

“Hammer of Witches” followed very accurately the rhythm of early modern subsistence crises. After the first edition, the handbook survived six editions until 1500 and another eight until 1523. However, during the balanced and mild climate of the mid-16<sup>th</sup> century, no new editions were published for about half a century. In the unprecedentedly cold decades between 1570 and 1601, however, there was demand for five more editions. The witch trials, which according to the most cautious estimates claimed at least fifty thousand lives in Central and Western Europe, Behringer considers to be the direct predecessor of the Holocaust, and calls their occurrence the “sin of the Little Ice Age”. According to Swiss authors, in addition to the rationalism of the Enlightenment, the fact that by the turn of the 17<sup>th</sup>-18<sup>th</sup> centuries the charges of witchcraft had fallen out of practice, and the power of religious or theological explanations had significantly weakened, also played a role.

In terms of environmental history, the age of organic economies ended with the industrial revolution, ushering in the era of industrial economies. The energy source for this new era was fossil fuels, of which coal was the dominant energy source until the end of the 1950s. On this economic base, global transportation and communication networks were established. Crop yields were still heavily dependent on weather patterns, but due to increasing transportation capacities, regional differences in yields could be balanced out. The third major era, the age of consumer societies, began in the United States after World War II, and in Europe in the 1960s. The dominant energy sources became oil, gas, and nuclear energy. The production of food is fundamentally determined by the availability of technologies based on the use of fossil fuels. According to Pfister and Wanner’s conclusion, in agrarian societies, the economic playground was the city and its vicinity, in the era of industrial societies, the network extended to neighboring countries, and in the era of consumer societies, we now live in a globalized and integrated world. Accordingly, the people of the traditional world operated with 11% of today’s energy use, while industrial societies used a third. However, this economic growth has had serious environmental consequences. The dominant greenhouse gas, carbon dioxide, increased from 290 ppm in 1900 to 410 ppm in the second decade of the 21st century. Similar increases were seen in other greenhouse gases, such as methane and nitrous oxide. Following Paul Crutzen, the Swiss authors call the period of exponential economic growth that began in the 1950s the age of humans, or the Anthropocene. Since 1988, scenarios regarding accelerating global warming vary only in their degree of pessimism. However, there may be reason for hope, as in 2010, the Vatican allowed the faithful living in the Swiss canton of Valais to revive the 17th-century procession tradition, with the difference that the purpose of the prayer today is not to advance the glacier but to stop its melting.

Lajos RÁCZ

**ENVIRONMENTAL ARCHAEOLOGY OF THE CARPATHIAN BASIN, ELEK BENKŐ  
– CSILLA ZATYKÓ (EDS.): ENVIRONMENTAL HISTORY OF THE MEDIEVAL  
AND EARLY MODERN CARPATHIAN BASIN. RESEARCH CENTER FOR THE  
HUMANITIES – ARCHAEOLOGIA FOUNDATION, BUDAPEST, 2021. 463 PAGES.**

In 2021, the Archaeological Institute of the Research Center for the Humanities and the Archaeologia Foundation published a comprehensive and highly representative collection of studies, edited by academician Elek Benkő, director of the Archaeological Institute, and Csilla Zatykó, the institute’s chief scientific associate. The professional background of the volume was provided by a research program implemented between 2014 and 2019, funded by the National Scientific Research Fund. The leading researcher of the program was Elek Benkő, who directed the work of a 19-member research team. The book is primarily in Hungarian, however, to facilitate international use, the studies are complemented by extended summaries in English, and the captions of all appendices can also be read in English.

In the introduction to the volume, the editors note as a reason for the research program and the creation of the volume, that the time has come to elevate the interdisciplinary relationship with specialist

sciences that intersect with archaeology at many points, such as geology, biology, and environmental and climate research, to a higher and more organized level. I believe this objective can be fully agreed upon, however, it would have been worthwhile to address the theoretical background and international context. The presentation of all eleven studies in such an extensive volume would certainly stretch the formal framework of a book review. Therefore, I decided that in my review, I will only try to interpret and evaluate the results of those studies that are closer to my interest in climate and environmental history, and my research experience, and in this way, I can form a substantiated opinion about them.

