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.

¹ 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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22: Paragraph 4]
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         co cook coll collo collo
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Folio 1, Verso

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Tollog crog strog ctog oldag — sogering croso gog erg etting

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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
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- \mathbb{Z} la fire that Social follows for the first first and so \mathbb{Z}
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 - 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 $_{1}$ $_{1}$ $_{2}$ $_{3}$ $_{2}$ $_{3}$ $_{2}$ $_{3}$ $_{3}$ $_{4}$ $_{1}$ $_{2}$ $_{3}$ $_{3}$ $_{3}$ $_{4}$ $_{3}$ $_{4}$ $_{4}$ $_{5}$ $_{6}$ $_{7}$ $_{1}$ $_{2}$ $_{3}$ $_{4}$ $_{4}$ $_{4}$ $_{5}$ $_{6}$ $_{7}$
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Folio 3, Recto

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18; Paragraph 4
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occo? ocoq o8a\\V ocoq 2 a\\V ottoqo? ag

Folio 3, Verso

OI; Paragraph 1

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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

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Folio 4, Recto

Folio 4, Verso

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Folio 5, Recto

01; Paragraph 1

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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

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Folio 5, Verso

01; Paragraph 1

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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

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01; Paragraph 1

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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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104

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Folio 7, Verso

- OI: Paragraph 1
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Folio 8, Recto

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01; Paragraph 1
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                               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.
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                               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
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              offer of tax of the party for the same of 
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              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
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             6,0902
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              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}
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Folio 9, Recto

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               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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Folio 9, Verso

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Folio 10, Recto

Folio 10, Verso

04: Paragraph 2
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coll coll col cetteg tottog tottog tottog coops.

tottog coglig cog cetteg sall sall cetteal

Folio 11, Recto

01; Paragraph 1

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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
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Folio 13, Verso

Folio 14, Recto

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01; Paragraph 1
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  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
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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
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OI coro fleto offeco eeffeco danno effeco offodo
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Folio 15, Recto

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01; Paragraph 1
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                Seecall coosall org — Sox ettalld Sax
                toller ? 200? elle — 80110 elle 89
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                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

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20 long to long the older of the older older

Folio 16, Verso

OI: Paragraph 1
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Folio 17, Recto

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O1; Paragraph 1
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The ose of any tooley too and offess offers, offers, ose offers, ose offers, ose offers, ose offers, offers,
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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

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τοίτος 8ο? οίτος 8αιιν οίτος οίταν

12 οίτα οίτο οίτο ο βαιιν ος οίταν ο οίτα

Folio 20, Recto

01; Paragraph 1

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09: Paragraph 3
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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

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01; Paragraph 1
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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

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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
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offoco? effecos ecos ffcos
98a110 ccco? todog oloda110
 loto Poar ello do toller olloleras
 08 050 050 8080000 91108
 ಕಿದ್ದಂತೆ ಕಿದ್ಯೂ ಂದಕ್ಕ
 offccox 080118
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Folio 25, Recto

OI; Paragraph 1
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Folio 25, Verso

Folio 26, Recto

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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 coolloor 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

```
[P1, 1]

1 foctog cannot tollor of cor off coro sanno offos or [P1, 2]

9 flonn cftcor offanno tollor offos tolland co offanno foctog tolland cftcor offanno
```

[P2, 4]

Toollary barry offers bar are sarry - 98

[P2, 5]

glig tollary tollaror allog offogg

[P2, 6]

chor chor tollary tollogody — barry barry

[P2, 7]

Zor are lor tollor barry

[P3, 8]

No.10 ccorosg tollarid ctorg offag — ctor ctcor sar

[P3, 9]

gliccosg tollarg gliarid ccg tollor—sg — office gog sarid

tollo ollacoccor sacor ccg ctg sarid — gaccg llog sarir

ollacor sarid cffcg sard sarid

Folio 37, Verso

```
[P1, 1]

| fictody toothey tothogogy croffsand cog [P1, 2]
| 80? crog ctro? o?cro cro? dann)
| folicrod cty crod dann dy decor defined decor decor dann)
| 8ctor defined decor dann
| P1, 6]
| golfor other offcand dann
| p1, 6]
| golfor other cannot offg
| p1, 7]
| tothcor dann
```

[P3, 14]

Thosand ctann ctropose

[P3, 15]

20110 ccollog sand sand

[P3, 16]

Tothor sand ccothand

[P3, 17]

201100 tothon dand sand osg

[P3, 18]

office sand sand osg

[P3, 19]

sand thond tothog sand

[P3, 20]

occothacy offor sand ctrope

[P3, 21]

occothacy offor sand ctrope

[P3, 22]

Tothog offord coothacy

[P3, 23]

Folio 38, Recto

```
[P1, 1]

Thoso? crocifics — olly crown ollicos ogg olly

[P1, 2]

ollicos crosso? — ofform offarm offarm offarm

tollo? ollarm — offarm tollicos crollollo?

[P1, 4]

garoll cros crotit — cro cello? osam dann ogg

[P1, 5]

ollo? cros llard — cro? offo sand offogs

[P1, 6]

garo coo llos — sand ollog crocro? sand
```

Folio 38, Verso

```
[P1, 1]
  office of crop chotog offices offices of crop & and & and & [P1, 2]
  ctonn chotog fice cho on on offices and control offices for the crop offices fices and offices fices and offices fices and offices and offices and the control offices and the control offices and and and files fices fices fices and and and files for the control offices and and and files for the control offices and and and files for the control of the control offices and and and files for the control of t
```

Folio 39, Recto

[P1, 1]

The so are a cheer of as and each term of or and are than of other soft of the so

[P2, 6]

**Tecology of the state of the stat

[P3, 10]

**Tecolor decolor are anterested and anterested anterest

Folio 39, Verso

[P1, 1]

#8a\? cc89 #8911a\D o? a\? &c911a\\\D o#c09 11a? o? a\\D &ox 119 o&&9

[P1, 2]

20? &g 110? cc0x totto 11cc89 ox 119 80? cc89 of 1a? ox 11c8a\\D o&9 89

8a\\D cc0? of 1a\D of 1a\\T cc089 2a\\D o? a\\D to 1a\\D of 1a\\D of 168a\\D of 168

