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Volume I

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Volume I

edited by

Marie-Louise Nosch
Hedvig Landenius Enegren



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Abbreviations

I. Journals

<i>AA</i>	<i>Archäologischer Anzeiger.</i>
<i>AAWW</i>	<i>Anzeiger der Österreichischen Akademie der Wissenschaften in Wien, Philos.-Hist. Klasse.</i>
<i>ABSA</i>	<i>Annual of the British School at Athens.</i>
<i>AC</i>	<i>Antiquité Classique</i>
<i>ACD</i>	<i>Acta classica Universitatis Scientiarum Debreceniensis.</i>
<i>AD</i>	<i>Αρχαιολογικόν Δελτίον</i>
<i>AE</i>	<i>Αρχαιολογική Εφημερίς.</i>
<i>AIÖN</i>	<i>Annali dell'Istituto universitario orientale di Napoli.</i>
<i>AJA</i>	<i>American Journal of Archaeology.</i>
<i>AOF</i>	<i>Archiv für Orientforschung.</i>
<i>AR</i>	<i>Archaeological Reports.</i>
<i>ArchAnAth</i>	<i>Αρχαιολογικά Ανάλεκτα εξ Αθηνών.</i>
<i>ASAA</i>	<i>Annuario della Scuola Archeologica di Atene e delle Missioni Italiane in Oriente.</i>
<i>BCH</i>	<i>Bulletin de Correspondance Hellénique.</i>
<i>BIBR</i>	<i>Bulletin de l'Institut historique Belge de Rome.</i>
<i>BICS</i>	<i>Bulletin of the Institute of Classical Studies of the University of London.</i>
<i>BSL</i>	<i>Bulletin de la Société de Linguistique de Paris.</i>
<i>CArchJ</i>	<i>Cambridge Archaeological Journal.</i>
<i>CPh</i>	<i>Classical Philology.</i>
<i>CQ</i>	<i>Classical Quarterly.</i>
<i>CRAI</i>	<i>Comptes rendus de l'Académie des Inscriptions et Belles-Lettres.</i>
<i>Ergon</i>	<i>Τό Εργον τής εν Αθήναις Αρχαιολογικής Εταιρείας.</i>
<i>G&R</i>	<i>Greece and Rome.</i>
<i>IF</i>	<i>Indogermanische Forschungen.</i>
<i>JHS</i>	<i>Journal of Hellenic Studies.</i>

<i>JNES</i>	<i>Journal of Near Eastern Studies.</i>
<i>JPR</i>	<i>Journal of Prehistoric Religion.</i>
<i>MDAI(A)</i>	<i>Mitteilungen des Deutschen Archäologischen Instituts (Athenische Abteilung).</i>
<i>MH</i>	<i>Museum Helveticum.</i>
<i>MSS</i>	<i>Münchener Studien zur Sprachwissenschaft.</i>
<i>OAth</i>	<i>Opuscula Atheniensa.</i>
<i>OJA</i>	<i>Oxford Journal of Archaeology.</i>
<i>PCPhS</i>	<i>Proceedings of the Cambridge Philological Society.</i>
<i>PP</i>	<i>La parola del passato.</i>
<i>PZ</i>	<i>Prähistorische Zeitschrift.</i>
<i>RAL</i>	<i>Rendiconti della Classe di Scienze morali, storiche e filologiche dell'Accademia dei Lincei.</i>
<i>RCCM</i>	<i>Rivista di Cultura Classica e Medioevale.</i>
<i>RDAC</i>	<i>Report of the Department of Antiquities Cyprus.</i>
<i>REA</i>	<i>Revue des études anciennes.</i>
<i>REG</i>	<i>Revue des études grecques.</i>
<i>REL</i>	<i>Revue des études latines.</i>
<i>RFIC</i>	<i>Rivista di filologia e di istruzione classica.</i>
<i>RhM</i>	<i>Rheinisches Museum für Philologie.</i>
<i>RPh</i>	<i>Revue de philologie, de littérature et d'histoire anciennes.</i>
<i>SCO</i>	<i>Studi classici e orientali.</i>
<i>SMEA</i>	<i>Studi Micenei ed Egeo-Anatolici.</i>
<i>SMSR</i>	<i>Studi e materiali di storia delle religioni.</i>
<i>SPAW</i>	<i>Sitzungsberichte der Preussischen Akademie der Wissenschaften.</i>
<i>SSL</i>	<i>Studi e saggi linguistici.</i>
<i>TAPhS</i>	<i>Transactions of the American Philosophical Society.</i>
<i>TPhS</i>	<i>Transactions of the Philological Society.</i>
<i>ZAnt</i>	<i>Živa Antika.</i>
<i>ZPE</i>	<i>Zeitschrift für Papyrologie und Epigraphik.</i>

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- 8th Cretological Congress* Πεπραγμένα Η' Διεθνούς Κρητολογικού Συνεδρίου, Heraklion, 9-14 September 1996 (2000).
- 9th Cretological Congress* Πεπραγμένα Θ' Διεθνούς Κρητολογικού Συνεδρίου, Elounda, 8-6 October 2001 (2006).
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PREFACE AND ACKNOWLEDGEMENTS

Marie Louise Nosch and Hedvig Landenius Enegren

At the meeting of the *Comité international permanent d'études mycéniennes* (CIPEM) in Sèvres in September 2010, the CIPEM accepted Marie-Louise Nosch's suggestion to host the 14th Mycenological colloquium in Copenhagen. The first gathering took place in Gif-sur-Yvette near Paris in 1956. The spirit of good humour and collaborative enthusiasm established at the first colloquium became known within the field as *l'esprit de Gif*.

