

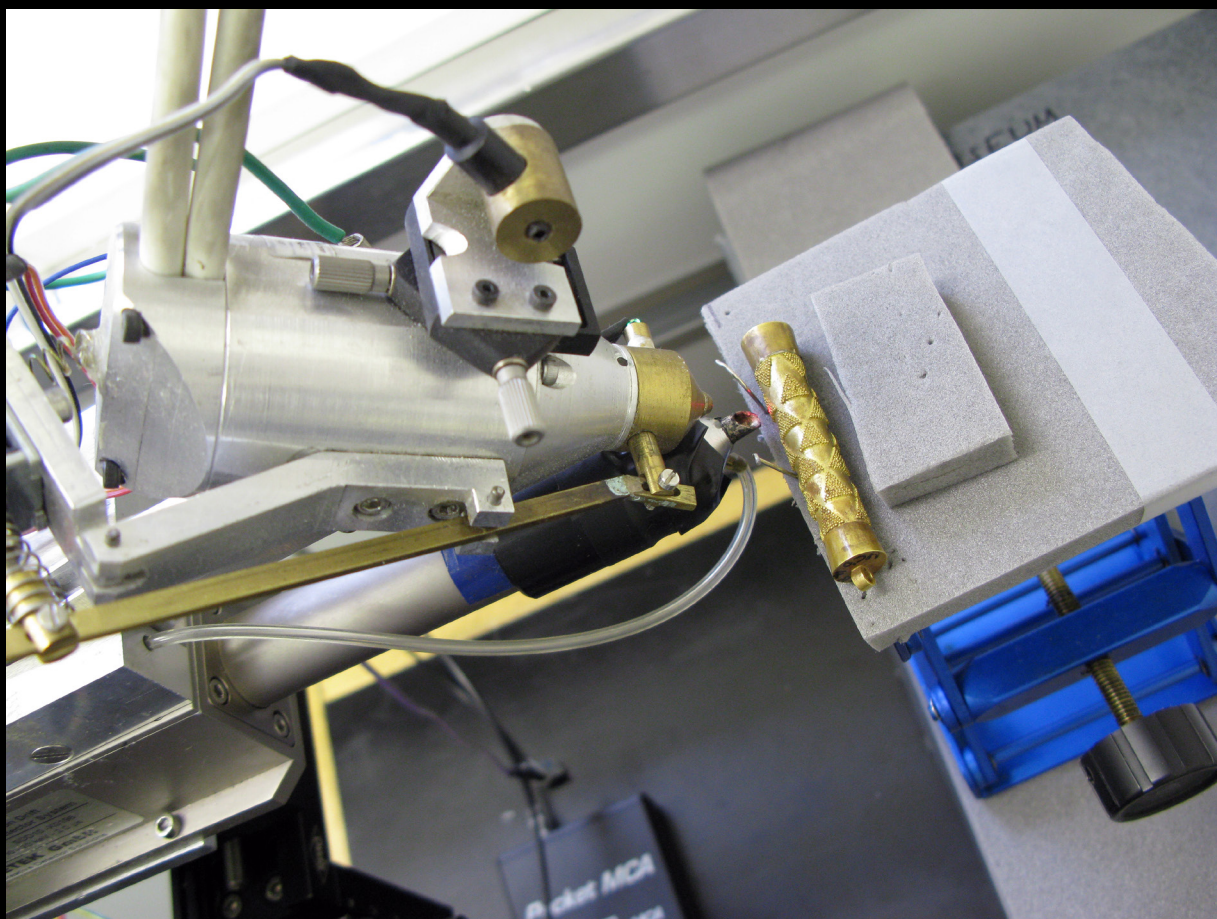


McDONALD INSTITUTE MONOGRAPHS

# Ancient Egyptian gold

Archaeology and science in jewellery  
(3500–1000 BC)

Edited by Maria F. Guerra, Marcos Martín-Torres  
& Stephen Quirke



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Edited by Maria F. Guerra, Marcos Martín-Torres  
& Stephen Quirke

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On the front cover: *Analysis of the gold cylindrical amulet from Haraga at The Petrie Museum of Egyptian Archaeology (UC6482) using a portable XRF spectrometer.*

On the back cover: *Details under the SEM of the triangular designs of granulation on the tube of the cylindrical amulet from Haraga.*

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# CONTENTS

Contributors	xi
Figures	xiii
Tables	xx
Editorial foreword	xxiii
<b>Part I</b>	<b>Gold and goldsmiths in ancient Egypt</b>
<i>Chapter 1</i>	Gold, an exceptional material 3
	MARIA F. GUERRA
	Why gold? 3
	Exploiting gold sources 4
	Towards a gold metallurgy? 8
	From grain to object 10
<i>Chapter 2</i>	Centres of goldworking in ancient Egypt: Egyptological questions and sources 27
	STEPHEN QUIRKE
	Archaeology of procurement and archaeology of production 29
	Bronze Age Egyptian written sources on procurement and working of gold 37
	Interpreting ancient Egyptian depictions of metal-working 57
	Concluding questions 67
<i>Chapter 3</i>	Jewellery in Egyptian burials 75
	WOLFRAM GRAJETZKI
	Three level system of Egyptian burials 75
	Chronological overview 76
<i>Chapter 4</i>	Jewellery manufacture: an Egyptian quartet 87
	JACK OGDEN
	Wire 88
	Engraving 95
	Gold cladding 96
	Enamel 99
<i>Chapter 5</i>	Reflections on gold: colour and workshop practices in Egypt 105
	MARIA F. GUERRA
	A question of colour 105
	Making colourful strings 108
	One object, several goldsmiths 112
	Gold, another colour 114
	Gold alloys, chance or circumstances? 118
<b>Part II</b>	<b>New analyses of ancient Egyptian jewellery</b>
<i>Chapter 6</i>	Analytical approaches to Egyptian goldwork 131
<i>Chapter 6.1</i>	Analysing gold jewellery 133
	MARIA F. GUERRA
<i>Chapter 6.2</i>	Goldwork under white light and X-rays: inferring technologies 137
	LORE TROALEN & MARIA F. GUERRA

<i>Chapter 6.3</i>	Egyptian gold jewellery under the SEM-EDS	143
	MARIA F. GUERRA	
	From optical to electron microscopy	143
	Imaging with SEM	144
	SEM-EDS microanalysis	147
<i>Chapter 6.4</i>	Elemental analysis of goldwork with portable XRF equipment	149
	MARIA F. GUERRA & MARCOS MARTINÓN-TORRES	
<i>Chapter 6.5</i>	New analytical development for the analysis of Egyptian jewellery at AGLAE: mapping hard soldered joins and PGE inclusions	153
	QUENTIN LEMASSON, BRICE MOIGNARD, CLAIRE PACHECO, LAURENT PICHON & MARIA F. GUERRA	
	Fast mapping with PIXE at AGLAE	153
	Analytical challenges	154
	Estimating the depth of analysis	155
	Homogeneity of the analytical data	155
	Limits of detection	157
	PGE inclusions on hard soldered joins	157
	Conclusion	158
<i>Chapter 6.6</i>	Double Dispersive X-Ray Fluorescence analysis for the provenance of gold	159
	MARTIN RADTKE & UWE REINHOLZ	
	D <sup>2</sup> XRF	159
	D <sup>2</sup> XRF performance	161
	Application	164
	Conclusions	164
<i>Chapter 6.7</i>	3D imaging, colour and specularity of an Egyptian Scarab	165
	LINDSAY MACDONALD & MONA HESS	
	3D digitization	165
	Evaluation of 3D reconstruction methods	167
<i>Chapter 6.8</i>	The corrosion of precious metals: the case of Egyptian goldwork	175
	ISABEL TISSOT & MARIA F. GUERRA	
	Corrosion of precious metals	175
	Corrosion of Egyptian goldwork	177
	Characterization of the corroded surface	179
	Intergranular corrosion and stress corrosion cracking	183
	Conclusions	183
<i>Chapter 7</i>	The early jewellery	193
<i>Chapter 7.1</i>	The early jewellery analysed	195
	MARIA F. GUERRA	
<i>Chapter 7.2</i>	Introduction to sites	197
	WOLFRAM GRAJETZKI	
	Abydos	197
	Qau and Badari	197
<i>Chapter 7.3</i>	Predynastic and Early Dynastic goldwork from Abydos	201
	MARIA F. GUERRA, NIGEL MEEKS & STEPHEN QUIRKE	
	Predynastic diadem from tomb 1730 at Abydos	201
	Beads and gold foils from 1st Dynasty tombs at Abydos	206

<i>Chapter 7.4</i>	First Intermediate Period goldwork from Qau and Badari	215
	MARIA F. GUERRA, MARCOS MARTINÓN-TORRES & STEPHEN QUIRKE	
	Polychrome strings with cowrie-shaped beads	215
	The large beads	219
	The amulet pendants	222
	Making small ring beads	226
	The gold alloys	228
<i>Chapter 8</i>	Middle Kingdom jewellery	245
<i>Chapter 8.1</i>	Jewellery in the Middle Kingdom	247
	MARIA F. GUERRA	
<i>Chapter 8.2</i>	Haraga tomb 72	249
	LORE TROALEN, MARGARET MAITLAND & MARIA F. GUERRA	
	The gold jewellery	249
	The gold alloys	255
	Conclusion	258
<i>Chapter 8.3</i>	Riqqa tomb 124	261
	LORE TROALEN, MARIA F. GUERRA, MARGARET MAITLAND, MATTHEW PONTING & CAMPBELL PRICE	
	Manufacture and restoration	261
	Analytical data	264
<i>Chapter 8.4</i>	Objects from excavations at Haraga, Lahun and other sites	267
	MARIA F. GUERRA & STEPHEN QUIRKE	
	The objects from Haraga	267
	The objects from Lahun	270
	Objects from Naqada and Buhen	272
	The gold alloys	274
<i>Chapter 8.5</i>	Granulation in Egypt and the cylindrical amulet from Haraga	279
	MARIA F. GUERRA & NIGEL MEEKS	
	A question of technology?	279
	Granulation in Egypt	280
	Technical study of amulet UC6482	283
<i>Chapter 8.6</i>	Jewellery from Abydos excavated by Garstang	287
	MARIA F. GUERRA, LORE TROALEN, MATTHEW PONTING & IAN SHAW	
	The analysed corpus	287
	Technological study	288
	The gold alloys	291
<i>Chapter 8.7</i>	Middle Kingdom jewellery in the collection of the Petrie Museum	297
	MARIA F. GUERRA & STEPHEN QUIRKE	
<i>Chapter 8.8</i>	Necklace British Museum EA3077 said to be from Thebes	303
	NIGEL MEEKS, SUSAN LA NIECE, STEPHEN QUIRKE & MARIA F. GUERRA	
<i>Chapter 9</i>	Second Intermediate Period jewellery	313
<i>Chapter 9.1</i>	Jewellery in the Second Intermediate Period	315
	MARIA F. GUERRA	

<i>Chapter 9.2</i>	The Qurna burial	317
	LORE TROALEN, JAMES TATE & MARIA F. GUERRA	
	The Qurna gold jewellery	317
	Gold alloys from Qurna	318
	Joining technique	322
	Conclusions	326
<i>Chapter 9.3</i>	Second Intermediate Period jewellery in the collection of the British Museum	327
	SUSAN LA NIECE, GIANLUCA MINIACI, MAREI HACKE & MARIA F. GUERRA	
	Technical description	327
	Gold alloys and joining technique	331
	Conclusions	332
<i>Chapter 9.4</i>	Jewellery bearing the names of Ahhotep and Ahmose	335
	MARIA F. GUERRA & SANDRINE PAGÈS-CAMAGNA	
	The jewellery construction	337
	The gold alloys and the joining technique	340
	Conclusions	343
<i>Chapter 9.5</i>	Second Intermediate Period jewellery in the collection of the Petrie Museum	345
	MARIA F. GUERRA, MARCOS MARTINÓN-TORRES & STEPHEN QUIRKE	
	Jewellery from Qau	345
	Jewellery bearing the names of Kamose and Seqenenra Taa	349
	The gold alloys	352
	Conclusions	354
<i>Chapter 10</i>	New Kingdom jewellery	359
<i>Chapter 10.1</i>	Jewellery in the New Kingdom	361
	MARIA F. GUERRA	
<i>Chapter 10.2</i>	Jewellery from tomb 296 at Riqqa	363
	LORE TROALEN & MARIA F. GUERRA	
	The group of jewellery	363
	The gold alloys and the soldering process	363
<i>Chapter 10.3</i>	Making pennanular ear ornaments in Egypt	369
	MARIA F. GUERRA	
	The ribbed penannular earrings	370
	Penannular earrings with one tube	374
	The gold alloys	376
	Concluding remarks	380
	Appendix: Ribbed penannular earrings with triangular tubes	381
<i>Chapter 10.4</i>	Finger-rings	387
	MARIA F. GUERRA, SUSAN LA NIECE, NIGEL MEEKS, STEPHEN QUIRKE & LORE TROALEN	
	Rings for the fingers in Egypt	387
	Swivelling finger-rings and signet rings in the collection of the British Museum	389
	Finger-rings supposedly from the Royal Tomb at Amarna and comparators	394
	New Kingdom finger-rings with wires	404
<i>Chapter 10.5</i>	Jewellery reportedly from the Royal Tomb at Amarna	411
	LORE TROALEN, MARIA F. GUERRA & MARGARET MAITLAND	

<i>Chapter 10.6</i>	New Kingdom strings in the collection of the British Museum	419
	NIGEL MEEKS, SUSAN LA NIECE & MARIA F. GUERRA	
	String EA14696	419
	String EA66827	424
	The gold alloys	429
<i>Chapter 10.7</i>	On beads, pendants, scarabs and chains dated to the New Kingdom	433
	MARIA F. GUERRA & STEPHEN QUIRKE	
	Technological study	433
	The gold alloys	439
<i>Chapter 11</i>	Towards a conclusion: Qurna in context	449
	MARIA F. GUERRA	
	The Qurna collar and the use of hard soldering in Egypt	451
	Egyptian tiny beads and the Qurna child's necklace	455
	Puzzling Qurna earrings	457
	The whitish and heavily worn Qurna girdle	465
	Egyptian gold alloys and the Qurna group	468
	Final remarks	475
<i>Appendix 1</i>	Map of Egypt with cited sites	481
<i>Appendix 2</i>	Egyptian chronology 4th millennium BC – AD 395	482
<i>Appendix 3</i>	Kings cited in text, with tentative dates, by dynasty	483
<i>Appendix 4</i>	Sudan chronology	484
<i>Appendix 5</i>	List of objects analysed	485
<i>Appendix 6</i>	Index of objects analysed	489
<i>Appendix 7</i>	Illustration credits	496



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## Figures

1.1	<i>Au-Ag-Cu ternary phase diagram showing the relation between composition and colour of the alloy.</i>	4
1.2	<i>Tomb 15, Beni Hassan: workshop scene where different types of objects are plated and gilt.</i>	4
1.3	<i>Formation of the main types of gold placer deposits.</i>	5
1.4	<i>Gold panning in Lusitania (from De Re Metallica) and a modern pan containing gold nuggets.</i>	6
1.5	<i>Amounts of silver in gold grains from mines in the Egyptian Eastern Desert.</i>	7
1.6	<i>Tomb of Wepemnefert at Giza: scene showing metallurgical processes.</i>	12
1.7	<i>Representation of some solder alloys in the Au-Ag-Cu ternary phase diagram.</i>	14
2.1	<i>Web of operations in Roman gold mining at Três Minas (2nd century AD).</i>	28
2.2	<i>From ore to object: metal production sequence.</i>	29
2.3	<i>Gold-mining sites in Egypt assigned to the 'Old to Middle Kingdom' phase.</i>	30
2.4	<i>Identified Old to Middle Kingdom sites of copper, gold and lead extraction.</i>	30
2.5	<i>The Balat workshop at phase 3, rooms 7–8 at right, 5–6 at left.</i>	34
2.6	<i>The Balat workshop: distribution of ceramic finds related to metalworking.</i>	35
2.7	<i>Ramesseid jar rim sherd with start of the verse on the sculptor and goldsmith in the Teaching of Khety.</i>	39
2.8	<i>Locations of inscriptions with smnty titles in expedition areas.</i>	42
2.9	<i>Unprovenanced limestone stela referring to 'the chapel of the goldsmith Kiky'.</i>	48
2.10	<i>Glazed steatite scarabs inscribed for the goldsmith Nebipu and the overseer of goldsmiths Saptah.</i>	49
2.11	<i>Stela of the head goldsmiths Panehsy and Paramheb.</i>	50
2.12	<i>Miniature votive stela of the goldsmith Khonsumes.</i>	53
2.13	<i>New Kingdom chapels among the Old Kingdom monuments of north central Saqqara.</i>	55
2.14	<i>Papyrus of head of makers or fine gold-leaf Neferrenpet, with gold foil decoration.</i>	57
2.15	<i>The context of metalworking depictions (melting, pouring and hammering) and necklace-stringing.</i>	60
2.16	<i>Depictions of metalworking in the tomb-chapel of vizier Rekhmira, 18th Dynasty, Thebes.</i>	63
2.17	<i>Depictions relating to gold working in the tomb-chapel of Khay, Saqqara.</i>	66
2.18	<i>Crucible from Badari 4964, c. 2100–2000 BC.</i>	69
3.1	<i>Categories of Egyptian burials: three steps of burial equipment types.</i>	76
3.2	<i>Examples of Old Kingdom funerary jewellery: two diadems and gold wire with beads.</i>	77
3.3	<i>Amulets, found in burials at Qau and Badari, First Intermediate Period.</i>	79
3.4	<i>Necklaces from the burial of Mayet with a torque-like string.</i>	80
3.5	<i>Necklace of Wah.</i>	81
3.6	<i>Burial of Nubhetepi-khered with the typical jewellery equipment of a high status person.</i>	81
3.7	<i>Objects from the jewellery box of the king's daughter Sithathor at Dahshur.</i>	83
3.8	<i>The broad collar of Senebtysy, especially made for the burial.</i>	83
4.1	<i>Wire drawing showing how the wire is compressed and elongated by wire drawing.</i>	88
4.2	<i>Gold bracelet from Mostagedda. First Intermediate Period.</i>	89
4.3	<i>Detail of the bracelet in Figure 4.2 showing break.</i>	89
4.4	<i>The construction of strip-twist wire.</i>	90
4.5	<i>Detail of the wire and granulation on one of Tutankhamun's daggers (18th Dynasty).</i>	90
4.6	<i>Gold and lapis lazuli scarab ring (17th Dynasty).</i>	91
4.7	<i>Detail of the ring in Figure 4.6 showing the seams on the wire.</i>	91
4.8	<i>Drawing showing how strip drawing curls a strip round into a circular section.</i>	91
4.9	<i>Magnesite jar with gold lid. From the tomb of Khasekhemu at Abydos, 2nd Dynasty.</i>	92
4.10	<i>Detail of the gold lid and binding wire on the jar in Figure 4.9.</i>	92
4.11	<i>Detail of the twisted wire 'ropes' on the jar in Figure 4.9.</i>	93
4.12	<i>Detail of the wires on the jar in Figure 4.9.</i>	93
4.13	<i>Gold wire diadem from the tomb of Senebtysy at Lisht, late 12th to early 13th Dynasty.</i>	94
4.14	<i>Gold base from a scarab ring with the name of Ameny from Lisht, Middle Kingdom.</i>	96
4.15	<i>Detail of the ring in Figure 4.14.</i>	96
4.16	<i>Gold base on a gold and amethyst scarab ring of Senusret III from Dahshur.</i>	97
4.17	<i>Detail of the engraving on the ring in Figure 4.16.</i>	97
4.18	<i>Detail of the base plate on the ring in Figure 4.6 showing chased inscription and recent scratches.</i>	97
4.19	<i>Two of the pendants from a New Kingdom Egyptian collar found in tomb 93 at Enkomi, Cyprus.</i>	98

4.20	<i>Detail of a gold and glass (perhaps enamel) pectoral from the tomb of Wendjebaendjed.</i>	100
4.21	<i>Detail of a gold and glass (perhaps enamel) pectoral from the tomb of Wendjebaendjed.</i>	100
4.22	<i>Detail of the enamelled disk in the centre of a gold bowl from the tomb of Wendjebaendjed.</i>	101
5.1	<i>Gold shell-shaped pendants from several tombs, some inscribed.</i>	106
5.2	<i>Detail of the pectoral of Sathathoriunet with the name of Senusret II.</i>	107
5.3	<i>Components of different colours in a string of beads from Badari, tomb 4903.</i>	107
5.4	<i>The four bracelets from the tomb of king Djer at Umm el-Qaab.</i>	108
5.5	<i>Second bracelet and one of the 'hour-glass' beads in the bracelet.</i>	109
5.6	<i>Broad anklets and bracelet of Sathathoriunet, 12th Dynasty, Lahun.</i>	110
5.7	<i>One of the ring beads from the Qurna child's necklace.</i>	111
5.8	<i>Details of the beads and separators strung in Sathathoriunet's anklets and bracelet.</i>	111
5.9	<i>Detail of necklace British Museum EA3077, said to be from Thebes.</i>	112
5.10	<i>Feline-head shaped hollow gold beads from two girdles.</i>	113
5.11	<i>The ropes of motifs in two items from the tomb of Tutankhamun.</i>	114
5.12	<i>Reflectivity spectra of copper, silver, and gold and estimated reflectivity of several Au-Ag alloys.</i>	116
5.13	<i>Detail of string of beads from tomb 7923 at Qau.</i>	117
5.14	<i>Elemental composition of objects dated from Predynastic to First Intermediate Period.</i>	117
6.1	<i>Compact high-resolution video microscope with colour image sensor.</i>	137
6.2	<i>Strip-twisted wire in a Roman Period earring, showing the helical seam and the hollow interior.</i>	138
6.3	<i>Roman Period bracelet and X-radiograph of its pair.</i>	138
6.4	<i>X-radiograph of string of beads from Haraga, tomb 72.</i>	139
6.5	<i>X-radiograph of finger-ring NMS A.1883.49.8.</i>	140
6.6	<i>X-radiograph of finger-ring NMS A.212.12.</i>	140
6.7	<i>The main emissions by bombardment with an electron beam and radius of interaction volume.</i>	144
6.8	<i>Part of gold pendant in the form of a hawk with spread wings under the SEM.</i>	145
6.9	<i>SE images of a detail of pendant N 1855A.</i>	146
6.10	<i>SE images of granules and wires in pendant N 1855A.</i>	146
6.11	<i>SE images of pendant N 1855A, showing details related to the production of the granules.</i>	147
6.12	<i>SE image of a detail of the edge of pendant N 1855A.</i>	148
6.13	<i>CNRS portable XRF spectrometer, showing the positioning of the beam spot.</i>	150
6.14	<i>UCL Institute of Archaeology handheld XRF equipment.</i>	151
6.15	<i>The handheld XRF equipment of the C2RMF with its lightweight stand.</i>	151
6.16	<i>University of Liverpool handheld XRF equipment.</i>	152
6.17	<i>AGLAE external microprobe: location of the six detector, exit window, and video microscope.</i>	154
6.18	<i>Elemental distribution of Ir by PIXE in colour scale.</i>	155
6.19	<i>Elemental distribution of Cu, Ag, Au, Ir, Ru and Os by PIXE in colour scale.</i>	158
6.20	<i>The developed setup for D<sup>2</sup>XRF measurements.</i>	160
6.21	<i>Cu K<math>\alpha</math> peak for 0.1 mm and 1 mm beam size and using the second-order reflex.</i>	162
6.22	<i>Effect of energy dispersion of the pnCCD chip for an Au standard at the BAMline.</i>	163
6.23	<i>D<sup>2</sup>XRF spectrum of NA-Au-30 at the mySpot beamline.</i>	163
6.24	<i>Six views of scarab UC11365 illuminated by a circle of 16 flashlights.</i>	166
6.25	<i>Photogrammetric imaging setup with scarab UC11365 on target board.</i>	166
6.26	<i>Positioning scarab UC11365 on the baseboard of the UCL dome.</i>	167
6.27	<i>Photogrammetric reconstruction and detail showing erroneous cut by craftsman.</i>	167
6.28	<i>3D point cloud generated by the colour laser scanner.</i>	167
6.29	<i>3D reconstruction from photometric normals.</i>	167
6.30	<i>Comparison of point cloud from photometric stereo reconstruction and laser scanner.</i>	168
6.31	<i>Measurement of gold band on a scarab.</i>	169
6.32	<i>Colorimetric coordinates of 10 measurements at different positions on the gold band around the scarab.</i>	169
6.33	<i>Image of scarab, with enlarged detail showing sampling locations for gold and steatite.</i>	170
6.34	<i>Intensity distributions from 64 lamps for a single pixel for steatite and gold.</i>	170
6.35	<i>Image components derived from processing the original set of 64 images: (left) albedo, (right) normals.</i>	171
6.36	<i>Image components: (left) specular quotient, (right) specular colour.</i>	171
6.37	<i>Scatter plot of specular vector angle vs normal vector angle and specular vs albedo colours.</i>	172

6.38	<i>Fitting of flank and Lorentzian function and function generated.</i>	172
6.39	<i>Original photograph and rendered image, both illuminated from same hemisphere coordinates.</i>	173
6.40	<i>Detail of Early Bronze Age archer's armband, displaying a reddish corroded layer with iridescent effect.</i>	176
6.41	<i>Iron Age earring with stress-induced corrosion and crack in an Early Bronze Age diadem.</i>	177
6.42	<i>Corroded surfaces of a cartouche-shaped box and 12th Dynasty beads.</i>	178
6.43	<i>Fragments of corroded gold foils from burials excavated at Abydos, North Cemetery.</i>	178
6.44	<i>Fragments of wood with gold leaf excavated at Abydos, North Cemetery.</i>	179
6.45	<i>Gold foils with heterogeneous coloured surface and homogeneous red colour.</i>	180
6.46	<i>Gold versus silver contents obtained by <math>\mu</math>XRF for a gold foil with heterogeneous coloured surface.</i>	181
6.47	<i>Ratio Au/Ag versus S content obtained by <math>\mu</math>XRF for corroded and non-corroded areas.</i>	181
6.48	<i>FEG-SEM-SE micrographs of the heterogeneous corroded area of Abydos foil fragment 2.6.</i>	182
6.49	<i>FEG-SEM-SE micrographs of homogeneous red corroded areas of a gold fragment from Abydos and Haraga.</i>	182
6.50	<i>FEG-SEM-SE micrograph of the Haraga bead fragment with heterogeneous surface.</i>	183
6.51	<i>SEM-SE micrograph of the intergranular corrosion and corrosion products of the cartouche-shaped box.</i>	184
7.1	<i>Diadem from intact grave 1730 at Abydos.</i>	202
7.2	<i>Detail of diadem showing the tiny gold beads, with table of measurements for select beads.</i>	202
7.3	<i>Details under the SEM of the small gold ring beads in the diadem.</i>	203
7.4	<i>Method for making small rings.</i>	203
7.5	<i>SEM details of the small gold ring diadem beads.</i>	204
7.6	<i>Silver versus copper contents of the gold alloys used for the diadem compared to Predynastic jewellery.</i>	205
7.7a	<i>Two of the four pieces of gold foil thought to be from Abydos tomb B10.</i>	207
7.7b	<i>String of beads recorded as from tomb 500 at the funerary enclosure for king Djer.</i>	207
7.8	<i>Ball-shaped gold bead and biconical gold bead in Abydos tomb 500 string.</i>	208
7.9	<i>Scraped surface of the biconical gold bead suggesting a shaping or finishing process.</i>	208
7.10a	<i>Silver versus copper contents for gold beads and foils from Abydos and other items.</i>	210
7.10b	<i>Silver versus copper contents by date for the same objects.</i>	210
7.11	<i>Silver versus copper contents by date as in Figure 7.10b, adding hypothetical alloys.</i>	212
7.12	<i>String of beads from tomb 7923 at Qau.</i>	216
7.13	<i>Small ring beads from string UC18092 under the SEM showing production details.</i>	217
7.14	<i>The four cowrie beads from tomb 3053 at Matmar.</i>	217
7.15	<i>A detail of the string from tomb 4903 at Badari and of some of its gold beads.</i>	218
7.16	<i>One of the ribbed tubular gold beads from Badari tomb 4903 under the SEM.</i>	219
7.17	<i>One of the barrel beads from Badari tomb 4903.</i>	219
7.18	<i>Detail of string from Qau tomb 1030 showing several gold components.</i>	220
7.19	<i>Two of the spherical beads in the Qau tomb 1030 string.</i>	220
7.20	<i>Some of the gold beads from tomb 7777 at Qau.</i>	221
7.21	<i>Details of the decorated gold barrel bead from Qau tomb 7777.</i>	221
7.22	<i>One of the gold amulets in the shape of the god Heh in string from Badari tomb 4903.</i>	222
7.23	<i>Details of the flattened and rolled wires in gold Heh amulet from Badari tomb 4932.</i>	223
7.24	<i>Amulet pendants in the shape of a quail chick with crown, from tombs 5270 and 5281 at Badari.</i>	223
7.25	<i>Detail of string from tomb 3029 at Matmar, showing several components.</i>	224
7.26	<i>Details of the legs of bird amulets from Matmar tomb 3029.</i>	224
7.27	<i>Detail of gold string UC20649 from Badari tomb 4915.</i>	225
7.28	<i>Ankh-shaped, Taweret-shaped and bee-shaped amulets from Qau tomb 1030.</i>	225
7.29	<i>Ring beads from Badari tomb 4915, and one of their visible PGE inclusions.</i>	227
7.30	<i>The ring beads from Badari tomb 4915 under the SEM.</i>	227
7.31	<i>The tiny beads from Matmar 3029.</i>	227
7.32	<i>The tiny beads from Qau tomb 1030, showing variety of colour and shape.</i>	229
7.33	<i>Some of the ring beads of string UC20896 from Qau tomb 7777.</i>	229
7.34	<i>The variety of the small ring beads from Badari tomb 3306.</i>	229
7.35	<i>Silver versus copper contents for jewellery from Qau and Matmar.</i>	231
7.36	<i>Silver versus copper contents for jewellery from Qau and Matmar compared to other objects.</i>	231
7.37	<i>Some of the rings of a gilt copper chain from the tomb of king Khasekhemwy, Umm el-Qaab.</i>	232
7.38	<i>Silver versus copper contents of small ring beads from Qau and Badari.</i>	234



