

BIRTH at Conferences:

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Stefanović, S., Dimitrijević, V., Porčić, M. 2015. *Births, mothers and babies: Prehistoric fertility in the Balkans between 10000-5000 cal. BC*. MESO 2015 – The Ninth International Conference on the Mesolithic in Europe (14th-18th September, Belgrade, Serbia) Book of Abstracts: p. 28.

Abstract: BIRTH ERC project will investigate the key biological and cultural mechanisms affecting fertility rates resulting the Neolithic Demographic Transition, the major demographic shift in human evolution. Project integrate skeletal markers with micro-nutritional and macro-scaled cultural effects on fertility rates during the Early-Middle Holocene (10000-5000 BC) in the Central Balkans. Human, animal and plant remains, will be analysed using methods from bioarchaeological, forensic, chemical sciences in order to: 1) Investigate variability in the pattern of birth rates (number of pregnancies, interval(s) between them and the duration of the reproductive period) through histological analysis of irregularities in tooth cementum of women; 2) Determine paleoobstetric and neonatal body characteristics, health status and nutrition through analysis of skeletal remains; 3) Determine micro-nutritional changes during the Early-Middle Holocene through trace element (Zn, Ca and Fe) analysis; 4) Investigate the micro and macronutritional value of prehistoric foodstuffs, through an analysis of animal and plant remains and to compare the nutritional intake in relation to health and fertility; 5) Establish a chronology of the NDT in the Balkans by summed radiocarbon probability distributions; 6) Explore the possible role of culture in driving fertility increases, through analysis of community attitudes to birthing through investigation of neonate graves and artifact connected to the birthing process. Given that the issues of health and fertility are of utmost importance in the present as they were in the past, the BIRTH project offers new understanding of biocultural mechanisms which led to fertility increase and novel approaches to ancient skeletal heritage.



Živaljević, I. and Dimitrijević, V. 2015. *Becoming sedentary? The seasonality of hunting in the Mesolithic-Neolithic Danube Gorges*. 22nd Neolithic Seminar „Modelling the Processes of Neolithisation”, November 06th-07th 2015. Ljubljana, Slovenia.

Abstract: The Danube Gorges archaeological sequence (c. 9500-5500 cal. BC) offers great possibilities for exploring various aspects of Mesolithic-Neolithic transformations, including the changes of settlement patterns. The more intense building activities in the Late Mesolithic and Mesolithic-Neolithic ‘Transformational’ phase have been interpreted as archaeological indicators of increased sedentism and economic and social changes brought by ‘Neolithic’ lifeways. In this paper, we investigate whether the Danube Gorges sites were occupied seasonally or year-round by looking at animal bones. The hunting seasons of most important game animals have been determined on the basis of skeletal elements which are sensitive to the question of seasonality. This included ageing of red deer and roe deer on the basis of antler growth, and ageing of red deer, roe deer, fox and wild boar on the basis of tooth eruption and wear. The patterns of food resource exploitation seem to indicate a year-round occupation of the settlements, given that red deer, the most important game animal was apparently hunted throughout the year. This data suggests that a significant degree of sedentism existed in the Danube Gorges prior to, and independent from the adoption of animal and plant husbandry, and was largely influenced by favourable hunting conditions.

Porčić, M., Blagojević, T. and Stefanović, S. 2015. *Demography of the Central Balkan Neolithic: preliminary results of population dynamics reconstruction using summed radiocarbon probability distributions as population proxy*. 22nd Neolithic Seminar „Modelling the Processes of Neolithisation”, November 06th-07th 2015. Ljubljana, Slovenia.

