ANTHROPOLOGY CURRENT AFFAIRS MAGAZINE MAY 2023

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PAPER -1

PHYSICAL & ARCHAEOLOGICAL ANTHROPOLOGY

1. Scientists "Revive" Stone Age Molecules From Ancient DNA

In a highly transdisciplinary study, scientists are rebuilding microbial natural products up to 100,000 years old using dental calculus of humans and Neanderthals.

Breakthroughs in ancient genome reconstruction and biotechnology are now revealing the rich molecular secrets of Paleolithic microorganisms. In a new study published in Science, a transdisciplinary team of researchers led by the Leibniz Institute for Natural Product Research and Infection Biology, the Max Planck Institute for Evolutionary Anthropology, and Harvard University reconstructed bacterial genomes of previously unknown bacteria dating to the Pleistocene. Using their genetic blueprints, they built a biotechnology platform to revive the ancient bacteria's natural products.

Microbes are Nature's greatest chemists, and among their creations are a large number of the world's antibiotics and other therapeutic drugs. Producing these complicated chemical natural products is not straightforward, and to do so bacteria rely on specialized kinds of genes that encode enzymatic machinery capable of making such chemicals. At present, scientific study of microbial natural products is largely limited to living bacteria, but given that bacteria have inhabited the earth for more than 3 billion years, there is an enormous diversity of past natural products with therapeutic potential that remain unknown to us – until now.

"In this study, we have reached a major milestone in revealing the vast genetic and chemical diversity of our microbial past," says co-senior author Christina Warinner, Associate Professor of Anthropology at Harvard University, Group Leader at the Max Planck Institute for Evolutionary Anthropology, and Affiliate Group Leader at the Leibniz Institute of Natural Product Research and Infection Biology (Leibniz-HKI). "Our aim is to chart a path for the discovery of ancient natural products and to inform their potential future applications," adds co-senior author Pierre Stallforth, Professor of Bioorganic Chemistry and Paleobiotechnology at Friedrich Schiller University Jena and Head of the Department of Paleobiotechnology at the Leibniz

A billion-piece jigsaw puzzle

When an organism dies, its DNA rapidly degrades and fragments into a multitude of tiny pieces. Scientists can identify some of these DNA fragments by matching them to databases, but for years microbial archaeologists have struggled with the fact that most ancient DNA cannot be matched to anything known today. This problem has long vexed scientists, but recent advances in computing are now making it possible to refit the DNA fragments together – much like the pieces of a jigsaw puzzle – in order to reconstruct unknown genes and genomes. The only problem is that it does not work very well on highly degraded and extremely short ancient DNA from the Pleistocene.

"We had to completely rethink our approach," says Alexander Hübner, postdoctoral researcher at the Max Planck Institute for Evolutionary Anthropology and co-lead author of the study. Three years of testing and optimization later, Hübner says they reached a breakthrough, achieving stretches of reconstructed DNA more than 100,000 base pairs in length and the recovery of a wide range of ancient genes and genomes. "We can now start with billions of

unknown ancient DNA fragments and systematically order them into long-lost bacterial genomes of the Ice Age."

Exploring the microbial Paleolithic

The team focused on reconstructing bacterial genomes encased within dental calculus, also known as tooth tartar, from 12 Neanderthals dating to ca. 102,000–40,000 years ago, 34 archaeological humans dating to ca. 30,000–150 years ago, and 18 present-day humans. Tooth tartar is the only part of the body that routinely fossilizes during the lifetime, turning living dental plaque into a graveyard of mineralized bacteria. The researchers reconstructed numerous oral bacterial species, as well as other more exotic species whose genomes had not been described before.

Among these was an unknown member of Chlorobium, whose highly damaged DNA showed the hallmarks of advanced age, and which was found in the dental calculus of seven Paleolithic humans and Neanderthals. All seven Chlorobium genomes were found to contain a biosynthetic gene cluster of unknown function. "The dental calculus of the 19,000-year-old Red Lady of El Mirón, Spain yielded a particularly well-preserved Chlorobium genome," says Anan Ibrahim, postdoctoral researcher at the Leibniz Institute of Natural Product Research and Infection Biology and co-lead author of the study. "Having discovered these enigmatic ancient genes, we wanted to take them to the lab to find out what they make".

Ice Age chemistry

The team used the tools of synthetic molecular biotechnology to allow living bacteria to produce the chemicals encoded by the ancient genes. This was the first time this approach had been successfully applied to ancient bacteria, and it resulted in the discovery of a new family of microbial natural products that the researchers named "paleofurans." "This is the first step towards accessing the hidden chemical diversity of earth's past microbes, and it adds an exciting new time dimension to natural product discovery," says Martin Klapper, postdoctoral researcher at the Leibniz Institute of Natural Product Research and Infection Biology and co-lead author of the study.

A novel collaboration to found a new field

The success of the study is the direct outcome of an ambitious collaboration between archeologists, bioinformaticians, molecular biologists, and chemists to overcome technological and disciplinary barriers and break new scientific ground. "With funding from the Werner Siemens Foundation, we set out to build bridges between the humanities and natural sciences," says Pierre Stallforth. "By working collaboratively, we were able to develop the technologies needed to recreate molecules produced a hundred thousand years ago ," says Christina Warinner. Looking towards the future, the team hopes to use the technique to find new antibiotics.

2. Ancient Woman's DNA Recovered From 20,000-Year-Old Deer Tooth Pendant

Researchers from the Max Planck Institute have successfully isolated ancient human DNA from a Paleolithic deer tooth pendant, paving the way for directly identifying the users of artifacts from the deep past and gaining deeper insights into Paleolithic societies.

An international research team led by the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, has for the first time successfully isolated ancient human DNA from a Paleolithic artifact: a pierced deer tooth discovered in Denisova Cave in southern Siberia. To preserve the integrity of the artifact, they developed a new, non-destructive method for isolating DNA from ancient bones and teeth. From the DNA retrieved they were able to reconstruct a precise genetic profile of the woman who used or wore the pendant, as well as of the deer from which the tooth was taken. Genetic dates obtained for the DNA from

both the woman and the deer show that the pendant was made between 19,000 and 25,000 years ago. The tooth remains fully intact after analysis, providing testimony to a new era in ancient DNA research, in which it may become possible to directly identify the users of ornaments and tools produced in the deep past.

Artifacts made of stone, bones, or teeth provide important insights into the subsistence strategies of early humans, their behavior, and culture. However, until now it has been difficult to attribute these artifacts to specific individuals, since burials and grave goods were very rare in the Palaeolithic. This has limited the possibilities of drawing conclusions about, for example, division of labor or the social roles of individuals during this period.

In order to directly link cultural objects to specific individuals and thus gain deeper insights into Paleolithic societies, an international, interdisciplinary research team, led by the Max Planck Institute for Evolutionary Anthropology in Leipzig, has developed a novel, non-destructive method for DNA isolation from bones and teeth. Although they are generally rarer than stone tools, the scientists focused specifically on artifacts made from skeletal elements, because these are more porous and are therefore more likely to retain DNA present in skin cells, sweat, and other body fluids.

Before the team could work with real artifacts, they first had to ensure that the precious objects would not be damaged. “The surface structure of Paleolithic bone and tooth artifacts provides important information about their production and use. Therefore, preserving the integrity of the artifacts, including microstructures on their surface, was a top priority” says Marie Soressi, an archaeologist from the University of Leiden who supervised the work together with Matthias Meyer, a Max Planck geneticist.

The team tested the influence of various chemicals on the surface structure of archaeological bone and tooth pieces and developed a non-destructive phosphate-based method for DNA extraction. “One could say we have created a washing machine for ancient artifacts within our clean laboratory,” explains Elena Essel, the lead author of the study who developed the method. “By washing the artifacts at temperatures of up to 90°C, we are able to extract DNA from the wash waters, while keeping the artifacts intact.”

Early setbacks

The team first applied the method to a set of artifacts from the French cave Quinçay excavated back in the 1970s to 1990s. Although in some cases it was possible to identify DNA from the animals from which the artifacts were made, the vast majority of the DNA obtained came from the people who had handled the artifacts during or after excavation. This made it difficult to identify ancient human DNA.

To overcome the problem of modern human contamination, the researchers then focused on material that had been freshly excavated using gloves and face masks and put into clean plastic bags with sediment still attached. Three tooth pendants from Bacho Kiro Cave in Bulgaria, home to the oldest securely dated modern humans in Europe, showed significantly lower levels of modern DNA contamination; however, no ancient human DNA could be identified in these samples.

A pendant from Denisova Cave

The breakthrough was finally enabled by Maxim Kozlikin and Michael Shunkov, archaeologists excavating the famous Denisova Cave in Russia. In 2019, unaware of the new method being developed in Leipzig, they cleanly excavated and set aside an Upper Paleolithic deer tooth pendant. From this, the geneticists in Leipzig isolated not only the DNA from the animal itself, a wapiti deer, but also large quantities of ancient human DNA. “The amount of human DNA we recovered from the pendant was extraordinary,” says Elena Essel, “almost as if we had sampled a human tooth.”

Based on the analysis of mitochondrial DNA, the small part of the genome that is exclusively inherited from the mother to their children, the researchers concluded that most of the DNA likely originated from a single human individual. Using the wapiti and human mitochondrial genomes they were able to estimate the age of the pendant at 19,000 to 25,000 years, without sampling the precious object for C14 dating.

In addition to mitochondrial DNA, the researchers also recovered a substantial fraction of the nuclear genome of its human owner. Based on the number of X chromosomes they determined that the pendant was made, used or worn by a woman. They also found that this woman was genetically closely related to contemporaneous ancient individuals from further east in Siberia, the so-called ‘Ancient North Eurasians’ for whom skeletal remains have previously been

analyzed. “Forensic scientists will not be surprised that human DNA can be isolated from an object that has been handled a lot,” says Matthias Meyer, “but it is amazing that this is still possible after 20,000 years.”

The scientists now hope to apply their method to many other objects made from bone and teeth in the Stone Age to learn more about the genetic ancestry and sex of the individuals who made, used, or wore them.

3. The Intriguing Lifestyle of Neanderthals – Tooth Enamel Reveals New Clues

An international group of researchers, led by the University of Southampton, has offered a fascinating look into the hunting strategies and dietary habits of Neanderthals and other human groups residing in Western Europe.

The team scrutinized the chemical composition preserved within tooth enamel to reconstruct the lifestyle of prehistoric individuals in relation to their local environment. The study focused on the Almonda Cave network, situated near Torres Novas in the heart of Portugal, dating back nearly 100 thousand years.

Their findings, published in the journal *PNAS*, show Neanderthals in the region were hunting fairly large animals across wide tracts of land, whereas humans living in the same location tens of thousands of years later survived on smaller creatures in an area half the size.

Strontium isotopes in rocks gradually change over millions of years because of radioactive processes. This means they vary from place to place depending on the age of the underlying geology. As rocks weather, the isotopic 'fingerprints' are passed into plants via sediments, and make their way along the food chain – eventually passing into tooth enamel.

In this study, archaeologists used a technique that laser samples enamel and makes thousands of individual strontium isotope measurements along the growth of a tooth crown. Samples were taken from two Neanderthals, dating back about 95,000 years, and from a more recent human who lived about 13,000 years ago, during the Magdalenian period.

The scientists also looked at isotopes in the tooth enamel of animals found in the cave system. Alongside strontium, they measured oxygen isotopes, which vary seasonally from summer to winter. This enabled them to establish not only where the animals ranged across the landscape, but in which seasons they were available for hunting.