7.39	<i>Silver versus copper contents obtained for the bird amulets analysed.</i>	234
7.40	<i>Silver versus copper contents obtained for the bird and tiny amulets analysed.</i>	236
7.41	<i>Silver versus copper contents obtained for all amulet pendants analysed and button seal UC34110.</i>	236
7.42	<i>Unprovenanced button seal-amulet with details.</i>	237
7.43	<i>Silver versus copper contents obtained for all the analysed beads except the small ring beads.</i>	237
7.44	<i>Silver versus copper contents obtained for all the analysed amulets and beads.</i>	239
7.45	<i>Silver versus copper contents obtained for First Intermediate Period jewellery.</i>	239
8.1	<i>The gold jewellery from Haraga tomb 72.</i>	250
8.2	<i>Representation of a daughter of Ukhhotep IV, in his tomb-chapel at Meir.</i>	251
8.3	<i>Blue faience female figure from a burial at Deir el Bahari, Thebes.</i>	251
8.4	<i>The three gold catfish pendants from tomb 72.</i>	251
8.5	<i>Details from three strings from Haraga tomb 72.</i>	252
8.6	<i>String of biconical and ball beads and X-radiograph revealing various densities.</i>	253
8.7	<i>X-radiographs of two fish pendants, revealing the construction of each.</i>	253
8.8	<i>SEM-AEI micrographs of pendant NMS A.1914.1079.</i>	254
8.9	<i>SEM-AEI micrographs of pendant NMS A.1914.1080.</i>	255
8.10	<i>Silver versus copper contents obtained by analysis of the strings from Haraga tomb 72.</i>	256
8.11	<i>Silver versus copper contents obtained by analysis of the fish pendants from Haraga tomb 72.</i>	256
8.12	<i>PGE inclusion in pendants NMS A.1914.1080-1.</i>	258
8.13	<i>Gold objects from tomb 124 at Riqqa in the collection of the Manchester Museum.</i>	262
8.14	<i>Surface scratches and cracks of the restored pectoral and modern wires in the pendant.</i>	262
8.15	<i>Details of the winged beetle pendant.</i>	263
8.16	<i>The suspension rings of the pectoral and the winged beetle pendant.</i>	263
8.17	<i>Details of the shell shaped pendant, with visible surface scratches.</i>	264
8.18	<i>Silver versus copper contents obtained for the jewellery from tomb 124 at Riqqa.</i>	265
8.19	<i>Fish pendant from tomb 520 at Haraga, with a detail of the fish's body.</i>	268
8.20	<i>Fish pendant from Haraga tomb 520, showing the head and the copper-based tail.</i>	268
8.21	<i>Gold cowrie pendants and cylinder amulets with gold caps from tomb 211 at Haraga.</i>	269
8.22	<i>Details of the gold cylinder amulet from tomb 211 at Haraga.</i>	269
8.23	<i>Details under the SEM of granules soldered to the cylinder.</i>	269
8.24	<i>Detail of the pierced hole (modern?) used for suspension of the gold shell shaped pendant.</i>	270
8.25	<i>Restrung beads and amulets from Lahun, with a detail of the gold bead.</i>	270
8.26	<i>Details of the two ends of the gold bead in the string from Lahun.</i>	271
8.27	<i>Private-name scarab of steatite mounted in a gold sheet.</i>	271
8.28	<i>Two scraps of gold foil with decoration from royal tomb 8 at Lahun.</i>	272
8.29	<i>Lozenge shaped gold bead from the Egyptian fort at Buhen (Sudan).</i>	273
8.30	<i>Private-name scarab of amethyst set in a gold plinth, acquired during excavations at Naqada.</i>	273
8.31	<i>Black jasper scarab set in a gold base plate, from excavations at Naqada.</i>	274
8.32	<i>Silver versus copper contents obtained for the gold jewellery and foils from Haraga.</i>	275
8.33	<i>Silver versus copper contents obtained for the gold jewellery and foils from Lahun.</i>	275
8.34	<i>Silver versus copper contents obtained for the gold jewellery from different excavated sites.</i>	277
8.35	<i>Silver versus copper contents obtained for gold jewellery and foils from Lahun, Haraga and Riqqa.</i>	277
8.36	<i>Cylindrical amulet UC6482 from tomb 211 at Haraga.</i>	280
8.37	<i>Jewellery with granulation from Mereret's burial, Dahshur.</i>	281
8.38	<i>Cylindrical gold amulet pendant from Lisht North.</i>	281
8.39	<i>Hollow cylindrical gold amulet pendant from Saqqara.</i>	282
8.40	<i>The cap, suspension ring, and triangles in granulation of amulet UC6482.</i>	283
8.41	<i>The cracks on the surface of the Haraga cylindrical amulet.</i>	284
8.42	<i>SEM-SE image showing triangular geometrical designs of granulation.</i>	284
8.43	<i>One of the analysed triangles in granulation and composition of the granules and solders.</i>	285
8.44	<i>Gilded objects from Abydos tomb 381.</i>	288
8.45	<i>Fragments of gilded wooden artefacts from excavations at Abydos, tombs 533 and probably 432.</i>	289
8.46	<i>Gold mount for a heart-scarab, from Abydos tomb 405.</i>	289
8.47	<i>Details of the gold heart-scarab mount.</i>	290

8.48	<i>Cylindrical pendant amulet with gold caps from Abydos tomb 459.</i>	290
8.49	<i>One of the gold rings of the Abydos 459 cylinder amulet.</i>	291
8.50	<i>The gold caps of the Abydos 459 cylinder amulet.</i>	291
8.51	<i>Gold and electrum beads from Abydos tomb 492.</i>	292
8.52	<i>Silver versus copper contents obtained for the gold leaves and foils from Abydos.</i>	293
8.53	<i>Silver versus copper contents obtained for gold leaves and foils from Abydos, Haraga and Lahun.</i>	293
8.54	<i>Silver versus copper contents obtained for all the gold objects from Abydos.</i>	294
8.55	<i>PGE inclusion at the surface of the Abydos heart scarab mount.</i>	294
8.56	<i>Details of cylindrical case amulet UC52202.</i>	298
8.57	<i>Gold cowrie shell shaped bead with two holes at each end restrung in string UC8971.</i>	298
8.58	<i>Cowrie shell shaped beads in the girdles of Hepy and Sathathoruiunet.</i>	298
8.59	<i>Some of the gold components of string UC8973.</i>	299
8.60	<i>Some of the gold components of string UC36475.</i>	299
8.61	<i>One of the barrel beads in string UC36475 made from gold foil.</i>	299
8.62	<i>Some of the small ring beads found in deposit 1300 at Sidmant.</i>	300
8.63	<i>Silver versus copper contents obtained for Middle Kingdom gold jewellery.</i>	301
8.64	<i>Some of the many PGE inclusions visible at the surface of gold cowrie shell shaped bead in string UC8971.</i>	301
8.65	<i>Silver versus copper contents of Middle Kingdom gold jewellery.</i>	302
8.66	<i>Components said to be from Thebes, restrung as a necklace, British Museum EA3077.</i>	304
8.67	<i>One of the cowrie shell beads, and the X-radiograph showing the spheres inside the beads.</i>	304
8.68	<i>X-radiograph showing the mounting of the two fish pendants.</i>	305
8.69	<i>Details of the two fish pendants.</i>	305
8.70	<i>One of the sidelock pendants, chased after mounting the upper gold sheet.</i>	306
8.71	<i>Front and X-radiograph of the papyrus umbel pendant with a god Heh amulet.</i>	306
8.72	<i>Cloisonné work of the papyrus umbel pendant and the body and arms of the Heh amulet.</i>	307
8.73	<i>SEM image of one of the spherical beads of gold foil.</i>	307
8.74	<i>Silver versus copper contents obtained by SEM-EDS for the components of necklace EA3077.</i>	308
8.75	<i>Point analysis tracking across the edge seam solder of a cowrie-shell shaped bead (EA3077).</i>	308
9.1	<i>Ahhotep's group of jewellery and weapons exhibited in the Egyptian Museum, Cairo.</i>	316
9.2	<i>The Qurna adult's jewellery set: necklace; bracelets; earrings; girdle.</i>	318
9.3	<i>SEM micrographs and X-Radiographic plate showing details of Qurna jewellery.</i>	319
9.4	<i>Silver versus copper contents obtained for the jewellery from the Qurna burial.</i>	321
9.5	<i>PGE inclusions in the adult's earrings and necklace.</i>	322
9.6	<i>SEM-AEI micrographs of the adult's and child's earrings.</i>	323
9.7	<i>X-radiographs revealing details of construction of the adult's jewellery.</i>	324
9.8	<i>SEM-SEI micrographs of the adult's girdle.</i>	324
9.9	<i>SEM-BSC micrographs of a ring from the adult's necklace.</i>	325
9.10	<i>Heart-scarab of king Sobekemsaf.</i>	328
9.11	<i>X-radiographic image of the heart-scarab of king Sobekemsaf.</i>	328
9.12	<i>Details of the Sobekemsaf heart-scarab.</i>	328
9.13	<i>Details of hieroglyphs on the Sobekemsaf heart-scarab.</i>	329
9.14	<i>Finger-ring with lapis lazuli scarab, EA57698: at right the inscription on the underside.</i>	329
9.15	<i>Details of finger-ring EA57698.</i>	330
9.16	<i>Details of the wire of the shank of finger-ring EA57698.</i>	330
9.17	<i>Spacer-bars inscribed for king Nubkheperra and queen Sobekemsaf, EA57699 and EA57700.</i>	330
9.18	<i>Detail of the hieroglyphs incised on underside of spacer-bar EA57699.</i>	331
9.19	<i>PGE inclusion at the surface of king Sobekemsaf's heart-scarab.</i>	332
9.20	<i>Gold jewellery in the Louvre Museum bearing the names of Ahhotep and Ahmose.</i>	336
9.21	<i>Details of the Seth amulets.</i>	337
9.22	<i>The as-cast finishing of the inner side of the signet ring bearing the name Ahhotep.</i>	337
9.23	<i>Details of the closing system of the cartouche-shaped box bearing the name Ahmose.</i>	338
9.24	<i>Details of cartouche-box bearing the name of Ahmose.</i>	338
9.25	<i>Details of one armband lion, showing PGE inclusions and corrosion products.</i>	339
9.26	<i>Details of the chased decoration and tail of one armband lion.</i>	339

9.27	<i>Silver versus copper contents obtained for the jewellery bearing the names Ahhotep and Ahmose.</i>	341
9.28	<i>Silver versus copper contents obtained for Second Intermediate Period jewellery.</i>	343
9.29	<i>Gold jewellery from tomb 3757 at Badari and tomb 7352 at Qau.</i>	346
9.30	<i>Details of the mounting of crescent bead from Qau tomb 7352.</i>	346
9.31	<i>Details of the coiled wires from Badari tomb 3757.</i>	347
9.32	<i>The double tubular bead and barrel beads in the string from Badari tomb 3757.</i>	347
9.33	<i>Different forms of barrel beads in the string from Badari tomb 3757.</i>	347
9.34	<i>Some of the barrel beads from Badari tomb 3757, showing marks of wear from use.</i>	348
9.35	<i>Some of the quite regular small gold beads from Badari tomb 3757.</i>	348
9.36	<i>Details of one of the tiny Badari 3757 beads.</i>	348
9.37	<i>Ring and barrel beads from Qau tomb 7323, with PGE inclusions and marks of wear.</i>	349
9.38	<i>Unprovenanced oval gold pendant bearing the name of Kamose.</i>	350
9.39	<i>Details of the Kamose pendant showing the suspension ring made by rolling the gold strip.</i>	350
9.40	<i>Unprovenanced gold shell pendant with the cartouche of king Taa.</i>	350
9.41	<i>Details of the cartouche of king Taa on the gold shell pendant.</i>	351
9.42	<i>Details of the inscription on the Taa gold shell pendant.</i>	351
9.43	<i>The guidelines of the motif and the cracks in the Taa gold shell pendant.</i>	352
9.44	<i>Silver versus copper contents obtained for the jewellery in the Petrie Museum.</i>	352
9.45	<i>Silver versus copper contents obtained for the Second Intermediate Period objects analysed.</i>	354
10.1	<i>The gold necklace from tomb 296 at Riqqa.</i>	364
10.2	<i>One of the three ribbed penannular earrings from tomb 296 at Riqqa.</i>	364
10.3	<i>X-radiograph of the necklace and detail of the joining of the beads.</i>	365
10.4	<i>SEM-AEI micrographs of several beads observed in the necklace.</i>	365
10.5	<i>Details of the scarabs and scaraboid bead in the necklace.</i>	365
10.6	<i>SEM-AEI micrographs of one ribbed penannular earring.</i>	366
10.7	<i>Silver versus copper contents obtained for the gold items from tomb 296.</i>	366
10.8	<i>One of the ribbed penannular earrings from tomb 1371 at Deir el-Medina, Thebes.</i>	371
10.9	<i>Closing tube sheets in several ribbed penannular earrings.</i>	371
10.10	<i>Ribbed penannular earrings from Riqqa with V-shaped gold sheets.</i>	372
10.11	<i>Details of ribbed penannular earring N2084 with hollow round tubes.</i>	373
10.12	<i>Gold hollow penannular earrings with one round tube and PGE inclusions.</i>	374
10.13	<i>Penannular earring with hollow tube and suspension system.</i>	375
10.14	<i>X-radiography of a gold penannular earring with hollow tube.</i>	375
10.15	<i>Details of a penannular earring under the SEM.</i>	376
10.16	<i>Silver versus copper contents obtained for the gold penannular earrings analysed.</i>	377
10.17	<i>Silver versus copper contents for gold penannular earrings and Second Intermediate Period objects.</i>	377
10.18	<i>Mounting of a scarab swivelling finger-ring according to Vernier.</i>	388
10.19	<i>Middle Kingdom finger-ring from tomb G62 at Abydos.</i>	389
10.20	<i>Finger-ring EA37308, with details under the stereomicroscope.</i>	390
10.21	<i>Finger-ring EA2922, with lapis cylinder in gold mount.</i>	391
10.22	<i>Swivelling mechanism and the long wires wound around the shank of finger-ring EA2922.</i>	391
10.23	<i>Finger-ring EA4159, with detail of the chipped edge of the faience bezel.</i>	392
10.24	<i>Details of the swivelling mechanism of finger-ring EA4159.</i>	392
10.25	<i>The Ashburnham finger-ring with construction details.</i>	393
10.26	<i>The Ashburnham finger-ring: tool marks left by sharp engraving/chasing tools.</i>	394
10.27	<i>Finger-ring with carnelian wedjat-eye A.1883.49.8 and X-radiograph.</i>	395
10.28	<i>SEM-BSE details of finger-ring A.1883.49.8.</i>	395
10.29	<i>Finger-ring with a cat on a plinth EA54547 and X-radiograph.</i>	396
10.30	<i>Details of the finger-ring EA54547.</i>	396
10.31	<i>Finger-ring with frog and granulation A.1883.49.2 and X-radiographs.</i>	397
10.32	<i>Details of the finger-ring A.1883.49.2.</i>	398
10.33	<i>SEM-BSE detail of finger-ring A.1883.49.2.</i>	398
10.34	<i>SEM-AEI details of finger-ring A.1883.49.2.</i>	399
10.35	<i>Gold finger-ring with frog figure, Cleveland Museum of Art 1916-658.</i>	399



10.36	<i>Finger-ring with frog and granulation EA2923.</i>	400
10.37	<i>SEM-BSE image of finger-ring EA2923 showing details of the granulation.</i>	400
10.38	<i>SEM-BSE images of bezel, end shanks and hammered wire of finger-ring EA2923.</i>	401
10.39	<i>Areas analysed by <math>\mu</math>PIXE on finger-ring A.1883.49.2.</i>	401
10.40	<i>PGE tiny silvery coloured inclusions at the surface of finger-rings A.1883.49.2 and EA2923.</i>	403
10.41	<i>Finger-ring AF2462, with a detail showing the thinned shank entering the bezel.</i>	404
10.42	<i>Detail under the SEM of the shank of finger-ring AF2462.</i>	405
10.43	<i>Creases visible at the surface of the coiled shank of finger-ring AF2462.</i>	405
10.44	<i>Finger-ring UC12689 with details of construction.</i>	405
10.45	<i>Finger-ring UC12683 with details of the gold pivot wire wound around the shank.</i>	406
10.46	<i>The tool marks of the inscription of signet ring A.1965.362.</i>	406
10.47	<i>Gold signet ring N747 bearing the cartouche of Horemheb.</i>	407
10.48	<i>Sharp linear tool marks on the bezel of finger-ring N747.</i>	407
10.49	<i>The small spindle soldered to the cup terminal of the shank of finger-ring N747.</i>	408
10.50	<i>The coiled gold wire decorating the shank of gold finger-ring N747.</i>	408
10.51	<i>Finger-ring in openwork wire UC58121, with details.</i>	409
10.52	<i>Silver versus copper contents for New Kingdom and Ahhotep's finger-rings analysed.</i>	410
10.53	<i>Signet finger-ring NMS A.1883.49.1 with the name of Queen Neferneferuaten-Nefertiti.</i>	412
10.54	<i>Gold sequin A.1883.49.6 with detail of embossed design with piercing back to front.</i>	412
10.55	<i>Gold foil fragment NMS A.1883.49.15.</i>	412
10.56	<i>Ear-stud NMS A.1883.49.9 and its construction under X-ray.</i>	412
10.57	<i>Details under the SEM and stereomicroscope of ear-stud A.1883.49.9.</i>	413
10.58	<i>Details of beads in string A.1883.49.13, showing the modern mounting.</i>	414
10.59	<i>X-radiograph of the bead composition NMS A.1883.49.13.</i>	415
10.60	<i>SEM-AEI details of string A.1883.49.13.</i>	415
10.61	<i>Silver versus copper contents obtained for the Amarna Royal Tomb New Kingdom objects.</i>	416
10.62	<i>Wallet bead string EA14696 with X-radiographic view.</i>	420
10.63	<i>The pairs of holes for cords in two of the beads in string EA14696.</i>	420
10.64	<i>String EA14696: wallet and duck beads and large PGE inclusion.</i>	420
10.65	<i>Details of wallet beads in string EA14696.</i>	421
10.66	<i>Details of duck beads in string EA14696.</i>	422
10.67	<i>String EA14696: the two types of duck-shaped beads and the X-radiographic image.</i>	422
10.68	<i>Duck-shaped beads in string EA14696 with large hatched wings and dot-punched decoration.</i>	423
10.69	<i>Duck bead in string EA14696 under the SEM.</i>	423
10.70	<i>String EA14696: the snake's head terminal and the lotus terminal.</i>	423
10.71	<i>Details of the lotus terminal of string EA14696.</i>	424
10.72	<i>PGE inclusion in components of string EA14696.</i>	424
10.73	<i>Reconstructed bead and pendant necklace British Museum EA66827.</i>	425
10.74	<i>Details of necklace EA66827 components and X-radiography.</i>	426
10.75	<i>Details of drop-shaped pendant in necklace EA66827.</i>	426
10.76	<i>Details of inlaid nefer-shaped pendants of necklace EA66827.</i>	427
10.77	<i>Details of a nefer-shaped pendant, assembled like a closed box.</i>	427
10.78	<i>X-radiographs of a spherical bead and nasturtium seed bead.</i>	428
10.79	<i>SEM images of small ring beads in necklace EA66827 and diadem EA37532.</i>	429
10.80	<i>The group of jewellery of the Khamwaset find, Serapeum, Saqqara.</i>	434
10.81	<i>Details of the loop-in-loop chain E2990A.</i>	434
10.82	<i>Details of a nefer-shaped pendant from Sidmant tomb 406.</i>	435
10.83	<i>String of New Kingdom components from Madinat al-Ghurab, UC45602.</i>	436
10.84	<i>Details of the scorpion-shaped pendant in string UC45602.</i>	436
10.85	<i>The biggest scarab in string UC45602.</i>	437
10.86	<i>The smallest scarab in string UC45602.</i>	437
10.87	<i>The heavily corroded hollow metal scarab in string UC45602.</i>	437
10.88	<i>Gold sheet with the throne-name of king Amenhotep III (Nebmaatra), UC12323.</i>	438
10.89	<i>Some of the gold components of string E22658.</i>	438



10.90	<i>Details of string E22658 showing diverse beads.</i>	439
10.91	<i>The variety of forms and dimensions of the tiny gold beads in string E 22658.</i>	439
10.92	<i>Groups of tiny beads in string E22658 of different types, dimensions and compositions.</i>	442
10.93	<i>Silver versus copper contents for the New Kingdom objects analysed.</i>	443
10.94	<i>Silver versus copper contents for New Kingdom objects.</i>	443
11.1	<i>The two coffins of a young woman and a child excavated at Qurna by Petrie.</i>	450
11.2	<i>The gold jewellery worn by the woman buried at Qurna as shown by Petrie.</i>	450
11.3	<i>The fastening system of the Qurna collar.</i>	451
11.4	<i>Details of small collar EA14693.</i>	452
11.5	<i>Choker of gold rings from Asasif, Thebes.</i>	452
11.6	<i>Details of the ring beads strung in the Asasif choker, showing one PGE inclusion.</i>	453
11.7	<i>Ring beads strung in the Qurna collar, with tool marks and smoothed surfaces.</i>	453
11.8	<i>Silver versus copper contents for Second Intermediate Period and New Kingdom base and solder alloys.</i>	454
11.9	<i>Silver versus copper contents for the base and solder alloys analysed in this volume.</i>	455
11.10	<i>Some of the irregular tiny beads in the necklace of the child buried at Qurna.</i>	456
11.11	<i>Some of the very regular tiny beads from Qau tomb 7923.</i>	456
11.12	<i>The so-called earrings of the Qurna child, under the stereomicroscope.</i>	457
11.13	<i>The reverse of the pectoral from Middle Kingdom tomb 124 excavated at Riqqa.</i>	458
11.14	<i>The beaded penannular earrings from Qurna as shown by Petrie, and with a detail.</i>	459
11.15	<i>One of four ribbed penannular earrings excavated in 1911 at Birabi, Thebes.</i>	459
11.16	<i>Early 18th Dynasty beaded penannular earring from Mandara, Dra Abu al-Naga, Thebes.</i>	460
11.17	<i>Pair of gold spiral rings from Asasif, Thebes.</i>	460
11.18	<i>Gold sheets closing the triangular tubes of the earrings from Deir el-Medina, tomb 1371.</i>	461
11.19	<i>Gold sheets closing the beaded tubes of the earrings from Qurna.</i>	461
11.20	<i>Detail of the ribbed penannular earring from Riqqa (Manchester Museum 6146).</i>	462
11.21	<i>Earring from Asasif and fragment from a hinged bracelet or belt from Gaza.</i>	462
11.22	<i>Earrings and scarab from city grave 2 at Tell Ajjul and the scarab from Qurna.</i>	464
11.23	<i>The group of jewellery from burial A1, Pit 1, Courtyard CC 41, Asasif, Thebes.</i>	465
11.24	<i>Two of the chased wallet-shaped beads in the girdle from Qurna.</i>	466
11.25	<i>One wallet-shaped bead and some of the barrel beads in the girdle from Qurna.</i>	467
11.26	<i>Barrel beads from Second Intermediate Period strings from Badari 3757 and Qau 7323.</i>	467
11.27	<i>The heavily worn gold mount of lapis lazuli scarab bearing the name of Ahhotep.</i>	468
11.28	<i>Silver versus copper contents for the Qurna jewellery with comparative data.</i>	469
11.29	<i>Silver versus copper contents for the Qurna jewellery and gold objects from Nubia.</i>	470
11.30	<i>Silver versus copper contents obtained for the Second Intermediate period jewellery.</i>	471
11.31	<i>Silver versus copper contents obtained for the New Kingdom jewellery.</i>	472
11.32	<i>Ratio Cu/Au as a function of ratio Ag/Au obtained for Qurna and New Kingdom jewellery.</i>	473
11.33	<i>Silver versus copper contents obtained for the Middle Kingdom jewellery.</i>	473
11.34	<i>Silver versus copper contents obtained for all the tiny beads analysed in this volume.</i>	474

## Tables

0.1	<i>Numbers of artefacts (museum inventory numbers) analysed by site and period.</i>	xxiv
1.1	<i>List of gold minerals, after Boyle.</i>	5
2.1	<i>Early Egyptian gold-mining chronology, after Klemm &amp; Klemm.</i>	29
2.2	<i>Types of settlement at mining and quarrying sites, after Shaw.</i>	31
2.3	<i>Old Kingdom Buhen material possibly related to copper-working, in the Petrie Museum.</i>	32
2.4	<i>Operations for obtaining copper archaeologically attested at Ayn Soukhna.</i>	34
2.5	<i>Inventory of the storage-vase from the Qantir workshop sector.</i>	37
2.6	<i>The great word-list of Amenemipet, section on artists, compared with the evidence from Qantir.</i>	38
2.7	<i>Manual occupations described in the Teaching of Duau Khety.</i>	39
2.8	<i>Different word-contexts attested for ancient Egyptian designations of artists.</i>	40
2.9	<i>Titles, in expedition areas, incorporating the element 'prospector/purveyor of metal ore'.</i>	41

2.10	<i>Attestations of coppersmiths in Sinai inscriptions, after Gardiner et al.</i>	44
2.11	<i>Attestations of named goldsmiths by object-type.</i>	45
2.12	<i>Middle Kingdom sources for named goldsmiths, after Ward.</i>	46
2.13	<i>Middle Kingdom sources for named overseers of goldsmiths, after Ward.</i>	47
2.14	<i>Middle Kingdom sources for named section overseers of goldsmiths, after Ward.</i>	47
2.15	<i>New Kingdom sources for men designated as overseers of goldsmiths.</i>	51
2.16	<i>New Kingdom sources for men designated as head goldsmiths.</i>	51
2.17	<i>Old and Middle Kingdom metalworking depictions, by date.</i>	58
2.18	<i>New Kingdom metalworking depictions, numbering after Drenkhahn and Prell.</i>	59
2.19	<i>Summary of Old and Middle Kingdom metalworking scenes, after Drenkhahn and Scheel.</i>	61
2.20	<i>Summary of New Kingdom metalworking scenes, after Drenkhahn.</i>	62
2.21	<i>Words for metal in inscriptions accompanying metalworking scenes.</i>	62
2.22	<i>Conversations in Old Kingdom chapel scenes, after Scheel.</i>	64
2.23	<i>Words spoken without replies in Old Kingdom scenes, after Scheel.</i>	65
3.1	<i>Jewellery types in the late Middle Kingdom.</i>	82
6.1	<i>Effective penetration depth of Au, Cu and Ag lines: PIXE, XRF and EDS.</i>	135
6.2	<i>Results obtained by SEM-EDS and <math>\mu</math>PIXE analysis of gold pendant N 1855A.</i>	148
6.3	<i>Results obtained using handheld XRF for three gold beads from string UC26275</i>	152
6.4a	<i>Depth of analysis calculated for four typical Egyptian gold alloys at our experimental conditions.</i>	156
6.4b	<i>Depth of analysis calculated for four typical PGE inclusions at our experimental conditions.</i>	156
6.5	<i>Results obtained for selected areas from centre to rim of the biggest PGE inclusion.</i>	156
6.6	<i>Results obtained for the PGE inclusion and the gold alloy.</i>	157
6.7	<i>Results obtained for the PGE inclusions, hard solder alloy and base alloy.</i>	157
6.8	<i>Qualitative comparison of 3D representations.</i>	168
6.9	<i>List of the objects studied, with their identification, accession number, and collection.</i>	178
6.10	<i>Results obtained by <math>\mu</math>PIXE, SEM-EDS and <math>\mu</math>XRF for the studied objects.</i>	180
6.11	<i>Results obtained for the three layers in the blue corroded area of fragment 2.6.</i>	181
6.12	<i>Results obtained for the base alloy and corrosion layer of foil fragment 2.4.</i>	181
7.1	<i>Results obtained for the composition of diadem from Abydos tomb 1730.</i>	205
7.2	<i>Data published by Gale &amp; Gale and Payne for Predynastic items.</i>	206
7.3	<i>Composition of foils UC35689, gold beads in string UC36517 and comparators.</i>	209
7.4	<i>Hypothetical native gold alloys and artificial silver alloy.</i>	212
7.5	<i>First Intermediate Period jewellery analysed in this chapter.</i>	215
7.6	<i>Results obtained for the jewellery from tomb 7923 at Qau and tomb 3053 at Matmar.</i>	230
7.7	<i>Results obtained by SEM-EDS for the small beads analysed.</i>	233
7.8	<i>Results obtained by XRF for the amulets analysed.</i>	235
7.9	<i>Results obtained by XRF for the beads analysed (excluding the smaller ones).</i>	238
8.1	<i>Results obtained by XRF and <math>\mu</math>PIXE for the Haraga tomb 72 necklaces and scarab.</i>	257
8.2	<i>Results obtained by XRF and <math>\mu</math>PIXE for the Haraga pendants.</i>	258
8.3	<i>Results obtained by SEM-EDS for the PGE inclusions analysed in the Haraga jewellery.</i>	258
8.4	<i>Elements visible in the spectra obtained by SEM-EDS for inlays from the Riqqa pectoral.</i>	264
8.5	<i>Results obtained for the different components of the jewellery from Riqqa tomb 124.</i>	265
8.6	<i>Results obtained for one cell plate and adjacent solder alloy in the Riqqa pectoral.</i>	266
8.7	<i>Results obtained for PGE inclusions in Riqqa tomb 124 pendant and pectoral.</i>	266
8.8	<i>Results obtained for the gold scraps and jewellery from excavation at Haraga.</i>	274
8.9	<i>Results obtained for the gold scraps and jewellery from excavation at Lahun.</i>	276
8.10	<i>Results obtained for the jewellery from excavations at Naqada and Buhen.</i>	276
8.11	<i>Results obtained for the components of the Haraga 211 cylinder amulet.</i>	283
8.12	<i>Results obtained for the granules and solders of the Haraga 211 cylinder amulet.</i>	285
8.13	<i>Results obtained by SEM-EDS for the foils and jewellery from excavations at Abydos.</i>	292
8.14	<i>Results obtained for Middle Kingdom gold objects in the collection of the Petrie Museum.</i>	300
8.15	<i>Results obtained by SEM-EDS for necklace EA3077.</i>	307
9.1	<i>Results obtained for the Qurna jewellery using several techniques.</i>	320
9.2	<i>Results obtained by SEM-EDS for PGE inclusions in the Qurna jewellery.</i>	322

9.3	<i>Results obtained for the joining areas in the Qurna jewellery.</i>	325
9.4	<i>Results obtained by XRF and SEM-EDS for the heart-scarab of king Sobekemsaf.</i>	331
9.5	<i>Results obtained by XRF and SEM-EDS for finger-ring EA57698.</i>	331
9.6	<i>Results obtained by XRF for spacer-bars EA57699 and EA57700.</i>	332
9.7	<i>Results obtained by SEM-EDS for PGE inclusions.</i>	332
9.8	<i>Results obtained for the jewellery bearing the names of Ahhotep and Ahmose.</i>	340
9.9	<i>Results obtained for the joins and base alloys of armband E7168 and scarab E3297.</i>	341
9.10	<i>Results obtained for PGE inclusions in the objects bearing the names of Ahhotep and Ahmose.</i>	342
9.11	<i>Results obtained for objects from several excavations and bearing king names.</i>	353
10.1	<i>Results obtained for the base and the solder alloys for Riqqa tomb 296 jewellery.</i>	367
10.2	<i>Results obtained for the PGE inclusions in the jewellery from tomb 296 at Riqqa.</i>	368
10.3	<i>Results obtained and published for penannular earrings.</i>	378
10.4	<i>Results obtained for the PGE inclusions in the earrings studied.</i>	380
10.5	<i>Information on the ribbed penannular earrings with triangular hoops considered.</i>	382
10.6	<i>Results obtained for the finger-rings in the collection of the British Museum.</i>	394
10.7	<i>Results obtained for finger-rings in the NMS and British Museum collections.</i>	402
10.8	<i>Results obtained for the PGE inclusions in the NMS finger-rings.</i>	403
10.9	<i>Results obtained for the finger-rings in the Louvre Museum, Petrie Museum and NMS.</i>	409
10.10	<i>Results obtained for the New Kingdom objects associated with the Royal Tomb at El-'Amarna.</i>	414
10.11	<i>Results obtained for the two strings in the British Museum.</i>	430
10.12	<i>Results obtained for the small ring beads in necklace EA66827.</i>	430
10.13	<i>Results obtained for New Kingdom objects in the Louvre Museum and the Petrie Museum.</i>	440
10.14	<i>Results obtained by SEM-EDS for the different components of string E22658.</i>	440

## Editorial foreword

This volume aims to present a wide range of perspectives on early Egyptian goldwork, integrating the complementary yet distinct approaches of archaeology, materials science, jewellery and Egyptology. On one level, our primary task has been to present new analytical data on the manufacturing technology and elemental composition of dozens of artefacts preserved at six European museums. At the same time, we have sought to anchor and contextualize this new information based on current research from three perspectives: an introduction to the fundamental geochemistry and material properties of gold, a reanalysis of historical sources and of goldwork manufacturing-techniques, and a guide to the key analytical techniques employed. In this way, we wish to ensure that the volume is accessible to specialists and students from different backgrounds. We anticipate that this body of material will provide a rich source of information for further interrogation and discussion in the future, and our concluding chapter offers a first synthesis of some key points emerging from this new research. There we focus particularly on the findings that seem to us most significant, alongside open questions and suggestions for future work. In so doing, we explicitly highlight some of the many strands beyond the scope of the work presented here, hoping that they may provide pointers for others. We emphasize that the volume is addressed not only to those interested in the archaeology of Egypt in the timespan covered, but equally to scholars researching past technologies and archaeological goldwork elsewhere, who may find technical observations of broader scope that could prompt cross-cultural comparisons.

