CURIOUS

EDITION : OCTOBER 2020
MONTHLY MAGAZINE ON
ANTHROPOLOGY

E-BOOK

The scientific argument for marrying outside your CASTE

Explained: The Nobel Prize in Chemistry for scissors to edit genes

More and more babies are being born without wisdom teeth

"Curious" seeks to enlighten the spirit of anthropology amongst the students. It provides an opportunity for students to keep them updated about the recent developments in the field of anthropology in a holistic perspective.

Disclaimer: The views expressed in the various articles are those of the authors and they not necessarily reflect the views of Vijetha IAS Academy. The advertisements apart from Vijetha if any added to this document regarding career guidance/books/ institutions shall be verified by such claims.

For corrections/additions kindly write to us at www.vijethaiasacademy.com

> The purpose of anthropology is to make the world safe for human differences.
>
> *-Ruth Benedict*

TABLE OF CONTENTS

PAPER 1

1. New Study of Neanderthal And Denisovan DNA Reveals a Surprising Link to Men Today
2. GTEx Consortium releases fresh insights into how DNA differences govern gene expression
3. Difference Between Race and Racism in Modern Day Medical Practice
4. We've Completely Misunderstood 'Survival of the Fittest,' Evolutionary Biologists Say
5. Neanderthals' Deep and Short Ribcage was Already Present at Birth
6. Human anatomy is evolving at fastest rate for centuries as wisdom teeth vanish and people grow new arteries
7. Past Tropical Forest Changes Drove Megafauna and Hominin Extinctions
8. DOES MATING EXPLAIN VARIATION IN GREAT APE Y CHROMOSOMES?
9. More Humans Are Growing an Extra Artery in Our Arms, Showing We're Still Evolving
10. Monkey fossils from 6.4 million years ago found in China
11. DECIPHERING 'CELL TALK' TO UNDERSTAND OUR EVOLUTION
12. 'Genetic scissors' and rewriting the code of life
13. Seeing evolution happening before your eyes : DNA enhancers more complex than thought
14. Why evolution always goes in one direction
15. Blood type O least vulnerable to Covid, A and AB at most risk: Study
16. Explained: The Nobel Prize in Chemistry for scissors to edit genes
17. Climate Change Likely Drove Our Ancestors to Extinction, Study Finds
18. When Did We Become Fully Human? What Fossils and DNA Tell Us About the Evolution of Modern Intelligence
19. Meteor impact destroyed first human settlement 10,000 years ago
20. Indigenous Bajau People Evolved Larger Spleens for Free-Diving
21. Giants of Madagascar Driven to Extinction by Humans and Climate Change
22. More and more babies are being born without wisdom teeth
23. Homo erectus, not humans, may have invented the barbed bone point
24. Explained: Evolutionary expansion of human neocortex
25. Like Humans, Chimps Prioritize Positive Relationships As They Age
26. Answer to Darwin's question

27. Discover Neanderthal footprints at Iran’s Do-Ashkaft Cave.
28. Denisovan DNA in the genome of early East Asians

PAPER 2

1. Two Centers of Excellence for tribal welfare in partnership with Art of Living.
2. The Appalling Educational Status of Muslims in India Needs Urgent Attention
3. How The Impact Covid-19 Has Reached Tribal Communities In India
4. Why India's local health traditions need to be formalised
5. Involve Traditional Healers In Public Health Initiatives To Mitigate Spread Of COVID-19
6. Indus valley had dairy production way back in 3rd millennium BCE
7. Farming is Indian, not Iranian
8. Discovery of habitation site at Adichanallur is a milestone
9. Data: More than 90% of the ‘Crimes against SCs’ are pending in Courts
10. ‘Lost’ river that ran through Thar Desert 172,000 years ago found
11. Study gives clues to glacier health and Indus valley civilisation
12. Local community key in building resilience among tribal communities: Report
13. Inter-caste marriage isn’t the problem, marrying a Dalit man is!
14. Tigers and tribals: Conservation project displaced 18,493 families in 48 yrs
15. The scientific argument for marrying outside your caste
16. Tribal Rights and Heritage Conservation in the Western Ghats of Karnataka
17. In a Path breaking Initiative, Shri Arjun Munda to Launch Largest Market of Tribal Products ‘Tribes Indiae-Marketplace’ Tomorrow

“Curious” seeks to enlighten the spirit of anthropology amongst the students. It provides an opportunity for students to keep them updated about the recent developments in the field of anthropology in a holistic perspective.

The purpose of anthropology is to make the world safe for human differences.

-Ruth Benedict

New Study of Neanderthal And Denisovan DNA Reveals a Surprising Link to Men Today

Decades of teasing apart Neanderthal DNA has produced an archive of ancient genes that spell out a history of love affairs between estranged branches of humanity's family tree. Until now, the story has been rather lopsided. For whatever reason, the most well preserved material has come from female remains, leaving an entire male genetic history in the dark.Finally, however, Neanderthal (aka Neandertal) men now get to tell their side, thanks to a newly conducting sequencing of their Y chromosome.

Researchers from around the globe collaborated to successfully identify male-specific DNA sequences from the remains of three Neanderthals recovered from sites in modern Russia, Spain, and Belgium.All lived roughly 38,000 to 53,000 years ago, in what's essentially the twilight years of the now extinct humans. These were compared with similar genes in their more eastern cousin, the Denisovan, represented by two sets of Siberian remains from individuals who lived around 70,000 and 120,000 years ago.

If we didn't know any better, we might guess these Neanderthal and Denisovan men would have fairly similar chromosomes. After all, they split from the same stock that divorced modern humans around 800,000 years ago, only their own separation was much more recent – about 400,000 years ago.

That wasn't what the researchers found at all. Rather, the Y chromosome in the Neanderthals was a closer match for ours than it was the Denisovans’. "This was quite a surprise to us," says evolutionary geneticist Martin Petr from the Max Planck Institute for Evolutionary Anthropology, the study's lead author.
"We know from studying their autosomal DNA that Neandertals and Denisovans were closely related and that humans living today are their more distant evolutionary cousins. Before we first looked at the data, we expected that their Y chromosomes would show a similar picture."

This discrepancy implies a swap took place shortly after their separation, exchanging the Neanderthal's original Y chromosome for one more like ours.Exactly why such an exchange took place isn't clear. We know our ancestors couldn't keep their hands off one another (or pretty much any other human population), with frequent genetic mixing events leaving a legacy of DNA in our own genomes today.

But this isn't like leaving behind a small genetic recipe for coping with a disease or malnutrition. It's a whole recipe book that potentially affects a wide range of male sexual and non-sexual characteristics.One possibility is that this version of the Y chromosome was simply doing a better job.

"We speculate that given the important role of the Y chromosome in reproduction and fertility, the lower evolutionary fitness of Neandertal Y chromosomes might have caused natural selection to favour the Y chromosomes from early modern humans, eventually leading to their replacement" says Petr.

Computer simulations showed that relatively small Neanderthal communities scattered across the continent could have easily amassed a bunch of problematic mutations through inbreeding.

A more robust version of a Y chromosome picked up from humans could have added a fertility boost, quickly gaining ground as it was passed from fathers to sons down the family line.

Whoever those chromosome donors were, they eventually petered out themselves. Though more closely related to our modern global community, their bloodlines were also a dead end.

Just getting this level of detail from ancient male bones was a task in itself. Jokes about fragile masculinity aside, the Y chromosome isn't exactly a solid piece of work.

In the study, the researchers put the early human Y chromosomes together by using modern Y sequences as a template for a special set of probes. Clinging to as much shared DNA as they could, the probes also dredged up enough unique sequences to build a complete picture.

It's technology we might be able to use to fill in even more of the missing chapters of the Neanderthal's past.

"If we can retrieve Y chromosome sequences from Neandertals that lived prior to this hypothesised early introgression event, such as the 430,000-year-old Neandertals from Sima de los Huesos in Spain, we predict that they would still have the original Neandertal Y chromosome and will therefore be more similar to Denisovans than to modern humans," says senior author Janet Kelso from the Max Planck Institute for Evolutionary Anthropology.

It's certainly possible, but given how studies like this tend to deliver more twists than any modern reality show, we're sure there'll be a surprise or two waiting in just about any set of male Neanderthal genes we find.

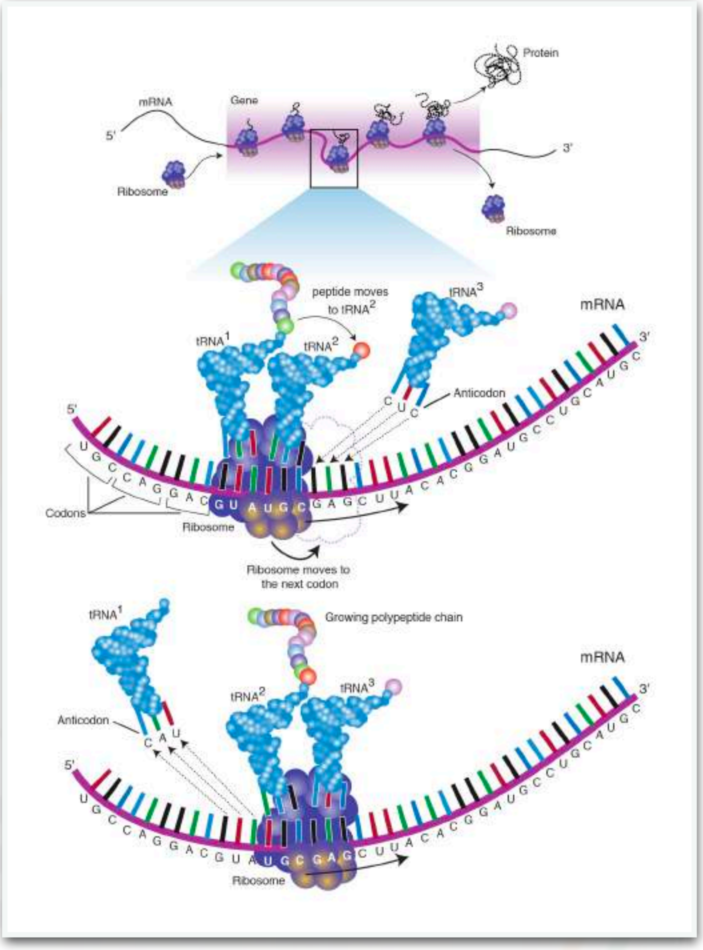
(Source:Science)

GTEx Consortium releases fresh insights into how DNA differences govern gene expression

Scientists from the Genotype-Tissue Expression (GTEx) project, a National Institutes of Health-funded consortium including researchers from the Broad Institute of MIT and Harvard, have completed a wide-ranging set of studies documenting how small changes in DNA sequence can impact gene expression across more than four dozen tissues in the human body.

These studies, released in a set of 15 papers published in Science and other journals, constitute the most comprehensive catalog to date of genetic variations that affect gene expression.

They also highlight the importance of cell type as a factor in understanding how genes are regulated in human tissues, and provide a rich resource for connecting the functional dots between genetic variation and human traits and diseases.



The NIH launched GTEx in 2010 to identify and map quantitative trait loci (QTLs), namely, associations between genetic variants at specific locations in the genome and gene expression within a variety of tissues. Researchers have mapped the vast majority of genetic variants discovered through genome-wide association studies -- which scan the genome to identify variants linked to traits or disease -- to regions of the genome's non-coding DNA (which does not directly instruct the construction of proteins). This suggests that these variants act by influencing genes' expression, rather than by altering the proteins they encode.

To shed light on these relationships, GTEx set out to genotype and measure gene expression in samples of up to 50 tissue types (brain, heart, lung, prostate, uterus, etc.) from as many as 1,000 deceased donors, with a goals of identifying QTLs for as many genes as possible, and determining whether or not their effects are shared among multiple tissues or cell types.

"GTEx attempted to map, across as many individuals as possible, the basis of gene regulation, starting from how a genetic change might affect how a gene is expressed or how a protein is produced," said Kristin Ardlie, who directs the GTEx Laboratory Data Analysis and Coordination Center at Broad, and who served as co-corresponding author on the project's flagship Science paper with Broad computational biologist François Aguet and Tuuli Lappalainen of the New York Genome Center (NYGC).

A resource for the future : The flagship Science paper details the results of the GTEx Consortium's 10 years of work, efforts that have helped reveal much about the immense complexity underlying genetic control of gene expression. It presents the results of the consortium's analysis of 15,201 samples representing 52 tissues, collected from 838 donors -- a dataset nearly twice the size of that behind the most recent prior GTEx papers published in 2017. Each donor underwent whole genome sequencing to identify the genetic variants present, along with RNA sequencing of all tissue samples to establish the pattern of gene expression within the tissue.

The resulting dataset -- available via the GTEx portal -- catalogs QTLs governing the expression of more than 23,000 genes, with multiple QTLs regulating many genes. These included variants that directly affect expression of (eQTLs) or splicing within genes (sQTLs), both for variants close to the genes they control (cis-QTLs) and ones located on chromosomes other than the one harboring their target gene (trans-QTLs).

The data also confirmed that QTLs tend to be either very tissue-specific in their expression effects, or shared quite broadly across all tissues; and revealed some differences in QTL effects between sexes and across populations.

Mechanistically, the findings suggest that QTLs may often affect how a cell's transcription factors bind to the genome at a gene's promoter or enhancer, which in turn affects that gene's expression. And they also provide a baseline for deeper insights into functional roles QTLs play.

"At this larger sample size, and with the diverse tissues and donors we have, we can start to see that there is more than one regulatory effect per gene, and that these differ not just by tissue but by cell type," Ardlie said. "We can start to map at high resolution the variants that actually impact a trait. And we can begin to relate GWAS signals to QTLs and see whether what appear to be random GWAS hits might actually fall within functional elements that affect gene regulation and complex trait and disease phenotypes."

Tuning in

A key focus for this latest set of GTEx studies was to understand how QTLs mapped not just to tissues, but to specific cell types. With hundreds of samples sequenced from many tissues, GTEx researchers found that many genes were influenced by multiple QTLs. This phenomenon, called "allelic heterogeneity," reflects the fact that the GTEx tissue samples represent mixtures of many types of cells.

To gain a more nuanced understanding of QTLs' cellular specificity and learn the extent to which QTLs from different cell types contributed to their tissue-level observations, a GTEx team led by Aguet at Broad and Lappalainen and Sarah Kim-Hellmuth at NYGC used the project's RNA profiling data to computationally identify the cell types present within GTEx's tissue samples. They then checked whether QTLs mapped within those tissues were likely to be specific to the inferred cell types.

These analyses, reported in a companion Science paper, pinpointed thousands of "cell type interaction QTLs," many of which had not been previously characterized. The results indicate that many more cell type specific QTLs are likely to exist but cannot yet be detected without additional samples or improved methods. They also showed that the patterns of QTL sharing and specificity across tissues could be tied back to whether those tissues shared cell types in common.

The findings also revealed that even at the cell type-level, multiple QTLs can influence any given gene, sometimes acting together to boost expression, sometimes in opposition to tamp expression down, depending on an individual's genotype.

"In a sense, QTLs act like a dial on expression, one that can be adjusted up or down," Aguet explained. "One QTL might increase expression, but another might turn it back down a little. It all adds to the complexity of how genetic variation regulates gene expression."

An end, but also a beginning

This collection of studies comprises the consortium's final analysis of the GTEx dataset, though a great deal of work remains to be done and a great deal of knowledge remains to be gleaned from the catalog of QTLs. For instance, Ardlie noted, QTL analysis provides only one lens through which to view the functional implications of genetic variation, one that complements epigenomic, proteomic, and other forms of genomic and transcriptomic analysis.

"GTEx was an ambitious, complex undertaking, and it remains very difficult to access this breadth of tissues from individuals, and in that sense GTEx was unique and has helped pave the way for studies like the Human Cell Atlas," she said. "But we really need large-scale resources like this and others, such as ENCODE, from which we can glean complementary information to get a more complete picture of the molecular mechanisms that drive biology."

(Source:sciencedaily.com)

The Difference Between Race and Racism in Modern Day Medical Practice

Data has consistently shown that Black Americans die at higher rates than White Americans, especially when related to specific health problems. For example, data shows that Black mothers die over twice as frequently as White mothers related to childbirth.1 Data has also demonstrated the Black Americans die at approximately 3 times the rate as their White counterparts in relation to SARS-CoV-2 infections during the COVID-19 pandemic.2

Throughout the history of medicine, there has been much effort in trying to identify something unique and genetic about being Black that might be causing poorer health. When I was in physician assistant (PA) school, one of my Black colleagues would often groan when we were given data from lecturers noting higher rates of morbidity and mortality from specific illnesses for Black patients.

But research and studies that look at racism, and not race, as the cause of these discrepancies has gained increasing acceptance in recent years. Researchers Arline Geronimus and David Williams have been focusing on this issue for decades, and their work continues to receive increased attention and acceptance in the medical community. Geronimus was one of the first to introduce the concept of "weathering." Weathering describes the greater prevalence of maternal morbidity among Black women. In 1992, she proposed the "weathering" hypothesis: "namely, that the health of Black women may begin to deteriorate in early adulthood as a physical consequence of cumulative socioeconomic disadvantage."3

More recently, Geronimus and colleagues have asserted that Black communities and individuals experience premature health deterioration due to the cumulative effects of racism including social, economic, and political oppression. She noted that accumulation of stress from ongoing racial trauma leads to changes in the body that "weather" and erode the physical well-being of non-White communities, predisposing them to accelerated deterioration, leading to premature mortality David Williams has also explored the impact of racism, as opposed to race, on health. One of his most significant observations has been that the health impact of racism is distinct from looking for genetic make-up of specific races, noting: "In recent decades, there has been remarkable growth in scientific research examining the multiple ways in which racism can adversely affect health. This interest has been driven in part by the striking persistence of racial/ethnic inequities in health and the empirical evidence that indicates that socioeconomic factors alone do not account for racial/ethnic inequities in health. Racism is considered a fundamental cause of adverse health outcomes for racial/ethnic minorities and racial/ethnic inequities in health."

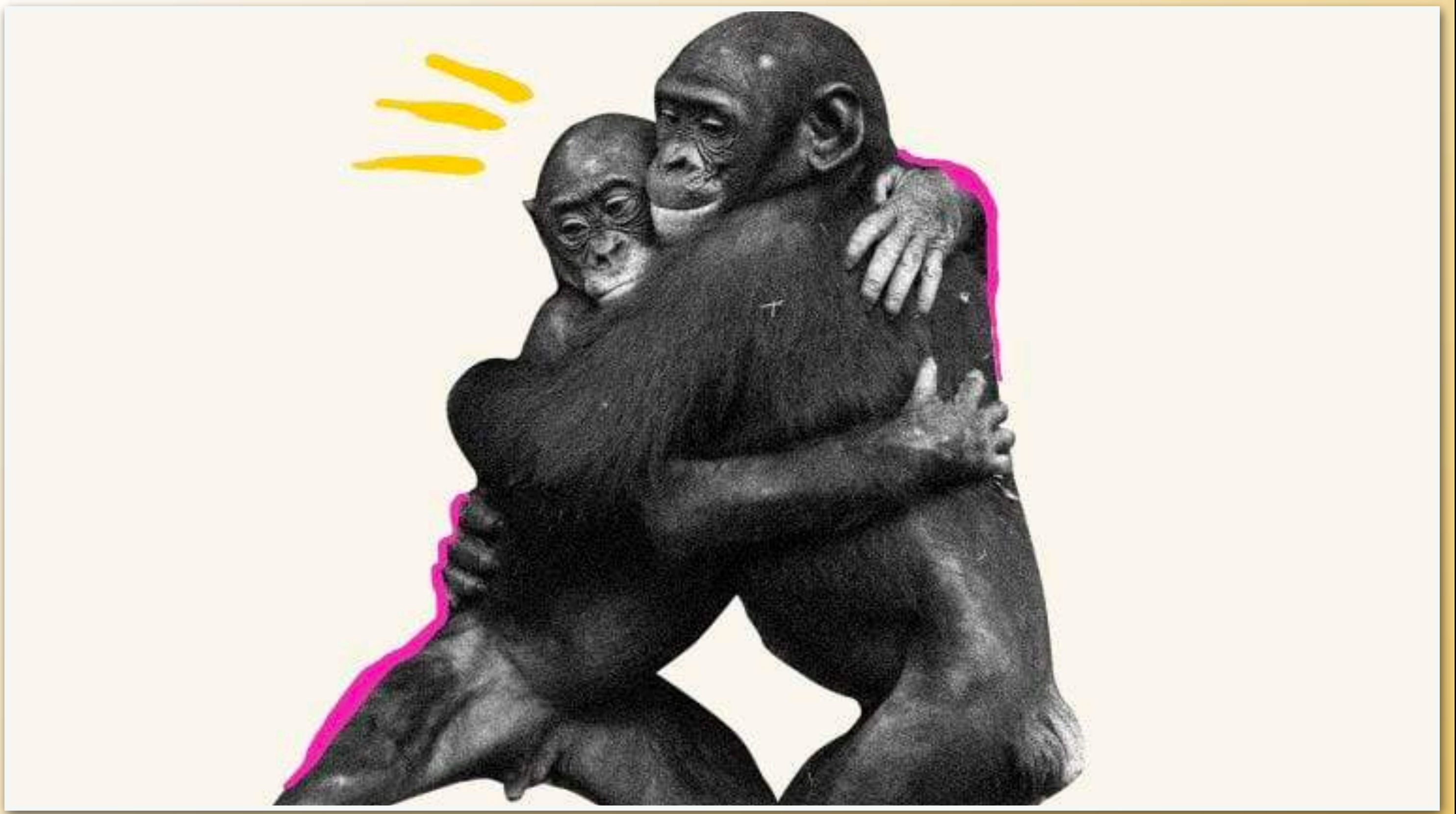
Another intriguing insight into understanding the role of racism and health is a proposal where the medical community began to view and treat racism as a chronic disease. The Baylor University African American Center for Medical Ethics and Health Policy proposed discussed this framework of racism in a blog post.

