Opis raziskovalnega dela *(Research work description*)

1. Članica UL (*UL member)*:

Filozofska fakulteta *(Faculty of Arts)*

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

izr. prof. dr. Matija Črešnar (matija.cresnar@ff.uni-lj.si)

3. Raziskovalno področje (*Research field*):

6.02 Arheologija *(6.02 Archaeology)*

4. Opis raziskovalnega dela (Research work description*)*:
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce *(It includes any additional conditions that the candidate for a young researcher must meet, which are not listed in the call to tender for young researchers.)*.

Slov.:

Opis raziskovalnega dela in cilj raziskave:
Raziskovalno mesto mladega raziskovalca je usmerjeno v interdisciplinarno preučevanje grobišč bronaste in starejše železne dobe na območju Slovenije in širšega prostora med Alpami in Panonijo. Kandidat bo povezoval arheološke podatke z izbranih grobišč s podatki iz antropoloških raziskav ter rezultati sodobnih naravoslovnih analiz, kot so stabilni izotopi (C, N, S, O, Sr) in ATR-FTIR spektroskopija. Tako bo z analizo materialne kulture in rezultatov naravoslovnih analiz pridobil boljši vpogled v pogrebne običaje, demografsko sliko, prehranjevalne navade, mobilnost oz. migracij itn., s tem pa poglobil razumevanje skupnosti in družbenih sprememb (npr. spremembe pogrebnih običajev – inhumacija/kremacija) v tem obdobju.

Ključne naloge:
1. **Analiza obstoječih podatkov:** Pregled, sinteza in analiza obstoječih arheoloških in antropoloških podatkov z izbranih grobišč z območja Slovenije iz bronaste in železne dobe.
2. **Izotopske analize:** Dopolnitev obstoječih rezultatov izotopskih analiz na posmrtnih ostankih ljudi in živali. Trenutno je bilo uspešno analiziranih preko 800 vzorcev (361 odvzetih iz posmrtnih ostankov ljudi in 240 iz posmrtnih ostankov živali), večje število vzorcev pa je še v analizah. Hkrati je bilo analizirano tudi rastlinje na preko 200 lokacijah v Sloveniji, kar bo omogočilo izdelavo izotopske karte stroncija (priprava karte je v zaključni fazi in bo na razpolago).
3. **FTIR spektroskopija:** Uporaba ATR-FTIR za analizo sprememb v kemični sestavi kosti, povezanih z rituali pokopa (predvsem pri kremaciji). Podobno kot točka 3, je tudi tukaj že veliko obstoječih podatkov, ki bodo dopolnjeni.
4. **Statistične analize:** Za potrditev/ovržbo hipotez, modeliranje razmerij in preverjanjem veljavnosti podatkov ter odkrivanje skritih vzorcev, zakonitosti in nepričakovanih povezav v podatkih brez predhodnih hipotez.
5. **Povezovanje podatkov:** Sinteza podatkov iz različnih virov za oblikovanje čim bolj celovitih interpretacij.

Rezultati in doprinos:
- Prispevek k razumevanju družbe v bronasti in železni dobi.
- Prispevek k razumevanju odnosa skupnosti do družbenih (in okoljskih) sprememb v preteklosti.
- Razvoj orodij in pristopov, ki bodo uporabni tudi v drugih interdisciplinarnih arheoloških raziskavah.

Pridobljena znanja:
- Celostna analize grobišč in grobnih ritualov.
- Delo s podatkovnimi bazami, ki vključujejo različne vrste podatkov.
- Analize stabilnih izotopov: od vzorčenja do priprave vzorca za analize, analize in interpretacije podatkov.
- ATR-FTIR spektroskopija: od vzorčenja do priprave vzorca za analize, analize in interpretacije podatkov.
- Izvedba statističnih analiz.
- Povezovanje različnih vrst podatkov za potrebe celostne interpretacije.

Usposabljanje in delovno okolje:
Mladi raziskovalec (MR) bo vključen v že obstoječe sodelovanje med Oddelkom za arheologijo FF UL, Institutom Jožef Stefan (IJS), Kemijskim inštitutom (KI) in Vrije Universiteit Brussel (VUB). To sodelovanje je vpeto v delo in raziskovalni razvoj naše programske skupine Arheologija (P6-0247), kot je bilo predvideno za naslednje obdobje.

Ob tem pa so razvoj naše programske skupine in njenih kapacitet ključni tudi nanjo vezani raziskovalni projekti, kot je projekt CRIME (Kremacija ali inhumacija pri preteklih skupnostih) ter nadaljnji načrtovani projekti, kot na primer TRAP (Transition, Resilience, and Adaptation in Prehistory). Oba projekta med drugim vključujeta povezovanje arheoloških in naravoslovnih podatkov, zatorej bo MR neposredno vpleten tako v aktivnosti programske skupine, kot tudi v projektno delo ter domače in mednarodno raziskovalno okolje. Hkrati bo vključen tudi v projekt MATRES (Materialna odpornost v časih okoljskih in družbenih sprememb), ki se pripravlja na razpisu za Velike interdisciplinarne projekte Univerze v Ljubljani, saj se raziskovalna tema neposredno navezuje tudi na vsebino projekta.
Poudariti velja, da bo MR pridobil v slovenski stroki trenutno manjkajoča znanja na presečišču arheologije in bioarheologije. Na IJS in VUB se bo izučil, kako pripraviti vzorce in izvesti analize izotopov, ter na KI, kako pripraviti vzorce in izvesti FTIR analize. Gre za analize, ki so v arheoloških interdisciplinarnih raziskavah zelo pogosto prisotne, zatorej je ključno, da se aktivno vključimo vanje tudi z vzgajanjem prihodnjih rodov raziskovalcev. Pri tem pa niso potrebna le (tehnična) naravoslovna znanja. Predvsem nam primanjkuje strokovnjakov, ki bi znali razumeti in smiselno povezovati arheološke in bioarheološke (vključno z izotopskimi) podatke, tako za interpretacije kot tudi za načrtovanje raziskav in sodelovanje pri različnih interdisciplinarnih projektih.