In spite of the substantial amount of data compiled here for the first time, it is important to remind ourselves of some potential biases that are inherent to this work and may thus skew our interpretations. The most important of these concerns the selection of

objects. This project starts and, in many ways, remains throughout its course with the exceptional group of gold jewellery buried in Qurna, on the west bank of Thebes in Upper Egypt, with a woman and child whose names are unknown to us, at some point in the 17th or 16th century BC. Today the Qurna group is the most important Egyptian assemblage in the National Museum of Scotland, Edinburgh. In 2008, curator Bill Manley with materials scientists Jim Tate, Lore Troalen and Maria Filomena Guerra launched a programme of new analyses of the goldwork from the group. Already in this first investigation, the scope extended to comparison with jewellery from the preceding and following centuries (Tate et al. 2009; Troalen et al. 2009). With funding obtained from the CNRS, Guerra could then expand the range of collections involved in collaboration with Thilo Rehren at UCL, to include the UCL Petrie Museum of Egyptian Archaeology and the UCL Institute of Archaeology with its laboratory facilities, as well as the National Museums of Scotland and the British Museum as project partners (CNRS project PICS 5995 EBAJ-Au). On the initiative of Jim Tate, contact had been established already with colleagues Matthew Ponting and Ian Shaw at the University of Liverpool. As a result, the Garstang Museum is also participant in the wider project, together with the Manchester Museum, through the support of curator Campbell Price, and the Louvre Museum, through the support of curator H  l  ne Guichard and the late Sandrine Pag  s-Camagna, material scientist at C2RMF (Centre de Recherche et de Restauration des Mus  es de France). We wish to emphasize here the fundamental role of Sandrine Pag  s-Camagna in crucial stages of the project; without her participation the project could not have achieved a significant part of its aims – notably comparison between the Qurna group and the nearest securely dated examples of royal goldwork from the reigns of kings Kamose and Ahmose.



Other institutions participated with the provision of access to particularly specialized equipment: AGLAE facilities at C2RMF, Bundesanstalt für Materialforschung und –prüfung, and LIBPhys at NOVA University of Lisbon

With this new support, the research agenda was able to grow organically, adapting to fresh questions emerging from preliminary results, while contingent on the artefacts present in museums that were accessible to the project. Indeed, the history of the collections has been a significant factor, both enabling and constraining our research. The Louvre collections contain a range of jewellery from early excavations in Thebes, including representative material from the late second millennium BC settlement Deir al-Madina, and major works from 16th century royal burials uncovered during fieldwork directed by Auguste Mariette. The British Museum and the other participating museums in England and Scotland also preserve a mixture of material from documented excavations and earlier undocumented collecting practice. Here colonial history frames the kinds of material available. During and after the full British military occupation of Egypt (1882–1922), the Antiquities Service of Egypt under French Directors permitted officially recognized institutions to excavate in Egypt and, in return for the enrichment of the Egyptian Museum Cairo, to take a share of finds from excavations. Following division of finds in Egypt, excavation funding bodies based at Liverpool (since 1903) and London (since 1882) distributed finds to dozens of sponsoring museums (Stevenson 2019). The university museums in Liverpool and London were among the major recipients

of these finds, and also hold substantial excavation archives. The Qurna group itself and several other sets of jewellery analysed during the project are unusual examples of this pattern of dispersal, where the vast majority of items distributed belonged to the types of objects found in large numbers in fieldwork. The project was therefore able to investigate objects from a wide social spectrum, from palace production (Qurna group, Haraga fish and cylinder, items of kings Ahmose and Kamose from Thebes) to finds in cemeteries of regional rural towns and villages (Qau, Badari, Matmar). At the same time, in expanding the chronological scope of analyses forwards to the New Kingdom and back to the late prehistory of Egypt, the participating museums could not cover every social group for every period. Most notably, and perhaps surprisingly for those outside the museum circle, these collections hold none of the major goldwork from the age of the great pyramids, the mid-third millennium BC. At that period, the concentration of power at Memphis around kingship separates the royal court from the regions, and this is reflected in the tombs of the period and in the distribution of finds. Gold and gilt ornaments are more prominent in burials at the Memphite cemeteries: Giza and Saqqara. The single outstanding assemblage of Egyptian goldwork from the mid-third millennium BC is the unparalleled burial of material related to Hetepheres, mother of king Khufu; the finds are on display in the Egyptian Museum Cairo. Egyptologists from Cairo, Vienna, Boston, Hildesheim and Leipzig directed excavations at Giza; their museums received a share in finds (Manuelian 1999). The museums in our project, from Paris to Edinburgh,

**Table 0.1.** *Numbers of artefacts (museum inventory numbers) analysed by site and period.*

	Dyn 1-2	First IP	Middle Kingdom	Second IP(-Dyn18)	New Kingdom	?	Total
Memphis					2		2
Riqqa			4		7		11
Haraga			13 + 1?				14
Lahun			5				5
Ghurab					1		1
Sidmant			1		1		2
Amarna					8		8
Qau area		15		5			20
Abydos	4		2 + 2?	2		3	13
Naqada			2				2
Thebes			2	2 + 7?	4		15
*Qurna				12			12
Buhen			1				1
?		1	5	2	22		30
<b>TOTAL</b>	<b>4</b>	<b>16</b>	<b>36</b>	<b>30</b>	<b>45</b>	<b>3</b>	<b>136</b>

are not on that distribution map. With this and other lesser gaps, our sample, however extensive, cannot and does not claim to be random or representative of an underlying population of 'Egyptian goldwork'. On our chronological range from fourth to second millennia BC, there are peaks and troughs in the frequency of artefacts, and we encourage the reader to keep these in mind graphically, in order to assess our interpretations in context and to develop their own further research agendas (see Table 0.1).

Another delimiting factor in the selection of objects derives from our focus on technique, directing our attention predominantly to jewellery, rather than other gold elements such as the prominent use of sheets for gilding larger substrates of wood or plaster. Gold foils were included for comparative purposes, particularly in the investigation of composition, but to a lesser extent. Furthermore, within the rich repertoire of Egyptian gold jewellery, we took a particular interest in select assemblages, starting with the Qurna group itself, and within these certain specific features, such as the small beads found in the child's coffin and the adult's girdle. While these are fascinating manifestations of both technology and consumption, they are not necessarily representative of a broader corpus. We would also emphasize that we sought primarily artefacts with well-recorded archaeological contexts, as these evidently allow for more robust inferences, and provide the most secure foundations on which to build further research. Where the museums could provide access to material not from documented excavations, but acquired before 1970, we have included certain items if they helped to complete gaps in understanding, as a secondary circle of supplementary information. In each such case we have done our utmost to investigate their authenticity and source, but undeniably any interpretation based on an unprovenanced object will have to remain tentative. Indeed, one of our analytical investigations demonstrated the risks in building historical conclusions on material without documented

excavation context; a gold shell inscribed with the name of king Taa, who reigned close in time to the Qurna group, presents disconcerting features more consistent with modern rather than with ancient manufacture.

A final and equally important constraint concerns the background and expertise of the editors and contributors to this volume. While together we span interdisciplinary breadth, and have found synergies in our research, inevitably there remain areas beyond our interests and access, and indeed beyond the time scope of the project. For example, our data may be used as a starting point to address issues of provenance, but targeted consideration of the extraction methods and possible geological sources of gold is not addressed in detail in this volume. Instead, much more emphasis has been placed on issues of technology, and the application of the results to a concluding interpretation of the Qurna group. We look forward to seeing how others may take up such topics, and feel sure that the woman and child of Qurna will continue to pose new questions.

Finally, for the opportunity to share our discussions and findings with a wider research audience, we would like to express our gratitude to the McDonald Institute for Archaeological Research for including this volume in its series.

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## Chapter 2

# Centres of goldworking in ancient Egypt: Egyptological questions and sources

Stephen Quirke

*The archaeological record for goldworking in Egypt comprises uneven information across the stages of procurement, production, and use, including recycling and reworking. East desert mines yield traces of working, including expedition inscriptions. Nile Valley excavations have identified no ancient Egyptian gold workshop, though gold is present within a*

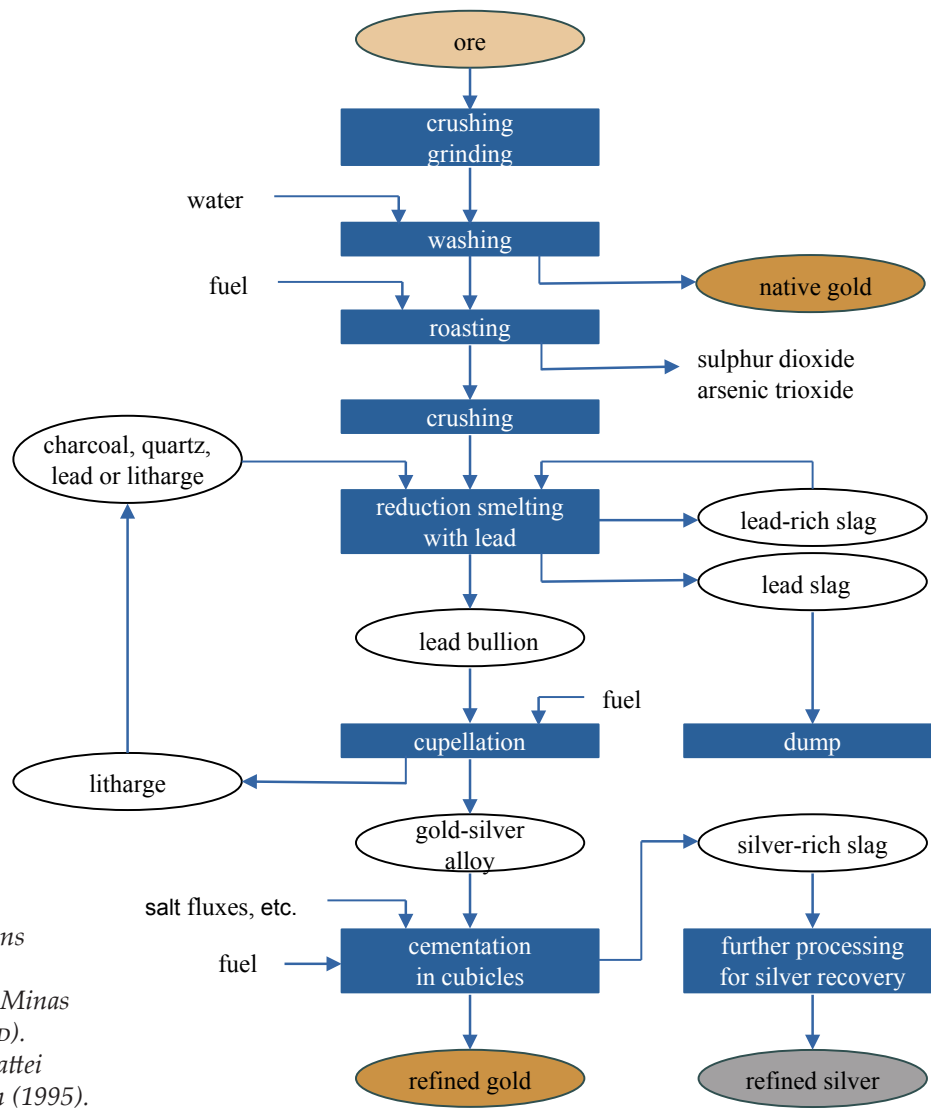
*chariot assembly at the 19th Dynasty royal city Per-Ramesses (Qantir). In writings and depictions, named and anonymous goldsmiths appear individually and in groups, adding some detail to our knowledge of their techniques, organization of work, and social setting. Within that part of the record, goldworking time and space seems flexible and project-based.*

In the principal current reference work on materials and technology for Egyptian Archaeology, Jack Ogden provides a clear review of the ways in which gold was procured and worked in ancient Egypt (Ogden 2000, 161–6 and, for platinoid inclusions, 169–70). My philological foray here into this terrain is structured from his survey of Nile river and Sahara Desert sources for gold and Bronze Age gold-working. From the late 4th millennium BC onwards, human population in north-east Africa has been concentrated in the floodplain of the narrow Valley and broad Delta of the river Nile, the main water source and transport road. Egyptian archaeological evidence, including the written and visual sources, has most often survived or been sought on the Saharan fringe of this landscape. This basic characteristic of physical geography has led to a markedly lopsided modern view of ancient Egyptian social and economic life, with an emphasis on the desert rather than the settled floodplain. An abundance of direct information on gold procurement at desert sites outweighs the indirect and partial echoes from Nile valley sites of gold-working. From my training in philological Egyptology and from my previous experience as a curator of an Egyptian archaeology collection, I aim here to summarize areas of archaeological evidence, including depictions and written sources.

As a preparation for entering the field of Bronze Age Egyptian written evidence for gold, general insights may be sought from comparative studies in early Egyptian mining and working of other metals,

within the wider context of archaeological and anthropological research on gold-mining in other parts of the world. Here the visual articulation of the *chaîne opératoire* ‘task sequence’ may be useful (see Chapter 1). To take an example of complexity from a much later context, a *chaîne opératoire* drawn up by Hans Bachmann from the evidence for Roman gold-mining in northern Portugal (Fig. 2.1, cf Bachmann 1995, Domergue 2008, 166–7) offers a basis for reflecting on evidence at earlier Egyptian sites, not least for its contrast with a different geographical and cultural context. The combination of fieldwork with interpretation of ancient written sources can help to highlight the methodological issues in studying Bronze Age Egyptian gold. The Roman Period example from the temperate Iberian climate alerts us to the logistical challenges in supplying large volumes of both water and fuel; in the hyperarid contexts of the Saharan Egyptian and Nubian mines, those materials would be as heavy as and, in the desert, more precious than gold. Comparative study of technology can also remind us of the difficulty in finding parallels for a waterflow as powerful as the Nile, with its annual cycle from late summer flood surge, and autumn inundation, to next summer low-water drought. In Egypt and north Sudan the seasonal Nile rhythm can no longer be investigated ethnographically, because 19th to 20th century construction of barrages interrupted the flow, culminating in the construction of the High Dam at Aswan in the 1960s. However, 19th century and earlier historical records offer guidance,



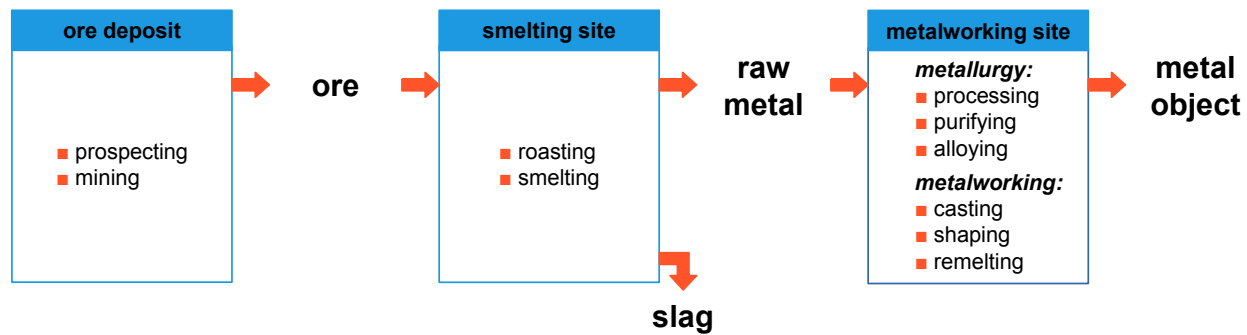


**Figure 2.1.**  
*Web of operations  
 in Roman gold  
 mining at Três Minas  
 (2nd century AD).  
 Drawing A. Mattei  
 after Bachmann (1995).*

and some topographical features remain constant. In the 8th to 4th millennia BC, Northeast Africa had a predominantly wetter climate, with extended phases when the tropical summer rain-belt shifted north (Phillipps et al. 2012). By the beginning of the Bronze Age in Egypt (3rd–2nd millennia BC), the climate in northeast Africa shifted to its present hyperaridity (Kuper & Kröpelin 2006). The new dry conditions would exclude the possibility of continuous flowing water such as mountain streams at the gold sources within reach of Egyptian officials or traders. Other than the periodic storm floods, once in a generation, the main water source would have been desert wells. The 21st century gold rush in northern parts of Sudan may provide evidence on the logistics of panning for gold at the river, as long as the archaeologist or ancient historian identifies the water source or assesses the lower ancient capacity for carrying water to a panning

site. At present, no gold-panning sites have been identified. Jean Vercoutter identified a distinctive rock-cut feature at five sites in Nubia close to the Nile as basins for washing crushed gold ore, including one at Kawa in a level of the Meroitic Period (c. 4th century BC–3rd century AD); three of these sites are located at the mouths of desert valleys leading to gold mines, and Vercoutter notes the ancient Greek and 19th century French descriptions of similar washing-structures at desert-mining sites (Vercoutter 1959).

In addition to its clarity on technical and organizational aspects of mining, the graphic device of the *chaîne opératoire* provides a useful framework for approaching an ancient activity as simultaneously gestural and material (Schlanger 2004). On this micro-level, a stark confrontation with a schematic sequence of tasks can help to problematize the linearity, which the description of a process may suggest. Experimental



**Figure 2.2.** From ore to object: metal production sequence. Drawing S. Quirke after Hauptmann (2014, 73).

archaeology can then also contribute effectively to restore the messiness of the experience, the logistical challenge of supplying a range of materials, and the continual recursiveness and multi-tasking in productive practice. The task-sequence effectively helps to foreground ‘producers’ in the context of their interconnected acts, whether isolated or grouped, sequential or recursive (Sillar & Tite 2000). In this way, the diverse social aspects of an art come into focus, opening the way to the inclusion of physical interventions, which may not seem to us of technical relevance (Budd & Taylor 1995; Wailes 1996; Blakely 2006). Graphic presentation may also be used to highlight different logistical implications of alternative procedures, as for example between panning for river gold and mining gold from quartz veins. For the present chapter, a generic metallurgical *chaîne opératoire* by Andreas Hauptmann offers a useful level of abstraction for the simultaneous approach to archaeological finds and to all the people involved in producing gold objects, that is, the prospectors, miners, gold processors and goldsmiths, in Bronze Age Egypt (Fig. 2.2).

### Archaeology of procurement and archaeology of production

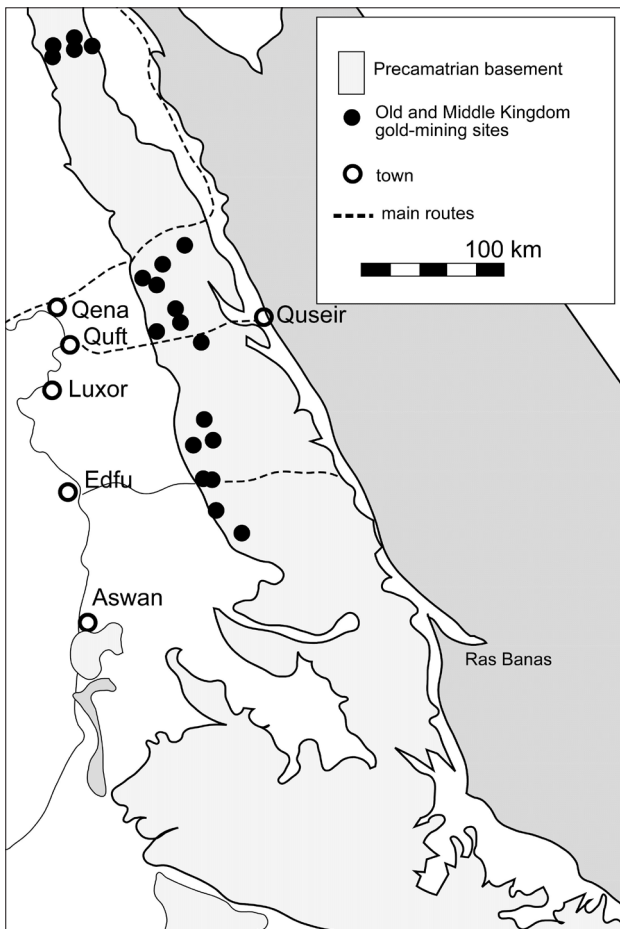
Panning for gold in Nile gravels may not have left material traces, but the archaeological record for gold-mining in neighbouring desert regions is plentiful, even after millennia of continuous intensive and inherently destructive exploitation. From an extensive survey of the deserts east of the Nile in Egypt and Sudan, Rosemarie and Dietrich Klemm have mapped

the distribution of gold sources where ancient mining activity can be detected (Klemm & Klemm 2013; summary in Klemm et al. 2001). The surface record at the mines included sufficient diagnostic ceramic remains and general types of tools to allow provisional dating to broad ranges of time (anchor maps in Klemm & Klemm 1994). The period covered by the analyses in the present volume extends across their second phase, roughly corresponding to the Old and Middle Kingdom in traditional Egyptological chronology, and their third phase, roughly the New Kingdom (Table 2.1).

Further investigation would be required to assess which sites have a specifically Old or Middle Kingdom presence, and which saw activity during the Second Intermediate Period, between the Middle and New Kingdom. The survey publications are also a valuable basis for new research into the typology and dating of stone tools. According to the survey results, the start of the ‘Old to Middle Kingdom’ phase saw the adoption of lighter tools, notably dolerite ‘fist hammers’ about 5 cm in diameter and 18–20 cm in length, interpreted as for grinding down extracted ore; within the broad period, Middle Kingdom sites also have mortars and pestles for further crushing operations, though the ‘final gold processing method in the Old and Middle Kingdoms remains mostly obscure’ (Klemm & Klemm 2013, 604). Sites assigned to this broad phase are concentrated in the western Precambrian basement, and absent from gold deposits farther east (Fig. 2.3). This distribution of sites could be explained on the basis of ‘the ancient prospecting method, which chiefly relied on the presence of malachite linings at the mineralised quartz veins’ (Klemm & Klemm 2013, 604–6).

**Table 2.1.** Early Egyptian gold-mining chronology in Klemm & Klemm (1994, 2013).

Political historical period	Cultural/technological period	Approximate date
Pre- to Early Dynastic	Chalcolithic to Early Bronze Age	4th to early 3rd millennia bc
Old to Middle Kingdom	Early to Middle Bronze Age	3rd to early 2nd millennia bc
New Kingdom	Late Bronze Age	Late 2nd millennium bc

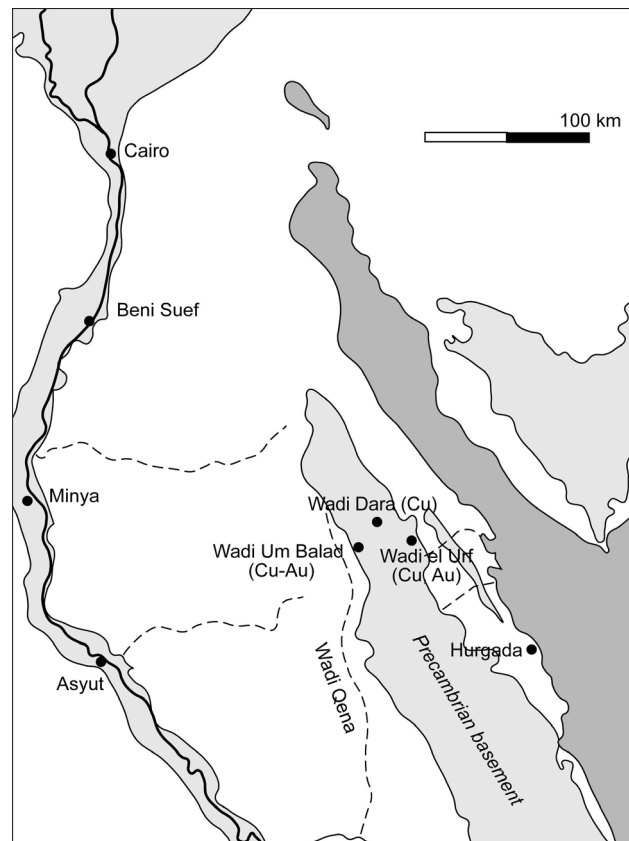


**Figure 2.3.** Gold-mining sites in Egypt assigned to the 'Old to Middle Kingdom' phase. Drawing W. Grajetzki after Klemm et al. (2001, 650).

The successful survey of sites establishes the basis for future excavation of a Bronze Age gold mining camp, to investigate further the operations at the source, and to identify the form in which material was sent on to the Nile valley for further processing. In the northern part of the Egyptian eastern desert (Fig. 2.4), a 1st millennium AD gold-smelting installation about 2 km east of 3rd millennium BC mining huts and copper-smelting installations at Wadi Dara shows the working of gold at source in more recent periods (Castel et al. 1992, 52–3, fig.1 sites C, D; on the copper-working here, see below). Gold is also present at nearby Wadi Umm Balad, where excavation of a mining camp indicated copper extraction during the Old Kingdom, but not, on the evidence of the pottery, into the Middle Kingdom (Castel et al. 1998). On a promontory in the same sector, a gabbro-diorite stela inscribed with the names of the Middle Kingdom king Amenemhat II and the treasurer Merykau had been installed apparently as a marker,

not for a mine, but for offerings on the road from the Nile valley towards galena mines at Gebel Zeit and across the Red Sea to the copper and turquoise mines of Sinai (Mathieu 1998). Farther south, the extensive mining area of Bir Umm Fawakhir and Wadi al-Sidd is famous in Egyptology for the unique map of gold mines dating to the 20th Dynasty, at the end of the New Kingdom (Klemm & Klemm 2013, 132–6: in support of their interpretation of the compressed format to fit the papyrus roll dimensions, the Ptolemaic and Roman Period papyri with a schematic religious map of Fayoum provide a useful parallel, see Beinlich 1991; Beinlich et al. 2013). There are Old and New Kingdom camps in the area; the fullest investigation has been of the Byzantine Period presence (Meyer et al. 2014).

In a review of other Old and Middle Kingdom mining and quarrying sites, Ian Shaw has identified three general types of settlement: wide scatters of rough stone shelters; clusters of dry-stone huts; and rectangular walled dry-stone or mud-brick settlements, sometimes with fortifications (Shaw 2010, 128–33; summarized here in Table 2.2: note that the function



**Figure 2.4.** Identified Old to Middle Kingdom sites of copper, gold and lead extraction. Drawing W. Grajetzki after Castel et al. (1998, 73).

**Table 2.2.** *Types of settlement at mining and quarrying sites, after Shaw (2010, 128–33).*

Type of settlement	Examples	Date	Material at/near site
rectangular walled	Wadi el-Hudi site 9	Middle Kingdom	
	Qasr el-Sagha	Middle Kingdom	basalt (associated?)
clusters of stone huts	Wadi Maghara	Old Kingdom	copper ore, turquoise
	Hatnub main quarry P	Old Kingdom	amethyst
	Wadi el Hudi site 5	Middle Kingdom	travertine ('alabaster')
scatters of shelters	Umm el-Sawwan	Old Kingdom	basalt
	Hatnub	Old Kingdom	travertine ('alabaster')
	Gebel Zeit	Middle Kingdom	galena (lead ore)

of the Qasr al-Sagha settlement in relation to the basalt quarries is uncertain, see Di Teodoro 2018, 115–20). Inasmuch as quartz extraction for gold followed procedures for the quarrying of other crystalline hard stones, the Old Kingdom camps and quarries at Hatnub in the desert south-east of Amarna in Egypt may offer particularly relevant comparative material in relation to organization as well as techniques and tools (Shaw 2010). Changes may be detected across periods, as in the shift from Old Kingdom three-chamber to New Kingdom single chamber shelters, perhaps reflecting different base units of work organization, between respectively small gang and individual miner or quarryman (Shaw 2010, 73).

For the Old Kingdom (mid-3rd millennium BC), in addition to the Wadi Umm Balad camp-site noted above, excavations have documented the extraction of copper ores and preliminary copper-working on site at nearby Wadi Dara and across the Red Sea in south Sinai. At Wadi Dara, about thirty U-shaped furnaces were recorded, each of stone slabs enclosing a space of around 40 cm in breadth and height, and often in clusters of two to four, and arranged along windy slopes for natural ventilation (summary by Castel and Tallet in Abd el-Raziq et al. 2011, 47–8). At Sinai sites, furnaces were also found close to the source, with the major exception of Seh Nasb, which is by far the largest installation (Tallet et al. 2011). Several mountain routes meet there, facilitating delivery of copper ore from multiple sites across south Sinai. The nodal location of Seh Nasb in the logistical network would explain the concentration of an estimated three thousand naturally-ventilated furnaces at the site.

