

CREATING ECONOMIC ORDER
RECORD-KEEPING, STANDARDIZATION,
AND THE DEVELOPMENT OF ACCOUNTING
IN THE ANCIENT NEAR EAST



VOLUME IV

in a series sponsored by the
Institute for the Study of Long-term Economic Trends
and the International Scholars Conference on
Ancient Near Eastern Economies

A Colloquium Held at The British Museum, November 2000

EDITED BY
Michael Hudson
Cornelia Wunsch

CDL
Bethesda, Maryland

COVER ART: Mycenaean Linear B tablet from Pylos (Jn 829, obverse) listing expected contributions of recycled 'temple' bronze from the 16 major administrative districts of the kingdom of Pylos; see page 290f. for transliteration and discussion.

This photograph is reproduced from the archives of the Program in Aegean Scripts and Prehistory, University of Texas at Austin, with the kind permission of the Department of Classics, University of Cincinnati.

Copyright © 2004 by CDL Press

All rights reserved. This book, or parts thereof, may not be reproduced in any form or by any means, electronic or mechanical, including photocopying, recording or any information storage or retrieval system now known or to be invented, without permission of the publisher.

Library of Congress Cataloging-in-Publication Data

Creating economic order: Record-keeping, standardization and the development of accounting in the ancient Near East / edited by Michael Hudson and Cornelia Wunsch

355 p. 23×15 cm

At head of title: The International Scholars Conference of Ancient Near Eastern Economies, vol. 4

Includes bibliographical references.

ISBN 1883053-854

1. Accounting—Middle East—History. I. Hudson Michael, 1939- II. Wunsch, Cornelia. III. The International Scholars Conference of Ancient Near Eastern Economics.

TYPESETTING AND DESIGN: Cornelia Wunsch

TYPE: 11/13.2 Adobe Garamond with customized diacritics

Table of Contents

Acknowledgments	v
Introduction: The Role of Accounting in Civilization's Economic Takeoff <i>Michael Hudson</i>	1
1. Proto-Cuneiform Account-Books and Journals <i>Robert Englund</i>	23
2. Accounting in Early Mesopotamia: Some Remarks <i>Marc Van De Mieroop</i>	47
3. The Function of Written Documentation in the Administrative Praxis of Early Babylonia <i>Piotr Steinkeller</i>	65
4. Bookkeeping in the 21 st Century BCE <i>William Hallo</i>	89
5. Accounting for Change: The Development of Tabular Book-keeping in Early Mesopotamia <i>Eleanor Robson</i>	107
6. Accounting in Neo-Babylonian Institutional Archives: Structure, Usage, and Implications <i>Michael Jursa</i>	145
7. Weight Systems and Trade Networks in the Old World (2500-1000 BC) <i>Alfredo Mederos and C. C. Lamberg-Karlovsky</i>	199
8. Accounting Practices and Economic Planning in Egypt before the Hellenistic Era <i>Ogden Goelet</i>	215
9. Mycenaean Accounting Methods and Systems and Their Place within Mycenaean Palatial Civilization <i>Thomas Palaima</i>	269
10. The Development of Money-of-Account in Sumer's Temples <i>Michael Hudson</i>	303

11. General Discussion	331
Bibliographical Abbreviations	355

ACKNOWLEDGMENTS

On November 10-11, 2000, our fourth colloquium met at the British Museum to present and discuss the papers presented in this volume. The meeting was hosted by Christopher Walker at the Department of Ancient Near East at the British Museum.

Ogden Goelet and Carl Lamberg-Karlovsky submitted papers but were unable to attend the London meeting. Attending and participating in the discussion but not presenting papers were Johannes Renger from Berlin, Cornelia Wunsch from Perth, and Carlo Zaccagnini from Rome. Also attending were the economist Arno Daastol from Oslo, Lamia al-Gailani from London, and Geoffrey Gardiner, a Fellow of Britain's Institute of Chartered Secretaries and Administrators and member of its National Council from 1973 to 1981.

We are grateful to Harvard University, the Robert Schalkenbach Foundation, and anonymous personal contributors for providing the funding for this colloquium.

9.

Mycenaean Accounting Methods and Systems and Their Place within Mycenaean Palatial Civilization

Thomas G. Palaima
University of Texas at Austin

1. Introduction

My purpose here is to discuss the effects of Linear B accounting on the economic and social life of the Mycenaean palace period (c. 1500-1200 BC) and to give some sense of the integration of record-keeping administration into the activities of daily life in the well-documented Mycenaean palatial territories. Right up front I would like to say that it is easy to overemphasize the degree to which centralized palatial administration permeated or controlled the working lives of the 50,000-100,000 inhabitants of a palatial territory like Pylian Messenia in southwestern Greece. We should keep in mind that from the well-preserved destruction horizon of the palatial center we have c. 1,000 clay tablets attributed to just over thirty 'scribes' (Palaima 1988 2l and 2003 2i below). The tablets from Pylos indicate an administrative reach that covers the entire region of two geographically natural provinces divided into 16 (and two alternative) districts and that encompasses c. 240 sites.

Nonetheless, the tablets also only reference about 4,000-5,000 individuals and many of them anonymously as members of collective groups (smiths, wall-builders, herdsman, specialized crafts personnel, women cloth production workers, rowers, infantry soldiers) (Hiller 1988 2b below). Religious and political officials, some with clear administrative functions, are mentioned in the texts, too. But many of these, *e.g.*, the local village big man or *basileus*, occur on the texts only as their areas of rather independent interests coincide with some specific need of the palatial center, *e.g.*, regarding the control of specific groups of smiths in outlying areas who would be used for palatial bronze production (Morpurgo Davies 1979 2b below). The influence of the palatial center would be felt by most inhabitants of the territory only

intermittently and indirectly. Most inhabitants would be directly affected by clan chieftains, local big men (*basileis* in the plural), or even socially and economically prominent 'aristocrats' who occur in the tablets without any title, by personal name only, and are known as 'collectors' from their involvement with sheep and wool/cloth production. The 'collectors' also have relations with the palace centers (Killen 1995 2p, Olivier 2001 2p below), but they do not seem to be exclusive agents of the palatial centers out in the landscape.

Five major sites have yielded substantial to modest numbers of Linear B clay tablet records. In descending order of documentation these are: Knossos (c. 3300 tablets), Pylos (c. 1000 tablets), Thebes (c. 200 tablets once likely aggregates of fragments from the same tablets are taken into account), Mycenae (c. 75 tablets) and Tiryns (c. 24 tablets) (for typology of tablets, cf. Palaima 1990 2i and 2003 2i below). These tablets are minimalistic in their overall information contents and in their purposes. They are all focused on registering information that would be useful, most likely later in a mnemonic way, to those involved in monitoring the materials, economic interests and activities of sites, groups and individuals linked, directly or tangentially, dependently or almost independently, into the palatial system of regional organization.

Pylos and Thebes clearly exploit, without necessarily totally controlling, the resources of well-defined regions, known for this reason as palatial territories. The scale of these territories and the palatial centers will strike Near Eastern textual scholars as rather small, not to say petty (the Pylos region is 2,000 square kilometers and it is large for a palatial territory). The records from these two sites give us good evidence for yet smaller localities whose materials and human resources came under the view of the central administrations (cf. below Sergent 1994 2m and Piteros, Olivier and Melena 1990 2m).

The Pylos records, most of which come from the single administrative year that marked the end of the palatial center's existence c. 1200 BC (Palaima 1995 2l below), give us our best view of the relationships that existed among the palatial center proper, two natural geographical 'provinces', districts within those provinces, regional centers within those districts, and an array of other minor sites, social, political, and economic organizations, and human agents involved in the economic activities that made the entire complex system viable. Mycenaean understanding of these relationships is constantly under revision. We are now seeing that almost all the simple models of organization pro-

posed in the first two decades after the decipherment of Linear B in 1952 were reductionist.

This does not mean that they were *wrong*. Their binary-ism, partly adapted from what Mycenological linguists, Aegean archaeologists, Homerists and Greek economic historians thought of as Near Eastern models (*e.g.*, for temple vs. palatial economy, centralized economic control, workshops, scribal status) helped us to see different facets of the overall economic and political organizational scheme (for an overview of trends in history of scholarship in the last century, cf. Palaima 2003 2a). But where, in the 1950s into the 1970s, we were likely to interpret the whole of things in the light and darkness of single on-off switches, we now use dimmer controls and panels of switches to focus lighting and shading on areas of evidence in subtler ways. This also means, of course, that we are less categorical about the general scheme of things. Most of the words that I will necessarily use here, *e.g.*, ‘scribes’, ‘administration’, ‘agents’, ‘regional economy’, ‘monitor’, ‘palatial center’ and ‘control’, have specific or even vague meanings in a Mycenaean context that do not transfer readily to non-Mycenaean cultures.

The Knossos Linear B records have a difficult chronology, and the administrative system of which they are part has a longer and more complicated history, with antecedents reaching back into Minoan palatial society. The extant Linear B tablets of the so-called Mycenaean phase (c. 1450-1200 BC) give us a broad view of how the palatial center interacted with regional centers of different orders throughout the central and western parts of the island. They also attest to the importance on the island of Crete in this period of several of the conspicuous social, political and economic organizations and one main class of human agents, those prominent individuals, already mentioned, known as ‘collectors’ (Olivier 2001 2p, Bennet 1992 2k below), documented also at Pylos.

The sparser Thebes, Mycenae and Tiryns material gives us glimpses of some of the same patterns of organization we see elsewhere. The Thebes material is especially critical in providing us with a set of nodules, *i.e.*, clay devices with sealing impressions molded around the knot in a looped fine string, by which single transactions among agents and institutions involving specific commodities, in this case animals destined for ritual slaughter and commensal ceremonial consumption (Killen 1994 2f, Piteros, Olivier and Melena 1990 2f), were authenticated, authorized and/or verified as fulfilled (Palaima 2000a and 2000b 2o below).

All in all, then, Mycenaean accounting within Mycenaean palatial civilization looks markedly different from record-keeping in cuneiform cultures. Here I shall try to give some sense of how Mycenologists interpret the evidence we now have. I shall do this first by providing some guidance to what I consider accessible works of scholarship on particular sub-topics relating to economic and administrative interests. Then I shall describe the Mycenaean situation in broad outline. Finally I shall offer a few detailed examples, or test cases, of how particular kinds of records or recording formats affect social life within Mycenaean palatial civilization, specifically through the physical and conceptual organization of accounts and how they enable the control of labor and the provision of goods and services.