The group of countries and scholars at the mycenological conferences still reflect the correspondents and receivers of Ventris's work notes, which he had circulated to colleagues long before the internet made such a practice feasible.¹ The Gif colloquium included participants from Britain, Bulgaria, France, Greece, Italy, Spain, Switzerland and the USA.

Today mycenological studies are also an active field of research in Germany, Canada, Norway, Sweden, Denmark, Holland, the Czech Republic, Cyprus, and Australia. It is still the founding members of CIPEM who represent the most numerous scholars in the field of Aegean scripts since 1956, but new scholars join the group, and the photographs from each mycenological colloquium illustrate how the number of participants increases. We are an expanding discipline. Another significant change is the increasing number of female scholars in the field. John Chadwick, in his speech at Salzburg in 1995 noticed the few female scholars,² but this has also changed since then. In Nürnberg 1981, the hosts graciously arranged for a parallel 'spouse program' during the colloquium. In Copenhagen, 24 of 57 participating scholars were women. Since the publication in 1954 of *Documents in Mycenaean Greek*, Ventris and Chadwick strived to include other disciplines into the study of Aegean scripts, among others, the disciplines exploring texts from the ancient Near East.

Pierre Carlier and his co-organisers of the *13th Mycenological Colloquium*

¹ Bennet 2014.

² Chadwick 1999, 36.

in Sèvres in 2010 were the first to convene special events on comparative studies of the Mycenaean palatial economy and Near Eastern palatial economies.³ We believe this to be a particularly important yet challenging endeavour and we are happy that several colleagues took up the challenge and publish stimulating comparative studies in the present volume.

Since the Paris colloquium in 2010, we have lost colleagues who will be missed for their scholarly contribution as well as for the friendship that unites us: Pierre Carlier (1949-2011), Emmett L. Bennett Jr. (1918-2011), Petar Hr. Ilievski (1920-2013), Martin S. Ruipérez (1923-2015), Anna Morpurgo-Davies (1937-2014) and Margareta Lindgren (1936-2017). We would like to take this opportunity to dedicate this volume to one our discipline's first ladies, historical linguist Anna Morpurgo-Davies, a world-leading figure in the study of ancient Greek and Anatolian, and as such a role model for what it takes to conduct comparative analyses. We corresponded with Anna Morpurgo-Davies until a few months before she passed away in September 2014. She was trained by Gallavotti and was editor of the first lexicon of Mycenaean, published in 1963. In Oxford, she worked closely with professor of Comparative Philology, Leonard Palmer, and Hittitologist and epigraphist David Hawkins. In 1971, she succeeded Palmer as chair at Oxford.

In this volume we also wish to remember the very first female scholar in Aegean scripts, Alice Kober (1903-1950), and thus highlight her significant contribution to the field of Mycenaean studies. Alice Kober who received an MA and PhD from Columbia University became assistant professor at Brooklyn College. It was with a Guggenheim Fellowship that she was able to immerse herself full-time to the study of Linear B.⁴ Her methodological approach to the study of the Linear B signary, in which she established that the Mycenaean script shows an inflected language, ultimately influenced Ventris's final decipherment of the script.⁵

We also wish to commemorate our Scandinavian colleague, Margareta Lindgren (1936–2017). A pupil of Arne Furumark, she continued the Linear B scholarly tradition at Uppsala University with her publication on the prosopography of Pylos, a fundamental work within Mycenaean Studies.

As head of the Department for Maps and Prints at the Uppsala University Carolina Library for many years, she kept in close contact with the Department of Archaeology and Ancient history as an immensely appreciated lecturer in Aegean Scripts, who really knew how to engage her audience with her keen sense of humour. On a personal note, she was the thesis advisor to the co-

³ Zurbach et al. forthcoming.

⁴ http://en.wikipedia.org/wiki/Alice_Kober

⁵ <https://repositories.lib.utexas.edu/handle/2152/15875>

editor of this volume (Hedvig Landenius Enegren). Her last participation in a Mycenological Colloquium was in Rome in 2006 with a paper on Cypriot Scripts. Many of us remember her vivid personality and her enthusiasm in a wide range of interests that went beyond Linear B; these included in later years, among others, pistol target shooting and the Harry Potter books!

It was an honour to host the 14th *Mycenological Colloquium* in Copenhagen, 2-5 September 2015. We thank friends and colleagues for joining us for this event, and for their presentation and fruitful discussions. We are particularly honoured to hear of *l'esprit de Copenhague*, uniting us all in a friendly conversation on the advancement of knowledge in our field.

For hosting the conference on the exquisite premises of the Carlsberg Academy, the former private villa of brewer Jacobsen and domicile of Niels Bohr, we warmly thank the Carlsberg Foundation. For continued support and trust, we thank the Danish National Research Foundation and the University of Copenhagen. Egzona Haxha, Camilla Ebert and Louise Ludvigsen were our efficient and kind coordination and organisation hostesses and assistants. We warmly thank Maurizio Del Freo for all his help in editorial and other matters; for the indexation Mikkel Nørtoft and for editorial assistance Peder Flemstad. We warmly thank Lillian and Dan Finks Fond, the Institute for Aegean Prehistory and the R.K. Rasks Legat foundation for generous support for this publication. We are grateful to Alessandro Naso, Marco Bettelli and Maurizio Del Freo for welcoming the conference proceedings in the *Incunabula Graeca* series.