9 of 1cc9 cc089 ccc0? a\\D of 1689 cc08ax of 1c89 to 1c89 8ax o? a\\D &f 1689

of 1c89 110? o? &c19 11a\D of 1a? o? a\\D of 1a\\D of 1a\\D of 1689

x 11c89 of 1cc9 &o? \tag{168} co cf 1689 cc of 1689

Folio 40, Recto

```
[P1, 1]

Taco Ilcosar agsgsg — tollg ollag 289 oglicsg offace ar orsanni

tollar ollar ollar sar — glaco Ilanni ollor aces ollar aragor

[P1, 3]

29 tollag as gar — glar ollor and ollogar tollar ollar

[P1, 4]

or and acellos sar — tollog ollanni ollar ollg ollogsg og

[P1, 5]

gollar tollar ollar — ollog og aces tollar ar ar or sag

[P1, 6]

Thor or ar and ollor of — ogaces tollar area Ilar oranni

gand acelland oll — gaces
```

[P2, 8]

| face | face & are are marked of and are face & are face

Folio 40, Verso

```
[P1, 1]

Tocosand occtanno ogso
[P1, 2]

Thosa? tolland og aras
[P1, 3]

Z anr and olland otlas

[P1, 4]

Tharand olland occtar

[P1, 5]

Zogand ollar ogg occtar
[P1, 6]

tocos and og occso sand
[P1, 7]

chosy tollog occso ar
[P1, 7]

chosy tollog occso ar
[P1, 8]

chosy tollog occso ollag
[P1, 9]

Thocosand occlar ollar og
[P1, 10]

Thocosand focso folland
[P1, 11]

Zoccso tollog occso sagor antico
[P1, 12]

goccclicco sand olland

[P2, 13]
```

Folio 41, Recto

```
[P1, 1]

Taco licoarco olico acilica — otaco otaco talalicos polico araco olico technologia polico araco olico licoarco — otaco otaco otaco araco olico ilcoarco otaco o
```

[P2, 6]

checked formed folices melicos office — milimos offices for checks

[P2, 7]

farmes firmes offices folicos — offices milimos offices folices

farmes firmes offices folicos — offices milimos folices meets

and milimos folices melicos melicos — folicos melicos melicos folicos offices melicos melicos melicos melicos melicos melicos melicos melicos folicos folicos folicos folicos folicos folicos melicos melicos melicos melicos melicos melicos folicos folicos folicos melicos me

Folio 41, Verso

```
[TI, 1]
| Mcc2odag
| [PI, 2]
| Taccodo totaccito otado atechado — otacedo acetacito adacedo totas da?
| [PI, 3]
| Sacedo taceo 2 and acetaco otado otago — sand otago oficeo oficeo sas
| [PI, 4]
| totado otago totacodo oraceo electro otago — eleccodo totaceo otago acede
| [PI, 5]
| oaceo oraceo sand or aced otago oraceo oraceo oraceo oraceo otago otago oraceo otago otago
```

```
Folio 42, Recto
 Costa to otalia patracetto offices forca?
 Osymbarry Cells offcarry carres
Tocto celleta ceollar cears &ag
 Fire Fab Siallow Fallow Fois
toldar croctly crotlor toldar
 807a17 cca?
 र्रिट० ८९ १८४० १० २०१४ १० ५००
octog crec2 ettog cto7 ctog ettog cra79
+ offceo? offceog cffco fceo8al cellceo?9
colfs dog lícico efferd offog efferg crog — crog da \sqrt{0} [P2, 11]
. Screeg crop chor crollann croelly scffg — sand sage _{[P2,\ 13]}
to like colf colary crosarry barry — 8ag _{[T2, \, 15]}
 Tocoso offices sosarry
```

Folio 42, Verso

```
8chcg flowg g llowg colleg ctg 8al - 8al offog 8all
                  cio حماله وعلام من عمور من والم عماله وهواره وهماله من من الم
 †offceg celloeg 2a2 8g — o8arrs — glloeg ollog 83
 collector cocy collar - of - of - of - or - of - of - or - of - or - of - or 
 offcollear creotlerar — 29 — Zarri ctrar 8ag
colf & colfcg fleecg 8 — \frac{1}{[P1, 8]}
                  GIIDS RDBOS
                 Total of the state of the state
                  \mathcal{S} cos offers \mathcal{S} of \mathcal{S} or \mathcal{S} or \mathcal{S} or \mathcal{S} or \mathcal{S}
to all tolless less energy offcos -8 — they feall 8 _{[P2,\ 12]}
 coffeecy cox ox early officered — either flaxly 9 _{\rm [P2,\ 13]}^{\rm [P2,\ 13]}
to acq floof they accounting savid — acolling savid
 tother one they offer character of the state of the stat
                  حزهاادع حرمع ماادع
                  02280 Follo
```

Folio 43, Recto

[P1, 1]

The rose in the rose of the restrict of the restrict of the rose of t

Folio 43, Verso

[P1, 1]

**T82a\?9 &ax11cocc9 &a x9 ccc11 o? a?osx x11co ? a?a\\\) ottcs9 o toxs9

[P1, 2]

**Ccc89 octto ottcs9 ccc89 &a? ccc2 to ottcs9 ott9 ottax89 toxs9 otta?

[P1, 3]

**Toss9 toxs9 tott coctto cclf0 ott9 ccs9 ottcs9 ottax\\)

**Toss9 ottos9 ccc2 a\\\)

**Ccc11 o? a?osy x11cocs9 ottos9 ottax\\

**Ccc12 ottos9 ottos9 ottax\\

**Ccc13 o? axoss9 ottos9 cct11cocs9

**Toss9 ottos9 ottos9 ccc11cocs9

**Toss9 ottos9 ottos9 ccc11cocs9

**Toss9 ottos9 ottos9 ottos9

**Toss9 ottos9 ottos9

**Toss9 ottos9 ottos9 ottos9

**Toss9 ottos9 ottos9

**Toss9 ottos9 ottos9

**Toss9 ottos9 ottos9

**Toss9 ottos9

*

[P2, 6]
Thoselicido olicoso tolicosos cicoso olicosos cicoso ticos os ticos os olicosos olicosos cicosos olicosos cicosos cicos cicosos cicosos cicosos cicosos cicosos cicos cicos