Regarding scholarship, I am being highly selective. The works I cite can be viewed as convenient portals for outsiders into the distinctive world of Mycenaean script and administration. Based on my own experience with intensive hyper-specialization in the many sub-disciplines of Mycenaean studies (for example, epigraphy, palaeography, archival studies, sphragistics = sealing systems, linguistics, archaeology, anthropology, iconography, general prehistory, Indo-European studies, Homeric studies and so forth) I doubt whether any of us can become more than generally informed non-accidental tourists in scholarly realms that are not our own. For this reason, it is crucial that we refer to well-documented and well-argued scholarly interpretations and reconstructions.

I start with scholarship because briefly surveying key publications will also indicate what topics are of critical concern to leading specialists at this time and therefore are, as I implied above, in interpretive flux. In other words, these are areas where readers cannot rely on whatever general information about Mycenaean record-keeping seeps out through mostly outdated handbooks or the occasional 'outside' article into the domain of scholarship on ancient Near Eastern economies. I concentrate on scholarship relating to the Linear B inscribed tablets and sealings and Linear B paint-inscribed transport stirrup jars as records within economic administrative and accounting systems. All these works are relevant to understanding how records and record-keeping were integrated into what we rather artificially still separate, primarily for analytical purposes, into Mycenaean social, political, economic and religious systems of organization.

2. Succinct scholarly review

2a. The Mycenaean palatial system:

Context, general overview and scholarly trends

- Shelmerdine, C.W. (1997), "Review of Aegean prehistory VI: The palatial Bronze Age of the southern and central Greek mainland," *American Journal of Archaeology* 101:537-85.
- Chadwick, J. (1976), *The Mycenaean world*. Cambridge: Cambridge University Press.
- Dickinson, O. (1994), *The Aegean Bronze Age*. Cambridge: Cambridge University Press.
- Palaima, T.G. (2003), "Archaeology and text: Decipherment, translation and interpretation," in *Theory and practice in Mediterranean archaeology: Old world and new world perspectives*, edited by J.K. Papadopoulos and R.M. Leventhal, 45-73. Cotsen Advanced Seminars 1. Los Angeles: The Cotsen Institute of Archaeology.
- Driessen, J. and C. MacDonald (1997), *The troubled island. Minoan Crete before and after the Santorini eruption*. Aegaeum 17. Liège and Austin: Histoire de l'art et archéologie de la Grèce antique Université de Liège and PASP UT Austin.
- Wright, J.C. (1994), "The Spatial configuration of belief: The archaeology of Mycenaean religion." In *Placing the gods. Sanctuaries and sacred space in ancient Greece*, edited by Susan E. Alcock and Robin Osborne, 37-78. Oxford: Clarendon Press.

2b. The General structure of society

- Palaima, T.G. (1995), "The nature of the Mycenaean wanax: Non-Indo-European origins and priestly functions," in *The Role of the ruler in the prehistoric Aegean*, edited by P. Rehak, 119-39. Aegaeum 11. Liège and Austin: Histoire de l'art et archéologie de la Grèce antique Université de Liège and PASP UT Austin.
- (1997), "Potter and fuller: The royal craftsmen," in *Tekhne*, edited by R. Laffineur and P.P. Betancourt, 407-12. Aegaeum 16. Liège and Austin: Histoire de l'art et archéologie de la Grèce antique Université de Liège and PASP UT Austin.
- Lindgren, M. (1973), *The People of Pylos* vols. 1-2. Boreas 3:1-2. Uppsala: Almqvist & Wiksell.
- Morpurgo Davies, A. (1979), "Terminology of power and terminology of work in Greek and Linear B," in *Colloquium Mycenaeanum. Actes du sixième*

colloque international sur les textes mycéniens et égéens tenu à Chaumont sur Neuchâtel du 7 au 13 Septembre 1975, edited by E. Risch and H. Mühlestein, 87-108. Geneva: Libraire Droz.

- Hiller, S. (1988), "Dependent personnel in Mycenaean texts," in *Society and economy in the eastern Mediterranean (c. 1500-1000 B.C.)*, edited by M. Heltzer and E. Lipiński, 53-68. *Orientalia Lovaniensia Analecta* 23. Leuven: Uitgeverij Peeters.
- (1981), "Mykenische Heiligtümer: Das Zeugnis der Linear B-Texte," in *Sanctuaries and cults in the Aegean Bronze Age*, edited by R. Hägg and N. Marinatos, 95-126. *Acta Instituti Atheniensis regni Sueciae, series in 4º*, 28. Stockholm: Paul Åströms Förlag.
- Chadwick, J. (1988), "The women of Pylos," in *Texts, tablets and scribes*, edited by J.-P. Olivier and T.G. Palaima, 43-95. *Suplementos a Minos* 10. Salamanca: Ediciones Universidad de Salamanca.
- Lupack, S. (2002), *The Role of the religious sector in the economy of Late Bronze Age Mycenaean Greece*. Ph.D. dissertation, University of Texas at Austin.
- Lejeune, M. (1972), "Le damos dans la société mycénienne," in *Mémoires de philologie mycénienne* volume 3. *Incunabula Graeca* 41. Rome: Edizioni dell' Ateneo: 137-54.
- Carlier, P. (1984), *La royauté en Grèce avant Alexandre*. Études et travaux (Université des sciences humaines de Strasbourg. Groupe de recherche d'histoire romaine) 6. Strasbourg.

2c. Economy: Overall and representative spheres

- Killen, J.T. (1985), "The Linear B tablets and the Mycenaean economy," in *Linear B: A 1984 survey*, edited by A.M. Davies and Y. Duhoux, 241-305. *Bibliothèque des Cahiers de L'Institut Linguistique de Louvain* 26. Louvain-la-Neuve: Cabay.
- Olivier, J.-P. (1996-97), "El comercio micénico desde la documentación epigráfica," *Minos* 31-32:275-92.
- Duhoux, Y. (1976), *Aspects du vocabulaire économique mycénien (cadastre-artisanat-fiscalité)*. Amsterdam: Adolf M. Hakkert.
- Halstead, P. (1992), "The Mycenaean palatial economy: making the most of the gaps in the evidence," *Proceedings of the Cambridge Philological Society* 38: 57-86.
- Voutsaki, S. and J. Killen (2001), *Economy and politics in the Mycenaean palace states*. Cambridge Philological Society Supplementary Volume no. 27. Cambridge 2001.
- Carlier, P. (2001), Journées égéennes Nanterre, 8-10 mars 1999. *KTEMA Civilisations de l'Orient, de la Grèce et de Rome antiques* 20: 5-159.

2d. Representative agricultural commodities (land, grains and wine)

- Palmer, R. (1989), "Subsistence rations at Pylos and Knossos," *Minos* 24: 89-124.
- (1992), "Wheat and barley in Mycenaean society," in *Mykenaïka*, edited by J.-P. Olivier, 475-97. *Bulletin de Correspondance Hellenique* Supplement 25. Paris: Diffusion de Boccard.
- (1999), "Perishable goods in Mycenaean texts," in *Floerant studia mycenaean*, edited by S. Deger-Jalkotzy, S. Hiller and O. Panagl, vol. 2: 463-85. Österreichische Akademie der Wissenschaften Philosophisch-Historische Klasse Denkschriften Band 274. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.
- (2002), "Models in Linear B landholding: An analysis of methodology," in *Economy and politics in the Mycenaean palace states*, edited by S. Voutsaki and J. Killen, 223-50. Cambridge Philological Society Supplementary Volume no. 27. Cambridge 2001.
- Halstead, P. (1995), "Late Bronze Age grain crops and Linear B ideograms *65, *120 and *121," *Annual of the British School at Athens* 90: 229-34.
- (1999b), "Surplus and share-croppers: The grain production strategies of Mycenaean palaces," in *Meletemata*, edited by P. Betancourt, V. Karageorghis, R. Laffineur and W.-D. Niemeier, 319-26. *Aegaeum* 20. Liège and Austin: Histoire de l'art et archéologie de la Grèce antique Université de Liège and PASP UT Austin.
- (2001), "Mycenaean wheat, flax and sheep: Palatial intervention in farming and its implications for rural society," in *Economy and politics in the Mycenaean palace states*, edited by S. Voutsaki and J. Killen, 38-50. Cambridge Philological Society Supplementary Volume no. 27. Cambridge 2001.
- Palmer, R. (1994), *Wine in the Mycenaean palace economy*. *Aegaeum* 10. Liège and Austin: Histoire de l'art et archéologie de la Grèce antique Université de Liège and PASP UT Austin.
- Wright, J.C. (1995), "Empty cups and empty jugs: The social role of wine in Minoan and Mycenaean societies," in *The origins and ancient history of wine*, edited by P.E. McGovern, S.J. Fleming and S.H. Katz, 287-309. Philadelphia: Gordon and Breach Publishers.

2e. Wool products and sheep management

- Killen, J.T. (1964), "The wool industry of Crete in the late Bronze Age," *Annual of the British School at Athens* 59: 1-15.
- Luján, E.R. (1996-97), "El léxico micénico de las telas," *Minos* 31-32: 335-69.

2f. *Livestock and their use in commensal ceremonies and for other purposes*

- Killen, J.T. (1994), "Thebes sealings, Knossos tablets and Mycenaean state banquets," *Bulletin of the Institute of Classical Studies of the University of London* 39:67-84.
- (1998), "The Pylos Ta tablets revisited," *Bulletin de Correspondance Hellenique* 122:421-22.
- (1999a), "Mycenaean *o-pa*," in *Floreat studia mycenaea*, edited by S. Deger-Jalkotzy, S. Hiller and O. Panagl, vol. 2:325-41. Österreichische Akademie der Wissenschaften Philosophisch-Historische Klasse Denkschriften Band 274. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.
- Piteros, C., J.-P. Olivier and J.L. Melena (1990), "Les inscriptions en linéaire B des nodules de Thèbes (1982): La fouille, les documents, les possibilités d'interprétation," *Bulletin de Correspondance Hellenique* 104:103-84.
- Palaima, T.G. (1988), "Perspectives on the Pylos oxen tablets: Textual (and archaeological) evidence for the use and management of oxen in Late Bronze Age Messenia (and Crete)," in *Studia Mycenaea (1988)*, edited by T.G. Palaima, C.W. Shelmerdine and P. Hr. Ilievski, 85-124. *Živa Antika Monographies No. 7*. Skopje.
- Speciale, M. Stella. (1999), "La tavoletta PY Ta 716 e i sacrifici di animali," in *ἐπὶ πόντων πλαζόμενοι. Simposio italiano di Studi Egei dedicato a Luigi Bernabò Brea e Giovanni Pugliese Carratelli*, edited by V. La Rosa, D. Palermo and L. Vagnetti, 291-97. Rome: Scuola Archeologica Italiana di Atene.
- Nikoloudis, S. (2001), "Animal sacrifice in the Mycenaean world," *Journal of Prehistoric Religion* 15:11-31.