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LIST OF AUTHORS

Francisco Aura-Jorro,
Universidad de Alicante, Spain
francisco.aura@ua.es

Federico Aurora
University of Oslo, Norway
federico.aurora@ub.uio.no

Lisa M. Bendall
Keble College, Oxford University, UK
lisa.bendall@arch.ox.ac.uk

John Bennet
British School at Athens, Greece
director@bsa.ac.uk

Alberto Bernabé
Universidad Complutense de Madrid,
Spain
albernab@filol.ucm.es

William Bibee
University of Texas at Austin, USA
willbibee@yahoo.com

Flavia Carraro
University of Copenhagen, Denmark
fcarraro@yahoo.fr

Massimo Cultraro
CNR-IBAM, Catania, Italy
massimo.cultraro@cnr.it

Maurizio Del Freo
CNR-ISMA, Rome, Italy
maurizio.delfreo@isma.cnr.it

Fatima Diez Platas
Universidad de Santiago de
Compostela, Spain
fatima.diez@usc.es

Yves Duhoux
Université Catholique de Louvain,
Louvain-la-Neuve, Belgium
yves.duhoux@uclouvain.be

Elena Džukeska
University “Ss. Cyril and
Methodius”, Skopje, FYROM
elena.dzukeska@gmail.com

Markus Egetmeyer
Université de Paris IV-Sorbonne, France
markus.egetmeyer@paris-sorbonne.fr

Richard Firth
University of Bristol
firth827@btinternet.com

José Luis García Ramón
Universität zu Köln, Germany
garcia.ramon@uni-koeln.de

Alessandro Greco
Sapienza, Università di Roma, Italy
a.greco@uniroma1.it

Joann Gulizio
University of Texas at Austin, USA
gulizioj@austin.utexas.edu

Erik Hallager
University of Aarhus, Denmark
klaeh@cas.au.dk

Margherita Jasink
Università di Firenze, Italy
annamargherita.jasink@unifi.it

José Miguel Jiménez Delgado
Universidad de Sevilla, Spain
jmjimdelg@us.es

Anna Judson
Pembroke College, Cambridge
University, UK
apj31@cam.ac.uk

Artemis Karnava
Inscriptiones Graecae,
Brandenburgische Akademie der
Wissenschaften, Berlin, Germany
artemis.karnava@bbaw.de

John Killen
Jesus College, Cambridge
University, UK
jandakillen@gmail.com

Evangelos Kyriakidis
University of Kent, UK
ek47@kent.ac.uk

Daniel Kölligan
Universität zu Köln, Germany
d.koelligan@uni-koeln.de

Hedvig Landenius Enegren
University of Copenhagen, Denmark
hedvigenegren@gmail.com

Alex Leukart
University of Geneva, Switzerland
alex.leukart@gmail.com
nakileukart@hotmail.com

Eugenio R. Luján
Univ. Complutense de Madrid, Spain
erlujan@filol.ucm.es

Susan Lupack
Macquarie University, Sydney, Australia
susanlupack@mac.com

Torsten Meissner
Cambridge University UK
tm10012@cam.ac.uk

Dimiri Nakassis
University of Colorado Boulder,
USA
Dimitri.Nakassis@colorado.edu

Stavroula Nikoloudis
University of Melbourne, Australia
s.nikoloudis@unimelb.edu.au

Marie-Louise Nosch
University of Copenhagen, Denmark
nosch@hum.ku.dk

Thomas G. Palaima
The University of Texas at Austin,
USA
tpalaima@austin.utexas.edu

Ruth Palmer
Ohio University, USA
palmerr@ohio.edu

Oswald Panagl
Universität Salzburg, Austria
oswald.panagl@sbg.ac.at

Massimo Perna
Università degli Studi Suor Orsola
Benincasa, Naples, Italy
maxperna59@gmail.com

Vassilis Petrakis
Ministry of Education, Athens,
Greece
vpetrakisrm@yahoo.gr

Rachele Pierini
Università di Bologna, Italy
rachele.pierini@gmail.com

Juan Piquero
Universidad Complutense de Madrid,
Spain
jpiquero15@gmail.com

Kevin Pluta
The University of Texas at Austin,
USA
kpluta@austin.utexas.edu

Françoise Rougemont
CNRS, UMR 7041, Nanterre, France
francoise.rougemont@mae.u-paris10.fr

Anna Sacconi
Sapienza, Università di Roma, Italy
anna.sacconi@uniroma1.it

Irene Serrano
Universidad Complutense de Madrid,
Spain
irene.serrano.laguna@filol.ucm.es

Cynthia W. Sherlmerdine
The University of Texas at Austin,
USA
cwshelm@gmail.com

Philippa Steele
Magdalene College, Cambridge
University, UK
pms45@cam.ac.uk

Rupert Thompson
Selwynn College, Cambridge
University, UK
rjet1@cam.ac.uk

Helena Tomas
University of Zagreb, Croatia
htomas@ffzg.hr

Carlos Varias García
Universitat Autònoma de Barcelona,
Spain
carlos.varias@uab.cat

Juan Pablo Vita
CSIC–Instituto de Lenguas y

Culturas del Mediterráneo y Oriente
Próximo, Madrid, Spain
juanpablo.vita@cchs.csic.es