"Racism is not new. It's unceasing with no treatment or vaccine in sight. A more appropriate diagnosis would be racism as a chronic disease, like cancer or diabetes. But this particular chronic disease does not destruct the body of the individual who is infected. Instead, in America, its effects are felt throughout the entire Black community and are not only physical, but also emotional and social."

The works of Geronimus, Williams, and others offer a fresh and exciting area of examination and have done much to decrease and dismiss racist assertions about the cause of poorer health of Black patients compared with White individuals. It is ironic that it now appears to be true that it's not race, but racism itself, that has played a key role in health inequality.

(Source:clinicaladvisor.com)

We've Completely Misunderstood 'Survival of the Fittest,' Evolutionary Biologists Say



British naturalist Charles Darwin's theory of evolution and natural selection often gets broken down into one simple phrase: 'Survival of the fittest,' which we've come to understand as the survival of the strongest, meanest, most aggressive, and selfish. It's a concept that thrives even today, as invoked in the Covid19 pandemic to shrug our shoulders at the plight of the elderly or to bolster anti-science politicians talking about their strength as a tool to fight off the virus. But evolutionary biologists say we've grossly misunderstood the concept of 'fittest,' and it's hurting our lives and livelihoods.

"Fitness is just your ability to reproduce. So this idea that you had to be the biggest and the strongest and the meanest in order to succeed, it's not what Darwin meant at all," co-author of Survival of the Friendliest, Vanessa Woods, tells the BBC. Woods says constant competition and desire to come out on top, essentially wanting to be an alpha male, doesn't automatically mean success. "It's actually very costly to be the alpha male. It can be incredibly stressful. You're always looking over your shoulder."

Darwin didn't even coin the term 'survival of the fittest,' which was actually thought up by social Darwinist and philosopher Herbert Spencer. Darwin also criticized the 'survival of the fittest' argument often, presenting instead a hypothesis for human evolution that centered sympathy. "Communities, which included the greatest number of the most sympathetic members, would flourish the best, and rear the greatest number of offspring," he wrote. Over the years, evolutionary biologists and psychologists have added cooperation, kindness, friendliness, and niceness to their interpretation of Darwinism, asserting that it's humans' ability to live with each other, feel each other's pain, care for their young and loved ones that make Homo sapiens the species that won out over all the others.

It was definitely not brute strength or bigger brains, evolutionary anthropology expert and co-author of Survival of the Friendliest, Brian Hare, tells the BBC. The Neanderthals, for example, had similarly sized brains as Homo sapiens, they were stronger, had their own culture and technology. Yet, they died out. One theory for Homo sapiens' evolutionary victory suggests nothing to do with how smart or strong humans were, but how friendly their faces looked — short, narrow, without imposing brow ridges that signaled aggression or brute strength.

Competition is also not the natural order of the world, the authors say, invoking their research into bonobos. Bonobos don't kill each other; bonobo females make lasting friendships and don't tolerate aggressive males; the friendliest bonobos are always the ones with the most offspring. Friendliness and cooperation are found in most natural occurrences from how single cells cooperate to make larger organisms to how human beings find affection and commonality with out-groups.

Our interpretation of 'survival of the fittest,' then, is actually hurting how we order social institutions, including schools and workplaces. We value cut-throat competition as an essential tool, often the only tool, for success. This has led to the instilling of a masculinity contest culture in science and other fields. Devaluing traits such as cooperation and friendliness, in favor of a competition that is often alienating, affects non-males particularly intensely, widening the gender gap in terms of opportunity and independence in society. At the end of the day, it is humans' ability to work together that got us this far, and it is continuous friendliness and consideration, even to out-groups, that will see us even farther.

"Sympathy is the strongest instinct that humans have," University of California, Berkeley psychologist, Dacher Keltner, tells Aeon. Let's use it.

Neanderthals’ Deep and Short Ribcage was Already Present at Birth

An international team of researchers has virtually reconstructed the ribcages of four Neanderthal individuals from birth to around 3 years old and found that most of the skeletal differences between the Neanderthal and modern human ribcage are already largely established at birth, the Neanderthal ribcage being deeper and shorter than that of modern humans.

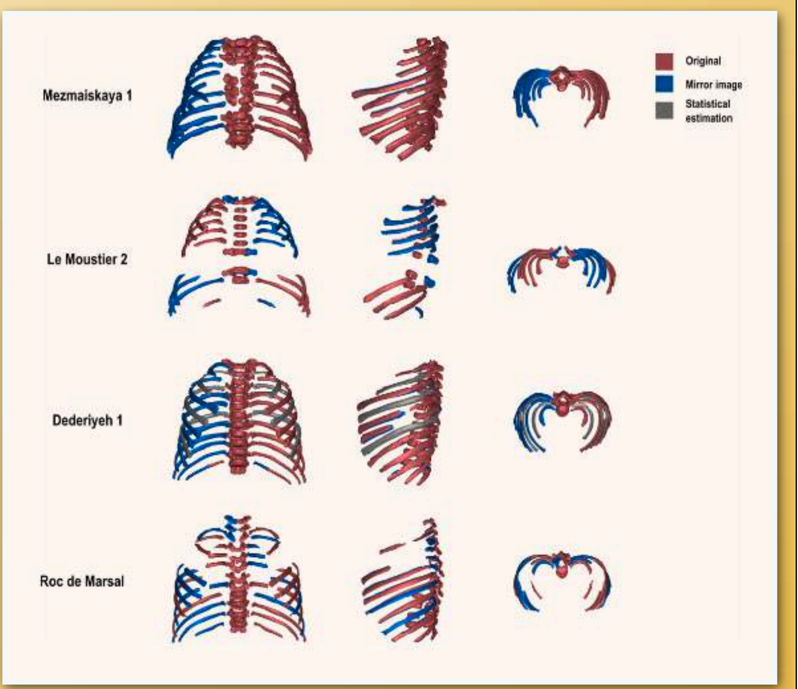
“Despite genetic similarities that allowed for admixture between Neanderthals and anatomically modern humans, there is a well-established consensus that Neanderthals showed significant morphological differences when compared to humans,” said Dr. Daniel García-Martínez from the University of Bordeaux, the Spain’s Museo Nacional de Ciencias Naturales, and the Centro Nacional de Investigación sobre la Evolución Humana, and colleagues.

“Some of these differences are inherited traits from their Pleistocene ancestors, while others are present exclusively in Neanderthals.”

“Neanderthals were highly encephalized and heavy-bodied hominins requiring large amounts of energy.”

“It has been proposed that to fulfill these energetic demands, their ribcage had a large estimated total lung capacity and a different shape that included a shorter, slightly deeper, and larger chest, compared to modern humans.”

To identify potential differences with modern humans in ribcage morphology, the researchers used virtual and statistical methods to reconstruct the ribcage of four young Neanderthals.



Specifically, they reconstructed the ribcages of perinatal individuals of Mezmaiskaya 1 (7 to 14 days old) and Le Moustier 2 (less than 120 days) and infant individuals from Dederiyeh 1 (1.41 years) and Roc de Marsal (2.54 years).The most complete Neanderthal specimen, Dederiyeh 1, revealed the species had relatively longer mid-thoracic ribs compared to its uppermost and lowermost ribs and a spine folded inward toward the center of the body, forming a cavity on the outside of the back.

The scientists compared ribcage development in these specimens with a baseline for modern human development in the first three years of life, which they derived from a forensic assessment of remains from 29 humans.The Neanderthal specimens had consistently shorter spines and deeper ribcages. “The bulky Neanderthal ribcage may have been genetically inherited, at least in part, from early Pleistocene ancestors,” the authors concluded.

Their paper was published in the journal Science Advances.

Human anatomy is evolving at fastest rate for centuries as wisdom teeth vanish and people grow new arteries

BABIES are being born without wisdom teeth as humans evolve faster than at any time in the past 250 years, says a new study.

Shorter faces, extra leg and foot bones and a new artery in the forearm are also signs our bodies are changing.

It poses no health risk - and even offers benefits by boosting blood supply.

It can also be used as a replacement in surgical procedures in other parts of the body.

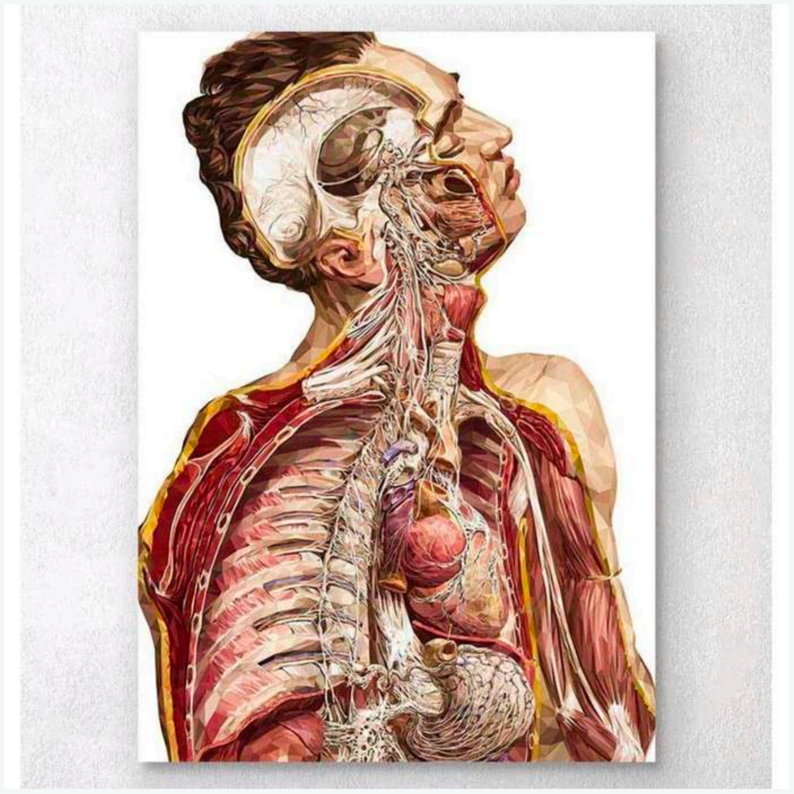
Dr Lucas said: "Since the 18th century, anatomists have been studying the prevalence of this artery in adults and our study shows it is clearly increasing.

"If this trend continues, a majority of people will have median artery of the forearm by 2100."

The researchers investigated the rate of retainment in each generation by analysing published records and dissecting cadavers from individuals born in the 20th century.

Senior author Professor Maciej Henneberg said: "This is 'micro evolution' in modern humans.

"The median artery is a perfect example of how we are still evolving because people born more recently have a higher prevalence of this artery when compared to humans from previous generations."



Humans are evolving faster than at any time in the past 250 years, a report claims Australian scientists say the human race is now experiencing a "microevolution" where changes happen over a shorter period of time.

Other examples of human anatomy changing over time include the increasing absence of wisdom teeth.Dr Lucas said: "As our faces are getting alot shorter there is not as much room for teeth because of smaller jaws.

"This is happening in time as we have learnt to use fire and process foods more. Alot of people are just being born without wisdom teeth."

The study also identified more cases of spina bifida occulta - an opening of the sacral canal which is the bone at the base of the spine.Dr Lucas added: "We are also finding alot of people have extra joints in the feet - abnormal connections between two or more bones.

"There are also more being born with a small bone at the back of the knee called the fabella. None of these things can harm you."

At the start of the millennium, the widely held belief human evolution halted before the reign of the pharoahs.
But recent research has suggested genetic change has occurred 100 times quicker in the past 5,000 years than any other period.

(Source:TheSun)

Past Tropical Forest Changes Drove Megafauna and Hominin Extinctions

Researchers have found that the loss of these grasslands was instrumental in the extinction of many of the region's megafauna, and probably of ancient humans too.

"Southeast Asia is often overlooked in global discussions of megafauna extinctions," says Associate Professor Julien Louys who led the study, "but in fact it once had a much richer mammal community full of giants that are now all extinct."

By looking at stable isotope records in modern and fossil mammal teeth, the researchers were able to reconstruct whether past animals predominately ate tropical grasses or leaves, as well as the climatic conditions at the time they were alive. "These types of analyses provide us with unique and unparalleled snapshots into the diets of these species and the environments in which they roamed," says Dr. Patrick Roberts of the MPI-SHH, the other corresponding author of this study.
The researchers compiled these isotope data for fossil sites spanning the Pleistocene, the last 2.6 million years, as well as adding over 250 new measurements of modern Southeast Asian mammals representing species that had never before been studied in this way.

They showed that rainforests dominated the area from present-day Myanmar to Indonesia during the early part of the Pleistocene but began to give way to more grassland environments. These peaked around a million years ago, supporting rich communities of grazing megafauna such as the elephant-like stegodon that, in turn, allowed our closest hominin relatives to thrive. But while this drastic change in ecosystems was a boon to some species, it also lead to the extinction of other animals, such as the largest ape ever to roam the planet: Gigantopithecus.However, as we know today, this change was not permanent. The tropical canopies began to return around 100,000 years ago, alongside the classic rainforest fauna that are the ecological stars of the region today.

The loss of many ancient Southeast Asian megafauna was found to be correlated with the loss of these savannah environments. Likewise, ancient human species that were once found in the region, such as Homo erectus, were unable to adapt to the re-expansion of forests.

“It is only our species, Homo sapiens, that appears to have had the required skills to successfully exploit and thrive in rainforest environments,” says Roberts. “All other hominin species were apparently unable to adapt to these dynamic, extreme environments.”

Ironically, it is now rainforest megafauna that are most at risk of extinction, with many of the last remaining species critically endangered throughout the region as a result of the activities of the one surviving hominin in this tropical part of the world.

“Rather than benefitting from the expansion of rainforests over the last few thousand years, Southeast Asian mammals are under unprecedented threat from the actions of humans,” says Louys. “By taking over vast tracts of rainforest through urban expansion, deforestation and overhunting, we’re at risk of losing some of the last megafauna still walking the Earth.”

(Source: MAX PLANCK INSTITUTE FOR THE SCIENCE OF HUMAN HISTORY)

DOES MATING EXPLAIN VARIATION IN GREAT APE Y CHROMOSOMES?

New analysis of the DNA sequence of the male-specific Y chromosomes from all living species of the great ape family helps to clarify how the enigmatic chromosome evolved.

A clearer picture of the evolution of the Y chromosome is important for studying male fertility in humans as well as our understanding of reproduction patterns and the ability to track male lineages in the great apes, which can help with conservation efforts for these endangered species.

A team of biologists and computer scientists at Penn State sequenced and assembled the Y chromosome from orangutan and bonobo and compared those sequences to the existing human, chimpanzee, and gorilla Y sequences. From the comparison, the team were able to clarify patterns of evolution that seem to fit with behavioral differences between the species and reconstruct a model of what the Y chromosome might have looked like in the ancestor of all great apes.

A paper describing the research appears in the Proceedings of the National Academy of Sciences.

REPETITION IN THE Y CHROMOSOME

“The Y chromosome is important for male fertility and contains the genes critical for sperm production, but it is often neglected in genomic studies because it is so difficult to sequence and assemble,” says Monika Cechova, a graduate student at Penn State at the time of the research and co-first author of the paper.

“The Y chromosome contains a lot of repetitive sequences, which are challenging for DNA sequencing, assembling sequences, and aligning sequences for comparison. There aren’t out-of-the-box software packages to deal with the Y chromosome, so we had to overcome these hurdles and optimize our experimental and computational protocols, which allowed us to address interesting biological questions.”

The Y chromosome is unusual. It contains relatively few genes, many of which are involved in male sex determination and sperm production; large sections of repetitive DNA, short sequences repeated over and over again; and large DNA palindromes, inverted repeats that can be many thousands of letters long and read the same forwards and backwards.

HUMANS, CHIMPS, AND GORILLAS

Previous work by the team comparing human, chimpanzee, and gorilla sequences had revealed some unexpected patterns. Humans are more closely related to chimpanzees, but for some characteristics, the human Y was more similar to the gorilla Y.

“If you just compare the sequence identity—comparing the As,Ts, Cs, and Gs of the chromosomes—humans are more similar to chimpanzees, as you would expect,” says Kateryna Makova, biology professor and a leader of the research team. “But if you look at which genes are present, the types of repetitive sequences, and the shared palindromes, humans look more similar to gorillas. We needed the Y chromosome of more great ape species to tease out the details of what was going on.”

The team, therefore, sequenced the Y chromosome of a bonobo, a close relative of the chimpanzee, and an orangutan, a more distantly related great ape. With these new sequences, the researchers could see that the bonobo and chimpanzee shared the unusual pattern of accelerated rates of DNA sequence change and gene loss, suggesting that this pattern emerged prior to the evolutionary split between the two species.

The orangutan Y chromosome, on the other hand, which serves as an outgroup to ground the comparisons, looked about like what you expect based on its known relationship to the other great apes.

“Our hypothesis is that the accelerated change that we see in chimpanzees and bonobos could be related to their mating habits,” says Rahulsimham Vegesna, a graduate student and co-first author of the paper.

“In chimpanzees and bonobos, one female mates with multiple males during a single cycle. This leads to what we call ‘sperm competition,’ the sperm from several males trying to fertilize a single egg. We think that this situation could provide the evolutionary pressure to accelerate change on the chimpanzee and bonobo Y chromosome, compared to other apes with different mating patterns, but this hypothesis, while consistent with our findings, needs to be evaluated in subsequent studies.”

GREAT APE ANCESTOR

In addition to teasing out some of the details of how the Y chromosome evolved in individual species, the team used the set of great ape sequences to reconstruct what the Y chromosome might have looked like in the ancestor of modern great apes.

“Having the ancestral great ape Y chromosome helps us to understand how the chromosome evolved,” says Vegesna. “For example, we can see that many of the repetitive regions and palindromes on the Y were already present on the ancestral chromosome. This, in turn, argues for the importance of these features for the Y chromosome in all great apes and allows us to explore how they evolved in each of the separate species.”