2g. *Perfumed oil production and trade*

- Van Alfen, P. (1996-97), "The LMIIIB inscribed stirrup-jars as links in an administrative chain," *Minos* 31-32:251-74.
- Shelmerdine, C.W. (1998), "The perfumed oil industry," in *Sandy Pylos: An archaeological history from Nestor to Navarino*, edited by J.L. Davis, 101-09. Austin: University of Texas Press.
- Hallager, E. (1987), "The Inscribed Stirrup-Jars: Implications for Late Minoan IIIB Crete," *American Journal of Archaeology* 91:171-90.
- Palaima, T.G. (1991), "Maritime matters in the Linear B texts," in *Thalassa. L'Égée préhistorique et la mer*, edited by R. Laffineur and L. Basch, 273-310. *Aegaeum* 7. Liège.

2h. *Literacy, orality and the use of written documents*

- Palaima, T.G. (1987), "Comments on Mycenaean literacy," in *Studies in Mycenaean and Classical Greek presented to John Chadwick*, edited by J.T. Killen, J.L. Melena, J.-P. Olivier, 499-510. *Minos* 20-22.
- (1988), "The Development of the Mycenaean writing system," in *Texts, tablets and scribes: Studies in Mycenaean epigraphy and economy in honor of Emmett L. Bennett, Jr.*, edited by J.-P. Olivier and T.G. Palaima, 269-342. *Suplementos a Minos* 10. Salamanca: Ediciones Universidad de Salamanca.
- (1994-95), Review of Kevin Robb, *Literacy and paideia in ancient Greece* (New York, Oxford University Press 1994). *Minos* 29-30:392-97.

2i. *Overview of Mycenaean record-keeping and archival accounting systems*

- Palaima, T.G. (1990), "The purposes and techniques of administration in Minoan and Mycenaean society," in *Aegean seals, sealings and administration*, edited by T.G. Palaima, 83-104. *Aegaeum* 5. Liège: Histoire de l'art et archéologie de la Grèce antique Université de Liège.
- (2003), "'Archives' and 'scribes' and information hierarchy in Mycenaean Greek Linear B records," in *Ancient archives and archival traditions*, edited by M. Brosius, 153-94. Oxford: Oxford University Press.
- Driessen, J. (1994-95), "Data storage for reference and prediction at the dawn of civilization? A Review article with some observations on *Archives before writing*," *Minos* 29-30:239-56.
- Bennet, J. (2001), "Agency and bureaucracy: thoughts on the nature and extent of administration in Bronze Age Pylos," in *Economy and politics in the Mycenaean palace states*, edited by S. Voutsaki and J. Killen, 25-35. Cambridge Philological Society Supplementary Volume no. 27. Cambridge.
- Pluta, K. (1996-97), "A reconstruction of the Archives Complex at Pylos: Preliminary progress report," *Minos* 31-32:231-50.
- Shelmerdine, C.W. (1999), "A comparative look at Mycenaean administration," in *Floreat studia mycenaea*, edited by S. Deger-Jalkotzy, S. Hiller and O. Panagl, vol. 2:555-76. Österreichische Akademie der Wissenschaften Philosophisch-Historische Klasse Denkschriften Band 274. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.
- Carter, A.L. (2003), *Ancient inventories: A Comparative study of temple inventories from Athens and Delos and the Linear B inventories from Pylos and Knossos*. M.A. Thesis. The University of Texas at Austin.

2j. *Linear A and Linear B*

- Palaima, T.G. and Sikkenga, E. (1999), "Linear A > Linear B," *Meletemata. Studies in Aegean archaeology presented to Malcolm H. Wiener as he enters his 65th year*, edited by P. Betancourt, R. Laffineur, V. Karageorghis and W.-D. Niemeier, 599-608. Liège and Austin: Histoire de l'art et archéologie de la Grèce antique, Université de Liège and PASP UT Austin.
- Duhoux, Y. (1985), "Mycénien et écriture grecque," In *Linear B: A 1984 Survey*, edited by A. Morpurgo Davies and Y. Duhoux, 7-74. Louvain-la-Neuve: Cabay.
- Chadwick, J. (1987a), *Linear B and related scripts*. Berkeley: University of California Press.
- Schoep, I. (1996), *Minoan administration on Crete. An interdisciplinary approach to documents in Cretan Hieroglyphic and Linear A*. Ph.D. Dissertation. Katholieke Universiteit Leuven.
- (2002a), "Minoan administration at Haghia Triada: A multi-disciplinary comparison of the Linear A tablets from the *Villa* and the *Casa del Lebebe*," in *A-NA-QO-TA. Festschrift for J.T. Killen*, edited by J. Bennet and J. Driessen. *Minos* 33-34:205-22.
- (2002b), *The administration of Neopalatial Crete. A critical assessment of the Linear A tablets and their role in the administrative process*. Suplementos a *Minos* 17. Salamanca: Ediciones Universidad de Salamanca.

Specific regional Mycenaean record-keeping economies and archival accounting systems

2k. *Knossos and Crete*

- Driessen, J. (1997), "Le palais de Cnosos au MR II-III: Combien de destructions," in *La Crète mycénienne*, edited by J. Driessen and A. Farnoux, 113-34. *Bulletin de Correspondance Hellenique* Supplement 30. Paris: Diffusion de Boccard.
- (2000), *The scribes of the Room of the Chariot Tablets. Interdisciplinary approach to the study of a linear B deposit*. Suplementos a *Minos* 16. Salamanca: Ediciones Universidad de Salamanca.
- Bennet, J. (1985), "The structure of the Linear B administration at Knossos," *American Journal of Archaeology* 89:231-49.
- (1990), "Knossos in context: Comparative perspectives on the Linear B administration of LM II-III Crete," *American Journal of Archaeology* 94:193-211.
- (1992), "'Collectors' or 'owners'? An examination of their possible func-

tions within the palatial economy of LM III Crete,” in *Mykenaiika*, edited by J.-P. Olivier, 65-101. *Bulletin de Correspondance Hellenique* Supplement 25. Paris: Diffusion de Boccard.

Hallager, E., M. Vlasakis and B.P. Hallager (1992), “New Linear B tablets from Khania,” *Kadmos* 31:61-87.

2l. Pylos and Messenia

Shelmerdine, C.W. (1998), “The palace and its operations,” in *Sandy Pylos: An Archaeological history from Nestor to Navarino*, edited by J.L. Davis, 101-09. Austin: University of Texas Press.

Palaima, T.G. (1988), *The Scribes of Pylos*. Incunabula Graeca 87. Rome Edizioni dell' Ateneo.

— (1995), “The last days of the Pylos polity,” in *Politeia: Society and state in the Aegean Bronze Age*, edited by R. Laffineur and W.-D. Niemeier, 623-33. *Aegaeum* 12. Liège and Austin: Histoire de l'art et archéologie de la Grèce antique Université de Liège and PASP UT Austin.

Bennet, J. (1998), “The Linear B archives and the kingdom of Nestor,” in *Sandy Pylos: An archaeological history from Nestor to Navarino*, edited by J.L. Davis, 111-33 and 134-38. Austin: University of Texas Press.

Davis, J.L., and J. Bennet (1999), “Making Mycenaean: Warfare, territorial expansion and representations of the other in the Pylian kingdom,” in *Polemos*, edited by R. Laffineur, vol. 1, 105-20. *Aegaeum* 19. Liège and Austin: Histoire de l'art et archéologie de la Grèce antique Université de Liège and PASP UT Austin.

Galaty, M.L., and W.A. Parkinson (1999), *Rethinking Mycenaean palaces: New interpretations of an old idea*. The Cotsen Institute of Archaeology University of California, Los Angeles Monograph 41. Los Angeles.

Davis, J.L. (1998), “The palace and its dependencies,” in *Sandy Pylos: An archaeological history from Nestor to Navarino*, edited by J.L. Davis, 53-68. Austin: University of Texas Press.

De Fidio, P. (1987), “Palais et communautés de village dans le royaume mycénien de Pylos,” in *Tractata Mycenaea*, edited by P.H. Ilievski and L. Crepajac, 129-49. Skopje: Macedonian Academy of Sciences and Arts.

2m. Thebes

Sergent, B. (1994), “Les petits nodules et la Grande Béotie,” *Revue des Études Anciennes* 96:365-84.

Piteros, C., J.-P. Olivier and J.L. Melena (1990), “Les inscriptions en linéaire B des nodules de Thèbes (1982): La fouille, les documents, les possibilités d'interprétation,” *Bulletin de Correspondance Hellenique* 104:103-84.

Inscribed sealings as a component of Mycenaean economic administration

2n. The Minoan background

Hallager, E. (1996), *The Minoan roundel and other sealed documents in the Neopalatial Linear A administration*. Aegaeum 14. Liège and Austin: Histoire de l'art et archéologie de la Grèce antique Université de Liège and PASP UT Austin.

Palaima, T.G. (1994), "Seal-users and script-users / Nodules and tablets at LM I B Hagia Triada" and "Response to Paper of G. Fissore," in *Archives before writing*, edited by P. Ferioli, E. Fiandra, *et al.*, 307-37, 355-61. Pubblicazioni del Centro Internazionale di Ricerche Archeologiche Antropologiche e Storiche I. Turin.

2o. The Mycenaean system of inscribed sealings

Palaima, T.G. (1987), "Mycenaean seals and sealings in their economic and administrative contexts," in *Tractata Mycenaea*, edited by P.H. Ilievski and L. Crepajac, 249-66. Skopje: Macedonian Academy of Sciences and Arts.