[P3, 10]

That coop at assat cos sassat colf offices coffees forces office offices off

Folio 44, Recto

[P2, 5]

100 dopto toticog cood ciclo decog office 8a\\0\
[P2, 6]

8dood office dop o occultary toticog office 8a\\0\
[P2, 7]

totico ot8 door toticog ooffe coog

[P3, 8]

They offers to free offers to free offers offers for offers offers offers follow of offers follow to free follows of offers follow to free follows as follows to free follows of offers offers offers offers offers offers offers offers offers

Folio 44, Verso

[P1, 1]

There to the control of the

[P2, 4]
golfagos canno cor coroso cello co offico oficos ofo
[P2, 5]
oand cog ctto ctanno officor officor officor ctand
[P2, 6]
flog sand offano sog officand offolicos officor offano sog
[P2, 7]
offo ficanno cttos so coop

[P3, 8]

The coop effect of ode to the coop effo — of ode — og [P3, 9]

8 ho of effect of ode the coop effo effect of ode of [P3, 10]

get o follow the often of offer o

Folio 45, Recto

[P1, 1]

Tollosas cartes offs cas tot car ofcas ofcar ofcar

[P1, 2]

cor offs tollos tollarry cas cos slarry sar of

[P1, 3]

to cattes lacos sarry toarry offs carry slarry

gor of larry slarry

gor of larry slarry

gor of larry slarry

[P3, 8]

There of the fosuin offe sand effect offosus sand specified to the following offers of the fosuin offe sand sand offers of the same offers of the following of the following offers of the fo

Folio 45, Verso

```
[P1, 1]

Notato culto Nox accop theory to the of offers so of the offers of the offers and offers a
```

Folio 46, Recto

[P1, 1]

Toccofteg totless octly so octloss of octloss ocanno dece totless sand dece so sags
[P1, 2]

Posanno decess took decotloss ocethes sanno decilident decs xor and decethes
sanno deor star octloss ocethes
sanno deor star octloss ocethes
totless density decilis decilis decilis decilis decilis decilis decilis decotloss

Italiano decilis decilis

[P2, 6]

The soft of the soft

Folio 46, Verso

Folio 47, Recto

[P2, 6]

Tog? acg 20 acg cog and cog and cog asg agg agg

[P2, 7]

2acc2g Maco? attand acg acg acg acg acg attag

[P2, 8]

colleg ag Maco8 acg ac attag acg attag

[P2, 9]

Tollo Mo? and ollag acg sand ollag acg

[P2, 10]

ag ollag acg sand sag

[P2, 11]

sto atg sand sand

Folio 47, Verso

```
[P1, 1]

The coll accor acordo at tag 2ag — 2arg

[P1, 2]

8th cop at a offico offico offico of acord — 8arro

[P1, 3]

Atop arar officos 8or officos at tag — 8arro

[P1, 4]

tothor according at tag — 6th officos at tag — 6th officos according at tag — 6th officos according at the first officos according acco
```

Folio 48, Recto

[P1, 1]

The dann of the good of good

Folio 48, Verso

```
[P1, 1]

The coders deceds the edge of and streets and streets the edge of the
```

[P2, 7]

Tools are considered to the state of the state o

Folio 49. Recto

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

³ There is a curlicue above the first c as used in \mathcal{A} .

⁴ There is a curlicue above to as used in &.

⁵ There is a curlicue above a_{λ} as used in \mathcal{A} .

⁶ There is a curlicue above $\uparrow \circ$ as used in \mathcal{A} .

```
Folio 49. Verso
```

```
[P1, 2]
                        Proposition of the sock of the
†olíceg †olíceo8 cto c<del>lí</del>eg<sup>7</sup>
                      \frac{1}{2} collars are \frac{1}{2}
                      ollood to tollook 8a89
                        toffer croffer croffs ^{11} _{\scriptscriptstyle{[P1,\,8]}}
                      ट्याटि ट्याटिक ट्याटिक
1016cc2 ccco 8a110 80g
                      octo? Lcco8 16cco84
 80000 ctrog 80110 ccollo
 octolices effecs sarry sarr ecollos
                      tollog collicoso offor lacol crox sall
  [P2, 15]
                         fallow — oSws 2080229 o gowll 2020 Foward
                      or of the state of
                     The office of the same of the 
                        chos ost (1/20 csots
 toffero encos enos 2 eno enefferos 3 encos — enofferos 9
                      colloo do aco? aco! lacel aco? 8 acol 89 — 8acol tollo
 to tean coor cooling tercor band — to band the same form that the same form that the same form that the same form to the same form to be same form to the same form to be same form to the same form to be sa
                      مالاعدين حدو الإكامة المراجعة المراجعة من الأمراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة
                      S of the post for the process of plan bridge
 toffercog ency enor enollagy enor day — enavived [P3, 26]
 _{\mathrm{[P3,\,27]}}^{\mathrm{-}} coof cucl cultaging collectly — cultofal
                      officials of coco sally
                     This line is preceded by a 1.
                   This line is preceded by a 2.
                         This line is preceded by a 3.
  10 This line is preceded by a 4.
```

11 This line is preceded by a 5.

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

Folio 50, Recto

[P1, 1]

The cor of tax of the cost of the

Folio 50, Verso

They so asa? collects tollects offeres tollog coop of a tarsay theosan occes offan tarsay theosan occes offan to coop offan tollects o

¹³ There is a curlicue above \circ as used in \mathcal{A} .