The Y chromosome is also unusual because, unlike most chromosomes it doesn’t have a matching partner. We each get two copies of chromosomes 1 through 22, and then some of us (females) get two X chromosomes and some of us (males) get one X and one Y. Partner chromosomes can exchange sections in a process called ‘recombination,’ which is important to preserve the chromosomes evolutionarily. Because the Y doesn’t have a partner, it had been hypothesized that the long palindromic sequences on the Y might be able to recombine with themselves and thus still be able to preserve their genes, but the mechanism was not known.

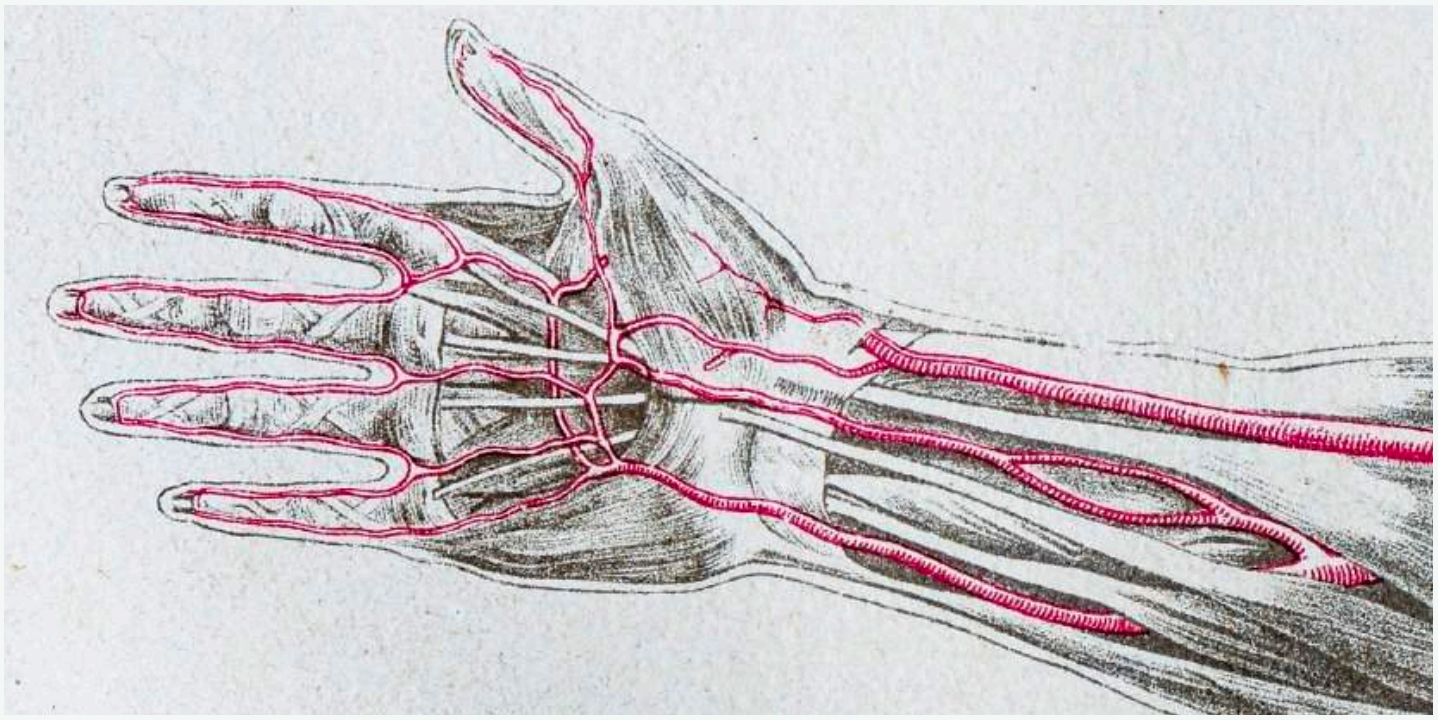
“We used the data from a technique called Hi-C, which captures the three-dimensional organization of the chromosome, to try to see how this ‘self-recombination’ is facilitated,” says Cechova. “What we found was that regions of the chromosome that recombine with each other are kept in close proximity to one another spatially by the structure of the chromosome.”

“Working on the Y chromosome presents a lot of challenges,” says Paul Medvedev, associate professor of computer science and engineering and of biochemistry and molecular biology and the other leader of the research team. “We had to develop specialized methods and computational analyses to account for the highly repetitive nature of the sequence of the Y.”

Support for the work came from the US National Institutes of Health, the US National Science Foundation, the Clinical and Translational Sciences Institute, the Institute of Computational and Data Sciences, the Huck Institutes of the Life Sciences, and the Eberly College of Science of Penn State and from the CBIOS Predoctoral Training Program awarded to Penn State by the National Institutes of Health.

(Source:futurity.org)

More Humans Are Growing an Extra Artery in Our Arms, Showing We're Still Evolving



Picturing how our species might appear in the far future often invites wild speculation over stand-out features such as height, brain size, and skin complexion. Yet subtle shifts in our anatomy today demonstrate how unpredictable evolution can be.

Take something as mundane as an extra blood vessel in our arms, which going by current trends could be common place within just a few generations.Researchers from Flinders University and the University of Adelaide in Australia have noticed an artery that temporarily runs down the centre of our forearms while we're still in the womb isn't vanishing as often as it used to.That means there are more adults than ever running around with what amounts to be an extra channel of vascular tissue flowing under their wrist.

"Since the 18th century, anatomists have been studying the prevalence of this artery in adults and our study shows it's clearly increasing," says Flinders University anatomist Teghan Lucas."The prevalence was around 10 percent in people born in the mid-1880s compared to 30 percent in those born in the late 20th century, so that's a significant increase in a fairly short period of time, when it comes to evolution."

The median artery forms fairly early in development in all humans, transporting blood down the centre of our arms to feed our growing hands.At around 8 weeks, it usually regresses, leaving the task to two other vessels – the radial (which we can feel when we take a person's pulse) and the ulnar arteries.Anatomists have known for some time that this withering away of the median artery isn't a guarantee. In some cases, it hangs around for another month or so.Sometimes we're born with it still pumping away, feeding either just the forearm, or in some cases the hand as well.

To compare the prevalence of this persistent blood channel, Lucas and colleagues Maciej Henneberg and Jaliya Kumaratilake from the University of Adelaide examined 80 limbs from cadavers, all donated by Australians of European descent.The donors raged from 51 to 101 on passing, which means they were nearly all born in the first half of the 20th century.Noting down how often they found a chunky median artery capable of carrying a good supply of blood, they compared the figures with records dug out of a literature search, taking into account tallies that could over-represent the vessel's appearance.The fact the artery seems to be three times as common in adults today as it was more than a century ago is a startling find that suggests natural selection is favouring those who hold onto this extra bit of bloody supply.

"This increase could have resulted from mutations of genes involved in median artery development or health problems in mothers during pregnancy, or both actually," says Lucas.

We might imagine having a persistent median artery could give dextrous fingers or strong forearms a dependable boost of blood long after we're born. Yet having one also puts us at a greater risk of carpal tunnel syndrome, an uncomfortable condition that makes us less able to use our hands.

Nailing down the kinds of factors that play a major role in the processes selecting for a persistent median artery will require a lot more sleuthing.

Whatever they might be, it's likely we'll continue to see more of these vessels in coming years.

"If this trend continues, a majority of people will have median artery of the forearm by 2100," says Lucas.

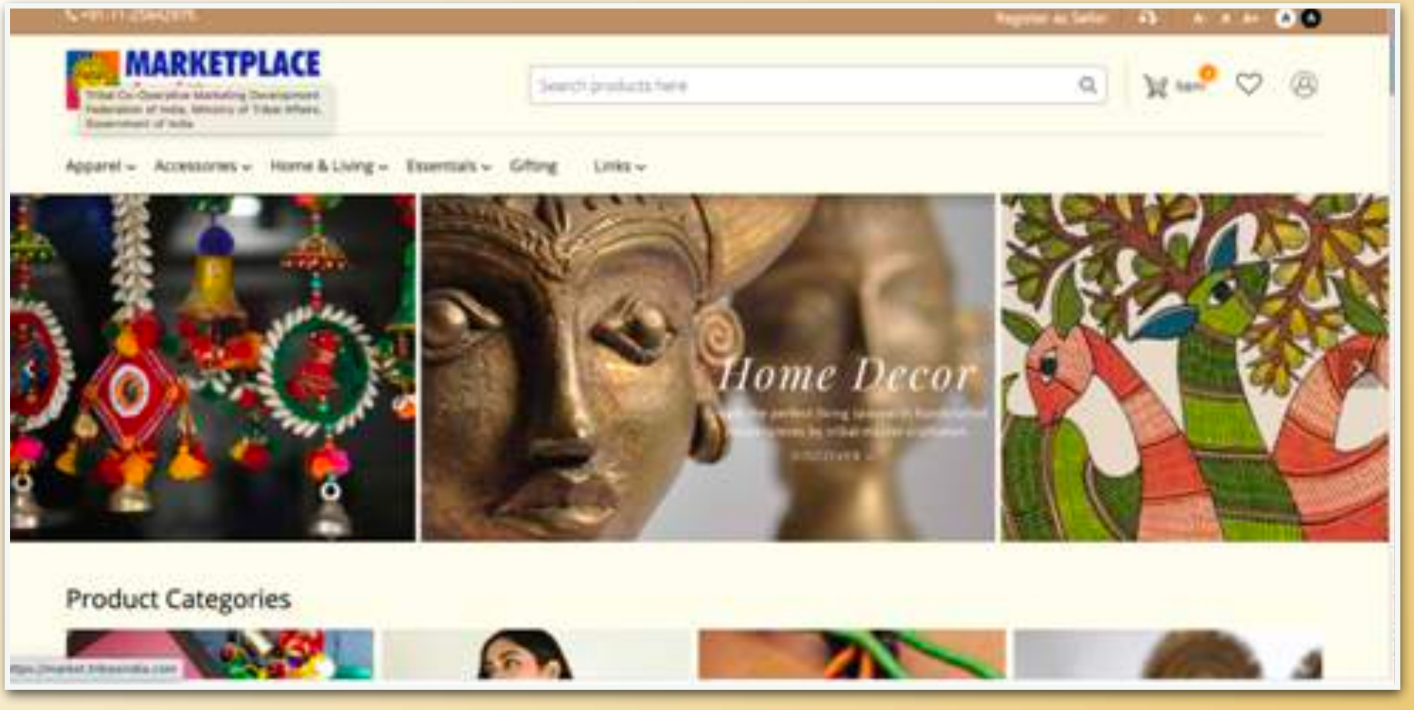
This rapid rise of the median artery in adults isn't unlike the reappearance of a knee bone called the fabella, which is also three times more common today than it was a century ago.

As small as these differences are, tiny microevolutionary changes add up to large-scale variations that come to define a species.

Together they create new pressures themselves, putting us on new paths of health and disease that right now we might find hard to imagine today.

(Source :This research was published in the Journal of Anatomy)

In a Path breaking Initiative, Shri Arjun Munda to Launch Largest Market of Tribal Products 'Tribes Indiae-Marketplace' Tomorrow



Shri Arjun Munda, Union Minister for Tribal Affairs will virtually launch India's largest handicraft and organic products marketplace, Tribes India E-Marketplace (market.tribesindia.com) on the occasion of Gandhi Jayanti(October 2, 2020) in the presence of Smt Renuka Singh, Minister of State, Ministry of Tribal Affairs and Shri Deepak Khandekar, Secretary, Ministry of Tribal Affairs.

Keeping in line with the vision of the Prime Minister of making India Aatmanirbhar and self-reliant,this pathbreaking initiative of TRIFED under Ministry of Tribal Affairs will showcase the produce and handicrafts of tribal enterprises from across the country and help them market their produce/ products directly, is also a major leap towards the digitisation of tribal commerce.On this occasion, Shri Munda will also flag off several other TRIFED initiatives that are aimed to support the tribal brethren. These include the inauguration of Tribes India's 123rd and 124th outlets in Rishikesh and Kolkata; inclusion of new tribal product ranges from the states of Jharkhand and Chhattisgarh; partnership of TRIFED/ Tribes India with Amazon in their Seller Flex program. Sh Arjun Munda will also launch Pakur Honey by Trifed & Tribes India. It is 100% natural honey which is Multi Floral , Forest Fresh, gathered by Santhal Tribals and Vulnerable Pahadhiya tribes from Pakur, Jharkhand.

Tribes India e-Marketplace is an ambitious initiative through which TRIFED aims to onboard 5 lakh tribal producers for sourcing of various handicraft, handloom, natural food products across the country and brings to you the best of tribal produce. The suppliers comprise of individual tribal artisans, tribal SHGs, Organisations/ Agencies/ NGOs working with tribals. The platform provides the tribal suppliers with an Omni-channel facility to sell their goods through their own retailers and distributors, TRIFED's network of Outlets and eCommerce partners as well as their own account in e-Marketplace.

"The E-Marketplace will help us in onboarding large number of Tribals and Artisans and give them the immediate benefits of online trade. It will also facilitate B2B trade connecting tribals dependent on Minor Forest Produces and Medicinal plants to large buyers /manufacturers. This in turn will help ensure livelihoods for the tribal populations of our country and go a long way in making them self-reliant." said Pravir Krishna, Managing Director, TRIFED.

Showcasing tribal products (produce and handicrafts) from all over India one place, the E-marketplace is a state-of-the-art e-commerce platform which can be accessed on the web and also mobile (Android and iOS) for both customers and the tribal vendors registered.

The occasion also will witness the launch of several other TRIFED initiatives and partnerships which will go a long way in furthering the inclusive growth and empowerment of the tribal artisans and suppliers.

Two new Tribes India Outlets in Rishikesh and Kolkata: Taking the Prime Minister's message forward to "Be Vocal for Local" and to promote the livelihood of the tribal artisans through marketing, TRIFED is continuing to expand its retail operations across the country. Two new outlets, Tribes India's 123rd and 124th outlets, will be inaugurated in Rishikesh and Kolkata respectively.

Besides stocking products – arts and crafts from all the 27 Indian states, the outlets will also focus on Van Dhan essentials and immunity boosters – essential products during the ongoing pandemic.

New product ranges from Jharkhand and Chhattisgarh: In addition to these initiatives, two new Tribal product ranges from the states of Jharkhand and Chhattisgarh will be included in the Tribes India product line-up. Tribes India also introduces attractive handicrafts and decorative items, all made by tribal artisans from Chhattisgarh. Besides these, there are spices such as turmeric and coriander powder, pickles and tangy drinks like Imli chuski processed from tamarind in Sukna!

Pakur Honey:The tribal Santhal community of Pakur District, Jharkhand have set an example by exploring the potential of beekeeping commercially. The collection of honey is carried out in an eco-friendly manner on sustainable basis by the local youth. Pure Multiflora Honey is collected from a variety of flowers and floras. It is 100% natural made from pollen and nectar collected by bees. Natural Multiflora honey is a good source of anti-oxidants and antiseptic vitamins, nutrients, enzymes and other herbal properties that no other super-food can provide.

It will be available in two different tastes, i.e., Karanj and Multifloral (Wild)

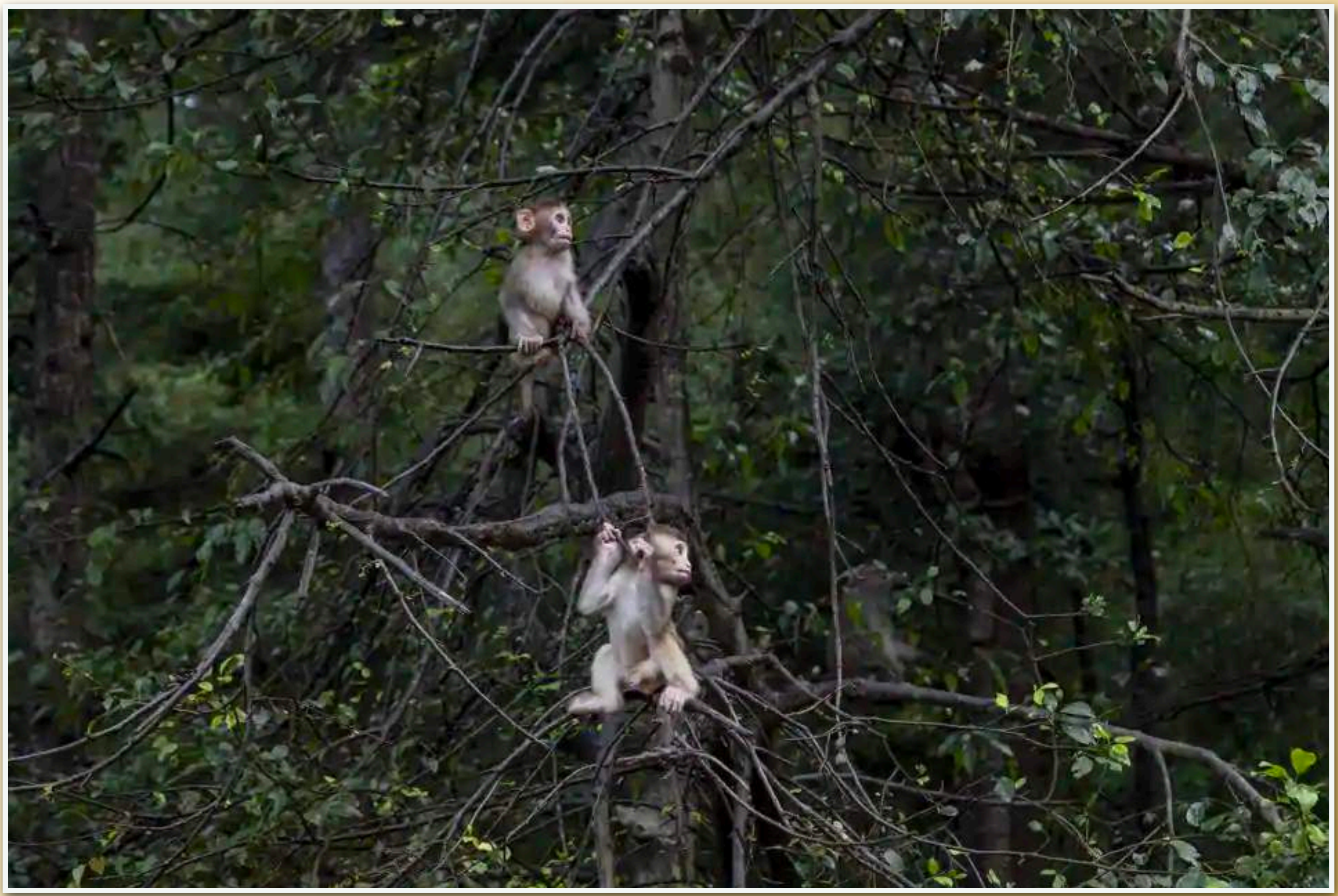
TRIBES INDIA joins Amazon Seller Flex program - As a step further in its long standing partnership with Amazon, which has enabled sellers and artisans to sell Tribes India products across India and the world, and to accelerate the growth of tribal owned and run handicraft businesses, TRIFED (Tribes India) will now be associated with Amazon's Seller Flex Program. This program is intended to share Amazon's best practices in warehousing, inventory management, and shipping with sellers. With Tribes India now a part of the Seller Flex program, the cost of transporting TRIBES India goods to Amazon's warehouses will be minimized which will allow our artisans and sellers greater control over their inventory. With Seller Flex, Tribes India will be able to run its processes from end to end. The support and expertise from Amazon will help empower thousands of artisans and weavers who are part of Tribes India.

TRIFED is striving in its mission to make these initiatives a huge success, which will further enable the economic welfare of these communities and bring them closer towards mainstream development.

(Source:PIB)

Monkey fossils from 6.4 million years ago found in China

The study, published in the Journal of Human Evolution, noted that the unearthed jaw and thigh bones were found in close proximity, "and are probably of the same individual."



Scientists have found that the fossil samples unearthed in a lignite mine in China belong to a monkey species that lived about 6.4 million years ago, a discovery which indicates that they existed in Asia at the same time as apes, and are probably the ancestors of some of the modern primates in the area.

According to the researchers, including Nina G. Jablonski from the Pennsylvania State University in the US, the samples collected from a mine in southeastern Yunan Province in China are "some of the very oldest fossils of monkeys outside of Africa."

