# FORGOTTEN TIMES AND SPACES

New perspectives
in paleoanthropological,
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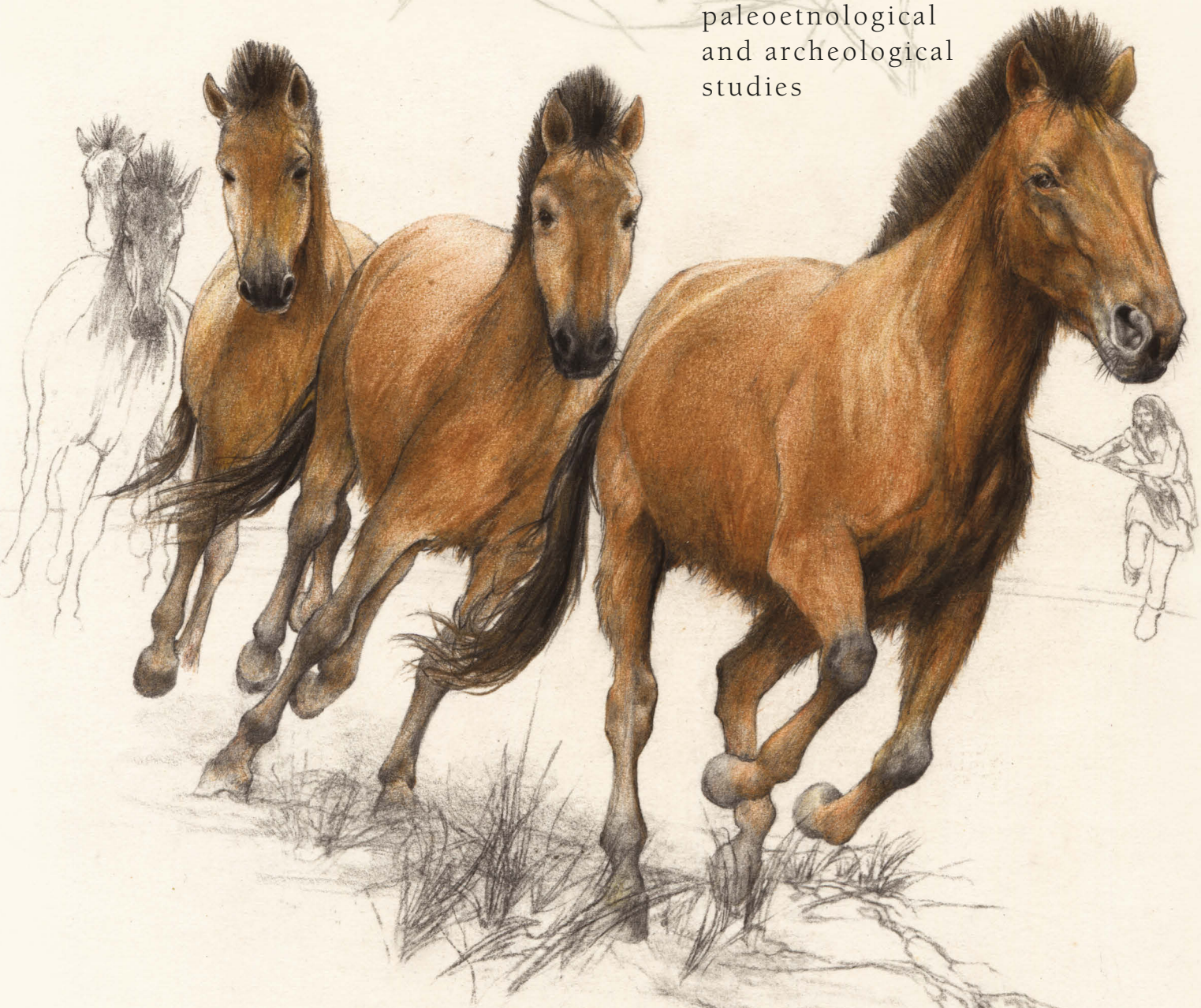
and archeological
studies



Edited by Sandra Sázelová, Martin Novák and Alena Mizerová

INSTITUTE OF ARCHEOLOGY OF THE CAS, BRNO & MASARYK UNIVERSITY

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*This monograph is dedicated to Jiří Svoboda*

Reviewed by:

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dr. Philip R. Nigst (Division of Archeology, University of Cambridge, Cambridge)

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# FOREWORD

Human lives and their evolution are spanned throughout different times and various spaces. Nevertheless, their destiny might seem inexorable, for the witnesses, their memories or tangible evidences are slowly forgotten. This book displays two main efforts – on one hand in collecting and describing the shreds of previous and yet forgotten lifestyles, and on the other in reflecting the scope of Jiří Svoboda's physical and intellectual cooperation with all our contributors, even if they were looking just for inspiration in his work.