Folio 51, Recto

```
[P1, 1]
 Sccoolarry efficacy efficacy coop
9 800089 cttc9 off9 cttc08a7 tolf9
 8a117 office office occopy office occopy
 Thecoog tosann effecy toether flann
90008a110 008a110 9800-8a110 98a8
90002a7 crotteg loco tolorg totag
octos osavvi effeco effecoso tolles offoso
 Thos garry focogas gas togo toctlas
9/1000 807 cc09 tollcog loccy cog ollar
 flocosarry ctcoso tollor off.osarry llosoflas
gocc2 effeccy flog ecceas offco7 foethers ferodas
00117 ctros 916cos otrocos ctroosa117 9160989
tollox ccco? offcax 2 of axes — offax
```

Folio 51, Verso

```
[P1, 1]
Tocoog to losa? cosann totay — scarce cands greet, 2]
scross attack totay to los sofann as — to log sann attack
[P1, 3]
Theroso attack to a other tos others — sann attack
[P1, 4]
offann tosay offax accosa? coso — offer sann attack
[P1, 5]
Thosann offos to tosay to and and accos and and accos and and accos offann attack
[P1, 6]
offor attack tosay to attack to to log to to and offann accos and and profess accos to a cos — others accos and and profess accos to log accos and and attack tosay to an accos of accos of a cos and and accos accos and and accos accos and and accos accos and and accos accos accos and accos accos and accos accos accos accos and accos accos
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Folio 52, Recto

```
[P1, 1]

The forcetty getting offer? Lar to to be and offered and
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Folio 52, Verso

```
[P1, 1]

Theorem cate of the control of the control
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[P2, 7]

foccos cosonno cttos anno
[P2, 8]

flodanno cttos tollocos os
[P2, 9]

danno cttos cos tollos danno
[P2, 10]

gollocos tollodo cos dosd anno
[P2, 11]

danno cttos todanno cttos das
[P2, 12]

toclar cttos ollocos cttos
[P2, 13]

ollor ollanno cttocos danno
[P2, 14]

odar coollor cttocos

Folio 53, Recto

```
[P1, 1]

floods coothoos offo
[P1, 2]

dog dand coote offo
[P1, 3]

ctocc? collad obg
[P1, 4]

officodanni offo offod
[P1, 5]

olfe offog offeodog offod tolfod offod
[P1, 6]

officodar offor offe obor cand follod offod cocc dag
[P1, 7]

Codar offod foo offe odor cand follod offod follog

tolficog dar offod foo offeo offeo collod offod
[P1, 8]

tolficog dar follo coffe odor cand follo
```

Folio 53, Verso

[P1, 1]

There deep toolettes ette oftee oftees of and total total [P1, 2]

offees dand decelles deof deof deof oftees of so [P1, 3]

goann ette of the oftees oftees oftees offees offe

Folio 54, Recto

Folio 54, Verso

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[PI, I]

Teccosa? cetas osovi effeco sa? tolleco effeccav » Zas
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8a7 cro7 crcllg crox olla/1) cro8g crox 8g
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 Thos cross crocted togarry florogo
  Sand choose of and tolley
  Barro Barg tollarro offcas offas og
98a110 tocker todas offas offas 89
  log clarry colleg tollag dag toctleg
[P1, 11]
 oally foether tollar
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9000 ollas 9011009
 Mad ctco May assay
[P1, 15]

07 agang offag 80g aro80g89
  8a11) ccox 0x8a11)
```

Folio 55, Recto

[P2, 7]

Therefore accosites a cross it to the state of t

Folio 55, Verso

```
[P1, 1]

Mcccobacobo ocolar 20 acetta — ottog — ottog occolor offices offices to the color offices offices offices to the color offices office
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[P2, 7]

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[P2, 9]

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offatly tolled offas eco of — or ann offann offatly

offatly offat offat os

[P2, 10]

oann os ann offann offat os

[P2, 11]

offann ecoar ecolog oso — ann offat osfed or or or or or offan

sann or ecolog osfeces of — ar ann offat

Folio 56, Recto

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   osercy crolleros ercy lecy tollers erolles erolles \frac{1}{|P1,4|}
   t offeror crop cropor cropo
   حدمحده؟ حده حدههم هماري)
   9/1/cco 89 8ccc9 /1/cc9 8a11) 9
خت الحدود والحدوك حدوالع هود
[1]، 8]
                        Zeroz erog erollg erccelleosg
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                        Follow For 20th (1/108 cospil 6)
                        à a la follolla
                      olico crollecco lecas
                      Scrop croffox toffcro
                        The offerog cros offer
   101/crg crosg cffcor crcg 1/crar 8
                        collect following Screet Barry 89
                     For collection of the collecti
                        Olles soll possilo
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Folio 56, Verso

```
[P1, 1]

[P1, 2]

Cod! cog cog tollow cog tollow cog tollow cog cogo?

[P1, 3]

Occep cog cog tollow dann collect dag

[P1, 4]

Cog flow dann decay follow dann collect dag

[P1, 5]

tollow cog cog choc dann

[P1, 6]

