The Indo-European Puzzle Revisited

This book examines the impact of ancient DNA research and scientific evidence on our understanding of the emergence of the Indo-European languages in prehistory. Offering cutting-edge contributions from an international team of scholars, it considers the driving forces behind the Indo-European migrations during the third and second millennia BC. The volume explores the rise of the world's first pastoral nomads, the Yamnaya culture, in the Russian Pontic steppe, including their social organization, expansions, and the transition from nomadism to semi-sedentism when entering Europe. It also traces the chariot conquest in the late Bronze Age and its impact on the expansion of the Indo-Iranian languages into Central Asia. In the final section, the volume considers the development of hierarchical societies and the origins of slavery. A landmark synthesis of recent, exciting discoveries, the book also includes an extensive theoretical discussion regarding the integration of linguistics, genetics, and archaeology, and the importance of interdisciplinary research in the study of ancient migration.

Kristian Kristiansen is Professor of Archaeology at the Department of Historical Studies at the University of Gothenburg and Affiliated Professor at the Globe Institute, University of Copenhagen. He specializes in the Bronze Age of western Eurasia, archaeological theory, and cultural heritage studies.

Guus Kroonen is an Indo-Europeanist based at the Leiden University Centre for Linguistics. His specializations include Scandinavian, Germanic, and Indo-European linguistics. In addition, he is Professor with Special Responsibilities of Linguistic Prehistory at the Copenhagen University section of Indo-European Studies.

Eske Willerslev is Lundbeck Foundation Professor at the Globe Institute at the University of Copenhagen, and Prince Phillip Professor at the Department of Zoology at the University of Cambridge. He is an evolutionary geneticist, recognized for his studies on human evolution and environmental DNA.

The Indo-European Puzzle Revisited

Integrating Archaeology, Genetics, and Linguistics

Edited by

Kristian Kristiansen Universities of Gothenburg and Copenhagen

Guus Kroonen Universities of Leiden and Copenhagen

Eske Willerslev Universities of Cambridge and Copenhagen



Cambridge University Press & Assessment 978-1-009-26174-6 — The Indo-European Puzzle Revisited Edited by Kristian Kristiansen , Guus Kroonen , Eske Willerslev Frontmatter <u>More Information</u>

> CAMBRIDGE UNIVERSITY PRESS

Shaftesbury Road, Cambridge CB2 8EA, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi-110025, India

103 Penang Road, #05-06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

We share the University's mission to contribute to society through the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9781009261746

DOI: 10.1017/9781009261753

© Cambridge University Press & Assessment 2023

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press & Assessment.

First published 2023

Printed in the United Kingdom by TJ Books Limited, Padstow Cornwall

A catalogue record for this publication is available from the British Library.

Library of Congress Cataloging-in-Publication Data

Names: Kristiansen, Kristian, 1948- editor. | Kroonen, Guus, 1979- editor. | Willerslev, Eske, editor.

Title: The Indo-European puzzle revisited : integrating archaeology, genetics, and linguistics / edited by Kristian Kristiansen, University of Gothenburg ; Guus Kroonen, University of Leiden ; Eske Willerslev, University of Copenhagen.

Description: Cambridge ; New York, NY : Cambridge University Press, 2023. | Includes bibliographical references and index.

Identifiers: LCCN 2022030552 (print) | LCCN 2022030553 (ebook) | ISBN 9781009261746 (Hardback) | ISBN 9781009261722 (Paperback) | ISBN 9781009261753 (epub)

Subjects: LCSH: Indo-European languages. | Indo-Europeans– Migrations. | DNA–Analysis. | Indo-European antiquities. | Historical linguistics. | BISAC: SOCIAL SCIENCE / Archaeology | LCGFT: Essays.

Classification: LCC P525 .I53 2023 (print) | LCC P525 (ebook) | DDC 417/.7-dc23/eng/20220720

LC record available at https://lccn.loc.gov/2022030552

LC ebook record available at https://lccn.loc.gov/2022030553

ISBN 978-1-009-26174-6 Hardback

Cambridge University Press & Assessment has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

Contents

List of Figures page vii List of Tables ix List of Contributors xi Preface xiii

INTRODUCTION

1 Re-theorizing Interdisciplinarity, and the Relation between Archaeology, Linguistics, and Genetics 3 KRISTIAN KRISTIANSEN AND GUUS KROONEN