Nicola Antonello Vittiglio
Universitat Autònoma de
Barcelona, Spain
nicola.vittiglio@uab.cat

Jörg Weilhartner
Universität Wien, Austria
joerg.weilhartner@oeaw.ac.at

Aren Max Wilson-Wright
The University of Texas at Austin,
USA
wilsonwright@utexas.edu

Julien Zurbach
Ecole Normale Supérieure, Paris,
France
julien.zurbach@gmail.com

PA-RO , *DA-MO*. STUDYING THE MYCENAEAN CASE SYSTEM
THROUGH DAMOS (DATABASE OF MYCENAEAN AT OSLO)*

Federico Aurora

Introduction

DAMOS is an electronic database containing all the published Mycenaean texts, together with rich metadata and epigraphic and linguistic annotation. It was born as a tool to allow for a corpus linguistic study of the case system and the expression of case functions and grammatical relations in Mycenaean, a question central in Mycenaean linguistics with implications for the general history of the Greek language.

During the work with the creation of the database, though, it quickly became clear that it could, if made available online and developed in the right direction, become a more broadly useful and versatile instrument for scholars (specialists and not) and teachers, and for dissemination in general. This has, thus, become the idea that informs the work with DAMOS.¹

The main objectives of DAMOS can be summarized as follows:

- offer online, and freely accessible, a constantly updated version of the Linear B texts
- offer a flexible tool for the palaeographic² and linguistic analysis of Mycenaean (for the present author, with a special focus on its case system)
- facilitate the access to the Mycenaean material for non-specialists by creating different “entry points” (translations, maps, etc.) to the

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¹ A first version of the database has been online at <https://www2.hf.uio.no/damos/> since February 2013, allowing, at the time of writing this article, for browsing through the corpus or a subset of it, and for complex word searches. For more details about the online version see Aurora 2015, 29-30.

² Especially if properly combined – and linked to – an image database, see *infra*.

world of the Linear B documents.³

- contribute to better integrate Mycenaean scholarship within the rest of classical scholarship, not least by the inclusion of Mycenaean data into major digital resources in the field.

The texts in DAMOS

DAMOS contains electronic versions of all the published Mycenaean texts as they are reproduced in current standard editions, but updated with new finds, joins and readings. This is particularly relevant for the Pylos tablets, the edition of which (*PTT I*) goes back to 1973 and for which a high number of joins and new readings have been published since then. I would like here to point out that when the work started with the database, the draft of *PoN IV* circulated by José L. Melena was not yet available to me, so that it has not been possible to take its text as a basis.⁴ From my personal survey, though, the texts in DAMOS, updated with all the new joins, do not substantially diverge from the texts in the draft of *PoN IV*. However, whenever I have found differences between the two, these are reported in the notes to the single texts.⁵ Regarding the Knossos documents, it is important to underline that for tablets 1-1063 I have used *KT5*, which is more updated than the first two volumes of *CoMIK*, while for the rest of the Knossos documents *CoMIK* has been the reference edition (also this, of course, integrated with the joins published after the publication of its last volume).⁶

The part of each text or its metadata (series and subseries classification, scribal hand attribution, etc.) that has been changed, following a new publication, from the standard edition, has been tagged and is therefore available for searches so that one can, e.g., generate a list of the texts, which differ from standard editions.⁷ The sources of the changes for each document are also recorded in the “notes” field.⁸

Finally, as previously pointed out, DAMOS has as its first objective to offer a constantly updated version of all the published Linear B texts, so as soon as new texts – or joins – are published (either in canonical editions or in journal

³ For more technical details about the creation process see Aurora 2015, 24-29.

⁴ Furthermore, I am not sure that it would have been methodologically justifiable to use an edition not yet published in its definitive form.

⁵ This should not, though, be regarded as a systematic comparison between the two texts. This will be possible first when *PoN IV* is published in a definitive version.

⁶ For a complete bibliography of the editions used for the texts in DAMOS, see <https://www2.hf.uio.no/damos/index/about/page/texts>.

⁷ In the current online version the changed parts can be visualized in bold by toggling the button “Highlight changes.”

⁸ It has not been possible, though, to link the single changes to the single source, even though this has been done for join sources, see *infra*.

articles) they will, of course, be incorporated in the database and in its online version.

Epigraphic conventions

The texts in DAMOS follow the Wingspread convention,⁹ and generally also follow occasional *ad hoc* solutions of the main editions – which the Wingspread convention gives space for – for the sake of compatibility with other resources (*DicM.*) and the rest of the literature. There is one point, though, where we have decided to follow one single practice, namely in the case of the line identification assigned to a line following an “.a” line. Here *PTT I* and *CoMIK/KT5* differ in their practices, since *CoMIK/KT5*¹⁰ identify such lines as “.b”, while *PTT I* leaves it without a further line identification, this resulting in a certain ambiguity when the line is quoted: the second line of **PY Aa 777**, for example (Fig.1), is then referred to (e.g. in *DicM.* or in its online indexes)¹¹ simply as **PY Aa 777**, leaving it ambiguous if this is the only line of the tablet or if it follows an ‘.a’ line. It must be added that the reason for the choice of the authors of *PTT I* is that they, in fact, reserve ‘b.’ only for cases in which “in an unruled space several lines of text are inscribed, obviously in the normal order.”¹² However, there are actually only two such cases¹³ in *PTT I* (and the same holds for the draft of *PoN IV*), namely **PY Ea 59** and **PY La 626**, so

PY Aa 777

.a e-ke-ro-qo-no
o-pi-ro-qo MUL 7 ko-wa 3 ko-wo 4 DA 1 TA 1

KN Dq 42

.a] pe-ri-qo-ta-o [
.b]jo ,/ ma-sa , OVIS:m[

Fig.1 Differences of practice in *PTT I* and *CoMIK/KT5* exemplified by **PY Aa 777 and **KN Dq 42**.**

⁹ At the time of writing, there are still some minor differences between the conventions of DAMOS and the Wingspread Convention, but this is only a temporary situation due to computational needs.

