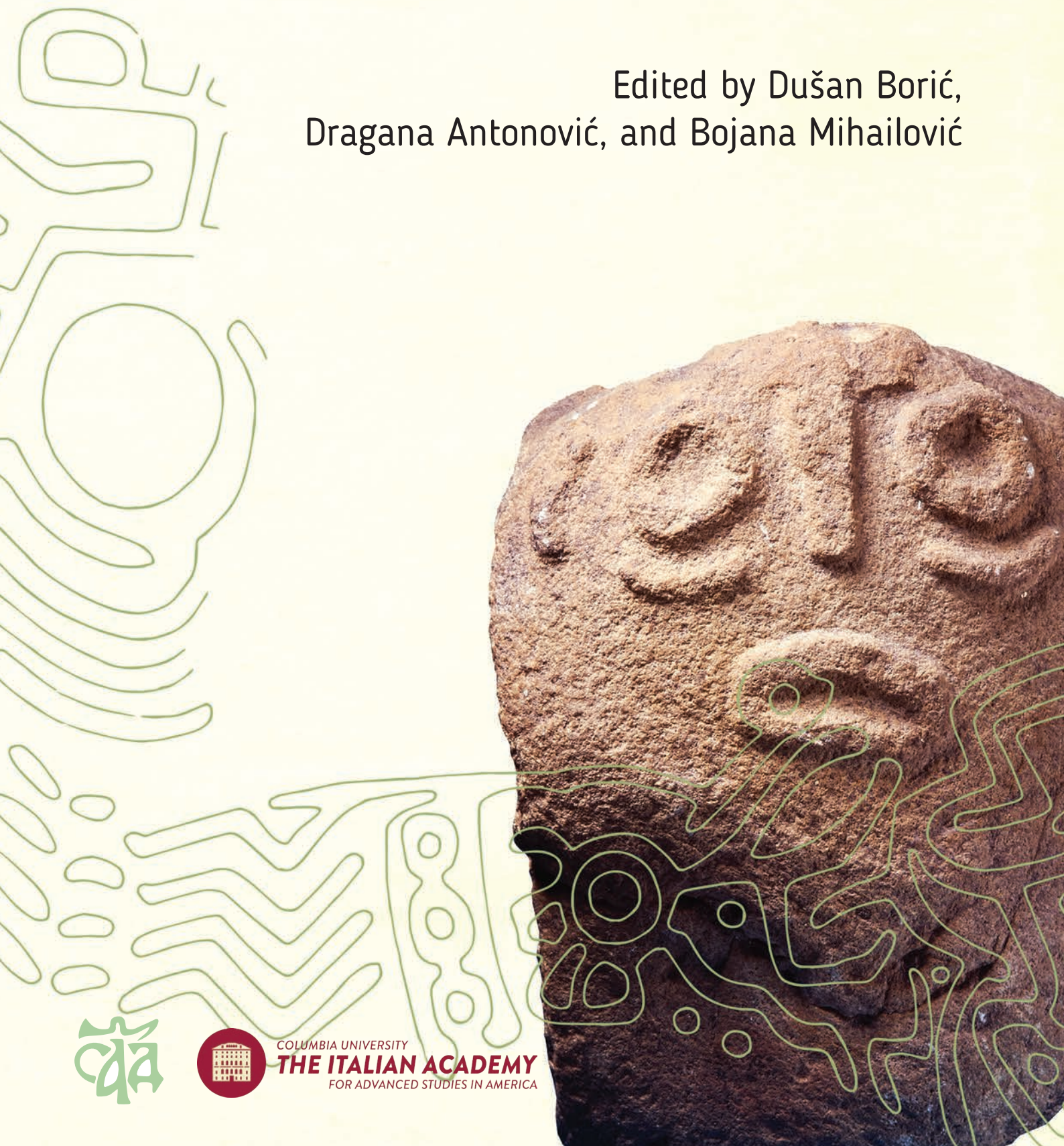


Foraging Assemblages

Volume **2**

Edited by Dušan Borić,
Dragana Antonović, and Bojana Mihailović



COLUMBIA UNIVERSITY
THE ITALIAN ACADEMY
FOR ADVANCED STUDIES IN AMERICA

Foraging Assemblages

Volume  2

Edited by Dušan Borić,
Dragana Antonović, and Bojana Mihailović

Serbian Archaeological Society
The Italian Academy for Advanced Studies in America, Columbia University

Belgrade & New York

The NOMIS Foundation provided a grant in support of preparation and publication of this book



Publishers

Serbian Archaeological Society, Belgrade, Republic of Serbia

The Italian Academy for Advanced Studies in America, Columbia University, New York, USA

For Publishers

Adam Crnobrnja

David Freedberg

Edited by

© Dušan Borić, Dragana Antonović, Bojana Mihailović 2021

This publication is in copyright. No reproduction of any part may take place without the written permission of the authors.

First published 2021

Peer-reviewed by

Pablo Arias

Nuno Bicho

Clive Bonsall

Dušan Borić

Chantal Conneller

Emanuela Cristiani

Vesna Dimitrijević

Federica Fontana

Ole Grøn

Judith Grünberg

Lars Larsson

Dušan Mihailović

Nicky Millner

T. Douglas Price

Rick Schulting

Robert Whallon

Copy-editing and proof-reading

Hannah Elmer

Dušan Borić

Design

Dušan Pavlić

Index compiled by

Mia Borić

Dušan Borić

Desktop publishing

Marko Huber

Print run 400

Printed by Publikum

ISBN

978-86-80094-15-1

978-86-80094-16-8

A CIP record of this book is available from the National Library of Serbia, Belgrade

Front Cover Illustration: Sculpted sandstone boulder named 'Progenitor' (inv. no. 41) from Lepenski Vir (National Museum in Belgrade)

Back Cover Illustration: Lepenski Vir during excavations (Photograph courtesy of Alan McPherron)

CIP - Каталогизacija у публикацији
Народна библиотека Србије, Београд

903(4)"632/633"(082)
902.2(4)(082)

FORAGING Assemblages. Vol. 2 / edited by Dušan Borić, Dragana Antonović, and Bojana Mihailović. - Belgrade : Serbian Archaeological Society ; New York : The Italian Academy for Advanced Studies in America, Columbia University, 2021 (Belgrade : Publikum). - VIII str., str. 353-820 : ilustr. ; 29 cm

Tekst štampan dvostubačno. - Tiraž 400. - Napomene i bibliografske reference uz tekst. - Bibliografija uz svaki rad. - Registar.

