

**XV. SIMPOZIJ ŠTUDIJSKE SKUPINE ICTM ZA GLASBENO ARHEOLOGIJO &  
DELAVNICA PROJEKTA EVROPSKA GLASBENA ARHEOLOGIJA (EMAP)**

**XV SYMPOSIUM OF THE ICTM STUDY GROUP ON MUSIC ARCHAEOLOGY &  
WORKSHOP OF THE MUSIC ARCHAEOLOGY PROJECT (EMAP)**

**24.–26. AVGUST 2017 / 24–26 AUGUST 2017**

**Prešernova dvorana, Slovenska akademija znanosti in umetnosti, Ljubljana, Slovenija**  
Prešeren Hall, Slovenian Academy of Sciences and Arts, Ljubljana, Slovenia

**Narodni muzej Slovenije, Ljubljana, Slovenija**  
National Museum of Slovenia, Ljubljana, Slovenia

# **GLASBA V KAMENI DOBI** **MUSIC IN THE STONE AGE**



**PROGRAM IN IZVLEČKI / PROGRAMME AND ABSTRACTS**



Neandertalčeva piščal iz Divjih bab  
Neanderthal Flute from Divje babe

NARODNI  
MUZEJ  
SLOVENIJE



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# GLASBA V KAMENI DOBI MUSIC IN THE STONE AGE



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## UVOD

XV. simpozij študijske skupine ICTM za glasbeno arheologijo z imenom Glasba v kameni dobi bo pokazatelj sodobnih raziskav o možnih zvočilih prazgodovinskih človeških glasbenih kultur in o njihovih večplastnih implikacijah za poreklo glasbe v začetkih človeštva. Simpozij bo, poleg obravnavanja sodobnih projektov in rezultatov, prispeval k poglobitvi potekajočih razprav in postregel z objavo podatkov v načrtovani antologiji (Publikacije študijske skupine ICTM za glasbeno arheologijo).

Referati se osredotočajo predvsem na izdelavo, glasbeno rabo ter pomen zvočnih artefaktov, za katere verjamemo da so paleolitska, mezolitska in neolitska glasbila ter na organološka dognanja in kulturne interakcije v zgodnjem obdobju človeške glasbe.

V času simpozija bosta potekali panel in okrogla miza s finančno podporo Evropskega glasbenoarheološkega projekta (EMAP). Njun namen je ponovno obujanje diskusije o preluknjani stegenici jamskega medveda, najdeni v jami Divje babe I na Slovenskem, ki je v preteklosti bila deležna ostrih debat, namreč ali gre za piščal ustvarjeno v času Neandertalcev ali ne. Najdba kar naprej ostaja vir navdiha za raziskovalce. Tako v sklopu delavnice kot tudi v sklopu okrogle mize bomo predstavili, soočili in odprto predebatali argumente za in proti.

Vredno je opozoriti na petkov popoldan, ki ga bo zaznamoval vodeni ogled potujoče multimedijske glasbene razstave ARHEOMUZIKA v Narodnem muzeju Slovenije ter na dva koncertna večera v sklopu festivala Noči v stari Ljubljani.

### Dr. Arnd Adje Both

Nemški arheološki inštitut

*Kurator, Evropski glasbenoarheološki projekt* *Curator, European Music Archaeology Project*

*Predsedujoči, Študijska skupina ICTM za glasbeno arheologijo*

## INTRODUCTION

XV Symposium of the ICTM Study Group on Music Archaeology - Music in the Stone Age - will be a platform of current research on the possible sound tools of prehistoric human music cultures and on their multiple implications for the origins of music in the early stage of humanity. Besides reflecting current projects and results, the symposium is intended to deepen ongoing discussions, and to publish the information in a forthcoming anthology (Publications of the ICTM Study Group on Music Archaeology).

Papers of the symposium principally consider the making, playing, and meaning of sound artefacts believed to be Palaeolithic, Mesolithic and Neolithic musical instruments, and organological developments and cultural interactions in the early phase of human music.

During the symposium a panel and round table funded by the European Music Archaeology Project (EMAP) will be held. The event is intended to reconsider divergent views on the perforated thighbone of a cave bear excavated in the Divje Babe I cave, Slovenia, which lead to the heated controversy if this object could be a flute produced in the time of the Neanderthals. The find stimulated research over the last two decades, and the debate is ongoing. On the workshop and round table both pro- and counter-arguments will be addressed and openly discussed.

Other important events of the symposium are an afternoon with a guided tour to the travelling multimedia music exhibition ARHEOMUZIKA at the National Museum of Slovenia, and two concert evenings within the festival Nights in Old Ljubljana Town.

### Dr. Arnd Adje Both

German Archaeological Institute

*Curator, European Music Archaeology Project*

*Chair, ICTM Study Group on Music Archaeology*



# PROGRAM:

Četrtek/Thursday, 24. 8. 2017

PREŠERNOVA DVORANA SAZU/PREŠEREN HALL SAZU, NOVI TRG 4, LJUBLJANA

9:00-9.30 REGISTRACIJA/REGISTRATION

## 1: PLENARNO PREDAVANJE/KEYNOTE

9:30 -10.00 **Glasba v kameni dobi / Music in the Stone Age**  
Arnd Adje Both, Nemčija/Germany

10:00-10.30 Odmor/Break

## 2: RAZMIŠLJANJA O POREKLU GLASBE/THOUGHTS ON THE ORIGINS OF MUSIC

*Predsedujoča/Chair:* Cajsa S. Lund

10:30 -11.00 **Proučevanja glasbe paleolitske Evrope: o evoluciji simbolnega mišljenja, glasbe in jezika / Studies on the Music of Palaeolithic Europe: About the Evolution of Symbolic Thinking, Music and Language,** Michael Praxmarer, Avstrija/Austria

11:30-12:00 **Glasba in zavest / Music and Consciousness**  
Marcel Otte, Belgija/Belgium

11:00-11:30 **Glasba v jami: kdo so bili prvi glasbeniki? / Music in the Cave: Who Were the First Musicians?**  
Simona Petru, Slovenija/Slovenia

12:00-13:30 Kosilo/Lunch

## 3: STANJE RAZISKAV NAJSTAREJŠIH MOREBITNIH PIHAL/ CURRENT STATE OF RESEARCH ON THE EARLIEST POSSIBLE WIND INSTRUMENTS

*Predsedujoči/Chair:* Arnd Adje Both

13:30-14:00 **Pihala iz Švabske Jure: pregled in trenutno stanje raziskav / Wind Instruments of the Swabian Jura: Overview and current State of Research,** Susanne C. Münzel, Anna Friederike Potengowski, Nicholas J. Conard, Nemčija/Germany