Tünde Töröcsik and Pál Sümegi (University of Szeged) attempt to debunk an old myth in the beginning of their study on medieval grain production based on pollen-based reconstruction, specifically that the Carpathian Basin is the westernmost bay of the Eurasian steppe ocean. According to their findings, not steppe, but climatic forest-steppe developed in the inner areas of the basin. Moreover, the forest-steppe in the Carpathian Basin, according to the authors, fundamentally differs from the Eurasian versions, its uniqueness shaped primarily by the basin situation and the precipitation shadow effect of the Carpathians. An important conclusion of the study is that the results of the grain pollen examination refute the prolonged drought dated to the turn of the 8<sup>th</sup> – 9<sup>th</sup> centuries, to which many researchers of the period tied the decline of the Avar Empire. According to the research results of Tünde Töröcsik and Pál Sümegi, Carolingian agriculture flourished in Transdanubia during the examined period, and according to the testimony of grain pollens, the cultivated area was the most extensive in the early Middle Ages in the central and southern areas of the Great Hungarian Plain. The increasing proportion of grain pollens between 1450 and 1550 most likely indicates the advance of the cooler and especially wetter climate of the Little Ice Age, as it fell back mainly in the southern and central parts of the basin, but even in Little Hungarian Plain and the pre-alpine region. The authors attribute the decrease in agricultural land to the increase in the intensity and duration of floods. They found that during the more intense periods of the Little Ice Age, precipitation increased by 50-100 mm and the annual average temperature decreased by 0.5-0.6 Celsius degrees.

The largest working group of the study volume carried out a multidisciplinary environmental history examination of the Calul de Piatră marsh (1630 meters), located in the central zone of the Transylvanian Mountain Range. The members of the numerous research team (Gusztáv Jakab [Hungarian University of Agriculture and Life Sciences], Ilona Pál [Eötvös Loránd University], Lóránd Silye [Babeş-Bolyai University], Pál Sümegi [University of Szeged], Attila Tóth [Sapientia Hungarian University of Transylvania], Balázs Sümegi [University of Szeged], József Pál Frink [National Forestry Research and Development Institute, Cluj-Napoca], Enikő Magyarai [Eötvös Loránd University], Zoltán Kern [Research Centre for Astronomy and Earth Sciences], Elek Benkő [Institute of Archaeology, Research Center for the Humanities]) interpreted their work within the disciplinary category of alpine archaeology. The basic question of their analysis was what factors determine the intensity of the utilization of the subalpine zone, which primarily involved high mountain pastoralism and deforestation during the centuries of the Middle Ages and Early Modern Times. Based on pollen examinations, four significant periods of deforestation can be identified in the Bihar Mountains during the centuries of the Middle Ages and Early Modern Times: the first between 810-850, the second between 1060-1170, the third occurred between 1500-1570, and finally, the last and still ongoing period of deforestation began in the 1700s. A particularly interesting result of the macrofossil examinations carried out in the marsh area is the dry period dated between 810-850, which contradicts the research results presented in the previous writing of the study volume from Nagybárkány, but coincides with the first period of medieval deforestation. During the pollen examinations, the cool and rainy climate regime characteristic of the Little Ice Age in the Carpathian Basin was well detectable from the beginning of the 16<sup>th</sup> century, which, according to the analysis, lasted until the 20<sup>th</sup> century. Based on the moss cellulose examinations, the coldest period of the Little Ice Age can be dated to the first decades of the 17<sup>th</sup> century, and the intensely cold and rainy climate period lasted until the 1720s.