ISBN 978-86-80094-15-1 (SAS)
ISBN 978-86-80094-16-8 (niz)

1. Borić, Dušan, 1973- [urednik] 2. Antonović, Dragana, 1960- [urednik]
3. Mihailović, Bojana, 1963- [urednik]

a) Археолошка налазишта, праисторијска -- Европа -- Мезолит -- Зборници
б) Археолошка истраживања -- Европа -- Зборници

COBISS.SR-ID 35939593

VOLUME I

	List of Contributors	ix
	Preface	xxv
	The Danube Gorges Mesolithic: The first fifty years (<i>Dušan Borić</i>)	xxvii
	Transitions – Beginnings	1
1	Introduction: Transitions – Beginnings (<i>Dušan Mihailović and Robert Whallon</i>)	3
2	Transition and tradition: Lithic variability in the cave of Vlakno, Croatia (<i>Dario Vujević and Mario Bodružić</i>)	5
3	Workspace organization of a Final Palaeolithic hunter-gatherer camp (<i>Anton A. Simonenko and Olesya I. Uspenskaya Aleksandrova</i>)	12
4	The problem of the Palaeolithic to Mesolithic transition on the Upper and Middle Don River (central Russia) (<i>Alexander N. Bessudnov and Alexander A. Bessudnov</i>)	20
5	Early Holocene human adaptation and palaeoenvironment of the north-western Caucasus (Elena V. Leonova, Olesya I. Uspenskaya, Natalia V. Serdyuk, Elena A. Spiridonova, Alexey S. Tesakov, Elena V. Chernysheva, Pavel D. Frolov, and Elena V. Syromyatnikova)	29
6	Early Mesolithic of northern Bohemia: 2015 excavations (<i>Jiří Svoboda</i>)	36
7	The last hunter-gatherers of South Arabia: A review of the Terminal Pleistocene and Early Holocene archaeological record (<i>Yamandú Hieronymus Hilbert</i>)	45
	Colonization	53
8	Introduction: Colonization	55
9	First Mesolithic occupations at high altitudes in Vercors (Isère, France): The case studies of Les Coins I, Roybon, and Gerland (<i>Alexandre Angelin and Régis Picavet</i>)	57
10	The Mesolithic site of Borovskoye 2 in light of the Pre-Boreal habitation in Karelia (<i>Sergey Lisitsyn, Alexey Tarasov, Nataliya Tsvetkova, and Stanislav Belsky</i>)	64
11	The Mesolithic of Fontanella rockshelter (Vilafranca, eastern Mediterranean Iberia) and the last hunters-gatherers of northern Valencian country (<i>Dídac Román, Inés Domingo, and Jordi Nadal</i>)	74
	Landscapes	83
12	Introduction: Landscapes (<i>Dušan Borić</i>)	85
13	The missing landscapes and territories of Mesolithic Portugal (<i>Ana Cristina Araújo and Ana Maria Costa</i>)	88
14	A comparative perspective on Mesolithic assemblages from different landscapes in Bohemia (<i>Katarína Kapustka, Jan Eigner, and Matthew Walls</i>)	94
15	The Early Mesolithic of the Piave River basin: Mountain tops, riverbanks, and seashores? (<i>Federica Fontana, Davide Visentin, and Stefano Bertola</i>)	102
16	Integrating communities and landscape: A wetland perspective from the Lower Rhine area (<i>Luc W. S. W. Amkreutz</i>)	110

17	Tracing raw materials: Procurement strategies and movements in the Early Mesolithic, a case study from Larvik, south-eastern Norway (<i>Guro Fossum</i>)	118
18	Local or imported? Tracking the provenance of flint raw materials of the Mesolithic habitants of Estonia and northern Latvia with the help of geochemical methods (<i>Kristiina Johanson, Aivar Kriiska, Jaan Aruväli, Peeter Somelar, Kaarel Sikk, and Liina Sepp</i>)	123
19	The Upper Dee Tributaries Project: Finding the Mesolithic in the mountains of Scotland (Shannon M. Fraser, Gordon Noble, Graeme Warren, Richard Tipping, Danny Paterson, Wishart Mitchell, Ann Clarke, and Caroline R. Wickham-Jones)	129
20	Surviving Doggerland (<i>Caroline R. Wickham-Jones</i>)	135
21	A Mesolithic moment in time: The Drumnaglea Cache (<i>Peter Woodman† and Sarah Close</i>)	142
22	Transient campsites, logistic campsites, and the cumulative taphonomy of Malham Tarn site A: A persistent place in the northern Pennines (<i>William A. Lovis and Randolph E. Donahue</i>)	148
	Settlement	157
23	Introduction: Settlements, dwellings, pits, and middens – still very far from a theory of everything! (<i>Ole Grøn and Nuno Bicho</i>)	159
24	Of space and time: The non-midden components of the Cabeço da Amoreira Mesolithic shell mound (Muge, central Portugal) (<i>João Cascalheira, Nuno Bicho, Célia Gonçalves, Daniel García-Rivero, and Pedro Horta</i>)	162
25	Looking for the ‘Asturian’ dwelling areas: New data from El Alloru and Sierra Plana de la Borbolla (Asturias, Spain) (<i>Pablo Arias, Miriam Cubas, Miguel Ángel Fano, Esteban Álvarez-Fernández, Ana Cristina Araújo, Marián Cueto, Patricia Fernández Sánchez, Eneko Iriarte, Inés L. López-Dóriga, Sara Núñez, Christoph Salzmann, Carlos Duarte, Felix Teichner, Luis C. Teira, and Paloma Uzquiano</i>)	169
26	Habitation areas in Asturian shell middens and site formation processes: Mazaculos II cave (La Franca, Asturias, northern Iberia) and the new sites of El Total III and El Mazo (<i>Manuel R. González Morales</i>)	177
27	Mesolithic settlement patterns and occupation of central and eastern Cantabria (Spain) (<i>Mercedes Pérez-Bartolomé</i>)	184
28	Domestic life by the ocean: Beg-er-Vil, c. 6200–6000 cal BC (<i>Grégor Marchand and Catherine Dupont</i>)	191
29	Mesolithic pit-sites in Champagne (France): First data, key issues (<i>Nathalie Achard-Corompt, Emmanuel Ghesquiere, Christophe Laurelut, Charlotte Leduc, Arnaud Remy, Isabelle Richard, Vincent Riquier, Luc Sanson, and Julia Wattez</i>)	198
30	Some observations on the archaeological record of the (Late) Mesolithic in the northern Netherlands (<i>Marcel J. L. Th. Niekus</i>)	202
31	Life on the lake edge: Mesolithic habitation at Star Carr (<i>Nicky Milner, Chantal Conneller, Barry Taylor, Mike Bamforth, Julian C. Carty, Shannon Croft, Ben Elliott, Becky Knight, Aimée Little, Harry K. Robson, Charlotte C. A. Rowley, and Maisie Taylor</i>)	210
32	Late Mesolithic shallow pithouse from Sąsieczno 4 (central Poland) (<i>Grzegorz Osipowicz</i>)	216
33	Mesolithic complexes on the right bank of the Vyatka River (the middle Volga Basin) (<i>Tatyana Gusentsova</i>)	223
34	Mesolithic hearth-pits and cooking-pits in western Sweden and south-eastern Norway: When, where, how, and a bit about why (<i>Robert Hernek</i>)	227
35	Mesolithic ‘ghost’ sites and related Stone Age problems with lithics (<i>Ole Grøn and Hans Peeters</i>)	233
36	Sømmevågen. A Late Mesolithic–Early Neolithic settlement complex in south-western Norway: Preliminary results (<i>Trond Meling, Hilde Fyllingen, and Sean D. Denham</i>)	240
37	Mesolithic settlement on Utsira, western Norway: Mesolithic hunter-gatherers in transition as reflected by dwellings and site patterns (<i>Arne Johan Nærøy</i>)	246
38	Mesolithic dwellings from Motala, Sweden (<i>Ann Westermarck</i>)	252