We would like to thank to the Institute of Archeology of the Academy of Sciences of the Czech Republic in Brno and Masaryk University for their financial and technical support. We are grateful to Pavel Dvorský for drawings, to Roland Nespoulet & Dominique Henry-Gambier, Luc Moreau, Laurent Klaric, Walpurga Antl, Marc Händel and Alexander Pryor for their help with French, German and English corrections and translations; to Angela Perri and Philip Nighst for their reviews, to Ivan Ruller & Valér Kováč for their unique photo documents and drawings from the Libyan expedition in 1979–1981; to Margherita for portrait of J. Svoboda, and to Petra Hájková & Lea Novotná for their brave and often ungrateful help in typing and reference-proofs. The main English work was done by company Proof-reading-Service.com.

Sandra Sázelová, Martin Novák and Alena Mizerová

# PART I

# WHAT DO AUSTRIAN PUPILS KNOW ABOUT HUMAN EVOLUTION? A SURVEY IN SECONDARY SCHOOLS

*Gerhard W. Weber and Cornelia Fitsch*

**Abstract**
This article discusses the importance of education in human evolution for modern developed societies and makes an attempt to evaluate the current status-quo in Austria. In a pilot study 157 pupils at the end of their final school year (aged 18–20) of four Austrian federal states (Lower Austria, Upper Austria, Styria and Vienna) and all kinds of types of school were included. By means of a questionnaire background information about the general structure of the class and the education in biology was gathered. The second part of the questionnaire tried to assess the pupils' actual knowledge in human evolution. Moreover, structured interviews with school and university teachers as well as with didactic and paleoanthropology experts were conducted and analysed. In summary, human evolution is taught in most of the secondary schools in Austria, although the extent can be regarded as minor, particularly *vis-à-vis* the disciplines of cell and molecular biology, and often with only little or no relation to the current scientific literature. The use of demonstration material in class increased the knowledge significantly. Religious creation myths such as Intelligent Design and Creationism do not seem to have a big influence in our Austrian sample. There is a good chance for improvements since the survey highlights the distinct interest of pupils in biology and human evolution. Cross links from evolution to other topics might improve the understanding of this complex issue considerably.

**Keywords**
Human evolution, education, secondary school, questionnaire study, Austria

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## Introduction

The topic "human evolution" is more or less exotic for the layman but there is hardly any educated citizen who is entirely unresponsive when it comes to the question of our own biological roots. Every now and then public media report sensational findings, for instance, when a new species or "ancestor" is discovered. These waves of attention are like tsunamis – short lasting but huge – and capture virtually all channels from high quality to tabloid press, TV and radio stations, and of course all kinds of online media. While we can be sure that the topic comes into the popular focus occasionally, the question remains what the average citizen knows about human evolution? And why should (s)he bother anyway?

Particularly the last decades have shown rapid progress in developing methods in the field and a rapid increase in the number and completeness of unearthed fossils. The picture that we can draw based on hard evidence becomes finer. In addition, molecular and genetic sciences support one or another scenario for geographical dispersal and admixture or raise doubts on traditional views such as the separateness of species. Moreover, ethologists working with extant primates or evolutionary psychologists widen our horizon on how our typical traits such as human perception and language might have evolved. Is anything of that relevant for our daily lives? Not so much if our goal is just to survive until the next day. However, to understand how groups of organisms develop over time and how humans and their societies act and interact, in the long run it seems advisable to learn from our unwritten history deep in the past. Sexual dimorphism, to mention just one obvious example, affects our daily life. Not only have sex differences in medicine (Miller 2014) became important since the 1990s but also the hurdles in overcoming gender inequalities are more likely to be understood if taking into account our biological and cultural evolution. This is not a statement out of biologism. Our genes co-determine our phenotype and are the product of a long evolution. While some traits selected in the past might have been favorably then, they could create trouble in our new lifestyle. Diabetes, impacted wisdom teeth, infarction and other problems might be better understood if we consider the conditions for which our bodies were shaped. Besides such practical considerations, knowing about our origin is mainly an intellectual endeavor, of no less and no more merit than writing opera or flying to the moon. If one appreciates those merits, one can also argue that, at least in a wealthy and educated society, people should be aware of where they come from (which might also help to understand where we might be heading in the future).

While in general the wealth of evidence for evolution, and human evolution in particular, leaves no question mark about its existence, for some people the safe harbor of religious beliefs is still stronger. Two religious creation myths, Intelligent Design and Creationism, have gained more and more influence in the USA over the last decades (http://ncse.com/creationism/general/what-is-intelligent-design-creationism) which had has an impact on biological education at US-American high schools, e.g., in Kansas (http://ncse.com/news/2005/11/antievolution-standards-adopted-kansas-

00626; http://ncse.com/news/2007/02/evolution-returns-to-kansas-001070), and led to calls for "anti-evolution bills". This situation is unfortunately not limited to the United States, there is a real danger that this movement might cross to Europe and other countries (Gross 2002; Cornish-Bowden and Cárdenas 2007; Curry 2009; Borczyk 2010). So we can find an additional motivation why we should be careful with educating our young people in evolution, in Central Europe and also in Austria, where the head of the largest religious group (Roman Catholics) supports Intelligent Design (Schönborn 2005).