PART I EARLY INDO-EUROPEAN AND THE ORIGIN OF PASTORALISM

- 2 The Yamnaya Culture and the Invention of Nomadic Pastoralism in the Eurasian Steppes 13 DAVID W. ANTHONY
- 3 Yamnaya Pastoralists in the Eurasian Desert Steppe Zone: New Perspectives on Mobility 34 NATALIA I. SHISHLINA
- 4 Proto-Indo-Anatolian, the "Anatolian Split" and the "Anatolian Trek": A Comparative Linguistic Perspective 42 ALWIN KLOEKHORST

PART II MIGRATORY PROCESSES AND LINGUISTIC DISPERSALS BETWEEN YAMNAYA AND THE CORDED WARE

- 5 The Corded Ware Complex in Europe in Light of Current Archaeogenetic and Environmental Evidence 63 WOLFGANG HAAK, MARTIN FURHOLT, MARTIN SIKORA, ADAM BEN ROHRLACH, LUKA PAPAC, KARL-GÖRAN SJÖGREN, VOLKER HEYD, MORTEN FISCHER MORTENSEN, ANNE BRIGITTE NIELSEN, JOHANNES MÜLLER, INGO FEESER, GUUS KROONEN, AND KRISTIAN KRISTIANSEN
- 6 Emergent Properties of the Corded Ware Culture: An Information Approach 81 QUENTIN BOURGEOIS AND ERIK KROON

- 7 Linguistic Phylogenetics and Words for Metals in Indo-European 93 THOMAS OLANDER
- 8 Word Mining: Metal Names and the Indo-European Dispersal 105 RASMUS THORSØ, ANDREW WIGMAN, ANTHONY JAKOB, AXEL I. PALMÉR, PAULUS VAN SLUIS, AND GUUS KROONEN

PART III THE CULTURAL AND LINGUISTIC SIGNIFICANCE OF BELL BEAKERS ALONG THE ATLANTIC FRINGE

- From the Steppe to Ireland: The Impact of aDNA Research 129
 J. P. MALLORY
- Beaker Culture Metal and Mobility in Atlantic Europe: Some Implications for Genetic and Language Origins 146
 WILLIAM O'BRIEN
- "From the Ends of the Earth": A Cross-Disciplinary Approach to Long-Distance Contact in Bronze Age Atlantic Europe 157 JOHN T. KOCH AND JOHAN LING
- 12 With the Back to the Ocean: The Celtic Maritime Vocabulary 172 DAVID STIFTER
- European Prehistory between Celtic and Germanic: The Celto-Germanic Isoglosses Revisited 193
 PAULUS VAN SLUIS, ANDERS RICHARDT JØRGENSEN, AND GUUS KROONEN

PART IV THE BRONZE AGE CHARIOT AND WOOL HORIZONS

 Relative and Absolute Chronologies of the Chariot Complex in Northern Eurasia and Early Indo-European Migrations 247
 IGOR V. CHECHUSHKOV AND ANDREY EPIMAKHOV

v

Cambridge University Press & Assessment 978-1-009-26174-6 — The Indo-European Puzzle Revisited Edited by Kristian Kristiansen , Guus Kroonen , Eske Willerslev Frontmatter <u>More Information</u>

CONTENTS

- 15 Indo-European and Indo-Iranian Wagon Terminology and the Date of the Indo-Iranian Split 257 ALEXANDER LUBOTSKY
- 16 Fire and Water: The Bronze Age of the Southern Urals and the Rigveda 263 ANDREY EPIMAKHOV AND ALEXANDER LUBOTSKY
- Wool Fibers of the Northern Eurasian Bronze Age: The Cultural and Geographical Contexts 275
 NATALIA I. SHISHLINA, POLINA S. ANKUSHEVA, OLGA V. ORFINSKAYA, AND DARIA V. KISELEVA
- 18 An Archaeolinguistic Approach to Indo-European Wool Terminology 282
 BIRGIT A. OLSEN

PART V KINSHIP SYSTEMS, MARRIAGE, FOSTERAGE, FREE, AND UNFREE

 Mobility, Kinship, and Marriage in Indo-European Society 289
 TIJMEN PRONK

- 20 Marriage Strategies and Fosterage among the Indo-Europeans: A Linguistic Perspective 296 BIRGIT A. OLSEN
- 21 Fostering Women and Mobile Children in Final Neolithic and Early Bronze Age Central Europe 303 PHILIPP W. STOCKHAMMER
- 22 Hiding in Plain Sight? The Enigma of the Linguistic Remains of Prehistoric Slavery 308 BENEDICTE NIELSEN WHITEHEAD