Regional Identities	259
39 Introduction: Regional identities (<i>Rick Schulting</i>)	261
40 Holocene foraging in the Dinaric Alps: Current research on the Mesolithic of Montenegro (<i>Dušan Borić, Emanuela Cristiani, Ljiljana Đuričić, Dragana Filipović, Ethel Allué, Zvezdana Vušović-Lučić, and Nikola Borovinić</i>)	264
41 New perspectives on the Mesolithic of the Sado Valley (southern Portugal): Preliminary results of the SADO MESO project (<i>Pablo Arias, Mariana T. Diniz, Ana Cristina Araújo, Ángel Armendariz, and Luis C. Teira</i>)	274
42 The 'Asturian' and its neighbours in the twenty-first century: Recent perspectives on the Mesolithic of northern Spain (<i>Pablo Arias, Esteban Álvarez-Fernández, Miriam Cubas, Miguel Ángel Fano, María J. Iriarte-Chiapusso, Mercedes Pérez Bartolomé, and Jesús Tapia</i>)	281
43 The Mesolithic in the northwest of the Iberian Peninsula (Galicia, Spain): The state of art (<i>Eduardo Ramil Rego, Natividad Fuertes Prieto, Carlos Fernández Rodríguez, Eduardo González Gómez de Agüero and Ana Neira Campos</i>)	289
44 The last foragers in the north-east of the Iberian Peninsula: New evidence of human occupation during the seventh/sixth millennia cal BC (<i>Antoni Palomo, Igor Bodganovic, Raquel Piqué, Rafel Rosillo, Xavier Terradas, Marta Alcolea, Marian Berihuete, and Maria Saña</i>)	295
45 The Late Mesolithic of the south-western coast of Portugal: The lithic industry of Vale Marim I in focus (<i>Joaquina Soares, Niccolò Mazzucco, and Carlos Tavares da Silva</i>)	301
46 The temporality of the Mesolithic in southern France (<i>Thomas Perrin</i>)	308
47 Re-evaluating the old excavation from Pinnberg, Germany (<i>Daniel Groß, Steffen Berckhan, Nadine Hauschild, Anna-Lena Räder, and Anne Sohst</i>)	312
48 Exploring early Ertebølle: Results of preliminary assessments at a submerged site in the Kiel Bay (Baltic Sea, Germany) and its potential (<i>Julia Goldhammer, Annika B. Müller, Laura Brandt, Steffen Wolters, and Sönke Hartz</i>)	318
49 Identifying regional practices in cave use during the Mesolithic in south-western Britain (<i>Caroline Rosen</i>)	324
50 About time for the Mesolithic near Stonehenge: New perspectives from Trench 24 at Blick Mead, Vespasian's Camp, Amesbury (<i>David Jacques, Tom Lyons, Barry Bishop, and Tom Phillips</i>)	330
51 Secrets of Blue Maiden: The archaeology of a virgin island in the Baltic Sea (<i>Kenneth Alexandersson, Anna-Karin Andersson, and Ludvig Pappmehl-Dufay</i>)	337
52 Mesolithic site locations in the river valleys of Karelia, west of Ladoga Lake, Russia (<i>Hannu Takala, Mark. M. Shakhnovich, Aleksey Yu. Tarasov, and Anssi Malinen</i>)	345

VOLUME II

People in Their Environment	355
53 Introduction: People in their environment (<i>Clive Bonsall and Vesna Dimitrijević</i>)	357
54 Late Glacial to Early Holocene environs and wood use at Lepenski Vir (<i>Ethel Allué, Dragana Filipović, Emanuela Cristiani, and Dušan Borić</i>)	359
55 Plant use at the Mesolithic site of Parque Darwin (Madrid, Spain) (<i>Marian Berihuete Azorín, Marta Alcolea Gracia, Raquel Piqué i Huerta, and Javier Baena Preysler</i>)	367
56 A tale of foxes and deer, or how people changed their eating habits during the Mesolithic at Vlakno cave (Croatia) (<i>Siniša Radović, Victoria Pía Spry-Marqués, and Dario Vujević</i>)	374
57 Coastal resource exploitation patterns and climatic conditions during the Early Mesolithic in the Cantabrian region (northern Iberia): Preliminary data from the shell midden site of El Mazo (<i>Asier García-Escárzaga, Igor Gutiérrez-Zugasti, David Cuenca-Solana, Adolfo Cobo, and Manuel R. González-Morales</i>)	382

58	How ‘marine’ were coastal Mesolithic diets? (<i>Rick J. Schulting</i>)	389
59	The seasonality of hunting during the Mesolithic in southern Scandinavia (<i>Ola Magnell</i>)	398
60	Incremental growth line analysis of the European oyster (<i>Ostrea edulis</i> , Linnaeus, 1758) from the kitchen midden at Eskilsø, Denmark (<i>Harry K. Robson, Søren A. Sørensen, Eva M. Laurie, and Nicky Milner</i>)	404
61	Skellerup Enge: Evidence for a distinctive subsistence economy in western Denmark during the early Ertebølle (<i>Kenneth Ritchie, Søren H. Andersen, and Esben Kannegaard</i>)	410
62	Hunting beyond red deer: Exploring species patterning in Early Mesolithic faunal assemblages in Britain and north-western Europe (<i>Nick J. Overton</i>)	416
63	Size estimations of sturgeons (<i>Acipenseridae</i>) from the Mesolithic-Neolithic Danube Gorges (<i>Ivana Živaljević, Igor V. Askeyev, Dilyara N. Shaymuratova (Galimova), Oleg V. Askeyev, Sergey P. Monakhov, Dušan Borić, and Sofija Stefanović</i>)	422
	Technology	429
64	Introduction: Technology (<i>Federica Fontana, Emanuela Cristiani, and Dušan Mihailović</i>)	431
65	<i>Couteaux de Rouffignac</i> : A new insight into an old tool (<i>Davide Visentin, Sylvie Philibert, and Nicolas Valdeyron</i>)	434
66	The lithic assemblage of the Mesolithic station of Alp2 (pre-alpine mountain range of Chartreuse, northern French Alps): Preliminary data (<i>Jocelyn Robbe</i>)	440
67	The First and Second Mesolithic of La Grande Rivoire (Vercors range, Isère, France): A diachronic perspective on lithic technology (<i>Alexandre Angelin, Thomas Perrin, and Pierre-Yves Nicod</i>)	444
68	Techno-functional approach to a technological breakthrough: The Second Mesolithic of Montclus rockshelter (Gard, France) (<i>Elsa Defranould, Sylvie Philibert, and Thomas Perrin</i>)	452
69	The late microblade complexes and the emergence of geometric microliths in north-eastern Iberia (<i>Dídac Román, Pilar García-Argüelles, Jordi Nadal, and Josep Maria Fullola</i>)	457
70	Mesolithic raw material management south of the Picos de Europa (northern Spain) (<i>Diego Herrero-Alonso, Natividad Fuertes-Prieto, and Ana Neira-Campos</i>)	464
71	New perspectives on Mesolithic technology in northern Iberia: Data from El Mazo shell midden site (Asturias, Spain) (<i>Natividad Fuertes-Prieto, John Risetto, Igor Gutiérrez-Zugasti, David Cuenca-Solana, and Manuel R. González Morales</i>)	470
72	The conical core pressure blade concept: A Mesolithic <i>chaîne opératoire</i> (<i>Tuija Rankama and Jarmo Kankaanpää</i>)	476
73	Middle and Late Mesolithic microblade technology in eastern Norway: Gradual development or abrupt change? (<i>Svein Vatsvåg Nielsen and Torgeir Winther</i>)	482
74	Shaori II: An obsidian workshop in Javakheti, Georgia (<i>Dimitri Narimanishvili, Petranka Nedelcheva, and Ivan Gatsov</i>)	490
75	Finding, shaping, hiding: Caching behaviour in the Middle Mesolithic of south-eastern Norway (<i>Lucia Uchermann Koxvold</i>)	495
76	Hafting flake axes: Technological and functional aspects of an assemblage from north-western Norway (<i>John Asbjørn Havstein</i>)	499
77	Quantifying Irish shale Mesolithic axes/adzes (<i>Bernard Gilhooly</i>)	505
78	Technology of osseous artefacts in the Mesolithic Danube Gorges: The evidence from Vlasac (Serbia) (<i>Emanuela Cristiani and Dušan Borić</i>)	512
79	Antler in material culture of the Iron Gates Mesolithic (<i>Selena Vitezović</i>)	520
80	Tools made from wild boar canines during the French Mesolithic: A technological and functional study of the collection from Le Cuzoul de Gramat (France) (<i>Benjamin Marquiebielle and Emmanuelle Fabre</i>)	526