According to the European statistics office Eurostat, Austria in 2013 was the second richest country in the European Union measured as the Gross Domestic Product (GDP) per capita (http://epp.eurostat.ec.europa.eu/tgm/mapToolClosed.do?tab=map&init=1&plugin=1&language=en&pcode=tec00114&toolbox=types). So there is no reason to believe that educational standards in Austria should be far behind other countries, though there are some discussions going on with regard to other educational management issues (https://www.bifie.at/node/90). In a small pilot study to which we refer here (Fitsch 2011), we tried to investigate how much graduates, who are just about to leave the Austrian secondary schools (called "Gymnasium"), know about human evolution. Their knowledge should have reached a "peak" when they were interviewed because our respondents had just passed the school leaving examination (called "Matura") a few weeks or even days before filling out our questionnaire. The last reform of the syllabus for biology lessons in those secondary schools (BGBl II Nr. 277/2004, p. 53) resulted in a strong degradation of the topic human evolution *vis-à-vis* the disciplines of cell and molecular biology. Human evolution is no longer mentioned explicitly, which practically means it can be, but is not necessarily, taught. With regard to the developments mentioned above, there should be a vital interest of developed societies to promote general education in higher schools as well as the education of the general public with regard to its own biological origins, and, of course, to consider the related training at universities.

## Material and methods

We included 157 pupils at the end of their final school year (aged 18–20) of four Austrian federal states (Lower Austria, Upper Austria, Styria and Vienna) and all kinds of types of "gymnasium" which have various specialities, e.g., humanities, natural sciences, technology, economics, sport, etc.

All of them were asked to fill in the same questionnaire. One part of the questions dealt with the general structure of the class and the education in biology:

- Which school was attended?
- How many years of education in biology were passed?
- Was the topic of human evolution treated?
- How many lessons were handling human evolution?
- Was demonstration material used for teaching human evolution?

– If yes, which ones?
– Do you remember the author and title of the school book used?
– Do you think that real models (casts) could support the understanding of human evolution?
– Do you have other ideas to improve the education in human evolution?
– How would you describe the biology lessons in general?
– Are you personally interested in human evolution?

The second part of the questionnaire tried to assess the pupil's actual knowledge in human evolution (see below). Moreover, structured interviews with university teachers who are responsible for the education of future biology teachers at the University of Vienna (among them the head of the Didactic centre for biology and the chairman of the Study group in biology), ten international experts in paleoanthropology [namely Sarah Elton (Hull York Medical School), Dean Falk (Florida State U), Donald Johanson (U Chicago), Andrew Kramer (U Tennessee), Gerd Müller (U Vienna), Jeffrey Schwartz (U Pittsburgh), Horst Seidler (U Vienna), Tanya Smith (Harvard U & MPI Leipzig), Fred Smith (U Illinois State), Ian Tattersall (AMNH New York City)], eight biology teachers in Austrian secondary schools, and one prominent German expert in didactics (namely Prof. Ulrich Kattmann, Carl von Ossietzky University Oldenburg) were included. The international experts in paleoanthropology were asked to describe the situation in their countries, their experience with first-year students, and their opinion about what should be taught in human evolution.

**Results and discussion**

The overall results draw a fairly positive first picture. More than 75% of the Austrian pupils included in this study were generally interested in human evolution, and 87% had the opportunity to hear about the topic in school. A similar outcome was achieved from the interviews of teachers. Most of the pupils were also aware of at least two important facts: 70% knew that our closest living relative is the chimpanzee, and almost 80% answered that the relative size of the brain correlates with its performance.

However, other questions, even quite simple ones as, for instance, the approximate period when our own species emerged, could not be answered correctly by even half of the pupils, some others only by an absolute minority of one or two individuals. Particularly it seems that there is a need to catch up with present-day developments. While, as noted, most of the pupils got in touch with the topic human evolution, they were not well informed about more current findings in this field of research (where we define "current" as having emerged from the last ten or twenty years). Instead, outdated "wisdom" seems to persist for quite long. The prime example is the direct connection between bipedalism and tool production which still dominates the perception of 17% of the respondents. We have evidence for upright locomotion from *Ardipithecus ramidus* from about 4.4 million years ago (White *et al.* 2009) and very likely also for *Orrorin tugenensis* from 6 million years ago (Pickford *et al.* 2002). The first stone tools, in contrast, emerge millions of years