The team showed that the Neanderthals, who were targeting large animals, could have hunted wild goats in the summer, whereas horses, red deer, and an extinct form of rhinoceros were available all year round within about 30 kilometers of the cave. The Magdalenian individual showed a different pattern of subsistence, with seasonal movement of about 20 kilometers from the Almonda caves to the banks of the Tagus River, and a diet that included rabbits, red deer, wild goat, and freshwater fish.The researchers approximated the territory of the two different human groups, revealing contrasting results.

The Neanderthals obtained their food over approximately 600 square kilometers, whereas the Magdalenian individuals occupied a much smaller territory of about 300 square kilometers.

Lead author, Dr Bethan Linscott who conducted the research while at the University of Southampton and who now works at the University of Oxford said: "Tooth enamel forms incrementally, and so represents a time series that records the geological origin of the food an individual ate.

"Using laser ablation, we can measure the variation of strontium isotopes over the two or three years it takes for the enamel to form. By comparing the strontium isotopes in the teeth with sediments collected at different locations in the region, we were able to map the movements of the Neanderthals and the Magdalenian individual. The geology around the Almonda caves is highly variable, making it possible to spot movement of just a few kilometers."

Co-author, Professor Alistair Pike of the University of Southampton, who supervised the research said: "This study shows just how much science has changed our understanding of archaeology in the past decade. Previously, the lives and behaviors of past individuals were limited to what we could infer from marks on their bones or the artifacts they used. Now, using the chemistry of bones and teeth, we can begin to reconstruct individual life histories, even as far back as the Neanderthals."

Co-author, Professor João Zilhão of the University of Lisbon, who led the excavation of the Almonda caves said: "The difference in the territory size between the Neanderthal and Magdalenian individuals is probably related to population density. With a relatively low population, Neanderthals were free to roam further to target large prey species, such as horses, without encountering rival groups. By the Magdalenian period, an increase in population density reduced available territory, and human groups had moved down the food chain to occupy smaller territories, hunting mostly rabbits and catching fish on a seasonal basis."

4. New DNA Research Changes Origin of Human Species

New model for human evolution suggests Homo sapiens arose from multiple closely related populations.

A new study in Nature challenges prevailing theories, suggesting that Homo sapiens evolved from multiple diverse populations across Africa, with the earliest detectable split occurring 120,000-135,000 years ago, after prolonged periods of genetic intermixing.

In testing the genetic material of current populations in Africa and comparing it against existing fossil evidence of early *Homo sapiens* populations there, researchers have uncovered a new model of human evolution — overturning previous beliefs that a single African population gave rise to all humans. The new research was published on May 17, in the journal *Nature*.

Although it is widely understood that *Homo sapiens* originated in Africa, uncertainty surrounds how branches of human evolution diverged and how people migrated across the continent, said Brenna Henn, professor of

anthropology and the Genome Center at UC Davis, corresponding author of the research.

"This uncertainty is due to limited fossil and ancient genomic data, and to the fact that the fossil record does not always align with expectations from models built using modern DNA," she said. "This new research changes the origin of species."

Research co-led by Henn and Simon Gravel of McGill University tested a range of competing models of evolution and migration across Africa proposed in the paleoanthropological and genetics literature, incorporating population genome data from southern, eastern, and western Africa.

The authors included newly sequenced genomes from 44 modern Nama individuals from southern Africa, an Indigenous population known to carry exceptional levels of genetic diversity compared to other modern groups. Researchers generated genetic data by collecting saliva samples from modern individuals going about their everyday business in their villages between 2012 and 2015.

The model suggests the earliest population split among early humans that is detectable in contemporary populations occurred 120,000 to 135,000 years ago, after two or more weakly genetically differentiated *Homo* populations had been mixing for hundreds of thousands of years. After the population split, people still migrated between the stem populations, creating a weakly structured stem. This offers a better explanation of genetic variation among individual humans and human groups than do previous models, the authors suggest.

"We are presenting something that people had never even tested before," Henn said of the research. "This moves anthropological science significantly forward."

"Previous more complicated models proposed contributions from archaic hominins, but this model indicates otherwise," said co-author Tim Weaver, UC Davis professor of anthropology. He has expertise in what early human fossils looked like and provided comparative research for the study.

The authors predict that, according to this model, 1-4% of genetic differentiation among contemporary human populations can be attributed to variation in the stem populations. This model may have important consequences for the

interpretation of the fossil record. Owing to migration between the branches, these multiple lineages were probably morphologically similar, which means morphologically divergent hominid fossils (such as *Homo naledi*) are unlikely to represent branches that contributed to the evolution of *Homo sapiens*, the authors said.

5. Early Human Evolution: Hominin Fossils in "Cradle of Humankind" May Be a Million Years Older Than Thought

Famous Sterkfontein Caves deposit is 1 million years older than previously thought.

New dates for Australopithecus-bearing Sterkfontein Cave deposit places South African hominin fossils at the center of global paleo research.

Nearly four million years of hominin and environmental evolution are revealed by fossils found at the Sterkfontein Caves in South Africa. Research began at the site in 1936 when Robert Broom discovered the first adult hominin of the genus Australopithecus. Since then it has become famous for the hundreds of Australopithecus fossils yielded from excavations of ancient cave infills,

including iconic specimens such as the Little Foot skeleton and the cranium known as Mrs. Ples.

Ancient cave infill called 'Member 4' is where the majority of Sterkfontein's wealth of Australopithecus fossils have been excavated from. In fact, it is the richest deposit of Australopithecus fossils in the world. Over the last 56 years of University of the Witwatersrand-led research at Sterkfontein, the age of Member 4 at Sterkfontein has remained contested. Age estimates have ranged from as young as about 2 million years ago, younger than the appearance of our genus Homo, back to about 3 million years.

New research presented in a paper published in the journal Proceedings of the National Academy of Sciences (PNAS) re-evaluates the age of Australopithecus from Member 4 at Sterkfontein together with the Jacovec Cavern, which contains a few additional hominin fossils in a deeper chamber in the cave.

"The new ages range from 3.4-3.6 million years for Member 4, indicating that the Sterkfontein hominins were contemporaries of other early Australopithecus species, like Australopithecus afarensis, in east Africa," says Professor Dominic Stratford, director of research at the caves, and one of the authors on the paper.

The new ages are based on the radioactive decay of the rare isotopes aluminum-26 and beryllium-10 in the mineral quartz. "These radioactive isotopes, known as cosmogenic nuclides, are produced by high-energy cosmic ray reactions near the ground surface, and their radioactive decay dates when the rocks were buried in the cave when they fell in the entrance together with the fossils," says Professor Darryl Granger of Purdue University in the United States and lead author on the paper.

Previous dating of Member 4 has been based on dating calcite flowstone deposits found within the cave fill, but careful observations show that the flowstone is actually younger than the cave fill and so it underestimates the age of the fossils.

"This re-assessment of the age of Sterkfontein Member 4 Australopithecus fossils has important implications for the role of South Africa on the hominin evolution stage. Younger hominins, including Paranthropus and our genus Homoappear between about 2.8 and 2 million years ago. Based on previously suggested dates, the South African Australopithecus species were too young to be their ancestors, so it has been considered more likely that Homo and Paranthropus evolved in East Africa," says Stratford.

The new dates show that Australopithecus existed at Sterkfontein almost a million years prior to the appearance of Paranthropus and Homo, providing more time for them to evolve here, in the Cradle of Humankind, and placing the hominins from this site front and center in the history early human evolution.

"This important new dating work pushes the age of some of the most interesting fossils in human evolution research, and one of South Africa's most iconic fossils, Mrs. Ples, back a million years to a time when, in east Africa, we find other iconic early hominins like Lucy," says Stratford.

"The redating of the Australopithecus-bearing infills at the Sterkfontein Caves will undoubtably re-ignite the debate over the diverse characteristics of Australopithecus at Sterkfontein, and whether there could have been South African ancestors to later hominins," says Granger.

6. Not Where We Thought: Human Bipedalism May Have Evolved in Trees

A female carries her infant on her back as she navigates the crown of a large woodland tree during foraging. Despite their open and dry habitat, chimpanzees at Issa remained highly arboreal and did not walk on the ground more than chimpanzees living in tropical forests, findings which support upright walking evolving in the trees, not on the ground in our early ancestors. Credit: Rhianna Drummond-Clarke

A new study involving researchers from University College London, the University of Kent, and Duke University suggests that human bipedalism – walking on two legs – may have originated in trees, rather than on the ground.

The study, published in the journal *Science Advances*, analyzed the behaviors of wild chimpanzees living in the Issa Valley of western Tanzania, an area similar to the habitat of early human ancestors and known as "savanna-mosaic" – a mix of dry open land with few trees and patches of dense forest. The researchers aimed to determine if the openness of this type of landscape could have led to bipedalism in early hominins.

The study is the first of its kind to explore if savanna-mosaic habitats would account for increased time spent on the ground by the Issa chimpanzees and compares their behavior to other studies on their solely forest-dwelling cousins in other parts of Africa.

Overall, the study found that the Issa chimpanzees spent as much time in the trees as other chimpanzees living in dense forests, despite their more open habitat, and were not more terrestrial (land-based) as expected.

Furthermore, although the researchers expected the Issa chimpanzees to walk upright more in open savanna vegetation, where they cannot easily travel via the tree canopy, more than 85% of occurrences of bipedalism took place in the trees.

The authors say that their findings contradict widely accepted theories that suggest that it was an open, dry savanna environment that encouraged our prehistoric human relatives to walk upright – and instead suggest that they may have evolved to walk on two feet to move around the trees.

Study co-author Dr. Alex Piel (UCL Anthropology) said: "We naturally assumed that because Issa has fewer trees than typical tropical forests, where most chimpanzees live, we would see individuals more often on the ground than in the trees. Moreover, because so many of the traditional drivers of bipedalism (such as carrying objects or seeing over tall grass, for example) are associated with being on the ground, we thought we'd naturally see more bipedalism here as well. However, this is not what we found.

"Our study suggests that the retreat of forests in the late Miocene-Pliocene era around five million years ago and the more open savanna habitats were in fact not a catalyst for the evolution of bipedalism. Instead, trees probably remained

essential to its evolution – with the search for food-producing trees a likely a driver of this trait."

To establish their findings, the researchers recorded more than 13,700 instantaneous observations of positional behavior from 13 chimpanzee adults (six females and seven males), including almost 2,850 observations of individual locomotor events (e.g., climbing, walking, hanging, etc.), over the course of the 15-month study. They then used the relationship between tree/land-based behavior and vegetation (forest vs woodland) to investigate patterns of association. Similarly, they noted each instance of bipedalism and whether it was associated with being on the ground or in the trees.

The authors note that walking on two feet is a defining feature of humans when compared to other great apes, who "knuckle walk". Yet, despite their study, researchers say why humans alone amongst the apes first began to walk on two feet still remains a mystery.

Study co-author Dr. Fiona Stewart (UCL Anthropology) said: "To date, the numerous hypotheses for the evolution of bipedalism share the idea that hominins (human ancestors) came down from the trees and walked upright on the ground, especially in more arid, open habitats that lacked tree cover. Our data do not support that at all.

"Unfortunately, the traditional idea of fewer trees equals more terrestriality (land-dwelling) just isn't borne out with the Issa data. What we need to focus on now is how and why these chimpanzees spend so much time in the trees – and that is what we'll focus on next on our way to piecing together this complex evolutionary puzzle."