collow cog cog choc
```

Folio 57, Recto

[P1, 1]

Tocco cttcg osand accost accos accttcg so accit accosg gosan
[P1, 2]

Sant and acting accost accos

The codag of any extress of easy soction of easy of losan of orang [P2, 7]

Sance decedy to be cody each of easy each of each of each each of each of

Folio 57, Verso

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[T1, 1]
8a\20g
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[R1, 2]

A 2a & g 20c02 A2 a7 office2 o 8 20c feece2 & g 202 office 8cto to 9 fficeas & ct offog 2a7 88ag offog 2 o 8a112 office 8ct 80 8ffag2 offog feece a 7 offa110 8ag ffa7080 A7 office 8a7ag toffa7 offag offag 8 o g ctlcag 808a2 o ff ctc? 2a110 0 g 8 7 A x ff g t * ff ? * * g c * o g 8 7 A x ff g t * ff ? * * g c * o g 8 7 A x ff g t * ff ? * * g c * o g 8 7 A x ff g t * ff ? * * g c * o g 8 7 A x ff g t * ff ? * * g c * o g 8 7 A x ff g t * ff ? * * g c * o g 8 7 A x ff g t * ff ? * * g c * o g 8 7 A x ff g t * ff ? * * g c * o g 8 7 A x ff g t * ff ? * * g c * g 8 7 A x ff g t * ff ? * ff ? ff & ff
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¹⁴ Apparently, R2 repeats the sequence "o g & ? A x If & If ? * * 9 c *" four times.

Folio 58. Recto

[P2, 16]
The true of and and effects of true of the same of the same of the potential of the potential of the same of the same

Posar tolly officea ofasard officegarry offsarry office offo crapital as checeffing that as creat creat coop at any osospilo osasas osas cos 3 av2 collas osasso ollasoso osaga? crco? Sa? agog sago crcog cro? a? agsag crag crcag Soso office at agon tollagor cross sair cross cross offogers offagos ostatos flavido polagos coos oscilas offascos coos llas tollas otoffago tollarid ceffagos tollo sar as coostfago tollagos Scroctfires 8agogs tollagos croof ocllooss tollags tolla? 89 92 Lcox crolles saxox collagox tollago llags, offartog 8 solo follo fagos gottos cosas anno coottoas Pharry color colleg tollo cettes officed collar ofosilico? oscroctes etcos cosos cosos cella VI) osteras polleoffe Girallo Gira Sa Folle collo Sosso capllo Sossocs offictor offiar ollar orox ctoox toother tollars carox earas 92090000 afarfagg 40089 1102agg agog2 glagg 11a7 afag Scrop crollag Zarry sag ollagZagcrcg

Folio 58, Verso

Tox collago starry offarry crotago star offar offarsoffarroll ofliso soza sa sinter ososilo bilas osogatot o siali bilas so sias Tiobag totland to theceg tolleg olleg tollagerag bagg at any of allo offalo offag tollar tollar offago offago offago tarro otazaz totlarro 2009 totlarro 9totlagg otlag totlagg otlagg tollars of agg ctos sarry cross sag sllarry off tcccs ollags olls 9 8arry tolles follar secres tollagor choose office arry explicit Marrie Chros Baggo tollars agas offag arro offarro offarro offago Bag Zagag togalld coorfices ffocogg tollalld tollalldo ofocces ogagg Theogetog for tollaroof of ollarid collario coolarid ofices of the following of the same of the tocca? aglica \ V offag coo offag cooffeg flag cficto flag Eaf a 17 agos crog occar co pollag crog lagar Tal a? ofag totolin ollar arak 2 and toar tlarcood ollar coo otlar 8ar $g\dot{R}_{a} \times 0$ tolla θ ollago tollag crago crocotteg ogago tlaggad ag 8a11) agag 8ag toll11? offag cro80g tollcag crc0g cro2 ollccag Tarry cras cras tocttog sar arry octtrog tollog toarry aras ollar collag chooses follor oglag choose 8ar cholloco ollagoro Thosa V a? office offas cros offas a? crefts cellaga? os oparo Posaso Gallo Sulla Collas Gallo Occaso esollozo coozo Follox

[P2, 23]

Tocolo costo costo cotagocos costo costo costo a salla asalla tollas asalla tollas asalla tollas asalla tollas costo costo costo allas tollas asallas asallas asallas tollas dalla tollas costo tollas of tollas tollas tollas of tollas of tollas tollas tollas tollas tollas tollas asallas tollas asallas tollas asallas tollas asallas tollas asallas allas allas tollas asallas allas allas tollas asallas allas allas allas of tollas of tolla

[P4, 34]

Thoseco lico! ar totecos sar articos oferas ecotico oliaso
[P4, 35]

Sarri offari oliari ecos olicos tolicos osar eco soso saspece
[P4, 36]

The coso olicor octico tolias olias ecolico tolicos sasar
[P4, 37]

osilicos oliar ar ecolis oliari olios ecolico ecclis sasar
[P4, 38]

oficoso toliar tolis licos tolios olior ecolis 2989
[P4, 39]

oecor toliari oliar ecar ecr zarosz

Folios 59-64

Folios 59–64 are missing from the manuscript.

Folio 65, Recto

[L1, 1]
offarg—8ag agag

Folio 65, Verso

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[P1, 1] cto facates so — sactand acting to to for atsometric solution of the content of the con
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[P2, 4]

**Thocoso offor toso — office toso tolloce office office

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Folio 66, Recto
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2a29
[L2, 2]
    SapS
[L3, 3]
<del>1</del>07
   8079
[L5, 5]
9. ICOR
2ag9
   Past
   1ª29
[L9, 9]
CSoffot
[L10, 10]
9 lago
[L11, 11]
8 x 099
[L12, 12]
ζαννθ
[E13, 13]
   tollag
[L14, 14]
25 of
[L15, 15]
   PaPag
```

[P1, 17]

#\$a\\\\ offices offices caff action 280, office according offices according offices according offices according to the object of offices off

[P2, 24]

Thockcocy dog horody tohody tohody tohology tohody

P2, 25]

Show dann dag hy they tohy tohan tohy dan offer they they ghody

P2, 26]

Toccolly tothy dagage tody tohody tohody

Tocolly tothy dagage tody tohody

P2, 27]

ton toodage togdy tohody

Tollogy

[P3, 30]

**Timot" & coxtor & annotation of the core of the cost of the core of the core

[P4, 34]

**Tcco89 ctcox cotox ollco89 tollox89 olla?089 cce89 cce89 dar?

[P4, 35]

2ar? ox darro darro dar dox cce89 dare axo darrax doxae cce9 do?

