lovstva kroz osobu aristokrata, političara i strastvenog lovca, grofa Béle Telekija (1896.-1969.). U svome radu Halász se posvetio njegovom svekolikom djelatnoću kao župana županije Zala u međuratnom razdoblju. Zbornik završava radom Margite Kopp o lovstvu i lovačkoj kulturi na dvoru knezova Esterházy.

Zaključno možemo reći kako je ovaj zbornik u potpunosti opravdao naša visoka očekivanja. Veliki broj iznimno kvalitetnih radova nastalih na radu s raznim vrstama izvorne građe, kao i na stručnoj i znanstvenoj literaturi specijaliziranoj za pitanja šuma i šumskih površina, pridonosi novom i sadržajnijem poznavanju problematike šuma kao životnog i gospodarskog prostora u panonskoj regiji. S velikim zadovoljstvom ovaj zbornik možemo pridružiti sada već iznimno bogatoj i hvalevrijednoj biblioteci »Mogersdorf«.

Ivica ŠUTE

THE CLIMATE HISTORY OF EUROPE, OR THE LEGACY OF BRUNO MESSERLI. CHRISTIAN PFISTER - HEINZ WANNER. *CLIMATE AND SOCIETY IN EUROPE - THE LAST THOUSAND YEARS*. HAUPT VERLAG. BERN. 397.

The book "Climate and Society in Europe - the Last Thousand Years" by Christian Pfister and Heinz Wanner, published in 2021, is the most important summary of European climate and environmental history to date. The fact that the two Swiss authors managed to produce a comprehensible summary handbook for both professional opinion and educated interested readers, surpassing previous important partial results, was significantly influenced by the parallel biographies of the two authors. In multi-author scientific summaries, such as the most recent climate history handbook by Palgrave Macmillan Publishers in 2018, the editors, despite all their efforts, were hardly able to create a truly coherent scientific synthesis due to the heterogeneous research backgrounds of the many authors. However, the biography and scientific socialization of Christian Pfister and Heinz Wanner proceeded so parallel and overlap so much that it could even be suggested (with sufficient imagination) that we are not talking about two people, but the ideal European climate historian, who due to hardware problems is stored in two bodies. Pfister was born in 1944, Wanner in 1945. They were both students at the University of Bern at the same time, both were disciples of geographer Bruno Messerli, and geography was the common intersection in their studies, with the difference being historical studies in Pfister's case and meteorology in Wanner's case. Messerli, who among other things was the rector of the University of Bern, the president of the International Geographical Union and one of the directors of the International Geosphere-Biosphere Program, established a geography-ecological workshop of international significance at the Institute of Geography of the University of Bern. It was particularly important in the lives of both authors when Messerli co-founded the PAGES (Past Global Changes) program with his climate researcher colleague Hans Oeschger, in which both Pfister and Wanner participated. Both authors are Professors Emeritus of the University of Bern, and researchers at the Oeschger Center for Climate Research, named after the co-founder of PAGES, which operates within the scientific ecosystem of the University of Bern. The book was published by the Haupt Publishing House in Bern, which often undertakes the publication of scientific handbooks and has previously published several scientific works by both authors.

According to the introductory chapter, one of the main goals of the authors in writing the book was to draw readers' attention to the dangers of future climate change by expanding the temporal horizon and using historical examples. During the writing of the manuscript, Pfister and Wanner strived simultaneously for understandability and expertise. The authors agreed that a book-sized synthesis needed to be written, not a collection of studies, as the Swiss saying goes, "a sack of crumbs is not the same as a loaf of bread". A fundamental axiom of climate historical analysis was that humans have a dual nature: on the one hand, they are biological beings, on the other hand, they are carriers of culture. A crucial common starting point for the authors was that a key task of climate history research should be to consider both aspects during the analysis.