7. Gene Editing Gets a Triple Boost: "Happy Accident" Leads to Enhanced CRISPR Efficiency

Scientists have enhanced the efficiency of CRISPR/Cas9 gene editing by threefold using interstrand crosslinks, without resorting to viral material for delivery. This approach boosts the cell's natural repair mechanisms, allowing for more accurate and efficient gene editing, potentially improving disease research and preclinical work.

Gene editing is a powerful method for both research and therapy. Since the advent of the Nobel Prize-winning CRISPR/Cas9 technology, a quick and accurate tool for genome editing discovered in 2012, scientists have been working to explore its capabilities and boost its performance.

Researchers in the University of California, Santa Barbara biologist Chris Richardson's lab have added to that growing toolbox, with a method that increases the efficiency of CRISPR/Cas9 editing without the use of viral material to deliver the genetic template used to edit the target genetic sequence. According to their new paper published in the journal *Nature Biotechnology*, their method stimulates homology-directed repair (a step in the gene editing process)

by approximately threefold "without increasing mutation frequencies or altering end-joining repair outcomes."

"We've found a chemical modification that improves non-viral gene editing and also discovered an intriguing new type of DNA repair," Richardson said.

Find, Cut and Paste

The CRISPR/Cas9 method works by capitalizing on a defense technique employed by bacteria against viral attackers. To do this, the bacteria snip a piece of the invading virus's genetic material, and incorporate it into their own in order to recognize it later. Should the bacteria get reinfected, they can target the now-familiar genetic sequences for destruction.

In gene editing, this process uses the enzyme Cas9 as molecular "scissors" to snip sequences it recognizes, guided by the CRISPR system. This cut is also an opportunity to replace the severed genes with similar (homologous) but improved ones, utilizing the cell's natural repair mechanisms. If successful, the cell should have modified expressions and functions thereafter.

To deliver the repair template DNA to the nucleus of the cell where its genetic material lives, oftentimes viruses are used. While they are effective, the researchers say, viral workflows "are expensive, difficult to scale, and potentially toxic to cells."

Nonviral templates are potentially less expensive and more scalable, although researchers still must overcome efficiency and toxicity barriers. In their study, the Richardson Lab found that introducing interstrand crosslinks into the workflow increased homology directed repair dramatically.

"Every workflow that we have put this approach into has worked better by roughly threefold," Richardson said.

Interstrand crosslinks are lesions that keep the double strands of a DNA helix tethered to each other, making them unable to replicate. Cancer chemotherapies use this mechanism to interrupt tumor growth and kill cancer cells. Added to a homology directed repair template, however, these crosslinks were found to stimulate the cell's natural repair mechanisms and increase the likelihood of editing success.

"Basically, what we've done is taken this template DNA and damaged it," Richardson said. "We've in fact damaged it in the most severe way I can think of. And the cell doesn't say, 'Hey this is junk; let me throw it away.' What the cell actually says is, 'Hey this looks great; let me stick it into my genome.'" The result is a highly efficient and minimally error-prone nonviral system of gene editing.

Their discovery, like many breakthroughs in science, was actually something of a happy accident. While working to purify proteins to study DNA repair, graduate student researcher and lead author Hannah Ghasemi noted unanticipated changes to the outcomes of their experiments.

"We were introducing these chemical modifications to the DNA templates in order to be able to pull them out of the cells and see what proteins were bound to them, and I was just checking to see if this modification had somehow affected the editing in any capacity," she said. "I was expecting to either see no change or that it actually might have negatively affected the editing."

What she found instead was a positive effect, up to three times the editing activity of the uncrosslinked controls. Furthermore, the team found that even with the increase in edits — and therefore the chances for errors — there was no increase in mutation frequency. They are still investigating the specific mechanisms leading to this result, but they have ideas.

"What we think happens is that the cell detects and tries to repair the damaged DNA that we've added this crosslink to," Richardson said. "And in doing so, it delays the cell past a checkpoint where it would normally stop this recombination process. And so by prolonging the amount of time that it takes the cell to do this recombination, it makes it more likely that the edits will go to completion."

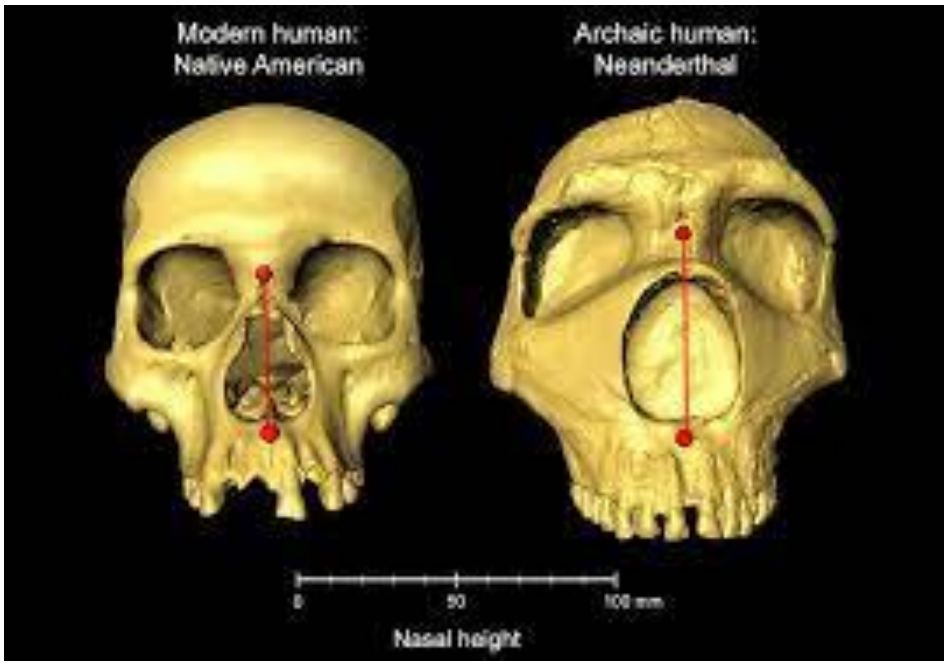
Studying this new process could also lead to a better understanding about how cells detect editing reagents and how they "decide" to accept them or not, he said.

This method will find the most use in ex-vivo gene editing applications, according to the team, that is, in the realm of disease research and preclinical work.

"We can more effectively knock down genes and insert things into genomes to study systems outside of the human body in a lab setting," Ghasemi said. This development allows them to more efficiently build disease models and test

hypotheses about how diseases work, which could lead to better clinical and therapeutic approaches.

8. Cold Climate Adaptation: Neanderthal Genetics Shape Our Facial Features



A study by University College London researchers discovered that humans inherited genetic material from Neanderthals, affecting nose shape. The gene responsible for a taller nose may have resulted from natural selection as ancient humans adapted to colder climates after leaving Africa.

Humans inherited genetic material from Neanderthals that affects the shape of our noses, finds a new study led by University College London (UCL) researchers.

The new *Communications Biology* study finds that a particular gene, which leads to a taller nose (from top to bottom), may have been the product of natural selection as ancient humans adapted to colder climates after leaving Africa.

Co-corresponding author Dr Kaustubh Adhikari (UCL Genetics, Evolution & Environment and The Open University) said: "In the last 15 years, since the Neanderthal genome has been sequenced, we have been able to learn that our own ancestors apparently interbred with Neanderthals, leaving us with little bits of their DNA.

"Here, we find that some DNA inherited from Neanderthals influences the shape of our faces. This could have been helpful to our ancestors, as it has been passed down for thousands of generations."

The study used data from more than 6,000 volunteers across Latin America, of mixed European, Native American and African ancestry, who are part of the UCL-led CANDELA study, which recruited from Brazil, Colombia, Chile, Mexico and Peru. The researchers compared genetic information from the participants to photographs of their faces – specifically looking at distances between points on their faces, such as the tip of the nose or the edge of the lips – to see how different facial traits were associated with the presence of different genetic markers.

The researchers newly identified 33 genome regions associated with face shape, 26 of which they were able to replicate in comparisons with data from other ethnicities using participants in east Asia, Europe, or Africa.

In one genome region in particular, called *ATF3*, the researchers found that many people in their study with Native American ancestry (as well as others with east Asian ancestry from another cohort) had genetic material in this gene that was inherited from the Neanderthals, contributing to increased nasal height. They also found that this gene region has signs of natural selection, suggesting that it conferred an advantage for those carrying the genetic material.First author Dr Qing Li (Fudan University) said: "It has long been speculated that the shape of our noses is determined by natural selection; as our noses can help us to regulate the temperature and humidity of the air we breathe in, different shaped noses may be better suited to different climates that our ancestors lived in. The gene we have identified here may have been inherited from Neanderthals to help humans adapt to colder climates as our ancestors moved out of Africa."

Co-corresponding author Professor Andres Ruiz-Linares (Fudan University, UCL Genetics, Evolution & Environment, and Aix-Marseille University) added: "Most genetic studies of human diversity have investigated the genes of Europeans; our study's diverse sample of Latin American participants broadens the reach of genetic study findings, helping us to better understand the genetics of all humans."

The finding is the second discovery of DNA from archaic humans, distinct from Homo sapiens, affecting our face shape. The same team discovered in a 2021

paper that a gene influencing lip shape was inherited from the ancient Denisovans.

9. Scientists Discover Surprising Similarities in Stone Tools of Early Humans and Monkeys

Macaques unintentionally created stone fragments that bear a resemblance to some of the earliest stone artifacts crafted by early hominins.

The study focuses on fresh analyses of stone tools employed by long-tailed macaques in Thailand's Phang Nga National Park. These primates utilize stone tools to open tough-shelled nuts, frequently causing their hammerstones and anvils to break in the process.

The collection of fragmented stones that results from this process is both significant in size and extensively distributed across the terrain. Furthermore, numerous artifacts exhibit the same traits typically associated with purposefully crafted stone tools found at some of the earliest archaeological sites in East Africa.

"The ability to intentionally make sharp stone flakes is seen as a crucial point in the evolution of hominins, and understanding how and when this occurred is a huge question that is typically investigated through the study of past artifacts

and fossils. Our study shows that stone tool production is not unique to humans and our ancestors," says lead author Tomos Proffitt, a researcher at the Max Planck Institute for Evolutionary Anthropology.

"The fact that these macaques use stone tools to process nuts is not surprising, as they also use tools to gain access to various shellfish as well. What is interesting is that, in doing so they accidentally produce a substantial archaeological record of their own that is partly indistinguishable from some hominin artifacts."

New insights into the evolution of stone tool technology

By comparing the accidentally produced stone fragments made by the macaques with those from some of the earliest archaeological sites, the researchers were able to show that many of the artifacts produced by monkeys fall within the range of those commonly associated with early hominins.

Co-lead author Jonathan Reeves highlights: "The fact that these artifacts can be produced through nut cracking has implications for the range of behaviors we associate with sharp-edged flakes in the archaeological record.."

The newly discovered macaque stone tools offer new insights into how the first technology might have started in our earliest ancestors and that its origin may have been linked to similar nut cracking behavior which could be substantially older than the current earliest archaeological record.

"Cracking nuts using stone hammers and anvils, similar to what some primates do today, has been suggested by some as a possible precursor to intentional stone tool production. This study, along with previous ones published by our group, opens the door to being able to identify such an archaeological signature in the future," says Lydia Luncz, senior author of the study and head of the Technological Primates Research Group at the Max Planck Institute for Evolutionary Anthropology.