14:00-14:30 **Mousteriensko glasbilo iz Divjih bab I: trenutno stanje raziskav in védenja / Mousterian Musical Instrument from Divje Babe I: The State of Current Research and Knowledge**  
Matija Turk, Slovenija/Slovenia

14:30-15.00 Odmor/Break

## 4: DIVJE BABE I, *Predsedujoči/Chair:* Peter Turk

15:00-15:30 **Mousteriensko glasbilo iz Divjih bab I: trenutno stanje raziskav in védenja / Mousterian Bone Flute from Divje Babe I: Presentation of Ljuben Dimkaroski's Musical Research and Findings,** Katinka Dimkaroska, Slovenija/Slovenia

15:30-16:00 **Mousterienska koščena piščal iz Divjih bab I: predstavitev glasbenih raziskav in ugotovitev Ljubena Dimkaroskega / Early Acoustic Research and Experiments with Mousterian Bone Flute from Divje Babe I,** Drago Kunej, Slovenija/Slovenia

16:00-16:30 **Praktična predstavitev, kako je možno izdelati piščal iz Divjih bab / Practical Presentation of How Divje Babe Flute Could be Made,** Giuliano Bastiani, Italija/Italy

16:30-17:00 **Zareze in luknje na kosteh: Potočka zijavka in Divje babe I na Slovenskem / Cuts and Holes in Bones (Potočka Zijavka and Divje Babe I, Slovenia),** Boštjan Odar, Slovenija/Slovenia

## 5: OKROGLA MIZA/ ROUNDTABLE, *Predsedujoča/Chairs:* Arnd Adje Both & Matija Turk

17:00-18:00 **Divje babe I: potekajoča razprava / Divje Babe I: An Ongoing Discussion**

19:00-21:00 *Plovba po Ljubljani/Ljubljana River Cruise*

## Petek/Friday, 25. 08. 2017 (dopoldne/morning)

PREŠERNOVA DVORANA SAZU/PREŠEREN HALL SAZU, NOVI TRG 4, LJUBLJANA

### 1: GLASBILA V NEOLITIKU/MUSICAL INSTRUMENTS IN THE NEOLITHIC

*Predsedujoči/Chair:* Jean-Loup Ringot

- 9:00-9:30 **Kroglasta keramična piščal iz Makedonije: prazgodovinski glasbeni instrument / Globular Clay Flute of Macedonia: A Prehistoric Musical Instrument**  
Dragan Dautovski, Makedonija/Macedonia
- 9:30-10:00 **Kamenodobni bobni v srcu Evrope / Stone Age Drums in the Heart of Europe**  
Luboš Chroustovský, Češka/Czech Republic
- 10:00-10:30 **Brneči zvoki v mlajši kameni dobi? Raziskovanje slušnih navad v neolitiku ob srednji Donavi / Basso Sounds in the Younger Stone Age? Researching the Musical Auditory Habits in the Middle Danube's Neolithic**, Beate Maria Pomberger, Avstrija/Austria

10:30-11:00 *Odmor/Break*

### 2: STENSKA UMETNOST & GLASBA NA KAMNIH/ROCK ART & MUSIC ON ROCKS

*Predsedujoči/Chair:* Placido Scardina

- 11:00-11:30 **Plesalci iz jame Addaura na Siciliji / Dancers in the Addaura Cave, Sicily**, Paola Budano, Italija/Italy
- 11:30-12:00 **Glasba in ples v stenski umetnosti osrednje Indije / Music and Dance in the Rock Art of Central India**  
Meenakshi Dubey-Pathak, Indija/India
- 12:00-12:30 **Domnevna kamenodobna kamnita tolkala na Tajskem / Presumable Stone Age Lithophones in Thailand**  
Gretel Schwörer-Kohl, Nemčija/Germany

12:30-14:00 *Kosilo/Lunch*

## Petek/Friday, 25. 08. 2017 (popoldne/afternoon)

NARODNI MUZEJ SLOVENIJE/NATIONAL MUSEUM OF SLOVENIA, PREŠERNOVA CESTA 20, LJUBLJANA

### 3: VODENI OGLED RAZSTAVE/EXHIBITION GUIDED TOUR

- 14:00-15:30 **Archaeomusica / Arqueomúsica / Arheomuzika**  
Arnd Adje Both, Nemčija/Germany

### 4: MUZEJSKE PREDSTAVITVE IN DELAVNICE/MUSEUM PRESENTATIONS AND WORKSHOPS

- 16:00-16:30 **Ljudje in njihovi glasbeni pripomočki v Skandinaviji v kameni dobi: glasbenoarheološka dejstva in fikcije / People and Their Sound Tools in Stone-Age Scandinavia: Music-Archaeological Fact and Fiction**, Cajsa S. Lund, Švedska/Sweden
- 16:30-17:30 **Razlaganje arheoloških najdb skrivnostnih cevastih kosti kot glasbenih instrumentov: možnosti in pasti / Interpreting Archaeological Finds of Enigmatic Tubular Bones as Sound Instruments: Possibilities and Pitfalls**  
Annemies Tamboer, Nizozemska/Netherlands and Riitta Rainio, Finska/ Finland
- 20:00-21:30 *Koncert/Concert: Glasba v kameni dobi / Music in the Stone Age*

## Sobota/Saturday, 26. 08. 2017

PREŠERNOVA DVORANA SAZU/PREŠEREN HALL SAZU, NOVI TRG 4, LJUBLJANA

### 1: ROGOVI IN PIŠČALI/HORNS AND FLUTES

*Predsedujoča/Chair:* Dorothee Judith Arndt

- 9:00-9:30 **Školjka kot glasbilo v neolitiku na Malti: organologija, vloga v družbi in izvajalski kontekst / The Conch Shell as a Musical Instrument in Neolithic Malta: Organology, Role in Society, and Performance Contexts**, Juan Sebastian Correa Caceres, Malta

9:30-10:00 **Pregled zvočnih artefaktov z najdišč Bluff Shelter na planoti Ozark v osrednjem delu ZDA / A Survey of Sound-Making Artifacts From Bluff Shelter Sites in the Ozark Plateau Region of the Central United States**, James A. Rees, Jr., ZDA/USA

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10:00-10.30 *Odmor/Break*

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## 2: MELODIJE PRIHODNOSTI: RAZMIŠLJANJA O POMENU UPORABE ZGODNIH PIHAL V SODOBNEM SVETU / FUTURE MELODIES: CONSIDERING THE SIGNIFICANCE AND APPLICATION OF THE EARLIEST MELODIC WIND INSTRUMENTS IN THE CONTEMPORARY WORLD

*Predsedujoči/Chair:* Svanibor Pettan

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10:30-11:00 **Ples v grifonovi koži / Griffon Skin Dance**  
Simon Wyatt, Združeno kraljestvo/United Kingdom

