
   089a960
38; Title 8
offceoffceco offceo2
39; Paragraph 8
   011020 910 9080 90908
40 80 MaV ος αθ οθας
41; Label 12
ο Μαθ ος ορθαν
42; Label 13
   ccosazs
43; Title 9
CCICC8a?
cros 8x (v) olfog
45 offor 8a110 or
46; Label 14 offoa110
47; Label 15
   911000899
48; Title 10
9 Paragraph 10 offog802 octtoge
So5 ccc8a110 80
offco2 0110 06
52; Label 16
   Seattoo
53; Title 11
53; HITE 11
glicoffco olla?
54; Paragraph 11
gflocoffco colloso
Socto cros ochto
  890 So Gilb Gilbs
57; Label 17
   Sploto
58; Title 12
V///280 So 0801110
   02050 Saslag
62; Label 18
97a\V
63; Label 19
   09020
```

64; Ring 1

Cafo Faso estates some sale of some solo of solos fra S

65; Paragraph 13

8a? assall godell thos godell total? offal? offall godell godell

```
Folio 67, Verso 2
```

```
01; Label 1
offa?a?a\0
02; Label 2
offcco2a\03; Label 3
  010000
04; Paragraph 1
Thos of and an othogo caxon
  Follo Fo GIIABSON GIIAB
06; Paragraph 2
olicco Isoo Xsakak
  980-94 ogagasc osas
08; Paragraph 3
  828 Fallas 8128 Saoll
  Sogar Ctco Sogag 8ago
10; Paragraph 4
olcos cros at olas—say
  Poarro ofag og ofagarro oa?
12; Label 4
offcco ocfcc89
ollaPagett ogllao
16; Label 8
olfg8203 oatoagg
occ class ologang
19; Label 11
  Proposition Possons
20; Label 12
  grass — Gilbos
21; Label 13
  2090 - c90S
```

## Folio 67, Verso 1

```
01, Label 1
8ccc29lcc9
91co8a7
03, Label 3
8ccco2lfog
04, Label 4
   82Sooth 30
05, Label 5
   Pocra989
06, Label 6
  260220
09, Label 9
8a \ ? | | a g
10, Label 10
  ofaz a79
11, Label 11
807 ccc lagag
12, Label 12
   ollogageg
13, Paragraph 1
   Toosan? offer ochecoso
14, Paragraph 2
   800000 to 1111000 0000000
15, Paragraph 3
office o aco sall offices offo
17, Paragraph 5
9/1cc9 tolicc9 colicca?
octoco locoso coco 8ago
19, Paragraph 7
olla? coo tollocoo 8allo
20, Paragraph 8
  essilo essilo Sisso
21, Paragraph 9
   208/108 Sus Girosoons
  23, Paragraph 11

0907

24, Paragraph 12
  especial follogians
25, Paragraph 13
  officero ecoso ecoso
26, Paragraph 14
offcco80? 08ccc9
27, Paragraph 15
   crocffco crocffo
28, Paragraph 16

9ffccg fccoccg 8ax7 ocficg
29, Paragraph 17
   16ccc cg ccg 16989
```

## Folio 68, Recto 1

```
01, Paragraph 1
                            possilo possible poss
                            8000 0000 Follows Follows people position posson people and position of the people and p
                              9807 changed to the same of th
                              8000 Paris
   05, Label 1
                              919
                              69p8
                              حرارحهااهه
 08, Label 2
                              ollosas\mathbf{9}^{15}
                            08cccc<del>11</del>c9
                            ೧೪೦೦೨೦
                            olloazo
   12, Label 6
                          2 to 0 to 0
 13, Label 7
 14, Label 8
911cco89
   15, Label 9
 16, Label 10
0¶989
17, Label 11
                            900910
 18, Label 12

21cocffc9

19, Label 13
                              Swilello
20, Label 14
Sello
   21, Label 15
                            9999
 22, Label 16
                              octfcg
   23, Label 17
23, Label 17

ofc.co?