[P4, 36]

**Tocco tollax89 ollo ox liccollo tollo dare oxo

[P5, 37]

Thoseccy through the synthesis of the synthesis

[L16, 49]

officeo 8a\\\ \omega \ccloss office Coee8

Folio 66, Verso

P1, 1]
offcosof accord of ofter sax softeeth offoso saxscas
[P1, 2]
floosax flaces steep offees offces saccelly saxsy toffax to
[P1, 3]
offcot to offees offees offees sax offax accords accelly
[P1, 4]
atolicate sax to offees accelly sox action sax floosax accellax sax
[P1, 5]
atolicate to sax to offees accellax sax

[P2, 6]

There is a cost of the cost of th

[P3, 9]
Todo cheodo cutada? cheeo tadao cheeo ch

Folio 67, Recto 1

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[P1, 1]

The cool of the cool
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[RI, 5]

Coarros & & grollcoso glicesas os oficosarros conficeso ofi cultollarro conficeso offor effer cultivity ar decedo seeds coeffect offers grant offer coeffes offered cultivity ar decede seeds coeffect offered sar are offered grant offered sare and sare coeffes of sare as a coeffect offered sare as a coeffect offered sare are offered offered sare are offered offered

Folio 67, Recto 2

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[P1, 4]

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ccocco ?aç
[P1, 5]
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[L1, 6]
                9280110
  [T2, 7]
 [12, 7]
    offctop? apag
    offosctox 2and arso
[P2, 9]
    Cocco sonn orse
809cc 2089
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   9/1ccco 085 cc5089
              Q Gralloo Sootto Grirago
 [P3, 14] office of 20! Parrs 89
 [P3, 15]

totaco dann dag

[L4, 16]
                920000
   [T4, 17]
                905 60S
  98ccoS avy a7 a89
 (P4, 19)

ccoctes Sarage

[P4, 20]

Cannot of or
  [L5, 21]
olfag
   [L6, 22]
                9Sag8ag
 coto?ccg 2g/lo?

[P5, 24]

coto?ccg 2ag2o√xv

[P5, 25]
             Sosas ofos as
  [P5, 26]
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[L7, 27]
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   [T6, 28]
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[L9, 32]
             for sall
 [T7, 33]
              800000
[P7, 34]

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[P7, 35]

octor ogog

[L10, 36]
            0100989
 [L11, 37]
             089afto
Sofar 08ar ave akovvo
 [P8, 40] 80 May oca? osag
 ota? ocog8av
 [L13, 42]
             ccogazg
  [T9, 43]
           حثالحهم
911000899
 [T10, 48]
 9/a2 9/a29
[P10, 49]
 offox802 octtogc
[P10, 50]
2007 ccc8a110 89
Seatoo
 [T11, 53]
 glity of the property of the p
officeoface achoso
[P11, 55]
Cocco acoc oches
8a\\V a\\V oS 926
             9110110
 حداله حدهالحد؟ حدم
[12, 59]
  οςτοδο c2 οδαννν
[P12, 61]
              02a50 S22920
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[L18, 62]
9 Ta \ J
[L19, 63]
     902016
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[R1, 64]

Cafo FaSo estates 8000 Socotion Society Society Society Society States

8a? ag8a\\0 98a\\0 †llog 98a\\0 †ota\? 9ta\? 9lloa\\0 980g9 9tagcco2 0g9 ollog [P13, 66] 2cco 29ccc2 toglicog 9llocog 9llocog 0a\\0 olloga? 0g 9000 tolloco80 ccco2 occo2 toctes coo anno olloco80 tolloanno osan xo a? on 200

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Folio 67, Verso 2
```

```
[L1, 1]
offa7a7a\v
[L2, 2]
offcco2a8
   ಂ11 ರಾಗಿ
Thos of and an othogo caxon
   9010 90 61128301 61128
[P2, 6]
offccg ffcog xZagag
   800 280 280 80 20 80 Pollo
[P3, 8]
floag sarg Zalla? sag
[P3, 9]
   Sogar Ctco Sogag 8ago
offcog crog at offag-8a8
   Moarry of as of ofagarry oas
[L4, 12]
\underset{[L5,\ 13]}{\text{olfccc9}} \ \text{oclfcc89}
ocosa sc2 a12a2

oa2 glasg cca2
   offafaget ogfao
[L8, 16]
olf98<del>2</del>08 oatoa89
occ-clav2 ollogavg
Borce Possis
\mathop{\log_{\text{L13, 20]}}}_{\text{[L13, 21]}}^{\text{[L12, 20]}} - \operatorname{degag}
  2070 — cFoS
```

Folio 67, Verso 1

```
[01, Label 1]
8ccc29[cc9
[02, Label 2]
91co8a7
[03, Label 3]
80000 100 p. [04, Label 4]
octcoSa8
   ps facial of
0822209
[13, Paragraph 1]
   Toosan? offer ochecoso
[14, Paragraph 2]
   80000 to 111100 000000
[15, Paragraph 3]
  glicco coco sarri gitacs offg
[16, Paragraph 4]
   ೦೩೩೩೩೩ ೦೦೩ ೦೦೩ ೦೦೩೩೩೩೩
[17, Paragraph 5]
   9 fccc9 toffccg ccoffcca?
[18, Paragraph 6]
   Sappage Cost
[19, Paragraph 7]
   olla? Les folleco? 8a111?
[20, Paragraph 8]
   62210 622210 S2220
[21, Paragraph 9]
   208/208 Sins Suras
[22, Paragraph 10]
   2090 PO 0800059110
```

[23, Paragraph 11]
oga? a?olfg

[24, Paragraph 12]
offo? Ifcog o? cccg &a?g

[25, Paragraph 13]
olfcccg ccco&g ccclfg

[26, Paragraph 14]
offccco&o? o&cccg

[27, Paragraph 15]
ccocffcg cccocffcg

[28, Paragraph 16]
offcccg lfccoccg &a\? oclfcg

[29, Paragraph 17]

10289 co 10889

Folio 68, Recto 1

```
[01, Paragraph 1]
                    Los contros contros con for contros co
   [02, Paragraph 1]
                   8000 possolos folios possolos pos possolos pos possolos pos possolos possolos possolos possolos possolos possol
[03, Paragraph 1]

office accept cooling — office *0? coffice &a?a?