Abstract: The Central Balkans has great importance for understanding the spread of the Neolithic in Europe, especially the issues related to the Neolithic demographic transition, yet little is known about the population dynamics of this region during this critical period. In this study, which is a part of the ERC BIRTH project, we apply the method of summed calibrated probability distributions on the published radiocarbon dates from Serbia in order to make a preliminary reconstruction of population dynamics during the Neolithic in the Central Balkans. The results suggest that there were interesting demographic events: 1) an initial population increase episode related to the earliest Neolithic ~6000 calBC followed by a trough ~5700 calBC which was in turn followed by a rebound 2) another decrease between 5500 and 5400 calBC, just

before the transition from the Early (Starčevo) into the Late Neolithic (Vinča) period 4) major population growth during the Late Neolithic period. It should be emphasized that these results should be taken as preliminary and tentative as they are based on a relatively small set of published radiocarbon dates collated from various sources motivated by different research agendas which might have introduced some bias into the results.

Stefanović, S. 2015. *Prehistoric babies in the (bio)archaeological record*. 22nd Neolithic Seminar „Modelling the Processes of Neolithisation”, November 06th-07th 2015. Ljubljana, Slovenia.

Abstract:The whole evolution of human fertility is based only on indirect evidences, such as sites densities and paleodemographic reconstructions, and there is no evidence about number of babies born by prehistoric mothers. On those indirect evidences we have built one of the most important chapter of human evolution: people lived at the very low population densities until the beginning of the Neolithic when they experienced fertility increase. Starting point of the new ERC BIRTH project is that such important chapter of human evolution cannot be written without direct evidences about fertility rate and project intends to provide first direct, skeletal evidence about number of babies born by prehistoric mothers. The project develops an integrative framework for understanding skeletal, nutritional and cultural effects on fertility rates, and for the study of bioarchaeological evidence of birthing in the Central Balkans between 10000-5000 BC. In this presentation, special attention will be on possible role of culture in prehistoric demographic shift, and some archaeological evidences about community attitudes to birthing process and childcare from prehistoric Balkans will be presented.



S. Stefanović and G. Goude. 2016. "Births, mothers and babies: a bioarchaeological perspective" Session organized at the 8th World Archaeological Congress, August 26th-September 2nd 2016. Kyoto, Japan

Abstract: Although births, mothers and babies present key pillars for human survival, their role has not been adequately studied, either by physical anthropology or archaeology. The attitudes of past communities towards pregnancy, birth and neonatal care must have played a key role in the success of the birthing process, but these have also not been satisfactorily addressed in archaeological writing. The aim of this session is to provide an overview of bioarchaeological research into the place of births, mothers and babies in ancient populations across time and space. Contributions will use multidisciplinary approaches and improved methodologies to address the roles and circumstances of birthing in human evolution. New methods for studying pregnancy, breastfeeding-weaning and social status of women and children, eg., through studies of nutrition, health, and growth, will be showcased.

Kristina Penezić, Sofija Stefanović, Ursula Wittwer-Backofen, Petra Urban, Jelena Jovanović. 2016. *Female stress during the Neolithic Demographic Transition in the Balkans: evidences from tooth cementum*. 8th World Archaeological Congress, August 26th- September 2nd 2016. Kyoto, Japan.

Abstract: It is generally accepted that the first fertility increase occurred in the Neolithic, during the process of the so-called Neolithic Demographic Transition. But this hypothesis is not based on biological skeletal evidence of fertility, but rather derived from indirect evidence. In order to provide direct evidences about female fertility ERC BIRTH project investigates "crisis lines" which correspond to stressful life events and are visible in tooth cementum. We compare number of "crisis lines" in Mesolithic and Neolithic females from the Balkans (10000-5000 BC) in order to investigate whether the number of stressful events increased with Neolithic as a possible consequence of increase of fertility.

Jelena Jovanović, Camille de Becdelievre, Gwenaëlle Goude, Sofija Stefanović. 2016. *Children feeding practices and growth patterns during Mesolithic-Neolithic transition in the Danube Gorges*. 8th World Archaeological Congress, August 26- September 2nd 2016. Kyoto, Japan

Abstract: The Mesolithic-Neolithic transition, major shift in subsistence, has been correlated with a general decline in health status and a global reduction of body proportions. Recent stable isotope analyses performed on Mesolithic and Neolithic individuals from the Danube Gorges (Balkans, 9500-5500 BC) document significant differences in term of children feeding practices. Therefore, we examine here how different feeding practices could have influenced children growth patterns and health status. We reconstruct the evolution of growth patterns and health status per age categories (infant-early childhood-childhood), and interpret the results in the light of our current understanding of breastfeeding and weaning patterns.