Eng.:

Description of Research Work and Research Goal:

The research focus of the young researcher is aimed at the interdisciplinary study of burial sites from the Bronze and Early Iron Ages in Slovenia and the broader area between the Alps and Pannonia. The candidate will integrate archaeological data from selected burial sites with data from anthropological studies and results of modern natural science analyses, such as stable isotopes (C, N, S, O, Sr) and ATR-FTIR spectroscopy. By analyzing material culture and natural science results, the research will offer deeper insights into burial customs, demographic structures, dietary habits, mobility and migration, etc., thus enhancing the understanding of communities and societal changes (e.g., changes in burial practices—inhumation/cremation) during this period.

Key Tasks:

1. **Analysis of Existing Data:** Review, synthesis, and analysis of existing archaeological and anthropological data from selected burial sites in Slovenia from the Bronze and Iron Ages.
2. **Isotopic Analyses:** Supplementation of existing results from isotopic analyses of human and animal skeletal remains. To date, over 800 samples have been successfully analyzed (361 from human remains and 240 from animal remains), with a larger number of samples still under analysis. Additionally, plant remains from over 200 locations in Slovenia have been analyzed, allowing for the creation of a strontium isotopic map (the map is in the final stages and will be available).
3. **FTIR Spectroscopy:** Use of ATR-FTIR spectroscopy to analyze changes in the chemical composition of bones related to burial rituals (primarily cremation). As with point 3, there is already a significant body of existing data that will be supplemented.
4. **Statistical Analyses:** To confirm or refute hypotheses, model relationships, validate data, and uncover hidden patterns, regularities, and unexpected connections in the data without prior hypotheses.
5. **Data Integration:** Synthesis of data from different sources to form the most comprehensive interpretations possible.

Results and Contribution:

- Contribution to the understanding of society in the Bronze and Iron Ages.
- Contribution to the understanding of how communities responded to social (and environmental) changes in the past.
- Development of tools and approaches that will be useful in other interdisciplinary archaeological research.

Acquired Knowledge:

- Comprehensive analysis of burial sites and burial rituals.
- Work with databases that include various types of data.
- Stable isotope analysis: from sampling to sample preparation for analysis, data analysis, and interpretation.
- ATR-FTIR spectroscopy: from sampling to sample preparation for analysis, data analysis, and interpretation.
- Execution of statistical analyses.
- Integration of different data types for comprehensive interpretation.

Training and Work Environment:

The Young Researcher (YR) will be involved in the existing collaboration between the Department of Archaeology at the University of Ljubljana (FF UL), the Jožef Stefan Institute (IJS), the Chemistry Institute (KI), and the Vrije Universiteit Brussel (VUB). This collaboration is embedded in the work and research as well as development of our Archaeology research group (P6-0247), as planned for the upcoming period. In this context, the development of our research group and its capacities is also crucial for the associated research projects, such as the CRIME project (Cremation or Inhumation in Past Communities) and other planned projects, such as TRAP (Transition, Resilience, and Adaptation in Prehistory). Both projects, among other things, involve the integration of

archaeological and natural science data, so the YR will be directly involved in both the activities of the program group and the project work, as well as in the national and international research environment. At the same time, he/she will also be included in the MATRES project (Material Resilience in Times of Environmental and Social Changes), which is being prepared for the call for Large Interdisciplinary Projects at the University of Ljubljana, as the research topic is directly related to the project's content.
It is important to emphasize that the YR will acquire knowledge currently missing in the Slovenian field at the intersection of archaeology and bioarchaeology. At IJS and VUB, the YR will learn how to prepare samples and conduct isotope analyses, and at KI, how to prepare samples and perform FTIR analyses. These analyses are common in interdisciplinary archaeological research, making it essential to actively engage in them and train future generations of researchers. In this context, not only (technical) natural science knowledge is necessary. There is a particular shortage of experts who can understand and meaningfully connect archaeological and bioarchaeological (including isotopic) data, both for interpretation and for planning research and collaborating on various interdisciplinary projects.

5. Priloge, ki jih kandidat priloži k prijavi *(Documents that the candidate submits with the application)*:

☒ **diplomska listina/potrdilo o zaključku študijskega programa** *(diploma certificate for study programme, with which the candidate has enrolled/ will enroll in a doctoral degree programme)*

☒ **priloga k diplomi/ potrdilo o opravljenih obveznostih (***official transcript of all the grades for study programme, with which the candidate has enrolled/will enroll in a doctoral degree programme)*

☒ **potrdilo o do sedaj opravljenih obveznostih z ocenami študijskega programa, s katerim se bo kandidat prijavil na študij** *(official transcript of all the grades the candidate has received so far for the study programme, with which the candidate will enroll to a doctoral degree programme)*

☒ **nagrade** *(awards (e.g. Prešeren Prize of the University of Ljubljana, Prešeren Prize of a University of Ljubljana member and/or another equivalent award))*

☒ **bibliografija** *(bibliography)*

☒ **življenjepis** *(CV)*

☒ **motivacijsko pismo** *(motivation letter)*

☒ **opis dosedanjega sodelovanja pri raziskovalnem delu** *(description of the candidate's research work)*

☐ **osnutek idejne zasnove raziskovalnega dela** *(preliminary research proposal)*

☒ **priporočilno pismo** *(letter of recommendation)*

☒ **druge priloge** *(other attachments)*