"It is close to or actually the ancestor of many of the living monkeys of East Asia. One of the interesting things from the perspective of paleontology is that this monkey occurs at the same place and same time as ancient apes in Asia," Jablonski noted.

The study, published in the Journal of Human Evolution, noted that the unearthed jaw and thigh bones were found in close proximity, "and are probably of the same individual."

The scientists also uncovered a left calcaneus -- heel bone -- that belongs to the same species of monkey, Mesopithecus pentelicus.

"The significance of the calcaneus is that it reveals the monkey was well adapted for moving nimbly and powerfully both on the ground and in the trees," Jablonski said. "This locomotor versatility no doubt contributed to the success of the species in dispersing across woodland corridors from Europe to Asia," she added. According to the researchers, the lower jawbone and upper portion of the leg bone indicate that the individual was female.

The scientists believe these monkeys were probably "jacks of all trades" able to navigate in the trees and on land, and their teeth indicated they could eat a wide variety of plants, fruits and flowers, while apes eat mostly fruit.

“The thing that is fascinating about this monkey, that we know from molecular anthropology, is that, like other colobines (Old World monkeys), it had the ability to ferment cellulose. It had a gut similar to that of a cow,” said Jablonski.

The monkeys were successful, according to the scientists, since they could eat low-quality food high in cellulose and obtain sufficient energy by fermenting the food and using the subsequent fatty acids then available from the bacteria.

They said a similar pathway is used by animals like cows, deer, and goats.

“Monkeys and apes would have been eating fundamentally different things. Apes eat fruits, flowers, things easy to digest, while monkeys eat leaves, seeds, and even more mature leaves if they have to,” Jablonski said.

“Because of this different digestion, they don’t need to drink free water, getting all their water from vegetation,” she added.

The study noted that these monkeys are the same as those found in Greece during the same time period.

Based on the evidence obtained so far, the researchers believe these monkeys did not have to live near bodies of water, and could survive periods of dramatic climatic change.

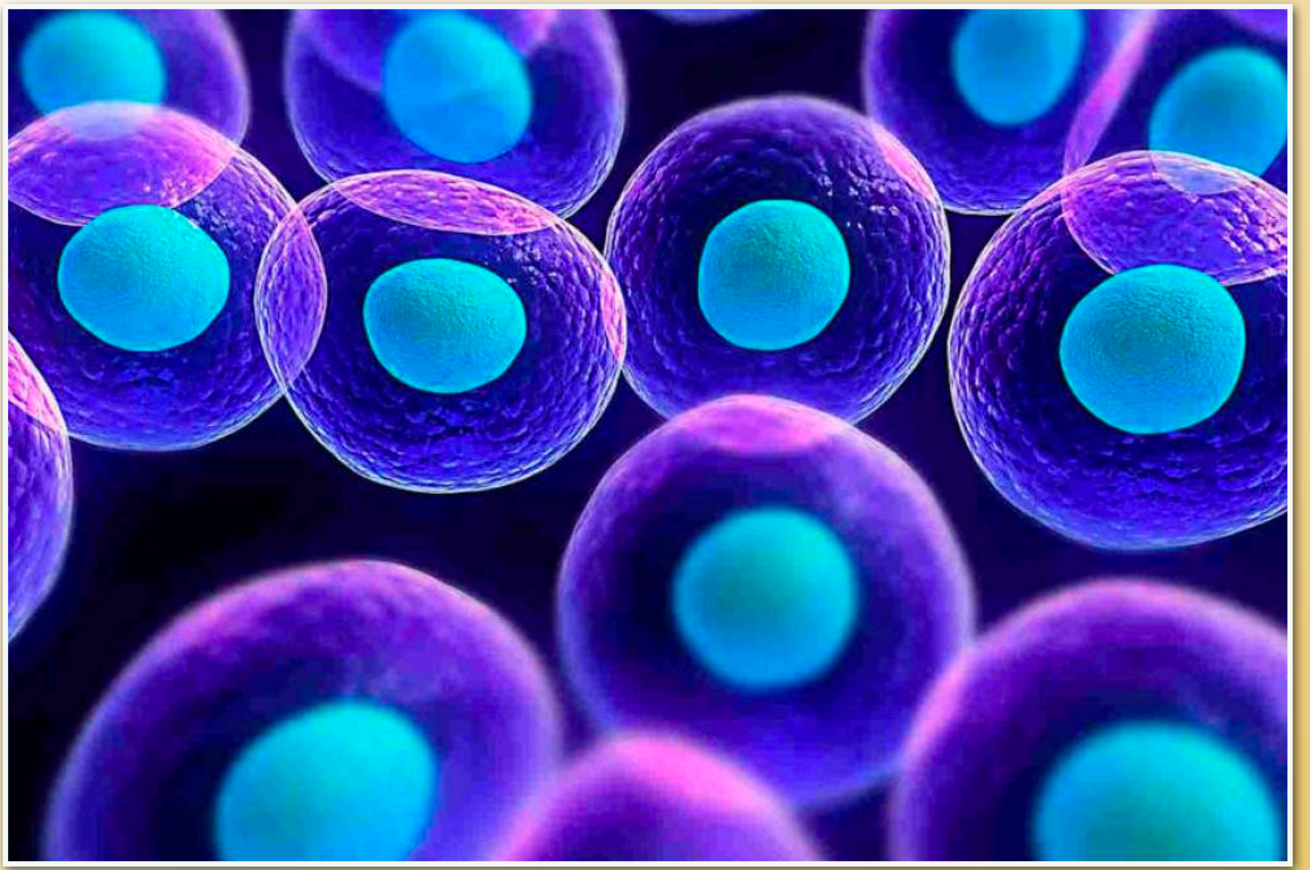
“Suggesting they spread out from a center somewhere in central Europe and they did it fairly quickly. That is impressive when you think of how long it takes for an animal to disperse tens of thousands of kilometres through forest and woodlands.” While there is evidence that the species began in Eastern Europe and moved out from there, Jablonski and her team noted that the exact patterns are unknown.

However, they said the dispersal of the species was rapid. “It shows that once a highly adaptable form sets out, it is successful and can become the ancestral stock of many other species,” Jablonski said.

(Source:HindustanTimes)

DECIPHERING 'CELL TALK' TO UNDERSTAND OUR EVOLUTION

By understanding how cells communicate, we can get insights into how all forms of multicellular life first came to exist and the origins of some of the diseases that still affect us



If you could hop in a time machine and travel back 600 million years, life on earth would be completely unrecognisable. In fact, unless you happened to have a microscope handy, there wouldn't be a whole lot to see. At that point in time, and for billions of years prior, life largely existed as microscopic single cells.
Around this time, though, something momentous began to happen: cells discovered that there was power in numbers. Cells began to aggregate together to form multicellular organisms in ways that were initially simple, but became increasingly complex over time.

Eventually cells started to more precisely organise themselves within these aggregates and adopt specialised roles, like coordinating movement and waste disposal.

These primordial steps ultimately led to the evolution of the varied and diverse organs and tissues now found in our bodies, and in all other multicellular animals.

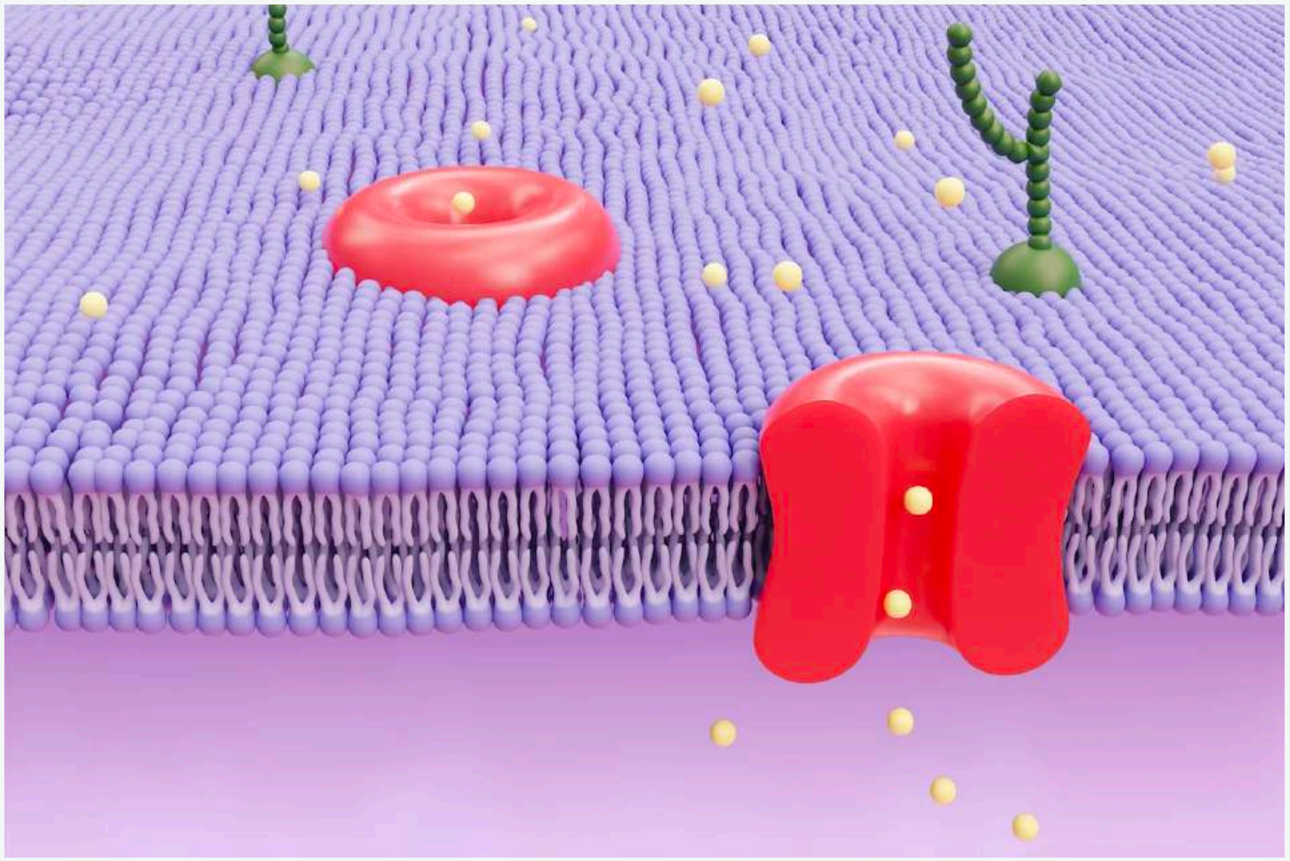
The huge diversity in complex multicellular life that we see today arose from those initial evolutionary leaps.
It is a big change to transition from a self-sufficient free living cell, to a cellular team that has to constantly work together in a highly sophisticated way.In order to achieve this level of coordination, cells in any multicellular organism need to communicate with each other. Only by continually chatting with its neighbours can a cell know where it should be, and what it needs to be doing, at any given point in time.

So how did a cell that's used to living alone learn to hold a conversation? And in what language did it communicate?
Answering these questions is critical if we're to understand how cells learnt to work together in the evolutionary leap to multicellularity. It's an issue that our research team will be tackling over the next five years.To address these questions, we need to better understand the frontier where this cell-cell dialogue occurs: the cell surface.

Cells are bounded by fatty lipid or fat membranes that are, at the most fundamental level, physical barriers that hold the cell together and prevent their constituents from floating away.

However, these membranes are not merely passive barriers. Instead, they are studded with an array of proteins that help the cell to monitor its environment so that it can respond if the conditions outside change.These surface proteins must often cluster in complex ways to function, and the complexity of this surface organisation process ratcheted up a notch when life transitioned from single cell to multicellular.

Suddenly, cells needed to not only organise their surface to look after themselves, but also to coordinate communication with



The changes to cell surface organisation that enabled the sophisticated communication required for multicellular life are largely unknown. This is a question that we aim to decipher because it is so fundamental to understanding our own evolution.

But how do you study an event that happened 600 million years ago? The best way to do this would be to travel back in time and study cells as they evolved into multicellular organisms, but for obvious reasons this isn't feasible (we do have a physicist in our research team, but he isn't that type of physicist).Instead, we study this process by investigating a fascinating group of proteins on the cell surface called tetraspanins. Tetraspanins are cell surface proteins whose main function is to organise everything.

Like Lego blocks, tetraspanins assemble into complex structures by sticking to each other, and to other proteins in the membrane. The net effect is that surface proteins adopt more complex and ordered structures when tetraspanins are around, and they seem to preferentially organise surface proteins needed for cell communication. This includes proteins that control how cells stick together, how they move around each other or how they obtain information from their environment.

The most striking thing about tetraspanins, though, is their history. This protein family is thought to have first evolved in the earliest multicellular organisms.Diverse types of multicellular life – from plants to fungi and animals –retained these tetraspanin proteins through hundreds of millions of years of evolution, which is usually a sign that these proteins are doing something important.

In contrast, few if any single-celled organisms possess tetraspanins. Clearly, something about the way that they organise the cell surface is critically important to multicellular life.The preferential association of tetraspanins with proteins required for communication means that these surface changes likely influence how cells interact.

We will use tetraspanins to gain insights into the surface structures that allow cells to communicate in a multicellular animal. To achieve this, we will map how they organise surface proteins at the nanoscale.

Tetraspanins can be deleted from cells and we will then measure how this alters surface protein organisation by employing an exciting new imaging approach that allows us to monitor the location of hundreds of different individual cell-surface proteins. In parallel experiments, we will also test how tetraspanin deletion functionally changes the way that cells interact.

These experiments will give us clues about what types of surface structures may contribute to the cell-cell dialogue. We can then specifically block these individual surface patterns using precisely fabricated nanoparticles, and see how this alters cell-cell interactions.

These surface patterns may form the 'words' of the cellular conversation and, by blocking them, we can measure their individual contribution to information transfer between cells.At the most philosophical level, answering questions surrounding the evolution of multicellularity helps us understand how we, and all other forms of multicellular life, first came to exist. And this is our primary motivation in doing this research.

However, almost all fundamental research has wide-ranging downstream implications.Our research will employ immune cells as a model system to study cell-cell communication, meaning that we're also aiming to gain fundamental insights into how immune cells communicate as a by-product of this work.

In particular, we will map how surface structures on important immune cells called 'dendritic cells' instruct another key immune cell type – called 'T cells – to fight or ignore a threat, like an infection.This could have future implications for understanding how the immune system functions in health and disease.

More broadly, a break-down in this cell-to-cell dialogue could underpin other diseases like cancer, where cells often stop listening to the instructions from their neighbours.However, we can't even begin to address these issues until we know exactly what cells are saying to each other.

(Source: Max Planck Institute of Biochemistry)

‘Genetic scissors’ and rewriting the code of life

How does a method for genome editing developed by two women scientists help in tackling diseases? Jacob Koshy

The story so far: The 2020 Nobel Prizes for sciences announced this week made history of sorts when one of it was exclusively shared by two women. Scientists Jennifer Doudna and Emmanuelle Charpentier bagged the Nobel Prize for Chemistry “for the development of a method for genome editing”. The discovery of “one of gene technology’s sharpest tools: the CRISPR/Cas9 genetic scissors” will lead to the emergence of novel biological applications by making it easier to edit genes, and “may make the dream of curing inherited diseases come true”.

What is CRISPR/Cas9?

Much like what Microsoft (MS) Word does for writing, the CRISPR/Cas9 system allows for adding, altering and deleting the genomic code in living beings. Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) are pieces of DNA that bacteria snip off from viruses that once attacked them, much like file names used to store various documents we write in MS Word.

The COVID19 pandemic has brought to the fore the importance of ‘memory cells’, which can quickly produce relevant antibodies to neutralise a repeat infection by a virus. Similarly, the CRISPR are a part of bacteria’s immunological systems that help them in recognising threatening viruses. When they sense a lurking virus, the bacteria produce customised RNA, which is necessary to translate DNA into protein, gleaned from the CRISPR libraries. This also contains Cas (CRISPRassociated) genes that are used to produce enzymes such as Cas9. These enzymes — the Cas9 being a particularly popular one — can be used to chop the DNA of the virus and destroy them.

How can this be used to edit genomes?

Using the tool, researchers can change the DNA of animals, plants and microorganisms with precision. Emmanuelle Charpentier, who is now director, Max Planck Institute for Infection Biology, Berlin, had studied Streptococcus pyogenes, a species of bacteria known to be associated with a range of illnesses such as pharyngitis, tonsillitis and scarlet fever. While studying this, she discovered a previously unknown molecule, tracrRNA. Her work showed that tracrRNA is part of bacteria’s ancient immune system, CRISPR/Cas, that disarms viruses by cleaving their DNA, the Nobel release explains. Dr. Charpentier published her discovery in 2011. The same year, she initiated a collaboration with biochemist Jennifer Doudna, now a professor at the University of California, Berkeley.

“Together, they succeeded in recreating the bacteria’s genetic scissors in a test tube and simplifying the scissors’ molecular components so they were easier to use,” says an explainer on the Nobel Prizes website on their work. In a significant experiment, they reprogrammed the genetic scissors. “In their natural form, the scissors recognise DNA from viruses, but Charpentier and Doudna proved that they could be controlled so that they can cut any DNA molecule at a predetermined site. Where the DNA is cut it is then easy to rewrite the code of life,” the note adds.

How is the tool different from other editing systems?

Other genome editing systems like TALENs and ZincFinger Nucleases can do similar jobs, but several users consider the CharpentierDoudna tool more adaptable and easier to use.

It is less than a decade since this system gained wide research and commercial interest, but in the past few years, scientists have been able to make precise singlebasepair changes or larger insertions. Coupled with the availability of genome sequences for a growing number of organisms, the technology allows researchers to find out what genes do, move mutations that are identified and associated with disease into systems where they can be studied and tested for treatment, or where they can be tested in combinations with other mutations.

The commercial potential of the system is so compelling that within years of its development, there was a battle over the ownership of the intellectual property rights of the CRISPR/Cas9 involving the University of California and the Massachusetts Institute of Technology's Broad Institute. The essence of this was that Feng Zhang of the Broad Institute had discovered a way to deploy the system in eukaryotic cells (that make up animal cells), whereas Dr. Doudna’s patent application covered the process more generally. Dr. Zhang’s patent was granted before Dr. Doudna’s application. The patent dispute is still ongoing, and both sides claim victory in terms of the commercial application of the patents.

The prize to CRISPR/Cas9 may be unusual as it is rare for a method to be announced and conferred a Nobel within a decade of its discovery, but it underlines its gamechanging potential. In the last five years, both Dr. Doudna and Dr. Charpentier have been recipients of several important prizes in sciences.

To what uses has the CRISPR/Cas9 been deployed so far?

Earlier this year, a person with hereditary blindness became the first to have a CRISPR/Cas9based therapy directly injected into her body. Geneediting company CRISPR Therapeutics announced in June that two patients with beta thalassemia and one with sickle cell disease would no longer require blood transfusions after their bone marrow stem cells were edited using CRISPR techniques.

Earlier this week, according to a report in Chemistry World, Dr. Doudna launched a new company, Scribe Therapeutics, to begin work on treatments for amyotrophic lateral sclerosis. Reuters reported that Dr. Doudna is already employing CRISPR in the battle against the COVID19 as a cofounder of biotech startup Mammoth, which has tied up with GlaxoSmithKline to develop a test to detect infections. This year, the CSIRInstitute of Genomics and Integrative Biology (CSIRIGIB) in Delhi developed a COVID19 testing kit, nicknamed ‘Feluda’, after the fictional Bengali detective, based on the CRISPR/Cas9 system. There are commercial CRISPRbased home kits that allow amateur researchers to develop their own biotechnology applications, triggering a subculture called ‘biohacking’.

Research is already underway for using proteins that are smaller and more efficient than Cas9, though the system purportedly holds promise for treating more complex diseases, such as cancer, heart diseases, mental illnesses, and the human immunodeficiency virus (HIV) infection.