[04, Paragraph 1]
                    8000 9010 NO
  [05, Label 1]
  9 1 9
[06, Label 1]
  8a79
[07, Label 1]
                    حدااحروااوه
  [08, Label 2]
                   {\rm olfodasg}^{15}
 08ccccffc9
                    والمردوع
 [11, Label 5]
                   oloazo
  [12, Label 6]
                    ದ್ಧುಕ್ಕ
  [13, Label 7]
                 021609
  [14, Label 8]
 offcc089
[15, Label 9]
                    0162.09
[16, Label 10]
off 989
[17, Label 11]
 olco?
[18, Label 12]
                   ctoctto
 offolice 2
                    Sello
  [21, Label 15]
  0,407
[22, Label 16]
 ocfc9
[23, Label 17]
                    9055576
  [24, Label 18]
                 off<del>c</del> ർം
  [25, Label 19]
                    offog
 [26, Label 20]
   [27, Label 21]
 0110a9
[28, Label 22]
                    080010
   [29, Label 23]
  ၇ါင္ 89
[30, Label 24]
  10cco8c1fc9
[31, Label 25]
  oc†c9
[32, Label 26]
 olicco8a9
[33, Label 27]
                    903910
```

¹⁵ 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.

Folio 68, Recto 2

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[01, Paragraph 1]
             The coop of the party of the pa
              809 officery 80000 officed a Roccolar college crop of at
[03, Paragraph 1]

Thereof offerolly offerog offog eccool crossery toffersal
cτον 
              Parly officed and officed and officed
[06, Label 1]
              olico olia? olio oliono oliaczo tolioog caco toliog
[07, Label 2]
              offogcecoffcg
[08, Label 3]
              ccco!20g
 [09, Label 4]
08a\\\\
[10, Label 5]_
 осто
[11, Label 6]
ქვ. Label 7]
              SCLOS
 [13, Label 8]
             168a7a1189
 [14, Label 9]
ogcccccog
[15, Label 10]
offcco?
[16, Label 11]
              offcook
[17, Label 12]
098CC9
[18, Label 13]
CCO207
              offcccoso
 [20, Label 15]
              8000989
 [21, Label 16]
              90000
 [22, Label 17]
              offocco
 [23, Label 18]
              0802220
            [25, Label 20]
             2022-61080
[26, Label 21]
             90<del>1</del>00
 [27. Label 22]
              offoctog
 [28, Label 23]
              50802
င်ငင် ၄
[30, Label 25]
              9050509
 [31, Label 26]
              ollog offoarry offog offo occoo ? offcog offccog occo o forry
```

Folio 68, Recto 3

```
[01; Ring 1]
                  205 208000 Prison Court color composition of the contract contract
                  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 tollcc9 8cccc9 8a11 offceage
                 flocid office to flog city to flower
                Moccos cocto tollass
                  Scroller 3a117 croll octrosa?
                  tollog-ascrop tollog arollog ollars
Scroffero des offeo offeo offoces
                 fco89 †ollco9 8co9 8c9 ∕ollβo989
 [09; Line 8]
                  leading offices sand secress offices
[10; Label 1]
                 90050
[11; Label 2]
OQÇCCCOÇ
[12; Label 3] 8ccox 8a9
 [13; Label 4]
                  0909
  [14; Label 5]
                 Sollo
 [15; Label 6]
                 ollogeeg
 [16; Label 7]
 [17; Label 8]
CC89 9 9 19 [18; Label 9]
                  807088
  [19; Label 10
0 cffc 98
[20; Label 11]
olcco89
[21; Label 12]
                  01983
[22; Ring 2]
                  offerody crollery allog croop da? or floor doga \illog olfog odg
```

Folio 68, Verso 3

```
[01; Paragraph 1]
               flaces actag sarres governments and flaces acceptances acressed acceptances ac
 offco tooffo 2ccc9
                 20209! locoog doug tello decog offerog onag decog sann decoso tollog and ono
                  offo offosso
 [03; Paragraph 1]
                 80!5 somflesson soft early — Cireisas Cires colleg Sarra For Fos Fallon
                 Secus forthers ceoss
 [05; Ring 1]
                 Girallossof Sias oso Fab gosto Girallo Go!S obosto Stoss Stoss Solo ollo
                 offercy day exclip office forces of office Society of office of the society of th
                 20110 20 205000110 e20000110 GIVES Soor CBOOCH FEB FEBOIL COMPONING PER 
                  os2co flos accos olícco acollado olíco follado socos adell
 [06: Line 1]
                 gocco log tollag ollog
                 tollcoso ollco acillas acillas ollagoso aciso
                 toclica! & tollo ollogoro ollogoas
 [09; Line 4]
                 offcox accosa toxifices oacifis cooss offats offo offos
                  Pag cesarg Scellog offcoso
 [11; Line 6]
                 occos tocco losos acollo ollas acoso so offices
                 980118 08 000 010008
 [13; Line 8]
                 91125 occop colleg officers socials grantered
 [14; Ring 2]
                 execulty example for the figure example collections and example example examples of the example 
                 980008
 [15; Label 1]
                  offodog
[16; Label 2]
                 ρβγοσοΐο
 [17; Paragraph 2]
                 soal ollos salos saso
   [18; Paragraph 2]
                  2080119 cffced oxcless 80
 [19; Paragraph 2]
                 9lcog ctcctcog 3a?
```

Folio 68, Verso 2

```
[01; Paragraph 1]
                            The cos defle gifted the cos decited of the cos decided of the cos dec
                                Scrarry to the screen to lice to lice sage of the files sages
                                focces delles elles agences effect to the following the
office, the office of the off
                              88 Japan Gazas Costo — 680 Japan Gatto Sasas
```

[06; Ring 1]

possilo p8:pollo! Sootlo plass Sollo Sosses poolo!ps p85s p8000llo Viraboollo olloos crelles eggine office offices offices carried by the collection offices are the collection of t offices for solling to follow the following safe and or solling to follow the solling to the contract of the solling to the contract of the solling to the contract of the con

```
[07; Line 1]
ccoffcc9 8a70
[08; Line 2]
  9! Daga! P
[09; Line 3]
   05 Sp SoS
   Coct 1 Thous
[11; Line 5]
offco89 cccffc9
[12; Line 6]
   officeos agazeco
[13; Line 7]
a8a\?!cc89 a\\0
[14; Line 8]
   Beccedag Bally
```

[15; Label 1] 9! Pccctog - 9! Pccg 10510S — 6250llo [17; Label 3] ezaSa90 — Seosto [18; Label 4] offce89 — cellag