81	Lost at the bottom of the lake. Leister prongs from the Early and Middle Mesolithic (<i>Lars Larsson, Björn Nilsson, and Arne Sjöström</i>)	535
82	Late Glacial and Early Holocene osseous projectile weaponry from the Polish Lowlands: The case of a point from Witów (<i>Justyna Orłowska</i>)	540
	Social Relations, Communication, Mobility	547
83	Introduction: Social relations, communication, mobility (<i>Chantal Conneller</i>)	549
84	Role of personal ornaments: Vlakno cave (Croatia) (<i>Barbara Cvitkušić and Dario Vujević</i>)	551
85	Marine shells as grave goods at S'Ormu e S'Orku (Sardinia, Italy) (<i>Emanuela Cristiani, Rita T. Melis, and Margherita Mussi</i>)	558
86	Visual information in Cabeço da Amoreira, Muge (Portugal): Shell adornment technology (<i>Lino André and Nuno Bicho</i>)	567
87	Neighbours on the other side of the sea: Late Mesolithic relations in eastern Middle Sweden (<i>Jenny Holm</i>)	574
88	Sedentary hunters, mobile farmers: The spread of agriculture into prehistoric Europe (<i>T. Douglas Price, Lars Larsson, Ola Magnell, and Dušan Boric</i>)	579
	Rites and Symbols	585
89	Introduction: Rites and Symbols (<i>Judith M. Grünberg and Lars Larsson</i>)	587
90	A portable object in motion – Complex layers of meaning embedded in an ornamented sandstone-object from the Late Mesolithic site of Brunstad (Norway) (<i>Almut Schülke</i>)	590
91	Net patterns in Mesolithic art of north-western Europe (<i>Tomasz Płonka</i>)	595
92	Protective patterns in Mesolithic art (<i>Peter Vang Petersen</i>)	602
93	Mesolithic engraved bone pins: The art of fashion at Téviec (Morbihan, France) (<i>Éva David</i>)	610
94	Final destruction and ultimate humiliation of an enemy during the Mesolithic of southern Scandinavia (<i>Erik Brinch Petersen</i>)	619
95	Archaeological remains of Mesolithic funerary rites and symbols (<i>Judith M. Grünberg</i>)	622
96	Buried side by side: The last hunter-gatherers of the south-western Iberian Peninsula through the lens of their mortuary practices (<i>Rita Peyroteo-Stjerna</i>)	629
97	Depositions of human skulls and cremated bones along the River Motala Ström at Strandvägen, Motala (<i>Fredrik Molin, Sara Gummesson, Linus Hagberg, and Jan Storå</i>)	637
98	Human–animal symbolism within a ritual space in the Mesolithic wetland deposit at Kanaljorden, Motala (<i>Fredrik Hallgren, Sara Gummesson, Karin Berggren, and Jan Storå</i>)	644
99	What are grave goods? Some thoughts about finds and features in Mesolithic mortuary practice (<i>Lars Larsson</i>)	649
100	Mesolithic companions: The significance of animal remains within Mesolithic burials in Zvejnieki and Skateholm (<i>Aija Macāne</i>)	655
101	Pit or grave? ‘Emptied’ graves from the cemetery at Dudka, Masuria, north-eastern Poland (<i>Karolina Bugajska</i>)	660
102	Beware of dogs! Burials and loose dog bones at Dudka and Szczepanki, Masuria, north-eastern Poland (<i>Witold Gumiński</i>)	668
103	Shamans in the Mesolithic? Re-analysis of antler headdresses from the North European Plain (<i>Markus Wild</i>)	678
104	Birds in ritual practice of eastern European forest hunter-gatherers (<i>Ekaterina Kashina and Elena Kaverzneva</i>)	685

Transitions – Endings	693
105 Transitions – Endings: Introduction (<i>T. Douglas Price</i>)	695
106 Modelling the empty spaces: Mesolithic in the micro-region of central Serbia (<i>Vera Bogosavljević Petrović and Andrej Starović</i>)	699
107 How North Iberia was lost? The Early Neolithic in Cantabrian Spain (<i>Miguel Ángel Fano and Miriam Cubas</i>)	706
108 Debating Neolithization from a Mesolithic point of view: The Sado Valley (Portugal) experience (<i>Mariana Diniz, Pablo Arias Cabal, Ana Cristina Araújo, and Rita Peyroteo-Stjerna</i>)	713
109 The Caucasian route of Neolithization in the Pontic-Caspian region (<i>Alexander Gorelik, Andrej Tsybriy, and Viktor Tsybriy</i>)	720
110 The Late Mesolithic and Early Neolithic of the Kama region, Russia: Aspects of the Neolithization process (<i>Evgeniia Lychagina</i>)	727
111 The Late Mesolithic in western Lesser Poland: Spectators or participants in the Neolithization? (<i>Marek Nowak, Mirosław Zajac, and Justyna Zakrzeńska</i>)	733
112 Wetland sites in a dry land area. A survey for Late Mesolithic and Early Neolithic sites in and around the Zwischenahner Meer Lake, Germany (<i>Svea Mahlstedt</i>)	740
113 Forager-farmer contacts in the Scheldt Basin (Flanders, Belgium) in the late sixth-early fifth millennia BC: Evidence from the site of Bazel-Sluis (<i>Erwin Meylemans, Yves Perdaen, Joris Sergeant, Jan Bastiaens, Koen Deforce, Anton Ervynck, and Philippe Crombé</i>)	746
114 Ritual continuity between the Late Mesolithic Ertebølle and Early Neolithic Funnel Beaker cultures (<i>Søren Anker Sørensen</i>)	750
115 Continuity and change: hunters and farmers in the Mesolithic-Neolithic transition, Östergötland, eastern middle Sweden (<i>Tom Carlsson</i>)	756
116 The Mesolithic-Neolithic transition in South Norway: Cylindrical blade technology as an indicator of change (<i>Dag Erik Færø Olsen</i>)	763
Representing and Narrating the Mesolithic	771
117 Introduction: Representing and Narrating the Mesolithic (<i>Nicky Milner</i>)	773
118 Mesolithic movie stars: Analyzing rare film archives of the Muge excavations from the early twentieth century (<i>Ana Abrunhosa and António H. B. Gonçalves</i>)	776
119 Elusive, perplexing, and peculiar? Presenting the Mesolithic to twenty-first century audiences (<i>Don Henson</i>)	785
120 Public perceptions and engagement with the Jomon and the Mesolithic (<i>Don Henson</i>)	789
121 Building Mesolithic: An experimental archaeological approach to Mesolithic buildings in Ireland (<i>Graeme Warren</i>)	796
Index	805

63. Size estimations of sturgeons (Acipenseridae) from the Mesolithic-Neolithic Danube Gorges

Ivana Živaljević, Igor V. Askeyev, Dilyara N. Shaymuratova (Galimova), Oleg V. Askeyev, Sergey P. Monakhov, Dušan Borić, and Sofija Stefanović

The significant role of sturgeon fishing in the Mesolithic-Neolithic Danube Gorges has long been recognized, but the reconstruction of the sizes of individuals caught has been hindered by the lack of recent specimens from the Danube drainage in reference collections. This paper presents a method to reconstruct the total length from skeletal remains of several sturgeon species (*Huso huso*, *Acipenser gueldenstaedtii*, *A. nudiiventris*, *A. stellatus*, and *A. ruthenus*) using linear and power regression equations, obtained from the database of biometric data of recent sturgeons from the Volga-Caspian Basin. The application of these regression equations to specimens from the Danube Gorge sites of Lepenski Vir, Padina, and Vlasac suggests that sturgeon fishing was oriented towards large adult individuals, with the largest specimens (in the case of beluga) surpassing 550 cm in total length. In addition to providing means for predicting body size of sturgeon specimens from archaeological contexts in areas where modern sturgeon stocks are diminished or completely extirpated, this study has important implications for investigating nutritional values, fishing techniques, and human-animal interrelationships in the Mesolithic-Neolithic Danube Gorges.