In her study, Zsófia Masek (Institute of Archaeology, Research Center for the Humanities) attempts to bring order to the open questions of the climatological reconstruction of the Roman period and the

Early Middle Ages, using environmental archaeological research results and their comparative analysis. Among all these, perhaps the most important is the dating of the transition from the warm period of the Roman era to the cold period of the Early Middle Ages in the Carpathian Basin. The results of archaeological site investigations around Lake Balaton suggest that a cooler and more rainy climate period could have already appeared at the turn of the 2<sup>nd</sup>-3<sup>rd</sup> century. Nonetheless, natural scientific examinations largely confirm that the highest annual and July average temperatures in the Danube Basin were during the 3<sup>rd</sup> century. The period between the 4<sup>th</sup> and 6<sup>th</sup> centuries appears to be a transitional climate period, with significant fluctuations in temperature and precipitation. The coldest century of the 1<sup>st</sup> millennium AD was the 6<sup>th</sup> century, which climate historical research named the Late Antique Little Ice Age. The triggers for this intense and global cooling were the volcanic eruptions in the middle third of the 6<sup>th</sup> century. According to consistent climate historical research results, the climate of the Carpathian Basin between the 6<sup>th</sup> and 9<sup>th</sup> centuries was continuously significantly rainier than the average of the past two thousand years, which is the most important regional climatic characteristic of the Early Medieval cold period.

Forestry historian Péter Szabó (Czech Scientific Academy, Botanical Institute) and András Vadas (Eötvös Loránd University), who researches historical land use, attempted in their study to answer two much-debated environmental historical questions of the centuries of the late Middle Ages and early Modern period. The first is the determination of the proportion of forest cover in the late Middle Ages, and the second is the question that causes extreme scattering of opinions about how much damage the construction and reconstruction of palisade castles caused to the forest stock during the one and a half centuries of the Turkish wars. The author pair commendably refrained from forming an opinion about the entire country and chose Transdanubia as a sample area for their investigation. Based on an extremely heterogeneous source base (popular, military survey maps), the authors concluded that approximately 56% of Transdanubia was forested in the late Middle Ages. However, it was particularly surprising to me that this roughly corresponded to the level of forestation in Transdanubia at the time of the first military survey (1782–1785). In light of this result, it was no longer a surprise that the construction of palisade castles in Transdanubia did not represent an extreme environmental burden and did not result in a radical reduction in the forest stock. However, the authors conclude that it cannot be ruled out that in the more vulnerable ecosystems of the Great Hungarian Plain, fortification works caused more severe damage.

Pál Sümegi, Gusztáv Jakab, and Elek Benkő have reconstructed the medieval and early modern environmental use and environmental changes of the Pilis royal forest, primarily relying on pollen examinations. Pollen traps that could be particularly well analyzed were the fish ponds built and maintained by the monks of the Pilis Cistercian Abbey. An important discovery of the research is the pollen of the dart oak without a petiole found in the mature medieval layer, which is a typical tree species of the Balkan Peninsula, its presence and distribution indicate that the climate of the Danube Basin became warmer and drier during the medieval warm period. However, a strong reforestation took place during the 16<sup>th</sup> and 17<sup>th</sup> centuries, largely due to the depopulation caused by the Turkish wars. At the same time, the settlement of peat moss in the 17<sup>th</sup> century suggests that the cooler and wetter climate brought about significant changes in natural vegetation. According to the authors, the summer half of the 17<sup>th</sup> century became distinctly cool and rainy, and this century was probably the coldest in the last two thousand years. The research results on the vegetation-modifying climatic effects of the Little Ice Age in the Pilis were confirmed by pollen-based landscape reconstruction carried out around the Marosszentkirály Pauline monastery in Transylvania. The research team consisting of Elek Benkő, Pál Sümegi, Tünde Töröcsik, Elvira Bodor, Balázs Sümegi and Gusztáv Jakab showed significant reforestation in the Transylvanian Basin in the centuries of the early modern age, and the expansion of rye production at the expense of wheat and oats.

Erika Gál (Archaeological Institute, Research Center for the Humanities) published two studies in the volume. In her first study, the author attempts to describe the medieval fauna of the Carpathian Basin and its feeding habits based on the 190 medieval animal bone assemblages uncovered so far. As an interested reader of faunal history, I found the so-called “little colors” of the study particularly entertaining.