Folio 68, Verso 1

costicos of costic

[03; Line 1]
8a \ 7 cfcc!flo 89
[04; Line 2]
2a \ 7 a Pog Za Z!
[05; Line 3]
offcco 2 a Pago
[06; Line 4]
offcco 3a Pago
[07; Line 5]
offog ccc offago
[08; Line 6]
offcco cc cff cccfco
[09; Line 7]
8a P cc ccoffco
[10; Line 8]

Folio 69, Recto

Pollo cto tollar

obootto Fabootto

[36; Line 16]

```
[01; Paragraph 1]
  The cool dog offairs and follows the start of the cast
  8aii to offait of the case offe offaith billo case
  Palloss esselle es sallo estroca se !!!!! Crisisos
  9! to 2!allo bland offer of glas cos
[05; Title 1]
259 cell!a12!9
off!ocfca?
911co ccosa8
[08; Title 4]
  2855 625 625 685
[09; Title 5]
  912 So 91210
[10; Title 6]
50 S office 7]
  cectta? a? agg
  8ag? ag 089
[13; Title 9]
8ag 8a117 offoga8
  9011.080222 Po
[15; Title 11]
  ollepto teos Sosto
  af osard cellago
[17; Title 13]
  offo saf afcros
[18; Title 14]
  olicco czco 89
[19; Title 15]
  80010009
  offax ar? ax
[21; Line 1]
  office!octfcg offa? a?
[22; Line 2]
  ccc8 a? theo!? a?9
[23; Line 3] Zan? caclleg 8an?a8
  offcco dag offa!? a!?
[25; Line 5]
20g a117 offc9!ffa8
  820 Sp Soollo
[27; Line 7]
  Socreco Boss Sas
[28; Line 8]
  उट्याटिक द्रीटिव्हिक ag
[29; Line 9]
  στος αν όδος
[30; Line 10]
  08216 08010 20 910S
[31; Line 11]
  905 cecoso ceollo
[32; Line 12]
  osollo sosloss
[33; Line 13]
  810czg c#c089 89
[34; Line 14]
  antifor a collag
[35; Line 15]
```

```
[37; Line 17]
    officeo ag 8a\? 8a?
[38; Line 18]
    officeo ag offo
[39; Line 19]
    8ogo 8ag 8a? ceoffo
[40; Line 20]
    officeo folfog 8ago
[41; Line 21]
    officeco89 offa?
[41; Line 22]
    8a? 19 8a? agogo

[42; Ring 1]
    offo! cc2c 8a\V! lfc9 occ2 ccco? officeo o! lfccco 8a? cco officeo2 ag a\vV
[43; Ring 2]
    8 o g 2 c8! 9
```

Folio 69, Verso

[01; Ring 1]

8a\7 cccollo offa89 — Za?!a!? ccolla? offa\? & a? cccfloso offcco2 o!ffco off!offaceo offccoso offcco solv? offcco o caa off!a offcso ac2so offcos!o so coa allo offa? coop ccc2c offo osa\? offo offaco sa? o co ffcoso saco? ca?

[02; Ring 2]

offao coop offa? — sap offaso colleco? cccoop ccop offcase ccc0 oa?a8 ocfto &cco
allo salla? cccoso cccop ocfo ccop offcos ccop solved ccop offa? op offacoso occop offa? ccoso occop offa? ccoso cccop occop offa? occop offa? op offacoso cccop occop offa? ccof occop o

80!a\P offax8ax — 8a\P o! cc89 offoaP aP o! cc9 foffa\P cc08 ccoffa\P a\P offa\P offax8ax offcax offoxo offoxo offoxo offoxo offoxo offcoaPaP ccoffa\P ccoffa\P offax\P ccoffax\P ccoffax\

[04; Label 1] 98669 [05; Label 2] offafo [06; Label 3] occSa [07; Label 4] 916089 [08; Label 5] ollo89 [09; Label 6] 01089 [10; Label 7] ollcog [11; Label 8] രീറേർ [12; Label 9] Spoots [13; Label 10] offcog [14; Label 11] 9 (15; Label 12) ollcos [16; Label 13] SaP!ag [17; Label 14] Za\\? [18: Label 15] Speolo [19; Label 16] 91co89 [20; Label 17] 28989 [21; Label 18] offccg [22; Label 19] olcc 9 89 [23; Label 20] olfc9 8 [24; Label 21] ollcos [25; Label 22] olloscro [26; Label 23] olico89 [27; Label 24] olfccc9 2 [28; Label 25] Seza 920 [29; Label 26] offers Sas [30; Label 27] 08 00110 [31; Label 28]

وحدمهاإ

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.

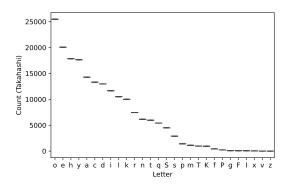


Figure 1: Letter frequencies in Takahashi's transliteration.

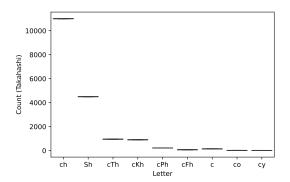


Figure 2: Frequencies in Takahashi's transliteration for several σ combinations.

Accordingly, Table 2 gives frequencies for several σ 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 ll c	950	
cKh	clfc	906	
cPh	c t 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 σ combinations.

Furthermore, while there are instances of a single \vee , it is not clear whether instances like \vee and \vee or combinations with ϑ 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 χ combinations.

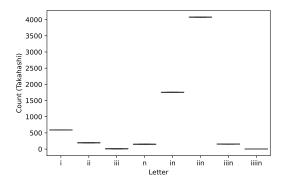


Figure 3: Frequencies in Takahashi's transliteration for several χ combinations.

- The glyph \mathcal{Z} is counted every time \mathcal{Z} and \mathfrak{c} appear consecutively.
- The glyph σc is counted every time σ 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 ι is counted every time it is not part of $\iota \Im$ or $\iota \iota \Im$ as well as in instances of τ .

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

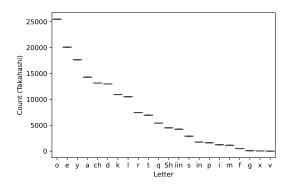


Figure 4: Glyph frequencies in Takahashi's transliteration.

- 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 τ , represented by I in EVA, is counted as ι , 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.

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