CONCLUDING REFLECTIONS

 23 New Directions in Archaeogenetics and Archaeolinguistics: Recapitulation and Outlook 329
 GUUS KROONEN AND KRISTIAN KRISTIANSEN

Index 339

Cambridge University Press & Assessment 978-1-009-26174-6 — The Indo-European Puzzle Revisited Edited by Kristian Kristiansen , Guus Kroonen , Eske Willerslev Frontmatter <u>More Information</u>

Figures

- 2.1 The nine regional groups (I–IX) of the Yamnaya culture defined by N. I. Merpert (1974). *page* 17
- 2.2 Early Yamnaya sites with radiocarbon dates ≥ 4350 BP. 18
- Seasonal herding camp artifacts from Peschanyi Dol 1, Samara Valley Project. 24
- 2.4 Bivariate plot of Eneolithic and Bronze Age stable dietary isotopes from humans in the middle Volga steppes. 25
- 3.1 Pilot area of the research: a Eurasian steppe belt, b
 Yamnaya culture, c Sal-Manych Ridge. 35
- 3.2 The Sal-Manych Ridge, Temrta IV burial ground. 36
- 3.3 Yamnaya culture funerary goods. 37
- 3.4 The Sal-Manych Ridge. Locations of Bronze Age seasonal campsites. 37
- 3.5 The Sal-Manych Ridge. Balka Volochaika. 39
- 4.1 The family tree of Indo-European according to the Indo-Anatolian Hypothesis. 43
- 4.2 The phylogenetic composition of the Anatolian branch. 44
- 4.3 Reconstruction of the linguistic landscape of Anatolia at the beginning of the second millennium BCE. 49
- 4.4 The route of the spread of (pre-stages of) Luwian within the Balkan scenario. 50
- 4.5 The route of the spread of (pre-stages of) Luwian within the Caucasus scenario. 51
- 4.6 Schematic route of the "Anatolian trek." 52
- 4.7 The dispersal of the Anatolian branch. 52
- 4.8 The spread of the stone horse-head maces in the Middle Eneolithic. 53
- 5.1 Double inhumation of an adult female and young boy from the Late Neolithic Corded Ware at Karsdorf, Germany. 64
- 5.2 Geographic map of Corded Ware-associated individuals studied to date. 65
- 5.3 Principal component analysis plot highlighting published Corded Ware-associated individuals. 66
- 5.4 Percentage of male individuals in Corded Ware and Bell Beaker graves. 68
- 5.5 Correlations of PC2 as a proxy for steppe ancestry in published Corded Ware-associated individuals with latitude, longitude, and time. 68
- 5.6 Y chromosome lineage diversity in Corded Wareassociated males. 69
- 5.7 Landscape Reconstruction Algorithm (LRA) calibrated pollen diagrams from Denmark. 71
- 5.8 Land opening and reforestation are indicated by northern German palynological data. 73

- 5.9 LRA calibrated pollen diagrams from Lake Belau, Poggensee, and Lake Woserin. 74
- 6.1 Identical Corded Ware grave sets and graves from the Netherlands, Denmark, and Poland. 82
- Geographical distribution of Corded Ware burials in the data set. 84
- 6.3 Cumulative percentage of similar burials across all relations that occur within a specified distance of the source. 86
- 6.4 Cumulative percentage curve of the total similarity within specified distances of the source for the entire data set, left-, and right-flexed burials. 87
- 6.5 Network representation of the distance and similarity between left-flexed burials in the data set. 88
- 6.6 Network visualization of the distances and similarities between right-flexed burials in the data set. 89
- 7.1 Traditional model of the Indo-European language family. 95
- 7.2 The neo-traditional model of the Indo-European language family. 96
- 7.3 A binary-branching model of the Indo-European language family. 97
- 7.4 Words for metals in a binary-branching model of the Indo-European language family. 99
- 8.1 The spread of iron metallurgy in Europe. 119
- 8.2 Schematic overview of the occurrence of the most important shared metal names in the Indo-European language family. 121
- 9.1 Radiocarbon density indicating population growth from ca. 2700 BCE to end of Bronze Age. 139
- 9.2 Density of radiocarbon dates from the Bronze Age to the early medieval period. 142
- 10.1 Chalcolithic/Beaker culture copper mines at Ross Island, southwest Ireland. 150
- 10.2 Entrance to Chalcolithic copper mines at El Aramo, Asturias. 151
- 10.3 Beaker culture networks in Atlantic Europe. 152
- 10.4 Chalcolithic copper mines at Les Neuf Boches, Cabrières. 153
- 11.1 First-order subgroups of Indo-European: simplified Indo-European family tree. 161
- 11.2 The Indo-European family tree published by August Schleicher in 1861. 162
- 11.3 Deposits of copper and tin, findspots of Late Bronze Age "warrior" stelae, and navigable rivers in the Iberian Peninsula. 164