Jelena Jovanović, Tamara Blagojević, Camille de Becdelievre, Sofija Stefanović - *The stress of farming: bodies and health during the Mesolithic and the Neolithic Transition in Serbia*. International Union of Anthropological and Ethnological Sciences, 4th - 9th May 2016, Dubrovnik, Croatia.

Abstract: The Neolithic transition, the passage from mobile foraging to sedentary farming, was a major shift during human prehistory: a series of behavioral and ecological transformations substantially modified the daily lifestyles and eventually impacted human biology. Studies suggested that this transition positively impacted fertility rates, promoted reproduction and enhanced population fitness; however, bioarchaeological studies carried on human remains have also documented a general decline in health status and a global increase in morbidity, suggesting that the shift toward agriculture also paradoxically had an adverse effect on individuals' physiological fitness. Using 200 Mesolithic and Neolithic skeletal remains (9500-5500 BC) discovered on the territory of Serbia, this research tests the assumption that the transition to the Neolithic brought important biological changes which are reflected by a higher prevalence of various skeletal and dental pathological conditions, and by a global reduction in the size of populations under the effect of growth disturbances. Two lines of evidence are compared chronologically and spatially: non specific stress markers (Cribriform orbitalia, Porotic hyperostosis, Enamel hypoplasia), indicators of diet (dental caries and calculus), and body proportions (body mass, stature and body mass index).

Marko Porčić, Tamara Blagojević, Kristina Penezić, Sofija Stefanović. 2016. *Culture, demography and climate at the beginning of the Neolithic in Southeast Europe*. International Union of Anthropological and Ethnological Sciences, 4th - 9th May 2016, Dubrovnik, Croatia.

Abstract: It has long been recognized in anthropology and archaeology that there is a complex relation between culture, demography and climate. This issue has been of central importance in the Neolithic archaeology in Europe, especially for the related questions of the spread of Neolithic and the Neolithic demographic transition. We present a critical review of the previous research along with new contributions based on the results of paleodemographic reconstruction of population dynamics for the parts of Southeast Europe during the 7th and 6th millennia BCE. The summed radiocarbon calibrated probability distributions method was applied on published datasets from Serbia, Bulgaria and Hungary, and the resulting curves were compared with the climate proxy data. We conclude that there are some clues that climate patterns were correlated with changes in culture and demography at various scales, but at present, there is no sufficient data to establish causal links.



Živaljević, I., Dimitrijević, V., Stefanović, S. 2016. Between the forest and the river: hunting and fishing in the Danube Gorges in the Mesolithic. 22nd European Association of Archaeologists Conference, Vilnius, Lithuania.

Abstract: Ever since the discovery of the site of Lepenski Vir, it was recognized that fishing had an important role in the settling of the Danube Gorges in the Mesolithic. The importance of wild game hunting has also been confirmed by the analyses of animal bones and emphasized ever since the first published archaeozoological reports. The issue of the role of terrestrial vs. aquatic resources in the diet has been addressed from the perspective of stable isotope analysis, with somewhat contrasting results. The analyses of carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) isotope ratios have suggested that the Mesolithic inhabitants of the Danube Gorges consumed considerable amounts of fish, with gradual broadening of the dietary spectrum to include terrestrial resources at the onset of the Neolithic (Bonsall et al. 1997; 2000; 2004; Grupe et al. 2003; Borić et al. 2004), whereas the analysis of sulphur ($\delta^{34}\text{S}$) isotope ratio has suggested that there have been significant inter- and intra-site variabilities in dietary practices (Nehlich et al. 2010). However, this issue had not so far been addressed in greater detail from an archaeozoological perspective, mainly due to great difficulties and biases in cross-referencing quantified mammal and fish remains, but also due to the fragmentary nature of faunal assemblages from some of the sites. Although the assessment of precise proportion of wild game meat vs. fish in the diet is elusive, particularly due to the differences in mammalian and fish skeletons, and biases affecting their survival and recovery, we attempted to tackle this issue by estimating their dietary contribution on the basis of the sum of average weight of the minimum number of individuals for both mammals and fish. In addition, we estimated the proportion (size and number) of economically most important fish (cyprinids, Wels catfish and acipenserids) in the assemblages from the sites of Lepenski Vir, Vlasac and Padina. Even with methodological biases concerning recovery techniques employed during the old and new excavations, and different areas of the sites they have encompassed, we found that fish species composition on the three sites varied to some extent. Given the site locations, their short distance from one another and similar landscape and environmental conditions (vicinity of cataracts and large whirlpools),