— (1996), "Sealings as links in an administrative chain," in *Administration in ancient societies*, edited by P. Ferioli, E. Fiandra and G.G. Fissore, 37-66. Turin: Centro Internazionale di Ricerche Archeologiche Antropologiche e Storiche.

— (2000a), "Transactional vocabulary in Linear B tablet and sealing administration," in *Administrative documents in the Aegean and their Near Eastern counterparts*, edited by M. Perna, 261-76. Turin: Centro Internazionale di Ricerche Archeologiche Antropologiche e Storiche.

— (2000b), "The palaeography of Mycenaean inscribed sealings from Thebes and Pylos, their place within the Mycenaean administrative system and their links with the extra-palatial sphere," in *Minoische-mykenische Glyptik: Stil, Ikonographie, Funktion*. V. internationales Siegel-Symposium, Marburg, 23.-25. September 1999, edited I. Pini and W. Müller, 219-38. *Corpus der minoischen und mykenischen Siegel* Beiheft 6. Berlin: Gebr. Mann Verlag.

Killen, J.T. (1992), "Observations on the Thebes sealings," in *Mykenaiika*, edited by J.-P. Olivier, 365-80. *Bulletin de Correspondance Hellenique* Supplement 25. Paris: Diffusion de Bocard.

Pini, I., ed. (1997), *Die Tonplomben aus dem Nestorpalast von Pylos*. Mainz: Philipp von Zabern.

2p. Work, production, taxation and economic control

- Melena, J.L. (1983), "Further thoughts on Mycenaean *o-pa*," in *Res Mycenaee*, edited by A. Heubeck and G. Neumann, 258-86. Göttingen: Vandenhoeck and Ruprecht.
- Killen, J.T. (1984), "Last year's debts on the Pylos Ma tablets," *Studi Micenei ed Egeo-Anatolici* 25:173-88.
- (1995), "Some further thoughts on Mycenaean 'collectors'," in *Politeia: Society and state in the Aegean Bronze Age*, edited by R. Laffineur and W.-D. Niemeier, 213-24. *Aegaeum* 12. Liège.
- (1999), "Mycenaean *o-pa*," in *Florent studia mycenaee*, edited by S. Deger-Jalkotzy, S. Hiller and O. Panagl, vol. 2:325-41. Österreichische Akademie der Wissenschaften Philosophisch-Historische Klasse Denkschriften Band 274. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.
- Olivier, J.-P. (2001), "Les 'collecteurs': leur distribution spatiale et temporelle," in *Economy and politics in the Mycenaean palace states*, edited by S. Voutsaki and J. Killen, 139-59. Cambridge Philological Society Supplementary Volume no. 27. Cambridge.
- Palaima, T.G. (2001), "The modalities of economic control at Pylos," in *KTEMA Civilisations de l'Orient, de la Grèce et de Rome antiques* 20:151-59.
- Deger-Jalkotzy, S. (2002), "Working for the palace: Some observations on PY An 261," in *A-NA-QO-TA. Festschrift for J.T. Killen*, edited by J. Bennet and J. Driessen. *Minos* 33-34:65-82.

2q. Identification of scribes and their spheres of activity

- Palaima, T.G. (2002), "Special vs. normal Mycenaean: Hand 24 and writing in the service of the king?" in *A-NA-QO-TA. Festschrift for J.T. Killen*, edited by J. Bennet and J. Driessen. *Minos* 33-34:205-22.
- (2000), "The Pylos Ta series: from Michael Ventris to the new millennium," *Bulletin of the Institute of Classical Studies* 44:236-37.
- Thompson, R.J.E. (1996-97 [1998]), "Dialects in Mycenaean and Mycenaean among the dialects," *Minos* 31-32:313-33.

2r. Mycenaean evidence for legal terminology

- Palaima, T.G. (2000), "θέρμυς in the Mycenaean Lexicon and the Etymology of the Place-Name **ti-mi-to a-ko*," *Faventia* 22/1:7-19.

3. Features of Mycenaean palatial civilization and record-keeping

The primary feature to highlight is that the Mycenaean regional palatial system and forms of record-keeping administration within it were late developments in the nearly 2000-year history of Aegean Bronze Age culture. Bennet (1998 2l) and Davis and Bennet (1998 2l) make clear that at least in Messenia on the Greek mainland, the stage where the central palatial complex of Pylos and its surrounding community were fully integrated into and in some sense in control of an overall unified territory consisting of two provinces and pyramidally organized districts and centers likely lasted little more than a century. Even a generous estimation of the longevity of the Linear B script gives it no more than c. 300 years, its invention either taking place at 15th-century Knossos or roughly coinciding with the point in the same century at which mainland palatial society had advanced enough to necessitate the keeping of records on clay and perhaps now lost less-permanent materials (Palaima 1988 2h).

This is important because it limits the degree to which written administration would have had to insinuate itself into long-standing traditional modes of economic control and operation involving clans and other kin group and pseudo-kin groups, villages, groups of elders, local chieftains, and land collectives (Deger-Jalkotzy 2002 2p, de Fidio 1987 2l). The Minoan system of record-keeping, so far as we can tell from our even more limited attested evidence (Hallager 1996 2n, Palaima 1987 2h, 1990 2i, Driessen 1994-95 2i, Schoep 2002b 2j), never fully replaced traditional arrangements for handling economic activities. Its system of uninscribed or single-sign countermarked sealings is much more complex than the Mycenaean (Hallager 1996 2n, Palaima 1994 2n). The most likely reason for this is that many of the sealings (with the exception of the flat-based packet sealings used to transmit folded parchment documents long distances) were used within the confines of individual regions. On such a 'local' level, the sealings accompanied a standard range of transactions which were known to the parties involved and for which there was no need to draw up lengthy written documents (Palaima 2000a and 2000b 2o). The limited information recorded on Linear A tablets also gives the impression of being very focused on regional centers. The Linear A tablets were used rather sparingly at that, even at the end of a four-century process of development within Minoan Cretan palatial civilization (c. 1850-1450 BC) (Schoep 2002b 2j).

The Mycenaean system adapted, rather than adopting, concepts, procedures, materials, forms and techniques of record-keeping and accounting from Minoan culture (Hallager 1996 2n, Palaima 1990 2i). Even from the earliest attested period for Linear B, the so-called Room of the Chariot Tablets inscriptions from Knossos (Driessen 2000 2k), we have clear differences from Minoan practices in tablet shapes and sizes, formatting elements such as the use of standardized ruling, a brand new system of metrical ideograms and, of course, a repertory of phonetic signs tailored to the needs of representing the closed-syllable structure of the Greek language (Palaima and Sikkenga 1999 2j, Chadwick 1987 2j, Palaima 1990 2i).

The Mycenaean Linear B system has signs for standard increments of weight and measure in contrast to Linear A, which uses, so far as we can tell, a combinatory 'aliquot' fractional system to specify aggregate parts of a larger whole unit. The metrical signs in these two different systems do not seem to be related, *i.e.*, the Linear B system would imply the imposition of new public standards for handling goods and commodities that had to be weighed and measured. Lastly the Linear B system is universal, with no valid proof of significant regional or chronological variation within the attested history of the use of the script. Thus we can speak of a use of writing and inscriptions which is culturally specific and tooled to the needs of Mycenaean palatial territories. Here, however, standardization appears not to be the result of some form of imposition by any overarching Aegean-wide authority.

Although we do not have a full diachronic picture, what we have suggests the following. Within the mainly homogeneous Mycenaean palatial culture, a prominent class of individuals, known conventionally as 'collectors' and perhaps related by ties of birth and family, acted as important economic agents (Killen 1995 2p, Olivier 2001 2p, Bennet 1992 2k). Their presence within different palatial territories alone would have exerted a conservative influence upon economic structures, making it more efficient to do things the same way region to region. Given the absence of any pressing need for radical experimentation or expansion of the uses of written recording, the concepts, procedures, materials, forms and techniques of record-keeping and accounting remained static within Mycenaean civilization for over two centuries. Small traces of variation come at the outset, transitional 'Minoanized' features being detected in the earliest extant documentation at LM II Knossos (Driessen 2000 2k).

The Linear B script had then a relatively brief *floruit* (c. 1450-1200 BC) and was used, so far as current evidence allows us to see, for limited purposes within territories of limited scale and scope. These palatial territories exist within the natural regions more familiar to us from the later Greek *poleis*. The sole exception here is the attested administrative reach of Knossos over the central and western two-thirds of the island of Crete, where a larger hierarchical extra-regional scheme operated with Knossos as the main organizational center (Bennet 1985 and 1990 2k). This appears to be, in some way, a carry-over from the status of Knossos in the Minoan period (Driessen and MacDonald 1997 2a).

The mainland regions, too, may well have had their own idiosyncrasies relating to the histories of their formation (Shelmerdine 1997 2a). But Pylos alone offers us inscriptional and archaeological evidence sufficient to put its accounting methods into context. Pylos in the latter half of LH III A and in LH IIIB (roughly the late 14th and 13th centuries BC) extended its dominance over a natural territory of c. 2,000 km² in Messenia in southwestern Greece. It is estimated that c. 4,000-5,000 individuals are recorded in the extant Pylos tablets. Just over a thousand of these individuals are supported by direct rations, others by palatially 'monitored' landholdings (Hiller 1988 2b). Thus a rather small percentage of the regional population, estimated at various times as between 50,000 and 100,000, made it into the extant central records (Shelmerdine 1997 2a and 1998 2l, Davis and Bennet 1999 2l, Davis 1998 2l). Depending on how we classify the status of the western Cretan site of Khania (Hallager, Vlasakis and Hallager 1992 2k) in the Mycenaean period, we have no evidence from anywhere in the Mycenaean world of Linear B administrative documents being found at what we consider second-order centers. This may change with further excavation.

The most stunning difference between patterns of economic accounting in cuneiform cultures and in Mycenaean culture is the lack of any evidence so far that written records were used in private households (*e.g.*, contracts and deeds or titles are missing) or at habitation sites other than palatial centers (albeit few second-order sites have been excavated). Economic administrative literacy, then, seems to have been limited to and have been monopolized—or viewed as useful—by the palatial centers where the complexity of operations and activities had outstripped simpler means of tracking economic data. To repeat, this must be related to the relatively late overlaying of the palatial system upon existing social and political structures (Bennet 1998 2l; Palaima 1995 2b).