11:00-11:30 **Etični labod: eksperimentiranje z dediščino mlajše paleolitske "piščali" in arheološko najdišče nasilja / The Ethical Swan: Experimenting with the Heritage of an Upper-Palaeolithic 'Flute' and an Archaeological Site of Violence**, Frances Gill, Švedska/Sweden

11:30-12:00 **Kamenodobni instrumenti - sodobna glasba / Stone Age Instruments: Contemporary Music**  
Barnaby Brown, Združeno kraljestvo/United Kingdom

12:00-12:30 **Ples za Cajso in duet za Anno. Pregled in praktična predstavitev dveh glasbenih stvaritev: Dueta za labodovo koželjnico in Kvarteta za labodovo podlahtnico in labodovo koželjnico / Dance for Cajsa and Duet for Anna: An Overview and Practical Demonstration of Two Pieces of Music - a Duet for Swan Radii and a Quartet for Swan Ulnae and Swan Radii**  
Frances Gill, Sweden, and Anna Friederike Potengowski, Nemčija/Germany

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12:30-14:00 *Kosilo/Lunch*

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## 3: RAZLIČNE RAZISKAVE/OFF-TOPIC RESEARCH

*Predsedujoča/Chair:* Annemies Tamboer

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14:00-14:30 **Zvočila v Muzeju vučedolske kulture / Sound Artifacts of the Vučedol Culture Museum**, Irena Miholić, Hrvaška/Croatia

14:30-15:00 **Koščene piščali v Gruziji (15.-13. stoletje pred Kr.) / Bone Flutes in Georgia (15<sup>th</sup>-13<sup>th</sup> Century BC)**  
Nino Razmadze, Gruzija/Georgia

15:00-15:30 **Proučevanje devetih zvenceh kamnov iz vzhodne grobnice Zhou v Hebiju na Kitajskem / Study on Nine Chime Stones From Eastern Zhou Tomb in Hebi, China**, Fang Xueyang, Kitajska/China

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15:30-16:00 *Odmor/Break*

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## 4: RAZLIČNE RAZISKAVE/OFF-TOPIC RESEARCH

*Predsedujoči/Chair:* Barnaby Brown

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16:00-16:30 **Zvoki gline. Predšpanska zrakovna glasbila kolumbijske kulture Tuza (1250 – 1550 po Kr.): Organologija, uglaševanje in oblikovanje kroglastih piščali / Sounds of Clay - Pre-hispanic Aerophones of the Colombian Tuza Culture (AD 1250 - 1550): Organology, Tuning and Design of Globular Flutes**  
Adriana Guzmán, Kolumbija/Colombia

16:30-17:00 **Poskusna tridimenzionalno oblikovana rekonstrukcija baročne flavte. Primerek iz Arheološkega muzeja v Vroclavu / The Experimental Three-dimensionally Modelled Reconstruction of the Baroque Flute: The Piece From The Archeological Museum of Wrocław**  
Aleksandra Gruda and Marta Pakowska, Poljska/Poland

17:00-17:30 **Rekonstrukcija tibije iz Ptuja na Slovenskem / Reconstruction of the Poetovio Tibia From Slovenia**, Olga Sutkowska, Nemčija/Germany

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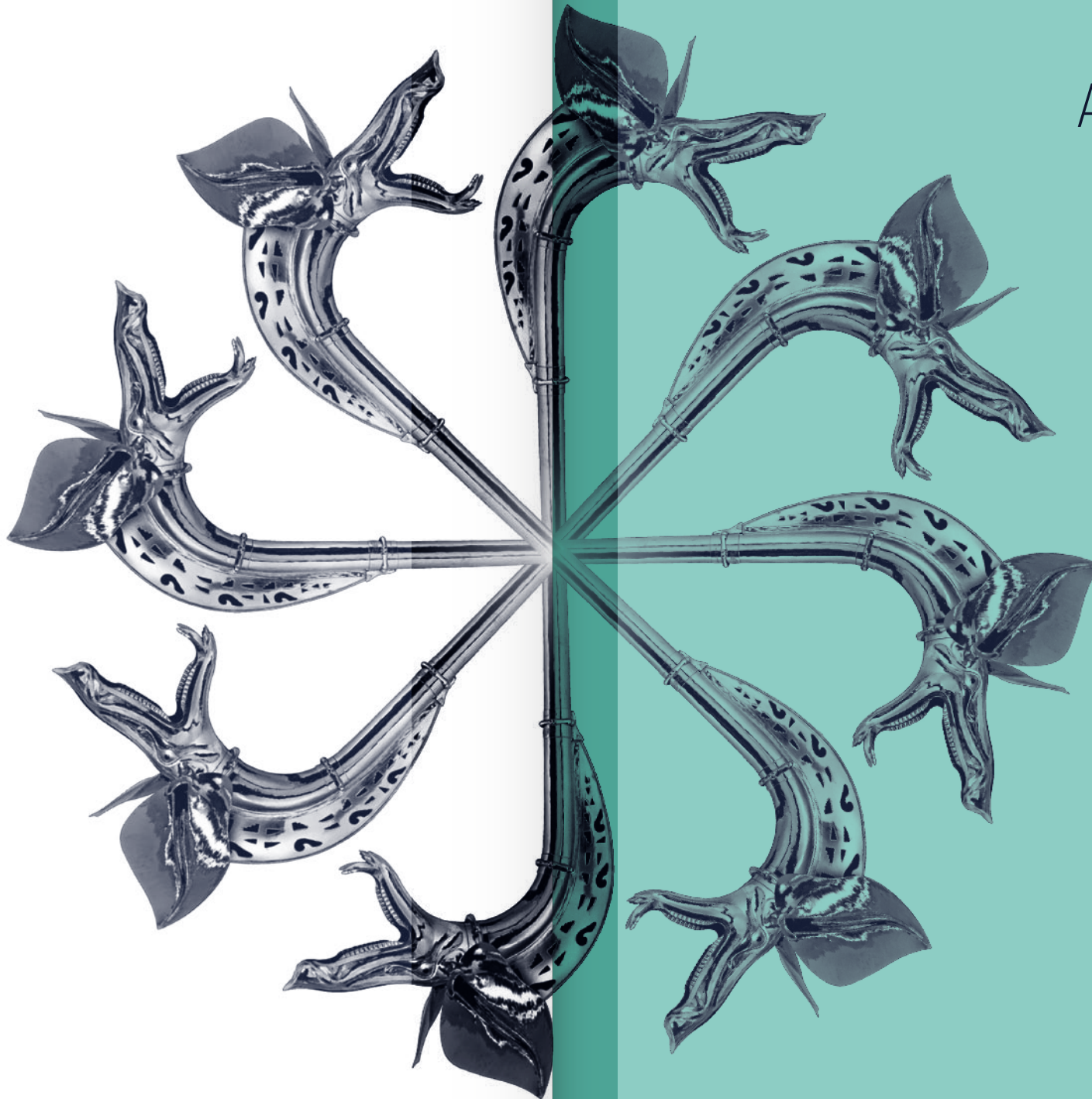
15:30-16:00 **ZBOR ČLANOV ŠTUDIJSKE SKUPINE / GENERAL ASSEMBLY OF THE STUDY GROUP**