this propensity towards fishing particular kinds of fish could suggest that the sites functioned as specialized fishing centres, and held different species of fish in special regard.

Dimitrijević, V., Blagojević, T., Sofija Stefanović. 2016. Aurochs in the background: distribution and evidence of hunting of ancestor of domestic cattle in the pre-Neolithic (Late Pleistocene and Early Holocene) and Neolithic in the Central Balkans. 22nd European Association of Archaeologists Conference, Vilnius, Lithuania.

Abstract: Cattle played an outweighing role from the beginning of neolithization in the Central Balkans, unlike in the southernmost Europe, where sheep and goat, mostly for environmental reasons, preceded and subsequently kept their key position in animal husbandry. As genetic evidence suggests, cattle was introduced to Europe from the initial centers of its domestication in the Near East. However, incidences of local domestication cannot be completely ruled out, and, even more so, that hybridization of domestic stock with wild progenitors occurred. In order to understand whether these processes ever happened, the data on the distribution of the wild ancestor of cattle in the region are important, as well as its features observed from skeletal remains and archaeological context of discovery. Although scarce, aurochs was present in the Central Balkans in the Late Pleistocene, as can be judged from the faunal remains from Palaeolithic sites and from alluvial deposits. The steppe bison, another large bovid of comparable size and ethology, was more frequent. Its prevalence is documented both by the number of sites where its presence has been confirmed, and regarding the ratio of bison and aurochs remains at sites where both species were found. Steppe bison became globally extinct towards the end of the Pleistocene, although the more precise timing of its disappearance in the region is not known. It can be hypothesized that aurochs consequently became more numerous and substituted bison in an empty niche, but there is also a lack of data on the presence of aurochs at the end of the Last Glacial and the beginning of Holocene. The remains of aurochs from Pleistocene alluvial deposits mainly consist of cranial parts, whereas those from Palaeolithic sites include scattered bone fragments and teeth, which makes it largely impossible to determine whether they accumulated as prey of human hunters or large animal predators.

The earliest occurrence of contextualized aurochs remains is a partial skeleton discovered in a Mesolithic layer at the site of Velesnica in the Danube Gorges. The processing of the animal carcass is evident from butchering marks on the articulated neck vertebra. During the Mesolithic, aurochs remains are scarce at other sites in the Danube Gorges and other parts of the Central Balkans. In the Neolithic, the remains of aurochs became a regular component of the settlement animal bones refuses, but mostly in modest proportions, showing that the intensity of hunting was not high. Nevertheless, owing to its cognation to domestic cattle, potential local domestication trials and hybridization, or solely to its impressive appearance, the significant

symbolic role of this large bovid, one that is going to endure throughout prehistory, was probably established already at the onset of the Neolithic. In this respect, the sudden and synchronous appearance of spoons made from aurochs metatarsal bones in the Central Balkans is intriguing, as well as within the large area stretching from Anatolia to Pannonian plane and Carpathian Mountains.



20th Congress of the European Anthropological Association

Zagreb, Croatia
24th – 28th August 2016

Sofija Stefanović, Jelena Jovanović, Kristina Penezić, Tamara Blagojević. 2016. New weaning food for prehistoric babies and origin of caries. 20th Congress of the European Anthropological Association *European Anthropology in a Changing World: From Culture to Global Biology*, 24th – 28th August 2016, Zagreb, Croatia.

