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GP 785722

MEMORANDUM OF UNDERSTANDING BETWEEN DST- BIRBAL SAHNI INSTITUTE OF PALAEOSCIENCES (BSIP), LUCKNOW AND DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD ON "ANCIENT DNA AND STABLE ISOTPE AND AMS DATING ANALYSIS OF HUMAN & ANIMAL SKELETAL REMAINS OF GANGA PLAINS FOR VARIOUS ARCHAEOLOGICAL MATERIAL OF THE STUDY CENTER"

The MEMORANDUM OF UNDERSTANDING made and entered into this day of, Two Thousand and Twenty-Four, between Birbal Sahni Institute of Palaeosciences, 53, University Road, Lucknow (hereinafter called BSIP), a constituent National Laboratory of the Department of Science and Technology, Ministry of Science and Technology, Govt. of India.

AND

Department of Ancient Indian History, Culture and Archaeology, University of Allahabad (hereinafter called DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD which expression shall, where the context so admits, include its successors and permitted assigns) of the second part.

PREAMBLE

WHEREAS **BSIP** is desirous of collaborating with the **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** to work on the Ancient DNA of the archaeologically excavated skeletal remains from Prehistoric human settlements for e.g. Sarai Nahar Rai, Mahadaha, Damdama and other sites of the Ganga plains Archaeological context. (herein after called the **PROJECT**) & Ancient DNA, stable isotope and AMS dating analysis for various skeletal remains of the **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** as per the scope of the work detailed in Annexure I to this Agreement

WHEREAS the **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** has agreed for undertaking exploratory studies for: "Ancient DNA and stable isotope analysis of human skeletal remains which are at the repository of **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD**."

Therefore, in consideration of the premises and mutual covenants hereinafter contained, the parties here by agree to as follows:

SCOPE OF THE MOU

The Agreement details the terms and conditions, financial arrangements, modalities of collaboration, intellectual property rights, responsibilities and obligations of the **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** and **BSIP** pertaining to the **PROJECT**.

FINANCIAL ARRANGEMENTS

BSIP and the **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** decides to execute the **PROJECT** together, each party contributing their knowledge and expertise to the project. **BSIP** will invest its own resources viz. manpower, analysis cost and infrastructure to conduct the research work.

All specific financial arrangements proposed in connection with the **PROJECT**, will depend upon the availability of funds and institutional approval of **BSIP**.

MODALITIES OF COLLABORATION

BSIP and the **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** shall work together to achieve the goals of the **PROJECT** as outlined in the document and conform to the outputs, milestones and targets under Annexure I to this Agreement. **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY,**

UNIVERSITY OF ALLAHABAD will provide the access to BSIP to collect the human and faunal skeletal remains for the ancient DNA and stable isotope analyses.

Further, unless otherwise specified, Intellectual Property arising out of this work will be shared equally between the Two Parties.

There will be a joint Monitoring Group for the PROJECT. The Monitoring Group shall consist of Principal Investigators (PI) each from **BSIP** and the **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD**. The Monitoring person will identify the work to be done by **BSIP** and the **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD**, the targets / milestones and criteria for completion of the PROJECT; it shall also review periodically the progress of the PROJECT.

RESPONSIBILITIES OF BSIP AND DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD:

- Both Parties shall engage the existing necessary manpower, infrastructure, materials, etc., required for undertaking the PROJECT.
- Both Parties shall undertake and complete the work on the PROJECT as per schedule of work separately prepared for each one.
- Both the parties separately or jointly shall submit a midterm progress report and a detailed final report for each PROJECT.
- Neither party shall be responsible for any damage to the property / material of the other party caused by its personnel during or consequent to the work carried out under this Agreement.

COMPLETION

The work envisaged to be done by **BSIP/DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** shall be deemed to have been successfully completed by the **BSIP / DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** on submission of the Final Report / fulfillment of its / their responsibilities as detailed in the PROJECT.

The PROJECT shall be deemed to have been successfully completed on satisfaction of criteria fixed by the Monitoring Group or any other criteria mutually agreed by the parties hereto.

RESULTS OF PROJECTS

Any intellectual property rights / patents / designs / trademarks / copyrights obtained by the Parties hereto pertaining to the PROJECT prior to signing of the Agreement shall remain the property of the respective Party.

The intellectual property, viz. know-how / designs / techniques / patents / copyrights generated in the PROJECT shall be jointly owned by **BSIP** and the **DEPARTMENT OF ANCIENT HISTORY,**

CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD. The extent of ownership shall be by default equal or otherwise decided mutually depending upon the relative inputs, viz. intellectual / technical / financial / physical made by the parties hereto to the PROJECT.

The procedural formalities for securing and maintaining the intellectual property rights (patents / trademarks / copyrights) if any, shall be the joint responsibility of **BSIP** and the **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD.** The expenditure incurred thereof shall be borne by each party in proportion to Intellectual Property ownership. The question of whether or not intellectual property rights should be secured, and the territory where these shall be secured, shall be decided jointly by the Parties here to.