The Mycenaean palatial system required intensive economic exploitation of regional resources (Killen 1985 2c, Morpurgo Davies 1979 2b). Sudden expansion of the power of a single palatial center to control broader regional resources and production would have created new hierarchies of power, work and socio-political networks (Bennet 1998 2l, Davis 1998 2l, Davis and Bennet 1999 2l, Galaty and Parkinson 1999 2l, Killen 1985 2c, Wright 1995 2d, Palaima 1990 2i). This led to intensive labor specialization with necessary systems of support, to traditional and new arrangements for reward and obligation (and related vocabulary within the texts: Palaima 2000a 2o), and to control structures (Hiller 1988 2b, Chadwick 1988 2b, Palaima 1987 2o, 1996 2o, 2000b 2o) that combined pre-existing and continuing procedures and relationships with new, super-imposed palatial elements.

The palatial system required maximal exploitation of regional resources within specific industries (*e.g.*, wool and flax and dye substances for cloth production: Killen 1964 2e, Lujan 1996-97 2e; olive oil, scent substances, and related pottery manufacture for perfumed oil: van Alfen 1996-97 2g, Shelmerdine 1998 2g, Hallager 1987 2g). The finished products of such specialized industries were traded in order to obtain necessary products (everything from exotic wood inlay materials to vital resources like copper and tin: Palaima 1991 2g). Subsistence rations were allotted to totally dependent (aka 'slave') women labor groups (Palmer 1989 2d, Chadwick 1988 2b). Land was carefully managed (Palmer 2002 2d) within religious sanctuaries and by agents for local land-management collectives known as *da-mo* (Lejeune 1972 2b) for the support of those who were dependent, directly or indirectly, upon the palatial system or who drew benefits from forms of service for the palatial authority or the sanctuaries (Lupack 2002 2b).

This led to steep pyramids of distributed economic and political power, with hierarchies consisting, in individual regions, of the palatial center, secondary centers, 'villages' (de Fidio 1987 2l), and collectives in outlying locales (Bennet 1985 2k and 1998 2l, Palaima 1995 2b and Morpurgo Davies 1979 2b). The Pylos Linear B records refer to c. 240 place names (including 16 districts or district capitals that function as second-tier centers). When we include the site of Pylos itself and the two alternative names that are used occasionally as substitutes for two of the canonical district capitals, we are left with 220 minor places in the Pylos tablets that are somehow involved in the economic interests of the center in the final year of its existence. Only 150 sites are so far

traceable on the ground during the III B period (Bennet 1998 2l), many quite small. In terms of scale the Pylos palatial center with its surrounding town now measures c. 20 hectares. From our looks at a few second-order centers we estimate that their size would be c. 5-7 hectares. There are then clusterings of yet smaller sites.

The surviving written records, as we have mentioned, attest to a highly limited literacy and dominant orality (Palaima 1987 and 1994-95 2h). Much of the economic activity must have relied upon traditional transactional arrangements between individuals and among social organizations (Palaima 1990 and 2003 2i, Driessen 1994-95 2i, Bennet 2001 2i, and especially Deger-Jalkotzy 2002 2p). Conspicuous is the traditional use of sealings, inscribed and more frequently uninscribed, at the interface between the palatial sphere and outlying individuals and communities (cf. especially Palaima 2000b 2o and Pini 1997 2o). We should also emphasize the absence of written texts relating to history (including propagandistic pronouncements), literature, ritual and cult (hymns, ceremonial prescriptions), compilations of legal precedent (contrast the Hittite law codes), and, as we have mentioned, contracts (for economic goods and services, deeds and titles to landholdings and possessions) (Palaima 2003 2i).

4. Record-keeping administration

The special nature of the Linear B documentation arises from the peculiar features of Mycenaean social, political and economic organization. At every Mycenaean site or locus within a site where Linear B is attested, records come from a single administrative period of not more than a year. The Knossos records contain c. 7 month names. The Pylos records preserve at most 5 month names. These few month names are brought into play only in 'religious' offering contexts, where the specification of the performance of the economic actions connected with rituals and ceremonies defined within the ritual calendar is clearly important. No specification of days or periods within months (Palaima 1995 2l) is known. There is no designation of long-term chronology by means of dating mechanisms, for example, no designation of year according to regnal lists or by archon or magistrate or priesthood dates, as are familiar from later Greek history. This in itself indicates either that records were not kept for long-term planning purposes, or, if they were, that they would have been kept on ephemeral materials like parchment (attested clearly on Minoan flat-based nodules) or papyrus.

The signs of the Linear B script, in fact, contain many complex patterns and curvilinear elements which are not very well-suited to writing on clay, although the blade-like writing tip of the Mycenaean stylus helps in this regard. They are much easier to execute, as I have recently privately experimented, with the ancient equivalent of an A-5 size calligraphic pen.

With regard to planning of economic activity, there is some indication of carry-over information in accounting terminology. The words 'last year', 'this year', 'next year', and 'yearly' are found sparingly, mainly in regional 'taxation' records (Killen 1984 2p, Palaima 1995 2l) wherein standard proportional quotas of products are recorded as expected from the sixteen canonical second-order districts and the two alternative places. 'Payments', short-falls, exemptions and carry-overs are listed for these districts.

The records that we have are intensively focused on the concerns of the palatial centers. The palatial centers in turn pursue their interests in their regions through human agents—palatially appointed, co-opted, or quasi-independent of the palatial centers—and through secondary centers. These agents and centers mobilize and orchestrate economic activity of benefit to the palatial centers. We always have to keep in mind that our view depends on the hazards of archaeological investigation. As we shall see below, certain tablets (for example, Pylos Jn 829 and the Pylos Ma series) offer clear evidence for major second-order centers (where we assume some kinds of extensive 'administrative accounting' took place: Bennet 1985 and 1990 2k) and others attest to the existence of separate religious territories (Hiller 1981 2b) with their own institutions (*na-wo* = 'dwelling place of a deity', later Greek 'temple'; *do* and *wo-ko* = 'house' or 'home' of deities; *i-je-ro* 'holy place', later Greek 'sanctuary'; and sanctuary designations in noun forms relating to individual deities). But no outlying sanctuary area of the period has yet been archaeologically identified within Messenia (Wright 1994 2a), and very few second-order centers have been investigated (cf. *ti-mi-to a-ko* = Nichoria: Palaima 2000 2r).

There is some evidence provided by the palaeography and the 'language' of the tablets that palatial tablet-writers were influenced by contact with individuals and institutions outside the palatial orbit (Palaima 2002 2q, Thompson 1996-97 [1998] 2q). Still we have no known 'private' records.

The tablet records in and of themselves do not seem to have ‘legal’ status, and so it is somewhat misleading to refer to them as ‘documents’, given what this term implies. However, the tablets do record transactions and conditions that are dependent on relationships among individuals and institutions. Such transactions must have relied upon notions of legal proof and legal arbitration as known from other societies, including Greek historical culture (Palaima 2000 2r). There is scanty evidence within the Linear B records of ‘disputes’, and absolutely no indication of how they were settled (Palaima 2000 2r). In the most famous case (on Pylos tablet Ep 704, see below) the status of a landholding is disputed between the priestess who is named *e-ri-ta* and the collective organization, known as the *da-mo* (later Greek *damos*), that monitors local land apportionment (Lejeune 1972 2b).

At individual palatial sites the administrative systems attested in clay records preserved from destruction phases were written by a good number of tablet-writers. Pylos has c. 33 identifiable ‘scribes’. These tablet-writers are anonymous. We do not even have a word for ‘scribe’. It is still disputed whether ‘scribes’ are ‘hidden’ among the many titles for officials listed within the tablets or are ‘petty functionaries’, subordinate to such officials (Palaima 2003 2i, Driessen 1994-95 2i, Bennet 2001 2i). The most intensive focal point for this question is the Pylos Ta tablets (Carter 2003 2i). The header tablet (Ta 711) indicates that the documents were drafted *o-wi-de pu₂-ke-qi-ri o-te wa-na-ka te-ke au-ke-wa da-mo-ko-ro*, *i.e.*, on a ceremonial occasion that required *Phugebris* to make a visual ‘inventory’ inspection when the *wanaks* (‘king’) appointed an individual named *Augewas* to the office of *damokoros*. The tablets then list cult paraphernalia and furniture in a document structure that is the result of ‘experienced improvisation’ (again seeming to reinforce the idea that the main purpose of such documents is ‘system-internal’ documentation and ‘memory-aid’ for the officials in charge: Palaima 2000 2q).

In such circumstances, with barely over 5,000 minimalist tablets and fragments from eight archaeological sites, it is understandable that the definitions of key terms are still being discussed. Among these are ‘archives’, ‘pre-archives’, ‘tablet deposits’, ‘offices’, ‘departments’, ‘bureaus’ and the internal relationships among these and such concepts as ‘workshops’ and ‘storage areas’ (Palaima 1987 2o, Palaima 2003 2i, Driessen 1994-95 2i).

5. Particular cases of resource mobilization and economic planning

As should be clear from the foregoing, we have a good sense of the complex hierarchies and relationships that were woven into the regional economic, social and political systems during the Mycenaean palatial period. Our ability to understand what long-term planning, if any, the central authorities used is severely limited by the nature of our data. But the data themselves, as I have argued above, may reflect how the Mycenaeans of the palatial period organized and used their resources.

My own belief is that many elements of economic production had histories that preceded, in whole or part, the establishment of the palatial centers atop regions. If this is so, the ways in which processes were controlled and managed may well also have large pre- and proto-literate components. Such traditional arrangements and procedures would never have required setting information out in written form, either temporarily or for longer periods. Written planning and tracking of execution and fulfillment is called into play when the scale and scope of a system far outstrip traditional methods of organization and control. In my opinion, the Linear B texts, especially those from Pylos, reveal that the palatial system of organization was exploiting labor and resources as much as possible through traditional channels. We might in fact do better to view economic mobilization simultaneously as both a top-down imposition upon and a bottom-up siphoning off of resources.

Although some of the following details are still subject to discussion among Mycenologists, what I offer here is a view of a few test cases of the Mycenaean regional system of economic mobilization and planning that study of the Linear B tablets reveals.