24, Label 18

off.c.80

25, Label 19
 offog
26, Label 20
offo?
   27, Label 21
 0110a7
28, Label 22
                          ollogog
 29, Label 23
9 CC 89
30, Label 24
1100008c1109
 31, Label 25
     32, Label 26
                            olccosag
   33, Label 27
   34, Label 28
                              0110890
```

<sup>15</sup> Here, from L2 to L27, the order of labels has been rearranged so that they can be read (roughly) from left to right and from top to bottom.

35, Label 29
offoct c89
36, Label 30
802CC89

[37, Label 31]

olfg olfa89 olfa789 †\*\*xca7 og89

## Folio 68, Recto 2

```
01, Paragraph 1
        The coop of the party of the pa
         8crg gliccorg 8crg/1g olicco8a Perco8ax crollecg erco? oPa8
         Taccol office of soll of the soll of the South
         crof crc29 ofice foccettes forther tollicox crcoax scropax
          faccocy accoss — San 3 gloosy and San 3
06, Label 1
         olico olla? ollo ollorg ollaczo tolog ccco tolog
07, Label 2
        offogcccffcg
 08, Label 3
        ccco!20g
09, Label 4
        θι ι αδο
 10, Label 5
        وحدوح
 11, Label 6
         9085
 12, Label 7
8CC09
13, Label 8
        168a7a1189
 14, Label 9
        odercrsco
 15, Label 10
        90509
16, Label 11
offcoog
 17. Label 12
098CC9
        ccosa?
        ၀ါတ္လင္၀၀၀
20, Label 15
8CCC0989
 21, Label 16
         90000
 22, Label 17
 offocco
23, Label 18
         0802270
         9250327
Pososson
25, Label 21
26, Label 21
27, Label 21
27, Label 21
         010000
 28, Label 23
        حدہ9مح
 29, Label 24
         ರ್ಧ
 30, Label 25
         90222210
31, Label 26
         ollog ollog ND ollog ollog occoo Pollog ollocog coco o llonn
```

## Folio 68, Recto 3

```
01; Ring 1
                    osces office of the cost cost of the cost of the cost office of the cost of th
                    ccooling country of the country of the color of the color
                    forcetters once offices of solutions of the state of the 
                    offcoscics offcos tollos collo sos sascicos offcos 15
02; Line 1
                    8ccc9 tolleg 8ccc9 8arro offcrag
                    flocco glicocic tollogerco tollerso
                  Toccos cocto tollass
                    8ccolleg 8a117 coll octrosa?
                     tollog-cescos tolleg college olles
                    800 Sooto collo collo costo
08; Line 7

Toco89 tollog 8009 8009 off80989
                     Person offices garry general offices
 10; Label 1
                    90089
 11; Label 2
                     ogaccoa
 12; Label 3
                    80008-800
                    09090
 14; Label 5
Ollo
  15; Label 6
                 ollogeeg
 16; Label 7
                    وعائي
  17: Label 8
                 وااو وهي
 18; Label 9
                  898988
 19; Label 10
o cffc 98
20; Label 11
olcco89
21; Label 12
                    01983
22; Ring 2
```

080 20110 Propose soul on Feb 2001 collo collo collo

## Folio 68, Verso 3

01: Paragraph 1

flaces actag sarres governments and flaces acceptances acressed acceptances ac essos offoot ossito

Possification and tolly decay officer was decay sail decosy tollog all more ctcollo ollo

80!S gostilos solt este — Gile — Giles Galla Fos sos Fos Fos Sallos os

Secus foethers cross

05; Ring 1

Grallossof Srab osos Fab gostlo Grallso Fo! S gestlo Sabsos offors Sos gotto ollo office of the course of the Sassage of the Sassage of the sale of the course of the co pollo po posocito opposito Gilas Socito peocito postor Februario pollo positor februario pollo p oglig flog acog office acolfacts office to fact of acog actif

06: Line 1 occco log tollag ollcog

tollcoso ollco acillas acillos ollagoso aciso

Lockets Locket of ollogous

offcog accosa toglicco oacifg cooso offatso offo offos

10; Line 5 ? as cegars Seechos offcodo

occos foces leoso acollo ollas acoso so offect

98a119 of coll offce98

91/12 possilizable polloss busilis poslicaco

execulty example for Forth Fight so essent collections and example example 980008

15: Label 1 off0809 16; Label 2

01/00/08/8

17; Paragraph 2 8007 911cog 80709 8099

. 2009a117 cttcco osctcco 89

9 Pcox ctrcctco 8a?

137

## Folio 68, Verso 2

06; Ring 1

officed of the soll of the sol

15; Label 1
9! Nccctog — 9! Tcc9
16; Label 2
01602c9 — 2a! ?9!
17; Label 3
016co92 — 0?a2ag9
18; Label 4
016cc89 — ccctog

## Folio 68, Verso 1

01; Ring 1 cc2 a \ \ P og cco a \ \ \ D office office of the Solice of the Solice office of the Solice office of the Solice office offi

costisted offices of costisted of costisted of costisted of costisted of costisted offices of costisted offices office

#### Folio 69, Recto

05; Title 1