The Parties shall consult each other for any publication in respect of the PROJECT. These publications (papers, reports etc.) shall be in the names of contributors from **BSIP** as well as the **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** wherein it will be duly acknowledged that the work has been carried out under the collaborative program between the Parties.

BSIP and **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, and UNIVERSITY OF ALLAHABAD** shall have the rights to use the R&D results generated during the PROJECT for its own R&D programs, without any obligation to the other.

CONFIDENTIALITY

During the tenure of the Agreement and for three years thereafter both **BSIP** and **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** undertake on behalf of their subcontractors / employees / representatives / associates to maintain strict confidentiality and prevent disclosure thereof, of all the information and data exchanged / generated pertaining to work under this Agreement for any purposes other than in accordance with this Agreement.

UTILISATION OF INTELLECTUAL PROPERTY DEVELOPED

BSIP and **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** shall have the joint rights to license the intellectual property generated in the PROJECT to others and the terms and conditions for licensing to others shall be settled mutually between **BSIP** and **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD.**

DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD shall have the right to license the intellectual property generated to others with the approval / concurrence of **BSIP.** The terms and conditions for such licensing shall

be settled mutually between **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** and **BSIP**.

The premier/royalty accrued from licensing of the intellectual property to other Parties shall be shared between **BSIP** and **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** by default equally or otherwise in a ratio to be mutually decided depending upon the relative inputs to the PROJECT and the effort to transfer the intellectual property to other parties.

During the work envisaged under the Agreement, in the event of **BSIP** scientists exploring, inventing or discovering results other than the specific objectives of the PROJECT, **BSIP** shall retain absolute rights on such results.

During the work envisaged under the Agreement, in the event of **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** professionals exploring, inventing or discovering results other than the specific objectives of the PROJECT, **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** shall retain absolute rights on such results.

FORCE MAJEURE

Neither party shall be held responsible for non-fulfillment of their respective obligations under this Agreement due to the exigency of one or more of the force majeure events such as but not limited to Acts of God, war, flood, earthquakes, strike, lockouts, epidemics, civil commotion, etc., provided on the occurrence and cessation of any such events, the party affected thereby shall give a notice in writing to the other party within one month of such occurrence or cessation. If the force majeure conditions continue beyond six months, the Parties shall then mutually decide the future course of action.

EFFECTIVE DATE, DURATION, TERMINATION OF THE AGREEMENT

The Agreement shall be effective from the date of signing and shall remain in force for a period of three years from the said date.

The Agreement shall terminate on the expiry of the period, unless extended by both the Parties.

During the tenure of the Agreement, parties hereto can terminate the Agreement either for breach of any of the terms and conditions of this Agreement or otherwise by giving one month's notice in writing to the defaulting party. Failure of either party to terminate the Agreement on account of breach or default by the other shall not constitute a waiver of that Party's right to terminate this Agreement.

In the event of termination, the rights and obligations of the Parties thereto shall be settled by mutual discussion; the financial settlement shall take into consideration not only the expenditure incurred but also the expenditure committed by the Parties hereto.

The Agreement arrived at between the Parties hereto for the utilization of the intellectual property, shall survive the termination of the Agreement.

NOTICES

All notices and other communications required to be served to **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** under the terms of this Agreement, shall be considered to be duly served if the same shall have been delivered to, left with or posted by registered mail to **DEPARTMENT OF ANCIENT HISTORY, CULTURE AND ARCHAEOLOGY, UNIVERSITY OF ALLAHABAD** at its last known address of business. Similarly, any notice to be given to the **BSIP** shall be considered as duly served if the same have been delivered to, left with or posted by registered mail to the **BSIP** at its registered address in Lucknow.

AMENDMENTS TO THE AGREEMENT

No amendment or modification of this Agreement shall be valid unless the same is made in writing by both the Parties or their authorized representatives and specifically stating the same to be an amendment of this Agreement. The modifications / changes shall be effective from the date on which they are made / executed, unless otherwise agreed to.

ASSIGNMENT OF THE AGREEMENT

This Agreement or any rights or obligations hereunder shall not be assigned by either Party to any Third Party without the prior written consent of the other Party and any attempted assignment without such consent shall be null and void, except that either Party may make such assignment, without aforesaid consent, to any entity which survives a merger or consolidation in which such Party participates or to any entity which acquires all or substantially all of the assets of such party.

SUCCESSORS

This agreement shall bind and inure to the benefit of the Parties, and their respective successors and permitted assigns.

ARBITRATION

Except as hereinafter provided, any dispute arising out of this Agreement, the same shall be referred to the arbitration of two arbitrators, one to be appointed by each Party to the dispute, and case of a difference of opinion between them, to an umpire appointed by the said two arbitrators before entering on the reference, and the decision of such arbitrators or umpire, as the case may be, shall be final and binding on both parties. The venue of arbitration shall be at such place as may be fixed by such arbitrators or umpire and the arbitration proceedings shall take place under the Indian Arbitration & Conciliation Act, 1996 or of any modifications or re-enactments thereof.