Is there a possibility of the tool being misused? The most controversial application of CRISPR/Cas9 was in 2018, when Chinese researcher He Jiankui announced that he had used it to create ‘geneedited twins’ Lula and Nana via invitro fertilisation. He used the gene scissors on the children when they were embryos to edit a gene, CCR5, that in its modified form would ostensibly protect the babies from HIV. The HIV uses the CCR5 to infect cells and the modified gene would shut the door against such an entry. He was widely condemned and sentenced to three years in jail, and stripped of his position at Shenzhen University, where he worked.

While he broke a number of medical rules, what is particularly controversial is that the specific mutations that would supposedly protect the children from HIV were not achieved. There were a host of other unintended mutations too. It is not known how these mutations are going to play out over the children's lifetimes and whether they will spread to humanity more widely in due course. Thus, even though the CRISPR/Cas9 system allows a democratic usage in labs across the world to tinker with genomes, it still has not reached the level of precision required to be sure that it does not cause unintentional side effects.

How often have women been awarded Nobel Prizes?

This year has seen a remarkable representation of women. Four women have been named Nobel Laureates in 2020 against five men so far. The Sveriges Riksbank (Sweden’s national bank) Prize for economics, or the 'economics Nobel', will be announced next week. The 20012019 interval has seen the maximum number of women Laureates — 24 — compared to just 11 from 1981 to 2000 and 7 from 1961 to 1980. There were only 12 women Laureates from 1901 to 1960. Only one woman, Marie Curie, has been honoured twice, with the 1903 Nobel Prize in Physics and the 1911 Nobel Prize in Chemistry.

“Many women think that no matter what they do, their work will never be recognized the way it would be if they were a man,” Al Jazeera quoted Dr. Doudna as saying.

“And I think (this prize) refutes that. It makes a strong statement that women can do science, women can do chemistry, and that great science is recognized and honoured.”

(Source:TheHindu)

Tribal Rights and Heritage Conservation in the Western Ghats of Karnataka

This paper is drawn from a larger research study titled "Tribals, Forest Rights and Heritage Conservation: A Study of Western Ghats in Karnataka" sponsored by the Indian Council of Social Science Research, New Delhi. The author would like to thank ICSSR for this. Comments of Tara Nair, Gujarat Institute of Development Research, on an earlier version of the draft have been useful in giving the paper its present shape. The usual disclaimer applies.

The Western Ghats, also referred to as Sahyadri (the benevolent mountains), were declared a world heritage site at the 36th Session of the World Heritage Committee (24 June–6 July 2012) held in Saint Petersburg, Russian Federation. The Western Ghats, running parallel to the western coast of India, are internationally recognised as a region of immense global importance due to their biodiversity, including areas of high geological, cultural and aesthetic value. The ghats traverse through Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu, stretching to a length of 1,609 kilometres, spread on 1,40,000 square kilometres (sq km).

In all, 39 areas consisting of national parks, wildlife sanctuaries and reserved forests form part of the world heritage site (UNESCO 2012). Of these, four are in Maharashtra, 10 in Karnataka, 20 in Kerala and five in Tamil Nadu. Many big and small rivers like Krishna and Cauvery have their sources in this region (MoEFCC 2017). Besides being home for the tribal or indigenous people since ages, the ghats support the subsistence of scores of people living in the western and southern parts of India, directly or indirectly. Certain areas are recognised as world heritage sites because they are so important and special in terms of cultural and natural heritage that it becomes the responsibility of the local government, as also the international community, to protect them collectively for their "outstanding universal value." The recognition makes the local authority/state—where the site is located—responsible for taking measures to protect the site in accordance with the guidelines of the United Nations Educational, Scientific and Cultural Organization (UNESCO).

Effects of Declaration

However, the declaration of Western Ghats as a world heritage site has not been a great development for the tribals living in these areas, as the authorities consider them a threat to the heritage in the parts declared as ecologically sensitive areas (ESA), and prohibit them from entering into these areas. This kind of restriction in their territories, according to C R Bijoy (2014), has been affecting the tribals adversely in every aspect of their lives. Curiously, it presents the contradictory effect of an international organisation, such as the United Nations, because in its Declaration on the Rights of Indigenous People in 2007,1 it had stressed on In India, a year prior to this declaration, a significant legislation recognising the rights of the tribals was enacted in the form of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006—popularly known as the Forest Rights Act (FRA)—which in all its essence was in harmony with the philosophy of accommodating the rights of the tribal people with an inclusive approach. The FRA is also applicable in protected areas, such as reserved forests, national parks and wildlife sanctuaries to which the community had traditional access (Ministry of Tribal Affairs 2014).

As per estimations, two-thirds of those living under the poverty line depend in one or the other way on the forest for their livelihoods (Khare et al 2000). The tribals who are its overwhelming inhabitants practise agriculture along with minor forest produce collection from the forest for their living. In the market, they are exploited by intermediaries like local traders and shop owners, who double up as moneylenders (Bandi 2015), leaving little for them to save for the future. As Sunita Narain (2009) has observed, the tribals in India remain the poorest of the poor despite living in resource-rich forests. At least 5% of them face acute food insecurity for up to six months (Radhakrishna and Ray 2006).

Against this background, this paper examines the position of the tribals in the context of the implementation of the FRA in the heritage sites of the Western Ghats in Karnataka. It touches upon the developments that occurred during the process of -assigning heritage status to the sites located in the state. Towards understanding the issue in its entirety, the reports of the committees chaired by Madhav Gadgil and Krishnaswamy Kasturirangan that studied the conservation of biodiversity in the Western Ghats are discussed briefly. In the way forward, the paper draws attention to the fact that globally, conservation models that vouched for the exclusion of human habitants from ESAs failed to conserve biodiversity. Hence, the paper argues for the adoption of an inclusive approach that has been in vogue for ages.

Implementation of the FRA

A renewed hope for the tribals bloomed when the FRA was legislated. The tribals expected their woes would end with this act because the preamble assured them of "undoing historical injustices" experienced by them over centuries (Ministry of Tribal Affairs 2014). After a decade of its implementation, the scenario presents a dissatisfying picture because the percentage of distribution of claims is only 44.5% (Table 1). Odisha with 67.7%, followed by Kerala (65.5%) and Tripura (63.3%), top the list of 20 states where the FRA is implemented (Ministry of Tribal Affairs 2018). Several reports and studies (Bandi 2016; Kukreti 2017; Mahapatra et al 2018; Gokhale 2019) suggest that the implementation of the act in the country

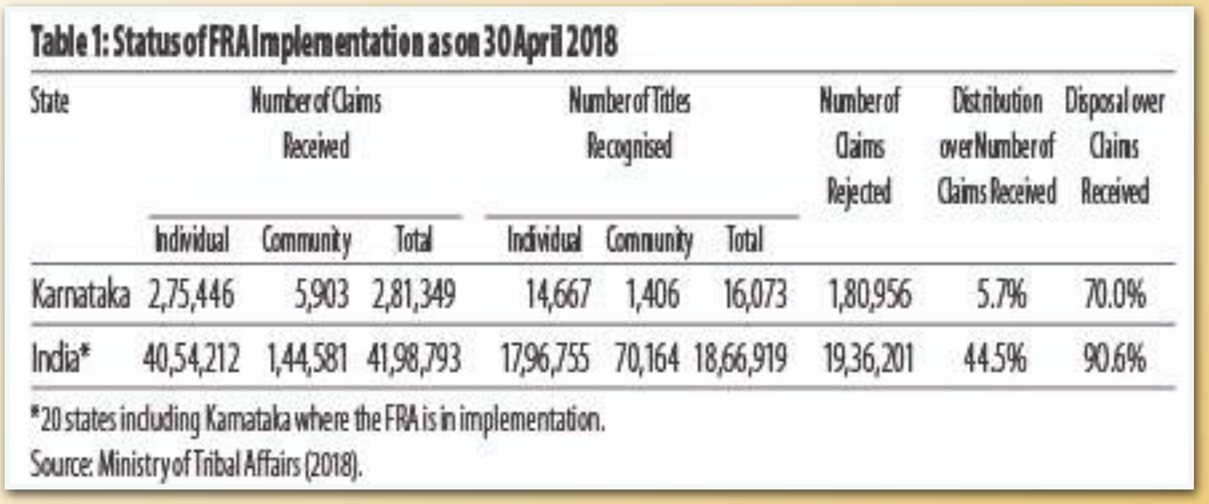


Table 1: Status of FRA Implementation as on 30 April 2018

State	Number of Claims Received			Number of Titles Recognised			Number of Claims Rejected	Distribution over Number of Claims Received	Disposal over Claims Received
	Individual	Community	Total	Individual	Community	Total			
Karnataka	2,75,446	5,903	2,81,349	14,667	1,406	16,073	1,80,956	5.7%	70.0%
India*	40,54,212	1,44,581	41,98,793	17,96,755	70,164	18,66,919	19,36,201	44.5%	90.6%

*20 states including Karnataka where the FRA is in implementation.

Source: Ministry of Tribal Affairs (2018).

Some of the reasons are a lack of awareness about the FRA among the tribals and more so among the particularly vulnerable tribal groups (PVTGs) and pastoralists (Kothari 2011); poor implementation in the protected areas (Fenari and Pathak-Broome 2017), where the most vulnerable tribals reside; and giving priority to individual claims over community forest rights by tribals for a good part of the FRA implementation, when the community forest rights had more potential in providing secure livelihoods (Kalpavriksh 2008). However, a major reason is the indifferent attitude of the forest department and a lack of political will on the part of either the respective state governments or the central government (Bandi 2013, 2019; Mahapatra et al 2018).

Then, there are legal and administrative issues too that contribute to complicating the implementation process further. Existing laws like the Indian Forest Act, 1927 and Forest (Conservation) Act, 1980 were used as pretexts to deny the rights under the FRA (Sunder and Parmeshwarappa 2014), putting an important decision-making body like the district-level committee on an unsure footing, by making its role more challenging while considering the rights. This is frequently observed, despite the FRA clearly mentioning about it superseding all such existing laws that are in conflict with it (Bandi 2017).

Status of the FRA in Karnataka

Karnataka has 19.6% (37,550 sq km) of its total geographical area covered by forests, according to the India State of Forest Report, 2017 (MoEFCC 2017: 212). The six districts (Chamarajanagar: 2,720 sq km; Chikmagalur: 3,936 sq km; Kodagu: 3,251 sq km; Mysuru: 1,029 sq km; Udupi: 2,138 sq km and Uttara Kannada: 8,118 sq km) where the Western Ghats are located have a forest share of 56.4% (MoEFCC 2017: 216–17). Karnataka has a poor record among 20 other states in the country for having less than 10% of claims recognised under the FRA until April 2018. Precisely, it is only 5.7% (Table 1).

More importantly, the figures in Table 1 depict that 70% of the claims are already disposed off. This means that, out of 2,75,446 total claims received under both individual and community forest rights, 30% are yet to be decided. Probably, even if all the remaining claims are recognised, the overall picture leaves scope for speculations about the way the implementation has taken place so far in the state. According to K N Murthy (2019), only 17.5% of applicants in Karnataka were tribals and the remaining 82.5% were other traditional forest dwellers (OTFD). Hence, he argues that the rights of tribals are more or less settled and the remaining applications have failed the scrutiny for the want of valid evidence.

At the national level, the emerging pattern of FRA implementation from protected areas indicates that the livelihoods based on forest-use are treated as contradictory to conservation efforts (Arvind 2019). In Karnataka, the exclusion of the indigenous people is not uncommon either (Kukreti 2017). The lack of documented proof has been the cause of the rejection of claims by the tribal communities like the Siddis (of African descent) in Karnataka. According to Sibi Arasu (2019), this was due to “bureaucratic oversight” and not because the claims were invalid. In this milieu of discouraging developments, there were rare stories of resilience and brave acts put up by the very tribals fighting for their rights. These have been inspiring their counterparts in the state to not lose their hearts when it comes to reclaiming their genuine and just rights.

Tribals versus OTFD

The debate on the inclusion of the OTFD along with the tribals in the FRA has been brewing since the legislation of the act. It is because the entire argument for forest rights was based on the “historical injustice” meted to the indigenous or tribal people in the country. The insertion of OTFD into the scheme of legislation as the act proceeded into final stages of enactment is seen as a deliberate attempt on the part of certain political parties supporting the government of the time (Bandi 2016). OTFD claims cannot just be brushed aside as unjustified because there are examples of communities like Gowlis, Kunbis, Halakki Vakkala and Kare Vakkala, Kunbi and Kulvadi Marathi, who have been residing in the forests of Uttara Kannada for years, depending on them for livelihoods in the form of collecting minor forest produce (cinnamon, kokam or Garcinia indica) (Rathore 2019).

It is also true that the OTFD find it a rigorous task to secure rights under the FRA in comparison to their tribal counterparts, as they have to prove their “continuous existence” for 75 years (Table 2). To add to their woes, the government has allegedly come up with a rule asking them to prove that the submitted documents are equally old (that is, 75 years) (Gokhale 2019). On 25 April 2019, relief came for them in the form of the Karnataka High Court issuing a stay order to stop evacuating such occupants from forestland. The court acknowledged the difficulty in obtaining such documents by these people (Rathore 2019).

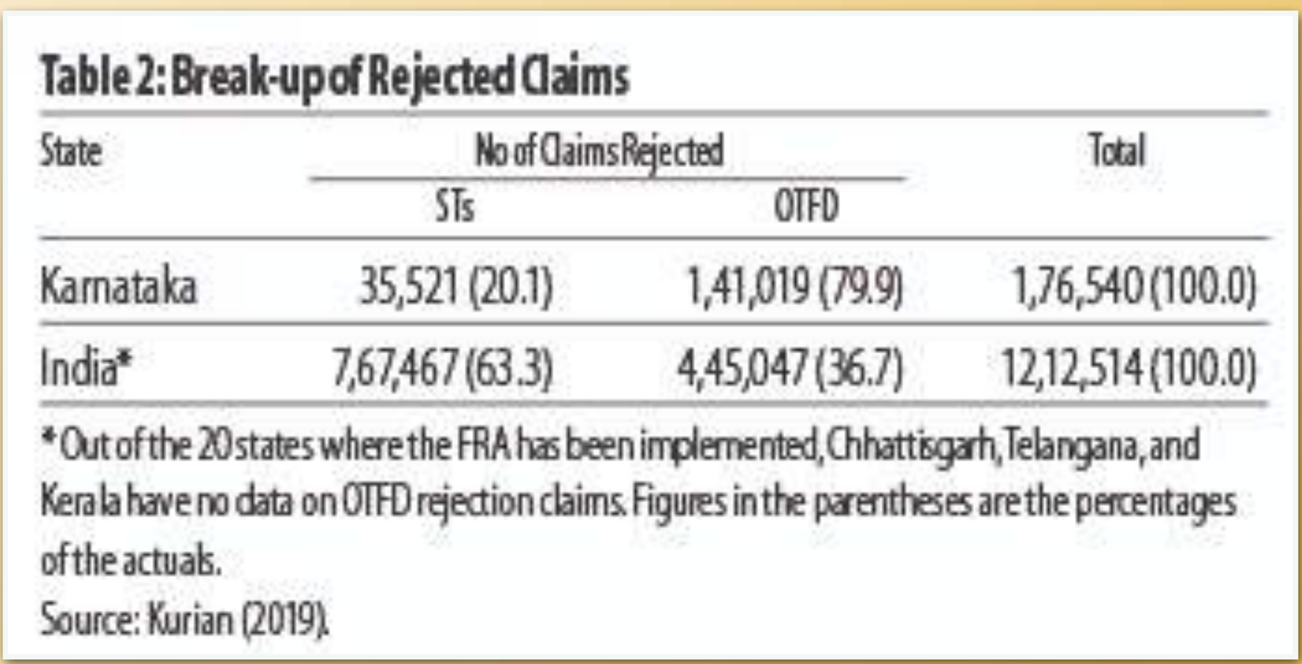


Table 2: Break-up of Rejected Claims

State	No of Claims Rejected		Total
	STs	OTFD	
Karnataka	35,521 (20.1)	1,41,019 (79.9)	1,76,540 (100.0)
India*	7,67,467 (63.3)	4,45,047 (36.7)	12,12,514 (100.0)

*Out of the 20 states where the FRA has been implemented, Chhattisgarh, Telangana, and Kerala have no data on OTFD rejection claims. Figures in the parentheses are the percentages of the actuals.

Source: Kurian (2019).

Assuming that denying OTFD their rights in the forests would help save forests is contestable for two reasons. One, the rights sought by them are not on fresh lands. And two, the threat to the forests comes in the form of huge loss of land when forestland is diverted for non-forest-related activities, such as mining, thermal power plants, dams, roads, railways and irrigation projects. Between 1950 and 1980, illegal or legal encroachments (mostly for agricultural purposes) occurred to a tune of 43 lakh hectares of forestland when forests were in the state list (GoI 1990). Post the enactment of the Forest (Conservation) Act, 1980 also the forestland was diverted to non-forest activities in the name of development. Interestingly, the latest report released by the Forest Survey of India suggests an improved forest cover in the last two years (FSI 2019). Further, the same report placed Karnataka at the top for having improved its forest cover by 1,025 sq km (FSI 2019). If the FRA has been as damaging as it is made out to be, would this development have ever happened?

Issues in World Heritage Sites

There are 184 Scheduled Tribe (ST) communities3 including a significant number of PVTGs4 living in the states5 covered by the Western Ghats. Karnataka has a maximum representation of 50 STs (Ministry of Tribal Affairs 2019). In the total population of 6.11 crore in the state, 6.95% belong to the ST category. About 44.2% of them reside in the districts covering the Western Ghats (Office of the Census Commissioner and Registrar General 2011). Among the 14 tribes who are primitive, two among them are primarily natives of the state (Roy et al 2015). All the 39 heritage sites located in the ghats fall under the jurisdiction of the Ministry of Environment, Forest and Climate Change (MoEFCC—originally Ministry of Environment and Forests), and are administered at the state level by the respective forest departments.

As observed by Marcus Colchester (2014), the relationship between tribal rights and conservation has always been complex. It is true in the context of Karnataka too. When the MoEFCC, along with the Wildlife Institute of India, Dehradun and two other non-governmental organisations based in Karnataka undertook the task of identifying potential sites to declare them of importance to heritage in the Western Ghats, people living in the area expressed their apprehensions about their future (Deccan Herald 2010a, 2010b). They feared restriction of access to the land and resources on which their lives depended and apprehended a lack of representation "in the management structures that would take overall control of the sites" (Bijoy 2014: 224).

The suspicion grew stronger when the World Heritage Committee in its "Statement of Outstanding Universal Value" mentioned about the protection of sites in India through various acts such as the Wild Life (Protection) Act, 1972, the Indian Forest Act, 1927, and the Forest (Conservation) Act, 1980 (IUCN 2011), but did not refer to the FRA. It is also important to mention that the Karnataka government of the time had opposed the nomination of 10 sites6 identified within the state by siding with the local people (Nandi 2018).

Conserving the Western Ghats

In 2010, the MoEFCC had set up a committee named Western Ghats Ecology Expert Panel (WGEEP) under Madhav Gadgil to assess the status of the ecology in the Western Ghats to demarcate the area as ecologically sensitive (WGEEP 2011: 110–14). The objective was to conserve, protect and rejuvenate the Western Ghats region. The panel was to come up with recommendations by following the consultation process with the local people living in the entire ghat region spread across the states. The final report was submitted to MoEFCC on 31 August 2011. However, it came into the public domain only in May 2012 (Vasudeva 2012).7

The significant recommendations of the WGEEP committee included the designation of the entire range of hills as ESA. The 142 talukas covering the Western Ghats were classified into three ecologically sensitive zones (ESZs). The ESZ 1 being the prioritised zone was barred from undertaking any developmental activities such as mining or establishing thermal or hydel plants. From the governance perspective, the committee recommended for establishing a Western Ghats ecology authority (WGEA), a statutory body under MoEFCC to administer the ESZs (WGEEP 2011).