"This discovery shows how living primates can help researchers investigate the origin and evolution of tool use in our own lineage"

10. India is many, not one; has assimilated ideas from everywhere: Upcoming report

Experts on genetics, archaeology, anthropology, linguistics, philosophy and history will prepare a 600-page report on 12,000 years of India's past through a different lens

India is the sum total of many peoples genetically, historically and liguistically. We are not one 'pure race' and have assimilated progressive ideas from all over the world. That is the main finding of a forthcoming report on the idea of India itself.

Eighty-eight scholars from a number of disciplines are compiling the report to present a 'different view' of India. They belong to disciplines like genetics, archaeology, anthropology, linguistics, philosophy and history.

Scholar and linguist Ganesh Narayan Devy was in the national capital to announce the release of the 600-page report on the past 12,000 years of Indian 'civilisation and histories'. The announcement was made October 9, 2022 at the India International Centre.

Eminent personalities like Ashok Vajpeyi, Zoya Hasan, Sitaram Yechuri, Narayani Gupta and Ashis Nandy addressed the event.

Tony Joseph, the author of the book Early Indians: The story of Our Ancestors and where we Came From, has contributed to the report. "His findings are that there is no pure race in India. All of us are mixtures of many migrations from the father's side," Devy told *Down To Earth* October 8.

The report also concludes that Indian history's Islamic and British Periods are not the 'darkness' they are made out to be. The period described as 'Muslim rule' was not entirely Muslim. The idea that Muslim rulers caused only damage is wrong, it notes.

Another finding of the report was that to say that colonialism made Indians intellectually bankrupt was only a partial and not a full view of colonialism.

"Without glorifying Empire, we need to say that we assimilated progressive ideas from all over the world," Devy said. He cited the examples of Babasaheb Ambedkar, Mahatma Gandhi, Jawaharlal Nehru and Vallabhbhai Patel, who were all educated in Britain and the United States.

Devy also pointed out that it was at the end of colonial rule that India emerged as a parliamentary democracy from the hotch-potch of feudal princely states that it was once.

Yet another finding dealt with Sanskrit.

"Sanskrit, which had taken shape in the southern steppes, started arriving in India in 1600 Before Common Era. Then it flourished into Vedic poetry from 1400 BCE and continued to grow for the next 700 years in its oldest form called Indic," Devy said.

The 7th Century BCE saw the emergence of Buddhism and Jainism and their teachings and liturgy were in languages other than Sanskrit — Pali and Prakrit.

"On the basis of this chronology, one can definitely say that some other tongues existed in India before Sanskrit. When Sanskrit developed, it did not spread all over India but only the Gangetic Plain," Devy said.

He said events that were historically important for the Indian people did not take place only around the Gangetic Plain. They were also taking place in the south, the North East, the Aravallis, the Vindhyas, etc.

'A different view of India'

The report will be an analysis of findings in existing scholarship through a different lens.

"It will cover a very large temporal span, beginning with the arrival of *Homo sapiens* in South Asia and ending with the onset of the third millennium," according to a note prepared by the organisers of the event.

The report will discuss continuities as well as discontinuities in India's past and present overviews of population migrations, emergence of social organisations, evolution of the state, development of philosophies and metaphysics.

It will also focus on the diversity of languages, major social movements, impact of colonialism on Indian ideas and culture, the freedom struggle and the making of India since Independence.

"The report, a work in progress, will bring alive India's past over 12,000 years as a union of traditions, transformations and the people," the note added.

SOCIO – CULTURAL ANTHROPOLOGY

1. How digital anthropology can help leaders navigate uncertain futures

By 2030, 700 million people will inhabit the metaverse. These digital worlds offer endless possibilities for human interactions and social transformations, but they also come with inherent threats. Without a deep understanding of the cultures and dynamics at play, we risk losing our ethical bearings. To fully grasp the human experience in the metaverse, we need to embrace new fields of social sciences such as digital anthropology.

Creating a metaverse that works for everyone

The metaverse promises to seamlessly blend our physical and virtual lives, as the digital world moves towards an immersive and interactive future where humans

and artificial intelligence (AI) coexist (as glimpsed by ChatGPT). The challenge is creating virtual worlds that are truly inclusive and ethical.

The question of how to shape the metaverse was discussed at the World Economic Forum's Annual Meeting in Davos in 2022 and in 2023, and twice Chris Cox, Chief Product Officer of Meta, framed the metaverse as merely a technical evolution of the internet, downplaying its potential social impact. Cox repeatedly described it as simply "the internet, but less flat". In contrast, Tom Boellstorff, a pioneering anthropologist exploring metaverse-like worlds, has called for an open the debate about what the metaverse is, recognizing how its definition will mould new social norms and standards.

Many uncertainties linger: Will the metaverse produce more or less disinformation? Will children be safe from inappropriate content? Will gaming and pornography drive its evolution? Will it extend discrimination and inequalities? We don't know, and that's worrying.As the metaverse evolves, leaders need to consider how culture, technology and behaviours are intrinsically linked to ensure better outcomes for both businesses and society.

Decoding digital culture

To understand digital human cultures, decision-makers must bring "thick data" to the conversation with speed and scale. Thick data is the emotions, stories, meanings and tones of a situation. This data is implicit, often invisible, and traditionally gathered through human observations.

Digital anthropology leverages thick data, which provides qualitative and contextual insights, to better understand digital communities. When combined with big data, which provides a quantitative and statistical perspective, digital anthropology can reveal the human perspectives that are often missing from our analysis. Also, digital anthropology's thick data informs better decision-making

while avoiding biases and short-sightedness.With digital anthropology tools, the metaverse can benefit everyone, as leaders can use them to counter discrimination, exclusion and exploitation of cognitive biases. For example, suppose data scientists identify a digital community that distributes threatening deepfake videos. In that case, digital anthropologists, equipped with new methods and technical innovations, could uncover the social and cultural reasons

behind this behaviour and reveal the values that underpin this damaging practice. This science can also help us to protect women from online discrimination and violence, as we have confirmed in our work in 2022.

How to observe the human side of the metaverse

The first step for a team that wants to integrate human insights into its thinking is to observe the digital world without prejudice and immerse itself in online communities. The next step is to scale the scope and speed of its observations using technology. Instead of humans, imagine bots hiking through virtual worlds and delivering selected observations to multidisciplinary research teams. These bots are created with what we call “cultural algorithms” and they have been recently used to monitor electoral violence and moderate extreme speech online.

Unlocking this new layer of observational data can spark a virtuous cycle of innovation and trust. When decision-makers understand and react to the behaviour and values of their digital audiences, institutions work better. This, in turn, helps institutions become value-driven and better aligned with their communities, leading to increased trust and support. This virtuous circle may be key in restoring confidence in institutions.Communities, consumers and social movements have the power to disrupt global institutions, markets, and belief systems using social media. They can divide us or bring us together on peaceful common ground.

The metaverse will be the next arena for them to act. But these new worlds are fragile, and we only have one opportunity to build them ethically and effectively for all.As digital worlds continue to evolve and transform society, it is imperative that ethical considerations are at the forefront of their construction. This is exemplified by the worldwide adoption of UNESCO's Recommendation on the Ethics of Artificial Intelligence, which raises critical questions about the impact of this rapidly advancing technology on individuals and societies.The metaverse is not “the internet but less flat”. The metaverse is a human system, a place for people, cultures and communities to come together. It is a human place that needs to be understood by the social and human sciences.

PAPER - 2

INDIAN & TRIBAL ANTHROPOLOGY

1. How a community-based initiative restored the dwindling hornbill population in the Western Ghats : Daily Current Affairs

- The Western Ghats, a biodiversity hotspot in India, is home to a unique **population of hornbills.**
- However, the hornbill species in the region have been facing a significant decline, primarily due to **habitat loss and poaching.**
- In response to this alarming situation, a community-based conservation initiative, led by the **Kadar tribal community,** has emerged as a beacon of hope for the dwindling hornbill population in the **Vazhachal Forest** division of the Western Ghats.

The Hornbill Nest Tree Monitoring Programme:

- The Hornbill nest tree monitoring program was initiated in 2005 in the **Vazhachal forest division** with the technical support of the Western Ghats Hornbill Foundation.
- The objective was to address the declining **hornbill population and restore** their nesting habitat. It became a significant initiative in safeguarding the Hornbill population.

The Precious Diversity of Hornbills:

- The **Athirappilly-Vazhachal** areas in the Western Ghats harbour all four South Indian species of hornbills:
    - The Great Hornbill
    - Malabar Pied Hornbill
    - Malabar Grey Hornbill
    - The Indian Grey Hornbill
- The Great Hornbill is classified as vulnerable in **IUCN Red List,** while the Malabar Pied Hornbill is considered near-threatened.

Engagement of the Kadar Tribal Community:

- To combat the declining hornbill population, the involvement of the indigenous **Kadar community was crucial.**
- Studies revealed that the Malabar Pied Hornbills were limited to a few low-elevation locations in Kerala.
- In collaboration with the Forest Department, a group of young individuals from the **Kadar community** joined the mission to protect and monitor the nesting trees and the species.
- **Protecting Nests and Creating Awareness:**
    - The scarcity of suitable nesting trees and rampant poaching were identified as the main threats to the hornbill population.
    - The Hornbill Foundation, with the help of Kadar community members, initiated an awareness program to combat hornbill poaching.
    - Additionally, the community took on the role of hornbill watchers, diligently monitoring the trees where the birds nested. This collective effort contributed to the protection and rejuvenation of nesting sites.
- **Impressive Results and Conservation Implications:**

- The persistent efforts of the community and conservationists yielded promising results.
- The number of successful nests increased, abandoned nests were re-established, and new nesting hollows formed in suitable trees.
- The population of Malabar Pied Hornbills in the area gradually rose to 100, with 12 identified nesting sites.

Scientific Studies and Recommendations:

- Researchers from MES **Asmabi College presented important findings** regarding the hornbill conservation efforts in the Western Ghats.
- They identified the niche specificity of the Malabar Pied Hornbill, which is confined to low-elevation forests between **0 and 500 meter**s above sea level.
- These forests face the highest conversion and threats due to their proximity to human settlements.
- The studies emphasized the urgent need to protect riparian forest habitats, which contain old trees with natural hollows essential for hornbill nesting and foraging.
- The research team **recommended site-specific management and eco-restoration plans** to prevent further decline of the hornbill species and their habitat.
- Furthermore, they proposed designating the Malabar Pied Hornbill as the **"ambassador or flagship species"** of the critically endangered low-elevation riparian evergreen forests.

Conclusion:

- The success of the community-based initiative involving the Kadar tribal community in the **Western Ghats has demonstrated the importance of engaging** local communities in conservation efforts.
- By protecting nesting trees and raising awareness against poaching, the hornbill population has experienced a remarkable recovery.
- The lessons learned from this initiative emphasize the significance of preserving riparian forest habitats and their flagship species like the **Malabar Pied Hornbill,** ultimately contributing to the conservation of the **Western Ghats biodiversity.**

2. Educational Complexes for Tribal Students: Odisha

Recently, the Government of Odisha has announced the establishment of **three mega educational complexes exclusively for tribal students,** where both academic and sporting skills will be harnessed.**Establishment:**

- The complexes will be established in **tribal-dominated districts** such as **Keonjhar, Sundargarh and Mayurbhanj.**
  - **Santal and Bhuyan** are two dominant tribal groups living in these districts.
- Each complex will house **3,000 tribal students,** which is a unique initiative in the field of **tribal education**.