```
01; Paragraph 1

Therecol deg offann energy deg folloca! desg og off offag lar

8ann deg offann energy deg folloca! desg og off offag lar

8ann deg offann energy deg energy offag energy offag energy

9! energy offann offen energy offag energy offag energy

9! energy offann offen energy offag energy offag energy
```

```
219 cell 12/9
off!ocffca?
911c9 ccosa8
08; Title 4
  0855 055th 95 8108
  912 So 912 80
10; Title 6
  ces of oss
  cectes as ago
  8055 as 080
13; Title 9
8ag 8all offogag
916cc089!167
  olleallo Hear Soallo
  osallos Graso Sp
  offo 8a7 a7ccog
  08 6222 02310
  8001009 95
20; Title 16
  offax aif ax
```

21; Line 1 offce!octtog offa? a? ccc3 a? 18co!? a?9 8097 cccllos garfag offcco dag offa!? a!? 8 all collo 91/10 205 820 Soollo 27; Line 7 Socrcco Pos Sas 28; Line 8 उट्याटिक द्रीटिन्डिक ag 29; Line 9 crof as oscro fas 30; Line 10 08216 080110 20 910S 31; Line 11 oloog cccoog 2a? 32; Line 12 collos olleca 33; Line 13 8 10 000 0 0 000 000 000 cooley collag 35; Line 15 offco 20 toffay 36; Line 16 olico8a7 offco89 37; Line 17 98 912 Sossilo