The government found the WGEEP report too difficult to implement for being too rigid on conservation issues. It appointed a 10-member high-level working group headed by Krishnaswamy Kasturirangan in August 2012 to study, review and suggest measures to implement the Madhav Gadgil report. The Kasturirangan report that was submitted to the MoEFCC in April 2013 substantially reduced the coverage of ESA to only 37% of the total Western Ghats area. However, it also recommended a complete ban not only on polluting industries, but also on mining (including sand mining) and quarrying in ESAs. As far as clearances required for power plant projects were concerned, they were to be given after a detailed study. The Kasturirangan report also divided the Western Ghats into cultural and natural landscapes. The former consists of 58% of the ghats, which includes human settlements, agricultural fields and plantations (Sethi 2013).

The major criticism of the Kasturirangan report was on the issue of the categorisation of ESAs, as it was believed that by identifying only 37% of the Western Ghats region as such would dilute the preservation of the environment. Nevertheless, in February 2017, the environment ministry had issued a draft notification accepting certain recommendations of the Kasturirangan report and the MoEFCC declared over 37% of the Western Ghats as ESA under the Environment (Protection) Act, 1986. The conservationists were unhappy as they believed that if the remaining 63% was exposed to developmental - activities, the ESA would be adversely affected (Pardikar 2018).

According to Rishika Pardikar (2018), the reason for the politicisation of the Madhav Gadgil report was mainly that it had recommended a WGEA to take up the role of an administrative authority of the Western Ghats. This development was seen as a ploy to curtail the authority of the political class. Interestingly, the Kasturirangan report too received opposition for recommending powers for bureaucrats rather than the local elected bodies. The present status of ESZs in the Western Ghats is that the National Green Tribunal, which is overseeing the matter, has issued an order on 7 May 2019 directing the MoEFCC to finalise the notification of ESZs within one month (NGT 2019).

In the context of world heritage nomination and the FRA, the WGEEP (2011) had observed that the implementation was far from attaining the objectives of the FRA. Recognising the concerns raised in the United Nations Permanent Forum on Indigenous Issues, it stressed for the participation of the local population in the implementation of the world heritage site proposal to serve the objectives of the UNESCO World Heritage Programme. Yet, the government at the centre hurriedly resubmitted the nomination for world heritage site for the Western Ghats (GoI 2012). Upon assessing the information, the International Union for Conservation of Nature and Natural Resources (IUCN) found the absence of wider support for nomination from the local indigenous groups. It suggested that the Indian government reconsider the identified sites for the nomination based on WGEEP recommendations (IUCN 2012a). Yet, the MoEFCC was busy collecting additional information for submitting it to the World Heritage Committee.

Recognising Tribal Rights

Conflicts between the indigenous people and conservationists emerge when the latter adopt a classical conservationist - approach for protecting the biodiversity or environment by isolating the natural areas from the people (Colchester 2014). The classical conservationists believe that the “resource” is all about controlling, exploiting and managing. However, the - indigenous people who have been living closely with the very surroundings relate with them in a more integrated and spiritual way (Berkes 1999). This presents a wide gulf of understanding between the conservationists and the indigenous people (Colchester 2014).The oldest reserve forest was established by forcefully removing 2,000 local people nearly 1,000 years ago in England (Colchester 2003; Griffin 2008). In brief, this kind of approach results in disturbing the life of the indigenous people. Scholars (Chatty and Colchester 2002; Colchester 2004; Dowie 2009) list an array of rights whose denial can amount to the systematic violation of indigenous people’s rights according to international law. Such violations include undermining their livelihoods, treating people as “poachers,” forced resettlement, breaking symbolic ties with environment, weakening their cultural identities, etc (Colchester 2014: 41).

The Way Forward

In times of threats looming in the wake of increasing population and the destruction of forests in the name of development, conservation of nature, including wildlife, is all the more crucial. It has been established beyond doubt that tribals living in the forest are integral to the biodiversity, and they cannot be a threat to nature (Berkes 1999). The IUCN policy on Conservation and Human Rights for Sustainable Development also urges us to make special efforts to protect the most vulnerable from the infringement of their rights while realising conservation programmes (IUCN 2012b).The UN declaration expects the adoption of a human rights-based approach to its activities affecting indigenous peoples in the management and protection of the world heritage sites (Disko et al 2014). About 16 crore people are estimated to be living in the Western Ghats, whose livelihoods depend on medicinal herb and non-timber forest produce collection and sale (Rehman and Shrivastava 2015). There are no figures available yet to help us specifically analyse how many tribals in the entire region in general and in the heritage sites in particular would be affected by the denial of their rights.
The implementation of the FRA is significant in the context of the declaration of the Western Ghats as a world heritage site, as it not only helps to recognise the rights of the tribals living there for ages, but also contributes to the conservation of biodiversity by including forests more effectively, as observed by Fikret Berkes (1999). The act can be an ideal instrument in realising this objective because, internationally, it is confirmed that the protection of sensitive ecosystems requires the democratic involvement of those who live in and depend on those ecosystems as legally empowered rights holders. - According to the Global Environment Outlook 5 report, biodiversity has decreased across the globe even when protected areas were increasing (UNEP 2012).

This only shows how the old models of conservation that isolated the indigenous people in their habitations in the protected areas have failed to improve biodiversity (UNEP 2012). To make conservation efforts meaningful, interdepartmental coordination in the forest jurisdiction needs to be improved to identify the causes of conflicts between the conservationists and the tribal rights activists. It has to be preceded by building trust between all stakeholders, especially the tribals. For this to happen, it requires more political will and less of politics, because merely legislating progressive acts like the Provisions of the Panchayats (Extension to the Scheduled Areas) Act, 1996 and the FRA only for the implementing agencies to violate them, will not help the cause of either the environment or the people living in it.

(Source:EPW)

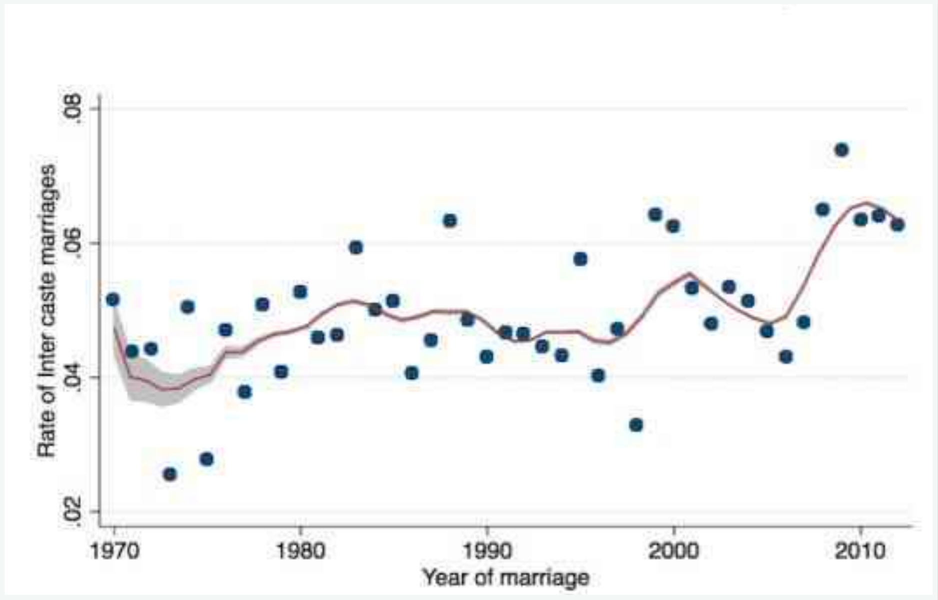
The scientific argument for marrying outside your caste

Community-based marriage systems remain prevalent in India despite rapid urbanisation and the

As India becomes more globalised, there are intense deliberations in orthodox families on the merits of getting married within their own community.

The obvious go-to-market strategy is to ask for family recommendations and visit websites tailored for the community. This is typically followed by patrika and gotra matching, and some family meetings.

But as our scientific understanding of diseases and other heritable attributes increases, we have to question whether continued insistence on community-based marriages is relevant.



Endogamy is the practice of marrying within the same community, and genetic diseases arising out of a limited gene pool are a major consequence of it.

There is a growing need to reflect on these practices and determine what's the best way to choose a life partner.

A tradition gains ground
Getting married within one's community made sense through history, in times of longer commutes between villages and lack of effective communication tools.

Further, our social structures have dictated community behaviours for a long time, from the way communities prepare food to the way they pray (if they choose to).It makes sense that parents prefer to get their children married within communities — it is easier to welcome a family member or send them into familiar traditions.

For example, a non-vegetarian woman marrying into an orthodox vegetarian family would find her diet constrained. Attending family gatherings if you do not speak your partner's native tongue can also make you feel like an outsider. But as India's families become more nuclear, and globalisation transcends traditions, one has to wonder if it makes sense to stick to this community-based marriage system.

Endogamy today

Community-based marriage systems remain prevalent despite rapid urbanisation and the proliferation of smaller families. They are surprisingly more prevalent among rich urban Indians than the rest of the country.The option of choosing from the community is really not wrong or unethical, but it comes today with one major caveat — genetic diseases.

Centuries of endogamy have lead to a limited gene pool within communities. If there is a defective gene in this gene pool, its presence gets amplified across generations. This might not necessarily lead to diseases.Inbreeding led the Habsburg royals to have peculiar jaws and also eventually led to the demise of their rule as the last king could not produce any children.

The presence of genetic mutations that lead to diseases present in a community gene pool puts future generations at heightened risk. Striking examples of such phenomena are present all around the world, from the Ashkenazi Jews predisposed to Tay-Sachs to Arya Vaisya community members who cannot break down a particular anaesthetic molecule.

Interestingly, it is advised that one should not get married into one's own gotra. This system suggests some semblance of cognisance that marrying into one's family could cause adverse reactions. Yet, once a woman gets married, her gotra supposedly changes to her husband's.

Under this system, one is allowed to marry their aunt’s children. The changing of gotra does not mean that the woman’s genes have changed, and you share an equitable gene pool across all your cousins. The custom of marrying cousins further exacerbates the impact of a decadent gene pool.

The freedom to make an informed choice

Community-based marriages should, therefore, come with a warning (actually this is true for any marriage, but endogamy increases the risk). The children of such a marriage may be predisposed to genetic defects and diseases.For a select list of diseases, genetic tests are available to identify the likelihood of a potential child suffering from them.

For example, mutations that cause thalassemia, a blood disorder, are well-known. When both the genes in a child are mutated, the child suffers from a full-blown form of the disease — thalassemia major. If only one gene is mutated, the child suffers from a milder version — thalassemia minor.

Pre-checking of parental DNA for thalassemia-related mutations can predict the likelihood of the child developing thalassemia. If there is a strong likelihood, parents could choose to screen the child during pregnancy or opt for pre-implantation genetic diagnosis to determine and implant a healthy child.Gene-testing is now becoming more common, with the idea of a gene “patrika” — to see whether a couple is genetically compatible — gathering ground.

However, robust scientific data only helps determine risk with regard to a limited number of diseases. There is no scientific evidence to perform genetic matches to pre-determine other attributes such as health, intelligence, etc. Genetic analysis is also not advanced enough to actually suggest matches based on compatibility. The danger with genetic testing, however, is that we have only scratched the surface of how genes work and what we can learn from studying them.

The other end of the genetic compatibility spectrum is to get swayed by untested scientific claims regarding marital compatibility and physical attributes of future children.

India as a society needs our future generations to be healthy, educated and productive individuals. There is a nature and nurture component to their development — endowing them with healthy genes, bringing them up in a peaceful environment, and providing them the opportunities to learn and explore.

But for that we need to give our current generations the education and freedom to make informed choices about their partners.

(Source:ThePrint)

Tigers and tribals: Conservation project displaced 18,493 families in 48 yrs

The displacements happened from critical tiger habitats, according to RTI response accessed by DTE

A total 18,493 families in 215 villages across Protected Areas (PA) in India have been displaced in the 48 years since the inception of Project Tiger, the Union government's flagship scheme for tiger conservation.

The Union Ministry of Environment, Forest and Climate Change shared the information in response to a query filed under the Right to Information (RTI) Act and accessed by Down to Earth.PAs comprise wildlife sanctuaries, national parks and conservation reserves.

The displacements, according to the RTI response, happened from the core areas (also known as critical tiger habitats) created under the Wildlife Protection Act (WLPA), 1972.The population of tigers in the country plummeted by the second half of the 20th century due to an increase in unrestricted killings following the declaration of the species as vermin, hunting and habitat loss.

This loss in population led to the creation of the First Tiger Task Force in 1972. At the end of the 19th century, there were around 40,000 tigers in India, which came down to 1,900 by the time the task force started work, according to the committee's report submitted to the central government in August 1972.

In its recommendations, the task force talked about the creation of "inviolate spaces", which are areas of wilderness undisturbed by humans (mostly forest dwellers).

Although the WLPA created the legal framework for settling rights in PAs, there was no legislative or policy framework to govern resettlement from core areas of national parks.

The mechanism, however, was set in place only in the 2006 amendment of the WLPA — on the basis of the Second Tiger Task Force report of 2005. The amendment, for the first time, brought the idea of "voluntary relocation" within the purview of law.

Experts, however, labelled the data for the number of displacements that took place between 1972 and 2006 shoddy, for there was no mechanism to oversee the displacement process.

Displacement history

Displacements from the PAs increased manifold after the 2006 amendment. This was partly because the state authorities blamed forest-dwelling communities for the local extinction of tiger population in Sariska Tiger Reserve in Rajasthan in 2003-04.

Till 2005, 2,900 families from 80 villages had been displaced, according to the Second Tiger Task Force Report. Between 2005 and 2020, 135 villages with 15,593 families were displaced.

Conflict between the villages in the forest and the state are brewing everywhere — from Rajaji Tiger Reserve in Uttarakhand to Mudumalai Tiger Reserve in Tamil Nadu. A recent study by Pune-based non-profit Kalpavrikah, in collaboration with Environment Justice (EJ) Atlas, mapped out these conflicts in 26 PAs across the country.

Between 2005 and 2020, the budgetary allocations to the Project Tiger increased by 1,150 per cent: To Rs 350 crore in 2019-20 from Rs 28 crore in 2006-07. Project Tiger finances tiger reserves, including relocation projects.

The major jump in the budgetary allocation, however, had happened in 2009-10, immediately after the local extension in Panna Tiger Reserve in 2009: The amount shot to Rs 150 crore in 2009-10 from Rs 28 crore in 2008-09.

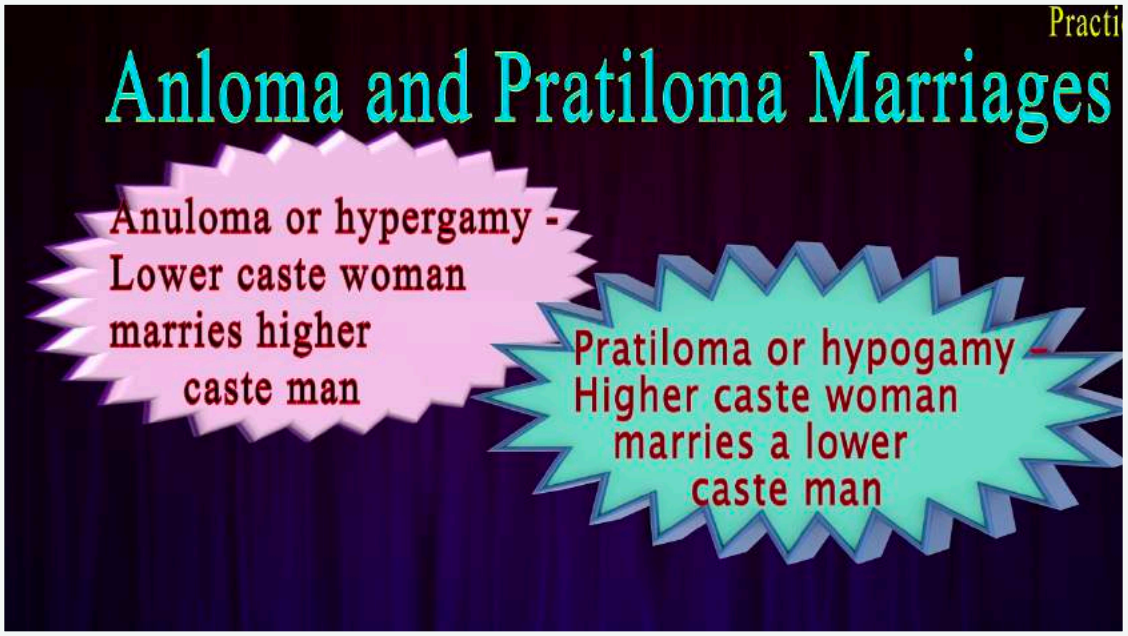
While the allocations increased manifold, the compensation amount for relocation only marginally increased from to Rs 10 lakh in 2006 from Rs 1 lakh in 1986.

Currently, there are still 496 villages with a population of 41,086 forest-dwellers across India’s critical tiger habitats, according to the RTI response.

(Source:Downtoearth)

Inter-caste marriage isn’t the problem, marrying a Dalit man is

An Indian Hindu male cannot bring himself to accept the fact that an adult woman has the liberty to love and marry as per her free will.



Another Dalit youth was murdered this week. The ‘crime’ of 25-year-old Haresh Kumar Solanki was that he had dared to fall in love with and marry a woman from the ‘upper caste’. Eight family members of his wife Urmila, who is two-months pregnant, hacked him to death while a women’s helpline team was trying to negotiate with the father, Dasrath Singh Jhala, to send his daughter back to her husband’s home.

The brutal killing in Varmor village in Gujarat’s Ahmedabad district comes six months after Haresh and Urmila got married against her family’s wishes.

To ensure her Dalit husband doesn’t meet the same fate as Haresh Solanki, Sakshi Mishra from Uttar Pradesh, the daughter of BJP’s Bithari Chainpur MLA Rajesh Mishra alias Pappu Bhartaul, put out a video asking the police for protection from her father and “his dogs (henchmen)”, who have allegedly threatened to kill her husband Ajitesh and his family.

In September last year, Pranay, a Dalit man in Telangana’s Hyderabad, was murdered by a goon allegedly sent by his father-in-law Maruthi Rao. His wife Amrutha was then five-months pregnant.

Have you ever heard or read any news where a Brahmin man has been murdered for marrying a Dalit woman or a woman from a ‘lower caste’? At least, I have never come across an incident of such nature. Why is it that any non-Brahmin woman marrying a Brahmin man doesn’t infuriate either family to the extent of killing the Brahmin groom?

It is quite apparent that the problem does not lie in an inter-caste marriage, and two things help explain this:

1. It is usually the woman’s family that would act on its discomfort over an inter-caste marriage in a violent way. In almost all cases of killing in the name of ‘honour’, it’s the woman’s family that is usually accused of murder. Moreover, a woman’s family harbours dislike for an inter-caste marriage only when the groom belongs to a ‘lower caste’. The dislike is greater if he happens to be a Dalit.

2. The Hindu society dislikes inter-caste marriages but not all inter-caste marriages. Otherwise, there would have been an instance of a Brahmin youth being killed in the name of ‘honour’ for marrying outside his caste.

Hindu tradition is against woman’s liberty

An Indian Hindu male just cannot bring himself to accept the fact that an adult woman has the liberty to love and marry as per her own free will. It does not matter that India’s Constitution gives the right to every adult, irrespective of gender, to choose his/her partner. Manusmriti (the laws of Manu), the Hindu society’s guide book on caste and other such matters, describes this mindset thus:

“पिता रक्षति कौमारे भर्ता रक्षति यौवने.

रक्षन्ति स्थविरे पुत्रा न स्त्री स्वातन्त्र्यं अर्हति” (section I, verse 9.3)

It says: A woman, at no stage in her life, is fit to be independent – the father should guard her until she is married, the husband during her adult life, and the son in her old age.

Even the most revered Hindu epic, Ramcharitmanas, has the author Tulsidas saying that a woman is ‘spoilt’ the moment she is given freedom: ‘जिमि स्वतंत्र होइ, बिगरहि नारी’.

