

TABLE OF CONTENTS

LIST OF FIGURES..... X

LIST OF TABLES..... XVIII

LIST OF GRAPHS..... XIX

LIST OF PLATES..... XX

LIST OF APPENDICES..... XXI

ABBREVIATIONS..... XXII

PREFACE by Dieter Vieweger/Jutta Häser..... 1

ACKNOWLEDGEMENTS..... 7

INTRODUCTION by Dieter Vieweger/Jutta Häser..... 9

1. THE ‘GADARA REGION PROJECT’/TALL ZIRĀ‘A by Dieter Vieweger/Jutta Häser..... 13

1.1. The ‘Gadara Region Project’ by Dieter Vieweger/Jutta Häser..... 14

1.2. Tall Zirā‘a by Dieter Vieweger..... 14

1.2.1. Morphology of Tall Zirā‘a 15

1.2.2. Emergence of the Natural Hill..... 19

1.3. The Wādī al-‘Arab and its Environment Dieter Vieweger/Jutta Häser..... 20

1.3.1. The Natural Conditions in the Wādī al-‘Arab..... 21

1.3.2. The Wādī al-‘Arab as a Trade Route..... 21

1.4. Research History for Tall Zirā‘a by Dieter Vieweger/Jutta Häser..... 23

1.4.1. Records of Gottlieb Schumacher..... 23

1.4.2. Observations of Nelson Glueck..... 24

1.4.3. Modern Surveys Preceding the ‘Gadara Region Project’..... 24

1.4.3.1. The 1978 Survey..... 25

1.4.3.2. The 1983 Survey..... 26

1.4.4. Archaeological Excavations on Tall Zirā‘a, Surveys and Study Campaigns 2001–2016..... 27

1.4.4.1. The Three Excavation Areas on Tall Zirā‘a..... 27

1.4.4.2. Archaeological Seasons from 2001 to 2016. An Overview..... 29

1.4.4.3. The 2001 Survey of Tall Zirā‘a and in its Hinterland..... 29

1.4.4.4. The 2001 and 2002 Test Trench Excavation..... 30

1.4.4.5. The Summer 2003 Excavation Season with Geophysical Prospection..... 30

1.4.4.6. The Spring 2004 Excavation Season..... 32

1.4.4.7. The Summer 2004 Excavation Season..... 33

1.4.4.8. The Spring 2005 Excavation Season..... 33

1.4.4.9. The Summer 2005 Excavation Season..... 34

1.4.4.10. The Spring 2006 Excavation Season..... 35

1.4.4.11. The Summer 2006 Excavation Season.....	36
1.4.4.12. The Spring 2007 Excavation Season.....	37
1.4.4.13. The Summer 2007 Excavation Season.....	39
1.4.4.14. The Spring 2008 Excavation Season.....	40
1.4.4.15. The Summer 2008 Excavation Season.....	41
1.4.4.16. The Spring 2009 Excavation Season.....	43
1.4.4.17. The Summer 2009 Excavation and Survey Season.....	46
1.4.4.18. The Spring 2010 Excavation Season.....	46
1.4.4.19. The Summer 2010 Excavation and Survey Season.....	48
1.4.4.20. The Spring 2011 Excavation Season.....	49
1.4.4.21. The Summer 2011 Excavation and Survey Season.....	50
1.4.4.22. The Summer 2012 Study Season.....	51
1.4.4.23. The Summer 2013 Study Season.....	52
1.4.4.24. The Summer 2014 Study and Excavation Season.....	52
1.4.4.25. The Summer 2015 Study Season.....	53
1.4.4.26. The Summer 2016 Study Season.....	54
1.5. Aims of the ‘Gadara Region Project’ <i>by Dieter Vieweger/Jutta Häser</i>	55
1.6. Bibliography.....	56
 2. THE 2001 SURVEY ON TALL ZIRĀ‘A <i>by Dieter Vieweger/Frauke Kenkel/Daniel Keller/Stefanie Hoss</i>	59
2.1. Methodology <i>by Dieter Vieweger</i>	59
2.2. Finds <i>by Dieter Vieweger/Frauke Kenkel/Stefanie Hoss/Daniel Keller</i>	59
2.2.1. Pottery from the 2001 Survey <i>by Frauke Kenkel</i>	59
2.2.1.1. Typological Studies of the Pottery.....	60
2.2.1.2. Two Sherds with a Stamp from Tall Zirā‘a.....	64
2.2.1.3. Early Bronze Age Pottery from Tall Zirā‘a.....	65
2.2.1.4. Early and Middle Bronze Age Pottery from Tall Zirā‘a.....	68