- These complexes will have state of the art facilities to improve educational and sporting skills of tribal students from **Standard I to XII.**
  - **State-of-the-art (cutting edge or leading edge)** refers to the **highest level of general development,** as of a device, technique, or scientific field achieved at a particular time.

Funding:

- Funds required for mega complexes will be sourced from **Odisha Mineral Bearing Areas Development Corporation (OMBADC),** which was formed

for focused development of **mineral-rich districts.** Incidentally, most mineral-rich districts are tribal-dominated.

- **Tribal Population in Odisha:**

  - According to the 2011 Census, tribal people constitute **8.6%** of the nation's total population i.e. over 104 million people.
    - A **tribe** has been defined as a **group of indigenous people** having a common name, language and territory tied by strong kinship bonds, having distinct customs, rituals and beliefs etc.
    - **The President** under **Article 342** is empowered to declare communities as scheduled tribes, while **Parliament** by law can amend the list.
  - **Odisha's tribal population** constitutes **9.17%** of the country's tribal population.
  - In Odisha, the tribal population is **22.85%** of the state's total population.
    - In terms of **percentage tribal population**, it occupies the **third position** in India.
    - The First and Second are **Madhya Pradesh and Maharashtra** respectively.
  - Similarly, of India's total 75 **particularly vulnerable tribal groups**, 13 reside in Odisha.
  - With 62 tribal communities, Odisha has the most diverse tribes in India.
    - Keonjhar, where tribes such as Sounti, Ho, Juang, Kharwar, Mahali, Oraon Kolha and Kora reside is the most mined district of the State.
    - **Keonjhar** district contains **more than 70%** of the iron ore reserves of Odisha.

Educational Schemes for Tribals

- **Eklavya Model School: Residential School** based on Navodaya Model to be opened in each tribal block by 2022.
- **Rajiv Gandhi National Fellowship Scheme (RGNF):** RGNF was introduced in the year 2005-2006 with the objective to encourage the students belonging to the ST community to pursue higher education.
- **Vocational Training Center in Tribal Areas:** The aim of this scheme is to develop the skill of ST students depending on their qualification and present market trends.

- **National Overseas Scholarship Scheme:** The National Overseas Scholarship Scheme provides financial assistance to 20 students selected for pursuing higher studies abroad for PhD and postdoctoral studies.
- Pre and Post Matric Scholarship Schemes.

Way Forward

- There is a need to give special focus to the education of tribal populations by the **Ministry of Tribal Affairs.**
- Awareness Campaigns like street drama, camps counselling session to bring attitudinal change in parents.
- Emphasis should be given to **career or job** oriented courses.
- Teachers should be locally recruited who understand and respect tribal culture and practices and most importantly are acquainted with the local language.
- **The Kothari Commission** stressed to pay special attention to the education of ST.
- **The XaXa Committee recommended** a greater focus on removing gender disparity in education.

3. Row over adopting fathers surname in meghalaya

The Khasi Hills Autonomous District Council (KHADC) defended its decision as a move to preserve its jurisdiction's unique matrilineal customs.

Opposition politicians and men's rights activists in Meghalaya have denounced an order by the Khasi Hills Autonomous District Council (KHADC) to refuse Scheduled Tribe (ST) status to people who adopt their husband's or father's surname.Titosstarwell Chyne, the KHADC's chief executive member, told *The Hindu* that the order was given to preserve the Khasi society's matrilineal customs and was in line with local laws.

In Khasi culture, children take their mothers' surnames, men move in with their wives, and the youngest daughters in a family inherit their parents' homes.

But detractors say that these customs are exclusionary and demoralising.

"I will fight for my children if there is an attempt to take away their right of being called Khasis," a Meghalaya legislator from the Voice of the People Party (VPP) said, adding that his children use his surname in contrast to Khasi norms."Why can they not be considered Khasi when my wife and I are Khasis?" he was reported saying by *The Hindu*.

Keith Pariat, a former leader of the men's rights group Syngkhong Rympei Thymmai, told a *BBC News* reporter that Khasi culture often reflects sexist assumptions.

"A tree is masculine, but when it is turned into wood, it becomes feminine … the same is true of many of the nouns in our language. When something becomes useful, its gender becomes female," he said.

The KHADC has made attempts in the past to enforce the Khasi community's matrilineal rules. In November 2021, the council tabled a Bill which proposed that women and children who adopt their husband's or father's customs should be deprived of their inheritance rights."We have women living abroad, who have adopted their husbands' customs, but who still own their families' property instead of their brothers living here. Why shouldn't that change?" Chyne said in defence of the Bill for an *Open the Magazine* feature in 2021

In fact, the Khasi Hills Autonomous District Khasi Social Custom of Lineage Act, 1997 also says that in order for someone to legally belong to their mother's Khasi clan, they or their mother cannot adopt the "personal laws" of their non-Khasi father (or husband).

Despite the KHADC's enforcement of these norms, some women's rights groups have expressed their concern that Khasi culture is actually a "patriarchal society

in disguise." In the *Open* feature, an activist named Joy Grace Syiem said that the lack of women in positions of power and government is evidence for the patriarchy in Khasi culture.

Meanwhile, in an interview to *The Meghalayan* on May 16, Chyne said that the KHADC was in the process of seeking the Meghalaya government's permission to authorise ST certification themselves.ST is a protected category in India which, among other things, affords reservations in educational institutes, government jobs and legislatures to its members.

4. Dispute in Meghalaya Over Whether ST Status Should Only Go to Those Who Keep Mother's Surname

The Khasi Hills Autonomous District Council (KHADC) defended its decision as a move to preserve its jurisdiction's unique matrilineal customs. “I will fight for my children if there is an attempt to take away their right of being called Khasis,” a Meghalaya legislator from the Voice of the People Party (VPP) said, adding that his children use his surname in contrast to Khasi norms.

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About Khasi people:

- The Khasi people are an **indigenous ethnic group of Meghalaya** in north-eastern India with a **significant population in** the bordering state of **Assam, and in certain parts of Bangladesh.**
- They **inhabit the eastern part of Meghalaya**, **in the Khasi and Jaintia Hills**. **Khasis** residing **in Jaintia hills** are now better **known as Jaintias**. They are **also called Pnars.**
- The **Khasis occupying the northern lowlands** and foothills are **generally called Bhois**. Those who live in the **southern tracts are termed Wars**.
- The Khasi people **form the majority of the population of the eastern part of Meghalaya**, and is the **state's largest community**, with around **48% of the population** of Meghalaya.
- **Dress**:
    - The traditional Khasi **male dress is "Jymphong**" or a l**ongish sleeveless coat without collar,** fastened by thongs in front. Now, the **Khasis have adopted the western dress.**
    - The Khasi **traditional female dress is** rather e**laborate with several pieces of cloth**, giving the body a **cylindrical shape.** O**n ceremonial occasions, they wear a crown of silver or gold on the head. A spike or peak is fixed** to the back of the crown, corresponding to the feathers worn by the menfolk.
- **Social Structure:**
    - They are **divided into several clans.**
    - They have a **matrilineal society.**
    - **Descent is traced through the mother**, but the **father plays an important role** in the material and mental life of the family.
    - **Inheritance**: In the Khasi society, it is only **the youngest daughter or "Ka Khadduh" who is eligible to inherit the ancestral property.**
- **Language**: They speak **Khasi**, **a member** of the Khasic group of **Austroasiatic languages.**
- **Religion**: The Khasis are now **mostly Christians**. But **before that, they believed in a Supreme Being, The Creator –** U Blei Nongthaw and under Him, there were several deities of water and of mountains and also of other natural objects.

5. Telangana: Rare anthropomorphic menhir unearthed in Mulugu

Archaeology enthusiasts in the district have discovered a rare anthropomorphic menhir dating back to the megalithic era

The discovery was made in the Suddhagutta area near Motlagudem village of Mangapet mandal in the district on Sunday.

The rare menhir, which is four and a half feet tall and wide, depicts a human figure with a curly head, an oblong chest, shoulders and a lower waist.

According to Aravind Arya Pakide, secretary of the Team of Research on Culture and Heritage (TORCH) organization, such anthropomorphic menhirs were incredibly rare and found only in a limited number of countries.

“Menhirs, also known as vertical stones, are often found in graves of important individuals within the local community. While such pillars are common in many parts of Telangana, the rare monument stone discovered in this area is incredibly unique,” said Aravind.Similar male and female forms have also been found engraved on stones in the Kachanpalli, Galaba, and Gundala areas of Khammam district.

The discovery of these ancient menhirs provides insight into the existence and evolution of early humans in the region. However, the destruction of hundreds of primitive graves near Kothur village for the construction of village houses is a painful loss. Furthermore, visitors to the site have already broken the rare memorial stone into two pieces.

In the wake of this rare development, Aravind Arya has urged officials of the Archaeology Department and villagers to take immediate steps to protect the remaining heritage site, as the discovery sheds light on the rich cultural and historical heritage of the region and deserves to be protected and preserved for future generations.

6. Nicobar project violates tribal rights

- The National Commission for Scheduled Tribes (NCST) has now flagged alleged discrepancies with respect to the forest clearance granted for the Great Nicobar Island (GNI) Project.

What is National Commission for Scheduled Tribes (NCST)?

- **Background**
  - NCST was established by amending Article 338 and **inserting a new Article 338A** in the Constitution through the Constitution (89th Amendment) Act, 2003.
  - By this amendment, the erstwhile National Commission for Scheduled Castes and Scheduled Tribes was replaced by two separate Commissions namely-
    - the National Commission for Scheduled Castes (NCSC), and
    - the National Commission for Scheduled Tribes (NCST).
- **About**
  - NCST is a **constitutional body** in India that was established in 2004.
  - Its main objective is to safeguard and promote the rights and interests of the Scheduled Tribes.
  - The NCST is responsible for monitoring the implementation of various safeguards and welfare measures provided to the Scheduled Tribes under the Constitution of India and other laws.
- **Composition**
  - NCST consists of one chairperson, one vice-chairperson and three full-time members.
  - The term of office of Chairperson, Vice-Chairperson and each member is three years from the date of assumption of charge.
  - The Chairperson has been given the rank of Union Cabinet Minister, and the Vice-Chairperson that of a Minister of State and other Members have the ranks of a Secretary to the Government of India.

Great Nicobar Island project

- In November 2022, the Environment ministry has given environmental clearance for the Centre's ambitious Rs 72,000 crore multi-development projects in Greater Nicobar Island.

What is the proposal?

- The Great Nicobar Island (GNI) is a mega project to be implemented at the southern end of the Andaman and Nicobar Islands.
- The project includes an international container trans-shipment terminal, an international airport, township development, and a 450 MVA gas and solar based power plant over an extent of 16,610 hectares in the island.
- The port will be controlled by the Indian Navy, while the airport will have dual military-civilian functions and will cater to tourism as well.

News Summary: Nicobar project violates tribal rights

- The NCST has cited alleged violations under the Forest Rights Act (FRA), 2006 with respect to the forest clearance granted for the Great Nicobar Island (GNI) Project.
    - The FRA provides for the recognition of wider community rights over forest land.
    - The legislation allows forest communities the right to control and manage the use of the forest land over which they hold titles and their consent is mandatory for diverting it.

What are the concerns raised by the NCST with respect to GNI Project?