At Buhen in Lower Nubia, an Old Kingdom Egyptian settlement site then only a few dozen metres from the river Nile was investigated in 1962–1964 as part of the UNESCO Nubian Campaign rescue excavations. The field director Brian Emery interpreted architecture and finds as evidence for copper smelting, but his records have led to questions over the material being worked there (O'Connor [1989] 2014, 221–7). In the core

area where buildings were better preserved, 'many' pieces of copper ore were found in the features labelled by Emery as 'Blocks' I, XII and XIII, covering both early and late phases of the site (O'Connor [1989] 2014, 97, fig. 3.7, 134–6). The small number of identifiable moulds perhaps indicate a small scale of production, not necessarily only or even primarily of copper. From the high gold content of copper ore from the site (El Gayar & Jones 1989), David O'Connor considered whether 'gold was the metal being produced at Buhen, with copper possibly a by-product' (O'Connor [1989] 2014, 337 with n.67). On this question, future analysis may return to the material in the Petrie Museum of Egyptian Archaeology: O'Connor notes the crucible UC20064 (from Giddy 1987, 236 n.244), and El Gayar and Jones cite 'a fragment of copper ore; some of the smelted copper metal and the copper-smelting slag; pieces of a smelting crucible; and a small artefact made from the smelted copper' (El Gayar & Jones 1989, 31). Relevant material identifiable in the museum (Table 2.3) leaves the impression of copper-working only, although this in itself raises the further questions of how this stage of gold-working would leave diagnostic traces in Bronze Age Nile Valley archaeology, and of whether and how ancient Egyptian expeditions were regularly organized for acquiring more than one material. Here the archaeology of mining and quarrying provides the bigger picture around the partial focus of hieroglyphic inscriptions; the archaeological evidence at Sinai includes malachite-extraction and copper-smelting on an industrial scale, whereas inscriptions foreground the more precious turquoise (El Hawary 2018 on the practice and mindset of expedition-leaders and inscription-composers; Gardiner et al. 1955, 3–11 for an earlier influential discussion). For copper or gold or both, a river post can offer water supply and a collecting-point for the wood needed for charcoal, and so provides a suitable location for the stages of crushing and reduction of Nubian gold-rich ores. On the archaeological map, the Old Kingdom settlement at Buhen would represent a separate stage theatre



**Table 2.3.** *Old Kingdom Buhen material possibly related to copper-working, now in the Petrie Museum of Egyptian Archaeology, UCL.*

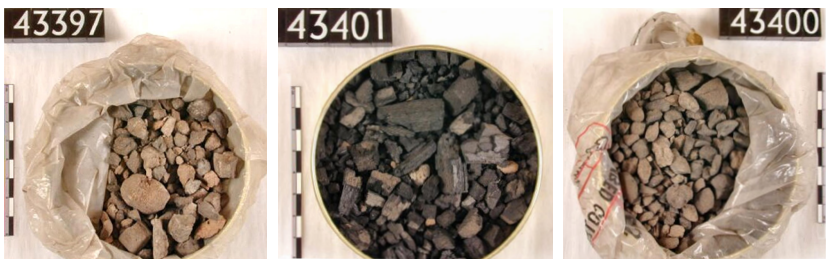







Museum inventory no.	Object description	Image
UC43397, 43400-1	Charcoal fragments	
UC43398	Bone and charcoal fragments	
UC43414, 43415	Pieces of copper ore	
UC43416	Copper and copper slag	
UC20064	Incomplete rough pot, blackened exterior with patches of copper ore	
UC20068, 20069	Parts of rough pottery moulds?	

Table 2.3 (cont.).

Museum inventory no.	Object description	Image
UC20070	Pottery mould coated with copper slag (?)	
UC20071, 20072, 20078	Parts of pottery moulds (?), coated with copper slag (?)	
UC20079	Copper slag adhering to pottery. Samples taken by P. de Jesus (1980) and B. Rothenberg (1986)	
UC20080	Copper slag, adhering to pottery, also traces of sand and copper ore. Analysed by C. Davey (1979); sample taken by B. Rothenberg (1986)	
UC19752	Leaf shaped flint point on flake, with slight traces of copper	
UC20036	Granite (?) mortar, irregular shape with six sides, depressions on five, one containing piece of copper.	



**Table 2.4.** Operations for obtaining copper archaeologically attested at Ayn Soukhna (after Abd el-Raziq et al. 2011, 5–6).

1	preparation for ore reduction: malachite and charcoal placed in naturally ventilated furnace
2	reduction of ore: firing at 1100–1200 °C for several hours
3	slag and cuprous elements retrieved from furnace floor
4	grinding of slag on stone slabs
5	sifting to extract copper particles
6	copper particles placed in crucible
7	crucible placed inside U-shaped open furnace
8	furnace fired to 1200 °C by artificial ventilation, using reed blowpipes with clay nozzles

of operations within the gold *chaîne opératoire*, after transportation from mining/quarrying sites. As a site of metallurgy en route, it can be compared with the Seh Nasb complex of furnaces at the desert crossroads in south Sinai above.

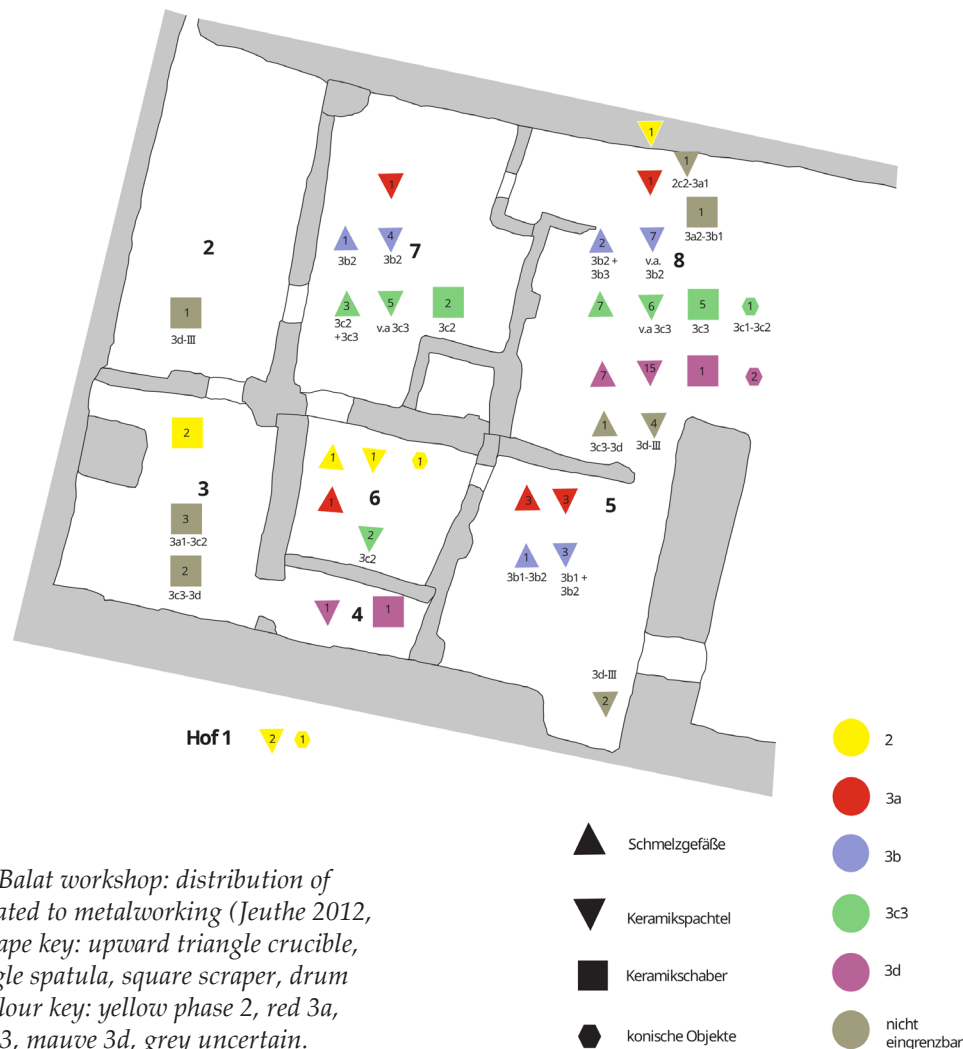
The same stages of processing the ore at a transit point can now be illustrated in greater detail for the Middle Kingdom (early 2nd millennium BC) from Ayn Sukhna on the Red Sea coast of Egypt, where recent excavations have revealed well preserved furnaces in copper smelting workshops (Abd el-Raziq et al. 2011, 5–141). The installations were along the foothills and on the adjacent narrow strip of coastal plain at a harbour site used for expeditions to Sinai in the Old and Middle Kingdoms, echoing the location of the Buhen settlement as an intermediate staging-post between mine source and Egyptian Nile Valley destination

(Tallet 2012, 2015). Experimental archaeology has also brought substantial advances here in appreciation and understanding of the processes (Fluzin in Abd el-Raziq et al. 2011, 147–206). Georges Castel and Pierre Tallet have outlined the basic sequence of operations attested at the site, and confirmed and elaborated in detail in experimental archaeology (Table 2.4). In contrast to Old Kingdom examples, the Middle Kingdom furnaces at Ayn Sukhna were markedly taller, at 1.2 m. A standardized arrangement of furnaces was also noted, with a battery of four natural draft furnaces for the initial reduction served by a single open furnace for refining with artificial ventilation.

In sum, east desert and Sinai excavations indicate initial working at mining sites, and Seh Nasb in Sinai and the Old Kingdom Buhen settlement represent off-site but still remote transit points of further processing. For metal-working at destination, in settlement sites, direct evidence on gold-working is lacking for the 3rd–2nd millennia BC, and it is necessary to seek analogies within the evidence for copper- and bronze-working. The comparison is complicated by the variables of material properties, scale of operation (quantity of material), and, relatedly, the intensity of control. Nevertheless, such aspects as tools, range of alloying practices, and labour organization may be common to the working of both precious and other metals. For the very end of the 3rd millennium BC, a workshop with a range of activities has been excavated at Balat in the Dakhla oasis, within the enclosure of the palace of the governor (Fig. 2.5; Jeuthe 2012). Eight separate workshop spaces had lightly built walls within the



**Figure 2.5.** The Balat workshop at phase 3, rooms 7–8 at right, 5–6 at left (Jeuthe 2012, 111, fig.34).



**Figure 2.6.** The Balat workshop: distribution of ceramic finds related to metalworking (Jeuthe 2012, 288, fig.117). Shape key: upward triangle crucible, downward triangle spatula, square scraper, drum conical object; colour key: yellow phase 2, red 3a, blue 3b, green 3c3, mauve 3d, grey uncertain.

footprint of an earlier courtyard, about 8.7 m by 9.2 m (Jeuthe 2012, 65–8 Period I courtyard, 68–83 Period II from initial adaptation as a production zone to 8-segment space in phase 2c1, 83–5 Period III main phase of use as workshop).

No metal artefacts were found, but copper-working is attested from the distribution of tools and ceramic finds including spatulae and crucibles, one with traces of oxidized copper (Fig. 2.6; Jeuthe 2012, 277–89). In phase 3a, most copper-working seems to have taken place in rooms 5–6, with melting in room 5 and cold-working in room 6; in phases 3b–d the focus shifted to room 7 and the workshop courtyard space 8 (Jeuthe 2012, 278–9, 365–9). The supply of copper artefacts either made in or brought to the oasis in earlier periods might have been sufficient to support production here, as entirely based on recycling (Jeuthe 2012, 277–8). Another main activity in the workshop was production of flint tools, and four stone axe-blades indicate the presence of carpentry (Jeuthe 2012, 358, considering

also the evidence for bone-working). Throughout the period of workshop use, baking is prominent, and from phase 3c rooms 1–4 were used intensively as a bakery (Jeuthe 2012, 363). The overall impression is of a multifunctional space, with changes in activity location as needs arose, around the primary task of equipping the palace, as agricultural control unit, with the flint and metal blades that its staff required in different seasons (synthesis in Jeuthe 2012, 361–75). The typologies of pottery vessels and stone tools associated with metal-working at the site are of particular importance, with forms that may be absent or unclear in ancient depictions of production (see below).

Within the 2nd millennium BC, some Nile valley town sites provide evidence of metal-working on a small scale. Just south of the Buhen settlement, some centuries after its end, Egyptian forces constructed a massive fortress in the early Middle Kingdom (20th century BC), remodelled in the New Kingdom (16th–11th centuries BC). In the disturbed and eroded central



area of the inner fortress, a circular brick pyrotechnological structure was preserved to a height of 67 cm; among the associated sherds, all of Middle Kingdom date, one had copper ore attached (Block I, room 12: Emery et al. 1979, 68–9). Another building in the same central area yielded two groups of fifty-four and twenty-six pottery tubes, and a scatter of eight more, ‘in an area where fragments of copper and of moulds for making copper implements were found’; according to the excavation report ‘the remains of a brick structure (brick size 37 cm by 17.5 cm) could have been part of a denuded kiln’ (Block E, room 42: Emery et al. 1979, 68). Overall, the limited evidence would suggest localized operations, such as production and repair of simple tool blades, rather than metal-working on any larger scale, and its date within the long lifespan of the fortress is difficult to assess, in the absence of clear stratigraphy or closed deposits (Emery et al. 1979, 66, 69; Williams 1996, 203–4). Within the Egyptian Nile Valley, near Lahun in the Fayum, Flinders Petrie uncovered evidence for metal-working in a town founded in the Middle Kingdom (19th century BC); he interpreted a find of ‘five moulds for bronze casting’, drills and whetstones in one room as ‘a caster’s shop’, though without locating or documenting the context (Petrie 1890, 29). Two further interesting assemblages were recorded from small houses in the town: near one Middle Kingdom object-group a thick uneven copper alloy knife blade had been deposited at a point when it was being worked or reworked (Manchester Museum 192: Petrie 1891, pl.13.17), and an array of wood and metal tools of New Kingdom date (14th century BC) included bronze blades broken, cut, or folded as if for recycling (Petrie 1891, 15, pls.13.21–31).

The main evidence for 2nd millennium BC metal-working within Nile Valley urban settings comes from two major centres of power, Kerma in Sudan and Qantir in Egypt. In the early to mid-2nd millennium BC, Kerma was the central city of the north Sudanese polity which became the most powerful on the Nile in the 18th–17th centuries BC, at a time when Egypt was divided (O’Connor 1984; Bonnet 2014). A furnace with eight fuel-ramps was found well-preserved in the precinct of the western monumental complex (Bonnet 2004, 29, fig. 21 P, 33–8). Traces of copper and tin on crucible fragments in the furnace confirmed the function as bronze production; the absence of slag indicates that the primary metals were extracted from their ores elsewhere (Bonnet 1986). The installation was dated by stratigraphy and  $^{14}\text{C}$  analyses to the end of the Middle and Classic Kerma Periods, contemporary with the end of the Middle Kingdom and Second Intermediate Period in Egypt (18th–16th centuries BC: Bonnet 2004, 34). An assessment of the scale of production from such

a furnace and the number of furnaces originally present at the complex would be useful in relation to its role in the city, on a spectrum from equipping an army to producing select items of restricted circulation. At the southwest of the city, a similar but smaller institutional context contained a copper- or bronze-working furnace in the vicinity of a pottery kiln and several bread ovens (Bonnet 1997, 102–6 ‘secondary settlement’, buildings E XVII, E XX); the metal-working installation had been adapted several times to new needs, techniques or scale (Bonnet 2004, 33–4).

Qantir, ancient Per-Ramesses, was the Residence and central city for the Ramesside kings of Egypt (13th–12th centuries BC). At the point where the site became a royal city, under Sety I or early in the reign of his son Ramses II, bronze-working installations on an industrial scale covered perhaps 30,000 m<sup>2</sup> of the palace sector (Pusch 1994, 168). One area could be investigated more fully, revealing the remains of ten furnace installations: six for (re)-melting metal and four larger versions of the massive eight-ramp type found at Kerma (excavation area Q1 north, stratum B/3: Pusch 1990, 1994; on the scale of the operation and sources of copper, see Rademakers et al. 2017; Rehren & Pusch 2012). The preserved examples indicated a regular pattern of one eight-ramp furnace supported by a pair of smaller furnaces (Pusch 1994, 164–5; Kreuzofen B and C aligned with respectively Schmelzbatterien I+II and III+IV stratum). A perimeter wall separated this field from an adjacent sector of workshops (Q1 south, stratum B/3). Here, in the workshop closer to the furnace field, simpler fire-pits for working the furnace products were associated with water basins for cooling, while the next building to the south yielded foil and some metal and stone tools, evidence for cold metal-working (Prell 2011, 173–6, 226–7). In the succeeding stratum B/2, dated to the reigns of Ramses II and his successors, a training-ground replaced the furnace field, while the workshop area continued in use, now demarcated by streets alongside its preserved north and east walls (Pusch 1990, 2007; Prell 2011, 176–9). The preserved remains and distribution of finds enabled Silvia Prell to specify the materials and activities in each part of the workshop sector, identifiable as part of the arsenal for the palace chariotry garrison (Prell 2011, 179–226, summary 227–39). Separate zones or units could be identified for hot and cold metal-working, leatherwork, and bone-working; in the later phase of this stratum (B/2a), an office and a secure store-room were added (Prell 2011, 233, fig. 109, 237, fig. 111). Despite the challenging conditions of excavation in floodplain agricultural land, the site thus provides what is otherwise generally missing in the archaeology

**Table 2.5.** *Inventory of storage-vase from Qantir workshop sector (after Prell 2011, 213–14).*

Form and material	Find number or Prell catalogue number
3 lengths of gold foil	FZN 1983/0785B, 0001-0003
bronze tweezers	FZN 1983/0785C, 0001-0005
bronze circular punch	
3 bronze round or rectilinear fragments	
unworked bone debris	FZN 1983/0785D, 0001-0007
1 stone hammer	cat.no.20
piece of ochre	FZN 1983/0785F, 0001-0002
piece of Egyptian blue	
disk bead of Egyptian blue	FZN 1983/0785G
charcoal fragments	FZN 1983/0785H, 0001-0004
possible remains of bitumen or asphalt	
rim sherd of calcite vase	FZN 1983/0785L

of Egypt, the ground, architecture and finds of a major workshop production zone.

Across the Qantir workshop sector, finds of gold foil were scarce, with three in the bone-working zone for bow and arrows production, five in a metal-working zone to the west, and a dozen around the northeast corner buildings which had been used first for hot and cold metal-working (B/2b), and later as office and store (B/2a). The scant evidence suggests that gold sheet and foil were produced elsewhere in Qantir, if not farther afield, and brought to this sector of workshops (Prell 2011, 231 with n.1274, 235 with plan 23). Across the workshops, vases for holding tools, raw materials and debris were placed room corners and niches at the closure of the workshop sector, in the late 19th or 20th Dynasty (12th century BC) most items of value had been removed, but seven storage vessels were found with their contents (Prell 2011, 213–15). The storage-vase with the most extensive inventory was found in the western buildings: beside tools, which included bronze tweezers and circular punch (Table 2.5), there were three gold foils, one with punched decoration (Prell 2011, 232, fig. 108).

Beyond Qantir, it is difficult to find gold on its way from river or mine to production workshop. One example might be a  $2.8 \times 2.0 \times 0.6$  cm lump of gold with traces of hammering, from Abydos; the Egyptian Museum Berlin received this in the official distribution of finds from excavations loosely supervised by Flinders Petrie, with a date on uncertain criteria as early 3rd millennium BC (Berlin 16003: Schäfer et al. 1910, 207 with no.1, fig. 210: ‘angeblich aus dem Anfang der zweiten Dynastie’). In a very general manner,

hammered gold in a temple precinct might indicate a site of storage and initial working, in the context of a major Early Bronze Age urban centre (Adams 1998; Kemp 1968, 1977). The lack of evidence reflects a difficulty in distinguishing metal-working from other high-temperature industries (Hodgkinson 2018, 136–7), exacerbated by the limited extent of publication of excavated workshop architecture and finds (as noted by Jeuthé 2012, 1–4; Prell 2011, 11–16). At the short-lived kingship late 18th Dynasty city at Amarna a low density of metal-working may be traced across the site (Hodgkinson 2018, 137–48). Evidence includes a small number of limestone moulds for casting multiple items of jewellery, perhaps in gold and silver, and for pressing sheet metal that could then be cut to shape; fish-shaped ornaments are attested from a mould 11 cm in length and a finished 17 cm gold foil (Kemp 2012, 284–5, figs. 8.8–9). However, Amarna yielded no sign of large-scale metal production to compare with Kerma or Qantir (Kemp 2012, 283–4). Either such installations needed to be at the river, on ground now under the fields, or armouries and foundries were not part of that cityscape.

From the uneven record of the sites where gold was obtained and worked, we can turn to the equally uneven part of the archaeological record, which comprises ancient depictions and written sources, each with their own particular problems of interpretation.

### Bronze Age Egyptian written sources on procurement and working of gold

#### *Gold and goldworker: word-lists and names of institutions*

The ancient Egyptian word for a goldworker is *nbwy* (conventionally pronounced ‘nebuwy’ in Egyptology), plural *nbwyw*, from *nbw* ‘gold’. In an encyclopedic word-list, best preserved on one early 1st millennium BC manuscript (papyrus Pushkin MFA Moscow 169, Gardiner 1947), the section on artists and craftsmen evokes the spatial distribution and range of workshops preserved across the palace site at Qantir (Table 2.6). The coppersmith and goldworker precede another high-temperature art, faience- and/or glass-working; the latter is present at another sector of the site (Pusch & Rehren 2007). Next come the artists of the arsenal, juxtaposed much as at Qantir: the leatherworker, and then the makers of suits of armour, chariots, arrows and bows. Inasmuch as luxury chariotry and armour might be adorned with gold, bronze and glass, those workshops might have been located close at hand, to deliver their products to the arsenal. The list of artists closes with palace arts with perhaps less close relations to the military sector, or perhaps merely located in

**Table 2.6.** The great word-list of Amenemipet, section on artists (Gardiner 1947) with Qantir evidence (QI B/3 Pusch 1990; QI B/2 Prell 2011; QIV-V Pusch & Rehren 2007).

Entry no.	Ancient Egyptian term	Translation	Workshop at Qantir
154	<i>hmww</i>	artist (general term), carpenter	(general label?)
155	<i>gnwty</i>	sculptor	-
156	<i>mdh</i>	carpenter, shipbuilder	-
157	<i>s'nh</i>	sculptor (of human images)	-
158	<i>hmty</i>	coppersmith	foundry QI B/3; smaller-scale working QI B/2
159	<i>nbwy</i>	goldsmith	-
160	<i>nšdy</i>	worker in precious stones	-
161	<i>b'bc</i>	worker in molten glass/faience	QIV-V B/3 glass production
162	<i>ms 'st</i>	purveyor of precious stones	-
163	<i>tbww nswt</i>	leatherworker of the king	QI B2
164	<i>irw tryn</i>	maker of suits of armour	QI B2 with leatherworking?
165	<i>hmww mrkbt</i>	artist of chariotry	QI B2?
166	<i>hmww 'h3w</i>	artist of weapons/ arrows	QI B2
167	<i>irw pdt</i>	maker of bows	QI B2
168	<i>strw</i>	necklace-assembler (?)	-
169	<i>t3y bš3</i>	engraver	-
170	<i>irw wšbt</i>	maker of beads	-
171	<i>n'y</i>	rope-maker	-
172	<i>mḥ ḥw</i>	filler of fans (?)	-
173	<i>sš3w</i>	? (chisel-sign as determinative)	

another direction from the arsenal (stringing necklaces, producing and engraving beads, cordage, and two less certain titles).

As at other Late Bronze Age courts, the privileged focus of New Kingdom palace display and military power was chariotry. In earlier periods, before the introduction of the horse into the Nile Valley (17th–16th century BC), the material requirements of the court would have been very differently constituted and configured. The difference can be seen in another written source where different arts are assembled, the *Teaching made by the man of Tjaru called Duau Khety for his son Pepy*; the date at which the *Teaching* was composed is uncertain, between 12th and early 18th Dynasty (Widmaier 2013). It comprises the advice of Khety to his son to concentrate on learning how to write, and so to avoid the hardships of manual labour. Nineteen occupations are dismissed in turn, in bleak evocations of dirt, exhaustion and pain, to ensure that the twentieth, the art of writing, remains the only desirable future for the novice (Table 2.7). The scope of this list extends beyond the workshops of a palace for a king or regional governor, to include all workmen needed to sustain them; occupations of women, particularly textile-weaving, are absent, as the *Teaching*

is presented as an address by Khety to his son Pepy. The opening verse in this series combines the views of Khety on the prestigious positions of sculptor and metalworker (*Teaching* section 4, Vernus 2001, 183; see Fig. 2.7 for part of this excerpt on a sherd):

‘I do not see a sculptor on a mission, or a goldworker on a task of his despatch, but I have seen the coppersmith at his toil, at the mouth of his furnace – his fingers like crocodile hide, his stench worse than fish eggs.’

In acknowledging the *bškw* ‘toil’ of the artists at the furnace, in a sense the author of the *Teaching of Khety* is paying them a compliment, not least as that word means ‘products’ in other contexts. Kings and princesses no more make their own jewellery than they till their fields. The *Teaching* also places the sculptor and goldworker first, and indeed gold dominates the horizon of art throughout these periods. The name of the main institution for producing sculpture for eternity was *ḥwt nbw* ‘mansion of gold’, a site of secrets into which artists were *bs* ‘initiated’ (von Lieven 2007a). According to one inscription of the 1st century AD at Dendera, in the



**Table 2.7.** Manual occupations described in the *Teaching of Duau Khety* (Jäger 2004); lines in bold indicate presence of an equivalent in the word-list of Amenemipet (Table 2.6).

Teaching section no.	Ancient Egyptian name of occupation	Translation
4	<i>gnwty</i>	sculptor
4	<i>nbwy</i>	goldsmith
4	<i>hmty</i>	coppersmith
5	<i>hmww nb</i>	every artist (general label)
6	<i>ms ʿst</i>	purveyor/worker of hard stone
7	<i>hʿk</i>	barber
8	<i>bty</i>	marsh-plant gatherer
9	<i>ikd nḏs</i>	potter
10	<i>ikd inbw</i>	bricklayer
11	<i>mḏḥ</i>	carpenter
12	<i>kꜣny</i>	gardener
13	<i>ʿhwtj</i>	farm-hand
14	<i>knwy</i>	mat-weaver
15	<i>ir ʿhꜣw</i>	maker of weapons/arrows
16	<i>shḥty</i>	desert courier (?)
17	<i>stny</i>	dyer (?)
18	<i>tbw</i>	leatherworker
19	<i>rhṯy</i>	laundryman, fuller
20	<i>whʿ ʿpḏw</i>	birdcatcher
21	<i>whʿ rmw</i>	fisherman

temple of the goddess Hathor (also called ‘the Gold’, perhaps the sunlit sky), images were produced in the ‘mansion of gold’ by a fixed staff on a monthly rota, comprising six pairs of artists, including carvers, inlay-artists, engravers, and sculptors (von Lieven 2007a after Derchain 1990: another title is of uncertain meaning, and one is not preserved). The ancient Egyptian word for valuables was *hmt* ‘sealed goods’; beside such organic

luxuries as linen and scented oil, the scope of the term is known to cover inorganic materials including gold (Berlev 1978, 167–70). At the palace of the king, the main institution for preserving valuables, in, was regularly called, not *pr nbw* ‘house of gold’, but *pr ḥḏ* ‘white house’, generally translated into English as ‘treasury’ (Papazian 2013, 70–3 for the 3rd millennium BC). Originally, the white perhaps denoted bright linen, the main object of large-scale production beside grain and pottery. When contrasted with ‘gold’, ‘white’ can denote ‘white gold’ and ‘silver’. White might also express luminosity as a less tangible aspect of kingship, in the pairing of White and Red Crown (Goebis 2008, 28–30, 175–89, 363). This duality is a dominant structuring principle of ancient Egyptian kingship as rule over earth and heaven, Lower and Upper Egypt, the two banks of the Nile, desert Red Land and floodplain Black Land. Therefore, the dual again identifies the scope of an institution as the entire land of Egypt in the term *prwy ḥḏ nbw* ‘the Dual House of Silver and Gold’, which appears in more extensive inscriptions of the 3rd and 2nd millennia BC, where officials responsibility for ‘sealed goods’ were said to be in charge of ‘the Dual House’. Here the pairing with *nbw* ‘gold’ indicates that *ḥḏ* ‘the white’ is the white metal, either silver or electrum, the silver-gold natural or artificial alloy more frequently found in earlier periods. Administrative titles for officials emphasize in some periods the term ‘sealed goods’, and in others the expression ‘white house’. In the Old Kingdom and Ramesside Period, the highest official in charge of valuables at the court of the king is ‘overseer of the white house’ or ‘overseer of the dual white house’; in the Middle Kingdom, his title is ‘overseer of sealed goods’, conventionally abbreviated to ‘treasurer’ in Egyptological translations (Grajetzki 2000, 43–78). Across these different periods, both terms seem to convey control over contents of a single dimension of palace, whether an architectural or an organizational structure or both. Detailed study of the context for all attestations of the ‘Dual House of



**Figure 2.7.** Ramesside jar rim sherd with start of the verse on the sculptor and goldsmith in the *Teaching of Khety to Pepy*, from the Ramesseum, Thebes, mid-13th century BC, UC33021.

Silver and Gold’ would enable an assessment of the specific ways in which gold populated the imagination of power in each period.

The ancient terminology of weighing is a more direct and diffuse indicator of the significance of *nbw* ‘gold’ in 3rd and early 2nd millennium BC Egypt. Although inscribed weights may amount to less than 4% of the material accessible to study, they confirm the results of statistical analysis of the corpus, with a *deben* ‘ring’ of gold at around 13 g, and its double the *deben* of copper at 27.5 g (Cour-Marty 1990, 19–20, 22, 45, fig. 17). Precisely as in the contemporary terms for goldworkers and coppersmiths, in this system ‘gold’ can signify not only a specific precious metal, but also the general sense of more ‘valuable’ in contrast to copper as the more regular metal. In the metrological and operational language of the time, then, ‘gold’ can effectively be a shorthand for all rarer materials that are being weighed. In the late Bronze Age, after 1500 BC, the gold/copper *deben* gives way to a new system of expression, in which a 91 g *deben* now denotes the tenfold weight of a *qedet* unit, without reference to the name of a metal (Cour-Marty 1990, 23). By the 1st millennium BC, silver becomes the new marker of value in the language of currency (Jurman 2015; Moreno García 2016).

#### Words in context

In order to mobilize the ancient written record in relation to the wider archaeological evidence, the context of each inscription, manuscript, word needs careful calibration in two dimensions: spatial context, being the location; and spatial-temporal context, being the type of the unit (inscription, passage, word, sign) in relation to others in the same kind of space (e.g. inscription for eternity at a mining-site, or ephemeral accountancy notation) and within temporal horizons (e.g. mining-site inscriptions of all periods, or all inscriptions of one period). With its location+type context, each attestation of a word is a speech-act, an utterance which shares with its ‘co-text’ of others an identifiable set of external features. If ‘co-text’ conveys the genre of an utterance, the collection of contexts in one study (e.g. of gold) may be considered as the range of genres of a particular geographical-historical configuration. The corpus of attestations is a necessary first step in understanding a word, and requires an analytical review of context (as in Berlev 1972, 1978). In the kaleidoscopic history of each overlapping word-horizon, words cannot be studied as if fixed. Evidently a word *ḥd* ‘white metal’ may convey rather different things to a 3000 BC Egyptian-speaker whose nearest gold is silver-rich and to a 300 BC Egyptian-speaker familiar with silver coin.

In the following section, I consider the ancient Egyptian written evidence for those who sought for and

worked gold. In order to assess these writings on gold, gold-finders and goldworkers, some preliminary categorization of word-contexts is required. As an initial framework, I apply the dozen source-types/ word-contexts, which I have previously inferred from the record in a study of Middle Kingdom art vocabularies (Table 2.8 after Quirke 2018, 177–80). In the following discussion, references to source-types 1–10 are based on this table and its definition of associations.