Hindu scriptures allow marrying a girl from lower caste

As social norms changed over time, the Hindu society too was forced to change its attitude towards ‘love marriage’. But it introduced a condition for a woman marrying of her own free will: the man should belong to the same caste. An additional condition is that the financial status (class) should be more or less equal. Some are ready to give up the ‘class’ condition, but no one abandons the ‘caste’ factor. In rare cases involving the ‘progressives’, the caste condition too will be ignored provided the woman marries someone from the ‘upper caste’. Manu has termed it as anulom vivah, and given his acceptance to it. He puts it thus:

“शूद्रैव भार्या शूद्रस्य सा च स्वा च विश: स्मृते.

ते च स्वा चैव राज्ञश्च ताश्चस्वा चाग्रजन्मन” (section III, verse 3.13)

It says: A Shudra can only marry a Shudra woman; a Vaishya can marry any of the two; a Khastriya can marry a woman from his clan or any woman from the clans below him; while a Brahmin is eligible to marry a woman from any of the four clans.

It is clear that as per all the prescribed conditions, the groom’s caste should not be lower than the bride’s caste, otherwise it will be a “pratilom vivah”, which the Hindu religion/vedas don’t permit.

On sex, the Manusmriti clearly delineates that:

कन्यां भजन्तीमुत्कृष्टं न किंचदपि दापयेत्.

जघन्ये सेवामानां तुंसयतो वावसयेदगृहे. (verse 8.365)

It says: A woman is not liable for punishment if she has sex with a man from the ‘higher castes’. But she is due for harsh punishment for having sex with a man from a ‘lower caste’. A section of the society is willing to move past all such conditions but in no case should the groom belong to the ‘untouchable’ caste. In a rare instance where a father may agree to his daughter marrying a man from a ‘lower caste’, the groom is likely to be a powerful politician or an official or some big businessman, which will help improve the financial status (class) of the bride’s family. There is, however, a very small section of society today that has managed to rise above all the discriminatory terms and conditions.

These perspectives help us understand the violent reactions to Urmila and Haresh’s marriage. Being an ‘upper caste’ woman, Urmila, as per Hindu tradition, religious scriptures, culture, and the mindset borne out of these, committed ‘two crimes’ by marrying Haresh, a Dalit. First, by falling in love and marrying of her own free will, she displayed her independence and thus challenged the patriarchal control. Second, by marrying a Dalit man, she indulged in ‘pratilom vivah’, which is against Hindu religion. Haresh’s financial status also meant that Urmila’s father couldn’t have accepted him as a son-in-law from a ‘lower caste’ on any ground.

(Source:ThePrint)

Role of gram sabha, local community key in building resilience among tribal communities: Report

The study documented case studies from Gujarat, Chhattisgarh, Maharashtra, West Bengal, Karnataka, and Odisha.

NEW DELHI: Recognition of rights to use community forests under the Forest Rights Act enabled forest-dependent communities to address the loss of livelihood opportunities that emerged amid the COVID-19 pandemic and the subsequent lockdown in the country, showed a report 'Community Forest Rights and the Pandemic: Gram Sabhas Lead The Way.'

The report was produced by a team of independent researchers of advocacy group Community Forest Rights -- Learning and Advocacy, and Vikalp Sangam initiative -- a platform which focusses on environmental issues.The study documented case studies from Gujarat, Chhattisgarh, Maharashtra, West Bengal, Karnataka, and Odisha.

Tribal communities have been severely impacted by the pandemic and have been marginalised further with large-scale loss of livelihood options.The report pointed out Adivasi and other traditional forest dwelling (OTFD) communities coped better with the crisis where their land and forest rights were recognised.

The role of gram sabhas proved to be crucial when they were been empowered under the legislations of The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 (FRA) and Panchayat Extension to Scheduled Areas Act 1996 (PESA).

In cases where the provisions of the legislations were diligently implemented, the recognition of rights led to overcoming constraints and crisis, it showed.Securing tenure, recognising individual and collective rights, and support for Adivasi and OTFDs towards effective management, restoration and conservation of their customary forests, and autonomy of gram sabhas could reduce the need for distress out-migration as it could create ample livelihood opportunities, the report said.

Ownership rights over minor forest produce such as mahua, bamboo, tendu leaves created sustainable economies for the communities.Around 100 million forest dwellers depend on MFP for food, shelter, medicines and having cash with them, according to the Centre. They derive 20-40 per cent of their annual income from MFP.

The case studies showed examples of gram sabhas coming to the aid of the most vulnerable among the forest communities like women and children, landless families, pastoralists, particularly vulnerable tribal groups (PVTGs) through collective resources generated from community forests.

Convergence of FRA and Mahatma Gandhi National Rural Employment Guarantee Act and scaling up efforts for employment generation from individual forest rights and community forest rights can be an effective strategy to boost local economy in tribal areas, the report suggested.

(Source:TheIndianExpress)

Seeing evolution happening before your eyes : DNA enhancers more complex than thought

Animal diversity and evolution are driven by changes in how our genetic code is expressed. Specific DNA sequences called enhancers control where, when and how strongly genes are expressed during development to create the respective organism. Studying enhancers and how they result in different patterns of gene expression therefore helps us to understand more about how evolution takes place. In addition to driving the evolution of species, enhancers are also relevant to disease: mutations in enhancers are associated with over 80% of all human diseases.

"What we see in terms of biodiversity in nature is caused, to a large degree, by changes in enhancers," explains Justin Crocker, group leader at EMBL Heidelberg. "Understanding -- and subsequently trying to predict -- evolution in the time of climate change, where many animals are under the pressure to adapt quickly to fast changing environments, is an important task."

Despite broad relevance to evolution and disease, researchers still struggle to understand how enhancers are coded in our genomes and how easy it is to reprogram them, for example to prevent or treat diseases. In an attempt to learn more about enhancers, the Crocker group from EMBL Heidelberg performed an extensive study, published in Nature, on a specific enhancer in the model organism Drosophila melanogaster, a species of fruit fly. The group discovered that this enhancer -- which controls the patterns where hair grows on flies -- contains a lot more information than expected.

"Whenever we changed a single letter of the enhancer DNA sequence, we created a significant change to the pattern of gene expression it drove," explains Timothy Fuqua, PhD student at EMBL and first author of the paper. "We also found that almost all mutations to the enhancer alter the gene expression pattern in multiple ways. For example, one mutation controls not only where the expression pattern is within the fly, but also when, and how much of the gene was expressed."

These results were surprising and contradict what had previously been known about enhancers. Researchers thought that these complex gene expression patterns were created by different proteins attaching to the enhancer. A first clue that this might not be true came when Crocker and his team discovered that artificially-produced enhancers did not work as designed. Their most recent results provide support for this idea. "The results showed that developmental enhancers encode a much higher level of information than previously appreciated," Crocker says. "When we received the data, I was honestly shocked! I couldn't believe it and we repeated everything, as we assumed that there has been a mistake."

Importantly, the density of information encoded within the enhancer also constrains how animals can evolve. The study also showed that each possible mutation has a certain possibility for happening. This gives scientists insights into where evolution could lead. "We can use this information to predict patterns in wild fruit flies. Something which has been incredibly difficult to do so far," Fuqua says. "Our results should encourage the community to reassess our assumption about how these regions contribute to human health."While studying enhancers is a well-established field in molecular biology, this study is unique in the sheer number of mutations having been studied. The group created more than 700 unique, randomly generated mutations within a single enhancer. "Nobody ever has studied so many enhancer variants at this level of depth before. It was as if evolution was happening before our very eyes!" highlights Fuqua. To perform so many experiments, the team built -- assisted by the Janelia Research Campus and the Advanced Light Microscopy Facility at EMBL -- a robot to handle the fly embryos used in the study, and an automated microscope pipeline to take images of each mutated line.

"Our study shows that what we have known about enhancers was oversimplified. It shows we have to study enhancers at much greater detail than ever before," Fuqua says. Therefore, in the next step, the team not only wants to expand the pipeline and its throughput, but also plans to study other enhancers and see if they can observe similar effects. "Can what we found be applied to other enhancers or not? We don't know yet. But we plan to find out," concludes Crocker.

(Source:Scienceday)

Lake sediment study gives clues to glacier health and Indus valley civilisation

The results, published in Nature journal last month, indicate that summer monsoon dominated precipitation 21% of the time, whereas the mid-latitude westerlies dominated precipitation 79% of the time and hence have been the main source of moisture during the last 1,100 years

The westerlies play a bigger role than the Indian monsoon in controlling rain, snow and glacier health in the Western Himalayas, a new study has found.

A team of scientists from the School of Environmental Sciences at Jawaharlal Nehru University (JNU) have analysed lake sediments from Chandratal lake in Himachal Pradesh to understand what has been determining glacial retreat, or in some cases glacial advance, in the western Himalayas.The results, published in Nature journal last month, indicate that summer monsoon dominated precipitation 21% of the time, whereas the mid-latitude westerlies dominated precipitation79% of the time and hence have been the main source of moisture during the last 1,100 years.

Glaciers are vulnerable to the impact of climate change, which can lead to several changes in water availability in the region. Understanding past moisture source for rain and snowfall over the Himalayan glaciers can also help understand how climate change will impact them in the future, authors of the study said. Normally, studies on a glacier's life cycle are conducted based on ice cores. "Obtaining ice core from the region is difficult and where it has been obtained it hasn't given much information. So we have retrieved sediments from Chandratal to understand what may have happened.

We know now that the monsoon impact has weakened and it's not bringing as much rain in the northwestern region as it used to be . Climate change has also impacted the westerlies or western disturbances with more cases of extremely heavy rain or snow being recorded. Such changes will impact moisture availability and hence could affect the glacier dynamics and its retreat ," explained AL Ramanathan, professor, JNU.India Meteorological Department (IMD) defines western disturbances as a cyclonic circulation/trough in the mid and lower tropospheric levels or as a low-pressure area which occurs in middle latitude westerlies and originates over the Mediterranean Sea, Caspian Sea, Black Sea and moves eastwards across north India.

A ministry of earth sciences (MoES) report released last year titled Assessment of Climate Change over the Indian Region suggested that there is a significant rising trend in western disturbances and rain extremes. But rain extremes don't necessarily mean availability of more water or ice, Ramanathan said, as they are not evenly distributed.

Ramanathan said the sediment core records from Chandratal are a very useful tool for archaeologists and paleoclimatologists who are studying the fall of the Harappan civilisation. Some scientists believe that the Harappan civilisation fell due to drying of rivers. “Reconstruction of the dynamics of moisture source changes during the Holocene is of great importance to get an insight into societal development (e.g Indus civilisation) and future climate changes,” he added.

“We haven’t conducted any studies on moisture sources but there is a general understanding that the westerlies could have more influence and this study quantifies that. It is difficult to say how the changing pattern of western disturbances will impact glacier health because there may not be a change in precipitation but timing of snowfall or rain is most important. If that changes we can see greater retreat of glaciers,” said Anil Kulkarni, Distinguished Scientist, Divecha Centre for Climate Change, Indian Institute of Science (IISc), Bengaluru.

(Source:HindustanTimes)

Why evolution always goes in one direction

he diversity and complexity of life on Earth is astonishing: 8 million or more living species – from algae to elephants – all evolved from a simple, single-celled common ancestor around 3.5 billion years ago. But does that mean that evolution always and inevitably generates greater diversity and complexity, having a predictable direction?

Charles Darwin identified three ingredients necessary for natural selection to occur. Individuals must be different, so there is variation in the population. They must also be able to pass this variation on to offspring. Finally, individuals must compete for resources that limit the number of offspring they can produce. Individuals with variations that allow them to obtain more resources are likely to produce more offspring like themselves.Evolution also depends on context and environment, which notoriously change constantly in unpredictable ways. For example, fishes who start living and evolving in unlit caves often lose their eyes, because the costs of developing them outweigh their advantages.

So natural selection operates from one generation to the next. It cannot plan ahead or have a goal. In addition, not all evolutionary change is a response to selection, but can be neutral or random. It is not even guaranteed to produce more species, since evolution can occur in a single lineage and this can go extinct at any time. How can we reconcile such an aimless process with the bewildering diversity and complexity we see?

Ecological influence

Ecology and evolution are two sides of the same coin. The environment is not just the physical surroundings of an organism, but also the other biological species with which it interacts.We can see this environmental interaction deep in the history of life. For billions of years, organisms were “stuck” as single cells within the seas. Several groups independently evolved multi-cellularity (perhaps 25 times). But the first animals, plants and fungi with complex development, different tissues and organs only appeared around 540 million years ago, with the Cambrian “explosion” of diversity.

This may have been triggered by increased levels of oxygen in the oceans, which was, in turn, the result of photosynthesis – the process by which plants and other organisms convert sunlight into energy while releasing oxygen – in much simpler forms of life over millions of years.Once animals had attained greater size and evolved guts, hard parts, jaws, teeth, eyes and legs, complex food webs became possible – along with “arms races” between predators and prey. Groups with adaptations that enabled them to live on land opened up even more opportunities. Once out of the bag, these innovations were difficult to “uninvent” – promoting diversity.

The only diagram in Darwin’s “On the Origin of Species” shows species splitting through time. If more species originate than go extinct, then species richness increases. Darwin wondered whether ecological space might simply “fill up” one day.

But so far as we can tell, the species count has been increasing for most of the last 250 million years. Even past natural mass extinctions were only temporary setbacks that may have created even more opportunities for diversity in the long run.

Variation is not random

As organisms evolve more complicated systems of development, they may, however, become less able to modify certain aspects of their anatomy. This is partly because genes, tissues and organs often have several different functions, so it may become difficult to change one for the better without accidentally "breaking" something elsewhere.

For example, nearly all mammals – from giraffes to humans – are stuck with just seven neck bones. Whenever different numbers develop or evolve, they bring other anatomical problems. Birds are entirely different, and seem to evolve new numbers of neck vertebrae with remarkable ease: Swans alone have between 22 and 25. But in general, while evolution produces new species, the flexibility of the body plans of those species may decrease with rising complexity.

Quite often, closely related species end up being selected along similar paths. Moreover, "developmental bias" means that anatomical variation is not produced at random.

Take mammals. They come from a common ancestor, and have taken strikingly similar forms even though they have evolved on different continents. This is another example of the fact that evolution isn't entirely unpredictable – there are only so many solutions to the same physical and biological problems, like seeing, digging or flying.

The future of evolution

Clearly, there is an apparent contradiction at the heart of evolutionary biology. On one hand, the mechanisms of evolution have no predisposition for change in any particular direction. On the other hand, let those mechanisms get going, and beyond some threshold, the interwoven ecological and developmental systems they generate tend to yield more and more species with greater maximum complexity.

So can we expect more diversity and complexity going forward? We are now at the beginning of a sixth mass extinction, caused by humans and showing no signs of stopping – wiping out the results of millions of years of evolution. Despite this, humans themselves are too numerous, widespread and adaptable to be at serious risk of extinction any time soon. It is far more likely that we will extend our distribution yet further by engineering habitable biospheres on other planets.

On other planets, we may one day find alien life. Would that follow the same evolutionary trajectory as life on Earth? From one cell, the transition to multi-cellularity may be an easy hurdle to jump. Although it came quite late on Earth, it nevertheless happened many times. More complicated development with different tissue types evolved in only a few groups on Earth, so may represent a higher bar.

If alien biology makes it over some hurdles, its development is indeed likely to favour patterns of increasing diversity and maximum complexity. But perhaps a dominant, intelligent species like humans will always be bad news for many of the other species on the planets where they evolve.

The astronomer Frank Drake proposed an equation to estimate how many intelligent civilisations we might expect in our galaxy. This contained a term for how long such civilisations might exist before destroying themselves. Drake was pessimistic about this: let's hope he was wrong.

(Source :Matthew Wills is a Professor of Evolutionary Palaeobiology at the Milner Centre for Evolution at the University of Bath.)

Blood type O least vulnerable to Covid, A and AB at most risk: Study

Researchers seek to show why the pandemic is lethal for some, not so for others
New research suggests that people with O blood type are less likely to contract the novel coronavirus. For such blood type, the risk of developing severe symptoms, including organ failure, is also reduced. However, people who have blood types A and AB are the most vulnerable to the infection.The findings of two separate studies aimed to reason why the virus is lethal for some, while others are not even aware they have had it.The study was published in the journal Blood Advances.

First study
The first team gathered information from the Danish health registry data of more than 4,73,000 Covid-19 positive individuals out of the general population of 2.2 million.The findings revealed that there were fewer positive results among those with blood type O — the most ommon while peers with blood type A and AB were the most vulnerable. Rates of infection were similar in these three groups.The trends remained unaffected after the researchers factored in ethnicity, which affects blood group distributions.Scientists find five blood molecules linked to severe Covid-19 outcome in patients

Lead author Dr Torben Barington, of Odense University Hospital, said in a statement: "It is very important to consider the proper control group because blood type prevalence may vary considerably in different ethnic groups and different countries." He added: "We have the advantage of a strong control group — Denmark is a small, ethnically homogeneous country with a public health system and a central registry for lab data. So our control is population-based, giving our findings a strong foundation."

Second study
In the second study, the researchers examined 95 critically ill Covid-19 patients in a hospital in Vancouver.They found that the A and AB blood types were at higher risk of severe symptoms than those with O or B.

The researchers observed that patients with these blood types are more likely to be put on mechanical ventilation. This suggested that they had greater rates of lung injury from the virus — and dialysis for kidney failure.These patients also had an increased risk of organ dysfunction or failure due to Covid-19.

The researchers also noted that people with blood types A and AB did not have longer overall hospital stays. However, they remained in the intensive care unit (ICU) for longer on average.This may also signal a greater Covid-19 severity level, said the Canadian team.Lead author Dr Mypinder Sekhon, of the University of British Columbia, said: "The unique part of our study is our focus on the severity effect of blood type on Covid-19."

The researchers noted in their study: "We observed this lung and kidney damage, and in future studies, we will want to tease out the effect of blood group and Covid-19 on other vital organs. Of particular importance, as we continue to traverse the pandemic, we now have a wide range of survivors who are exiting the acute part of Covid-19, but we need to explore mechanisms by which to risk stratify those with longer-term effects."

(Source:Thehindubuisnessline)

Explained: The Nobel Prize in Chemistry for scissors to edit genes

Emmanuelle Charpentier, Jennifer Doudna share Prize for the chemistry of CRISPR, which allows scientists to 'cut-paste' inside a genetic sequence. This has a variety of potential uses, but also raises ethical concerns.

Its simplicity has often been compared to the 'Cut-Copy-Paste' mechanism in any word processor (or probably, the equally common 'Find-Replace' mechanism), while its uses can potentially transform human beings, and all other life forms. It can potentially eliminate genetic, and other, diseases, multiply agricultural production, correct deformities, and even open up the more contentious possibilities of producing 'designer babies', and bringing cosmetic perfection. In effect, anything that is linked with functioning of the genes can be corrected, or 'edited'.

The CRISPR (short for the rather inelegantly named Clustered Regularly Interspaced Short Palindromic Repeats) technology for gene-editing has been triggering tremendous excitement ever since it was developed in the year 2012, both for the promise that it holds in improving the quality of life, and the dangers of its misuse.

Hundreds of scientists and laboratories have since started working on the technology for a variety of uses. In the last eight years, the technology has brought a string of awards and honours for its developers. On Wednesday, it culminated in the Nobel Prize for Chemistry for the two women who started it all, 52-year-old Emmanuelle Charpentier of France, and 56-year-old American Jennifer Doudna.

It is possibly the only time in the history of Nobel Prize that two women have been declared the sole winners.

The Technology

Editing, or modifying, gene sequences is nothing new. It has been happening for several decades now, particularly in the field of agriculture, where several crops have been genetically modified to provide particular traits.

"But what CRISPR has done is make gene editing very easy and simple, and at the same time extremely efficient. And the possibilities are nearly endless," said Debojyoti Chakraborty who works with this technology at the New Delhi-based CSIR-Institute of Genomics and Integrative Biology.

In essence, the technology works in a simple way — it locates the specific area in the genetic sequence which has been diagnosed to be the cause of the problem, cuts it out, and replaces it with a new and correct sequence that no longer causes the problem.