Abstract: Increase in caries is described in many Neolithic populations and often interpreted as a consequence of diet based more on carbohydrates. However, we suggest that intensification of caries is probably more connected to new way of food preparation with Neolithic than with new type of food. Special threat for deciduous teeth was new weaning food for babies, probably kind of porridge based on grinded cereals and milk which form a sticky paste around the teeth causing dental caries. We combine different lines of archaeological and bioarchaeological evidences from the territory of the Central Balkans which suggest appearance of new weaning food and increase of caries on deciduous teeth with Neolithic. First, we present our results of microscopic study of 40 Early Neolithic bone spoons from the sites Starcevo and Donja Branjevina, on which we had found evidences of deciduous teeth bite-marks, suggesting their usage for feeding the babies with porridge. Second, we present appearance of caries on children of known duration of breastfeeding from sites Lepenski Vir and Ajmana on which we had found correlation between duration of breastfeeding and caries presence. Our results indicate that in further understanding of origin of caries more attention should be on new way of food preparation in Neolithic than on food itself.



Marko Porčić, Tamara Blagojević, Kristina Penezić, Sofija Stefanović., 2016. *Kultura, demografija i klima početkom neolita u jugoistočnoj Evropi*. XXXIX Skupština i godišnji skup Srpskog arheološkog društva (SAD), Vršac, 2. - 4. jun 2016.

Абстракт: Свест о комплексности односа културе, демографије и климе већ дуго је присутна у археологији и антропологији. Ова тема је од централног значаја у неолитској археологији Европе, а посебно када је реч о питањима која се односе на ширење неолита и неолитску демографску транзицију. У овом раду даћемо критички осврт на ранија истраживања, као и нове резултате засноване на палеодемографској реконструкцији популационе динамике у деловима југоисточне Европе током 7. и 6. миленијума пре наше ере. Метод сумираних дистрибуција вероватноће калибрисаних радиокарбонских датума примењен је на публиковане датуме са територије Србије, Бугарске и Мађарске, а добијене кривуље поређене су са подацима о климатским показатељима. Резултати указују на то да постоје одређене назнаке о томе да су климатски обрасци повезани са променама у култури и демографији на различитим скалама, али да на тренутном степену истражености не постоје довољно јаки показатељи узрочних веза међу овим појавама.

Dragana Filipović, Camille de Becdelievre, Jelena Jovanović, Thomas Büdel, Kristina Penezić, Sofija Stefanović., 2016. *Ispitivanje ishrane prvih zemljoradnika i populacione dinamike u neolitu centralnog Balkana* (Poster presentation). XXXIX Skupština i godišnji skup Srpskog arheološkog društva (SAD), Vršac, 2. - 4. jun 2016

Абстракт: У светској литератури широко је прихваћено мишљење да су појава пољопривреде и развој седелачког начина живота довели до пораста степена фертилитета у људским заједницама, што је даље узроковало увећање популације и густине насељености, да би, на крају, допринело формирању најранијих урбаних центара. Није, међутим, до сада испитан ниједан директан доказ, попут биолошких индикатора видљивих на или у скелетним остацима људи, који би дефинитивно доказао ту претпостављену везу између “узрока” (промене у исхрани) и “последнице” (демографски раст) овог процеса. Пројекат BIRTH (који финансира Европски истраживачки савет / European Research Council) за циљ има да испита везу између конзумирања “нове хране” и популационе динамике током периода у ком на Балкану долази до преласка на пољопривредну производњу. Претходне антрополошке и анализе стабилних изотопа у

људским остацима прикупљеним са неколико мезолитских и ранонеолитских локалитета у региону сугеришу могући раст популације почев од краја касног мезолита, као и варијације у дужини периода дојења деце почетком неолита. У оквиру BIRTH пројекта, један од истраживачких корака је анализа биомаркера очуваних на и у људским костима и зубима, као и на алаткама. Присуство биомаркера биљака послужиће као основ за утврђивање улоге domestikованих биљака и животиња у археолошки препознатом повећању стопе фертилитета у време развоја пољопривреде.