#### Prospectors and purveyors of gold

Despite the allure of narrative written records, especially self-descriptions by participants, narration may not be the most reliable mode for reconstructing or

**Table 2.8.** Different word-contexts attested for designations of artists (after Quirke 2018, 178–9).

	Type of word-context	Script(s) and associations of word-context
1	items made for burial	hieroglyphic: projects an identity/idea into eternity
2.1	scenes in offering-halls	hieroglyphic: focus on beneficiary of offering-hall
2.2	items from smaller offering-chapels	hieroglyphic: focus on beneficiary of offering-chapel and (if different) of the individual item
2.3	scenes in temples to kings or deities	hieroglyphic: focus on kingship and primary beneficiary (king or deity)
3	rock inscriptions	hieroglyphic or hieratic: projects an identity/idea into eternity, with focus on named persons
4	seal-amulets and sealings with impressions from them	hieroglyphic: projects an identity into eternity, including act of securing/storing in earthly life
5	ritual manuscripts	cursive hieroglyphic: prescribes action or role within dimension of sacredness
6	literary manuscripts	hieratic (cursive): sharing by reading primarily in earthly life (sometimes placed in burials, perhaps to activate reading for eternity); persons / materials / actions may or may not conform with experience in earthly life
7	letters	hieratic (cursive): communication by reading in earthly life; contents relate directly to earthly life as document or metaphor
8	legal manuscripts	hieratic (cursive): communication by reading in earthly life; contents relate directly to earthly life as document
9	accountancy manuscripts	
10	objects made for use in earthly life	hieroglyphic: projects an identity or act into eternity hieratic: focus on identity or act in earthly life (e.g. ownership, production)

**Table 2.9.** *Titles, in expedition areas, incorporating the element smnty 'prospector/purveyor of metal ore' by location of inscription (after Eichler 1993, 188–92; for key to site numbers see Fig. 2.8).*

Region	Desert (mountain-lands) of Gebtyu				Desert of Edfu and province of Aswan			Lower Nubia		
Sites	1	2	3	4	5	6	7	8	9	10
Titles										
<i>smnty</i>	X	?	X				X			
<i>imy-r 10 smntyw</i>	X	X				?				
<i>imy-ht smntyw</i>			X							
<i>shd smntyw</i>			X							
<i>hrrp smntyw</i>	X	?	X		X					
<i>imy-r smntyw</i>			X						X	X
<i>zhz smntyw</i>	X	X	X	X				X		X

understanding history of technology (for a review of interdisciplinary positions, obstacles and potential, see Martín-Torres 2008). An example may be cited from more recent accounts of raw material procurement. For the history of anthropological techniques of fieldwork, Johannes Fabian has exploited the internal flaws of mid-19th century discovery tales, in which European audiences idolize their colonial explorers (Fabian 2000). His close re-reading reveals how the white hero of accounts in mass media was more likely to be killed by a mosquito than to meet a lion, and is invariably led by African traders along well-secured centuries-old routes. Similarly, by the time that an activity occurs on a sufficient scale to become visible in the archaeological record, it is likely to have been established practice for an unknown length of time, amounting to its pre-history or 'pre-archaeology'. In the social encounter with materials and the subsequent search for more, the discovery moment may have less impact than a long-term, transgenerational transmission within a social group or between groups. For the history of prospecting and of knowing the desert, ancient writings are no less problematic than modern, if they reinforce our focus on discovery and expedition-leader rather than slower and longer accumulations of knowledge of practice. Equally, a scatter of hieroglyphic inscriptions can become a crucial reminder of such practice preceding the inscription, if we read them attentively in the fuller spatial-temporal context of both what is not written and what is written. The written then becomes a reminder of a space and time outside inscription, and from this point the study of writing can assume a more realistic role within the multiple specialized studies of different types of finds in archaeology. Here the fragmentary and incomplete character of the ancient written record is an advantage rather than a disadvantage. Dietrich and Rosemarie Klemm open their survey of the eastern deserts of

Egypt and Sudan with a strong reminder that their guiding hosts are the essential openers of the desert (Klemm & Klemm 2013). In a study of 3rd millennium BC references to desert roads, Henry Fischer noted two 'guides of the good roads' among the desert rock inscriptions (source-type 3) east of Edfu, on routes to major gold sources, and just one 'guide of the desert', this time on an offering-chapel (source-type 2.2) for an official in the Nile Valley, at the Giza pyramid fields, the most monumental centre of kingship (Fischer 1991, 63). Between the different and distant spaces of Edfu and Giza, we glimpse the scope of prospecting for mines, as part of a history of knowing the desert and securing its roads (Darnell 2013).

One of the Edfu desert road guides was a man named Hesymin, who also held the position overseer or director of *smnty*-men (Žába 1974, 225, A1; the reading of the initial 'overseer' sign is uncertain). From the corpus of attestations for the word *smnty*, Jean Yoyotte demonstrated that it designated the prospector who brought back precious metal and semi-precious stones from the mountainous eastern deserts (Yoyotte 1975; Fischer 1985; Eichler 1993, 188–92). The hieroglyph used to write the word depicts a man carrying on his back a bag, which perhaps had the name *smnt* from which *smnty* 'the man of the *smnt*' derives (Yoyotte 1975, 50). The term is used in rock inscriptions, seals and sealing-impressions, and more rarely on objects from offering-chapels (source-types 3, 4, 2.2) throughout the 3rd millennium BC. During this period, 'overseers of ten', 'organizers', 'inspectors', 'directors' and overall 'overseers' of *smntyw* are found, indicating a measure of formalized hierarchy (Table 2.9, after Eichler 1993). The occurrence on a seal impression at the mid-3rd millennium BC Egyptian settlement at Buhen implies an active role of significance for administrative operations there (Yoyotte 1975, 51). By 2000 BC, people are no longer identified as *smntyw* in source-types of active

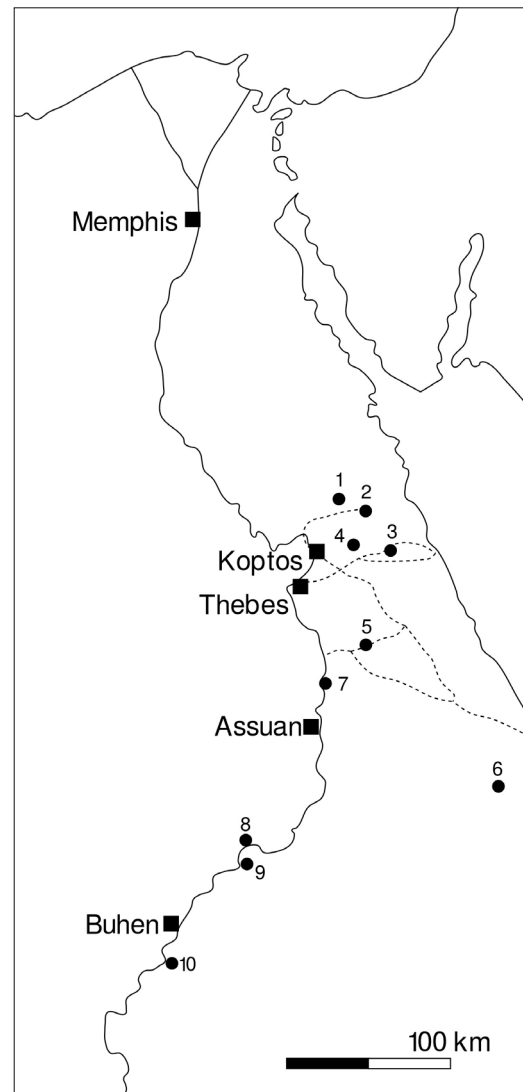


practice. The word recurs in a few 2nd millennium bc sources, as an archaizing feature in inscriptions of sovereigns and high officials under (Yoyotte 1975, 46–7, examples from the reigns of Senusret I and Amenemhat III in the 12th Dynasty, and Hatshepsut in the 18th). The Senusret I inscription in the temple of Mont at Tod, near Thebes, identifies the terrain of *smnty*-action (Barbotin & Clère 1991, 9, 16–17 nn. 66–72, fig.3 cols. 25–6):

*m3ꜥ wdhw m ḥd nbw ḥmty ḥsmn b3st m ḥsbḏ  
mḥk3t m ʿ3t nbt dmdt  
nfr nfr ʿš3 ʿš3 r ḥt nb m3 m t3 pn ḏr b3ḥ m b3kt  
ḥ3styw smntyw ḥnsw t3w*

‘Dedication of the offering-tables in silver and gold, copper and bronze, miraculous ores, in lapis lazuli and turquoise, in every hard stone assembled, twice perfect, twice numerous, beyond everything that has been seen in this land since ancient times as the products of the desert-people and the *smntyw* roaming the lands’

Here the miraculous materials of the works of art dedicated in the name of kingship include, in poetic rhythm, the pairs of more and less precious metals, the pair of remote semi-precious stones, and in summary all other gem-like stones. Desert-people and the *smntyw*-men with their characteristic bags are the purveyors of these materials, and so the *smntyw* might be considered prospectors of all portable desert stone and metal. At least two inscriptions describe a man in charge of *smntyw*-men as ‘the one who brings the ornaments of the king from the desert-lands’ (Yoyotte 1975, 48–9, sources nos. 10, 28; Eichler 1993, 188–9, no. 137, and with different reading no.201). However, the juxtaposition with the generic term ‘desert-people’ could be taken as an indication that *smntyw* have a distinctive task, and the geographical location of sources perhaps narrows their primary or at least more prestigious activity to gold-prospection. The rock inscriptions with *smntyw* are distributed along the major routes by which gold entered Egypt from the eastern desert (Yoyotte 1975, 50–1). Later Egyptian sources refer to gold from the Egyptian deserts by their port of entry, and gold from Nubian deserts by their provenance, and these groupings distinguish the inscription sites of *smntyw* and their officials: (1) the ‘gold of Gebtyu (Coptos)’ from Wadi Hammamat (Fig. 2.8 and Table 2.9 sites 1–4); (2) the ‘gold of Edfu’ from Wadi Barrimiya, and perhaps the desert bays along the Nile from Edfu to Aswan (Fig. 2.8 and Table 2.9 sites 5–7); and ‘gold of Wawat’ from Lower Nubia (Fig. 2.8 and Table 2.9 sites 8–10). In the main concentration along the Wadi



**Figure 2.8.** Locations of inscriptions with *smnty* titles in expedition areas. Drawing W. Grajetzki after Eichler (1993, fig. 1). Key to table: 1 Wadi Gudami, 2 Wadi Hammama, 3 Wadi Hammamat, 4 Wadi Abu Qwei, 5 Wadi Barrimiya, 6 Abrak, 7 Gebel al-Hammam, 8 Tumas, 9 Khor al-Aquiba, 10 Dakka.

Hammamat, principal gold source of the period, one title expands the regular ‘director of *smntyw*’ to refer specifically to *ḥd* ‘white gold’ or ‘silver’ (Eichler 1993, 189 Wehemka). Although their scope doubtless encompassed other materials, the *smntyw* may have been primarily prospectors and purveyors of gold, including the silver-rich ‘white gold’. A focus on the most precious metals would account for their visibility in the 3rd millennium bc written record.

Despite the prestige of their focal material, the *smntyw* did not dedicate any monument of their own,

beyond the rock inscriptions, and even the officials responsible for their work left only very few traces either of chapels for their eternal offering-supply, or of burial equipment inscribed for eternity. At Edfu, a gold-route emporium, excavations have yielded at least two chapel stelae (Yoyotte 1975, 54); on one, the 'overseer of metalworkers of gold' Tjau is also 'overseer of *smntyw* of the eastern desert', besides holding titles of palace rank (Yoyotte 1975, 54 no.34, dated to the 11th Dynasty by Fischer 1985, 25). Two late Old Kingdom limestone objects said to be from Thebes are each inscribed for a man with the titles the 'god's sealbearer' (expedition-leader), 'overseer of the army' and 'overseer of *smntyw*' (Fischer 1985, 25–8 statuette of Hemumin, headrest of Gerehi). The relatively low profile of these men may derive in part from their social status within 3rd millennium BC Upper Egypt. Ethnicity may also be a factor in some cases, as suggested by the association of one *smntyw*-official with the task of interpretation, perhaps as himself a speaker of a desert language unfamiliar to Nile Valley Egyptians (Eichler 1993, 188). The multiple alien aspects of a rich but unyielding desert – linguistic, logistical, military – are conveyed in one succinct record of a late Old Kingdom expedition to Wadi Hammamat: 'mission carried out by the king's sealbearer, sole companion, god's sealer, overseer of the army, overseer of *smntyw*, overseer of interpreters, overseer of all mountain desert-lands [of south and north], overseer of the mountain-passes (?), who projects the dread of Horus in the desert-lands, Tjetji' (Cuyat & Montet 1913, 46 no. 35; Eichler 1993, 190).

In the rock-inscription east of Edfu noted above, the director of *smntyw* Hesymin, 'guide of the good roads' is also identified as 'overseer of craftsmen'. Farther north, at Wadi Hammama east of Gebtyu, the titles of an official named Tjaz also refer to both the specific *smnty* and generic 'craftsmen' (Cuyat & Montet 1913, 115; Green 1909, 320, pl. 52 no. 37; Yoyotte 1975, 47 no. 26; Eichler 1993, 48–9 no. 59; an 'inspector of craftsmen Tjaz' in a Wadi Hammamat inscription may be the same man, see Eichler 1993, 67 no. 112). Whereas the general term 'desert-people' might define the *smntyw* against desert nomads without specific prospecting tasks, the 'craftsmen' supervised by the same officials may be specialists in metal-working, perhaps implying that *smntyw* prospectors did not have the skills or responsibility for that next stage of procuring gold or copper. In that case, an expedition would need both *smntyw* prospectors and metalsmiths, as implied in the two titles of Tjau on the Edfu stela cited above. The 'craftsmen' would include the persons charged with smelting ores, in order to reduce to the minimum the weight of material for transport back

to the Nile Valley, as attested by the smelting installations at east desert and Sinai sites. Eichler notes that 'craftsman' is the only term relating to metal-working in the 3rd millennium BC expedition inscriptions, and that these invariably identify middle-ranking officials but not individual craftsmen (Eichler 1993, 185–7: thirteen *imyw-ht* 'organizers', one *shd* 'inspector', ten *imyw-r* 'overseers'). Nine of the lower-rank position are labelled as 'organizers of craftsmen of the palace', three of them with the further designation *šps nswt* 'magnate of the king'. At the higher level, three are 'overseers of craftsmen of the palace', and two others have the title *rh nswt* 'known to the king'. The connection with king and palace may be direct, with kingship institutions as the source of needed metallurgical expertise, or indirect, reflecting more the destination of the material, or the royal sponsorship or prestige of an expedition. Apart from Hesymin (Edfu) and Tjaz (Wadi Hammama), all inscriptions naming officials 'of craftsmen' are in Wadi Hammamat, where the main gold mines of the 'desert mountains of Gebtyu' are located. On mining expeditions of this date, then, the general term 'craftsmen' may cover goldworking and copperworking, along with other skilled workers such as stone-cutters and carpenters.

Goldworkers among stoneworkers at quarries and mines in 2nd millennium BC inscriptions

After 2000 BC, the written record of prospectors and metalworkers on expeditions is reversed, as the *smntyw* disappear from titles, while coppersmiths and possibly also goldworkers now appear on rock inscriptions. On a literal reading, it might seem that the task of prospecting for new sources had been exhausted, and *smntyw* no longer offered a distinctive skillset. At least, in general terms, the mode of procurement and expedition staffing had altered. In part, any change may reflect the founding of a new Residence at Itjtawy under kings Amenemhat I and Senusret I at the start of the 12th Dynasty (c. 1950 BC). From that time on, the *smntyw* move out of expedition records and administrative titles and into a different, more literary domain of expression, the kingship inscriptions of the 12th and 18th Dynasties. However, evidence for metalworkers remains sparse in 11th–12th Dynasty expedition records (Seyfried 1981, 245–53, 262–3, expeditions nos. 2, 5–6). Among them, the most plausible instance of the word *nbwy* 'goldworker' is from year 16 of Senusret I, early 12th Dynasty: 'Going out to this desert-land with this loyal servant: men 5000, with (or comprised of) stone-cutters, with quarrymen, with ..., with goldworkers (?), with ..., with ..., with ..., with carpenters, with leatherworkers, with hardstone-cutters, with craftsmen, with every office of the house

of the king' (Couyat & Montet 1913, 85–6, no.123; Seyfried 1981, 248, noting Goyon interpretation of *nbwyw* as 'gold-searchers', and proposing *smntyw* for one unclear sign). In two other inscriptions, the sign read *nbwyw* 'goldworkers' is uncertain (expedition in year 2 of Nebtawyra Mentuhotep IV, end of 11th Dynasty, see Seyfried 1981, 246; expedition in year 38 of Senusret I, see Couyat & Montet 1913, 66 n.2, uncertain sign in passage relating to food-provisioning staff). At Sinai, coppersmiths are attested with their names on the margins of three inscriptions, and unnamed in summary lists of personnel in a further five (Table 2.10). In the personnel lists, the numbers of other specialists provide a sense of proportion within the overall expedition. The 3 coppersmiths of inscription 106 accompanied 200 stone-cutters (*hrtyw-ntr*), 20 ferrymen, and 3 quarrymen (*ikyw*); inscription 413 with 3 coppersmiths also has 40 ferrymen and 3 carpenters. In inscription 114, there are pairs of coppersmiths, carpenters and cutters of hard stones (*msw-ꜥt*) beside 80 stone-cutters and 8 quarrymen. In publishing their translations, the modern editors concluded that the coppersmiths 'were doubtless responsible for keeping the metal tools of the workers in order', rather than engaged in metal-working on a larger scale (Gardiner et al. 1955, 18). The discovery of the Middle Kingdom installations at Ayn Sukhna confirms that, at least at this date, a substantial quantity of the ore was being laboriously transported from the Sinai mines part way to the Nile Valley destination, for safe and efficient extraction of the metal (see above; after Abd el-Raziq et al. 2011).

Two clearer inscriptions by or for officials explicitly in charge of gold procurement at source are dated to the New Kingdom; these are located with numerous others at a point where expeditions stopped on their way from Quban to Wadi al-Allaqi, the major route to the gold of Nubia (Piotrovsky 1983, 30, 42 site no.10 on map, 44 location by number). However, these men are not goldworkers, but treasury officials, who may

have carved their own names on the rock walls of the valley: the inscriptions read 'accountant reckoning gold Inpumheb' and 'Year 40 <of Ramses II> made by the treasury accountant reckoning gold Khamwaset' (Piotrovsky 1983, 51 no.79 hand-copy, 155 photograph; 53 no.100 hand-copy, 160 photograph). The organizers of the goldworkers in earlier periods may also, then, be identified among the treasury officials who are prominent in the Middle Kingdom record at Sinai and eastern desert sites (Gardiner et al. 1955, 15–16; Seyfried 1981). For a more direct written record of goldworkers and their organizers, it is necessary to leave the procurement sites and desert roads, and return to the towns in the Nile Valley.

*Goldworkers in the Nile Valley: the range of attestations by source-type*

A preliminary tabulation of sources may indicate the range of contexts where goldworkers are mentioned by name (Table 2.11). The examples in depictions of metal-working (in source-type 2.1) are covered in the relevant section below. Ritual manuscripts (source-type 5) carry generic scope, where the reference is to a role rather than to individuals, and so names are not to be expected. Thus, one late Middle Kingdom burial liturgy lists a procession of 'all artists of [all] arts (?)' starts with *nbwy nbwy m ꜥ=f* 'the goldworker with blowpipe (?) in his hand' and *mdhw szw tfꜥ m-ꜥ=f* 'the carpenter sawyer with saw in his hand' (Gardiner 1955, 15 with n. 4, pl.5, noting that other artists hold tools rather than a product, but translating *nbwy* as 'gold collar'). As in many depictions of production, the unnamed artist here ensures the instrumental presence of an activity, rather than preserving the identity a specific person. For other source-types, there is no functional or contextual reason for omission of a category of people, and therefore the absence of goldworkers can help to delineate the social profile of the occupation. The few literary compositions of the 2nd millennium BC

**Table 2.10.** *Attestations of coppersmiths in Sinai inscriptions, after Gardiner et al. (1955).*

Inscription Sinai no.	Date	Name	Number
71 right edge, 2	Amenemhat II, year 11 (?)	Sebu born to Petu	
71 right edge, 2	Amenemhat II, year 11 (?)	Amen[y?]-hetep	
85 north face, 21	Amenemhat III, year 4	[name not preserved]	
85 north face, 22	Amenemhat III, year 4	[name not preserved]	
87 north face	Amenemhat III, year 5	Seneb [...]	
106 south face, 4	Amenemhat III, year 40	not named	3
114 south face, b	Amenemhat III	not named	2
122 west face, b	Amenemhat IV, year 9	not named	16
136 north face, 6	Middle Kingdom, a year 11	not named - uncertain	?
413 south face, 3	Middle Kingdom	not named	3

**Table 2.11.** Attestations of named goldsmiths by object-type (see Table 2.8 for associations of each type).

	Type of word-context	Old Kingdom	Middle Kingdom	New Kingdom
1	items made for burial	-	-	X
2.1	scenes in offering-halls	X see section 2.4	X see section 2.4	X see section 2.4
2.2	items from offering-places	X	X	X
2.3	scenes in temples	X see section 2.4	-	-
3	rock inscriptions	- section 2.3.2.2	? section 2.3.2.2	- section 2.3.2.2
4	seal-amulets and sealings	-	X	-
5	ritual manuscripts	-	-	-
6	literary manuscripts	-	-	-
7	letters	-	-	-
8	legal manuscripts	-	-	X
9	accountancy manuscripts	-	-	-
10	objects for use in life	-	-	-

(source-type 6) do not name metalsmiths or jewellers, among their heroes, anti-heroes or wider cast, nor do their names reach us in the haphazard survival of letters across the 3rd and 2nd millennium BC (source-type 7). The remaining source-types are reviewed by each of the three main periods within this timespan, as the range and forms of inscribed object-types and the expressions of occupation and hierarchy vary significantly between them.

#### Named goldworkers and goldworking supervisors of the Old Kingdom

The principal designation for goldworker in the Old Kingdom is written with two hieroglyphs: the first shows a pair of back-to-back crucibles, perhaps to be read *bdty* literally ‘the man of the crucible’ (Drenkhahn 1976, 38–9, from *bd* and *bd* ‘crucible’), and clearly denotes ‘metalworker’; the second a strung beaded necklace, reading *nbw* ‘gold’ (attestations and commentaries on the title are indexed in Jones 2000, 416 no.1533). Men with the core title *bdty nswt* ‘goldworker’ are known from sculpture and from architectural elements of chapels for their own offering-cult, indicating access to significant resources for ensuring their afterlife (source-type 2.1 in Table 2.11). The earliest example is Ankhwa (3rd Dynasty, c. 2650 BC), whose red granite statue is a rare and fine work, perhaps from Giza, which would reflect proximity to the Memphite centre of kingship and might imply a relation to the royal court (Spencer 1980, 13, pl.1). At a more humble level in that region, a goldworker Henenef is the only name and title inscribed on a stone libation basin of the 5th–6th Dynasties; it is more securely documented as being found at Giza among the outer rows of burial-chapels comprising the West Field behind the Great Pyramid of the 4th Dynasty (Porter et al. 1974, 55).

Supervisors of goldworkers are also attested, at the lower level of *shd* ‘inspector’ and the higher *imy-r* ‘overseer’. Without further evidence for their life or activities, it must remain uncertain whether these officials were themselves practicing smiths, or had practiced metal-working earlier in their career. The range of possibilities might be assessed from further comparative research into the history and ethnography of metal-working organization in later periods, such as the guilds of Islamic Period Egypt. These officials are mentioned here as possible participants in the physical labour of goldwork. Within the Memphite region, at Saqqara, Mariette recorded remains of the courtyard and chapel of Duanra, an overseer of agricultural and food-provisioning accountants; the focal stela in the small (1.2 m × 1.9 m) inner chapel included depictions of men bringing offerings for eternity, and one pair is identified as the ‘inspector of goldworkers Khunptah’ and the ‘goldworker Ptahshepses’ (Mariette 1889, 349–50 mastaba D61). Other offering-bearers named on the stela are two ivory-carvers, and one overseer of ivory-carvers of the king’s ornaments, locating the activity of Khunptah at the production centres of kingship, and evoking perhaps the combination of gold and ivory work in palace arts. Mariette also recorded a Saqqara chapel where the goldworking official is not a secondary figure, but the primary beneficiary of the offering-cult there, ‘overseer of goldworkers of the king’s ornaments Userptah’ (Mariette 1889, 116, mastaba C3). Ptah is the main god at Memphis, and associated with creative forces and with metalwork, and thus appropriate for evoking in the names of both these Memphite officials of gold-working and the goldworker Ptahshepses. Userptah is the only person named on the roughly carved and unfinished focal stela, the only inscribed element; the chapel takes



the form of a corridor with shallow niche against the mastaba (Arabic for bench-block), the solid cuboid mass covering the shaft to the burial chamber. In this case, the mastaba is constructed in mud-brick rather than limestone. The scale, material, quality of construction and carving, and absence of further decoration indicate that Userptah had access to just the minimum resources necessary to establish his place of offerings for eternity. Since his title implies service in the production of royal jewellery, either the monument dates to a less wealthy period at the Memphite centre of kingship, or the social status of goldworking officials occupies a place at the borderline between those who could and could not afford the minimum of draughtsmanship, stone-carving and architectural skills required for inscribed monuments for eternity. Possibly too the goldworkers of the king's ornaments might, either in general or in this case/period, be involved primarily in repair rather than in production. However, work on king's ornaments might be the sole task recorded for the primary beneficiary of a chapel, as indicated by the finely carved stela of a *bdty hkr nswt* 'metalworker of king's ornaments' Werka and his mother Khentetka, also from Saqqara (Fischer 2000, 5, 7 fig. 4, 58–9 n.42).

Among the officials responsible for *smntyw* prospectors, discussed above, Tjau was also 'overseer of goldworkers' at Edfu in southern Upper Egypt, a location suitable for expeditions to east desert gold mines, requiring both prospectors and goldworkers. The style of his stela and its hieroglyphs suggests a date late in the First Intermediate Period, the century

of disunity after the Old Kingdom, or even into the succeeding period of the Middle Kingdom (Fischer 1985, 25), when the distribution and expression of authority changed.

Named goldworkers and goldworking supervisors of the Middle Kingdom

The word *nbwy* 'goldworker' appears in sources of the Middle Kingdom (c. 2000–1700 BC) with names, either alone (Table 2.12) or in the titles *imy-r wꜣrt n nbwyw* 'overseer of the section of goldworkers', and *imy-r nbwyw* 'overseer of goldworkers' (Tables 2.13–2.14). The difference, if any, between the responsibilities of the 'overseer' and 'section overseer' has not been established. The individuals are all attested on one of two source-types: items from offering-chapels (source-type 2.2), and scarab-shaped seal-amulets (source-type 4). With their hieroglyphic inscriptions, the scarab seals indicate a permanence to the link between title and name as primary designators of identity; their amuletic use would be active whether or not they were used in administrative and domestic practice. Most of the elements from offering-chapels here are stelae (the exceptions are Table 2.12 nos.9–10 jambs and lintels of a small chapel door, Table 2.12 no.12 offering-table). The carving varies greatly in quality, and the goldworker or overseer may be either the main beneficiary of the monument or named on the monument of another individual. The position, quality, and range of other titles on the monuments provide details on the social status of these people involved in gold-working, in terms of their access to

**Table 2.12.** Middle Kingdom sources for named goldsmiths (after Ward 1982, no.824). \*chapel items = stelae except no.11 lintel and jambs of stela frame, no.12 offering-table. Abbreviations: A = Amenemhat, S = Senusret, D = Dynasty, MK = Middle Kingdom.

	Source	Date	Provenance	Name of nbwy	Status on monument
	chapel items*				
1	CG20285	mid-D12	Abydos North	Intef	main beneficiary
2	CG20536	A III, year 1	Abydos North	Renefsenef	on stela of <i>imy-r pr</i> Sobekemsaf
3	Louvre C6	AIII	? (Abydos?)	Iimeru	stela headed by <i>imy-r pr n rmt</i> Kefnen
4				Gebu	
5				Senbu	
6				Sen'a'a	
7	CG20271	late (?) MK	Abydos North	Sobekhotep	main beneficiary
8	CG20689	late (?) MK	Abydos North	Ameny	main beneficiary
9	CG20630	late MK	Abydos North	Pesesh	main beneficiary
10				Sobekhotep	named in filiation of <i>nbwy</i> Pesesh
11	UC14345	late MK	?	Keki	main beneficiary of associated monument?
12	Engelbach 1922	end MK?	Edfu	Menekh	main beneficiary
	scarab seals				
13	UC11377	late MK	?	Nebipu	

**Table 2.13.** Middle Kingdom sources for named overseers of goldsmiths (after Ward 1982, no.230). Abbreviations: A = Amenemhat, S = Senusret, D = Dynasty, MK = Middle Kingdom.

	Source	Date	Provenance	Name	Status on monument
	stelae				
1	CG20515	S I, year 1	Abydos North	Nakht	main beneficiary
2	CG20751	S I	Abydos North		son of main beneficiary
3	CG20594	mid-D12	Abydos North	Ameny	main beneficiary
4				Sarerut Intef	son of main beneficiary
5	CG20704	late (?) MK	Abydos	Neferher	main beneficiary
6	Louvre C6	A III	? (Abydos?)	Gemsu	stela headed by <i>imy-r pr n rmt</i> Kefnen
7				Pesesh	
	scarab seals				
8	Beaulieu	late MK?	?	Ninetib (?)	
9	MMA 26.7.287	late MK	?	Hay (?)	
10	UC11445	late MK	?	Saptah	

**Table 2.14.** Middle Kingdom sources for named section overseers of goldsmiths (after Ward 1982, no.112; Grajetzki 2001, 24 for stela Marseille 223). Abbreviations: D = Dynasty, MK = Middle Kingdom.

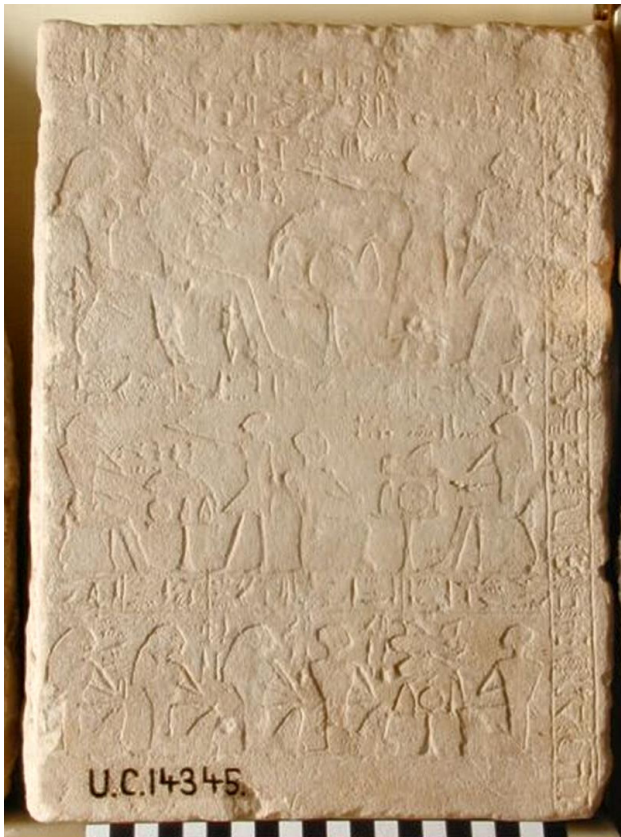
	Source	Date	Provenance	Name	Status on monument
	<i>stelae</i>				
1	Marseille	early D13	? (Abydos?)	Ptahwer	on stela of <i>rh nswt</i> Khenmes
2	CG20035	late MK	? (Abydos?)	Sobek	on stela of <i>šmsw i'zw</i> Iuferseneb
	<i>scarab seals</i>				
3	BM48831	late MK	?	Heteb (?)	

resources and places of work. The following review is intended as a preliminary assessment (mainly from the sources in Ward 1982).