Keywords: sturgeons, Acipenseridae, size estimation, Mesolithic-Neolithic, Danube Gorges

Introduction

The significance of sturgeon (Acipenseridae) fishing in the Danube Gorges (north-central Balkans) in the Epipalaeolithic, Mesolithic, and Early Neolithic (c. 13,000–5500 cal BC, cf. Bonsall 2008; Borić 2011) is manifested by considerable amount of sturgeon remains (cf. Bartosiewicz *et al.* 2008; Bökönyi 1992; Borić 2003; Borić and Dimitrijević 2005; Brinkhuizen 1986; Clason 1980; Nalbant 1970; Păunescu 2000; Živaljević 2017) despite preservation biases affecting their largely cartilaginous skeleton (Bartosiewicz *et al.* 2008; Brinkhuizen 1986). The data obtained from stable isotope analysis of human bone collagen are in agreement with the consumption of protein derived from both freshwater and anadromous fish (Bonsall *et al.* 1997; Borić *et al.* 2004), and the significance of sturgeons is further attested by some of the sculpted boulders from Lepenski Vir depicting elements of sturgeon anatomy (Borić 2005; Radovanović 1997). Moreover, it has been suggested that the Upper Gorge sites of Padina, Lepenski Vir, and Vlasac (Fig. 63.1), occupied more or less continuously between c. 9500–5500 cal BC (corresponding to the Mesolithic, Mesolithic-Neolithic Transformation phase, and the Neolithic, cf. Borić 2011; Borić and Dimitrijević 2009), had been settled as optimal spots for specialized whirlpool

fishing. Their location, as well as the location of the downstream sites of Cuina Turcului, Icoana, and Schela Cladovei (Fig. 63.1) greatly overlap with the most favourable localities for sturgeon fishing in more recent times (Borić 2003, 153; cf. Petrović 1998).

Prior to the completion of the dams in 1971 and 1984, several sturgeon species were undertaking their bi-annual (spring and autumn) spawning migrations to the Danube from the Black Sea. These included the beluga (*Huso huso*, Linnaeus 1758), Russian sturgeon (*Acipenser gueldenstaedtii*, Brandt and Ratzeburg 1833), ship sturgeon (*Acipenser nudiiventris*, Lovetsky 1828), and stellate sturgeon (*Acipenser stellatus*, Pallas 1771). Remains of these species as well as those of freshwater sterlet (*Acipenser ruthenus*, Linnaeus 1758) have been identified in the faunal assemblages from Lepenski Vir, Padina, and Vlasac (Borić 2003; Brinkhuizen 1986; Clason 1980; Dimitrijević *et al.* submitted; Živaljević 2017). Sturgeon remains had also been found at the sites of Cuina Turcului (Nalbant 1970), Icoana, Ostrovul Banului (Păunescu 2000), Schela Cladovei (Bartosiewicz *et al.* 2008), and Knjepište (Bökönyi 1992) (Fig. 63.1).

Sturgeons can reach an impressive size, which indicates that their economic role in prehistory of the Danube Gorges must have been significant. Most species of the genus

Fig. 63.1. Map of the Danube Gorges with relevant sites discussed in the text. Image from Google Earth.



Table 63.1. Regression statistics for linear ($y=ax+b$) and power ($y=ax^b$) functions relating measurements (mm) of skeletal elements (*pinna pectoralis I*, *parasphenoideum*, *parietale*, *dentale*, *suboperculare*, *supracleithrale*, *claviculare*, *maxillare*, *palatopterygoideum*, *hyomandibulare*, *cleithrum*) to total length (TL) for *Acipenseridae* of the Volga – Caspian Basin. Coefficient of determination (r^2) and number of data pairs in regression (n). The regression equations were obtained from the database of osteological collection of sturgeon bones from recent (19th –21st century) specimens, Biomonitoring Laboratory, Institute of Problems in Ecology and Mineral Wealth, Tatarstan Academy of Sciences, Kazan, Russia. The measurements of elements for genus *Acipenser* (elements of *Acipenser gueldenstaedtii* used as an example) shown in Fig. 63.2, for *Huso huso* shown in Fig. 63.3.

Species	Length range (TL, cm)	Element	Measurement	Type of Regression	a	b	r^2	n
<i>Acipenser gueldenstaedtii</i>	75.0–188.8	<i>pinna pectoralis I</i>	M1	Non-linear	5.1565	0.9062	0.9848	23
			M2	Non-linear	20.911	0.6771	0.9744	23
<i>Acipenser ruthenus</i>	24.3–58.8	<i>pinna pectoralis I</i>	M2	Non-linear	7.3087	1.1293	0.93	18
<i>Acipenser stellatus</i>	78.1–149.1	<i>pinna pectoralis I</i>	M1	Linear	4.5404	6.8927	0.9832	11
			M2	Linear	15.418	-9.998	0.9649	11
<i>Acipenser gueldenstaedtii</i>	90.1–188.8	<i>parasphenoideum</i>	M1	Non-linear	4.9524	0.9889	0.9898	10
			M2	Linear	3.5413	20.435	0.9821	10
<i>Huso huso</i>	83.7–301.0	<i>parasphenoideum</i>	M1	Non-linear	8.9923	0.9319	0.9848	4
<i>Acipenser gueldenstaedtii</i>	90.1–188.8	<i>parietale</i>	M1	Linear	6.0064	-3.3276	0.9779	10
<i>Acipenser gueldenstaedtii</i>	90.1–188.8	<i>dentale</i>	M1	Non-linear	3.4726	0.9363	0.9793	10
			M2	Linear	15.399	7.3188	0.9903	10
<i>Acipenser nudiventris</i>	91.3–128.2	<i>dentale</i>	M2	Non-linear	23.894	0.6689	0.9676	3
<i>Huso huso</i>	83.7–301.0	<i>dentale</i>	M1	Non-linear	2.0972	0.9476	0.9858	4
			M2	Non-linear	12.536	0.9398	0.9927	4
			M3	Non-linear	21.603	1.008	0.9884	4
<i>Acipenser gueldenstaedtii</i>	90.1–188.8	<i>suboperculare</i>	M1	Linear	2.2758	16.456	0.9545	10
			M2	Linear	2.4807	10.932	0.9728	10
<i>Acipenser gueldenstaedtii</i>	90.1–188.8	<i>supracleithrale</i>	M1	Non-linear	1.0393	1.0899	0.9739	10
<i>Acipenser gueldenstaedtii</i>	90.1–188.8	<i>claviculare</i>	M1	Linear	3.2204	-3.8201	0.9757	10
<i>Huso huso</i>	83.7–301.0	<i>maxillare</i>	M1	Linear	19.663	0.5654	0.9734	4
<i>Huso huso</i>	83.7–301.0	<i>palatopterygoideum</i>	M1	Non-linear	11.159	1.2535	0.9834	4
			M2	Non-linear	9.9349	0.8973	0.9829	4
<i>Huso huso</i>	83.7–301.0	<i>hyomandibulare</i>	M1	Non-linear	14.95	0.9366	0.9897	4
<i>Huso huso</i>	83.7–301.0	<i>cleithrum</i>	M1	Linear	44.624	-31.822	0.9891	4