To interpret climate changes, it is indispensable to define the concept of climate. According to the definition of the World Meteorological Organization, 30 years of atmospheric data is needed to create a statistical construction of the climate (possibly longer at higher latitudes). In everyday language, the climate is what you expect, the weather is what you get. As a reference period, the three decades between 1961-90 are commonly used in international climate historical research (previously, the data from the period 1901-60 served as the reference point). Climate databases based on nature's archives (pollen, tree rings, glaciers) are more homogeneous, continuous, precisely locatable, and reach back further in time than documentary sources. However, archival sources often provide more accurate and detailed information to uncover the most important climate changes and meteorological events from the perspective of human history. To analyze the descriptive sources from a statistical perspective, it was necessary to transform narrative texts into numbers, a method established by Christian Pfister in the 1980s. The base unit of the Pfister indices is a seven-grade scale for each month, which weights information on temperature and precipitation between the index values of +3 and -3. The seasonal and annual index values are created by summing the monthly values and integrating information over longer periods. Petr Dobrovolny, a Czech geographer-climatologist, created a Central European climate historical database based on German, Swiss, and Czech databases, which forms the backbone of Pfister and Wanner's climate historical analysis. During the time-series analyses of the millennial-scale climate historical reconstruction, seasonal data formed the backbone of the analysis.

Pfister and Wanner undertook the task of reconstructing and interpreting the climate history of the last thousand years. At the same time, their introductory case study on Ötzi, the Neolithic hunter thawed from alpine glacier ice, provided an opportunity to fit their climate history overview into the context of the current warming, the Holocene climate history, which began 11,700 years ago. For the last two thousand years, the authors provide a well-defined chronology of climate history. The balanced climate of the Roman Age Warm Period ended around 250, followed by the cooling of the Migration Cool Period between 250 and 800, which was closed off by the High Medieval Period, and the mild climate lasted until around 1300. The defining climate history period of the last thousand years was the Boreal Little Ice Age between 1300 and 1900. As a result of the characteristically cold period of the Little Ice Age, comparing the last two millennia (despite the current warming), the first was clearly warmer, and on a millennial scale, the millennium under examination was colder. The current warming began in the early 20th century (Modern Warm Period), but the Swiss authors divided this into two sub-periods. The slow warming period of the twentieth century lasted until 1988 (Short Twentieth Century), which has since accelerated unprecedentedly from the late 80s (Recent Warm Period).

In their investigation into the causes of climate change, Pfister and Wanner examine possible explanations, ranging from the Milankovic theory that attributes climate changes to the periodic changes in Earth's orbital elements, to explanations based on atmosphere-ocean interactions (NAO, ENSO, El Nino, La Nina). At the same time, they attribute significant importance to the partial effects of volcanic activity and changes in the Sun's radiant energy in the climate changes of the last thousand years. According to their argument, the cooling period during the age of migration (250-800) was significantly influenced by four temporally close and globally significant volcanic eruptions in the Pacific Ring of Fire (536, 540, 574 and 626), and the cooling effect of the identified solar minimum around the 650s. During the Medieval Warm Period (similar to the Roman Warm Period), volcanic activity was low, with data only on the eruption of the Icelandic Eldgja in 939 and the Oort solar minimum (1040-1080), which may have played a role in the temporary advance of the Alpine glaciers in the middle of the 11th century. The start of the Little Ice Age (1300-1900) was significantly influenced by the eruption of the Samalas volcano in Indonesia in 1257, which was the largest volcanic event of the last two millennia. The coldest periods of the Little Ice Age were always preceded by significant volcanic activity. In the mid-1340s, the eruption of an unknown tropical volcano caused years without summer on a global scale, greatly weakening the survival chances of contemporary societies on the eve of the Black Death. Around the turn of the 13th and 14th centuries, not only did the volcanic ash from the eruptions obscure solar radiation, but the sun's radiant energy decreased during the Wolf solar minimum between 1280 and 1350. In the last two dec-