Goldworkers are the main beneficiaries of the offering-cult in the case of one Edfu offering-table (Table 2.12 no.12, Engelbach 1922, 123), three Abydos stelae (Table 2.12 nos.1, 7–8), and one Abydos chapel doorway (Table 2.12 nos. 9–10). Offering-chapels were set up at Abydos both by inhabitants of the area and by officials sent to work on kingship projects there or passing on their way to other destinations (Volkhine 1998). The range of persons named on a monument can sometimes shed light on whether the goldworker is based at Abydos permanently or temporarily, and whether he is connected to local or royal commissions, there or elsewhere. For example, the fine mid-12th Dynasty stela of the goldworker Intef (Table 2.12 no.1) records his family and the ‘accountant of the district’ Amenemhat; the latter title sounds local, but might designate an official from a different region, leaving their relation to Abydos uncertain. Two less carefully carved stelae record a goldworker and his family, without other title-holders (Table 2.12 no. 7 Sobekhotep, Table 2.12 no. 8 Ameny). On the miniature chapel doorway of the goldworker Pesesh (Table 2.12 no. 10), the doorway

inscription identifies his father Sobekhotep as also being a goldworker, an interesting instance of father and son sharing the occupation, whatever the precise circumstances may have been; family apprenticeship is one possibility. On the symmetrical inscription of the lintel, Pesesh is on one side ‘goldworker’, on the other *ms ʿst* ‘worker in hard stones’; the combination may reflect either a regular skillset of a jeweller, or a lesser degree of specialization, perhaps in smaller-scale and/or regional production. The offering-table from Edfu is of sandstone, indicating local production; as with Old Kingdom sources for prospectors and goldworking overseers, this provenance connects him to the ‘gold of Edfu’ arriving from the eastern desert routes. According to the orthography of its inscription, its beneficiary the goldworker Menekh would have worked at the very end of the Middle Kingdom, when the unity of Egypt began to fragment. An unprovenanced stela with depictions of thirteen men and women, named but without titles, also seems to come from the chapel of a goldworker, according to the edge line of inscription appealing to passing staff to recite a formula for offerings ‘for the *ka* of this (group on a monument in the) desert, which is on the chapel of the goldworker Keki’ (Table 2.12 no. 11, Fig. 2.9).





**Figure 2.9.** Unprovenanced limestone stela referring to 'the chapel of the goldsmith Keki', UC14345.

On the Abydos stela of the estate manager Sobekemsaf and his wife Nethedj, beside the main couple a further five people are depicted, identified as another estate manager and brothers and sisters; six further men are named but not depicted below, being two more brothers, an estate manager and his wife, a sealer, and, at the end, the goldworker Renefseneb (Table 2.12 no. 2). This estate manager Sobekemsaf is described as a 'confidant of the king' and 'one who calculates products, accounting in thousands, totalling in millions', implying service on a major kingship project.

On another stela, plausibly from Abydos on the basis of parallels, the names and titles of the estate manager of labour Kefnen and lady of the house Seneb are written without depictions above four registers of figures and inscriptions, while two men with the title *gnwty* 'sculptor' are named but not depicted at top left and top right flanking the figures of Osiris and Wepwawet, deities of Abydos, and the throne-name of king Amenemhat III (Morfoisse & Andreu-Lanoë 2014, 75, fig.5). The first three registers show seated pairs of figures: four men are identified as *nbwy* 'goldworker' (Table 2.12 nos. 3–6), two as *imy-r nbwyw* 'overseers of

goldworkers' (Table 2.13 nos. 6–7), and there are six women with the title lady of the house. Geneviève Pierrat-Bonnefois notes that the father of the goldworker Senaa in this group has the name Aam, an ancient Egyptian word for someone from the Levant (in Morfoisse & Andreu-Lanoë 2014, 173 with fig.3). In Middle Kingdom sources, the word *ꜥm* is used to identify the non-Egyptian origin of people, who may have either west/northwest Semitic or Egyptian personal names (Albright in Hayes 1955, 92–9 on the most extensive document; list and discussion in Berlev 1972, 74–95; Schneider 2003). Further research may clarify the scope of usage of the ethnonym as a personal name in this period, when the word Nehesy 'Nubian' was similarly used as a personal name for people whose relation to Nubia may have been direct or indirect (Winnicki 1998; Schneider 2003, 4, 86). The fourth register contains three pairs of men and women, with a son between the pair at right; one man is an overseer of coppersmiths, one is keeper of a chamber (either in the food-provision sector or the treasury), and one is a doorkeeper of the works enclosure. Below the registers with figures, two further lines of inscription give the names of another keeper of a chamber, and three women with the title lady of the house. The presence of men employed in sculpting and gold-working implies a prestigious and perhaps large-scale operation. The pairing seems to be a systematic principle of organization at both upper and lower levels of the gold-working hierarchy. In effect, the stela conveys the activity of a gold workshop at Abydos together with sculptors during the 45-year reign of Amenemhat III. A group of offering-chapel monuments centred on the large stela of the treasurer Iykhernefret attests to dedications to the Osiris temple by that king with his father Senusret III, who may himself have been buried at Abydos (Wegner 2009, 128–9). However, Kefnen and the pairs of sculptors, goldworkers and overseers may have been active later in the long reign of Amenemhat III.

The title 'overseer of a section of goldworkers' is not attested as designation for anyone on their own chapel monument, but two stelae of other persons each record a man by this position. Ptahwer is named on the monument of 'the one known to the king' Khenmes (Table 2.14 no. 1), from a group of stelae inscribed for staff of the treasurer Senebsumai, in office during the early 13th Dynasty (Grajetzki 2001, 12–25). At this period, the rather vague-sounding title of Khenmes is held by officials in close relation to the treasurer, perhaps as deputies by royal appointment on top-level commissions (Grajetzki 2001, 47–8). A second, very similar stela of Khenmes records two men with the title *imy-r ḥnwty ḥrp skw* 'inner palace overseer,

director of troops', a designation for palace officials in charge of a force sent into the desert lands for mining and quarrying. The context for this section overseer of goldworkers might then be a royal expedition for procuring desert minerals and stone; if so, Ptahwer might have been responsible for the goldsmiths producing precious metal artefacts for the king, destined for palace or temple use. Where an item from an Abydos offering-chapel has no associated objects, but preserves titles and names of several people, that internal information can give some idea of the immediate activity that brought those individuals together. The section overseer of goldworkers Sobek is known from the stela of the guard and interpreter Iuferseneb, whose titles recall the Old Kingdom combination of concerns for security and for communicating with people who did not speak Egyptian, such as desert nomads or traders (Table 2.14 no. 2). Most other persons on the stela either hold military or policing titles, or belong to the family of Iuferseneb; one further official holds a middle-ranking palace title (*smsw h3yt* 'elder of the portal'), and one last title is of uncertain interpretation. The evidence on these two individuals provides limited support for the hypothesis that goldworkers might be organized in 'sections' in relation to kingship expeditions to procure and work eastern desert resources, and were perhaps present at Abydos, as a centre of kingship monument-making.

The rather cursory carving of the stelae on which Ptahwer and Sobek are recorded seems to imply modest resources either of these individuals or of the palace at the period when they worked, within the late Middle Kingdom. By contrast, men who held the shorter title 'overseer of goldworkers' are known from more impressive works, including the remarkable miniature chapel of Neferher from the late (?) Middle Kingdom (Table 2.13 no. 5), and three early 12th Dynasty stelae with 'overseer of goldworkers' of distinctly finer quality. One stela in elegant mid-12th Dynasty style depicts an overseer of goldworkers Ameny with his wife Nebetit and his son Sarerut Intef, also an overseer of goldworkers (Table 2.13 nos. 3–4); the carving was not completed, with the offering table and figure of the son rendered in paint. The inscription identifies the son as 'the one whom the king praised in his childhood', perhaps implying that both father and son supervised goldsmiths at the Residence or on kingship commissions elsewhere. The overseer of goldworkers Nakht is depicted on two stelae (Table 2.13 nos. 1–2), which come, with a third, from one Abydos offering-chapel, and have been described as representing 'some of the finest workmanship of the early part of the dynasty' (Simpson 1974, 23). Inscriptions on this set of monuments identify the main dedicator as the lector and

draughtsman Nakht, who set up one larger stela for his father the goldworker overseer Nakht (CG20515, h. 95 cm), a second for his father's father the estate manager Nakht (CG20751, h. 41 cm), and a third finally for himself and his father, here without the title overseer of goldworkers (CG20526, h. 57 cm). In this family, there is no transmission of office across the three generations of Nakht, although the art of draughtsmanship and lector's knowledge of hieroglyphic script would be essential in any design incorporating inscriptions and formal figures, including on stelae and jewellery (Vernus 1986). On the largest stela CG20515, bearing the formal date Regnal Year 10 of king Senusret I, the goldworker overseer's son Nakht is designated more fully as 'senior lector and draughtsman in Itjtawy-Amenemhat', demonstrating that he served at the Residence Itjtawy shortly after it was founded. His father the goldworker overseer might then have served in the previous generation, perhaps just before the founding of the new Residence; therefore, it is not clear whether he would have worked for the king or for others, or where he would have been based.

Among the few scarab seal-amulets for goldworkers and their overseers, there is no immediate difference in quality that might correspond to any hierarchical access to resources. Indeed, within the same broad period of the late Middle Kingdom, the scarab of a 'goldworker' may be more finely cut than that of an 'overseer of goldworkers' (Fig. 2.10), a reminder that the drafting, cutting and glazing of a seal-amulet may involve further factors beyond hierarchical position, such as regional variation and localized opportunities.



**Figure 2.10.** Glazed steatite scarab seal-amulets, undersides inscribed for the goldsmith Nebipu (left) and the overseer of goldsmiths Saptah (right) UC11377 and 11445.



Named goldworkers and goldworker supervisors of the New Kingdom

In the New Kingdom, the source types change in form, with painted-plaster as well as stone-relief offering-chapels. Their range also shifts to include statuettes in temples of deities, administrative documents, and handwritten 'visitor inscriptions' at monuments, while titles and names on seal-amulets become rarer, with no examples of goldworkers or their supervisors. Burial equipment now includes papyri for the afterlife on a more regular basis, though still only for select men and women with particular access to resources. However, the dominant general source is still the monument for securing an eternal supply of offerings for a named individual. With the establishment of Egyptian control over a greater area of Nubia and its gold mines, written evidence from or related to those southern desert-lands becomes more prominent. A review of readily accessible sources can provide a general impression of our evidence base for the goldworkers and supervisors we know by name.

The single monument with the largest number of named individuals in goldworking is a large and finely carved Ramesside stela, for which no findplace is recorded (British Museum EA 141, h. 76 cm; Fig. 2.11). The three most prominent persons are the *hry nbwyw m hwt-nbw* 'head goldworker in the Mansion of Gold' Panehsy and Paramheb, in the uppermost register (Table 2.16 no. 17), and, at lower right, *nbwy n hwt nbw ms ntrw* 'goldworker of the Mansion of Gold, fashioner of the gods' Iny the son of Paramheb, here also identified as 'fashioner of the gods' (Gaballa 1977, 126, notes the possibility that this Iny might be the 'overseer of goldworkers' attested on a stela from Saqqara, see Table 2.15 no. 4). Between are two registers, one with seven men, the other with eight women. Four of the men have titles related to gold-working: *nbwy n imn* 'goldworker of Amun' Amenkhau, *hry nbwy* 'head goldworker' Khonshotep, *nbwy n hwt nbw* 'goldworker of the Mansion of Gold' Sutaa, and the *wꜥb*-priest and goldworker Ptahmes. The other men are the *wꜥb*-priest of Ptah Pyay, a *sš* 'accountant', and Pendua, without title. All but Ptahmes are called 'his brother', which can be used for a full or half brother, cousin or uncle, or a colleague. A second monument, said to have been acquired at Akhmim, a limestone slab with a finely sculpted image of Ptah in raised relief, is inscribed for the head goldworker of the Mansion of Gold, fashioner of the gods Panehsy (Table 2.16 no. 17 Fitzwilliam E.195.1899: Martin 2005, 71–3). There his parents are identified as the head goldworker Paramheb and the lady of the house and chantress of Amun Tami, the same name as for the first of the eight women on the previous monument. As one

man in the group is a *wꜥb*-priest of Ptah, the main god at Memphis, this family of goldworkers may have worked in that city. The image of the Osiris emblem in the larger monument supports the hypothesis that the group set up a chapel at Abydos, in relation to kingship projects there (Akhnim is 50 km from Abydos, but would have been the nearest larger town in the early 19th century, and so plausibly a location for purchasing Abydos antiquities). The smaller monument bears the date year 4 of Merenptah, in whose reign an extensive programme of relief decoration was undertaken at Abydos in the Sety I temple for reviving Osiris (von Lieven 2007b). The two sources thus hint at the involvement of a family of senior



**Figure 2.11.** Stela of the head goldsmiths Panehsy and Paramheb, British Museum EA 141.

**Table 2.15.** *New Kingdom sources for men designated as overseers of goldsmiths.*

	Source type	Date	Provenance	Title	Name
	<i>temple statues</i>				
1	Louvre	Amenhotep II	?	<i>imy-r nbwyw n pr r</i>	Hatra
	<i>chapel stelae</i>				
2	Chicago OI 10789	mid-18th Dyn	?	<i>imy-r nbwyw n imn</i>	Amenemheb
	Yale 1937.144		?		
3	Florence 2570	late 18th Dyn	Saqqara?	<i>imy-r nbwyw n (...)</i>	Mery
4	Cairo JE15115	late 18th Dyn	Saqqara	<i>imy-r nbwyw n nb t3wy</i>	Iny

**Table 2.16.** *New Kingdom sources for men designated as head goldsmiths.*

	Provenance / location	Title	Name	Status on monument
	<i>Nubia</i>			
1	Sai T26.6 shabti, vases	<i>hry nbwyw / nbwy</i>	Khnummes	sole beneficiary
2	Buhen? stela BM 1188	<i>hry nbwyw</i>	Khnummes	father of main beneficiary
3	Aniba S31 heart scarab	<i>hry nbwyw</i>	Rek	sole beneficiary
4	Aniba? naos BM 476	<i>hry nbwyw</i>	Bakwerner	son of main beneficiary
	<i>Thebes</i>			
5	Theban Tomb 189	<i>hry nbwyw m pr imn</i>	Nakhtdjehuty	main beneficiary
		<i>hry nbwyw n pr imn</i>	Khonsemheb	son of main beneficiary
6	Theban Tomb 372	<i>hry nbwyw n pr imn</i>	Djehutymheb	son of main beneficiary
	<i>Abydos</i>			
7	stela Cairo CG34089	<i>hry nbwyw n nb t3wy</i>	Khons	main beneficiary
	<i>Saqqara</i>			
8	tomb-chapel S2730	<i>hry nbwyw n nb t3wy</i>	Ipuya	main beneficiary
9	tomb-chapel	<i>hry nbwyw n nb t3wy</i>	Ameneminet	main beneficiary
10	tomb-chapel	<i>hry nbwyw n nb t3wy</i>	Sayempeteref	main beneficiary
11	tomb-chapel?	<i>hry nbwyw</i>	Amenemheb	main beneficiary?
12	tomb-chapel?	<i>hry nbwyw</i>	Ptahemheb	main beneficiary?
13	tomb-chapel 2009/8	<i>hry nbwyw</i>	Tatia	main beneficiary
14	tomb-chapel of Mes	<i>hry nbwyw n pth</i>	Tatia (?)	secondary beneficiary
15	tomb Bubastieion I.27	<i>hry nbwyw n nb t3wy</i>	Yut	father of main beneficiary
	<i>Per-Ramses</i>			
16	stela Hildesheim 398	<i>hry nbwyw</i>	Penweret	main beneficiary
	<i>unprovenanced (Abydos?)</i>			
17	stelae BM 141 and Fitzwilliam E.195.1899	<i>hry nbwyw m hwt-nbw</i>	Panehsy	main beneficiary
		<i>hry nbwyw m hwt-nbw</i>	Paramheb	father of main beneficiary

goldworkers in a specific operation for embellishing the architecture or creating the ritual equipment of a major cult-centre. The two monuments of Panehsy provide another example of the possibility for a son to follow the same occupation as his father, in gold-working.

Other features of this group illustrate differences between the New Kingdom and preceding periods. First, the relation of the Mansion of Gold to the wider domain of valuables is articulated explicitly in the

titles of goldworkers and their supervisors, where previously it had seemed to be, not an institution with its own buildings, but rather a general term for a theme or category of activity. Both in and before the New Kingdom, 'gold' and its 'Mansion' may be expected to cover the wider range of materials and skillsets required for jewellery production. Secondly, titles at Thebes now refer regularly to the domain of the god Amun, centred on the massively expanded architectural temple complex at Karnak for the fused

form Amun-Ra. Egyptologists have seen in this manner of expression an opposition between kingship and temple, on the model of European histories of Church and State, but such an approach seems anachronistic (Exell & Naunton 2007, 93). If we are to understand the organization of gold-working in this period, it is important to recognize how the Amun domain follows already existing structures for administering southern Egypt and Nubia in a kingship based in Lower Egypt. In Middle Kingdom documents and titles, Thebes is the Southern City, and southern Upper Egypt is a separately administered region ‘the Head of the South’ (Quirke 2004, 116–18), terms which seem more ‘secular’, in the terms of European historiography (Asad 2003). However, temple estates and staff seem to operate within an overall system of kingship or royal administration in 2nd millennium BC Egypt, despite the separation into two sectors of *pr nswt* ‘domain of the king’ and ‘temple’ (explicit on the stela of Nebipu, an early 2nd millennium BC palace official, British Museum EA101, see Quirke 2004, 4). After the 16th century BC, the institutions for administering the south are expressed through the Amun temple, as an integral part of kingship. From its Middle Kingdom ‘Head of the South’ structural framing, the New Kingdom Amun domain would function as the economic dimension of a centralized but regionally articulated kingship. Within that kingship, the Amun domain variously flourishes or declines within the wider interregional developments of the Late Bronze Age. There is no ‘secular’ in this ancient history: the two institutional labels in written sources ‘king’s domain’ and ‘Amun domain’ are both equally ‘religious’ and ‘administrative’. Accordingly, we should not expect to find two sets of southern institutions, one a treasury of the king, and the other a treasury of Amun: at Thebes, the treasury for kingship is precisely the ‘treasury of Amun’, that is, of the god whose son and high priest is the king. This difference from normative Egyptological history is crucial for understanding the workplaces, projects and lives of the goldworkers in the sources, because it adds a general regional dimension to the evidence for them. On the stela of Panehsy, only one of his ‘brothers’ is explicitly a ‘goldworker of Amun’ (the term ‘brother’ can denote either colleague or kinsman). Either just one Theban joins a group in a kingship project, at Abydos or elsewhere, assembling specialists from different cities; or, though unstated, the other men are also from Thebes, in a project with goldworkers who were all from the Mansion of Gold at Thebes. The examples below provide further evidence for the integration of king’s domain and Amun domain, and for the associated question of single or multiple sources of staff on major projects. A third

difference between New Kingdom and earlier written sources is more readily legible as a change in styles of expression: in place of Old Kingdom inspectors, directors and overseers of goldworkers, and Middle Kingdom overseers, the New Kingdom brings the more current term of the day *hry* ‘head of’ goldworkers alongside rarer examples of their ‘overseers’. As no one inscription or manuscript seems to use both two terms, they seem to be synonyms with different nuances, rather than two levels of a hierarchy. Their contemporaneous use reflect the diglossia of the age, in which the earlier synthetic stage of the language Middle Egyptian provided a more formal expressive register beside the analytic stage of the language Late Egyptian (Vernus 1996).

On several sources a man is ‘goldworker’ without any further explicit information, while, in others, an institution is identified. At Saqqara, a goldworker of the temple of Ramses II wrote a devotional graffito at the Step Pyramid at Saqqara, indicating that he worked in the massive precinct of that king in Memphis. Two stelae record men with the title ‘goldworker of Amun’: Yetutu at Abydos (Cairo CG34076), and Meh at Thebes (UC14231). Here the context is essential for assessing location in hierarchy or attachment to an institution. In particular, it is useful to distinguish between instances where the goldworker is the main or sole person, or a secondary figure, for example, where the ‘goldworker’ appears on a monument of another person. A remarkable list of houses by owner is preserved on one papyrus from the late 20th Dynasty (12th century BC), including ‘the house of the goldworker Nesptah’ (British Museum EA10068, vso col.4, 17; Peet 1930, pl. 15). The list identifies 182 houses along the desert edge of the fields on the West Bank of the Nile at Thebes, and the wording might give the impression of an independent artist there. However, Jac Janssen demonstrated that the list identifies not all West Bank houses, but clusters of housing in the vicinity of three major kingship temples (Janssen 1992). The goldworker Nesptah is named for a house in far the largest grouping, 155 houses listed after the temple of Ramses III at Medinet Habu. Therefore, he might either have been affiliated to that temple, or working independently in that settlement, the largest on the West Bank from the 12th century BC to the 1st millennium AD. In this context, the historical question of artistic autonomy becomes somewhat subjective within the relative spectrum of dependency on the main commissioning entity in a locality. The same question applies to goldworkers attested at the major Nile Valley towns where gold from eastern desert mines would have been loaded onto boats for onward transport. During the New Kingdom Egyptian occupation of Nubia, with closer control of the gold mines in the



eastern deserts there, the Egyptian administration of Lower Nubia was centred on the town at Aniba. A stone stela dedicated in the main temple there is inscribed for the goldworker Nebsen, and a stone shabti of a goldworker named Khay comes from a burial in the town cemeteries (Steindorff 1937, 24–5 no. 44a, pl. 11 no. 42 stela of Nebsen, 79, pl. 42.3 shabti of Khay from burial S91). In relation to gold mines east of Upper Egypt, a miniature votive stela bears an image of Osiris lord of Gebtyu (Coptos/ Qift) and the title and name of the donor ‘goldworker Khonsumes’ (Fig. 2.12). In our limited knowledge of the New Kingdom economy (Janssen 1975), it is hard to locate Nebsen, Khay and Khonsumes on the spectrum between institutional and independent specialists. The question of affiliation is harder still to address in the case of objects with no indication of provenance, such as the fine shabti of the goldworker Hat (British Museum EA64582; Taylor & Strudwick 2005, 210–11).

In an incomplete but finely painted Theban tomb-chapel of the mid-18th Dynasty, the main beneficiary of the monument is a man named Nehemawy, identified by two titles, *nbwy* ‘goldworker’ and *sꜥnh* ‘sculptor’ (Theban tomb-chapel 165, Davies 1913, 40–1). The chapel is small, at about 3.5 m × 1.8 m, with no scenes of production in its single room, but the quality indicates an ability to access significant resources, in draughtmanship and execution of the painting. The combination of titles implies an ability either to gild figures or to cast figures in gold, requiring greater expertise and so perhaps explaining the more substantial monument for securing eternal offerings for this artist. If he had any institutional affiliation, it was not considered essential enough for his identity or afterlife to require mention in this space.

Some men are identified as ‘goldworker’ on a monument where another person is the main beneficiary (e.g. Neb on the stela of Yetutu from Abydos, above, and Nebmehyt among sons of Amenemhet in his Saqqara tomb-chapel, below). In these instances, the focus on the main ‘owner’ of the monument may lead to abbreviated designations for other individuals. On the stela of the *imy-r ḥmw ntr imy-r ḥmwtyw* ‘overseer of god’s servants’ and ‘overseer of craftsmen’ Mernedjem, the record of his parents immediately after his name gives his father as ‘goldworker’ Khnummes; however, next to the image of his parents below, Khnummes has the more senior title ‘head goldworker’ (Table 2.16 no. 2 British Museum EA1188, acquired at Wadi Halfa, perhaps from Buhen; Biebrier 1982, pls. 54–5). The variation within this single stela offers a warning that context and space may affect the expression of position of an individual, particularly where not the central person on the source.



**Figure 2.12.** *Miniature votive stela of the goldsmith Khonsumes, unprovenanced, Petrie Museum of Egyptian Archaeology UC14603.*

At least four men with the older version of the supervisory title ‘overseer of goldworkers’ are known from 18th Dynasty monuments, all of fine quality (Table 2.15). In each case, the core title was expanded by a phrase to specify the institutional location, but this is not preserved on the surviving section of the stela for Mery (Table 2.15 no. 3, Bosticco 1965, pl.37, late 18th Dynasty, c. 1300 BC). The lower half of a stela found at Saqqara is inscribed for a man named Iny, identified as ‘one greatly praised by the good god (the king), whose lord loves him for his qualities, overseer of craftsmen in Upper and Lower Egypt, who knows the secrets in the Mansion of Gold, overseer of goldworkers of the lord of the two lands (the king)’ (Table 2.15 no. 4, Gaballa 1977). This stela fragment may date to the late 18th or early 19th Dynasty (late 14th–13th centuries BC), when many members of the royal court were buried at the cemeteries of Memphis (Staring 2017, 602–3; see below for other gold-working titles there). The overseer of goldworkers of Amun Amenemheb is the main beneficiary on two stelae of the mid-18th Dynasty, c. 15th century BC (Table 2.15 no. 2, Simpson 1979). One informative source for the self-expression of a goldworker official is the temple statue for Hatra; made of quartzite, a hard stone requiring greater skill to sculpt, this monument is in the form of a temple guardian seated on the ground, and bears hieroglyphic inscriptions over front, back and sides, with the name of king Amenhotep II (late 15th century BC) at the right arm (Table 2.15 no. 1, de Cenival 1965). From these we learn that Hatra held the titles ‘god’s father of Atum’, a position in temple ritual, and ‘overseer of goldworkers of the domain of Ra’; Ra and Atum are two aspects of the sun-god at his main cult-centre, ancient Iunu



(Greek Heliopolis) northeast of central Cairo. The inscriptions assert that he had been entrusted with commissions across the land, and rewarded accordingly: ‘the overseer of goldworkers Hatra says before those who are on earth, the servants of this temple: I am an artist (*hmww*) of incisive sight (?) of Upper and Lower Egypt’ ... ‘I reached (south) to Elephantine and north to Tjary with the monuments made by His Power (the king) for Amun in this place, for Horus lord of heaven and lord of Mesen, for Wadjet of Imet’ (back); ‘the god’s father of Iunu, Hatra: I achieved works in this temple [...] at the house of Horus lord of Mesen, I was praised to its god, I was rewarded for it by the good god (the king), receiving numerous favours of the presence of the king time after time, consisting of silver and cloth, of every ... (?) of the king’s domain’ (right side); ‘the good god (the king) praised me, for the tasks which I achieved in this temple are known to him; I was assigned 50 arouras of farmland as reward’ (left side). The prominence of the goddess Wadjet of Imet (Tell el-Farain/ Nebesha) suggests that the statue was installed in her temple at that city in the northeastern Delta. Its inscriptions demonstrate how an official supervising goldworkers might travel from the south of Upper Egypt to the north of Lower Egypt, implying movements of skilled artists and of their knowledge across the country at this period.

The more frequent New Kingdom designation for senior goldworker, *hry nbwyw* ‘head goldworker’, is attested along the Nile Valley from the area of the Egyptian-controlled gold mines in Nubia, to the major cities of Thebes and Abydos, and the Residence cities of the late 18th Dynasty, Memphis, and 19th Dynasty, Per-Ramses (Table 2.16). The southernmost source is on Sai Island, in Upper Nubia, just south of the Second Cataract. Among the burials in one large tomb here, the earliest is of a man named Khnummes, identified as ‘goldworker’ and ‘head goldworker’ on a funerary figurine and two faience vessels; gold foil from a head mask was found, and pottery vessels indicate a mid-18th Dynasty (Table 2.16 no. 1, Budka 2017, 119–23). In Lower Nubia, in addition to the head goldworker Khnummes, recorded on the stela of his son Mernedjem (Table 2.16 no. 2, see above), a head goldworker Rek is known from burial equipment in the cemetery of the New Kingdom administrative centre Aniba. His title is given on a black faience heart scarab from the shaft of a plundered 6-chamber tomb SA31, from which shabtis of the overseers of craftsmen Bakwerner and Rek were also retrieved (Table 2.16 no. 3, Steindorff 1937, 83 shabtis, 88 heart scarab, 232 tomb plan and description). Curiously, the same two men appear on an item extracted without documentation in the early 19th century, and sold in the 1845 auction of items

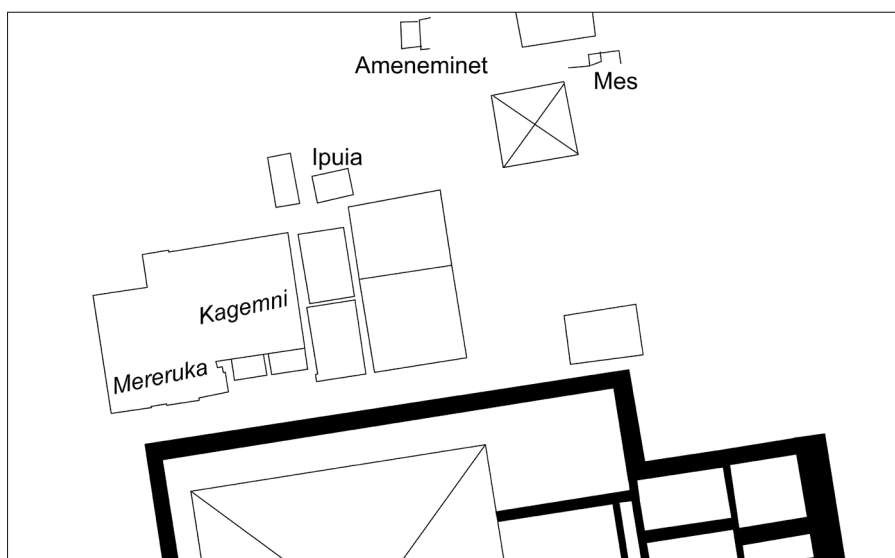
collected by Yiannis Athanasiou, an antiquities trader based at Thebes; this is a limestone shrine inscribed for the ‘overseer of craftsmen of the lord of the two lands (the king) and of Horus lord of Miam (Aniba)’ Rek and his son the head goldworker Bakwerner (Bierbrier 1982, pls. 58–60; now British Museum EA476). In the sources for these two men, the designations head goldworker and overseer of craftsmen appear interchangeable, indicating the dangers in reading in too fixed a manner; sometimes titles may denote overlapping skillsets or responsibilities.