- **Violations under the Forest Rights Act (FRA), 2006**
    - According to Rule of Forest Conservation Rules-2017 (FCR), any diversion of forest land would first require the District Collector to recognise and vest rights to locals under the FRA.
    - Only then do the rules permit authorities to seek consent of the now-rights-holding gram panchayats for the diversion of this land.
        - These provisions were envisioned to give primacy to rights of indigenous forest-dwelling communities.
    - However, the district administration did not receive or process a single claim over forest land under the FRA.
    - Instead, a special Gram Sabha meeting was called and a resolution was purportedly passed.
        - The resolution consented to diversion of the forest land adjacent to their villages for the purpose of the project.
- **NCST had also opposed the Forest (Conservation) Rules (FCR) 2022**
    - FCR 2022 make a provision for private parties to cultivate plantations and sell them as land to companies who need to meet compensatory forestation targets.
        - The rules allow private developers to clear forests without first seeking the permission of the forest dwellers.
    - NCST opposed the FCR-2022, which had done away with the consent clause altogether.
- **Nil implementation of FRA**
    - The Andaman and Nicobar administration had reported nil implementation of FRA.

        - The justification of the administration has been that the islands have the **Andaman and Nicobar Islands (Protection of Aboriginal Tribes) Act, 1956 (PAT56)**.
        - This act already provides for the full protection of the interests of forest-dwelling Scheduled Tribes.
        - So, there is no claim as such for settlement under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.
    - NCST claimed that, under the PAT56, a significant portion of the forest land in Great Nicobar has been marked as a Tribal Reserve.
    - Over these reserves, local tribespeople have been given rights to use and collect resources as and when needed for their daily sustenance.
    - However, the power of notification and de-notification of the land as a Tribal Reserve is solely with the administrator of the islands under PAT56.

7. Home gardens are key to better lives for vulnerable tribes in India, finds research

The forested hills and rolling fields in the state of Odisha are home to some of India's most vulnerable tribal groups, but a growing number of studies show that small home gardens—producing millet, pulses, fresh fruits and vegetables—could be key in the fight against the food insecurity, malnutrition and poverty found there.

In 2020, 828 million people globally went hungry and almost 3.1 billion people could not afford a healthy diet, according to World Health Organization (WHO) statistics.

Despite India now being a middle-income country, it continues to struggle with food security, malnutrition, and rising levels of anemia among women and children.

In recent years, there have been a growing number of studies about how home gardens—which, as the name suggests, are fruits, vegetables, or grains grown at a household scale—might help fight hunger, but there has been limited field evidence of their effects on food security, dietary quality, and incomes. In a new

paper, "Home gardens, household nutrition and income in rural farm households in Odisha, India," published in the *Journal of Agricultural Economics* researchers from the Alliance of Bioversity International and CIAT looked at about 1,900 households in tribal communities in the state of Odisha, India and produced solid evidence that home gardens can improve food security, dietary quality, and income in these rural farming communities.

Better food security

Sylvester Ogutu, a researcher for the Alliance of Bioversity International and CIAT and the paper's lead author, said that having a home garden increased annual home-produced food by nearly 90 percent.

"Our findings also suggest that home gardens can be a poverty-reducing strategy for resource-poor farmers and vulnerable population groups," Ogutu said, adding that the monthly value of home-produced and consumed food per adult rose by over half, increasing the probability of greater food security among adopters of home gardens.

"Having a home garden also increased monthly per adult equivalent incomes by 37% and reduced the prevalence of poverty by 11.7 percentage points," he said.

A bright future for home gardens

Jonathan Mockshell, an agricultural economist at the Alliance of Bioversity International and CIAT, study lead, and a co-author of the paper, said that programs aimed at teaching vulnerable population groups how to start or improve home gardens started in Odisha in 2017 and are ramping up, with three quarters of the home garden interventions completed between 2020 and 2021.

"Home gardens can also complement government programs, such as the National Nutrition Mission, to improve nutrition and also contribute toward achievement of the Sustainable Development Goals, especially those related to poverty, zero hunger, and good health and well-being," Mockshell said.

"Promotion of home gardens in India can help curb widespread malnutrition problems, such as anemia in women, by improving the quality of diets that are typically less diverse, dominated by cereals, and/or characterized by low intakes of fruits and vegetables," James Garrett, a co-author, said.

An Indian government program aims to reach over 27,300 beneficiaries with home garden interventions to help increase their production and consumption of highly nutritious home-produced foods, and ultimately improve their food and nutrition security by improving the quality of their diet.

This latest paper is part of a wider push at the Alliance of Bioversity International and CIAT, and the One CGIAR Initiative on National Policies and Strategies to link research evidence on the benefits of home gardens to policy making to contribute to transitioning to resilient food systems.

8. India's Tribal Communities- The Kodu/ Kondhu Tribe of Andhra Pradesh

Khonds (also spelt Kondha, Kandha etc.) are a tribal community in India.

- Traditionally, hunter-gatherers, they are divided into the hill-dwelling Khonds and plain dwelling Khonds for census purposes;
- All the Khonds identify by their clan and usually hold large tracts of fertile land but still practice hunting, gathering and slash-and-burn agriculture in the forests as a symbol of their connection to and ownership of the forest.
- They are a designated Scheduled Tribe in the states of Andhra Pradesh, Bihar, Chhattisgarh, Madhya Pradesh, Maharashtra, Odisha and West Bengal

 They are less social with the outer world
 They use traditional farming tools and techniques and lives in Kutcha houses
 3 Pins in the nose is common with women here
 Women wear sari and men only langot
 They are both economically and socially backward people
 They are in **PVTG category** in AP**KODU OR KONDH TRIBE OF ANDHRA PRADESH**

LANGUAGE: The Khonds speak the Kui language as their mother tongue. It is most closely related to Gondi and Kuvi. Kui is a Dravidian language written with the Odia script.

SOCIETY, CULTURE AND LIFESTYLE

 The Khonds are adept land dwellers exhibiting greater adaptability to the

forest and hill environment.

 However, due to development interventions in education, medical facilities, irrigation, plantation and so on, they are forced into the modern way of life in many ways.

 Their traditional life style, customary traits of economy, political organisation, norms, values and worldview have been drastically changed in recent times.

 The traditional Khond society is based on geographically demarcated clans, each consisting of a large group of related families identified by a Totem, usually of a male wild animal.

 Each clan usually has a common surname and is led by the eldest male member of the most powerful family of the clan.

 All the clans of the Khonds owe allegiance to the "Kondh Pradhan", who is usually the leader of the most powerful clan of the Khonds

 The Khond family is often nuclear, although extended joint families are also found.

 Female family members are on an equal social footing with the male members in Khond society, and they can inherit, own, hold and dispose of the property without reference to their parents, husband or sons.

 Women have the right to choose their husbands and seek divorce.

 However, the family is patrilineal and patrilocal.

 Remarriage is common for divorced or widowed women and men.

 Children are never considered illegitimate in Khond society and inherit the clan name of their biological or adoptive fathers with all the rights accruing to natural-born children.

 The Kondhs have a dormitory for adolescent girls and boys which forms a part of their enculturation and education process.

 The girls and boys sleep at night in their respective dormitory and learn social taboos, myths, legends, stories, riddles, proverbs amidst singing and dancing the whole night, thus learning the way of the tribe.

- The girls are usually instructed in good housekeeping and in ways to bring up good children while the boys learn the art of hunting and the legends of their brave and martial ancestors.
- Bravery and skill in hunting determine the respect that a man gets in the Khond tribe.
- A large number of Khonds were recruited by the British during the First and Second World Wars and were prized as natural jungle warfare experts.
- Even today a large proportion of the Khond men join the state police or armed forces of India to seek an opportunity to prove their bravery.

- The men usually forage or hunt in the forests.
- They also practise the podu system of shifting cultivation on the hill slopes where they grow different varieties of rice, lentils and vegetables.
- Women usually do all the household work from fetching water from the distant streams, cooking, serving food to each member of the household to assisting the men in cultivation, harvesting and sale of produce in the market
- The Khond commonly practice clan exogamy.
- By custom, the marriage must cross clan boundaries (a form of incest taboo).
- The clan is strictly exogamous, which means marriages are made outside the clan (yet still within the greater Khond population).
- The form of acquiring a mate is often by negotiation.
- However, marriage by capture or elopement is also rarely practised.
- For marriage, the bride price is paid to the parents of the bride by the groom, which is a striking feature of the Khonds.
- The bride price was traditionally paid in tiger pelts though now land or gold sovereigns are the usual mode of payment of bride price

RELIGION AND BELIEFS

- The Khonds were historically animists.
- But the extended contact with the Oriya speaking Hindus made Khonds adopt many aspects of the Hinduism and Hindu culture.

- The contact with the Hindus has made the Khonds to adopt Hindu deities into their pantheon.
- For example, the Kali and Durga are worshipped in a variety of guises, but always with the sacrifice of goats, fowl etc.
- The Kond marriage rituals also show the assimilation of many Hindu customs into traditional tribal practices.
- Traditionally the Khond religious beliefs were syncretic combining totemism, animism, ancestor worship, shamanism and nature worship.
- The Khonds gave the highest importance to the Earth goddess, who is held to be the creator and sustainer of the world.
- Before hunting they would worship the spirit of the hills and valleys they would hunt in lest they hide the animals the hunter wished to catch.
- British writers also claimed the Khonds practised human sacrifice.
- In the Khond society, a breach of accepted religious conduct by any member of their society invited the wrath of spirits in the form of lack of rainfall, soaking of streams, destruction of forest produce, and other natural calamities.
- Hence, the customary laws, norms, taboos, and values were greatly adhered to and enforced with high to heavy punishments, depending upon the seriousness of the crimes committed.
- The practice of traditional religion has almost become extinct today.
- Many Khonds converted to Protestant Christianity in the late nineteenth and early twentieth century due to the efforts of the missionaries of the Serampore Mission.
- The influence of Khond traditional beliefs on Christianity can be seen in some rituals such as those associated with Easter and resurrection when ancestors are also venerated and given offerings, although the church officially rejects the traditional beliefs as pagan.
- Many Khonds have also converted to Islam and a great diversity of religious practices can be seen among the members of the tribe.
- Significantly, as with any culture, the ethical practices of the Khond reinforce the social and economic practices that define the people.
- Thus, the sacredness of the earth perpetuates tribal socio-economics, wherein harmony with nature and respect for ancestors is deeply embedded whereas non-tribal cultures.
- That neglect the sacredness of the land find no problem in committing deforestation, strip-mining etc., and this has led to a situation of conflict in many instances

ECONOMY AND AGRICULTURE

- They have a subsistence economy based on hunting and gathering but they now primarily depend on a subsistence agriculture i.e. shifting cultivation or slash-and-burn cultivation or Podu.
- The Dongria Khond are excellent fruit farmers.
- The most striking feature of the Dongria Khonds is that they have adapted to horticulture and grow pineapple, oranges, turmeric, ginger and papaya in plenty.
- Forest fruit trees like mango and jackfruit are also found in huge numbers, which fulfil the major dietary chunk of the Dongrias.
- Besides, the Dongrias practice shifting cultivation, or podu chasa as it is locally called, as part of an economic need retaining the most primitive features of underdevelopment and cultural evolution.
- They go out for collective hunts eating the fruits and roots they collect.
- They usually cook food with oil extracted from sal and mahua seeds.
- They also use medicinal plants
- These practices make them mainly dependent on forest resources for survival.
- The Khonds smoke fish and meat for preservation.