```
38; Line 18
glicc9 dag olig
39; Line 19
dogg dag da? ccglig
40; Line 20
oliccog toliog dago
41; Line 21
glicccodg offa?
41; Line 22
da?!g da? agogg
```

42; Ring 1 olfo!cc2c 8a\ll. Ifc9 occ2 ccco? offcc9 o! fccco 8a? cco offcco2 ag a\ll.  $\frac{43}{8}$ ; Ring 2  $\frac{2}{9}$  8 o g 2 cg! 9

## Folio 69, Verso

01; Ring 1
8a\7 crcglfo offa89 — 2a?!a!7 crglfa? offa\7 & a? crcffo89 offco6!9 off!offcc9
offcco89 offcco 30\17 offcco 9 cca off!a offc89 cc289 offco8!9 89 cco a\10 offa?
offa? crop ccc2c offo o8a\7 offg offco 8a? o cg lco89 8cco7 cca?

girag cros gira? — sax giras colleco? crosq girax cros oarax octic cargaring annul garax cross grass grass

 $80!a \times 9!$  of 9! o

04; Label 1 9 1 cc 9 05; Label 2 9989 06; Label 3 OCC2a 07; Label 4 911089 08: Label 5 ollogo 09; Label 6 of 089 10: Label 7 ollcog 11; Label 8 ollcos 12: Label 9 Spoots 13; Label 10 offcog 14; Label 11 986286 15; Label 12 ollcos 16; Label 13 2a?!ag 17; Label 14 2a119 18; Label 15 Sazollo 19; Label 16 980016 20; Label 17 2805pS 21; Label 18 ಂಗಿದ್ 9 22; Label 19 olfcz9 89 23; Label 20 olico 8 24; Label 21 ollcos ollogazo 26; Label 23 olcoso 27; Label 24 S essollo 28; Label 25 Seza 920 29; Label 26 Sos osolo 30; Label 27 08 00110

31; Label 28

## 3 Analysis

#### 3.1 Frequencies

In the following, we take a look at the frequencies of glyphs and words from different perspectives. First, we try to simply count both for the whole manuscript.

#### 3.1.1 Overall Glyph Frequencies and Word Count

Based on a transliteration by Takahashi (see Section 1), a first basic analysis of frequencies can be performed, by simply counting each Latin letter of the transliteration. This results in Table 1, listing all letters that are used (also see Figure 1).

Letter	Representation	Count	
	-	Takahashi	Takahashi/Bauer
0	0	25,468	
е	С	20,070	
h	5	17,856	
У	9	$17,\!655$	
a	а	14,281	
С	C	13,314	
d	8	12,973	
i	\	11,660	
1	9	10,518	
k	ľ	9,996	
r	5	$7,\!456$	
n	จ	$6{,}141$	
t	11	5,968	
q	†	$5,\!423$	
S	₹ 2 **	$4,\!501$	
s	S	2,886	
р	₹	1,406	
m	В	1,116	
T	Ħ	976	
K	ff	938	
f	₽*	425	
P	挈	224	
g	දී	96	
F	4	80	
I	Τ	72	
x	χ	35	
V	٨	9	
z	М	2	
		234,956	

Table 1: Letter frequencies in Takahashi's transliteration.

Determining what counts as one glyph, though, is in some cases an interpretative act. It seems straightforward to assume that c and c are one glyph (i.e., cc). Likewise, c and c could be interpreted as another glyph (i.e., cc). Additionally, one might interpret instances of effe, effe, of c, or c as representing c (or c), on the one hand, and c, c, or c, on the other. Concerning those "gallows" characters, as they have come to be called, it is not clear whether c and c or c and c are variations of the same glyphs, only diverging in one small loop (as Tiltman 1967 seems to have interpreted them). In the following, the four gallows will be treated as distinct glyphs, as has become customary.

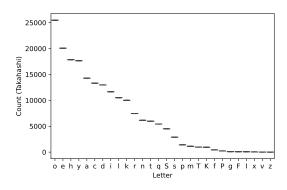


Figure 1: Letter frequencies in Takahashi's transliteration.

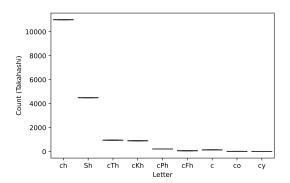


Figure 2: Frequencies in Takahashi's transliteration for several  $\sigma$  combinations.

Accordingly, Table 2 gives frequencies for several  $\sigma$  combinations, taking into account four forms of "pedestalled gallows" (also see Figure 2). The table also includes three instances that bear some resemblance to Latin abbreviations (also see D'Imperio 1978, p. 95).

Letter(s)	Representation	Count	
		Takahashi	Takahashi/Bauer
ch	cc	11,008	
Sh	ત્ત	$4,\!501$	
cTh	c <del>ll</del> c	950	
cKh	clfc	906	
cPh	c <del>t</del> tc	216	
cFh	ctc	74	
С	c	143	
со	ರಂ	9	
су	cd	7	
		17,814	

Table 2: Frequencies in Takahashi's transliteration for several  $\sigma$  combinations.

Furthermore, while there are instances of a single  $\vee$ , it is not clear whether instances like  $\vee$  and  $\vee$  or combinations with  $\vartheta$  like  $\vee \vartheta$  or  $\vee \vee \vartheta$  represent separate glyphs. Table 3 gives frequencies for several of those  $\vee$  combinations (also see Figure 3). Assuming there are three glyphs  $\vee$ ,  $\vee \vartheta$ , and  $\vee \vee \vartheta$ , it is of course difficult to determine when there actually is a  $\vee \vartheta$  or a  $\vee \vee \vartheta$ .

This being said, I tentatively stipulate a set of 22 glyphs. Table 4 gives frequencies for those glyphs (also see Figure 4). They are counted according to the following rules:

Letter(s)	Representation	Count	
		Takahashi	Takahashi/Bauer
i	\	590	
ii	\\	195	
iii	111	10	
n	Э	148	
in	رى	1,752	
iin	(1)	4,076	
iiin	1119	154	
iiiin	6,,,,	2	
		6,927	

Table 3: Frequencies in Takahashi's transliteration for several  $\chi$  combinations.

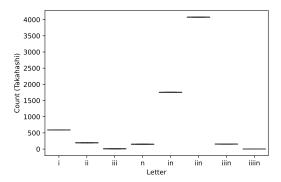


Figure 3: Frequencies in Takahashi's transliteration for several  $\chi$  combinations.