Head goldworkers are attested with name in two painted tomb-chapels of the Ramesside Period (13th–12th centuries BC) at Thebes. The head goldworker in the Amun domain Nakhtdjehuty is the main beneficiary in one, where the damaged decoration includes part of a narration of his life in the first person, and depictions of golden temple gates and portable boat-shaped shrines on which he worked during the long reign of Ramses II (Table 2.16 no. 5, Kitchen 1980, 348–53; Frood 2007, 136–8). Nakhtdjehuty is also designated ‘overseer of craftsmen of the northern lake of Amun’, and one of his autobiographical statements indicates that the two positions were officially combined: ‘I was appointed as overseer of craftsmen and head goldworker’ (Kitchen 1980, 350, section (g) lines 2–3). In one scene, his son Khonsemheb, also head goldworker of the Amun domain, is depicted bringing offerings to his parents. In a later Theban tomb-chapel, the ‘pure-priest, master of secrets in Ipetsut (the main Amun temple complex at Karnak), head goldworker of the Amun domain’ Djehutymheb, is identified as the dedicator of a scene of adoration of Ptah by his father Amenkhau, identified as ‘overseer of craftsmen of the temple of millions of years of Usermaatra (Ramses III) in the Amun domain on the west of Thebes’, a reference to the temple for Ramses III at Medinet Habu (Table 2.16 no. 6, Spiegel 1940). Here the interlacing of kingship and Amun domain is clearly and carefully articulated. A substantial, fairly skilfully carved stela from Abydos is for the ‘head goldworker of the lord of the two lands’ Khons and his family; the only other man with a title here is a son Ramose, a ‘writer’, indicating work in accountancy or perhaps the position of draughtsman (Table 2.16 no. 7 CG34089, 74 cm × 51 cm, late 18th Dynasty = late 14th century BC; on writers and draughtsman see Laboury 2016).

The main concentration of sources for this period is at Saqqara, the cemeteries of Memphis, starting in the reign of Akhenaten or his immediate successors, with the depiction of the ‘head goldworker of the lord of the two lands’ Yuti (Table 2.16 no. 15) in the Maia rock-cut chapel of his son Hatiay Raia, a treasury accountant of the Aten temple in Memphis (Zivie 2009, second image

for tomb I.27). After the Amarna Period, in the late 18th and 19th Dynasties (late 14th–13th centuries BC), monuments of head goldworkers and overseers of craftsmen are clustered in the central northern area around the Old Kingdom pyramid of Teti (Fig. 2.13), and on the southern plateau where the grand tomb-chapels of high officials at the royal court were located in the late 18th and 19th Dynasties (Gourlay 1979, 92–4; Málek 1985, 50; Staring 2017, 601–3). The original location and scale of many chapels remain uncertain, because numerous blocks from New Kingdom chapels were either reused across Saqqara in antiquity, or detached without precise documentation during 19th century extraction of items for museum collections (Martin 1987). One series dispersed of blocks comes from a chapel of unknown size for a head goldworker named Sayempeteref (Table 2.16 no. 10); his title is given more fully on one block as ‘head goldworker of the temple of Menmaatira (king Sety I)’ (Allard Pierson Museum 8851; Keimer 1929, 87; for other blocks see Drenkhahn 1989, 125–31). Despite the importance of these sources in assessing quality of sculpting and range of scenes commissioned for these officials, the excavated and published examples *in situ* are more informative, because the scale of each monument helps to illustrate the range of resources available to goldworkers operating at Memphis for the royal court and/or for the temples of the king and the main Memphite deity Ptah. The chapel of Ameneminet (Table 2.16 no. 9) is at the northern central area, near the pyramid of the Old Kingdom king Teti (Ockinga 2004). It comprises three chapels at the rear of an enclosed court; the central chapel for the offering-cult for Ameneminet is 2.43 m wide, and divided into an antechamber 1.22 m long and inner offering-space about 1.36 m long. In

front of the chapels was a portico with four papyrus-bundle columns; a further two columns supported the antechamber of the central chapel, and in front of these was found a statue of Ameneminet and his wife Nefertary Tahesyt, not necessarily its original location (Ockinga 2004, 34). On the stela from the central chapel, the main titles of Ameneminet connect his work directly with the king: ‘overseer of craftsmen of the lord of the two lands’ and ‘head goldworker of the good god’. The walls of the central chapel, the portico, and the entrance to south and north chapel, were clad with limestone blocks decorated in finely sculpted relief with scenes of the family and offering-bearers, including an image of the four-column portico façade (Ockinga 2004, 29–36, pls. 5–27). From the portico, the court measures about 8.7 m × 8.4 m; at its centre is the 1.9 m × 1.17 m mouth of a shaft 11.15 m deep, leading to two burial chambers below (Ockinga 2004, 26–7). In the remnants of burial equipment, a resin(?)–coated wood shabti (funerary figurine) is inscribed for Ameneminet as ‘overseer of craftsmen, overseer of goldworkers’ (Ockinga 2004, 117 Text 85); here the older ‘overseer’ title replaces ‘head goldworker’, perhaps as the more formal term appropriate to the more intensely sacralized environment of the burial chambers (see above on the distinction between the two terms). His sons include the ‘head goldworker Amenemheb’, on his stela, and the goldworker Nebmehyt (Ockinga 2004, 18–20). There are no traces of any production scenes, and, beyond the titles, none of the inscriptions refer directly to gold-working (Ockinga 2004, 20; Frood 2007, 129–30). Thus, rather than details of profession, the chapel informs us, primarily, of the relative wealth and social status of a head goldsmith for the royal court at Memphis in the late 14th–13th centuries BC.



**Figure 2.13.** New Kingdom chapels among the Old Kingdom monuments of north central Saqqara: Ipuia (S2730), Ameneminet (Loret 2), Mes (Loret 4).

In the same area of Saqqara, roughly 40 m south-west from the Ameneminet monument, there is another east-facing triple chapel with papyrus-bundle columns, enclosed courtyard and tomb shaft, for the 'head goldworker of the lord of the two lands' Ipuia (Table 2.16 no. 8: Quibell & Hayter 1927, 10–11, pls. 8–14). There is no evidence for a statue; instead, the central chapel stela is paired by a second stela against the outer wall to the north chapel. Otherwise, quality and scale are comparable, at an overall 9 m × 6.75 m, and shaft 1.97 m × 1 m leading 11.8 m down to two burial chambers. However, in this monument the themes of decoration are more varied, and include one wall-fragment with scenes of stela inscription, vase decoration, sculpting and chariot-wheel manufacture (Quibell & Hayter 1927, pl. 13). The family of Ipuia includes, on the central stela, his son 'overseer of craftsmen of the lord of the two lands' Parenu. Also in this area, a similar distance to the east of the Ameneminet monument, the offering-cult for a treasury accountant named Mes took the form of an open court, 5 m long, in front of a corner chapel 2.9 m long, and two or more further east-facing chapels (Gaballa 1977, 3–4, pl. 1). The north wall of the corner chapel bears depictions of offerings being brought to Mes and his wife Mutnefret, and two other couples, the accountant of the Ptah domain Huy and his wife Nubnefret, and the pure-one at the fore of Ptah, head goldworker of Ptah Tatia (?) (Table 2.16 no. 14; see Gaballa 1977, 29, pl. 11). Although the writing of the name is unclear on the archive photograph, and not preserved on the main part of the block (now Kestner Museum Hannover 1935.200.190; Martin 1987, 32–3 no.79, pl. 29), the titles and name suggest an identification with the main person on a more modest monument recently discovered in a different part of these Memphite cemeteries. Almost a kilometre away, on the southern Saqqara plateau, between larger temple-tombs and just west of a tomb-shaft, is a single-room chapel 2.4 m wide, 1.6 m long, for the head goldworker Tatia (Table 2.16 no. 13). Its walls were lined with finely sculpted limestone blocks, of which the lower courses survive *in situ*, and the inscriptions on its focal stela identify the principal beneficiary of the monument as 'pure-priest at the fore of Ptah, with (rights of) access in the Mansion of Gold of Ptah, head goldworker Tatia' and 'head goldworker of the Mansion of Gold in the domain of Ptah Tatia' (Raven et al. 2010, 9–14). With this 19th Dynasty monument, we encounter a head goldworker expending clearly fewer resources on his monument for eternity, as compared with the triple-chapel courts of Ameneminet and Ipuia. Historians and archaeologists of the Saqqara necropolis may comment on whether the difference reflects an overall decrease in resources

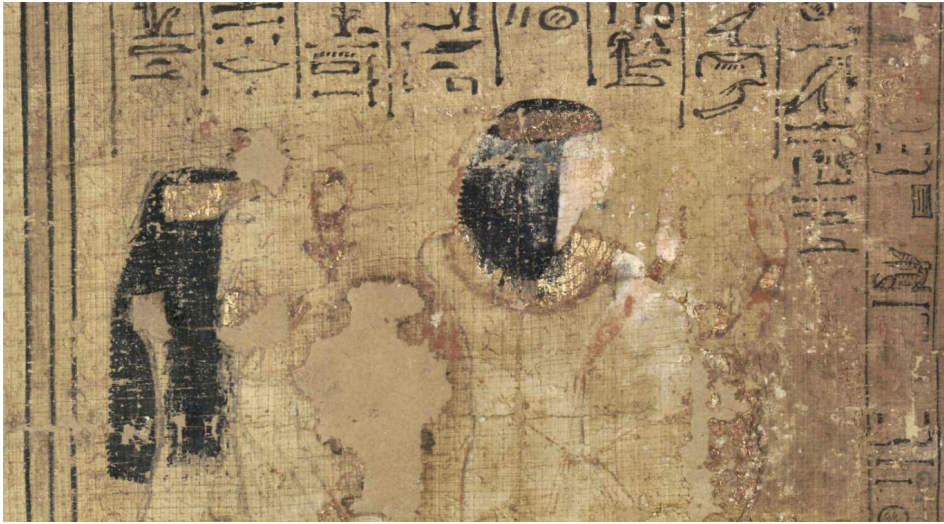
over time across the social group of Memphite officials, or a range of variation to be expected among holders of the same position within one broad period.

Moving to the Nile Delta, a series of distinctive votive stelae for people across a wide social range comes mainly from the city of Per-Ramses (Qantir), the Residence of 19th Dynasty kings (Exell 2009, 102–3). One small example is inscribed for the head goldworker Penweret, described as 'greatly praised by the good god (the king), the beloved', and depicted offering and with hands raised to the god Sobek-Ra (Table 2.16 no. 16 Hildesheim 398; Exell 2009, pl. 16).

Gold washing is attested in several sources, perhaps all relating to extraction sites. There may be an early example in a Middle Kingdom inscription on a chapel monument from Abydos; the treasury official Sahathor claims 'I constrained the leaders (in desert mining districts) to wash (?) gold' (see Chapter 1 n.13). The evidence for the Ramesside Period (13th–12th centuries BC) is clearer because it includes the term 'gold washers'. From the early 19th Dynasty, a remarkable group of inscriptions survives in a temple built for king Sety I deep into the desert in Wadi Mia, on the route from Edfu to the south-eastern Egyptian gold mines; among these a decree of the king stipulates that the 'head of the detachment of gold washers of the domain of Menmaatira (Sety I)' must face no administrative obstacle in delivering gold to that domain, located at Abydos, farther north in Upper Egypt (Lichtheim 1976, 56). The dual role of security and transport is confirmed by a batch of correspondence from the late 20th Dynasty king Ramses IX to his High Priest of Amun at Thebes, in which one letter contains instructions on protecting a gold-washing team from attacks by desert nomads (Wente 1990, 38–9 no. 38). A further important source is a relief block from Saqqara, showing Khay the 'gold washer of the treasury of Pharaoh' in a supervisory role among workers at separate tasks. The block of Khay is discussed in the following section with other depictions of gold-working.

One instance of a direct relation between the material of an object and the title of its beneficiary is the afterlife papyrus for the *hry irw nbw p3k* 'head of makers of fine gold leaf' Neferrenpet Kerten (Fig. 2.14; see addendum by T.G.H. James in Alexander 1965, 51; British Museum EA9940, acquired as part of a large collection assembled for sale by Yiannis Anastasiou, unknown provenance). Literally, the word *p3k* in the title of Neferrenpet Kerten denotes high quality thin linen textile; the prominent depiction of him at the preserved end of this papyrus roll includes gold leaf decoration (colour photograph in Oddy 1981, 76, fig.2). Though rare among surviving manuscripts, illustrations with gold leaf on papyrus paper are attested





**Figure 2.14.** *Head of makers of fine gold-leaf Neferrenpet Kerten and his wife Hener depicted on their afterlife papyrus, with gold foil decoration, British Museum EA9940 (detail).*

at different periods (four examples in Munro 1987, 198–9, New Kingdom; a fifth in DuQuesne 2009, 37 with n. 10). Much of the material sold by Anastasiou is from Saqqara, and so it is tempting to place this head of gold leaf makers in the company of the Memphite head goldworkers noted above. However, further evidence would be required to substantiate this, as many Anastasiou sale items come from other sites, notably Thebes (see Taylor 2009). Whether he worked at Memphis or Thebes, the degree of specialization indicates a larger scale of output than might be expected from the few surviving examples of gold leaf illustration. Just north of Memphis, the Giza necropolis yielded blocks from an offering-chapel of another ‘head of makers of fine gold leaf’, named Ptahmay, including a scene of work on a shrine, perhaps chiselling details on a surface to be covered in foil (Zivie-Coche 1975). Although rare, the specialized title correlates well with evidence for gold-covered surfaces, in an ancient Egyptian material aesthetic attentive to the *inm* ‘skin’, the visible and tangible exterior. This theme emerges again prominently among depictions of metal-working considered in the next section.

### Interpreting ancient Egyptian depictions of metal-working

Rosemarie Drenkhahn and Bernd Scheel have provided comprehensive lists and commentaries on metal-working depictions from forty-five Old, Middle and New Kingdom sources (Tables 2.17–2.18; Drenkhahn 1976, with additions from Scheel 1985, 1986, 1987). With two exceptions (Table 2.17 a, queen Meresankh; no. 11, king Wenis), the scenes come from monuments created to ensure the eternal supply of offerings for an official, in most instances of the highest status, or, in

the New Kingdom, an overseer of artists or craftsmen. Therefore, in most instances, the regular tasks of that primary beneficiary of the monument included either supervising production of metal items, or direct manual involvement in producing them. The range of sources from each period reflects the extent of preservation for each monument type in each period, with significant gaps in the record for the uppermost court officials in the Middle Kingdom and the Ramesside Period. In the Old and New Kingdoms, scenes are attested in the afterlife monuments of the highest officials with responsibility for major projects (Tables 2.17–2.18 nos. 1, b, 6, 12–14, Weser, 25–27, 29–31), and of palace officials with responsibility for the daily ritualized clothing and adornment of the king (Table 2.17 nos. 4, 7, 9) and the women closest to him (Table 2.18 no. 33). Necklace assemblage scenes are also found in the Old Kingdom chapel for a palace workshop director (Table 2.17 no. 3), while metal-working scenes appear in New Kingdom monuments for men with titles relating more directly to production of precious metal objects including sculpture (Table 2.18 nos. 32, 35–36, Khay). In the Old and Middle Kingdoms, scenes of gold-working are also found in Upper Egypt, from Thebes to Dishasha, in the large rock-cut tomb-chapels of regional governors, which are a distinctive feature of those periods (Table 2.17 nos. 8, 15–24, c–g). From the period of the reunification of Egypt at the start of the Middle Kingdom, under king Mentuhotep II at Thebes, metal-working scenes are attested in only one monument for a high official, the general Intef (Table 2.18 h).

Metal-working is not part of the repertoire on the walls of temples for gods and goddesses, either from the well-preserved southern Upper Egyptian and Lower Nubian monuments of the New Kingdom,

**Table 2.17.** *Old and Middle Kingdom metalworking depictions, by date, with title and name of main beneficiary of monument. Column 'other': a is wife of king Khafra; no.2 Iimeri is god's servant of Khufu (official in cult of king Khufu) and estate overseer of a great domain; no.10 Tepemankh is sealer of the god's book (treasury official?); h is a general. Numbering after Drenkhahn (1976, 18–23), lettered entries added from Scheel (1985, 119–21, 1986, 182).*

	Name	Site of source	Vizier	Regional governor	Palace/ workshop director	Officials for attire of king	Other
Old Kingdom							
a	Meresankh						X
1	Nebemakhet	Giza	X				
2	Iimeri						X
3	Nefer	Saqqara			X		
4	Kamrehu	Saqqara				X	
b	Ptahshepses	Abusir	X				
5	Wepmnefret	Giza		X			
6	Senedjemib Mehi	Giza	X				
7	Ti	Saqqara				X	
8	Serefka	Sheikh Said		X			
9	Khnumhotep, Nyankhkhnum	Saqqara				X	
10	Tepemankh	Saqqara					X
11	king Wenis	Saqqara					
12	Ankhmahor	Saqqara	X				
13	Kagemni	Saqqara	X				
14	Mereruka	Saqqara	X				
15	Nankhpepy	Zawiyet el-Meitin		X			
16	Inti	Dishasha		X			
17	Ibi	Deir el Gebrawi		X			
18	Djau			X			
19	Isi			X			
20	Pepyankh	Meir		X			
c	Kahep	Hawawish		X			
d	Shepsespumin			X			
e	Wenisankh	Thebes		X			
f	Khenti			X			
g	Ihy			X			
Middle Kingdom							
h	Intef	Thebes					X
21	Khety	Beni Hassan		X			
22	Baqet			X			
23	Amenemhat			X			
24	Senebi	Meir		X			

or from the more limited Old and Middle Kingdom evidence. Most, including the earliest, metal-working scenes are from monuments for court officials, but the example from the pyramid complex of the 5th Dynasty king Wenis at Saqqara (Table 2.17 no. 10) raises the question whether the motif was first formulated for

earlier kings. Reliefs have survived from the Giza pyramid complexes of the 4th Dynasty rulers Khufu and Khafra, on blocks reused at other sites, but the preserved motifs do not include either agricultural or artefact production. From a review of the iconographic range, function and context of royal reliefs in kingship



**Table 2.18.** *New Kingdom metalworking depictions, with title and name of main beneficiary, numbering after Drenkhahn (1976, 23–5) adding Weser and Khay from Prell (2011, 145): in column ‘palace officials’, no.28 Montuiwy is cupbearer of the king, no.33 Huya is overseer of the inner palace. In column ‘other’, no.34 Neferrenpet Kener is treasury accountant in the Amun domain; Khay is gold washer of the lord of the two lands (the king). No.38 Florence 2606 is a relief block of uncertain date, perhaps Late Period (cf Prell 2011, 145).*

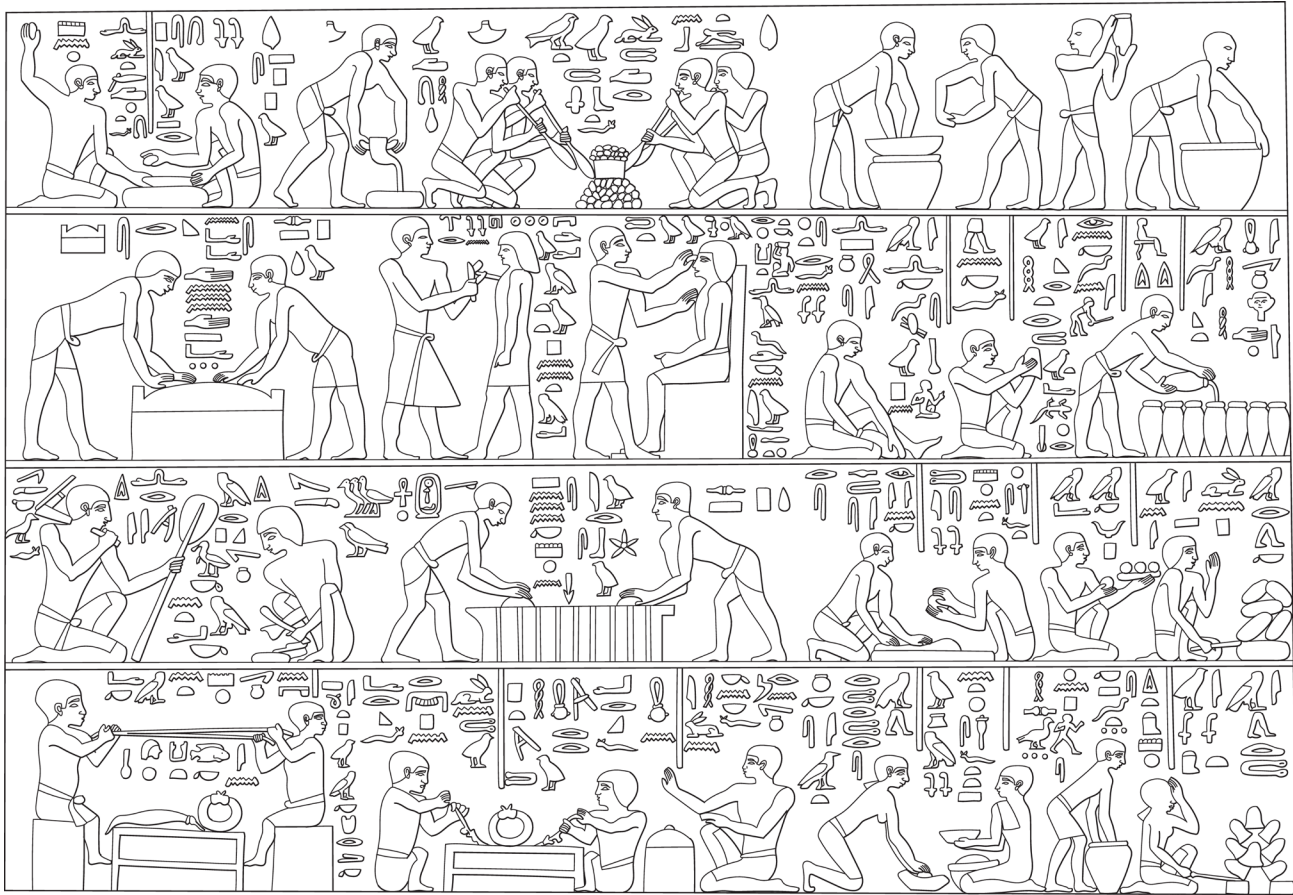
	Name	Vizier	Senior staff of Amun domain	Palace official	Sculptor, overseer of crafts	Other
<i>Thebes</i>						
-	Weser	X				
25	Ipumra		X			
26	Menkheperaseneb		X			
27	Rekhmira	X				
28	Montuiwy			X		
29	Mery		X			
30	Hepu	X				
31	Amenhotep Sase		X			
32	Nebamun, Ipuky				X	
<i>Amarna</i>						
33	Huya			X		
<i>Thebes</i>						
34	Neferrenpet Kener					X
<i>Saqqara (cemeteries of Memphis)</i>						
35	Kairy				X	
36	Ipuya				X	
37	Berlin 19782	<i>unknown</i>				
38	Florence 2606	<i>unknown</i>				
-	Khay					X

cult complexes, Dorothea Arnold observed the focus on the king as divine hero and companion of the gods, where reproduction of life, but not the making of things, is essential. In this context, she notes the Wenis causeway production and market scenes as an exception in which ‘all the subjects and iconography derive from the tombs of nonroyal persons’ (Arnold 1999, 99). Thus at present, it seems most plausible that the metal-working depictions originate in the aim to secure a blessed eternal life for the household of mortal humans, not for kings in their company of the gods. At the same time the titles in Tables 2.17–2.18 indicate that these scenes relate directly to the tasks of these specific officials in life; metal-working did not become a stock motif to be used for any courtier in a general metaphor (an example of such metaphorical extension is the afterlife weighing of the heart on a treasury scale to test the truthfulness of the deceased, expressed in words after 1800 BC on heart scarabs, and vividly depicted after 1450 BC in papyri of individuals with widely varying occupations, Seeber 1976).

Drenkhahn discusses the scenes under seven general headings, with a separate section for the Old Kingdom motif of necklace assembly, as that is most

often depicted on a different wall register (Fig. 2.15; Drenkhahn 1976, 18–25, 29–35, 43–5). Scheel provides a further breakdown, developing the analysis by Drenkhahn of such features as the placement of weighing scenes at start or end of a sequence, and revising points of interpretation. Subsequently, Edgar Pusch outlined the correspondences between New Kingdom depictions and the foundry evidence excavated at Qantir (Pusch 1990, 93–9, and see above). Here I give a general summary of more prominent features, following the sequence in Drenkhahn, but omitting her sixth heading ‘products’ (Tables 2.19–2.20, with additions from Scheel 1985, 1987).

Depictions in all periods incorporate three essential activities: weighing, melting and hammering. The presence of composite standing balances or simpler hand-held scales effectively ensures that quantification and control permeate or frame the overall sequence. In a similar vein, Pusch notes how a supervisory figure accompanies stages of production in the most elaborate sequence, in the tomb-chapel of the 18th Dynasty vizier Rekhmira (Pusch 1990, 97). The initial productive focus is the transformative act performed by the pairs or groups of men who melt the metal to enable



**Figure 2.15.** *The context of metalworking depictions: melting, pouring and hammering in the upper of four registers of production scenes, necklace-stringing in the lower register. Offering-chapel of Wepemnefret, Old Kingdom, Giza. Drawing V. Herring after Hassan (1936, fig.219 facing p.190).*

working. This distinctive symmetrical scene stands out strongly within the array of arts-and-crafts scenes on a wall. In an instance where just one episode had to convey the presence of metal-working, the artists selected the melting scene (Serefka, Table 2.19 no. 8; Scheel 1985, 129). Some monuments provide an image of the transitional moment at which the molten metal is poured into moulds; in the tomb of Mereruka, an assistant is shown holding back debris and impurities with a stick (Scheel 1985, 133 with no. 56). A few monuments have a depiction of one or more men carrying the crucible towards this operation. The focus then turns to the second visual drama of collective work, the arduous hammering to turn the block of material into sheet metal, with annealing to avoid body cracks in the end product. Many monuments add scenes in which metalworkers obtain the form of the artefact; this phase of 'shaping' is augmented in the New Kingdom with attention to the finishing touches, such as decoration and inscription. The New Kingdom brings

the most visible technical difference, the replacement of blow-pipes with bellows at the furnace scenes, the 'melting' phase (Fig. 2.16a; Drenkhahn 1976, 30 with fig.7, sources nos. 27, 31–2).

In general, commentators agree on correlating the sequence of depictions with the chain of production from metal to artefact. While discussions continue over individual scenes, Scheel seems closest to the ancient scene-composers when he defines an overall fourfold division of labour (Scheel 1985, 133 with no.57, 174–7): accountants (weighing the metal before and after), metal-melters, sheet-metal producers ('Grobschmiede') and artefact-producers ('Feinschmiede'). Most often, the scenes are discussed in terms of metal in general, and indeed three of the earliest examples with inscriptions have a generic word 'metal' (Drenkhahn 1976, 36 sources nos. 2, 4, 5). However, the word could apply to both precious and base metal, and another nine sources refer to gold, 'white gold' or silver, and electrum (Table 2.21 after Drenkhahn 1976, 36; Scheel 1985,

**Table 2.19.** Summary of Old and Middle Kingdom metalworking scenes (after Drenkhahn 1976,18–23; Scheel 1985,123–4, 1986,183). *Italics indicate fragmentary sequence (after Scheel ?). Sources cited by Scheel but not then published are omitted here (his nos.11 Kairer, 15 Mehu).*

	Name	Weighing	Melting, alloying	Pouring	Hammering, annealing	Shaping	Gilding	Necklace stringing
<i>Old Kingdom</i>								
a	Meresankh		X		X			
1	Nebemakhet	X	X	?		X		separate
2	Iimeri	X	X	X	X	X		
3	Nefer							alone
4	Kamrehu	X	X		X			together
b	Ptahshepses		X		X			
5	Wepmnefret		X	X	X			separate
6	Senedjemib Mehi	X	X			X		separate
7	<i>Ti</i>		X	X	X			
8	Serefka		X					together
9	Khnumhotep, Nyankhkhnum		X			X	X	separate
10	Tepemankh		X		X			
11	king Wenis	?	X		X	X		
12	Ankhmahor	X	X		X			separate
13	<i>Kagemni</i>		X					
14	Mereruka	X	X	X	X	?		separate
15	<i>Nankhppepy</i>		X			X		?
16	<i>Inti</i>	X				X		separate
17	Ibi	X	X		X			separate
18	<i>Djau</i>		X		X			separate
19	Isi	X	X		X	X		separate
20	Pepyankh		X	X	X			separate
c	Kahep		X		X			
d	Shepsespumin		X		X			
e	Wenisankh		X		X			
f	Khenti		X		X			
g	<i>Ihy</i>				X			
<i>Middle Kingdom</i>								
h	Intef		X	X	X			
21	Khety	X	X		X			
22	Baqet	X	X		?		X	
23	Amenemhat	X	X					
24	Senebi							X

147 cites a further Old Kingdom instance of electrum, from the hammering scene in the chapel of Mehu). Alongside a possible interpretation of the generic term ‘metal’ as base metal, the impression emerges that the scenes depict the working of precious metal. As Pusch emphasizes, the collection of scenes in any one monument would convey a range of different operations simultaneously in process across a production space, large or small, rather than a single line of operation on

one item (Pusch 1990, 96). Therefore, the juxtaposition of ‘metal’ and ‘electrum’ in one sequence (Table 2.19 no.17 Ibi) might convey a workshop for both copper and electrum, with one being shown at one stage, the other at another stage in the overall process. For identifying the material as base or precious metal, the status of the monument beneficiaries should also be considered. As outlined above, the scenes exist for the benefit of two sets of individuals: (1) they belong to the

**Table 2.20.** Summary of New Kingdom metalworking scenes after Drenkhahn (1976, 23–5). *Italics indicate fragmentary sequence, after Scheel (1987, 252).*

	Name	Weighing	Melting, alloying	Pouring	Hammering, annealing	Shaping
<i>Thebes</i>						
-	<i>Weser</i>	X				
25	Ipumra		X	X	?	X
26	<i>Menkheperra-seneb</i>	X	X	X	X	
27	Rekhmira	X	X	X	X	X
28	Montiywy	X			X	
29	Mery	X	X		X	X
30	<i>Hepu</i>		X			X
31	Amenhotep Sise	X	X			X
32	Nebamun, Ipuky		X			X
<i>Amarna</i>						
33	<i>Huya</i>		X			X
<i>Thebes</i>						
34	<i>Neferrenpet Kener</i>		X		?	
<i>Saqqara</i>						
35	<i>Kairy</i>		X		X	
36	<i>Ipuya</i>					X
37	<i>Berlin 19782</i>				?	X
38	Florence 2606		X		X	X

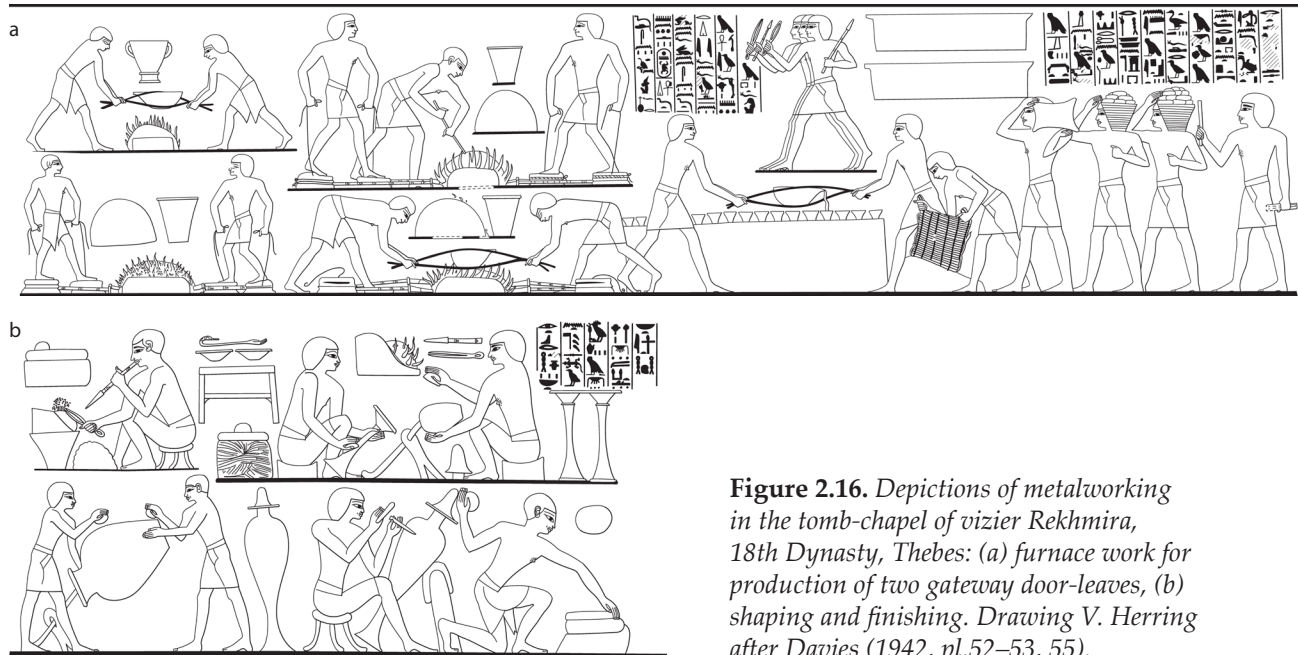
**Table 2.21.** Words for metal in inscriptions accompanying metalworking scenes.