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20:00 *Koncert/Concert: EMAP*

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# IZVLEČKI ABSTRACTS



## Michael Praxmarer

Institute of Archaeology, Leopold Franzens University of Innsbruck  
Avstrija/Austria

### Proučevanja glasbe paleolitske Evrope: o evoluciji simbolnega mišljenja, glasbe in jezika

## Studies on the Music of Palaeolithic Europe: About the Evolution of Symbolic Thinking, Music and Language

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When and where are the evolutionary steps to symbolic thinking, music and language situated? This paper provides a summary from the first possible symbolic artefacts in Africa and Europe to the "big bang of culture" in the European Upper Palaeolithic. Cognitive archaeology adds a new kind of communication to this context. In the stage of the appearance of cultural modernity and creative arts in our modern sense definitely intentionally made musical instruments are present in a remarkable number. The main finds will be considered and a typology of the palaeolithic aerophones, with special emphasis on their use (e.g. hunting purpose), will be suggested. Some replicas will also be presented.

Finally, the paper addresses the question whether different kinds of universals in world-music can contribute to the general concept of the first music in our modern sense as well as to the first presumable musical ways of signalling and communication.

## Marcel Otte

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### Glasba in zavest

## Music and Consciousness

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All human societies produce powerful and essential emotional activities. They combine solidarity and a sense of play and pleasure. Among them music is the most universal, and has the most powerful significance. Singing or dancing rarely yields material evidence, though they can sometimes be associated with basic instruments such as leaves or stalks.

A musical activity makes it possible to fit into the order of the universe, into a cosmic and natural harmony, into the unfolding of time. Those essential laws of the human mind find material evidence in the case of Divje Babe as early as sixty thousand years ago. The specific location of this isolated cave probably accounts for the use of bones, which were easy to be found on the spot.



## Simona Petru

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Slovenija/Slovenia

## Glasba v jami: kdo so bili prvi glasbeniki?

### Music in the Cave - Who Were the First Musicians?

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Modern humans frequently use music and colour, especially in their rituals, since both of them influence our emotions. Pigments were used early in human history, but sophisticated wall paintings and portable art started to appear relatively late in the Palaeolithic. What about music? Were Neanderthals expert musicians as flute from Slovenian cave site Divje Babe I implies? Was music known even earlier or did it appear later, with the emergence of modern humans? It seems that complex society with different sort of rituals occurred at the beginning of the Upper Palaeolithic. It might be that this occurrence was conditioned by cognitive changes, typical for modern humans. Maybe such changes enabled us to invent stories that were part of the different rituals and complex music might evolve to make those stories more emotional and thus easier to remember.

## Susanne C. Münzel

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Nemčija/Germany

## Anna Friederike Potengowski

Flutist, Ensemble VentOs (contemporary music), Berlin, AFPotengowski@gmx.com  
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## Nicholas J. Conard

Institut für Ur- und Frühgeschichte und Archäologie des Mittelalters, Abteilung für Ältere Urgeschichte und Quartärökologie, University of Tübingen  
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Nemčija/Germany

## Pihala iz Švabske Jure: pregled in trenutno stanje raziskav

### Wind Instruments of the Swabian Jura: Overview and Current State of Research

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The oldest material evidence for music and a musical tradition was found in the Aurignacian deposits of the caves of the Swabian Jura. In three caves, Geißenklösterle and Hohle Fels in the Ach Valley between Blaubeuren and Schelklingen, and Vogelherd Cave in the Lone Valley near Niederstotzingen, remains of bird bone and ivory flutes have been found in layers dating to 42 – 36 ka cal BP. The three most complete flutes are the two bird bone flutes made from a swan's (GK1) and a vulture's radius (HF1), and the flute made from mammoth ivory (GK3). The fact that they have been found in both valleys indicates that music was a regular feature in the lives of people starting no later than 40,000 years ago.

In the course of the last 20 years experimental archaeology has become an important tool to study past societies, and this is especially true for musical instruments. By playing on reconstructions, we gain an immediate impression of the potential sounds and music of the Upper Paleolithic.

This paper presents the archaeological finds and reconstructions of these flutes made by Friedrich Seeberger and Wulf Hein. We examine the tonality and musical possibility of these instruments when played by Anna Friederike Potengowski. This research demonstrates the great diversity of sounds and tones these instruments can produce and provides an idea of the potential Aurignacian soundscape 40,000 years ago.

## Matija Turk

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National Museum of Slovenia, Ljubljana  
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Slovenija/Slovenia

### Mousteriensko glasbilo iz Divjih bab I: trenutno stanje raziskav in védenja

## Mousterian Musical Instrument from Divje Babe I: The State of Current Research and Knowledge

In 1995, a perforated femur of a young cave bear was found in the cemented layer 8a of the Palaeolithic cave site Divje Babe I in western Slovenia. Supposition that the object could be a flute led to heated debates. The crucial question was related to the origin of the holes. These could only have been made either by a carnivore or by a human being.

The find from Divje Babe I is the most known and the most analyzed Slovene archaeological find. After more than 20 years of research there are more and more arguments that the find is actually an artefact. Moreover, recent musical experiments made on a replica confirmed that the perforated bone was a very efficient musical instrument.

Arguments for carnivore origin of the holes are critically reviewed and arguments for their artificial origin are presented. XCT analyses revealed traces of human agency and called into question the origin of some features previously declared solely as of carnivore origin. Together with some other findings from the site, the Neanderthal musical instrument offers a unique albeit still controversial insight into the Neanderthals' spiritual world and their exceptional discoveries.

## Katinka Dimkaroska

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Slovenija/Slovenia

### Mousterienska koščena piščal iz Divjih bab I: predstavitev glasbenih raziskav in ugotovitev Ljubena Dimkaroskega

## Mousterian Bone Flute from Divje Babe I: Presentation of Ljuben Dimkaroski's Musical Research and Findings

Several researchers studied the Divje Babe Mousterian bone flute from the musical point of view. Among them was academic musician Ljuben Dimkaroski, who recently passed away (1952-2016). His findings and achievements are exceptional. He manufactured a series of flutes made from wood and bone in order to conduct musical experiments. With the help of Ivan Turk, he made a replica of the reconstructed Divje Babe flute out of the femur of a young cave bear. Dimkaroski's musical research into the flute suggests that we are dealing with an extremely efficient musical instrument. The reconstructed musical instrument is capable of performing legato, staccato, double- and triple-tonguing, flutter-tonguing, glissando, chromatics, trills, broken chords, interval leaps and melodic successions from the lowest to the highest tones. It can achieve the range of three and a half octaves.