¹⁰ *KT5*, XIX

¹¹ <http://www.cervantesvirtual.com/bib/portal/diccionariomicenico/contenido/a.html>

¹² *PTT I*, 12.


¹³ There is, both in *PTT I* and in the draft of *PoN IV*, also one case of a line which is not identified as ‘.B’, even though it follows an ‘.A’ line, namely **PY Eo 160.3**

we chose¹⁴ to follow the practice of *CoMIK/KT5*, identifying as “.b” all lines following an “.a” line, and indicating the peculiarity of **PY Ea 59** and **PY La 626** in the notes.

Finally, a very small difference with standard editions is that we write the indication of a sealing’s face above the first line of text and not on the same line (see Fig. 2). This is in order to be coherent with the position of the corresponding indications of tablet face, ‘r.’(recto), ‘v.’ (verso), ‘lat. inf.’, etc.

Fig.2 Example of the layout of the transcription of a sealing (TH Wu 429) in DAMOS.

www2.hf.uio.no/damos/Index/item/chosen_item_id/5538

 Highlight Changes

TH Wu 429 (unknown)

[image \(Arachne\)](#)

α	*180+DI supra sigillum CMS VS3 369
β	o-pa
γ	vac.

Metadata

Every text is connected to a set of metadata: site, classification (series and subseries), find-place, state of preservation (<!>), place of preservation, writer,¹⁵ chronology, and notes. The joins are all registered in a separate table and they are therefore also searchable, easily allowing, in this way, for constantly updated concordance lists.¹⁶ The sources of the joins for each document are also recorded¹⁷ in a separate field, so that it is possible to obtain concordances of tablets, joins and relative publications.

A special remark has to be made here about the chronology of the texts. Since there is no general consensus about the relative or absolute chronology

¹⁴ This choice was at the beginning of the work a forced one, because of computational needs of unambiguity (Aurora 2015, 25).

¹⁵ This piece of information is actually linked to the texts through the annotation of hand attribution for each sign occurrence, in order to account for those texts (and words) where different scribal hands are responsible for different signs, see *infra*.

¹⁶ This is a feature already present in the online version.

¹⁷ This information is still being added at the time of writing.

of the archives,¹⁸ every relevant portion of the documents for which different datings have been proposed, are assigned a corresponding number of different chronological values in as many database posts. These various values are further organized in coherent sets according to different scholars' models. This way of structuring the data is very useful to build (and vary when needed) a chronological scenario against which to perform palaeographical or linguistic searches.

Regarding the assignment of texts to scribal hands, given the few uncertain cases of current reference studies, we have at the moment only given the possibility to assign an 'alternative writer' to a given sign (and thus, word and text), but a system similar to the one used for the different chronologies could be implemented if needed.¹⁹

Lines, words and signs

The Linear B corpus is stored in the database at different levels, in order to make searches as analytical and precise as possible. This means that the database, in addition to the full text of each document, contains interconnected lists of all Mycenaean lines, all Mycenaean words (a list of types and a list of occurrences) all Mycenaean signs (a list of types and a list of occurrences). Logograms, measure units, numerals and adjuncts have been stored both as words and as signs, while specified and ligatured logograms and monograms have been stored as words and broken into their constituent signs in the sign list.

Epigraphical annotation

For each of the levels mentioned above, detailed epigraphical information is connected to each unit and can be searched for. The epigraphical attributes of each line, word and sign are listed in Figs.3-5

FEATURE ANNOTATED	EXAMPLE
type	syllabogram-basic
sign number	08
uncertain reading	ḁ
damagedleft]a
damagedright	a[
reconstructed	[a]
erasure	[[a]]
written_under	a

¹⁸ See for example Driessen 2008 and Hallager & Hallager 2015.

¹⁹ Cf. Godart 2012 and Olivier 2012.

written_over	‘a’
over	<i>registers possible underlying sign(s)</i>
omission	<a>
supra_sigillum	<i>if written over a seal-impression</i>
hand	1
hand_uncertain	<i>the attribution to a given hand is uncertain</i>
writer_alternative	<i>if the attribution to another hand is possible</i>
modern_expunction	{a}
stylus	1

Fig.3 Searchable sign features

FEATURE ANNOTATED	EXAMPLE
size	-1 (<i>if preceded by a “/”</i>)
size_previous	bigger (<i>if preceded by a “/”</i>)
size_next	bigger (<i>if followed by a “/”</i>)
damagedleft]da-mo
damageint	pu-ru[]ta
damagedright	da-mo[

Fig.4 Searchable word features

FEATURE ANNOTATED	EXAMPLE
damagedleft] , OLE Z 2 VIN V 1
damagedright	qe-ra-si-ja OLE S 1[

Fig.5 Searchable line features

As one can see, this allows to query the database for, e.g., lines, words or signs that are damaged at the beginning or at the end, or internally. Particularly relevant for palaeographic research is, thus, the possibility to distinguish, in searches and statistics, between signs and words, which are: a) well-preserved, b) of difficult reading, c) erased, d) only conjectured (not physically present on the tablet). Further, this can be crossed with the information about the scribal hand – and stylus for Pylos²⁰ – which has been connected directly to each sign, so that one can look for signs written by a certain hand or group of hands. Moreover, every line, word and sign is classified under a “type” (see Fig.6-8), thus allowing for very fine-grained searches of specific categories of signs

²⁰ These are based on *Scribes Pylos*. I am, of course, aware of the remarks by Olivier 2012 about the use of the stylus category, but I thought it useful to include it anyway.