ades of the 16th century, an unprecedented series of five volcanic eruptions occurred (Billy Mitchell, Bougainville Island, Melanesia, 1580 (?); Kelud, Java, Indonesia, 1586; Raung, Java, 1593; Nevado del Ruiz, Colombia, 1595; and Huaynaputina, Peru, 1600), causing the strongest cooling of the last two millennia. The cooling of the late 17th century was certainly influenced by the eruption of the Gamkonora volcano in Indonesia in 1673 or 1674 and the eruption of an unknown Pacific Ocean volcano in 1695. Furthermore, the most significant solar minimum of the examined millennium, the Maunder Minimum, occurred between 1645 and 1715. In 1783, Laki erupted in Iceland, an unknown Pacific Ocean volcano in 1809, Tambora in Indonesia in 1815, Galunggung on Java Island in 1822, and finally, the Cosigüina volcano in Nicaragua in 1835. All of these were against the background of the Dalton solar minimum between 1790 and 1830. Towards the end of the Little Ice Age, globally significant volcanic eruptions became less frequent, with the last notable event being the Krakatoa eruption in 1883. It may also be worth mentioning the eruption of the Agung volcano in Indonesia in 1963, which resulted in the last Little Ice Age type of winter. It is not negligible background information that the modern solar maximum began in 1914 and lasted until 2008. That is, the natural warming and the greenhouse effect amplified by modern economic activity have created interactions for which there is no historical precedent.

The traditional economy of the world is described by the Swiss author duo as an organic system in which virtually all energy comes from the Sun, transformed into chemical energy by photosynthesizing plants, which then essentially transforms into motion and heat energy within the food chain. In this system, the amount of biomass created annually by plant photosynthesis represented the upper limit of energy that contemporary societies could mobilize. The amount of accessible energy and raw materials was predominantly determined by the extent of cultivable land and weather patterns. During the Medieval Warm Period (800-1300), both factors were favorable; the climate in Central and Western Europe was mild and balanced, which lengthened the vegetation period and increased the extent of cultivated land. According to the testament of Albertus Magnus (1200-1280), not only were olive and fig trees widespread in the Rhine region in the 13th century, but these trees also bore fruit, except for the colder years. It is no coincidence that Saint Bonaventure (1221-1274), a Franciscan monk, wrote that he lived in an era when famines had become a thing of the past in Europe. The memory of the 13th-century golden age haunted for a long time, one of the most famous being the legend of the Blüemlisalp mountain (3661 meters) in the Bernese Alps. According to the story, the mountain was covered in rich pasture and a carpet of flowers in the 13th century, where a very rich and evil shepherd lived in constant abundance. He bathed his bride in milk, and she could not step on the ground; she had to walk on slices of cheese. However, this hard-hearted shepherd refused to give a single cup of milk to his hungry mother. The mother cursed her son, and the once vibrant mountain became a world of snow, ice, and bare rocks. This Swiss paraphrase of the lost paradise fairly accurately depicted the process that contemporaries experienced in the marginal agricultural areas during the onset of the Little Ice Age in the 14th century.

Contemporaries, however, had to find some explanation for the deterioration of living conditions. There was complete consensus that severe natural disasters were punishments from God, with which the Creator punishes sinful people. In a theological sense, every person and community has/had a sort of "sin account", the greater the total of this account, the more severe the punishment logically was. In this theological view, the task of the church was to organize "sin management", in case contemporary society "overspent" its sin account. The simplest solution to the problem was scapegoating, the most established form of which was witch-hunting. In the late Middle Ages, witches were regarded as today's terrorists, against whom (almost) every tool or weapon can be deployed. The first step was taken when, in the middle of the 15th century, church lawyers developed the conspiracy theory of devil worship, which also theologically justified the persecutions. The first target group was the Waldensian heretics, whose religious life played an important role in women and whose worship was often held at night, in forest clearings. The decisive step, however, was taken by the Catholic Church towards systematic witch hunts when two Dominican inquisitors, Jacobus Sprenger (-1495) and Heinrich Kramer (1430-1505), wrote the practical handbook of witch-hunting, the Malleus Maleficarum (1486), for which Pope Innocent VIII (1432-1492) also wrote a preface. As Wolfgang Behringer has demonstrated, the editions of the

"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-16th 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 17th-18th 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 – ARCHAEOLINGUA FOUNDATION, BUDAPEST, 2021. 463 PAGES.

In 2021, the Archaeological Institute of the Research Center for the Humanities and the Archaeolingua 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

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

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