We will present technical characteristics of the instrument and the technique of playing. Theoretical introduction will be followed by practical demonstration.

## Drago Kunej

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### Zgodnje akustične raziskave in poskusi na mousterijski koščeni piščali iz Divjih bab I

## Early Acoustic Research and Experiments with Mousterian Bone Flute from Divje Babe I

The paper presents the early acoustic research and experiments with reconstructions of the suspected bone flute from Divje Babe I. This research attempted to answer the basic acoustic question related to any instrument: how to stimulate sound in it, why and how the instrument is able to sound. The shape of the bone find, as well as the holes in it provide possibilities for stimulating and changing the sound. Early experiments demonstrated that it is possible to stimulate sound in various ways with such a bone with holes. Determining accurately the fundamental frequency (the pitch of the fundamental tone) and tonal range of the suspected flute was of secondary importance in the early research, because the exact length of the instrument, the number of holes in it, and the way of playing were unknown. All these decisively influence the tonal possibilities of an instrument. Acoustic and sound experiments lead to the interpretation of the find as a possible sound or signal aid, perhaps even as a musical instrument with specific expressive power.

## Giuliano Bastiani

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Italija/Italy

### Praktična predstavitev, kako je možno izdelati piščal iz Divjih bab

## Practical Presentation of How Divje Babe Flute Could Be Made

Results of experimental puncturing of recent juvenile bear femurs using metal casts of teeth of the cave bear, hyena and wolf does not support carnivore origin of the holes on the Divje Babe flute. The key finding of these experiments is that it is practically impossible for any mighty beast, such as bear, to make two or more holes into a diaphysis without breaking it. Additionally, the holes do not correspond to holes made by carnivores. Holes on the flute are also different from holes on Upper Palaeolithic flutes, where techniques of manufacturing (screwing, chiselling, and grinding) are clearly visible.

The answer to the question, how the Neanderthal could have made such holes in the bone, was brought by experimental archaeology (experiments conducted by Giuliano Bastiani and Zoltan Horusitzky). Pointed stone tools and bone tools with a blunt point were found in the Divje Babe cave Mousterian layers. Using the technique of chiselling and puncturing with these tools, we can make exact the same holes as the ones that appear on the Divje Babe flute. A shallow indentation is carved into bone with a pointed stone tool, used as a chisel. The compact bone is pierced on the spot of indentation using the bone piercing tool and a wooden mallet. The important finding of this experiment was that this method usually left no visible tool marks around the holes.

The procedure of piercing the bone and fabrication of the flute with replicas of Divje Babe Mousterian tools will be practically presented on brown bear bone.

## Boštjan Odar

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### Zareze in luknje na kosteh: Potočka zijavka in Divje babe I na Slovenskem

## Cuts and Holes in Bones (Potočka Zijavka and Divje Babe I, Slovenia)

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The shortest possible definition of science, given to students by the famous Nobel Prize winning physicist of the mid-20<sup>th</sup> century, Richard Feynman, challenges the notions of some scientists in the case of the perforated bone from the Middle Palaeolithic cave site Divje Babe I, Slovenia.

In order to challenge the experimental results (not interpretation) that were obtained by Ivan Turk and his colleagues in the case of the perforated bone from Divje Babe I, they seem to neglect natural phenomena. The observation of animal behavior in their natural environment, for example, supports the experimental results of Ivan Turk.

A collection of 35,000 years old bone artefacts from the Slovenian cave site Potočka Zijavka provides a good insight into the process of bone carving and bone perforation. With the very same techniques the perforated bone, a musical instrument from Divje Babe I, was manipulated by the Neandertals some 60,000 years ago.

During the ongoing debate, beginning soon after the discovery of perforated bone in 1995, the decoding of human genome revolutionized the understanding of human evolution completely: the Neanderthals are still here, with(-in) us.

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### Kroglasta keramična piščal iz Makedonije: prazgodovinski glasbeni instrument

## Globular Clay Flute of Macedonia: A Prehistoric Musical Instrument

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An archaeological find from 1989 in the Neolithic settlement site Mramor-Chaska near Veles, Macedonia, raised interest in its musical capacities and the research that followed gave much needed impetus for the development of music archaeology, a discipline with global relevance, in the Republic of Macedonia. The organological approach, combined with other disciplinary approaches, confirmed that the estimated 6000 years old find indeed is a unique sound-producing device, related to zoomorphic oval clay instruments with hollow interior functioning as a sound chamber. It is particularly important that this prehistoric find is well preserved and in a playable condition. This paper presents the author's research results, including range, frequencies, possible tone series etc. and is supplemented by his demonstration of playing. His argumentation supports the debated hypothesis that this archaeological find is indeed a musical instrument.



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## Kamenodobni bobni v srcu Evrope

### Stone Age Drums in the Heart of Europe

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In the paper I shall present the archaeological finds of Late Neolithic (or Eneolithic) ceramic drums in the Czech Republic and my considerations on their role in the past societies. The process of their production and practical function (acoustic properties) has been researched through experiments. Their possible social meaning, symbolic significance and style are considered with regard to the other drums from Central Europe and to other potential forms of drums and percussions.

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## Brneči zvoki v mlajši kameni dobi? Raziskovanje slušnih navad v neolitiku ob srednji Donavi

### Basso Sounds in the Younger Stone Age? Researching the Musical Auditory Habits in the Middle Danube's Neolithic

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If we ask the question on musical auditory habits of man during the Neolithic Age, we have to investigate excavated musical instruments of this period. My studies took place in the regions of Eastern Austria, Western Hungary, the Czech Republic, Western Slovakia and Slovenia. Ranges of sounds, sound level measuring and ranges of reach were carried out with originals and reconstructed vessel flutes of the earliest Linear Pottery Culture in Lower Austria, clay rattles of the Bükk-Culture in Slovakia, sounding terra cotta – pre-forms of bells – from the Lengyel, the oldest known clay horn (Lengyel V- Ludanice Group, Hungary), drums of burned clay from the Funnel Beaker culture, conches of the Badener (Pecel) culture, whistles and an ocarina from the Jeřišovice culture, clay rattles from the Ljubljana moor (palafitte culture - Vučedol-Laibach), further whistles and a panpipes made of bones from the Corded Ware Culture and vessels with rattle feet from the Bell Beaker Culture.

Room acoustics were done in reconstructed Neolithic buildings to gain information about the acoustics of the surroundings where music might have been performed.