GOVERNING LAW

This agreement shall be governed by the Law of India for the time being in force.


SEAL OF PARTIES


In witness whereof, the Parties hereto have signed this Agreement on the day, month, and year mentioned hereinabove.

Parties

For and on behalf of BSIP

for and on behalf of Department of Ancient Indian History,
Culture and Archaeology, Allahabad University

Signature 

Signature 

Name: Prof. M.G. Thakkar

Name: Prof N. K. Shukla

Designation: Director

Designation: Registrar

Institute: BSIP

Institute: University of Allahabad

Seal
Prof. M. G. Thakkar
Director
Babul Sahni Institute of Palaeosciences
(Under Dept. of Science & Technology)
Govt. of India
Lucknow-226007

Seal
REGISTRAR
UNIVERSITY OF ALLAHABAD
PRAYAGRAJ

Principal Investigator (BSIP)

Principal Investigator (University of Allahabad)





Dr. Niraj Rai

Prof. Harsh Kumar

Scientist- D and Group Head,
Ancient DNA Lab

Head of Department, Department of Ancient History,
Culture and Archaeology, University of Allahabad

Date: 13-06-2024

Date: 13.06.2024

Venue: Lucknow, Uttar Pradesh

Venue: Allahabad, Uttar Pradesh

Priority Areas/Scope of Project:

1. The early population of the Mesolithic period of South Asia, especially Ganga Plains is an area that remains under researched. Many questions remain unanswered such as the continuity of early of human in South Asia, their genetic affinity and relation to the present day populations. The proposed research aims to charter the ancient DNA of the oldest Mesolithic skeletal materials of India that could reveal demographic history, admixture and genetic make-up of our oldest ancestor in the India.
2. While morphological studies on human and animal skeletal remains shed light on several aspects of the individual's lifetime, DNA is emerging as a powerful complementary tool that can reveal about individual and population origins and the relationship between ancient and modern populations in a region.
3. Ancient DNA analysis on the human skeletal remains will contribute to reconstructing the past population history of the region. Give that current technological developments require smaller sample input; analysis will be carried out with minimal destruction to the samples provided by Department of Ancient History, Culture and Archaeology, University of Allahabad
4. The study will thus focus in understanding the human past from the ancient human genome. In addition, comparative genomics will provide a lead in identifying putative disease-causing mutation(s), which have accumulated over a period of time.
5. The outcome of the study will lead us to understand how the human genome has adapted during the last 10,000 years. We also aim to analyze faunal skeletal remains e.g. cattle, Sheep, and other vertebrates. Ancient DNA analysis of such fauna will yield insights into the earliest domestication pattern in the Indian Sub-continent.
6. Considering the high throughput implication of Stable Isotopes in archaeological sciences and world class facility at BSIP, we aim to build up a picture of the dietary context of humans and their domesticated animals (if available) relative to any available wild fauna, focusing on the contribution of high-level trophic foods, the contribution of C₄ crops (such as millet), and reliance on marine or freshwater aquatic protein. These analyses can help to build up stable isotope ecology of hunter-gatherer and early farming communities in the region. This is particularly significant given that social and demographic changes in these periods have been linked to environmental and climatic shifts. Given potential concerns regarding the preservation of bone collagen in South Asia, stable carbon and oxygen isotope analysis of human and faunal tooth enamel will act as a back-up source of information regarding water-stress, water source, and the contribution of C₃ versus C₄ taxa (including millet) to human and animal (if available) diets. Samples of human and faunal tooth enamel will also be taken for strontium isotope analysis. This method has been shown to provide convincing evidence for

changing levels of mobility in populations, often linked to migration or changing settlement patterns. As such, this methodology will be able to test theories of mobility of prehistoric populations in South Asia.

7. Samples (both tooth/petrous bone) will be analyzed in dedicated laboratories for extraction of ancient proteins. Ancient DNA extraction will be carried out in a clean-room environment. Ancient DNA whole genome library preparation will be carried out in our dedicated library preparation clean room followed by whole genome sequencing of the ancient DNA.
8. All the ancient DNA analysis will be carried out at BSIP, Lucknow, India with the input of Co-Principal Investigator of the Department of Ancient History, Culture and Archaeology, University of Allahabad. Consequent upon completion of the project, all leftover samples will be returned to the Co-PI in Head of Department, Department of Ancient History, Culture and Archaeology, University of Allahabad, adopting the appropriate safety procedures during transfer of samples. Any new experiments beyond the scope of the current Research Agreement will require the mutual agreement of both Parties.
9. BSIP and Head of Department, Department of Ancient History, Culture and Archaeology, University of Allahabad will co-analyze the human and skeletal remains for various scientific analyses including AMS dating related to archaeological questions on the human and faunal skeletal remains.