Mycenaean palatial centers and their rulers (the Mycenaean 'king' or *wanaks*: Carlier 1984 2b, Palaima 1995 2b) legitimize and maintain their authority partly through control and management of resources. The tablets contain terminology for 'obligation' and 'benefit' and indicate how obligations were fulfilled and benefits were dispensed. The frustrating aspect of the Linear B tablets is that very few tablets and series contain descriptive headers that would inform us who is not privy to what is going on inside the administrative system, why particular data are being recorded and how they are being used.

Let us start with a tablet (Pylos tablet Jn 829) that does contain a header with an extravagant, by Mycenaean standards, amount of information. The tablet is written by Hand 2, who is a high-ranking 'scribe' of the first palaeographical class at Pylos (often viewed as the main

‘pupil’ of the ‘master scribe’ of the site Hand 1: Palaima 1988 2l) and is responsible for a number of high-level economic records. These include: (1) the Ta ‘banquet-paraphernalia’ inventory discussed above; (2) some of the Jn records of allotments of copper (traditionally translated as ‘bronze’) to groups of smiths at outlying locales; (3) the Ma regional taxation records, which, as we have mentioned, list quantities of six items due in proportional amounts from the sixteen (plus two) major districts or second-order centers and also list shortfalls, exemptions and carry-overs.

PYLOS Jn 829

- .1 Thus will give the *ko-re-te-re*, and *du-ma-te*,
 .2 and *po-ro-ko-re-te-re*, and *ka-ra-wi-po-ro*, and *o-pi-su-ko*, and *o-pi-ka-pe-e-we*
 .3 temple bronze for light javelins and spears as points
 .4 at pi-*82^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* BRONZE 0.75 kg.
 .5 at me-ta-pa^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* BRONZE 0.75 kg. [] blank
 .6 at pe-to-no^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* BRONZE 0.75 kg.
 .7 at pa-ki-ja-ne^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* BRONZE 0.75 kg.
 .8 at a-pu₂^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* BRONZE 0.75 kg.
 .9 at a-ke-re-wa^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* BRONZE 0.75 kg.
 .10 at ɾo-ɥ-so^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* BRONZE 0.75 kg.
 .11 at k̄a-ra-do-ro^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* BRONZE 0.75 kg.
 .12 at ri-]jō^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* BRONZE 0.75 kg.
 .13 at ɥi-mi-to-a-ko^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* BRONZE 0.75 kg.
 .14 at ra-]wa-ra-ta₂^{PL} *ko-re-te* BRONZE 2.75 kg. *po-ro-ko-re-te* BRONZE 0.75 kg.
 .15 at sa-]ma-ra^{PL} *ko-re-te* BRONZE 3.75 kg. *po-ro-ko-re-te* 0.75 kg.
 .16 at a-si-ja-ti-ja^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* 0.75 kg.
 .17 at e-ra-te-re-wa^{PL} *ko-re-te* BRONZE 2 kg. *po-ro-ko-re-te* 0.75 kg.
 .18 at za-ma-e-wi-ja^{PL} *ko-re-te* BRONZE 3.75 kg. *po-ro-ko-re-te* 0.75 kg.
 .19 at e-ro^{PL} *ko-re-te* BRONZE 3.75 kg. *po-ro-ko-re-te* 0.75 kg.
 .20-.23 blank

Jn 829 is a rare ‘prospective’ text, *i.e.*, its verbal form is in the future and it records that the amounts of metal here ‘will be given’ by the designated parties. One can, therefore, view the entire text as setting out an anticipated ‘target’ for the delivery of an important refurbished raw material. The third line of the heading designates that the ‘recycled’ bronze/copper to be contributed all falls under the heading of ‘temple bronze’ and will be used for spears and javelins. It has recently been shown that the word ‘points’ was added as a fine point of *post hoc* clarification to rule out its use for other metallic elements of spears and javelins.

On the actual tablet two changes were made as the scribe Hand 2 was entering the words in the heading. These changes reveal the concern he had to set up a syntax that will make clear most, but not all, of the actions involved here. The reader of the translated heading here should be aware that the scribe has taken special pains, after erasure, to group the *ko-re-te-re* with the *du-ma-te* and the *po-ro-ko-re-te-re* with the *ka-ra-wi-po-ro* and the following two ‘officials’ (the *o-pi-su-ko* and the *o-pi-ka-pe-e-we*).

These clusterings are meaningful. As can be deduced from the actual entries in lines .4-.19, the *ko-re-te-re* are officials (the noun-termination here, singular *-te*, plural *-te-re*, is agentive) and the *po-ro-ko-re-te-re* are associated subordinate officials. They are charged with seeing to it that the required ‘bronze’ from each of the sixteen second-order centers/districts listed is eventually ‘given’. In each case the officials, who I believe are palatially appointed agents for palatial interests in each of these districts, are nameless. The tablet writer at the palatial center is only concerned on this ‘prospective’ text with indicating that responsibility for collection in each second-order district lies with the *ko-re-te* and the *po-ro-ko-re-te* in that district. Note that there are no data for where and when the deliveries are to be made or the underlying reasons, regular or irregular, that give rise to this prospective collection. Lines .4-.12 give the ‘donations’ from the Nearer Province communities: 24.75 kg. Lines .13-.19 record the ‘donations’ from the Further Province communities: 25.25 kg. Both total amounts are within the general weight range of single copper ingots.

The *ko-re-te-re*, the syntax suggests, are to interact with religious officials of considerable standing in the tablets known as *du-ma-te*. The subordinate associates of the *ko-re-te-re*, *i.e.*, the *po-ro-ko-re-te-re*, are to interact with lesser religious officials known as the ‘key-bearers’ (*ka-ra-wi-po-ro*) and agricultural officials (perhaps with some connection to agricultural activity in sanctuary areas, but that is here unspecified) known as ‘fig-supervisors’ (*o-pi-su-ko*) and ‘overseers of digging’ (*o-pi-ka-pe-e-we*). Both of these latter officials occur only here in all of Linear B, so their identification is purely ‘etymological’, conditioned slightly by the context on Jn 829.

There is no concern with indicating how, *i.e.*, by what authority or means, the palatial officials (*ko-re-te-re* and *po-ro-ko-re-te-re*) are to collect the bronze/copper. Nor does the tablet indicate why the religious and agricultural officials should feel obliged to contribute. Finally the text does not indicate whether this ‘collection’ and ‘donation’ king-

dom-wide of essentially two ingots' worth of scrap metal is a regular procedure, and if so, how often it would recur, or an extraordinary event, and if so, what circumstances gave rise to it. We assume all this information was known to the administrators who were involved in writing the text and overseeing its eventual fulfillment.

We should also note that we do not know how the orders to do all this reached the officials involved in the sixteen districts. But Jn 829 indicates that the palatial center had the ability to mobilize regional resource collection and in something of a micro-managed way. Given that Jn 829 is a unique text, our questions will be answered only by further human ingenuity or by the discovery of new tablets. Unfortunately that is often the case in Linear B even when we have fuller or multiple 'sets' of tablets relating to a given economic concern.

The Ma records, however, appear to be part of ongoing and regular yearly 'taxation' recorded in terms of district-by-district proportional targets of six different commodities/raw materials. Of these six, we only know that *146 is a kind of cloth and *152 is 'oxhide'. It is assumed that the other commodities/raw materials are of a similar sort. For *KE* 'beeswax' has been proposed. I here give a selection of five texts sufficient to indicate their variety.

For each district the proportional relationship among the six listed items is the same: 7:7:2:3:1.5:150. This implies that the central administration is not trying to squeeze maximum amounts of these items out of the different districts. Given the variation in human and natural resources that must have existed district to district, such proportions would only work if the quantity of any item produced by the proportional formula was well within the capacity of each district. That whole districts had to donate 8, 10, 12, 22 and even up to 30 oxhides seemingly on a yearly basis does not seem to be hyper-exploitation. Once again, however, we should point out that cloth production workshops, herders and slaughterers and tanners, and specialized workers and crafts personnel associated with the other four commodities/raw materials recorded in these tablets would not have been occupied throughout the year manufacturing these numbers for the central palatial authority. Within the context of their work, perhaps for the *basileis* or prominent clans and other social groups of their localities, the quantities of materials siphoned off by the palatial center at Pylos might not have been recognized locally as a significant exploitation of labor or resources.

PY Ma 124

- .1 a-pu₂-we *146 23 RIM 23 KE M 7 *152 10 OM 5 ME 500
 .2 o-da-a₂, ka-ke-we, o-u-di-do-si *146 1 RIM 1 *152 1 ME 20

PY Ma 365

- .1 ro-u-so *146 17 RIM 14[] KE M 5 *152 8 OM 4 ME
 .2 o-da-a₂, ka-ke-we, a₂-te-ro, we-to, di-do-si *146 1 RIN 2 ME 10

PY Ma 346

- .1 ka-ra-do-ro *146 18 RIM 18 KE M 4 *152[8 OM 4] ME 400
 .2 a-pu-do-si *146 14 o *146 4 RIM 16 o 2 KE M 4 *152 8 OM 4 ME 440

PY Ma 123

- .1 ti-mi-to-a-ke-e 146 24 RIM 24 KE M 7 *152 10 OM 5 ME 500
 .2 a-pu-do-si 146 21 o 2 RIM KE M *152 OM ME
 .3 o-da-a₂, ka-ke-we, o-u-di-do-si *146 1 RIM 1 ME 10

PY Ma 378

- .1 sa-ma-ra *146 24 RIM 24 KE M 7 *152 10 OM 5 ME 500
 .a *152 2 ME 60
 .2 o-da-a₂, ka-ke-we, o-u-di-do-si *146 3 RIM 3 KE M 1 pe-ru-si-nu-wo,
 o-pe-ro *146 1 *152 2 ME 100

PY W_r 1457

- .α *152
 .β a-pu-do-si
 .γ uninscribed

I have arranged the texts according to the canonical order of the secondary districts/centers as listed on Jn 829. Here official human agency does not enter into the written records, *i.e.*, the scribe, again Hand 2, does not stipulate in writing who is responsible at the palatial center or in the outlying districts for seeing to the ordering, collection, shipment, receipt and verification of the 'taxed' items. All of that is left invisible, most likely because these activities and responsibilities and networks had long been set in place. The fullest text is Ma 123 for the site of **ti-mi-to-a-ko*, the first main center of the Further Province. Oddly enough the place-name is listed in the dative/locative (*ti-mi-to-a-ke-e*), which at least syntactically indicates that the scribe conceived of these materials as being 'at' the regional center at the time he was writing the text. Whether this is in fact the case is impossible to tell, because, again, we are not given any details in this or any related series about the where and when and how and why of these 'deliveries'/'payments'.