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## Plesalci iz jame Addaura na Siciliji

### Dancers in the Addaura Cave, Sicily

The Addaura cave is a complex of three natural grottoes located on the northeast side of Mount Pellegrino in Palermo, Sicily. It was discovered just after the Second World War, following the accidental detonation of wartime munitions stored in other caves, nearby. The importance of the complex is due to the presence of cave-wall engravings dated to the late Epigravettian and the Mesolithic. In one of the grottoes a vast and rich complex of carvings depicting men and animals was found. Amid a large group of bovids, wild horses and deer, there is a scene dominated by the presence of human figures: a group of characters, arranged in a circle, surrounding two central figures with their heads covered and their bodies strongly arched back. The most conflicting hypotheses have been put forward on the question of the identity of these two characters and the significance of their position inside the group. Some elements could suggest the presence of a group of dancers: we don't know if it is a ritual dance but the "hat" could be an important hint. The Addaura cave is also very important because it is the only case, in this period, in which humans are represented.

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## Glasba in ples v stenski umetnosti osrednje Indije

### Music and Dance in the Rock Art of Central India

Music and dance are practiced in cultures all over the world. That does not mean that they must play a significant part in visual art, i.e. in representations, which depend upon diverse cultural beliefs and practices. For example, we know very few examples in European Paleolithic cave art, such as one of the "Sorcerers" engraved in the Trois-Frères cave, seemingly playing a nose flute. On the other hand, as we are going to see, such images are particularly abundant in Central Indian rock art from the Mesolithic onwards and particularly in the recent periods which we have been studying.

We have found representations of drums, harps, pipes and cymbals in rock art sites, all in Madhya Pradesh where we did most of our work. None of them can be ascribed to the Mesolithic. They all belong to more recent periods (Neolithic and Historic).

Representations of people dancing are particularly numerous in Central Indian rock art. The dancers are most often in a row, but sometimes they may be in a group (organized or not), or even alone or just two. They belong to Mesolithic to late Historic times.

Out of the 82 painted shelters with dance scenes in the two states of Central India where we have been working, we have found many rows of dancers painted in 49 different shelters, 8 in Chhattisgarh and the others (41) in Madhya Pradesh. Occasionally, there are several rows on the same panel or in the same shelter. For example, in Singar Pathar (Chhattisgarh), we saw four different rows of dancers. The first one includes at least 35 yellow dancers with bent knees facing right and arms half raised, with above them two bigger ones facing left and five red ones facing right. We find representations of people dancing in a group in 18 shelters (16 in Madhya Pradesh and 2 in Chhattisgarh). Isolated dancers are rare (six in all). Three are duets.

A Mesolithic scene represents ten to twelve dancers with big complex headgear and body ornaments. Some of the dancers had an open mouth, i.e. they were singing while dancing!

Traditional music and dance are an integral part of tribal life. They may take different forms according to the various communities and to the innumerable occasions on which they are performed. We shall mention a few that have been represented or have close links with the rock art.

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## Domnevna kamenodobna kamnita tolkala na Tajskem

### Presumable Stone Age Lithophones in Thailand

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In the central plain of Thailand in several old temple complexes so-called "stone bells" can be found. They show a hole bored in one end of a huge flat piece of rock. Depending on the part that is beaten, they give various sounds, differing in pitch, clearness as well as loudness.

Sometimes a single piece is hanging on a thick rope or a metal chain in a wooden frame, sometimes up to 5 pieces are lying somewhere around on the floor. The longest piece (240 cm) I found so far is in the famous temple of Nakhon Pathom, used as a bench for visitors in one of the gardens. The monks I have asked said that the pieces date back to the gloomy Dvaravati-period that flourished from the 5<sup>th</sup> -11<sup>th</sup> century AD, and may have started in the first centuries BC, without any precise chronology so far (see Andrew Barram). Very likely the "stone bells" are relicts from the Stone Age.

The facts for this presumption will be discussed. A survey will be given of how many stones have been found in which areas and brought to which temples.

## Cajsa S. Lund

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## Ljudje in njihovi glasbeni pripomočki v Skandinaviji v kamni dobi: glasbenoarheološka dejstva in fikcije

### People and Their Sound Tools in Stone-Age Scandinavia: Music-Archaeological Fact and Fiction

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My paper addresses both the actual and imagined Stone-Age sound instruments related to Scandinavia which are used in the exhibition Archæomusica.

Music Archaeology has an exclusive capacity as a tool in the Third Mission of Academia, that is, to present research results to the general public in a way which brings them to life - in that it involves source material which can sound!

The exhibition Archæomusica and its satellite programmes are excellent examples of Public outreach which adopt an approach utilizing both fact and fiction. I have myself created two concert programs for Archæomusica one of which is called Prehistoric Soundscapes – and this can primarily be categorized as fiction.

Furthermore, I am responsible in Archæomusica for the Exploratorium which offers 60 different hands-on sound instruments, a selection of which is used in the above-mentioned Prehistoric Soundscapes. All the hands-on objects are type models on the basis of three categories of instruments: (1) actual finds from prehistoric and medieval times, (2) actual traditional sound instruments, and (3) fictitious sound tools, which, based upon scientific evidence are likely to have been used in ancient times.

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### **Razlaganje arheoloških najdb skrivnostnih cevastih kosti kot glasbenih instrumentov: možnosti in pasti**

## **Interpreting Archaeological Finds of Enigmatic Tubular Bones as Sound Instruments: Possibilities and Pitfalls**

Those tubular bones from the Stone Age that possess a neatly arranged row of finger holes are easily recognized as flutes by our modern eyes, even when, being incomplete, they lack an element like a window or an edge that can be blown in order to produce sound. Eagerly, sometimes too eagerly, one man-made hole is interpreted as an acoustical element too, but if in our eyes incongruously arranged holes, no holes or no obvious sounding elements are present, these bone tubes are mostly put aside from further investigation as "non-flutes", called "enigmatic" or assigned other functions. However, when keeping in mind the diversity of wind instrument elements man has developed through the ages, scrutinizing enigmatic bone tubes can yield previously unthought of sounding possibilities that would be a pity to miss. Hypotheses pertaining to the organological type of the "enigmatic tubes" are an incentive for further investigation, valuable even if proven unfruitful, and can enrich our image of the soundscapes of cultures long gone. In this paper we will present a few Mesolithic and Neolithic finds from the Netherlands, Sweden and Finland that illustrate this assumption. The paper reports the results of the Singing Bone Workshop on Experimental Music Archaeology that was organized in November 2014 at the University of Helsinki in tandem with the European Music Archaeology Project.

The paper is accompanied by a practical workshop in which you are invited to experiment with type models on the theme "enigmatic tubes".