Source	Name	Weighing	Melting	Hammering	Other
<i>Old Kingdom</i>					
2	Imeri	metal	metal		
4	Kamrehu	metal			
5	Wepemnefret		metal	metal	metal
9	Khnumhotep, Nyankhkhnum		gold		
11	king Wenis		silver	electrum	
12	Ankhmahor			gold	
14	Mereruka			electrum	
17	Ibi	metal	metal	electrum	
19	Isi			gold	
<i>Middle Kingdom</i>					
22	Baqet	gold	electrum		metal, gold
<i>New Kingdom</i>					
27	Rekhmira				gold, silver
31	Amenhotep Sise	gold			

narrowest circle of the ruling class (king and his family and highest court officials; officials responsible for the attire of the king; regional governors); or (2) they produce metal artefacts and work at places directly connected with the king (Memphis and, in the New

Kingdom, Thebes and Amarna). In this context, it seems plausible that metal-working scenes would involve the most precious materials. Apparent exceptions, notably the leaves of immense temple gates (Table 2.20, nos. 25–7), would have been included on account





**Figure 2.16.** *Depictions of metalworking in the tomb-chapel of vizier Rekhmira, 18th Dynasty, Thebes: (a) furnace work for production of two gateway door-leaves, (b) shaping and finishing. Drawing V. Herring after Davies (1942, pl.52–53, 55).*

of the unusual scale and the prominence of the object in a major sanctuary, and the gilding of the objects, as emphasized in the Rekhmira chapel inscription (Fig. 2.16b cf the two earlier sources with depictions of gilding in Table 2.19, nos. 9, 22). However, Scheel interprets the New Kingdom evidence differently, with small-scale working of precious metals depicted separately from large-scale working of base metal (Scheel 1987, 253–7). From the excavations at Qantir, Pusch identifies the New Kingdom sequences with bellows and pouring scenes as depictions of foundry work, with large-scale production, including the casting of such large-scale objects as the temple gates (Pusch 1990, 99).

Here a difference in functional and institutional context comes into view between the New Kingdom and earlier scenes. Drenkhahn argues that Old and Middle Kingdom scenes depict the production of burial equipment, as explicitly stated at the gilding scenes in the chapel of Nyankhkhnum and Khnumhotep (Table 2.19 no. 9; Drenkhahn 1976, 35; Prell 2011, 123). In support, it may be noted that metal products in the scenes are of types found in the burials of members of the king's family and court at Memphite cemeteries during the Old Kingdom. In that period, at the royal court and beyond, few items accompanied the embalmed, wrapped and coffined body into the afterlife; recurrent object types include a washing-set of basin and ewer, a cosmetic set of razors and mirror, with vases of hard stone, and a ceremonial necklace ('broad collar') and kilt tie. Surviving examples include both precious metal and gilt copper (Seipel 2001, 30–7: nos. 14–16 gold ewer and razors from the tomb of queen Hetepheres,

mid-4th Dynasty, and nos. 18–20 gilt copper diadem and broad collar elements from a late Old Kingdom burial at Giza). This restricted range of equipment is far removed from the modern popular imagination of the ancient Egyptian tomb as always replete with everything needed for life; that burial practice is attested in Egypt only for two periods, in the stock-piling of goods in royal and other rich tombs of the 1st Dynasty and the 18th Dynasty (general review in Grajetzki 2003). Unrecognizable under a label of 'daily life', the scenes in Old and Middle Kingdom chapels convey a selective image of production for specific functional scope within a defined social context (Moreno García 2003; Widmaier 2013, 522–3 no. 170). Through this conceptual filter, the metal-working depictions are intended to perpetuate an energetic capacity for the production and repair of material required at a perfect burial, as part of the underwriting of the eternal life of the main beneficiary of the monument. While following the same broad principles of image-construction, the New Kingdom artists apply a different selective filter and thematic focus.

The number and variety of accompanying inscriptions foreground differences between the periods. Captions identifying the subject-matter or titles and sometimes names of producers and their supervisors are found at all periods, but are rarer in the Middle Kingdom, and even more so in the New Kingdom (Scheel 1985, 1986, 1987). In the Old Kingdom, scenes abound with inscriptions, often adding lively exclamations and responses by people depicted (Tables 2.22–2.23). Their contents are too short to identify a terminological jargon or social dialect specific to the metalworkers as a



**Table 2.22.** *Conversations in Old Kingdom chapel scenes (after Scheel 1985, 137–72).*

	Chapel of	Address	Response
weighing scenes			
4	Kamrehu	but there is no metal!	it is as a block (or (level) with the weight?)
melting scenes			
2	Iimeri	push at its sole! it is the new vase	hurry now to the good face!
			come on, stir well in the crucible!
4	Kamrehu	the air is scorching on its pair!	beer for Sokar, my lordship (sarcastic)
6	Senedjemib	push at its sole! it is the new vase	hurry now to the [good] face!
			[...] in the crucible!
7	Ti	come with [...] not [...]	look, turn around effectively
12	Ankhmahor	look at its face! it is the new vase	I do as you urge, I am looking
		push more on its sole, my comrade!	
		then you can be fresh in life	
pouring scenes			
20	Pepyankh	make the brew go down for cooling	I do as you urge
hammering scenes (producing sheet metal / foil)			
5	Wepemnefret	cook this, it is brittle, it is bright metal	there is no hollow (?) if (?) it is effectively cooked
17	Ibi	strike the electrum, make it into foil!	it will be good
20	Pepyankh	hey, go down, bring (your arm down?)	I am bringing right now!

profession (cf for later scenes of food procurement and production, Guglielmi 1973). Further linguistic research into the range of Old Kingdom genres and registers of writing would be needed to assess any difference in use of language, and so the degree to which ancient professional writers superimposed their own linguistic expression over the speech of the smiths. The small stock of phrases includes examples repeated across different regions and centuries, as if a standardized repertoire, removed from the active processes of creating metalwork. At a more general level, the inscriptions install ancient words and languages as one further dimension of a place of production, where metalworkers would also communicate with one another. Whether widely shared metaphors or a restricted metal-working code, the words ascribed to the ancient metalworkers cast the furnace and equipment as living bodies: the air blown through the pipes has its 'twin' in the redoubled blast of the fire, the crucible underside is the sole of its feet, the walls of the fire-installation or crucible are its flanks or cheeks, and the desired result of pure metal is the 'good face'. The bodily and characterful points of reference offer ground for comparative anthropological and historical research, from a time-depth for which analogy may otherwise seem too hazardous (as expressed by Killick 2014, 509). Here too experimental archaeology may open routes beyond the academic disciplines. The recurrent response 'I do as you urge' in the scenes seems ironic, as does the reply 'beer for

Sokar'; the apparent earthy humour in these terse conversations might become a new dialogue between ancient and contemporary smiths.

Beside the reduction in captions noted above, New Kingdom scenes are also divided from those of the Old and Middle Kingdom by institutional context. Metal-working scenes in monuments at Thebes would relate primarily to production in or for the vast kingship complex at Karnak, centred on the temple to the creator-god Amun-Ra, while scenes in monuments at Memphis and Amarna would concern instead the kingship palaces in those cities (Prell 2011, 123). Theban scenes concentrate on temple cult equipment at varying scale, from gilt bronze gates to sculpture and vases of precious metal. In the chapels of viziers and of first and second god's servants of Amun, goldworkers may be attached to the Amun temple, and the place of production may be specified as 'temple workshop' (Drenkhahn 1976, 154, including sources from Table 2.18 nos. 25–7, 31). The great foundry required for casting and gilding temple gates would have been laid out on land of the Amun temple, perhaps directly in the vicinity of the mid-18th Dynasty temple architecture. As excavation of the early 19th Dynasty foundry at Qantir has shown, the installation for the largest-scale work might be project-related and so relatively short-lived (Pusch 1990, 78 B/3).

From the 19th Dynasty, two centuries after the Rekhmira scenes, the tomb-chapel of Neferrenpet

**Table 2.23.** Words spoken without replies in Old Kingdom scenes (after Scheel 1985, 137–72).

	Chapel of	Words
<i>weighing scenes</i>		
17	Ibi	look at it, it is as a block (or (level) with the weight?)
<i>melting scenes</i>		
5	Wepemnefret	hurry now! push at its sole!
b	Ptahshepses	the air is scorching on its pair – may my ka-spirit bring to me – it is to be a good face!
		blow hard [on the] flame, [...] raging (fire) (?)
9	Khnumhotep, Nyankhkhnum	the air is scorching on its pair - keep back from the flanks, do not touch!
10	Tepemankh	if only there was rest for Sokar, artist!
14	Mereruka	it is the new vase, come near to its flanks, my comrade!
17	Ibi	you are going to see a good (metal? result?)
19	Isi	<i>perhaps read as Iimeri</i> : push at its sole! it is the new vase - hurry now to the good face!
20	Pepyankh	push well, push! it is going to (be) a good face
<i>pouring scenes</i>		
14	Mereruka	the face is good, exceedingly!
<i>hammering scenes</i>		
b	Ptahshepses	strike hard! not [...]
		strike! make it into foil!
7	Ti	give this foil to be cooked, it is crumpled

Kener preserves the only depiction of an architectural setting for a Theban temple workshop with goldworkers (Hofmann 1995, 74–9, figs. 4.9–50, pls. 10–11). Four pairs of trees flank the doorway to a rectangular enclosure, with, at one side, another tree and a doorway to a room where ‘the draughtsman Pahemnetjer’ is shown seated at work, painting outlines or inscriptions on the back pillar of a statue, facing a funerary mask and three funerary statuettes (Hofmann 1995, pl. 10a). In the courtyard below, the ‘doorkeeper’ bows in greeting to ‘the artists’, three men with a bag on a carrying-pole. On the same central axis as the main entrance, a further doorway leads to the main workshop area, where Neferrenpet Kener is depicted standing, recording metal bars and artefacts brought to him by two figures, the upper one identified as ‘head goldworker’, without name. Behind the lower figure, five men are at work, two at a furnace with bellows and tongs, three on large pink-coloured vessels, perhaps copper (Hofmann 1995, 75) or an alloy. Behind the upper figure of the head goldworker, three rows of three men each are shown at work on yellow-coloured objects, presumably gold; in the lower two rows one man uses a blowpipe to increase the heat in a broad open vessel, and two others hammer bars to make sheet metal, while the uppermost row has a ‘head sculptor’ finishing a statuette in an angled support, and two ‘head jewellers’ drilling beads (Hofmann 1995, pl. 10b). Above the figure of Neferrenpet Kener, a

caption reads ‘[accountant] of the Mansion of Gold of Amun Kener, true of voice, receiving the products of the artists of the domain of Amun-Ra king of the gods’ (Hofmann 1995, 76, fig. 49). The adjacent wall of the chapel shows the ‘treasury’ or store-rooms, depicted as a series of four rectangular spaces with doorways of diminishing size. Entered from a main or side door, the front space has doors to chambers at three corners, with three scenes filling the space between: at right the ‘treasury doorkeeper’ sits on guard with a whip; at upper centre two ‘heads of estate-staff’ face four ‘treasury accountants’ who record bundles and bags; at left and lower centre is a weighing scene with the caption ‘the accountant of the treasury of Amun Kener receiving the products of the estate-staff of the Amun domain’. The other three spaces are stores, the first with men checking or carrying material beside a supervisor, the second with five ornate steering-oars in the central space between side-chambers containing vessels, the third with further side-chambers filled with boxes and other items. The combination of workshop and stores is clear in a functional sense, but the distance between them is not given, nor is the relative scale of each internal space or the size of objects necessarily to be read literally from the depictions (see Hofmann 1995, 75 no. 148 for varying opinions on the location of the structures).

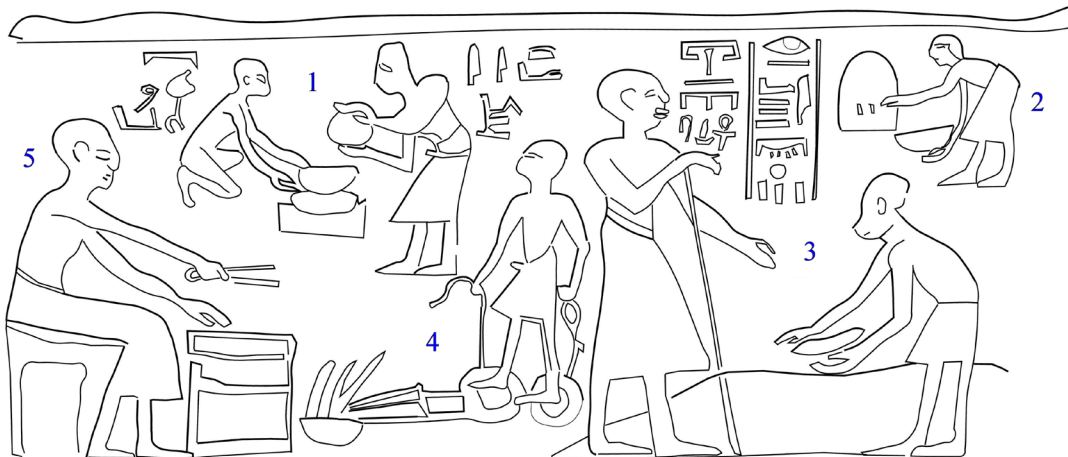
As a genre, the metal-working scene seems entirely focused on the workshop for an urban population,

with no depictions of work at sites of procurement or even of midway processing stations. Two possible exceptions may be noted. In the tomb-chapel of Baqet, an upright banded rectangle has been interpreted as 'possibly some type of gravity washing table' (Ogden 2000, 162 citing a 1983 study by Chappaz). However, the Baqet inscriptions and the relation between the men at work on the rectangle and adjacent sheet- or foil-producers indicate rather that the subject is the gilding of a shrine among other objects (Scheel 1986, 187 fig. 2, 195–6 with no. 46 against the gold-washing interpretation by Notton 1974 and Moesta 1983).

The second example is in the tomb-chapel of a man named Khay at Saqqara; the 2 m × 2 m limestone-clad brick structure comprises two rear chapels sharing a single-column portico or antechapel, and in the open area in front, a shaft leads to the burial chambers (Martin et al. 2001, 12). In the smaller southern chapel, one side-wall bears scenes in three registers, with the depictions of metal production in the lowest. Here we see seven men at work on five tasks (Fig. 2.17; Martin et al. 2001, 15 nos. 7, 26–7, pl. 11, pl. 55 photograph with upper half of scene): (1) upper left, a man holds with both hands a roughly circular object above a triple stack comprising lower block with concave upper line, round-ended central block, squared-oblong upper block, with a man kneeling at left with both hands extended to the upper block; (2) upper right, a man with a broad bowl hand-picks material from a domed heap; (3) centre and lower right, a man resting on a staff extends one arm towards a man moving material (?) in or out of a broad shallow bowl held over a low rise with concave upper line; (4) centre left, a man stands on, and holds cords of, two bellows blowing air into semi-circular object from which rise three flames; (5) left, a man seated on a padded lion-legged (?) stool holds tongs above an oval block on a two-segment anvil (?). Hieroglyphic inscriptions accompany the two larger

figures in this panel: to right and left of the man with the staff in (3) are the words 'made by the gold washer of the treasury of Pharaoh may he live, prosper and be well! Khay', while to upper right of the man with the tongs in (5) is the title 'head craftsman' without a name. Ogden summarizes the depictions as 'a scene of gold-washing with what appears to be grinding (?), a sloping washing-table, and melting' (Ogden 2000, 162), indicating work at the site of extraction, in desert gold mines. In the register immediately above, Khay appears, again with the title 'gold washer', with one hand raised in adoration of the goddess Hathor, and the other hand resting a broad shallow bowl at his shoulder (Martin et al. 2001, 15, pl.11, 55), perhaps implying his active participation in gold washing, rather than just the supervisory role shown at (3). He has the titles 'gold-washer of the lord of the two lands (the king)', 'washer of the lord of the two lands', and 'gold washer' on the antechapel and chapel jambs, abbreviated further to 'washer' in the main adoration scene on the rear wall of this chapel (Martin et al. 2001, 12 no.1, pl.6; 15–6, nos. 6, 8, 10, pls. 10, 12). By contrast, within the larger northern chapel and the antechapel his titles are instead 'head of archery of traders of the treasury of Pharaoh', 'head trader', 'trader of the treasury of the lord of the two lands', and '[...] of Ptah' (Martin et al. 2001, 12–14, 16 nos. 2–4, 11, pls.7–9, 14). Jacobus van Dijk concludes from the distribution of titles over the monument that Khay held his positions in security and gold-processing simultaneously, implying a role in gold-procurement operations at desert sites where archery protection was needed (in Martin et al. 2001, 25–8). Further research is required into the position of trader and its relation to institutions such as the royal treasury and Ptah temple (Römer 1992, especially page 282; Moreno García 2014, 25–6, 30–1; Hawk 2016, 59–62).

Despite such uncertainty in identifying work location, techniques and tools, the depictions need



**Figure 2.17.**  
Depictions on  
limestone wall-  
relief in tomb-  
chapel of Khay  
(drawing W.  
Grajetzki after  
Martin et al.  
2001, pl.11).

to be read within the artistic and cultural framework that generated them, across all periods (Arnold 2005; Pusch 1990, 96–9). The sculptors and painters convey especially activities rather than technical detail (Prell 2011, 161–2 on the limited detail in depictions of tools, or their outright omission), even if in the process we gain information from them on materials, gestures and, perhaps most importantly, combinations of different arts in adjacent spaces. From the late Old Kingdom to the early Middle Kingdom, many examples of burial equipment include painted wood models, often in sets (summary in Tooley 1995). Discussions of ancient Egyptian production have often drawn on these, notably the sets for the treasurer Meketra at Thebes and the estates overseer Gemni at Saqqara (e.g. Prell 2011, 151). A minority of these three dimensional images offer the architectural context missing from most chapel walls, though apparently in a compressed form, as if conveying just the essential activities rather than entire space and staff required to sustain an estate. Among the models from the tomb of Meketra, the model of a carpentry workshop includes metal-working appears on a small scale, in a support role. Three men sit under a roof that provides shade and control of airflow; one uses a blow-pipe to maintain the temperature of the fire, and his companions on either side ‘are doubtless re-tempering tools which have been heated in the forge’ (Winlock 1955, 34–5). A prominent feature in the yard is a box filled with carpentry tools, most with metal blades, which might need frequent repair (Winlock 1955, 35, pl. 69). A model from the tomb of Gemni at Saqqara shows a similar part-roofed structure, but divided into two enclosures, and a third work area outside, with a different profession in each; three carpenters work in the larger enclosed space, two coppersmiths in the smaller, and two potters work outside, next to a box of carpentry tools, all with metal blades (Jørgensen 1996, 136–7; Ny Carlsberg Glyptotek ÆIN 1633, 1636). A third example of a painted wood model of metal-working is from the burial of a man named Inpumhat, also at Saqqara; here two carpenters, a smith with blowpipe, a potter and a stone-vase manufacturer are depicted at work together within a single high-walled room or enclosure (Quibell & Hayter 1927, 40–1, pl. 24).

Accessibly published, and with their diverse production activities, the Meketra and Gemni models have been influential points of reference for ancient technology studies. It is therefore important to recall here that this rarer type of more architectural models has its own detailed history and purpose, as Dorothea Arnold has demonstrated (Arnold 2005, 32–55). Far from being regular examples of funerary models across the period 2300–1900 BC, the sets for Meketra, Gemni, and Inpumhat are exceptional in thematic range and

in prominence of architectural features, paralleled only from a further Saqqara find, the burial of Kareneni and Nefermedjdenyt. From the archaeological contexts of parallels for the pottery in these tombs, Arnold is able to date all four sets to the first years of the 12th Dynasty, early in the reign of Amenemhat I. I know of no models of metalworkers at work alone, without other occupations, either among the Old Kingdom stone models or the 2300–1900 BC wood models. Smiths appear within just these three early 12th Dynasty workshops, sharing either a building or a single room with carpenters (Meketra; Gemni with potters outside) and a potter and stone-vase maker (Inpumhat). This environment echoes the wall-relief scenes of production, and may now be compared with multifunctional workshops excavated at Balat and Qantir (Jeuthe 2012; Prell 2011, see above). In both instances, a single institutional task underlies the diverse activities: at 13th century BC Qantir the equipping of the chariotry division at the palace of the king; at 21st century BC Balat the equipping of agricultural estates centred on the palace of the oasis governor. Of the two, the Balat workshop is close in date and functional focus to the two- and three-dimensional imagery from chapels and burial equipment. In her publication of the Balat workshop, Clara Jeuthe could therefore draw on the visual evidence to estimate the number of people working at the same time across the eight rooms as 15–20 individuals (Jeuthe 2012, 373). Conversely, from the excavation, she assesses the capacity of a small room recurrently used for heating copper, as no more than four persons at a time (*ibid.* on room 5). The Balat excavation also contributes essential data to the identification of workshop areas with or without roof (Jeuthe 2012, 51–6), a fundamental aspect on which even the models may be ambiguous (as emphasized from the Meketra and Saqqara models in Arnold 2005, 46). Further research into metal-working can thus combine the evidence of space-use, architecture, finds, and ancient depictions and writings, in their uneven distribution across different social, geographical and functional settings.

### Concluding questions

For a social history of metal-working in 3rd–2nd millennium BC Egypt, the results of analyses presented in the following chapters may be assessed provisionally against the diverse scales and social contexts covered in the review of source categories above. For other industries, the evidence at the late 18th Dynasty kingship city Amarna has been interpreted as indicating three general scales of production, the first two perhaps directly linked to the royal court: (1) large-scale centralized activity at kingship institutions including temples;



(2) medium-scale production within palatial mansions of leading officials; (3) small-scale domestic production (Hodgkinson 2018, 34, 292). The fourfold matrix of scale, social context, and historical and geographical location, may help to interrelate the findings on the different materials attested in specific objects across the collections investigated in this project, and to compare with the findings and hypotheses developed from fieldwork (Rehren & Pusch 2012 on the Qantir material in the wider context of Late Bronze Age copper circulation).

The range of sources discussed in the sections above implies a need for the mixed methods, which David Killick proposes for a social archaeology of mining (Killick 1998); these in turn require collaborative research and authorship of multiple disciplinary specialists. Among his themes, the written evidence cited here has an important role in investigating social organization of work (Killick 1998, 287–8), as demonstrated by Ian Shaw for ancient Egyptian mining (Shaw 1998, 244–8). Other aspects of the question remain to be covered, starting from an assessment of the role for material cultural studies in identifying evidence on ethnicity, class and gender relations (Killick 1998, 282–6). Recognizing ‘the dangers of transposing modern value systems onto historical and archaeological scenarios’, Louise Iles and S. Terry Childs note the impact of Africanist anthropologists in bringing unitary approaches to studies of the ‘technical, social and cognitive-symbolic elements’ particularly in metallurgy (Iles & Childs 2014, 195). For subsequent multidisciplinary methods, they cite examples across the 1980s and 1990s of ‘holistic integration of ethnoarchaeology, materials science, ethnohistory, experimental archaeology and archaeological excavation’, observing further the contribution of art historical and artefactual studies (Iles & Childs 2014, 196–7). The methodological precision is crucial here, to sustain a self-critical assessment of results. In developing the analysis of social organization of metal-working in European prehistory, Tobias Kienlin finds in previous models the ‘modernist notions of managerial elites, craft specialisation and trade in valuable or prestigious objects’, and raises instead the possibility that metallurgy was “‘self-organising” among particular segments of society and metallurgical knowledge was passed along kinship lines’ (Kienlin 2014, 458, 467). However, the family may be another of the ‘modern value systems’ which may intrude into analysis, and other factors might be at work in social organization; indeed, Kienlin emphasizes the variability in the anthropological record of craft specialization (Kienlin 2014; 466 after Rowlands 1971). In the ancient Egyptian written evidence noted above, recurrent examples of fathers and sons as metalworkers would support a kinship-based, but

further research is needed to establish the proportion of instances, as against the cases where fathers and sons were identified as holding different occupations. Here feminist and African-centred approaches may bring methodological and theoretical rigour, to test deep archaeological and Egyptological assumptions about past social organization.

For the fusion of technical and symbolic in practice, comparative ethnography provides eloquent autobiographical accounts, as in the life-story of the Toro ironworker Adyeri, in Uganda (Childs 2000). A review of African iron-working shows a widespread principle that smelters must combine expertise in both ritual and metal-working (de Barros 2000, 164). Several Africanist anthropologists have concluded that smelting is one among a range of activities sharing a single ‘transformational paradigm associated with generally irreversible activities that involve an ambiguous period during which one does not know exactly what is happening’: among other examples, Philip de Barros cites birth, hunting, farming, circumcision, funerals and pottery production, a list which recalls to an Egyptologist many of the motifs in chapel scenes, as well as the underlying purpose of chapels – rebirth (de Barros 2000, 170; for the range of chapel motifs compare Harpur 1987). Along similar lines, from the ancient written evidence, Ian Shaw has emphasized the religious aspects of ancient Egyptian mining (Shaw 1998, 252–3). At Serabit el-Khadim, heart of the turquoise- and copper-mining zone on Sinai, a temple to Hathor was in use through much of the 2nd millennium BC, and the focus for a remarkable group of inscriptions. Amr El Hawary brings to the Sinai evidence a new evocation of local knowledge of the landscape in conjunction with the actor-network-theory approach of Bruno Latour, to delineate the profile of this variant of merging ritual and technological know-how: ‘the mystical dimension of the reality is (...) a practical one’ (El Hawary 2018, 78). Such evidence and its interpretation form the basis for new Egyptological contributions to the wider anthropology and archaeology of metal-working.

Research into the significance of colour in African metallurgy has special resonance for the results of analyses presented in this volume. In 1984 Eugenia Herbert published her influential study on copper as the ‘red gold’ of Africa, emphasizing ‘redness, luminosity and sound’ as the salient characteristics which exceed the utilitarian functional aspects of the material (Herbert 1984, 277–82, summarized in Bisson 2000, 110–12). In her comparative archaeological review of ancient Egyptian gold, Maria Filomena Guerra identifies the recurrent intentional focus on red, white and yellow surface hue of the gold, and the interplay





**Figure 2.18.** Crucible from Badari 4964, UC18146, c. 2100–2000 BC.

between them (see Chapter 5). These findings widen the ground for research into the relation between these varying solar and perhaps lunar effects, and between the associations of copper, silver and gold both in the workshop and in the recipients and users of workshop products. The African context again promises to guide the directions of enquiry in innovative ways.

A find of a crucible in the rural landscape between Badari and Qau in Upper Egypt provides a final framing point and question-marker for this chapter and the following research (Fig. 2.18). The fieldwork director offered the following description for a burial he numbered 4964 (Brunton 1927, 36, pl. 41.25; Seidlmayer 1990, 139, 395, for date of pottery vessel type 23j in phase IIC = First Intermediate Period): ‘Chamber on north, fallen in. Adult male on left side, hands down; mask over head of cartonnage painted white and grey. One pot, [type] 23j, at feet, and a crucible of clay, pl.xli,25, strengthened on the outside with plaster. The inside shows traces of copper; in it were two large grey pebbles.’

Contrary to public imagination and the expectations of 19th century narrators, ancient Egyptian burials only rarely include objects marking the profession of the individual; the regular triple focus of burial equipment is sustenance, status, and gender (Seidlmayer 2007). Therefore, even though it seems to confirm the modern notion of Egyptian burial customs, the crucible of the coppersmith is a striking exception to the general rule (as emphasized by Grajetzki 2020, 133–6 for this Qau find). Exceptional cases are by definition difficult to

explain and so stimulate research. In the depictions and at the sites for smelting copper ore, smelters are most often paired; is the crucible an anchor then to its twin on earth? The depictions of metal-working emphasize melting and hammering: are the two ‘pebbles’ the hammerstones of a smith? If so, the crucible and tools might evoke that frequent pair of scenes, and so either the entire metal-working sequence or perhaps the stage of producing the sheet metal or fine gold leaf. The body was in extended position, and the remains of a mask indicates that those responsible for the burial had more resources than most others; only nine other masks were recorded for the late 3rd millennium BC across the whole series of burials from Qau to Badari (Brunton 1927, 48). The burial is in the desert foothill cemetery immediately behind a modern village, Sheikh Isa (Brunton 1927, pls. 7, 9, numbered ‘4800–5000’), where several dozen other individuals were buried in the late 3rd millennium BC (Brunton 1928, pls. 57–8, 62–3, 67–8). The crucible is for copper, not gold, but its precise location in the chronology and regional geography of Egypt identifies for us one part of the skills map. Whether or not the person buried with the crucible was a smith, the find informs us that a regional villager did not need to go far for a repair. We can then expand the questions of skill and location across the country, through the filter of palace, large and small towns, and isolated villages, to consider where the individual talents and institutional infrastructure existed at the moment that one of the gold items under analysis was first produced. At the same time, we might use the full archaeological record from Egypt, including the inscriptions and depictions, to keep in mind the social dimension, that the people involved in producing each item lived in their own time and place with their own names.

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# Ancient Egyptian gold

This book aims to provide a new level of synthesis in the study of gold jewellery made in Egypt between 3500 BC and 1000 BC, integrating the distinct approaches of archaeology, materials science and Egyptology. Following accessible introductions to the art and use of gold in Ancient Egypt, and to current advances in technical analyses, the volume presents detailed results on the manufacturing technology and elemental composition of some 136 objects in the collections of six European museums, with discussion of the findings in historical and cultural contexts. The questions generated by the jewellery buried with a woman and a child at Qurna (Thebes) led to investigation of assemblages and individual artefacts from later and earlier periods in varied social contexts, from the rural environment of Qau and Badari, to sites connected with urban or royal centres, such as Riqqa, Haraga and Lahun. A final discussion of the Qurna group provides an agenda for future research.

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