2.2.1.5. Middle and Late Bronze Age Pottery from Tall Zirā‘a.....	69
2.2.1.6. Late Bronze Age Pottery from Tall Zirā‘a.....	71
2.2.1.7. Late Bronze Age/Iron Age and Iron Age Pottery from Tall Zirā‘a.....	73
2.2.1.8. Iron Age Cooking Pots from Tall Zirā‘a.....	75
2.2.1.9. Iron Age IIA/B and Iron Age IIC Pottery from Tall Zirā‘a.....	77
2.2.1.10. Hellenistic and Early Roman Pottery from Tall Zirā‘a.....	79
2.2.1.11. Hellenistic – Roman and Roman Pottery from Tall Zirā‘a.....	81
2.2.1.12. Late Roman and Byzantine Pottery Imports from Tall Zirā‘a.....	84
2.2.1.13. Roman – Byzantine, Byzantine and Byzantine – Early Islamic Pottery from Tall Zirā‘a.....	85
2.2.1.14. Late Byzantine – Early Islamic, Umayyad and Mamluk Pottery from Tall Zirā‘a.....	88
2.2.1.15. Islamic Pottery from Tall Zirā‘a.....	90
2.2.1.16. Islamic and Ottoman Pottery from Tall Zirā‘a.....	92

2.2.2.	Glass Finds from the 2001 Survey	<i>by Stefanie Hoss/Daniel Keller</i>	124
2.2.2.1.	Typology of the Glass Finds.....		124
2.2.2.2.	Analysis of the Glass Finds.....		126
2.2.2.3.	Catalogue of the Glass Finds.....		127
2.2.3.	Stone/Mineral Finds from the 2001 Survey	<i>by Dieter Vieweger</i>	134
2.2.3.1.	Stone/Mineral Finds of Different Types.....		134
2.2.3.2.	Catalogue of the Stone/Mineral Finds.....		134
2.2.3.3.	Two Early Roman Limestone Vessels.....		139
2.2.3.4.	Catalogue of the Early Roman Limestone Vessels.....		141
2.2.4.	Bone Finds from the 2001 Survey	<i>by Dieter Vieweger</i>	141
2.3.	The 2001 Survey Results	<i>by Dieter Vieweger</i>	142
2.3.1.	Results of Find Distribution.....		142
2.3.2.	Comparison of Different Survey Methods.....		146
2.4.	Bibliography.....		150
3.	SCIENTIFIC METHODS	<i>by Dieter Vieweger/Jutta Häser/Patrick Leiverkus/Götz Bongartz/Gilles Bülow/Johannes Große Frericks/ Dietmar Biedermann/Armin Rauen/Knut Rassmann/Samantha Reiter/Katja Soennecken/Linda Olsvig- Whittaker/David Adan-Bajewitz</i>	157
3.1.	Animated 3D-Models of Archaeological Excavation Contexts		
	from Tall Zirā'a	<i>by Dieter Vieweger/Jutta Häser</i>	157
3.1.1.	Reconstruction of an Iron Age I Four Room House.....		158
3.1.2.	Reconstruction of the Late Bronze Age City.....		159
3.2.	Aerial Survey and Photogrammetry	<i>by Patrick Leiverkus/Götz Bongartz</i>	163
3.2.1.	Photogrammetry and Documentation of Archaeological Features	<i>by Patrick Leiverkus</i>	164
3.2.1.1.	Digital Photogrammetry.....		164
3.2.1.2.	Representation of a Spatial Structure by Means of Image-Based 3D-Reconstructions.....		165
3.2.2.	Aerial Photogrammetry for the Creation of Maps	<i>by Patrick Leiverkus</i>	166
3.2.3.	Three Application Examples	<i>by Götz Bongartz</i>	167
3.2.3.1.	Large Scale: The Tall Zirā'a.....		167
3.2.3.2.	Medium Scale: Areas and Squares.....		167
3.2.3.3.	Small Scale: Objects.....		168
3.3.	Colorimetric Examination of Ceramic	<i>by Gilles Bülow/Johannes Große Frericks</i>	168
3.3.1.	The L*a*b*-Colour System.....		169
3.3.2.	The Program ('BAI-Computer').....		169
3.3.2.1.	Method of Classification of Pottery Ware Groups by Means of the 'BAI Computer'.....		169
3.3.2.2.	Method of Allocation of Munsell Value by Means of the 'BAI Computer'.....		170
3.3.3.	Methods of Measurements and Definition of L*a*b* Tolerances.....		170
3.3.3.1.	Determination of L*a*b* Tolorances.....		171
3.3.3.2.	Calculation of Target Value.....		172