Acipenser usually attain a size up to 2 m, while beluga sturgeons tend to grow even larger, up to 4–6 m (and even larger specimens have been documented) (Bănărescu 1964; Holčík 1989; Kottelat and Freyhof 2007; Svetovidov 1964). However, size reconstructions from their remains from the Danube Gorge sites have been hindered by a lack of reference material due to the sturgeons' disappearance from the Danube and other rivers of the Black Sea basin. Sturgeons had become rare in the Danube even before the dams effectively cut off their migratory routes, mainly due to overfishing and water pollution (Bartosiewicz *et al.* 2008; Lenhardt *et al.* 2014). Albeit most anadromous sturgeons are globally threatened due to the loss of spawning grounds, some Caspian Sea populations still migrate to the lower stretches of large rivers, most notably the Volga and Ural (Kottelat and Freyhof 2007). In this study, to determine the total length (hereafter TL) of the sturgeon specimens

from Lepenski Vir, Padina, and Vlasac, we have applied the regression equations established from an osteological collection of recent sturgeons from the Volga-Caspian Basin.

Materials and methods

The material used in this study comprised sturgeon remains collected during the 1968–1970 excavations at Padina, from the partially preserved faunal assemblage from Lepenski Vir (1968–1970 campaigns), and from the revisory excavations (2006–2009) at Vlasac. Sturgeons constitute 19.2 percent (208 identified specimens, hereafter NISP) and 6.0 percent (155 NISP) of the identified fish remains in the fish faunal assemblages from Lepenski Vir and Padina, respectively (Živaljević 2017), collected by hand from settlement contexts (*cf.* Borić 2003, Appendix 3; Dimitrijević 2008). Their remains were fewer (161 NISP, or 1.2 percent) in the hand collected, water sieved and floated faunal

sample from the new excavations of Vlasac (Dimitrijević *et al.* submitted; Živaljević 2017), which encompassed the peripheral part of the settlement (Borić *et al.* 2014). Previously, only sporadic comments on the size estimates of sturgeons from Padina were offered, based on the proportional method (Brinkhuizen 1986). Concerning the downstream sites, the size of sturgeons from Schela Cladovei has been estimated on the basis of the proportion of the greatest width of the articulation end of the first pectoral spine (*pinna pectoralis I*) and body length (Bartosiewicz *et al.* 2008).

The analysis and size reconstructions of subfossil sturgeon remains from the Ponto-Caspian Basin have a much longer tradition. The first study was published by Nikolsky (1935), who estimated the size of specimens from archaeological sites in the Vetluga and Vyatka River drainages. This study was based on the ratio of dimensions (length and width of the articulation end) of the first pectoral spine and body lengths of recent Russian sturgeon and sterlet specimens. Later studies by Soviet ichthyologists (Lebedev 1960; Tsepkin and Sokolov 1970) were based on the assumption that there was a linear correlation between bone size and fish size. These authors utilized biometric data of

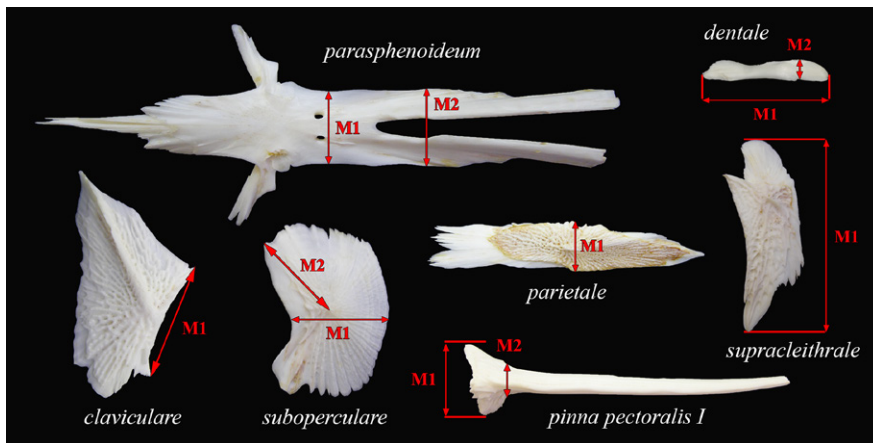


Fig. 63.2. Measurements of selected *Acipenser gueldenstaedtii* elements. Images from the Biomonitoring Laboratory of the Institute of Problems in Ecology and Mineral Wealth, Kazan.

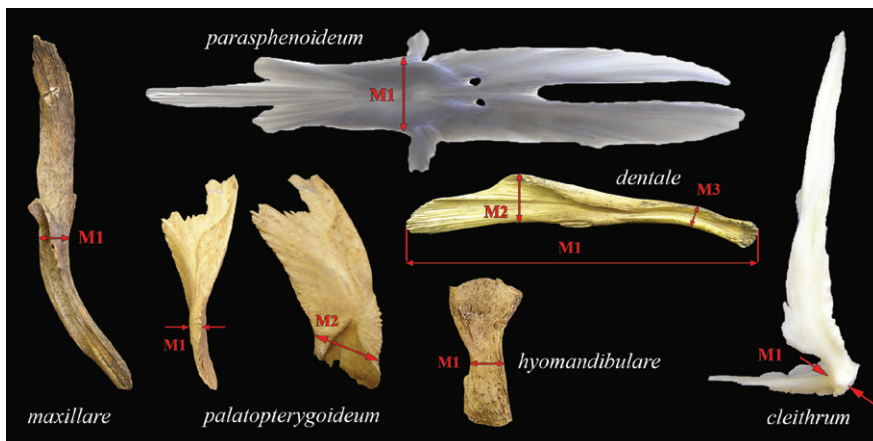


Fig. 63.3. Measurements of selected *Huso huso* elements. Images from the Biomonitoring Laboratory of the Institute of Problems in Ecology and Mineral Wealth, Kazan.

modern specimens of known size, plotting them graphically with values of archaeological specimens and thus calculating their total lengths. Consequently, the proportional method has widely been used in size reconstructions of sturgeons from archaeological faunal assemblages (Casteel 1976 and references therein), including those from the Danube River Basin (Bartosiewicz *et al.* 2008; Bartosiewicz and Takács 1997; Brinkhuizen 1986; Radu 2003). Askeyev *et al.* (2013) first introduced the linear regression equation on the relationship between the width of the articulation end of the first pectoral spine and TL of Russian sturgeon specimens from the Volga Basin.

In this study, we have employed linear and power regression equations relating the measurements of selected ossified elements of beluga, Russian sturgeon, ship sturgeon, stellate sturgeon, and sterlet to their total lengths (Table 63.1). The equations were derived from the Bio-monitoring Laboratory (Institute of Problems in Ecology and Mineral Wealth, Kazan) database of biometric data of individual elements and total lengths of recent sturgeon (19th–21st century) specimens from the Volga-Caspian Basin. Sturgeon remains from Lepenski Vir, Padina, and Vlasac have been measured with 0.1 mm precision, following schemes for species of the genus *Acipenser* shown in Fig. 63.2, and for beluga shown in Fig. 63.3.

Results and discussion

The results of size estimations of specimens from Lepenski Vir, Padina, and Vlasac are presented in Table 63.2. They suggest that predominantly large adult individuals were targeted. Most numerous were the remains of beluga, followed by those of Russian sturgeon, therefore the majority of measurable elements originated from these two species.