(uninterpreted syllabograms, or *doublets* and complex syllabograms, gender specifiers, etc.) words (monograms, logograms with ligatures or specifications, etc.) or lines (ruled, unruled, etc.). Notice that the word list and sign type list include also entities like traces of writing (“*vestigia*”), blank spaces (“*vacat*”), indication of the presence of a seal-impression (“*sigillum*”). Here it is also worth noticing that, following the practice of *PTT I*, DAMOS gives, for each published seal, an indication of its CMS number in the tablet texts and this is further linked (Fig.2) to the website of the digital CMS where pictures of the seal-impression and detailed information about the seal are stored.²¹ The CMS seal numbers are, obviously, also registered in an own list linked to the relevant texts and can thus be crossed with other parameters in searches.

TYPE	EXAMPLE
blank space	vac.
check mark	X
<i>deest</i>	deest
dividing line	:
graffito	graffito
large dot	●
logogram	OLE
logogram-uninterpreted	*178
logogram-vases	*211 ^{VAS}
measure: dry	T
measure: dry/liquid	V
measure: liquid	S
measure: weight	M
missing sign	•
number	1
<i>quantum satis</i>	qs
question mark	?
seal	sigillum
specification	: ₂
specification: gender	: ^f
syllabogram used as logogram (or part of it)	NI
syllabogram-basic	de
syllabogram-special	ra2
syllabogram-uninterpreted	*47

²¹ <http://www.uni-heidelberg.de/fakultaeten/philosophie/zaw/cms/>

traces	vest.
word-divider	,

Fig.6 Searchable sign types

TYPE	EXAMPLE
abbreviation	ki
check mark	X
common word	da-mo
logogram	OLE
logogram: ligature: logogram + ?	CYP[+?
logogram: ligature: logogram + logogram	AROM+PYC
logogram: ligature: logogram + syllabogram	*2II ^{VAS} +PO
logogram: ligature: logogram + syllabogram + syllabogram	*172+KE+RQ2
logogram: ligature: logogram and syllabogram	TELA+PA
logogram: monogram	MERI
logogram: specified	TELA;,;
logogram: specified: gender	OVIS: ^f

Fig.7 Searchable word types

TYPE	EXAMPLE
inf. mut.	inf. mut.
narrow line	angustum
prior pars sine regulis	prior pars sine regulis
reliqua pars sine regulis	reliqua pars sine regulis
ruled	.1
ruled: subdivision: no ruling	.1a
ruled: subdivision: ruling	.1A
single line	∅
single line: subdivision: ruling: no ruling	Aa
single line: subdivision: ruling	.A
sup. mut.	sup. mut.
top line	.0
unruled	.a

Fig.8 Searchable line types

Different readings, erasures, mistakes...

Different readings from the apparatuses of standard editions, *DMic.* or individual publications are at the moment registered, but not systematically, in the notes to the individual texts. We have now started the process of systematically entering all alternative readings found in the apparatuses in a dedicated list, directly connected to both the words and the signs (the latter to facilitate palaeographical work) they refer to, so that all alternative readings of a sign or a word will be directly available for searches. The same holds for texts written over erasures and for supposed scribal mistakes: erased text (when recoverable) and modern correction are being entered and linked to the corresponding words.

...and different editions?

Since *KT6*, *PoNIV* and the “Corpus des inscriptions en linéair B de Pylos”²² might be published in the near future, the question will be posed of 1) how to rapidly and efficiently update the texts in DAMOS, 2) how to deal with two different standard editions. Regarding the first question: if the editors of the new editions will make available text-files of their editions, it will not be too difficult to detect the differences automatically, with the aid of the computer. This would also have the advantage to allow the creation of an index of the changes introduced in the new editions, which can be very useful, particularly for the non-specialist researcher. The second point is more problematic, but a structure will have to be provided similar to, but distinct from, the one which is now linking alternative readings to corresponding words.

Normalization

In order for efficient searches to be performed, a list of ‘normalized’ forms of each word has been created. Normalization implies removing all the epigraphical mark up signs that can distinguish various occurrences of a word, e.g. *da-mo* vs. *ḏa-mo*[. By linking these two forms to a normalized form *da-mo*, we are able to capture all the (epigraphically) different occurrences of this word. Of course, if one wishes, she can still look for all the occurrences of a given epigraphical form.

Epigraphically vs. linguistically annotated database

What I have so long described is the epigraphical part of the database, where the interpretative component of the data is mostly confined to the not exceedingly many uncertain readings (c. 5% of the total of logograms, syllabograms and numerals, thus affecting c. 15% of all words) and their possible alternatives.

²² Olivier 2012, 108.