In a well-off medieval rural household excavated in Balatonkeresztúr, not only peacocks were kept, enhancing the aesthetic value of the household, but also grey geese and presumably domesticated cranes. Animal burials indicating pagan magical practices surviving among Christian relations are extremely interesting. As a committed cat owner, I was pleased to read that their increase can be used as a kind of urbanization indicator. Erika Gál's second study processes the fishbone heaps of the archiepiscopal kitchen of Esztergom from the perspective of fauna and dietary history. The analysis provides an accurate picture of how high social status made an extraordinary variety of food possible during the Middle Ages, from the pine jay to the oyster.

In the concluding study of the volume, László Bartosiewicz (Stockholm University) investigated the fish consumption of the medieval archiepiscopal kitchen in Esztergom, based on the systematic processing of the material from kitchen waste pits excavated on the side of Castle Hill. According to the author, the quality of the fish consumption at the archiepiscopal residence in Esztergom can be considered modest. There is little in it of the well-known luxury fish bones, and sturgeon were mostly represented by small specimens. Surprisingly, small-sized carp, considered mass-produced, were mostly processed in the archiepiscopal kitchen. The analysis of fish remains and the charter sources both suggest that alongside traditional river fishing exploiting the hydrographic conditions of the Danube floodplain, pond supplies played a significant role in the kitchen's consumption. Moreover, the fishing law introduced in 1412 on the Austrian section of the Danube, which prohibited the use of fine fishing nets to protect the offspring of large fish, suggests that signs of ecological problems caused by overfishing were already present in the Danube water system during the late Middle Ages.

The environmental history of the Carpathian Basin is pioneering and fills a gap. The antecedents of environmental archaeology can be traced back to the 1970s, when ecology evolved from a sub-discipline of biology into a global intellectual current. Reflecting on ecological issues led to the emergence of environmental philosophy, sociology, economics, history, and archaeology. In my opinion, defining conceptual and historical context would have greatly assisted the work of Hungarian environmental archaeologists seeking their own path. The prerequisite for successful archaeological fieldwork has always been the creative use of archival and natural science sources. From the last decade of the 20<sup>th</sup> century, the efficiency of natural science research methods and instruments has undergone a tremendous development. Moreover, these tools have become cheaper and smaller, promoting their effective use in the field. The authors have processed an incredible amount of research results, and some of them, by the nature of science, have challenged the validity of their colleagues' research findings. Among the open questions, perhaps the most significant was the problem of the Avar period drought, on which the pollen examinations in Nógrád and Bihar counties paint diametrically opposed pictures. From a professional point of view, it would have been extremely useful and interesting to include a summarizing study at the end of the volume, in which ambitious Hungarian environmental archaeologists make a comprehensive summary of the results of medieval and early modern environmental archaeology and open research questions in Hungary. I hope this summary will be completed soon, even if on a monographic scale, as it will be an important milestone for Hungarian environmental historians, just like this volume of studies.

Lajos RÁCZ

**J. PETTIFER AND M. VICKERS, *LAKES AND EMPIRES IN MACEDONIAN HISTORY: CONTESTING THE WATERS* (BLOOMSBURY ACADEMIC, 2022). XX + 215 PP., 12 ILL.**

U djelu *Lakes and Empires in Macedonian History: Contesting the Waters*, primarni fokus autora stavljen je na povijesnu, odnosno mikrohistorijsku, ekohistorijsku i geografsku analizu područja Prespanskog jezera. Prespansko jezero nalazi se na tromeđi Sjeverne Makedonije, Grčke i Albanije. Jezero je smješteno u tektonskoj dolini, između planine Babe na istoku, Galičice na zapadu i Suhe planine na jugu. U geografskom smislu, Prespansko jezero dijeli se na Veliko Prespansko jezero i Malo

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Jarun Lake (present state, post-renovation in the 1980s) in relation to the course of the Sava River in the 18<sup>th</sup> and 19<sup>th</sup> centuries (base map: Bing)

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