3.3.3.3.	Comparison of Pottery Ware Groups.....	172
3.3.4.	Conclusions.....	172
3.3.4.1.	Measuring Methodology.....	172
3.3.4.2.	Classification into Pottery Ware Groups.....	172
3.3.4.3.	Statistical Evaluation.....	173
3.3.4.4.	Classification of Munsell Values.....	173
3.4.	Experimental Archaeology <i>edited by Dieter Vieweger/Jutta Häser</i>	173
3.4.1.	Reconstruction of a Tabun.....	174
3.4.2.	Construction of Pottery Kilns.....	175
3.4.2.1.	Construction of an Updraft Kiln in 2001.....	175
3.4.2.2.	Ethno-Archaeology as an Approach to Better Understanding Technical Procedures.....	175
3.4.2.3.	Construction of an Updraft Kiln in 2006.....	176
3.4.2.4.	Construction of a Quadruple-Shelled Kiln in 2012.....	177
3.4.3.	Experiments on Melting Glass and the Processing of Raw Materials	178
3.4.3.1.	Production of Raw Glass.....	178
3.4.3.2.	Melting Raw Glass.....	179
3.4.3.3.	Glass Production in the Quadruple-Shelled Kiln.....	180
3.4.3.4.	The Glass Production on Tall Zirā‘a.....	180
3.5.	Geophysics <i>by Patrick Leiverkus/Armin Rauen/Dieter Vieweger/Dietmar Biedermann/Knut Rassmann/Samantha Reiter</i> ...	189
3.5.1.	Geophysical Survey in 2001 <i>by Patrick Leiverkus/Armin Rauen/Dieter Vieweger</i>	189
3.5.2.	Crosshole Investigations in 2007 <i>by Dietmar Biedermann</i>	191
3.5.3.	Seeing Beneath the Ground—Geomagnetic Prospection in 2014 <i>by Knut Rassmann/Samantha Reiter</i>	193
3.5.3.1.	Technical Equipment and Data Processing.....	193
3.5.3.2.	Data Processing.....	193
3.5.3.3.	Methodological Remarks.....	194
3.5.3.4.	Results.....	194
3.6.	Landscape Archaeology <i>by Patrick Leiverkus/Katja Soenneken/Linda Olsvig-Whittaker</i>	197
3.6.1.	The Wādi al-‘Arab Survey <i>by Patrick Leiverkus/Katja Soenneken</i>	198
3.6.2.	Landscape Archaeology and its Methods Used in the ‘Gadara Region Project’ <i>by Linda Olsvig-Whittaker</i>	202
3.6.2.1.	Habitat Mapping.....	202
3.6.2.2.	Multivariate Analysis of Assemblage Patterns.....	204
3.6.2.3.	Detrended Correspondence Analysis (DCA).....	205
3.6.2.4.	Canonical Correspondence Analysis (CCA).....	205
3.6.2.5.	Preliminary Results.....	205
3.7.	Archaeobotany <i>by Linda Olsvig-Whittaker</i>	206
3.7.1.	Ecological Background.....	207
3.7.1.1.	Ecological Background of Northern Jordan.....	207
3.7.1.2.	Ecological Background of Tall Zirā‘a.....	207