This epigraphical annotation is at the time of writing complete (with the aforementioned exception of alternative readings, erasures and possible scribal mistakes). Fig.9 is just an example of a possibly interesting query, just to give an idea of the potential of the database.

Syllabogram	Occurrences	%	Syllabogram	Occurrences	%
to	1974	4.0542	di	299	0.6141
jo	1890	3.8817	qa	288	0.5915
ko	1742	3.5777	pu	270	0.5545
e	1708	3.5079	tu	244	0.5011
o	1673	3.4360	se	240	0.4929
ro	1656	3.4011	je	202	0.4149
a	1466	3.0109	nu	192	0.3943
ja	1410	2.8959	zo	187	0.3841
ra	1376	2.8260	a ₂	184	0.3779
ke	1361	2.7952	su	165	0.3389
ta	1332	2.7357	du	142	0.2916
te	1216	2.4974	a ₃	117	0.2403
wo	1088	2.2345	qi	102	0.2095
we	1050	2.1565	za	99	0.2033
re	1041	2.1380	*56	97	0.1992
pa	1030	2.1154	*22	77	0.1581
ka	1021	2.0969	ra ₂	65	0.1335
na	1011	2.0764	pte	60	0.1232
u	983	2.0189	ze	60	0.1232
ri	887	1.8217	pu ₂	55	0.1130
si	811	1.6656	au	49	0.1006
no	799	1.6410	ro ₂	47	0.0965
so	789	1.6205	mu	42	0.0863
wa	789	1.6205	*34	31	0.0637
me	767	1.5753	*82	30	0.0616
i	761	1.5629	*65	28	0.0575
pe	728	1.4952	nwa	27	0.0555
da	699	1.4356	*83	26	0.0534
ti	672	1.3802	ta ₂	23	0.0472
pi	648	1.3309	ra ₃	22	0.0452
mo	645	1.3247	*47	21	0.0431
ki	602	1.2364	*63	21	0.0431
de	596	1.2220	dwe	17	0.0349

do	590	1.2117		dwo	11	0.0226
po	581	1.1933		*18	10	0.0205
qe	548	1.1255		*64	10	0.0205
ma	531	1.0906		*35	8	0.0164
ne	493	1.0125		*79	7	0.0144
ni	462	0.9489		twe	7	0.0144
wi	461	0.9468		*49	6	0.0123
ku	458	0.9406		*86	5	0.0103
ru	389	0.7989		two	4	0.0082
sa	388	0.7969		*19	3	0.0062
mi	330	0.6778		*89	1	0.0021
qo	314	0.6449		*92	1	0.0021

Fig. 9. Occurrences and frequency of syllabograms (excluding their use as logograms and excluding conjectures).

The linguistic interpretation of the texts

Multiple analyses and their organization

Moving into the domain of linguistic interpretation, the degree of uncertainty of the data, due to the well-known nature of the Mycenaean corpus, increases dramatically. This implies having to deal with the (at times very) different interpretations that a given form admits. It has therefore been necessary to devise a system of annotation, which can reflect this complexity, but still be manageable and heuristically useful. Thus, while allowing for more than one possible value for each annotated feature was an inevitable choice, the final goal of this kind of linguistic annotation is the organization of this variety in such a way to be able to capture (and retrieve and, finally, when possible, test):

- 1) The different hypotheses formulated about a single word with no further implications for other sets of words: these would typically address lexical or semantic questions (word class attribution, lexical meaning of a word, etc.).
- 2) The different structural hypotheses formulated about Mycenaean as a system and therefore regarding whole sets of words: these would typically address phonological, morphological and syntactic questions (number and form of case endings, the realization of semantic rules and grammatical relations through case or prepositional constructions, etc.).

These two groups of hypotheses are dealt with in two different ways. While, for example, different lexical values for a given word (group 1 above) need to result in two different analysis posts in the database, linked to the same

epigraphical word occurrence, different interpretations of the case form and function expressed by an ending (e.g. of the syllabogram *-e* in 3rd declension nouns), – this being a structural question (group 2) – are registered in different cells (case1, case2, etc.) of the same analysis post. These cells correspond to as many possible elements (pairs of form and function) of the case system, which can then be subgrouped to test different hypothetical case systems. The principles followed here are economy of representation (and annotation) and systematization of the proposed interpretations into theory-coherent sets.

The resulting annotation structure is, clearly, a complex one and needs to be adjusted and refined through concrete annotation practice according to the needs progressively revealed by the close inspection of the single texts and related analyses.²³ What has, at the time of writing, been done is a first, semi-automatic annotation²⁴ (a sort of “distant reading”)²⁵ of c. 11500 of the 15490 syllabic words of the corpus. Currently we are starting the phase of ‘close reading’ and refinement of the annotation structure.²⁶

One could, of course, object that the Linear B corpus is after all not immense, and is therefore quite manageable, so that many hypotheses can be tested also without a database. This is, however, quite time consuming, while using a database as the one here described allows hypotheses built by different scholars, their textual basis and most of the other data they are grounded on, to be stored and, consequently, reproduced (printed if one wants), tested and easily varied whenever new data or new insights appear²⁷ (new texts, revised readings, scribal hands assignment or find-places, etc.). Furthermore, and most importantly, this kind of database makes it possible to search for fine-grained metadata, epigraphic, palaeographical and linguistic data, and at the same time cross them through complex searches, this hopefully leading to new insights and hypotheses.