Estimated lengths of beluga specimens exhibited the most variability, ranging between 100.6–566.1, 96.7–498.3, and 148.9–376.0 cm at Lepenski Vir, Padina, and Vlasac, respectively (Table 63.2). The most frequent size class was between 200 and 350 cm, but exceptionally large belugas, surpassing 400 cm in TL were also caught (Fig. 63.4). The length of the largest specimen (estimated from a *cleithrum* found in the rear area of the Lepenski Vir settlement) measured c. 566 cm.

Estimated lengths of Russian sturgeon specimens from Lepenski Vir, Padina, and Vlasac ranged between 77.4–193.7 (Table 63.2), with the most frequent size class being between 100 and 150 cm. Few measurable elements of ship sturgeon, stellate sturgeon, and sterlet do not allow a precise assessment of the size classes targeted, but nonetheless originate from large adult individuals.

Cross-referenced with modern historical data, the estimated average lengths of Russian sturgeons from the Danube Gorges sites corresponded to those of individuals caught in the Danube in more recent times (*cf.* Bănărescu 1964; Holčík 1989). The length of a ship sturgeon specimen

Table 63.2. Size estimations of sturgeon species from Lepenski Vir (LV), Padina (PA), and Vlasac (VL). NISP=number of identified specimens; n=number of measured specimens used in size reconstruction.

Site	Species	NISP	N	TL Range (cm)	Mean TL (cm)
LV	<i>Acipenser gueldenstaedtii</i>	54	21	77.4–193.7	135.2
	<i>Acipenser nudiventris</i>	4	1	215.0	215.0
	<i>Acipenser ruthenus</i>	9	2	73.3–76.2	74.8
	<i>Huso huso</i>	83	42	100.6–566.1	290.9
PA	<i>Acipenser gueldenstaedtii</i>	13	7	92.0–174.4	128.0
	<i>Huso huso</i>	72	31	96.7–498.3	293.8
VL	<i>Acipenser gueldenstaedtii</i>	10	1	171.2	171.2
	<i>Acipenser stellatus</i>	5	1	151.4	151.4
	<i>Huso huso</i>	27	5	148.9–376.0	271.4

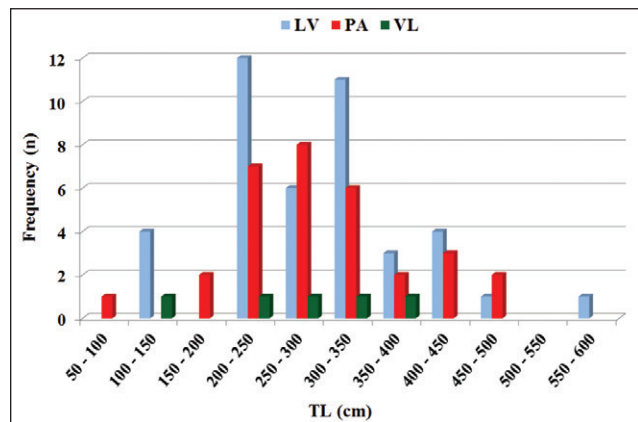


Fig. 63.4. Size classes of *Huso huso* specimens from Lepenski Vir (LV), Padina (PA), and Vlasac (VL).

(215 cm), established on the basis of *dentale* measurements, almost reached the maximum length (221 cm) recorded in recent populations (*cf.* Sokolov and Vasil'ev 1989). Beluga sturgeons caught in the Mesolithic-Neolithic were as large as the largest modern specimens from the Black Sea basin, and their estimated average lengths were statistically greater than those recorded by twentieth century catches in the Danube (*cf.* Bănărescu, 1964; Bartosiewicz and Takács 1997; Holčík 1989). On the basis of the contextual

provenance of sturgeon remains, which were related to Early Mesolithic (c. 9500–7400 cal BC), Late Mesolithic (c. 7400–6300/6200 cal BC), Mesolithic-Neolithic Transformation phase (c. 6300/6200–5900 cal BC), and Neolithic (c. 5900–5500 cal BC) occupations of the sites (cf. Borić 2011), it can be concluded that large sturgeon fishing represented a long-term local tradition.

Conclusion

The method for calculating the length of subfossil sturgeon specimens, established on the basis of biometric data of recent sturgeons from the Volga-Caspian Basin, provides a basis for reconstructing the size of specimens from faunal assemblages from other regions, where the species are no longer present and reference collections are inadequate or completely lacking. Consequently, this study represents the first application of linear and power regression equations in determining the total length of several sturgeon species that were encountered in the Danube drainage (*Huso huso*, *Acipenser gueldenstaedtii*, *A. nudiiventris*, *A. stellatus*, and *A. ruthenus*) from their skeletal remains. Size estimations of specimens from the Mesolithic-Neolithic faunal assemblages of the Danube Gorges are indicative of complex fishing strategies that were oriented towards large individuals, involving a great deal of planning, skill, cooperation, and a thorough knowledge of the landscape, fish habitats, and behaviour. Even if available during restricted times of the year, corresponding to their spring and autumn migrations, the impressive size of anadromous sturgeons, beluga in particular, probably made them an attractive prey and a significant dietary resource, and shaped perceptions of these large aquatic creatures.

Acknowledgements

This paper is a result of the European Research Council (ERC) funded project *BIRTH: Births, Mothers and Babies: Prehistoric Fertility in the Balkans Between 10,000–5000 BC* (Grant Agreement No. 640557). For the faunal remains from Vlasac excavated in 2006–2009 we acknowledge the funding provided by the British Academy (grants SG-42170 and LRG-45589) and the McDonald Institute for Archaeological Research at the University of Cambridge to D. B. We thank Vesna Dimitrijević, Harry Robson, and anonymous reviewers for constructive comments on earlier drafts of the manuscript.