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### **Školjka kot glasbilo v neolitiku na Malti: organologija, vloga v družbi in izvajalski kontekst**

## **The Conch Shell as a Musical Instrument in Neolithic Malta: Organology, Role in Society, and Performance Contexts**

This paper attempts to shed light on the possible existence of music activity in Neolithic Malta (5200 BC-700 BC) by focusing on a conch shell discovered at the Brochtorff Circle in Xaghra, Gozo. Archaeologists have speculated on the possibility that this shell served as a sound producer but no studies have been attempted to substantiate this speculation. This paper presents a study on replicas of this shell. The study consists of an analysis of the performance practices and the sonorous properties of this artefact. So as to support the idea that conch shells were used as musical instruments in Neolithic Malta, the paper presents comparative material found in contemporary societies of the Mediterranean. By extension, this material is also used to substantiate hypotheses on the role of this instrument and its possible performances contexts in Neolithic Malta.



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## **Pregled zvočnih artefaktov z najdišč Bluff Shelter na planoti Ozark v osrednjem delu ZDA**

### **A Survey of Sound-Making Artifacts from Bluff Shelter Sites in the Ozark Plateau Region of the Central United States**

In the 1920s and 1930s there were a number of bluff shelter sites excavated by professional archaeologists across the Ozark Plateau region. Unfortunately collections from these excavations languished on the shelves of various museums for many years. However, recently there has been renewed interest in studying these collections in order to better understand the cultural history of the prehistoric peoples of the Ozarks. This revival of interest has led to the rediscovery of a small sample of sound-makers all made from perishable materials that were preserved in some of the dryer bluff shelters. This paper will examine in some detail the structure and cultural significance of some of these remarkable artifacts including what is probably the oldest known example of a two-chambered Native American Flute.

## **Melodije pridodnosti: razmišljanja o pomenu uporabe zgodnjih pihal v sodobnem svetu**

### **Future Melodies: Considering the Significance and Application of the Earliest Melodic Wind Instruments in the Contemporary World**

There is more than just a sense that the contemporary world is in a new and volatile era. Both 'the past' and 'music' have inarguably powerful potentials positioned uniquely within current political and social practices. Whilst the discipline of archaeology is embracing the creative turn in the humanities, music has always and continues to be quintessentially creative.

This session will consider how the special relationship between these concepts of 1. THE PAST and 2. MUSIC – subsuming sound and acoustics – can be used to benefit society, for example the new significances they bring, and in applications with 'the future' in focus. The material culture or 'conch' is the Palaeolithic 'flute' aka, pipe and proto-clarinet.

Presenters for this session have been invited to offer their insights from different parts of a chaîne opératoire – making instruments, making sounds, making music and beyond – in order to consider the chain musicologically as a holistic and comprehensive practice. If this practice is as significant to the cultural traditions and identities of its practitioners as it is to writing of deep history, what else can be done with this power to benefit society?

**1. Griffon Skin Dance** (Simon Wyatt)

**2. The Ethical Swan: Experimenting with the Heritage of an Upper-Palaeolithic 'Flute' and an Archaeological Site of Violence** (Frances Gill)

**3. Stone Age Instruments: Contemporary Music** (Barnaby Brown)

**4. Dance for Cajsa and Duet for Anna: An Overview and Practical Demonstration of Two Pieces of Music - a Duet for Swan Radii and a Quartet for Swan Ulnae and Swan Radii** (Frances Gill and Anna Friederike Potengowski).

## Simon Wyatt

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## Ples v grifonovi koži

### Griffon Skin Dance

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The privilege of academic views over those of non-western cultures, and indeed the non-academic public has long been recognised, and relates to colonialism, the dominance of a western sensorium within museums, and reflexive archaeologies. A more balanced representation incorporates the academic material with the personal viewpoints of the academic, the public and ethnographic reports. Considering the value of personal meaning-making, I discuss the construction of identity through cross-modal abstraction and metaphor, in relation to Bateson's concept of double description. In practice, these ideas are interpreted through a spontaneous poetic response to an improvised piece of music, played on model instruments. This is presented as a method of incorporating non-academic interpretation into the discourse of music-archaeology.

## Frances Gill

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## Etični labod: eksperimentiranje z dediščino mlajše paleolitske "piščali" in arheološko najdišče nasilja

### The Ethical Swan: Experimenting with the Heritage of an Upper-Palaeolithic 'Flute' and an Archaeological site of Violence

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This is a story about a swan-radius flute, a historical massacre and a natural spring. The swan radius flute is based closely on an Upper-Palaeolithic artefact known as GK1 from Geissenklösterle cave in Germany. It is playing a role in the heritage of the massacre which took place at the Iron Age site of Sandby borg in Sweden dated towards the end of the Roman Empire. The natural spring in the vicinity of Sandby borg has become the subject of a piece of music scored for this flute played with a new embouchure; a technique described first by the late Friedrich Seeberger and developed recently by Anna Friederike Potengowski. The themes of reconciliation and contemplation are central to a larger ethical criterion. This is one example of collaboration processes between artists and archaeologists known as experimental heritage.

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## Kamenodobni instrumenti - sodobna glasba

### Stone Age Instruments - Contemporary Music

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What exactly does a perforated bone exclude? This presentation explores a range of creative solutions to music making that do not contradict archaeological evidence. Two finds are used for expanding the envelope of practical approaches beyond those presented at the 9th ISGMA Symposium in 2014: a vulture ulna from Isturitz with four holes and two finished ends, and a vulture radius from Hohle Fels with at least five finger holes and two broken ends. Considering the diversity of living musical traditions, particularly those that attract long apprenticeships, it asks what is brought by the find, by the archaeologist, by the vulture, by the maker, by the acoustic, by the audience, and by the player. This leads to a suggestion, that the key power to benefit society, introducing Stone Age instruments to contemporary music making, is in generating a sense of connection with unfamiliar cultures of the present.

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### Ples za Cajso in duet za Anno. Pregled in praktična predstavitev dveh glasbenih stvaritev: Dueta za labodovo koželjnico in Kvarteta za labodovo podlahtnico in labodovo koželjnico

### Dance for Cajsa and Duet for Anna: An Overview and Practical Demonstration of Two Pieces of Music - a Duet for Swan Radii and a Quartet for Swan Ulnae and Swan Radii

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In 2016 at a conference in Sweden in honour of the music archaeologist Cajsa Lund, Frances Gill performed a piece for two swan radii and two swan ulnae that she had recorded electroacoustically and which was performed together with acoustic material. It is called 'Dance for Cajsa'. In correspondence with the flautist Anna Friederike Potengowski, Anna invited Frances to write a duet for two almost identical reconstructions of GK1 made by Friedrich Seeberger and Frances Gill respectively. The players of the duet employ a 'ney' embouchure as described first by the late Friedrich Seeberger and developed recently by Potengowski. In the quartet piece a 'ney' embouchure and a normative flute embouchure (as in a Shakuhachi) are employed. GK1 is an Upper-Palaeolithic swan radius artefact from Geissenklösterle cave in Germany. We consider what the musical score can offer in the way of new data for research.