The scribe here does record in line .2 of Ma 123 the amounts rendered in 'payment' (Mycenaean Greek *a-pu-do-si*, a noun abstract in

the nominative case, literally ‘a giving away’). Twenty-one out of the 24 cloth units (*146) have been delivered; 2 are still ‘owing’ or due (abbreviation *o* = *o-pe-ro* ‘owed’). In line .3, Hand 2 explains the discrepancy. The final one unit ‘the smiths [in **ti-mi-to-a-ko*] are not giving.’

This last entry acknowledges an exemption that this group of specialists has and which accordingly lowers the overall tax payment actually due from the district. This in itself gives us some insight into resource mobilization through textual administration, since it implies that within the districts collective groups were responsible for deliveries of specific items and that adjustments could be made, as need arose. It is assumed that some special activities in the bronze production realm consumed the time that the collective smiths would otherwise have put into obtaining and providing the listed commodities/raw materials. Consequently they were exempted from same. This kind of decision meant that information about the work activities of the collective group of smiths was reported to and assessed by the central palatial administration or its agents in the districts (in my opinion the *ko-re-te-re* and *po-ro-ko-re-te-re*) perhaps in consultation with the local big men or *basileis*.

In ten out of the eleven cases where such excused ‘non-payments’ are listed on the eighteen extant Ma tablets, the group involved is the smiths (Mycenaean Greek *ka-ke-we*). The one exception is Ma 393, where the exemption is listed against a collective masculine group, here designated by the ethnic adjectival form (*ma-ra-ne-ni-jo*) of a minor place name that occurs in the dative/locative on a rower-mobilization text (Pylos An 610). Smiths are designated in Jn bronze/copper allotment texts by place-name adjectives (ethnics) so it is not impossible that the *ma-ra-ne-ni-jo* group of men are in fact smiths designated by the sub-locality where they live within the district of *za-ma-e-wi-ja* (the second-order district recorded on Ma 393).

Such variation in reference is well enough attested in Linear B and speaks to the degree of flexibility and improvisation permitted the ‘scribes’ during the course of their work. It also reflects the essential fact we stressed at the outset, namely that these clay tablet records functioned as mnemonics for administrators who understood the context of whatever economic activities were reported on them. The tablets therefore can be telegraphic and minimalist and still be very useful.

Ma 378 gives us a different variant for the site of *sa-ma-ra*. The targeted quantities are again listed in line .1. But here line .2 (and line

.2a) lists what smiths in the district do not give and also some quantities of cloth, oxhide and *ME* that are carried over as 'owing from last year' (*pe-ru-si-nu-wo*, *o-pe-ro* *146 1 *152 2 *ME* 100). We therefore know that administrative memory went back at least one calendar year.

Ma 365 for the site of *ro-u-so* lists the target quantities, but then on line .2 some amounts of the commodities that 'smiths are giving next year' (*ka-ke-we*, *a₂-te-ro*, *we-to*, *di-do-si*), apparently a form of postponement rather than exemption or pure 'write-off'. Again we are given no means of knowing why one group of smiths was handled one way, and another group another way. We just know now that they were.

Ma 124 gives the district targets with the smith dispensation already subtracted (unlike Ma 123 and Ma 378 with which it shares the same total taxation quantities). On Ma 124 no actual delivery has yet been recorded. Ma 346 is the simplest text, listing the target in line .1 and the 'payment' in line .2. In line .2 it specifies any still 'owed' quantities of *146 and *RI* by the abbreviation *o* = *o-pe-ro* and writing of the appropriate quantities following the entered paid amount.

An additional datum for resource mobilization of these commodities/raw materials comes from the central Archives Complex at the site of Pylos. Here was found an impressed sealing, counter-inscribed by the scribe of the Ma series, Hand 2, with the added information: oxhide 'payment' (*152 *a-pu-do-si*). Unfortunately we do not have precise information about find-spot for this sealing. But the sealing does indicate that a delivery of oxhides or of records about oxhide deliveries had been registered at some point by the central record-keeping authorities.

How such inscribed sealings function in the control of economic activities is best exemplified by the following small selection of sealing inscriptions from Thebes (Piteros, Olivier and Melena 1990 2f, Killen 1994 2f, Palaima 2000a and 2000b 2o). The purpose of inscribed sealings is to document that a transaction regarding single items or single groups of items was authorized by the user/holder/owner of the seal that impressed the sealing. The inscribed sealings from Thebes were found collected in a group in a work room at the palatial center. Their assembly accounted for the individual contributions, under different conditions of obligation, of animals for a commensal sacrificial ceremony such as is known from fuller tablets recording animals and other foodstuffs, especially from Pylos (Killen 1994 2f, Nikoloudis 2001 2f).

- THEBES Wu 46 .a SHE-GOAT *written over seal impression* C [5]
 .β of Praus^{PERSON}, *o-pa* work
 .γ *cyperus-fodder* 30
- THEBES Wu 56 .a HE-GOAT *written over seal impression* C [5]
surface above damaged
 .β1 Ophelesta^{PERSON}
 .β2 *o-pa* work
 .γ *cyperus-fodder* 30
- THEBES Wu 58 .a PIG *written over seal impression* C [5]
 .βa *o-pa* work
 .βb of Therios^{PERSON}
 .γ (at) Amarynthos^{PLACE}
 .βb Written (and thus read) before .βa.
- THEBES Wu 76 .a COW^f *written over seal impression* C [5]
 .β1 a-e-ri-qo^{PERSON}
 .β2 *empty space*
 .γ *o-pa* work *cyperus-fodder* 30
- THEBES Wu 88 .a GOAT^x *written over seal impression* C [5]
surface below damaged
 .β ra-mi-jo^{PERSON}, *o-pa* work
 .γ *facet missing*

The brief inscriptions on the three facets of each nodule (the technical name for the small lump of clay, ending up in rough ‘triangular’ shape, which is wrapped around fine knotted string and then impressed while resting between an individual’s fingers) identify the kind of animal, the conditions governing the contribution of the specific animal, and individuals and places involved with the contribution. In three of the example sealings given here (Thebes Wu 36, 56 and 76) the animals were accompanied by fodder in quantities sufficient for their maintenance over a thirty-day period, obviously until the particular ceremonial occasion came around on the ritual calendar.

In many cases the syntax of these brief entries is not clear. Accordingly, it is hard to know sometimes why an animal is listed as ‘at’ a locality when the sealing is found at the palatial center. It seems likely that the sealings were in fact manufactured at the place of origin of the animals. Otherwise the genitive of source or even a ‘case-less’ use of the

‘nominative of rubric’ might be in order. The sealing would then accompany the animal en route, as a kind of document of authorization that the individual bringing the animal had the right to be transporting it from one point to the other.

On Wu 58, the locality is probably located on the island of Euboea across a sea strait from the mainland region of Boeotia that Thebes dominated in prehistoric and historical times (Sergent 1994 2m). It thus attests to the outreach of the palatial center at least in connection with whatever ceremonial event gave rise to this contribution. The term ‘*o-pa* work’ indicates that the animals have been ‘finished off’, *i.e.*, brought to a state of readiness for ritual slaughter and consumption (Melena 1983 2p, Killen 1999 2p). The term can also be used of work with pieces of armor or chariot equipment that are brought into a state of readiness for their use.

The degree to which the palatial centers controlled or interacted with sanctuary locales and their officials and other personnel is a topic of considerable debate right now (convenient full discussion in Lupack 2002 2b). The Pylos E-series texts demonstrate that the palatial center had an interest in monitoring landholdings in the religious district known as *Sphagianes* (the name seems to mean ‘the place of ritual slaughter’). These are measured by quantities of seed grain. The terms under which the land is held (from the collective land-organization known as the *da-mo*) are stipulated. The most frequent term is *o-na-to*, literally ‘land for beneficial use’. In one interrelated series of tablets, these land allotments are listed as held by individuals with cult titles. Another series is specifically connected with personnel and specialists associated with the ‘military leader’ (or *ra-wa-ke-ta* = *lawage(r)tas*). The most frequent terms are *do-e-ro* and *do-e-ra* (servant, masculine and feminine) of the deity. We do not know whether the terms *do-e-ro* and *do-e-ra* are to be taken in a ceremonial, honorific or literal sense. But other cult titles and even occupational titles occur: priest, priestess, ‘key-bearer’ (as on Jn 829), and the potter, fuller, and perhaps armorer of the *wanaks* (Palaima 1997 2b).

PY Ep 704

.5 *Eritha*^{PERSON} the priestess has and claims to have *etonijo* land for the god, but the *damos* says that she has a beneficial plot of land from the communal land shares so much seed grain BARLEY $3\frac{9}{10}$ maximum dry units

.7 *Karpathija*^{PERSON} the key-bearer has two communal shares and is supposed to perform service on the basis of two shares, but she does not perform service so much seed grain BARLEY [quantity missing]

The entry on line .5 of Pylos tablet Ep 704 is *the* example of a dispute over the terms of landholding between the priestess and the local collective land organization known as the *da-mo*. What is at stake seems to be the degree to which she, or the deity she represents, will be obliged later to contribute some portion of production from the plot here registered. That is to say, this is a dispute over ‘tax status’. The ‘key-bearer’ in line .7 is obligated, at least from the perspective of the central administration, to perform service (the actual word is *wo-ze-e* ‘to work’) for the two communal shares. She has not done so. This is recorded, and there the matter rested when the palatial center was destroyed.

In these land documents we see the palatial center being very precise, just as on the Thebes sealings, to specify the exact terms under which resources were being somehow acted upon. We can extrapolate and say that persons of sufficient status to come within the orbit of the central administration would have aspects of their roles within the overall economy monitored and recorded. But, again, the impression one gets is that this is done on a selective basis and in accordance with traditional arrangements of long-standing. I would imagine that the partitioning of landholdings had long histories and was for centuries under control of the local *damos* organizations. The palatial center at Pylos records those particular holdings that were of concern to it.

The final example of resource mobilization that we will discuss concerns the mobilization of men, here as rowers and most likely in a military context.