References

- Askeyev, I. V., D. N. Galimova, and O. V. Askeyev (2013) Ihti-
ofauna pozdnego golotsyena Sryednyevolzhskogo basseyna
(po matyerialam arhyeologichyeskih raskopok). *Zoologichy-
eskiy zhurnal* 92(9), 1014–30.
- Bănărescu, M. P. (1964) *Fauna Republicii Populare Romîne,
Volumul XIII. Pisces — Osteichthyes (pești ganoizi și osoși)*.
București, Editura Academiei Republicii Populare Române.
- Bartosiewicz, L., C. Bonsall, and V. Şişu (2008) Sturgeon fishing
along the Middle and Lower Danube. In C. Bonsall, V. Boroneanț,
and I. Radovanović (eds.) *The Iron Gates in Prehistory: New Perspectives*
(British Archaeological Reports Int. Ser. 1893), 39–54. Oxford,
Archaeopress.
- Bartosiewicz, L. and I. Takács (1997) Osteomorphological studies
on the great sturgeon (*Huso huso* Brandt). *Archaeofauna* 6,
6–19.
- Bonsall, C. (2008) The Mesolithic of the Iron Gates. In G. N.
Bailey and P. Spikins (eds.) *Mesolithic Europe*, 238–79. Cam-
bridge, Cambridge University Press.
- Bonsall C., R. Lennon, K. McSweeney, C. Stewart, D. Harkness,
V. Boroneanț, L. Bartosiewicz, R. Payton, and J. Chapman
(1997) Mesolithic and Early Neolithic in the Iron Gates: A
palaeodietary perspective. *Journal of European Archaeology*
5(1), 50–92.
- Bökönyi, S. (1992) Animal remains from Mihajlovac-Knjepište,
an Early Neolithic settlement of the Iron Gates Gorge. *Bal-
canica* 23, 77–87.
- Borić, D. (2003) *Seasons, Life Cycles and Memory in the Danube
Gorges, c. 10,000–5500 BC*. Unpublished PhD thesis, Univer-
sity of Cambridge.
- Borić, D. (2005) Body metamorphosis and animality: Volatile
bodies and boulder artworks from Lepenski Vir. *Cambridge
Archaeological Journal* 15(1), 35–69.
- Borić, D. (2011) Adaptations and transformations of the Dan-
ube Gorges foragers (c. 13,000–5500 BC): An overview. In R.
Krauß (ed.) *Beginnings – New Research in the Appearance of
the Neolithic Between Northwest Anatolia and the Carpathian
Basin*, 157–203. Rahden, Verlag Marie Leidorf GmbH.
- Borić, D. and V. Dimitrijević (2005) Continuity of foraging strat-
egies in Mesolithic-Neolithic transformations: Dating faunal
patterns at Lepenski Vir (Serbia). *Atti della Società per la Pre-
istoria e Protostoria della regione Friuli-Venezia Giulia XV*
(2004–05), 33–107.
- Borić D. and V. Dimitrijević (2009) Apsolutna hronologija i
stratigrafija Lepenskog Vira. *Starinar* 57/2007, 9–55.
- Borić, D., C. A. I. French, S. Stefanović, V. Dimitrijević, E. Cris-
tiani, M. Gurova, D. Antonović, E. Allué, and D. Filipović
(2014) Late Mesolithic lifeways and deathways at Vlasac (Ser-
bia). *Journal of Field Archaeology* 39(1), 4–31.
- Borić D., G. Grupe, J. Peters, and Ž. Mikić (2004) Is the Mesolith-
ic-Neolithic subsistence dichotomy real? New stable isotope
evidence from the Danube Gorges. *European Journal of Ar-
chaeology* 7(3), 221–48.
- Brinkhuizen, D. C. (1986) Features observed on the skeletons of
some recent European Acipenseridae: their importance for
the study of excavated remains of sturgeon. In D. C. Brinkhu-
izen and A. T. Clason (eds.) *Fish and Archaeology. Studies in
Osteometry, Taphonomy, Seasonality and Fishing Methods*,
18–33. Oxford, British Archaeological Reports Int. Ser. 294.
- Casteel, R. W. (1976) *Fish Remains in Archaeology*. London, Ac-
ademic Press.
- Clason, A. T. (1980) Padina and Starčevo: Game, fish and cattle.
Palaeohistoria 22, 141–73.
- Dimitrijević, V. (2008) Lepenski Vir animal bones: What was left
in the houses?. In C. Bonsall, V. Boroneanț, and I. Radova-
nović (eds.) *The Iron Gates in Prehistory: New Perspectives*

- (British Archaeological Reports Int. Ser. 1893), 117–30. Oxford, Archaeopress.
- Dimitrijević, V., I. Živaljević, and S. Blažić (submitted) Faunal remains. In D. Borić (ed.) *Vlasac: A Mesolithic Site in the Danube Gorges Revisited*.
- Holčík, J. (ed.) (1989) *The Freshwater Fishes of Europe. Vol. 1, Part II: General Introduction to Fishes Acipenseriformes*. Wiesbaden, AULA – Verlag.
- Kottelat, M. and J. Freyhof (2007) *Handbook of European Freshwater Fishes*. Cornol, Publications Kottelat.
- Lebedev, D. V. (1960) *Pryesnovodnaya chyetyvertichnaya ihtiofauna Yevropyeysskoy chasti SSSR*. Moscow, Izdatyel'stvo Moskovskogo univversityeta.
- Lenhardt, M., M. Smederevac-Lalić, V. Đikanović, G. Cvijanović, B. Vuković-Gačić, Z. Gačić, and I. Jarić (2014) Biomonitoring and genetic analysis of sturgeons in Serbia: A contribution to their conservation. *Acta Zoologica Bulgarica* Suppl. 7(2014), 69–73.
- Nalbant, T. T. (1970) Cîteva Observații Asupra Resturilor de Pești Descoperite în Locurile Romanello-Aziliene (I–II) de la Cuina Turcului – Dubova. *Studii si Cercetari de Istorie Veche* 21, 41–3.
- Nikolsky, G. V. (1935) Materialy po ihtiofaune gorodishch basseynov Vetlugi i Vyatki. *Zoologichyeskiy zhurnal* 14(1), 79–96.
- Păunescu, A. (2000) *Paleoliticul și Mezoliticul din spațial cuprinsintre Carpați și Dunăre*. București, Agir.
- Petrović, M. (1998) Đerdapski ribolovi u prošlosti i sadašnjosti. In D. Trifunović (ed.) *Ribarstvo. Sabrana dela Mihaila Petrovića*, 175–270. Beograd, Zavod za udžbenike i nastavna sredstva.
- Radovanović, I. (1997) The Lepenski Vir culture: A contribution to interpretation of its ideological aspects. In D. Srejšović and M. Lazić (eds.) *Antidoron Dragoslavo Srejšović completis LXV annis ab amicis, collegis, discipulis oblatum*, 85–93. Beograd, Centar za arheološka istraživanja, Filozofski fakultet.
- Radu, V. (2003) *Exploitation des ressources aquatiques dans les cultures néolithiques et chalcolithiques de la Roumanie Méridionale*. Thèse de Doctorat, Université de Provence Aix-Marseille I.
- Sokolov, L. I. and V. P. Vasil'ev (1989) *Acipenser nudiventris* Lovetsky, 1828. In J. Holčík (ed.) *The Freshwater Fishes of Europe. Vol. 1, Part II: General Introduction to Fishes. Acipenseriformes*, 206–26. Wiesbaden, AULA – Verlag.
- Svetovidov, A. N. (1964) *Ribi Chernogo morja*. Moskva – Leningrad, Izdatyel'stvo 'Nauka'.
- Tsepkin, E. A. and L. I. Sokolov (1970) Russkiy osyetr *Acipenser gueldenstaedtii* Brandt v sryednyem i pozdnyem golotsyenyem. *Voprosi ihtologii* 10(1), 24–36.
- Živaljević, I. (2017) *Ribolov na Đerdapu u ranom holocenu (10.–6. milenijum pre n. e.)*. Unpublished PhD thesis, University of Belgrade.

Foraging Assemblages is the publication of the proceedings of the Ninth International Conference on the Mesolithic in Europe, held in Belgrade in September 2015. The two volumes of these proceedings gather 121 contributions on Mesolithic research in Europe, covering almost every corner of the continent. The book presents a cross-section of recent Mesolithic research, with geographic foci ranging from the Mediterranean to Scandinavia, and from Ireland to Russia and Georgia. The papers in the volumes cover diverse topics and are grouped into 11 thematic sections, each with an introduction written by prominent Mesolithic experts. The reader will learn about changes in forager lifeways and the colonization of new territories at the end of the Ice Age and the beginning of the Holocene warming; the use of diverse landscapes and resources; climatic instabilities that influenced patterns of settlement and subsistence; the organiza-

tion of settlements and dwelling spaces; the formation of regional identities expressed through various aspects of material culture and technologies of artefact production, use, and discard; aspects of social relations and mobility; symbolic, ritual, and mortuary practices; diverse ways in which Mesolithic communities of Europe were transformed into or superseded by Neolithic ways of being; and how we have researched, represented, and discussed the Mesolithic.



Volume 1

- Transitions – Beginnings
- Colonization
- Landscapes
- Settlement
- Regional Identities

Volume 2

- People in Their Environment
- Technology
- Social Relations, Communication, Mobility
- Rites and Symbols
- Transitions – Endings
- Representing and Narrating the Mesolithic