PROBLEMS

- They suffer from a lot of diseases due to lack of basic facilities
- They don't have clean drinking water
- There are no schools and Aanganvadis
- Lack of opportunities and employment

IMPACT OF MODERN WORLD

- Use modern material in building houses
- Moving from Jhum to Permanent cultivation
- Started wearing modern clothes
- Started coffee plantation
- Lives mostly on forest produce
- Migrate due to mining and other industries originating in the area.

9. Longstanding tensions between hill and valley people, the Meitei demand for ST status

Recently, violent clashes broke out in Manipur during the course of a '**Tribal Solidarity March'** called by the **All-Tribal Students' Union of Manipur** (ATSUM).

- Earlier, **Manipur High Court** has directed the **Manipur** state government to submit recommendations to the **union government** for the inclusion of **Meitei** in the Scheduled Tribes (**ST**) list.

Tribal Solidarity March

- It was called to **oppose** the demand that the **Meitei community** be included in the list of the state's **Scheduled Tribes** (ST).

Major communities residing in Manipur

- The **Meiteis** are the **largest community** in **Manipur**.

- There are **34 recognized** tribes, which are classified as '**Any Kuki Tribes'** and '**Any Naga Tribes**'.
- The **central valley** in **Manipur** is home primarily to the **Meitei** and **Meitei Pangals**
    - They roughly constitute **64.6**% of the state's population.
    - **Meitei Pangal** is a **Muslim** Meitei community.

Why does the Meitei community want ST status?

- The Scheduled Tribes Demand Committee of Manipur (**STDCM**) has constantly been demanding the ST status.
- The **Meitei community** was recognised as a **tribe** before the **merger** of the princely state of **Manipur** with the **Union of India** in **1949**.
    - It has lost its **identity** as a **tribe** after the **merger**.
- When different communities in India were classified as Scheduled Castes (SC) and ST under **Article 341** and **Article 342** of the constitution, the Meitei community was **not** included in them as they were meant for caste **Hindus**.
- The **Meitei population** which was **59**% of the total population of **Manipur** in **1951** has been reduced to **44**% in 2011.

Arguments against Meitei's inclusion:

- There was dominance of the **Meiteis**, both in **population** and in **political representation** as **40** out of **60 Assembly** constituencies of the state are located in the valley.
- The **Manipuri language** of the **Meiteis** is included in the **Eighth Schedule** of the Constitution,
- The sections of the **Meitei community** are already classified under **Scheduled Castes** (SC) or **Other Backward Classes** (OBC).

Special status of Hill Areas in Manipur:

- The Hill Areas in **Manipur**, comprising **90**% of the total land in the state, are declared by the government under the provisions of **Article 371C** of the Constitution.
    - **Article 371C** confers some **administrative autonomy** to the tribal-dominated hill areas of Manipur.
- **Article 371C** provides for the constitution of a **Hill Areas Committee** comprising **MLAs** from **Hills Areas**, while relevant laws passed by the assembly constitute village authorities.

- The committee and the authorities do **not** allow **non-tribals** to purchase **land** in the **notified Hills** areas.

10. Bihan Mela: A seed festival aims to help tribal Kondh farmers in Odisha return to their agricultural traditions

The seed festival and bank will facilitate use of indigenous varieties and traditional farming which farmers have abandoned since the Green Revolution

Since 2019, members of the Kondh tribe in Odisha's Nayagarh district have added one more event to their calendar of festivals and celebrations. Called Bihan Mela, literally the seed festival, the event is participated by farmers from as many as 40 villages in Dasapalla block, sorrounded by hills and forests.

Preparations begin as soon as farmers have harvested kharif crops, which includes both hybrid and indigenous varieties of paddy, millets, maize and sorghum.

Women, who are at the helm of this festival, carefully collect seeds of the indigenous varieties and store them in earthen pots. Then, on a designated day in December, they decorate the pots with red and white motifs, place them in a bamboo basket and carry it on head to the village where the fair is being organised. Along the way, they are accompanied by men beating drums and other traditional instruments.

Nirola Jani of Bidapaju village, who has participated in both the seed festivals organised so far, says the event could not be held for two years because of the COVID-19 pandemic.

Yet, when the festival resumed in December 2022, an overwhelming number of farmers participated in it. Jani carried to the festival four varieties of paddy and millet seeds that her family grew on their 0.5-hectare (ha) land, and brought back seeds of finger millets to sow this year.

"The fair mimics a traditional market where farmers used to exchange seeds," says Kailash Sahoo, programme coordinator of non-profit Nirman that works with the tribe on forest rights and agro-ecological farming and has initiated the seed festival.

Farmers in the region are mostly marginal and depend on the monsoon rains. In recent years, they have seen repeated crop failures either due to erratic rainfall or pest attacks.

"Since the Green Revolution, farmers in the region have abandoned native crops and varieties that are naturally resistant to pests and better suited to the region's climate," says Prashant Mohanty, executive director of Nirman.

Even in *dongars* or hilltops, where families used to practice mixed cropping until recently, have shifted to monoculture cash crops like cashew. This has not only affected their food and nutritional security, but also degraded the soil and made the farmers more vulnerable to crop loss.

"The seed festival was thus introduced to help farmers return to their traditional ways of farming like mixed-cropping," he adds.

To facilitate access to indigenous seeds, Nirman in 2019 also set up a seed bank in Raisar village. The bank works on a simple premise: collect and preserve indigenous seeds from across Kondh villages and lend those out to farmers.

"The farmers have to return double the quantity of seeds or two different seed varieties within the first year of cultivation," says Kanchan Behera, Raisar resident and in-charge of the bank.

The change is palpable. The bank, which was set up with just 12 varieties of paddy, now boasts of 62 varieties of paddy, four varieties of millets, five varieties of pulses and eight vegetables.

The bank is open to all Kondh farmers and has benefitted 750 families so far, says Sita Pradhan, one of the bank's members. After seeing the demand, Nirman plans to open three more seed banks in the region.

11. Tribals education and bottlenecks

Recognising tribal culture, language, cognitive strength, curriculum and inherent learning ability of children can revamp tribal education system

The Central and state governments, since India's Independence, have initiated several schemes and programmes to educate the country's tribal population. These include the establishment of Ashram Schools, Ekalavya Model Residential Schools, Kasturba Gandhi Balika Vidyalaya, pre-matric scholarships and vocational training centres.

Policy analyst and educationists have been meaning to recognise tribal culture, language, cognitive strength, curriculum and inherent learning ability of the tribal children. They believ this could revamp the tribal education system in the country.

There is, however, a long way to ensure holistic education in the tribal hinterlads.

Teacher-student relationship

A cordial relationship between tribal students and their teachers is one of the critical factors to promote meaningful learning in classrooms. It is important to understand that tribal children do not have the same backgrounds as their non-tribal schoolmates or teachers.

There is a need to respect and value culture, traditions, mannerisms, languages and cultural heritage of the tribal students. Interestingly, many tribal cultures have positive elements. It should be the responsibility of the teachers and academic personnel to promulgate this incredible wealth of indigenous knowledge among tribal youths in schools and colleges.

“I accepted my identity as a Saura, spoke Saura in public places and vehemently testified on the local community radio stations, that I belong to the Saura tribe,” said Srinibas Gomango, language teacher at a government primary school in Rayagada district, Odisha.

Medium of instruction

Article 350A of the Indian Constitution states that every state must have adequate facilities to teach children in their mother tongue.

“The initial medium of instruction should the kids’ mother tongue. They could then be gradually encouraged to learn the regional language,” stressed Lokanath Panda, linguistic expert, who works in the tribal areas of Odisha.

“Ensuring proper instruction at the primary stage could increase better performance of tribal students,” he added.

Some teachers assume that tribal students are slow-learners. Overcoming the language barrier requires concerted efforts. The Odisha Government and civil society organisations have made some promising efforts to educate the Gonds, Bhils, Santals and other tribal groups in their mother-tongue. Tribal children are responding well to such innovative programmes, according to educationists.

The literacy rate among the Koyas, Santals, Bhuyia, Bhatudi and Bhumiji, has steadily gone up over the years.

However, several areas need work. “Development and printing of text books and syllabus should be decentralised,” suggested Sushree Sangita Mohanty, deputy director, Mother Tongue-Based Multilingual Education, Kalinga Institute of Social Sciences (KISS).

"Learning materials should be prepared keeping in view the socio-cultural and economic situations of tribal people," highlighted Mohanty.

The language lab of KISS is India's first resource centre for the promotion of mother tongue based early childhood education among the indigenous population. Tribal children need to be cushioned with culture specific and appreciation of their ancestor's historiography in their learning process.

It is high time that schools explore folklore in primary education, which would help tap tribals' rich tradition in arts, crafts, music, songs, fables, etc. Similarly, stories and riddles should be collected, documented and used by teachers.

Tribal development experts have been advocating the need for participation and sensitisation of community people to reduce the drop-out rate in tribal pockets. Empowering youth and nurturing tribal leadership could help create an enabling environment for active community participation.

Potential of youth, tribal leadership

Integration of tribal youth in their culture is imperative.

Development in tribal societies should focus on educational programmes that motivate keeping tribal youth integrated in their own culture. Working with the tribal leaders is a key to ensure their active participation and cooperation in sensitisation programmes on the importance of education.

There is a need to promote intensive participatory community mobilisation and sensitisation programmes for the community leaders and key stakeholders. Moreover, such awareness generation programmes should be organised through experienced and credible institutions working in the domain of tribal education.

The role of United Nations

United Nations Children's Fund (UNICEF) has been promoting quality education and employability amongst marginalised children. UNICEF, in collaboration with UNESCO, is supporting the Union government to achieve quality education for all children between 6 and 14 years.

Some of the key areas for cooperation include reaching out to vulnerable and deprived children, adapting international practices as well as supporting care providers and community advocates to demand inclusive and quality education.

One of the promising initiatives by UNICEF is to support for the development of the child-friendly schools and systems (CFSS) guiding principles, launched in 2014 and approved by the Union Ministry of Human Resource Development.

To ensure effective implementation of CFSS, assistance has also been provided for monitoring tools and the integration of CFSS indicators into state plans in support of making child-friendly schools.

Similarly, in collaboration with UNESCO, UNICEF is implementing a project titled *Promoting the Rights of Disabled Children to Quality Education* financially supported by the UN partnership to promote rights of persons with disabilities. Under this project, UNICEF provides support to states to make primary education curriculum more inclusive for children with disabilities and building technical capacity of teachers.

Way forward

It is the pressing time to consider holistic tribal education and their inclusive growth.

There is a pressing need for collaboration and strategic discourse between government, policy-makers, civil society organisations and international development institutions to collectively put efforts to address the chronic problems and allocate adequate funds from central and state budget for tribal education. Policy framers need to focus on a long-term strategy to enhance educational status of tribal children.

“Equal access and opportunities should be given to tribal children to empower them,” said Joy Daniel Pradhan, development practitioner who works with the Union Ministry of Minority Affairs.

“Tribal communities will have to be elevated economically and educationally for promotion of a socio-economically integrated healthy society in the remote pockets,” Daniel said.

12. Education for tribals: Bottlenecks and the way forward

Recognising tribal culture, language, cognitive strength, curriculum and inherent learning ability of children can revamp tribal education system

The Central and state governments, since India's Independence, have initiated several schemes and programmes to educate the country's tribal population. These include the establishment of Ashram Schools, Ekalavya Model Residential Schools, Kasturba Gandhi Balika Vidyalaya, pre-matric scholarships and vocational training centres.