LIST OF FIGURES

- 11.4 Childe's 1939 map of "double-looped palstaves in western Europe." 165
- 11.5 Late Bronze Age stela from La Solanilla, Córdoba, Spain. 166
- 11.6 Rubbing of a rock-art image of a chariot and two-horse team from Frännarp, Skåne, Sweden. 167
- 12.1 Phylogeny of the Celtic languages. 173
- 13.1 Schematic representation of the main temporal strata of Celtic and Germanic. 197
- 13.2 Distribution range of the common yew (*Taxus baccata*). 203
- 13.3 The spread of silver in Europe. 206
- 14.1 The Bayesian sequence model of the chariot complex chronology. 251
- 14.2 Map approximating the diffusion of two-wheeled vehicles and chariots in northern Eurasia. 252
- 14.3 The principal directions of the IE migrations during the Bronze Age in northern Eurasia. 253
- 15.1 Plowing oxen in Nepal. 258
- 15.2 A young buck with nub horns. 258

- 16.1 Sintashta sites. 264
- 16.2 Sintashta fortified settlements on the basis of geomagnetic survey. 266
- 16.3 Sintashta settlement. 267
- 16.4 Kamennyi Ambar settlement. 268
- 17.1 Bronze Age sites with wool textiles. 276
- 17.2 Wool textile from Shakhaevsky 1, kurgan 4, grave 32. 276
- 17.3 Wool textile from Berezovy Rog, kurgan 20. 277
- 17.4 Wool textile from Chernyaki II, kurgan, grave. 278
- 17.5 ⁸⁷Sr/⁸⁶Sr strontium isotope ratios in the bioavailable reference of snails and Bronze Age textiles from Chernyaki II and Berezovy Rog. 278
- 23.1 The interdisciplinary cross-validation of the methodologies applied to the Indo-European homeland problem. 330
- 23.2 Diagram showing the impact of the three science revolutions in archaeology and their transformation of relative into absolute knowledge. 331
- 23.3 Model of an interdisciplinary research strategy. 335

Tables

- 2.1 Radiocarbon dates of 4350 BP or older from three early Yamnaya settlements and twenty-seven graves. *page* 15
- 2.2 Data on sacrificed animals found in Bronze Age graves located in the steppes between the lower Volga, the lower Don, and the North Caucasus. 20
- 2.3 Data on sacrificed animals found in EBA and MBA graves located in the Samara and Orenburg steppes between the south Urals and the Volga. 20
- $3.1 \ ^{14}\mathrm{C}$ data on the Lower Don Yamnaya. $\ 35$
- 6.1 Background data for Fig. 6.3. 85

- 6.2 Total similarity by distance from Corded Ware source burials. 87
- 9.1 Comparison between words that appear in the earliest Celtic inscriptions. 141
- 14.1 Chronology of chariotry of Northern Eurasia. Radiocarbon measurements. 250
- 14.2 Relative chronology of the Eurasian Bronze Age and the absolute (unadjusted) chronology of the chariot complex. 254
- 16.1 Features of Apām Napāt reconstructed for the common Indo-Iranian period. 272

Contributors

Polina S. Ankusheva South Ural Federal Research Center of Mineralogy and Geoecology, Ural Branch of the Russian Academy of

David W. Anthony Hartwick College, USA

Sciences, Miass, Russia

Quentin Bourgeois Leiden University, The Netherlands

Igor V. Chechushkov Institute of History and Archaeology, Ural Branch of the Russian Academy of Sciences, Yekaterinburg, Russia

Andrey V. Epimakhov South Ural State University, Chelyabinsk, Russia

Ingo Feeser University of Kiel, Germany

Morten Fischer Mortensen The National Museum, Copenhagen, Denmark

Martin Furholt University of Oslo, Norway

Wolfgang Haak Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

Volker Heyd University of Helsinki, Finland

Anthony Jakob Leiden University, The Netherlands

Anders Richardt Jørgensen University of Copenhagen, Denmark

Daria V. Kiseleva Institute of Geology and Geochemistry, Ural Branch of the Russian Academy of Sciences, Yekaterinburg, Russia