3.7.2.	Archaeobotanical Background.....	208
3.7.3.	Methods.....	208
3.7.4.	Preliminary Results of the Archaeobotanical Researches on Tall Zirā‘a.....	210
3.7.5.	Potential Future Archaeobotanical Researches on Tall Zirā‘a.....	210
3.8.	Archaeometry <i>edited by Dieter Vieweger/Jutta Häser/with a contribution by David Adan-Bajewitz</i>	212
3.8.1.	Pottery <i>edited by Dieter Vieweger/Jutta Häser/with a contribution by David Adan-Bajewitz</i>	213
3.8.1.1.	Provenance Study.....	213
3.8.1.2.	Typology.....	215
3.8.1.3.	Compositional and Provenance Study of Roman Period Pottery <i>by David Adan-Bajewitz</i>	216
3.8.2.	Glass, Glass Frit, and Faience <i>edited by Dieter Vieweger/Jutta Häser</i>	217
3.8.2.1.	Glass.....	217
3.8.2.2.	Glass Frits and Faience.....	218
3.8.3.	Production of Glass and Faience <i>edited by Dieter Vieweger/Jutta Häser</i>	220
3.8.3.1.	Glass.....	220
3.8.3.2.	Glass Frit and Faience.....	221
3.8.4.	Metals <i>edited by Dieter Vieweger/Jutta Häser</i>	221
3.8.4.1.	Copper (Ore/Slags) and Bronze.....	221
3.8.4.2.	Metal Artefacts.....	221
3.8.4.3.	Silver and Gold Objects.....	223
3.8.4.4.	Metal Processing on Tall Zirā‘a.....	223
3.8.5.	Stones and Minerals <i>edited by Dieter Vieweger/Jutta Häser</i>	224
3.8.5.1.	Minerals.....	224
3.8.5.2.	Balance Weights.....	227
3.9.	Bibliography.....	228
4.	FRAMEWORK OF ARCHAEOLOGICAL WORK ON TALL ZIRĀ‘A <i>by Dieter Vieweger/Jutta Häser</i>	235
4.1.	The Grid System Used at the Excavation <i>by Dieter Vieweger/Jutta Häser</i>	235
4.2.	Stratigraphic Nomenclature and Definition of Areas, Contexts and Finds <i>by Dieter Vieweger/Jutta Häser</i>	238
4.2.1.	Stratigraphic Nomenclature.....	238
4.2.2.	Definition and Numbering System of Areas, Contexts and Finds.....	241
4.3.	Archaeological Periods in the Southern Levant (a Short Chronology) <i>by Dieter Vieweger/Jutta Häser</i>	242
4.4.	Radiocarbon Samples from Tall Zirā‘a <i>by Dieter Vieweger/Jutta Häser</i>	244
4.4.1.	Area II.....	244
4.4.2.	Area I.....	244
4.4.2.1.	Ottoman Period (Stratum 1).....	244
4.4.2.2.	Early Roman Period (Stratum 7 c).....	245
4.4.2.3.	Iron Age (Strata 13–10).....	245
4.4.2.4.	Late Bronze Age II (Stratum 14).....	249

4.4.2.5.	Constructional Stratum (Stratum 15).....	250
4.4.2.6.	Middle Bronze Age (Strata 19–16).....	251
4.4.2.7.	Transitional Period from Early Bronze Age IV to Middle Bronze Age I (Strata 21 and 20).....	258
4.4.2.8.	Early Bronze Age II and III (Strata 24–22).....	260
4.5.	Bibliography.....	266