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"Tribal communities will have to be elevated economically and educationally for promotion of a socio-economically integrated healthy society in the remote pockets," Daniel said.

13. Nicobar project violates tribal rights: ST panel

- The National Commission for Scheduled Tribes (NCST) has now flagged alleged discrepancies with respect to the forest clearance granted for the Great Nicobar Island (GNI) Project.

What's in today's article?

- National Commission for Scheduled Tribes (NCST)
- Great Nicobar Island (GNI) Project
- News Summary

National Commission for Scheduled Tribes (NCST)

- **Background**
  - NCST was established by amending Article 338 and **inserting a new Article 338A** in the Constitution through the Constitution (89th Amendment) Act, 2003.
  - By this amendment, the erstwhile National Commission for Scheduled Castes and Scheduled Tribes was replaced by two separate Commissions namely-
    - the National Commission for Scheduled Castes (NCSC), and
    - the National Commission for Scheduled Tribes (NCST).
- **About**
  - NCST is a **constitutional body** in India that was established in 2004.
  - Its main objective is to safeguard and promote the rights and interests of the Scheduled Tribes.
  - The NCST is responsible for monitoring the implementation of various safeguards and welfare measures provided to the Scheduled Tribes under the Constitution of India and other laws.
- **Composition**
  - NCST consists of one chairperson, one vice-chairperson and three full-time members.
  - The term of office of Chairperson, Vice-Chairperson and each member is three years from the date of assumption of charge.
  - The Chairperson has been given the rank of Union Cabinet Minister, and the Vice-Chairperson that of a Minister of State and other Members have the ranks of a Secretary to the Government of India.

Great Nicobar Island project

- In November 2022, the Environment ministry has given environmental clearance for the Centre's ambitious Rs 72,000 crore multi-development projects in Greater Nicobar Island.

What is the proposal?

- The Great Nicobar Island (GNI) is a mega project to be implemented at the southern end of the Andaman and Nicobar Islands.

- The project includes an international container trans-shipment terminal, an international airport, township development, and a 450 MVA gas and solar based power plant over an extent of 16,610 hectares in the island.
- The port will be controlled by the Indian Navy, while the airport will have dual military-civilian functions and will cater to tourism as well.

News Summary: Nicobar project violates tribal rights

- The NCST has cited alleged violations under the Forest Rights Act (FRA), 2006 with respect to the forest clearance granted for the Great Nicobar Island (GNI) Project.
    - The FRA provides for the recognition of wider community rights over forest land.
    - The legislation allows forest communities the right to control and manage the use of the forest land over which they hold titles and their consent is mandatory for diverting it.

What are the concerns raised by the NCST with respect to GNI Project?

- **Violations under the Forest Rights Act (FRA), 2006**
    - According to Rule of Forest Conservation Rules-2017 (FCR), any diversion of forest land would first require the District Collector to recognise and vest rights to locals under the FRA.
    - Only then do the rules permit authorities to seek consent of the now-rights-holding gram panchayats for the diversion of this land.
        - These provisions were envisioned to give primacy to rights of indigenous forest-dwelling communities.
    - However, the district administration did not receive or process a single claim over forest land under the FRA.
    - Instead, a special Gram Sabha meeting was called and a resolution was purportedly passed.
        - The resolution consented to diversion of the forest land adjacent to their villages for the purpose of the project.
- **NCST had also opposed the Forest (Conservation) Rules (FCR) 2022**
    - FCR 2022 make a provision for private parties to cultivate plantations and sell them as land to companies who need to meet compensatory forestation targets.

        - The rules allow private developers to clear forests without first seeking the permission of the forest dwellers.
    - NCST opposed the FCR-2022, which had done away with the consent clause altogether.
- **Nil implementation of FRA**
    - The Andaman and Nicobar administration had reported nil implementation of FRA.
        - The justification of the administration has been that the islands have the **Andaman and Nicobar Islands (Protection of Aboriginal Tribes) Act, 1956 (PAT56)**.
        - This act already provides for the full protection of the interests of forest-dwelling Scheduled Tribes.
        - So, there is no claim as such for settlement under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006.
    - NCST claimed that, under the PAT56, a significant portion of the forest land in Great Nicobar has been marked as a Tribal Reserve.
    - Over these reserves, local tribespeople have been given rights to use and collect resources as and when needed for their daily sustenance.

14. Gond children learn to conserve forests

- On 30 January this year, on a sunny morning in winter, 10-year-old Khilawan, and a group of around 25 people comprising of children, young adults and the elderly were scouring the forest adjacent to Jharna Ghughari, their village in Dindori district of Madhya Pradesh.
- Excitement and interest were visible on the young faces. Faces of the elderly showed satisfaction. The group discovered the richness and diversity of the jungle. They walked almost 7 km across the forest, to become familiar with the varieties of plants and animals existing in the forest, understand their dependence on the forest products and their various qualities.
- With the premise that villagers would protect forests if they knew that it is an inherent part of their life, elders of Jharna Ghughari village help the younger generation discover the rich biodiversity of their forest. While the villagers turn forest defenders, the children take to conservation by documenting the species in a biodiversity register.

- **New learning**
- During the walk, the group collected leaves, barks and flowers, developing an understanding about the occurrence of certain plants in particular parts of the jungle and about the various parts of different plants used by the villagers for various purposes.
- They found trees such as sal, teak, tinsa and dhawaa, which are used for constructing houses and making agricultural implements. They found plants such as bel, harra, bahera, amla, kumbhi, paadhan, satavar, surteli, jamrashi banda and batua which have medicinal use and can cure illnesses like abdominal pain, snake bite, rabies and indigestion, besides respiratory and heart diseases.
- There are trees whose leaves and barks are used to catch fishes, and trees whose leaves are consumed as food. Some trees such as tendu, chaar and kusum are of economic importance. In addition to discovering the vast number of species that were still present in the village even after extensive deforestation, the group found many animals or their traces in the forest.
- **Documenting biodiversity**
- The children realized that various plants and animals were decreasing rapidly and that local knowledge about these species would be lost with the older generation. It was important to pass the elders' wisdom to the younger generation and document it in an easily understandable manner.
- Khilawan and his friends in the primary school made a biodiversity register with dried leaves, flowers and barks that they had collected. They wrote the local names of the plants, their usage and occurrence in the register. Khilawan said that the register would be kept in their school.
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- Children learnt about various plant species and their traditional uses during a walk through the forest, and hence the need to conserve them (Photo by Saurabh Singh)
- Hiralal, their teacher, assured them that he would help them update the register with details whenever they found a new species. The villagers now know that this register will help them find the species that are disappearing fast, and take actions to prevent it. This would strengthen their bond with the forest.
- **Dependence on forests**
- The biodiversity registry work started with the Adaptive Skilling Action Research (ASAR), a joint action research of Azim Premji University and Professional Assistance for Development Action (PRADAN). ASAR's objective is to find ways to reverse deskilling through adaptive skilling.
- Jharna Ghughari, a forest village about 9km from Amarpur, the administrative block's headquarters, is one of the three villages chosen for the action research. More than 84% of its population are Gonds, a Scheduled Tribe category.
- Forests, with their diversity of flora and fauna, have been an integral part of the lives and livelihoods of Adivasis in central Indian Plateau. Forests are their source of food, fodder, fuel, medicine and timber, as well as manure in the form of decomposed leaves and branches for the lands in the lower catchment.
- Adivasi farmers' knowledge and skill of farming were traditionally based on the intricate know-how of interdependence of forest and farming system shaped by other natural phenomena such as rainfall, sunlight, water, air, etc.
- **Forest degeneration**
- After the forest department was established, the floral diversity started decreasing gradually, as they started planting / nurturing only timber species. At the same time, with the advent of modern agriculture, seeds of high yielding or hybrid varieties along with chemical fertilizers and pesticides gave the farmers an assurance of higher yield.
- The farmers started practicing what the seed, fertilizer and pesticide companies prescribed. They gradually became dependent on the inputs supplied by the companies, and no longer needed the intricate knowledge about the forest-farm production system.
- Gradually the farmers forgot their generation-old knowledge and skill – a phenomenon called deskilling. As the deskilled Adivasi community has less attachment and knowledge about forests, they remained passive observers to the decline of their forest.

- **Unconcerned younger generation**
- In general, in the Adivasi villages that fringe the forests, the elderly people were concerned about the decline whilst the younger generation and school-going children had neither the knowledge about the plants in the forest nor were they bothered about the gradual destruction.
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- Creating a biodiversity register using leaves, flowers and barks collected from the forest helped villagers initiate steps to prevent further forest deterioration (Photo by Saurabh Singh)
- During discussions as part of the action research, the elderly raised their concern about the gradual thinning of the forest. They said that, on the one hand, the forest department was planting trees such as sagwan (teak), valued timber, thus replacing other plant species. On the other hand, legal and illegal felling of trees was denuding the forest every day.
- The forest at Jharna Ghughari spreads across 800 hectares. The villagers said that the gradual loss of knowledge among the younger generation about floral diversity and its use in Adivasis' life was the reason for their lack of interest in protecting the forest.
- They said that the last two generations have experienced the consequences in the form of less fodder, less firewood, water scarcity, and loss of medicinal herbs. During discussions, most of the villagers said that they wanted to live in a village where the forest is dense with diverse flora and fauna, and their farmlands are fertile.
- **Forest defenders**
- The villagers came up with a two-pronged plan to conserve the forests. Residents of 11 adjacent villages are dependent on Jharna Ghughari forest. Some of the villagers felled trees illegally. Jharna Ghughari villagers invited residents of the other villages including the village heads to discuss about forest conservation.
- On 1st January 2019, the day of Jangal Mahotsav, an event organized to celebrate forest life, people from two adjacent villages came to Jharna Ghughari. They took an oath to protect their forest. After several

discussions, residents of all the adjacent villages agreed to protect the forest.

- Each of the villages took responsibility to protect a designated part of the forest. They started guarding different parts of the forest to stop illegal felling, and confiscated the axes and cut wooden logs from outsiders coming to cut trees.
- Ramki Bai of Jharna Ghughari village said that people from all the adjacent villages got the message that villagers of Jharna Ghughari were against illegal felling. Hiralal said that this campaign to protect their forest would continue and they would get the management rights of their forest, under Forest Right Act.
- **Biodiversity register**
- Elderly people like Gangaram, who felt that the young generation lacked knowledge about their forest and hence lacked interest in protecting it, decided to educate them about the forest, the numerous species and their uses, the species that were disappearing fast and how they could rejuvenate the forest.
- It was the elderly people like Ramki Bai and Gangaram who organized the walk through the forest On 30th January, to educate the children. They involved Hiralal since he has significant knowledge about their forest.
- The villagers' idea that forests could be protected if the youth knew about the different species and the uses was unique. The method that the elders adopted to transfer this knowledge to the younger generation, through a walk in the forest, was also unique. The walk enabled the creation of a biodiversity registry.
- The awareness enabled the villagers to start guarding the forest. This two-pronged strategy, one for immediately stopping illegal felling of trees, and the other for a continued process of forest rejuvenation through knowledge enhancement and interest creation works well.
- Villagers of Jharna Ghughari plan to take this initiative to nearby villages and involve schools so that a movement can be created to pass on the knowledge through generations towards forest conservation. The forests will thus be rejuvenated and the people of Jharna Ghughari will reside in the village they dream of.