Alwin Kloekhorst Leiden University, The Netherlands

John T. Koch University of Wales, Aberystwyth, UK

Kristian Kristiansen University of Gothenburg, Sweden

Erik Kroon Leiden University, The Netherlands Guus Kroonen

1) Leiden University, The Netherlands; 2) University of Copenhagen, Denmark

Johan Ling University of Gothenburg, Sweden

Alexander M. Lubotsky Leiden University, The Netherlands

James P. Mallory Queen's University Belfast, Ireland

Johannes Müller University of Kiel, Germany

Anne Brigitte Nielsen University of Lund, Sweden

Benedicte Nielsen Whitehead University of Copenhagen, Denmark

William O'Brien University College Cork, Ireland

Thomas Olander University of Copenhagen, Denmark

Birgit Anette Olsen University of Copenhagen, Denmark

Olga V. Orfinskaya Centre for Egyptological Studies of the Russian Academy of Sciences, Moscow, Russia

Axel Palmér Leiden University, The Netherlands

Luka Papac Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

Tijmen Pronk Leiden University, The Netherlands

Adam Ben Rohrlach Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

Natalia I. Shishlina Department of Archaeology, State History Museum, Moscow, Russia

Martin Sikora University of Copenhagen, Denmark

Cambridge University Press & Assessment 978-1-009-26174-6 — The Indo-European Puzzle Revisited Edited by Kristian Kristiansen , Guus Kroonen , Eske Willerslev Frontmatter <u>More Information</u>

LIST OF CONTRIBUTORS

Karl-Göran Sjögren

University of Gothenburg, Sweden

David Stifter Maynooth University, Ireland

Philipp W. Stockhammer

 Ludwig Maximilian University of Munich, Germany;
 Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany Rasmus Thorsø Leiden University, The Netherlands

Paulus van Sluis Leiden University, The Netherlands

Andrew Wigman Leiden University, The Netherlands

Eske Willerslev 1) Cambridge University, UK; 2) University of Copenhagen

Preface

From May 2 to 5, 2018, the editors of this volume hosted an international, interdisciplinary conference at Gothenburg University under the name "When Archaeology Meets Linguistics and Genetics." Thanks to a generous grant from Riksbankens Jubileumsfond in 2016, the three organizers had already become involved in multiple interdisciplinary research projects on European prehistory. It was our ambition also to bring together other scholars from the aforementioned fields, in particular those working to solve some of the central questions related to the puzzle of Indo-European origins. With this vision in mind, we invited some of the most active scholars from archaeology, linguistics, and genetics to come to Gothenburg, and to present the state of the art of their fields.

To make this a constructive interdisciplinary encounter, we decided to organize the conference around a number of themes, each with a contribution from archaeology, linguistics, and archaeogenetics, when possible. These are (1) early Indo-European and the origin of pastoralism, (2) migratory processes and linguistic dispersals between Yamnaya and the Corded Ware, (3) the cultural and linguistic significance of Bell Beakers along the Atlantic fringe, (4) the Bronze Age chariot and wool horizons, and (5) kinship systems, marriage, fosterage, free and unfree. It turned out to be a rewarding approach, we believe, even if some results were unexpected, surprising, or straight-out problematic. After all, it is only by identifying new problems that new explanations can be explored, and in the interdisciplinary arena of Indo-European studies, such identifications often only happen by combining all of the available data sets.

Now, we can present this volume as a lasting result of our ambition to unite scholars from our highly divergent but increasingly interdependent fields. We would like to express our deepest gratitude to all the participants for joining our meeting in Gothenburg, for presenting their ideas, and for participating in the discussions, and last but not least for reevaluating their results in the light of their experiences at the conference.

We further thank the authors for contributing one or sometimes even two papers, each of which can be considered pioneering studies in their corresponding areas of research. While we cannot claim to have solved all the problems concerning the dispersal of the Indo-European languages, we are confident that the papers presented in this book take important new steps toward understanding what lies at the heart of the formation of the Eurasian linguistic landscape, i.e., the Indo-European dispersal. Although the puzzle of the Indo-European origins is over a century old, there has hardly ever been a more fascinating time to study it. By addressing all the old and the new problems that this topic presents, fresh insights can be gained not only on this key question in European prehistory, but also on how to make new inroads into the development of interdisciplinary tools for addressing other such major questions concerned with our shared human past.

Finally, we thank Kristen de Joseph for her efforts in copyediting all the contributions and Richard Potter for helping us prepare the manuscript for publication.