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### Zvočila v Muzeju vučedolske kulture

## Sound Artifacts of the Vučedol Culture Museum

In this paper I would like to present a few possible sound artifacts exhibited in the Vučedol Culture Museum: clay rattle, vessel flute and a part of a bagpipe – as they are defined and described by archeologists. Even though their importance for our history and culture is considerable, they are almost completely neglected in (ethno)musicological literature. This presentation aims to fill-in this gap and to encourage closer collaboration between archeologists and (ethno)musicologists.

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### Koščene piščali v Gruziji (15.-13. stoletje pred Kr.)

## Bone Flutes in Georgia (15<sup>th</sup>-13<sup>th</sup> Century BC)

Georgia is located at the crossroads of Asia and Europe. Archaeological and anthropological data prove that the territory of present-day Georgia has been inhabited by humans since the earliest period of the Paleolithic era without a chronological break. The connection between Georgian and Sumerian, Hittite, Hurrian, and Urartian tribes has been proven in various scholarly works.

The connection to ancient cultures is made clear by the archaeological musical instruments discovered on the territory of Georgia, though the material has not yet been fully classified and researched.

Nowadays, the most ancient musical instruments known to us, discovered in the territory of Georgia, are two bone flutes (salamuri): 1. Bone flute with three finger holes (characteristic of Western Georgia) from 14<sup>th</sup>-15<sup>th</sup> century BC, discovered in the Choloki settlement of the Kobuleti municipality and 2. Rim flute made of swan bone with four finger holes (characteristic of Eastern Georgia) from 14<sup>th</sup>-13<sup>th</sup> century BC, discovered in Mtskheta, at the Samtavro cemetery, in 'the grave of the little shepherd'.

In this paper I review the musical and technical possibilities as well as prototypes of the instruments preserved in Georgian culture up to the present.



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## Proučevanje devetih zvenceh kamnov iz vzhodne grobnice Zhou v Hebiju na Kitajskem

### Study on Nine Chime Stones From Eastern Zhou Tomb in Hebi, China

Among many percussion instruments of Oriental origin used in musical performance, the chime stone is one of the most interesting acoustically. According to the Chinese classical text Zhou li (The ritual system of the Zhou; author (s) unknown, probably dating to the 3rd century BCE), bayin was a classification system. Musical instruments were divided into eight groups, according to the materials from which they were made. These musical instruments were used in both ritual and non-ritual courts. The chime stone (Chinese term 磬 Qing), which I will introduce in this paper, belongs to the category of stone and it is a kind of percussive lithophone which can be categorized into idiophones within the H-S system.

Between 2009 and 2010, a set of chime stones dating to the Spring and Autumn period (c.770–476 BCE) of the Eastern Zhou Dynasty (ca.770–221 BCE) was excavated at Hebi Qixian Songzhuang in Henan province, China. Nine chime stones were found in the tomb M4. The shape of chime stones during this period had gradually become unified and standardized. When nine chime stones are struck by mallet respectively, they can produce a sound which constructs a tetrachord in pentatonic scale mode. They also had ritual meaning when they were used in an ancient royal court. Due to the fact that there are neither previous nor current articles relating to chime stones from this tomb, it would seem, therefore, that further investigation is needed in order to do systematic research on chime stones including typology, sound archaeology as well as their social and political meanings based upon the Li-yue (ritual music) cultural system. In this presentation, I will combine my fieldwork with theoretical research to make an exhaustive study of these instruments, including tone measurement, tonal analysis and so forth.

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## Zvoki gline. Predšpanska zrakovna glasbila kolumbijske kulture Tuza (1250 – 1550 po Kr.): Organologija, uglaševanje in oblikovanje kroglastih piščali

### Sounds of Clay. Pre-hispanic Aerophones of the Colombian Tuza Culture (AD 1250 - 1550): Organology, Tuning and Design of Globular Flutes

This paper presents results from a research - creation project based on the study of a collection of sonorous artefacts from the ceramic style called Tuza (1250 - 1550), elaborated by pre-hispanic Pastos communities located in the Colombian Southwest. The research established a study on organological types, tuning, design, and morphoacoustics for this collection of artefacts, with the aim to uncover their functionality as tools for the development of musical expressions. Without complete information of cultural or archaeological contexts, the objects themselves have become main source to elaborated propositions about musical attempts in these disappeared communities. Digital technologies for recording their sounds and convey a creative experimentation, for performing spectrum analysis, and the use of a multislice CT scanner, have demonstrated to be advantageous methods to reveal the structure of these instruments, their functionality, and idiomatic sonorous contents. This project put together technologies from two distant cultures, clay aerophones and electronic devices, to compose digital pieces that allow the public to listen the sounds of these ancient instruments, looking for understand the sound itself as cultural heritage, return to the object its main function as an instrument for musical expression, and to encourage the recognition of the material production from these Latino American indigenous communities.

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## Poskusna tridimenzionalno oblikovana rekonstrukcija baročne flavte. Primerek iz Arheološkega muzeja v Wrocławu

### The Experimental Three-dimensionally Modelled Reconstruction of the Baroque Flute: The Piece from The Archeological Museum of Wrocław

This paper/poster focuses on an object from The Archeological Museum of Wrocław (The City Museum of Wrocław). In the first part of our paper, we would like to present the way we identify it as a fragment from 18<sup>th</sup> century transverse flute, specifically its left handed joint (or a corps de rechange). Researches on the history of instrument development helped us to choose model of transverse flute, which was potentially suitable for the reconstruction. The second part of the presentation is about the experimental three-dimensionally modelled reconstruction based on laser scanning and digital modelling, which led to 3D printing. This method definitely has promising perspectives. It may be an intriguing solution for reconstructions of music-archaeological objects.

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## Rekonstrukcija tibije iz Ptuja na Slovenskem

### Reconstruction of the Poetovio *Tibia* from Slovenia

Several tube fragments comprising large parts of two tibia pipes were excavated in the territories of former Poetovio (modern Ptuj in Slovenia) in 1988. The instrument is dated to the 2<sup>nd</sup>–3<sup>rd</sup> century AD and its construction is to a large extent similar to the other tibia finds from the Roman imperial period. As it was the case in e. g. the Pompeii or Meroë findings, the Poetovian pipes are made of bone and at least two thin metal sheets. Additionally, the Slovenian instrument is provided with several side-tubes. This enigmatic organological feature has been numerously shown on iconographic representations, but so far seldom testified by archaeological evidence. A thorough music-archaeological examination of the Poetovio tibia including the use of dedicated software for auloi/tibiae reconstructions enables the reassembly of the instrument fragments according to our knowledge on the ancient Graeco-Roman musical system. The reconstruction of the Poetovio tibia undertaken within the framework of the European Music Archaeology Project (EMAP) forms an experimental attempt to get closer to the nature of this sophisticated musical instrument from the past.

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