- The glyph  $\mathcal{Z}$  is counted every time  $\mathcal{Z}$  and  $\mathfrak{c}$  appear consecutively.
- The glyph  $\sigma c$  is counted every time  $\sigma$  and c appear consecutively, as well as in cases where there is #, #, #, or # between them.
- The glyph  $\P$  is counted every time  $\P$  or  $\P$  appears.
- The glyph If is counted every time If, If, or If appears.
- The glyph f is counted every time f or f appears.
- The glyph f is counted every time f or f appears.
- The glyph  $\sqrt{3}$  is counted every time  $\sqrt{3}$  appear consecutively without there being a preceding second  $\sqrt{3}$ .
- The glyph  $\$  is counted every time  $\$ ,  $\$ , and  $\$  appear consecutively.
- The glyph  $\iota$  is counted every time it is not part of  $\iota \Im$  or  $\iota \iota \Im$  as well as in instances of  $\tau$ .

Letter(s)	Glyph	Count (Percent)		
		Takahashi		Takahashi/Bauer
0	0	25,468	(15.636)	
е	С	20,070	(12.322)	
У	9	$17,\!655$	(10.839)	
a	α	$14,\!281$	(8.768)	
ch	cc	$13,\!154$	(8.076)	
d	රී	12,973	(7.965)	
k	ľ	10,934	(6.713)	
1	9	10,518	(6.458)	
r	5	$7,\!456$	(4.578)	
t	11	6,944	(4.263)	
q	†	$5,\!423$	(3.329)	
Sh	ત્ત	4,501	(2.763)	
iin	110	4,232	(2.598)	
s	S	$2,\!886$	(1.772)	
in	61	1,752	(1.076)	
р	#	1,630	(1.001)	
i	\	1,240	(0.761)	
m	В	1,116	(0.685)	
f	₽*	505	(0.310)	
g	ද්	96	(0.059)	
x	ᆽ	35	(0.021)	
V	٨	9	(<0.001)	
		162,878		

Table 4: Glyph frequencies in Takahashi's transliteration

#### 3.1.2 Glyph and Word Frequencies for Currier Languages

#### 3.1.3 Glyph and Word Frequencies for Hands

## 3.2 Entropy

Next, let's take a look at the manuscript's entropy. To this end, I utilize the conceptualization of information entropy by Shannon (1948), basically measuring the variability of glyphs in the manuscript. Entropy H can be defined as shown in (1), where  $p_z$  denotes the probability of z, with z being an element of the alphabet Z.

$$H = -\sum_{z \in Z} p_z \log_2 p_z \tag{1}$$

To calculate the entropy, I suppose the above stipulated glyphs to form alphabet Z (see Table 4). Accordingly, changes to the corpus are made so that each stipulated glyph has a single corresponding character in the transliteration. Changes are made according to the following rules:

- The glyph & is represented by Sh in EVA. For calculating the entropy, every time S and h appear consecutively, they are replaced by 1

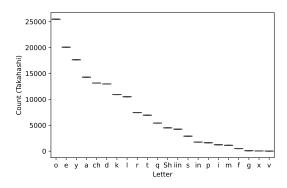


Figure 4: Glyph frequencies in Takahashi's transliteration.

- The glyph of, represented by z in EVA, is counted as If, represented by k in EVA. Hence, every z is replaced by k.
- The glyph wo is represented by iin in EVA. Every time i, i, and n appear consecutively, they are replaced by 3.
- The glyph  $\sqrt{3}$  is represented by in in EVA. Every time i and n appear consecutively, they are replaced by 4.
- Lastly, the glyph  $\tau$ , represented by I in EVA, is counted as  $\iota$ , represented by i in EVA. Hence, every I is replaced by i.

Calculating the entropy for this converted corpus results in H=3.866. As comparisons, Table 5 also offers the entropy values for the unconverted transliteration as well as for a randomly generated text consisting of 22 different characters and being 234,956 characters long (just as the converted transliteration).

Corpus	H
Takahashi	4.021
Takahashi (converted)	3.866
Takahashi/Bauer	
Takahashi/Bauer (converted)	
Random text	4.459

Table 5: Entropy (H) for different transliterations.

## References

- Beinecke Rare Book and Manuscript Library. 2004. "Cipher manuscript (Voynich manuscript)." Accessed February 14, 2023. https://collections.library.yale.edu/catalog/2002046/.
- Bettencourt, Rebecca. 2019. "Voynich unicode." Accessed January 30, 2023. https://www.kreativekorp.com/software/fonts/voynich/.
- Clemens, Raymond, ed. 2016. *The Voynich manuscript*. New Haven and London: Yale University Press.
- D'Imperio, Mary. 1978. The Voynich manuscript. An elegant enigma. Maryland: National Security Agency/Central Security Service.
- Schwerdtfeger, Elias. 2004. "Voynich information browser." Accessed January 30, 2023. http://voynich.freie-literatur.de/.
- Shannon, Claude Elwood. 1948. "A mathematical theory of communication." *Bell System Technical Journal* 27 (3): 379–423.
- Stolfi, Jorge. 1998. "Reeds/Landini's interlinear file in EVA, version 1.6e6." Accessed February 12, 2023. https://www.ic.unicamp.br/~stolfi/voynich/98-12-28-interln16e6/.
- Takahashi, Takeshi. 1999. "Voynich manuscript-transcription." Accessed January 30, 2023. http://www.voynich.com/pages/index.htm.
- Tiltman, John. 1967. "The Voynich manuscript. The most mysterious manuscript in the world." NSA Technical Journal 12:41–85.
- Zandbergen, René. 2023. "Text analysis. Transliteration of the text." Accessed February 2, 2023. http://www.voynich.nu/transcr.html.