PY An 610

.1	me-za-[wo?-]ne , rowers []	<i>blank</i> []	
.2	<i>traces of text</i> [] , settlers	MEN 46 []	
.3	‘later settlers’(?)	MEN 19 []	
.4]wa , settlers []	MEN 36 []	
.5	‘later settlers’(?) []	MEN 3 []	
.6	e-wi-ri-po ^{PLACE}	MEN 9	‘refugees’ []
.7	a-ke-re-wa ^{PLACE}	MEN 25	wo-qe-we [?] []
.8	ri-jo ^{PLACE}	MEN 24	wi-nu-ri-jo [?] []
.9	te-ta-ra-ne ^{PLACE}	MEN 31	‘later settl[ers]’(?)
.10	a-po-ne-we ^{PLACE}	MEN 37	‘later [settlers]’(?)
.11	ma-ra-ne-nu-we ^{PL}	MEN 40	po-ti-ja-ke-e ^{PLACE?} MEN 6[]
.12	z̄a-ku-si-jo ^{PLACE}	MEN 8	za-e-to-ro ^{PLACE} MEN 3
.13	da-mi-ni-jo []	MEN 40	of e-ke-ra ₂ -wo ^{PERSON} MEN 40[]
.14	of we-da-ne-u ^{PERSON}	MEN 20	ko-ni-jo ^{PL²} 126 ‘later settlers’(?) MEN 26
.15	po-ku-ta	MEN 10	we-re-ka-ra, te-qa-ta-qe MEN 20
.16-.19		<i>blank</i> []	

By now the minimalist nature of such texts is familiar. An 610 (written by ‘master scribe’ Hand 1) lists groups of men specified in the heading, unfortunately fragmentary, as ‘rowers’ and as somehow being overseen or under the control of an individual named *me-za-wo*. *me-za-wo* recurs on an important banqueting food provision text (Un 138) of the kind mentioned just above as being the end recorded result of collections of materials associated with sealings. The men are listed by the localities where they are, or, given the use of ethnics in lines .12 and .13 (*za-ku-si-jo* and *da-mi-ni-jo*), most likely are ‘from’. They are also specified by their status as either ‘settlers’ or ‘later settlers’. This, combined with the ethnics, indicates that these groups of men were compensated for their service as rowers by whatever rights and privileges, and perhaps landholdings, were accorded to their designated status. The numbers of men vary considerably, giving the impression that this is not a ‘target’ list, or at least not an ‘end-result’ ‘target’ list. It is possible that these numbers represent how many men are still required to meet the needs of the rower force. Five hundred and sixty-nine men are recorded in the preserved entries. The total number would be even greater, given the missing entries on lines .6-.10.

e-ke-ra₂-wo (line .13) is the personal name that ‘takes the place of the *wanaks* (‘king’) on commensal offering text Pylos Un 718.2. This arguably implies that he is the *wanaks* and is here personally responsible for providing men as rowers, men who would be attached to him as an individual ‘aristocrat’ rather than through his office as *wanaks*. This view is supported by the very next entry. *we-da-ne-u* (line .14) is an important person who has cultic associations in the Pylos Es series and is in charge of sacrificial bulls and other animals in Cn 418. Again these twenty men on An 610 might well be affiliated with *we-da-ne-u* as an individual of prominence, rather than because of any office he holds within the central administration. It must be significant that these two figures are recorded together near the end of this lengthy text.

po-ku-ta (line .15) is an occupational term. It was traditionally interpreted as ‘pourers’ *vel sim.*, but recently the suggestion has been made that it is related to Latin *pecus* and refers to herdsmen of some sort. The contextual association here of *po-ku-ta* and *we-da-ne-u*, who elsewhere is connected with herd animals, lends some support to this new etymology. The place names of *ri-jo*, *te-ta-ra-ne*, and *a-po-ne-we* (lines .8-.10) recur in the same order on An 1, a tablet that lists 30 rowers total (the size of a single ship) going to the site of Pleuron and coming from five different localities.

Hand 1 within the central administration was able to access and record this information about the military use of manpower. It is difficult to know exactly how the data on An 610 were ultimately used. But using the Ma exemptions granted to smiths as a parallel, it is possible that the service of these specific individuals from these localities as rowers had to be factored into whatever 'payments' had to be made to them for their service and whatever demands the central administration would otherwise make of these localities. Again we have no knowledge of whether any of these individuals would ever have interacted with an official of the central record-keeping administration, who would have taken the head counts of these contingents of men, or who would have verified those counts.

Given the facts that we have no deep chronology of written administrative records from any Mycenaean palatial center, it is difficult to know the extent to which economic planning occurred, how it was managed, and the degree to which written administration permeated the lives of inhabitants of Mycenaean palatial territories. It is worth repeating that the two most accomplished 'scribes' identifiable within the Pylos central 'archives' were responsible for just over 200 tablets (Hand 1) and just fewer than 90 tablets (Hand 2) (Palaima 1988 2l). Hand 2's work covers 5 or 6 economic subject areas (bronze allotments and collection, regional taxation, banqueting paraphernalia inventorying, perfumed oil allotments to sanctuaries, the transfer of unguent oil between individuals and the specification of the number of stirrup jars [containers] involved, and allotments of wheat or barley to sanctuaries, deities and religious personnel). Hand 1 deals with landholdings, rations to women work groups, flax production, commensal ceremonial texts, livestock and many kinds of personnel. We have seen representative texts of both scribes here above.

By modern information accessing and processing standards, such an output of tablets over a five-month period seems meager. I once asked (Palaima 2001 2p) what the scribes did in the rest of their time, since these few tablets could be written out, at least mechanically and physically, in a matter of days. I now think that if we take into account all the information that had to be accumulated concerning the goods, materials, places, responsible parties, nuances of obligation, fulfillment or non-fulfillment of same, and so forth, we might rather wonder how these particular scribes could be so productive in so little time. The data we do see amassed in the tablets of our thirty or so identifiable scribes

indicate a great concern on the part of the palatial center for economic activities and manpower use in the territory it dominates. At the same time, there is good reason to believe that the late developing palatial system extracted resources from pre-existing networks of labor and production, targeting a few areas for its own benefit.

BIBLIOGRAPHICAL ABBREVIATIONS

- AfO* *Archiv für Orientforschung* (Graz/Wien).
- AJA* *American Journal of Archaeology* (Princeton: Archaeological Institute of America).
- AOAT Alter Orient und Altes Testament (Kevelaer: Butzon&Bercker and Neukirchen-Vluyn: Neukirchener Verlag/Münster: Ugarit).
- AOS American Oriental Series (New Haven: American Oriental Society).
- ATU Archaische Texte aus Uruk (Berlin: Gebr. Mann).
- AuOr* *Aula Orientalis* (Barcelona: AUSA).
- BaM* *Baghdader Mitteilungen* (Berlin: Gebr. Mann).
- BASOR* *Bulletin of the American School of Oriental Research* (Atlanta: American School of Oriental Research).
- BBVO Berliner Beiträge zum Vorderen Orient (Berlin: Reimer).
- BiMes Bibliotheca Mesopotamica (Malibu: Undena).
- BiOr* *Bibliotheca Orientalis* (Leiden: Nederlands Instituut voor het Nabije Oosten).
- BSA Bulletin on Sumerian Agriculture (Cambridge).
- HUCA* *Hebrew Union College Annual* (Cincinnati: Hebrew Union College).
- JANES* *Journal of the Ancient Near Eastern Society* (New York: Jewish Theological Seminary).
- JCS* *Journal of Cuneiform Studies* (Atlanta: American School of Oriental Research).
- JESHO* *Journal of the Economic and Social History of the Orient* (Leiden: Brill).
- JNES* *Journal of Near Eastern Studies* (Chicago: University of Chicago).
- NABU* *Nouvelles assyriologiques brèves et utilitaires* (Paris: Société pour l'Étude du Proche-Orient Ancien).
- OBO Orbis biblicus et orientalis (Freiburg/Schweiz: Freiburger Universitätsverlag and Göttingen: Vandenhoeck & Ruprecht).
- OIP Oriental Institute Publications (Chicago: University of Chicago Press).
- OrAn* *Oriens Antiquus* (Rome: Centro per le Antichità e la Storia dell'Arte del Vicino Oriente).
- PIHANS Uitgaven van het Nederlands Historisch-Archaeologisch Instituut te Istanbul. Publications de l'Institut historique-archéologique néerlandais de Stamboul (Istanbul/Leiden: Nederlands Historisch-Archaeologisch Instituut).
- RA* *Revue d'Assyriologie et d'Archéologie Orientale* (Paris: Presses Universitaires de France).
- WZKM* *Wiener Zeitschrift für die Kunde des Morgenlandes* (Wien: Selbstverlag des Instituts für Orientalistik).
- YNER *Yale Near Eastern Researches* (New Haven–London: Yale University Press).

Guide to Economic Order Quantity formula, here we discuss its uses with practical examples and also provide you Calculator with downloadable excel template. Economic Order Quantity Formula (Table of Contents). Economic Order Quantity Formula. Economic Order Quantity Calculator. Economic Order Quantity Formula in Excel (With Excel Template). Economic Order Quantity Formula. In inventory management, economic order quantity (EOQ) is the order quantity that minimizes the total holding costs and ordering costs. It is one of the oldest classical production scheduling models. The model was developed by Ford W. Harris in 1913, but R. H. Wilson, a consultant who applied it extensively, and K. Andler are given credit for their in-depth analysis. Learn how the EOQ (economic order quantity) formula can help you find the right order quantity to help minimize inventory storage costs. Economic Order Quantity (EOQ) Formula and Definition for Ecommerce Shops. By Shannon Callarman. February 26, 2020. When reordering products, many businesses place orders based on what they need at the exact moment rather than using a reorder quantity formula. The economic order quantity, delivery schedules and data of the minimal ordered amount are indicated directly in the system; it enables to change them right after receiving new information from supplier and place an order according to the updated information. The economic order lot of the stock is defined automatically. As to the main indicators of inventory management: Turnover accelerated by 1.5 times. People naturally create order in order to flourish. Chaos is dangerous, but it is also what everything is naturally. This is far more a subject for psychology such as the lectures of Jordan Peterson, which I highly recommend. Maybe someone using the term "economic order" is referring to the spontaneous order which occurs when people are allowed to buy and sell as they see fit. The division of labor, specialization, prices, firms, all seem "ordered" but arise naturally out of repeated interactions. 2. Related Questions.