The linguistic annotation

The linguistic annotation comprises a semantic, morphological and

²³ The possibility of operating with subsequent refinements of the annotation, and also other features of DAMOS, benefit from its structure as a relational database (Aurora 2015, 24).

²⁴ Aurora 2015, 27-28.

²⁵ Moretti 2013

²⁶ A ranking of analyses posts (group 1 above) according to scholarly consensus (mainly based on the entries in DicM.) has also been entered (Aurora 2015, 28-29), but its efficiency and usefulness need to be tested in the “close reading” process.

²⁷ Cf., for example, the different scenarios considered by Rupert Thompson (Thompson 2014) for the realization in Mycenaean of the subset of case functions ablative, dative, instrumental and locative, in the light of some forms (*pa-ro*, *te-qa-jo-i qa-si-re-u-pi*) appearing in the recently published TH Uq 434 (Aravantinos *et al.* 2008). This case underlines as well the importance of integrating also different readings (here *te-qa-jo*, yielding a different morphological interpretation) in the annotation structure.

syntactic analysis of each word²⁸ as well as a syntactic annotation of sentences. Morphological and syntactical analysis of words (the main level of annotation, given the concise nature of our texts) includes the categories shown in Fig.10-11.

ANNOTATION CATEGORY	EXAMPLE
part of speech	N (<i>noun</i>)
declension	3
stem	-s
number	sing.
gender	m.
case 1	dative (<i>form</i>); position (<i>function</i>)
criterion-case 1	<i>reason for the given interpretation</i>
case 2	instrumental (<i>form</i>); source (<i>function</i>)
criterion-case 2	<i>reason for the given interpretation</i>

Fig.10 Annotation categories for nouns

ANNOTATION CATEGORY	EXAMPLE
part of speech	V
person	3
diathesis	act
mood	ind
tense/aspect	pres
thematic/athematic	them
stem formation	-o

Fig.11 Annotation categories for verbs

The semantic annotation is an important feature for bringing Mycenaean closer to the rest of classical scholarship, by providing more familiar forms – or a more general category like “semantic class”²⁹ – as “entry points” for searches, at the same time facilitating the process of linking the data contained in DAMOS to other digital resources in the field (see *infra*). Fig.12 shows the various levels of lemmatization present in DAMOS.

Finally, a scheme for the syntactical annotation of sentences according to

²⁸ In the case of Mycenaean words written as one single Linear B word, but that we interpret as being more syntactic words put together (e.g. *da-mo-de-mi*), different analyses (tagged in such a way not to be confused with competing analyses as described above) have been connected to the same epigraphical word, while, conversely, in the case of compound forms which are written as two words in Linear B (e.g. *a-pu*, *ke-ka-u-me-no* – at least in one of the possible interpretations of these forms), the same word analysis has been connected to the two epigraphical word forms.

²⁹ Based on Bartoněk 2003

dependency grammar (this in order to be compatible with the work being done with the rest of the Ancient Greek corpus)³⁰ is at the moment being developed.³¹

NORMALIZATION/SEMANTIC ANNOTATION	EXAMPLE
Linear B form	da-]m̄o (<i>or</i> da-mo-de-mi <i>etc.</i>)
Normalized Linear B form	da-mo-de
Linear B lemma	da-mo
Mycenaen form	dāmōi
Mycenaean lemma	dāmos
Attic form	δήμωι
Attic lemma	δήμος
Closest attested 1st millennium form	δαμωι
Indo-European	deh2-mo
Semantic Class	people groups, collective

Fig.12 Normalization and semantic annotation

Further developments

Linked Data

As already mentioned above one of the aims of DAMOS is to contribute Mycenaean data to other digital resources in the field. At the time of writing, the online version of DAMOS has the already mentioned links between the occurrences of seal-impressions and their pictures and related metadata in the digital CMS, hosted at Arachne,³² as well as links to the high definition pictures of the Knossos tablets hosted at the Ashmolean Museum, available on their website. This permits to integrate online texts with online pictures. Further important steps in this direction would be linking DAMOS with the searchable database of photographs of the Linear B tablets from hosted at CaLIBRA,³³ and with the pictures of the documents from Midea, Mycenae and Tiryns contained in LiBER³⁴ – and, of course, when they will be ready, with the 3D pictures which are being taken by Dimitri Nakassis and Kevin Pluta.³⁵ This can further lead to an integrated system, where signs and words are tagged on the pictures to

³⁰ Bamman & Crane 2011

³¹ Aurora 2015, 26-27.

³² <http://arachne.dainst.org>

³³ Judson *et al.* 2015.

³⁴ <http://www.liber.isma.cnr.it/cgi-bin/home.cgi>, Del Freo & Di Filippo 2014.

³⁵ See Nakassis & Pluta in this volume.

correspond to signs and words in the textual database.³⁶ Finally, once lexical data and linguistic annotation are entered, this will give the possibility to integrate the material in DAMOS into resources like the online LGPN, Epigraphical databases³⁷ and the Ancient Greek and Latin Treebank.

Maps

Starting from spring/summer 2016 we will be working on adding to the online version both maps of the individual sites and a general map of the Mycenaean world where to plot our data (find-places of the documents, linguistic annotations, etc.), with the aim to provide a (heuristically) useful visualization of the data and one more entry point for non-specialists.

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³⁶ Barpoutis *et al.* 2010.

³⁷ Cf. the newly started project "Integrating Digital Epigraphy" (Duke University) <http://blogs.library.duke.edu/dctthree/projects/>

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