The technology replicates a natural defence mechanism in some bacteria that uses a similar method to protect itself from virus attacks. An RNA molecule is programmed to locate the particular problematic sequence on the DNA strand, and a special protein called Cas9, which now is often described in popular literature as ‘genetic scissor’, is used to break and remove the problematic sequence. A DNA strand, when broken, has a natural tendency to repair itself. But the auto-repair mechanism can lead to the re-growth of a problematic sequence. Scientists intervene during this auto-repair process by supplying the desired sequence of genetic codes, which replaces the original sequence. It is like cutting a portion of a long zipper somewhere in between, and replacing that portion with a fresh segment.

Because the entire process is programmable, it has a remarkable efficiency, and has already brought almost miraculous results. There are a whole lot of diseases and disorders, including some forms of cancer, that are caused by an undesired genetic mutation. These can all be fixed with this technology. There are vast applications elsewhere as well. Genetic sequences of disease-causing organisms can be altered to make them ineffective. Genes of plants can be edited to make them withstand pests, or improve their tolerance to drought or temperature.“In terms of its implications, this is possibly the most significant discovery in life sciences after the discovery of the double-helix structure of the DNA molecule in the 1950s,” said Siddharth Tiwari of the Mohali-based National Agri-Food Biotechnology Institute who has been using the CRISPR technology on genes of banana plant.

The Winners

Charpentier and Doudna were working independently when they stumbled upon different pieces of information that later came together to be developed into this technology. Charpentier, a biologist then working at a laboratory in Sweden, needed the expertise of a biochemist to process the new information she had got on the genetic sequences in a particular bacteria she had been working on called Streptococcus pyogenes.

She had heard of Doudna’s work at the University of California, Berkeley, and the two happened to meet at a scientific conference in Puerto Rico in 2011, according to an account published on the website of the Nobel Prize. Chapentier proposed a collaboration, to which Doudna agreed. Their research groups then collaborated over long distance over the next year. Within a year they had been able to come out with a revolutionary technology of gene-editing.

Several other scientists and research groups also made vital contributions in the development of this technology. Someone like Virginijus Siksnys, a biochemist working at the Vilnius University in Lithuania, is widely recognised as a co-inventor of this technology. In fact, Siksnys shared the 2018 Kavli Prize in Nanoscience with Doudna and Chapentier for this technology. But the seminal contribution of the two women is undisputed. Their achievement has been recognised through several prestigious awards in the last few years, including the Breakthrough Prize in Life Sciences in 2015 and the Wolf Prize in Medicine earlier this year.

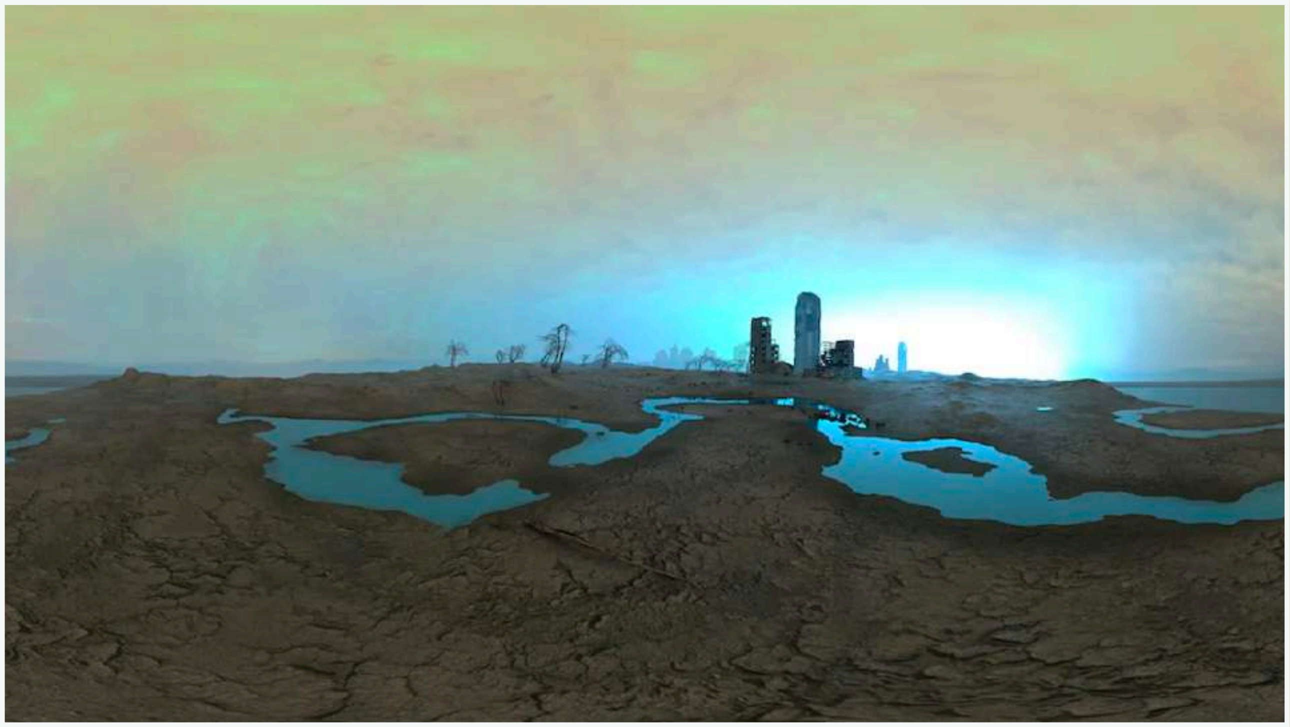
There has been some murmurs in the scientific community about the Chemistry Nobel having gone to biologists. But apparently this is not a new phenomenon. The central role of chemistry in life sciences — at the molecular level, biology is essentially chemistry — has ensured that increasing number of Nobel prizes have recently been awarded for work in the field of biochemistry. In fact, a research paper published earlier this year has pointed out this gradual shift in the nature of Chemistry prize. According to Chemistry World, a news magazine published by the Royal Society of Chemistry, of the 189 scientists awarded with the Chemistry Nobel so far, 59 had worked in the field of biochemistry. This was more than any other branch of chemistry.

Ethical Concerns

In November 2018, a Chinese researcher in Shenzen created international sensation with his claim that he had altered the genes of a human embryo that eventually resulted in the birth of twin baby girls. This was the first documented case of a ‘designer babies’ being produced using the new gene-editing tools like CRISPR, and raised exactly the kind of ethical concerns that scientists like Doudna have been speaking about.

In the case of the Chinese twins, the genes were edited to ensure that they do not get infected with HIV, the virus that causes AIDS. This special trait would then be inherited by their subsequent generations as well. The concerns were not over the reason for which the technology was used as much as the ethics of producing babies with particular genetic traits. Scientists pointed out that the problem in this case, potential infection to HIV virus, already had other alternative solutions and treatments. What made matters worse was that the gene-editing was probably done without any regulatory permission or oversight. Others also pointed out that while CRISPR technology was incredibly precise, it wasn’t 100 per cent accurate, and it is possible that some other genes could also get altered by mistake.Doudna herself has been campaigning for the development of internationally rules and guidelines for the use of CRISPR technology, and has advocated a general pause these kind of applications till such time. ***(Source:TheIndianExpress)***

Climate Change Likely Drove Our Ancestors to Extinction, Study Finds



Could the climate crisis drive Homo sapiens to extinction?

If history repeats itself, then maybe. In a study published in One Earth Thursday, scientists used a combination of the fossil record and climate modeling to determine that three early human species lost a significant chunk of their climate niche right before going extinct.

"It is worrisome to discover that our ancestors, which were no less impressive in terms of mental power as compared to any other species on Earth, could not resist climate change," lead author Pasquale Raia of Università di Napoli Federico II in Napoli, Italy said in a Cell Press press release published by Phys.org. "And we found that just when our own species is sawing the branch we're sitting on by causing climate change. I personally take this as a thunderous warning message. Climate change made Homo vulnerable and hapless in the past, and this may just be happening again."

The researchers looked at six early human species that had existed from the Pliocene to the Pleistocene epochs: Homo habilis, Homo ergaster, Homo erectus, Homo heidelbergensis, Homo neanderthalensis and Homo sapiens. They compared 2,754 archeological findings with a climate emulator that determines rainfall, temperature and other factors over the last five million years in order to determine the climate niche for each species and whether it changed over time.A climate niche is the sweet spot of climate conditions that are best suited to a given species' survival, New Scientist explained.

For Homo erectus, Homo heidelbergensis and Homo neanderthalensis, their climate niche shrunk just before extinction. Homo erectus, for example, went extinct during the last glacial period, which was the coldest period that species had ever experienced, the study said.

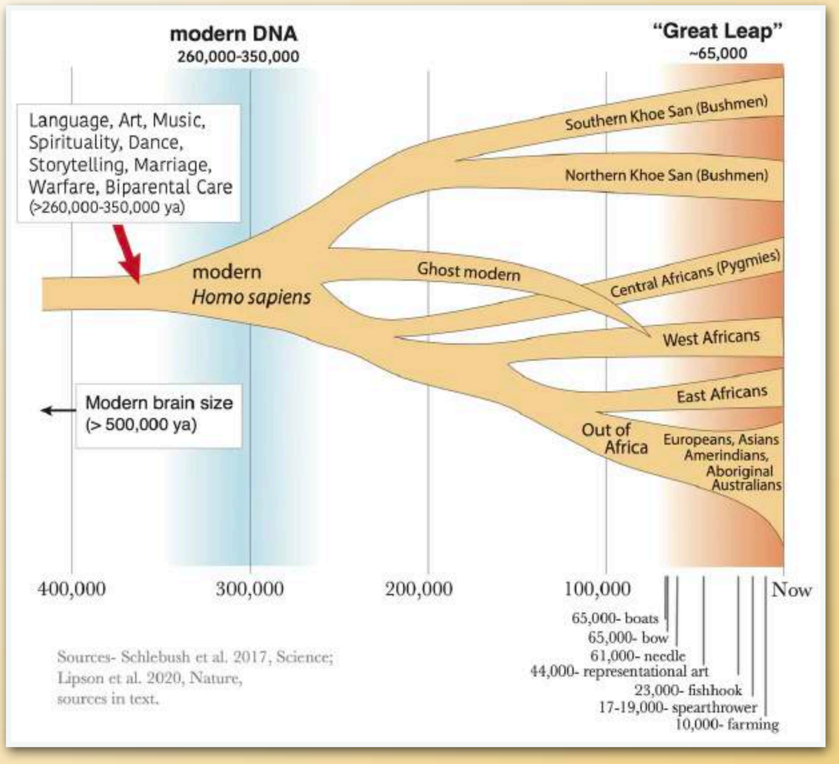
"Our findings show that despite technological innovations including the use of fire and refined stone tools, the formation of complex social networks, and — in the case of Neanderthals — even the production of glued spear points, fitted clothes, and a good amount of cultural and genetic exchange with Homo sapiens, past Homo species could not survive intense climate change," Raia said in the press release. "They tried hard; they made for the warmest places in reach as the climate got cold, but at the end of the day, that wasn't enough."

The researchers do think that, for Neanderthals, direct competition with modern humans combined with climate changes to push the species to the brink.Other researchers who were not involved in the study cautioned that the fossil record is spotty for all of the species studied besides Neanderthals, which might mean that the species had longer lifespans or different climate niches than revealed in the study. “Individuals belonging to these taxa lived at times, and in places, not sampled by the existing fossil record," Bernard Wood at George Washington University in Washington, DC told New Scientist.

The researchers did try to account for this somewhat by testing for two fossil records: a core fossil record including only remains known to belong to each species and an extended fossil record including unidentified remains that could have belonged to more than one species. They found that the climate niche shrunk before extinction for the three species in question no matter which record they used.

(Source:Ecowatch)

When Did We Become Fully Human? What Fossils and DNA Tell Us About the Evolution of Modern Intelligence



Sources- Schlebush et al. 2017, Science; Lipson et al. 2020, Nature, sources in text.

When did something like us first appear on the planet? It turns out there's remarkably little agreement on this question. Fossils and DNA suggest people looking like us, anatomically modern Homo sapiens, evolved around 300,000 years ago. Surprisingly, archaeology—tools, artifacts, cave art—suggest that complex technology and cultures, "behavioral modernity," evolved more recently: 50,000 to 65,000 years ago.

Some scientists interpret this as suggesting the earliest Homo sapiens weren't entirely modern. Yet the different data tracks different things. Skulls and genes tell us about brains, artifacts about culture. Our brains probably became modern before our cultures.

The "Great Leap"

For 200,000 to 300,000 years after Homo sapiens first appeared, tools and artifacts remained surprisingly simple, little better than Neanderthal technology, and simpler than those of modern hunter-gatherers such as certain indigenous Americans. Starting about 65,000 to 50,000 years ago, more advanced technology started appearing: complex projectile weapons such as bows and spear-throwers, fishhooks, ceramics, sewing needles.

People made representational art—cave paintings of horses, ivory goddesses, lion-headed idols, showing artistic flair and imagination. A bird-bone flute hints at music. Meanwhile, arrival of humans in Australia 65,000 years ago shows we'd mastered seafaring.

This sudden flourishing of technology is called the "great leap forward," supposedly reflecting the evolution of a fully modern human brain. But fossils and DNA suggest that human intelligence became modern far earlier.

Anatomical Modernity

Bones of primitive Homo sapiens first appear 300,000 years ago in Africa, with brains as large or larger than ours. They're followed by anatomically modern Homo sapiens at least 200,000 years ago, and brain shape became essentially modern by at least 100,000 years ago. At this point, humans had braincases similar in size and shape to ours.

Assuming the brain was as modern as the box that held it, our African ancestors theoretically could have discovered relativity, built space telescopes, written novels and love songs. Their bones say they were just as human as we are.

Because the fossil record is so patchy, fossils provide only minimum dates. Human DNA suggests even earlier origins for modernity. Comparing genetic differences between DNA in modern people and ancient Africans, it's estimated that our ancestors lived 260,000 to 350,000 years ago. All living humans descend from those people, suggesting that we inherited the fundamental commonalities of our species, our humanity, from them.

All their descendants—Bantu, Berber, Aztec, Aboriginal, Tamil, San, Han, Maori, Inuit, Irish—share certain peculiar behaviors absent in other great apes. All human cultures form long-term pair bonds between men and women to care for children. We sing and dance. We make art. We preen our hair, adorn our bodies with ornaments, tattoos and makeup.

We craft shelters. We wield fire and complex tools. We form large, multigenerational social groups with dozens to thousands of people. We cooperate to wage war and help each other. We teach, tell stories, trade. We have morals, laws. We contemplate the stars, our place in the cosmos, life's meaning, what follows death.The details of our tools, fashions, families, morals and mythologies vary from tribe to tribe and culture to culture, but all living humans show these behaviors. That suggests these behaviors—or at least, the capacity for them—are innate. These shared behaviors unite all people. They're the human condition, what it means to be human, and they result from shared ancestry.

We inherited our humanity from peoples in southern Africa 300,000 years ago. The alternative—that everyone, everywhere coincidentally became fully human in the same way at the same time, starting 65,000 years ago—isn't impossible, but a single origin is more likely.

The Network Effect

Archaeology and biology may seem to disagree, but they actually tell different parts of the human story. Bones and DNA tell us about brain evolution, our hardware. Tools reflect brainpower, but also culture, our hardware and software.

Just as you can upgrade your old computer's operating system, culture can evolve even if intelligence doesn't. Humans in ancient times lacked smartphones and spaceflight, but we know from studying philosophers such as Buddha and Aristotle that they were just as clever. Our brains didn't change, our culture did. That creates a puzzle. If Pleistocene hunter-gatherers were as smart as us, why did culture remain so primitive for so long? Why did we need hundreds of millennia to invent bows, sewing needles, boats? And what changed? Probably several things.

First, we journeyed out of Africa, occupying more of the planet. There were then simply more humans to invent, increasing the odds of a prehistoric Steve Jobs or Leonardo da Vinci. We also faced new environments in the Middle East, the Arctic, India, Indonesia, with unique climates, foods and dangers, including other human species. Survival demanded innovation.

Many of these new lands were far more habitable than the Kalahari or the Congo. Climates were milder, but Homo sapiens also left behind African diseases and parasites. That let tribes grow larger, and larger tribes meant more heads to innovate and remember ideas, more manpower, and better ability to specialize. Population drove innovation.

This triggered feedback cycles. As new technologies appeared and spread—better weapons, clothing, shelters—human numbers could increase further, accelerating cultural evolution again.

Numbers drove culture, culture increased numbers, accelerating cultural evolution, on and on, ultimately pushing human populations to outstrip their ecosystems, devastating the megafauna and forcing the evolution of farming. Finally, agriculture caused an explosive population increase, culminating in civilizations of millions of people. Now, cultural evolution kicked into hyperdrive.

Artifacts reflect culture, and cultural complexity is an emergent property. That is, it's not just individual-level intelligence that makes cultures sophisticated, but interactions between individuals in groups, and between groups. Like networking millions of processors to make a supercomputer, we increased cultural complexity by increasing the number of people and the links between them.

So our societies and world evolved rapidly in the past 300,000 years, while our brains evolved slowly. We expanded our numbers to almost eight billion, spread across the globe, reshaped the planet. We did it not by adapting our brains but by changing our cultures. And much of the difference between our ancient, simple hunter-gatherer societies and modern societies just reflects the fact that there are lots more of us and more connections between us.

(Source:SingularityHub)

Meteor impact destroyed first human settlement 10,000 years ago

New research suggests that the early human settlement on Earth was destroyed by a meteor impact around 10,000 years ago.

Scientists believe that the race of dinosaurs was wiped out by an asteroid millions of years ago. Now, new research suggests that an early settlement of human also suffered the same fate around 10,000 years ago by a huge chunk of space rock. Archaeologists from the University of California, Santa Barbara, claim that Tell Abu Hureyra, which lies in modern-day northern Syria, was annihilated by the cosmic impact of a fragmented comet. The site is well known amongst archaeologists for being the place where first human hunter-gatherers turned farmers lived 13,000 years ago. The place is since under what is known as Lake Assad now.

Evidence of a space rock destroying the early human settlement
The researchers found traces of a meltglass — they are calling Abu Hureyra meltglass or AH Glass — splashed onto building material and animal bones from the site. The AH Glass could only be formed under extremely high temperatures that could melt an automobile in seconds, which they believe could not have existed among the earliest civilizations.

Archaeologists say that this meltglass could not have been made even by lightning or by a volcano, which leaves the possibility of its formation only to a high-velocity phenomenon– such as a comet or an asteroid collision. According to geology professor James Kennett, an asteroid might have made an unexpected visit during the end of the Pleistocene age, which was around 11,700 years ago.

Another evidence that points towards the annihilation of ancient human settlement is the minerals found in the AH Glass. The research says that this meltglass contains corundum, mullite, and suessite. The suessite is a rare mineral but has been found relatively commonly in meteorites discovered by humans in modern times. That's why the researchers believe that a meteor struck Abu Hureyra and melted into the glass.

Meteor impact could have pushed humans towards agriculture
Researchers believe that the asteroid impact could have also annihilated some species of animals like mammoths because of the dust and debris that would shoot into the air upon collision. This, in turn, would have pushed the civilisation at the time to switch to agriculture.

The study points to researchers Moore and Kennett, who hypothesized that "impact-triggered climate change caused the prehistoric villagers at Abu Hureyra to transition from hunting/gathering to cultivation, indicative of earliest agriculture, one of the most significant cultural transformations in human history."

(Source:TheIndianExpress)

Indigenous Bajau People Evolved Larger Spleens for Free-Diving

The indigenous Bajau people of Southeast Asia spend their whole lives at sea, working 8-hr diving shifts with traditional equipment and short breaks to catch fish and shellfish. In a new study published in the journal Cell, an international team of scientists led by the Universities of California at Berkeley, Copenhagen and Cambridge report that Bajau's diving abilities may be thanks in part to genetically enlarged spleens. The findings have implications for hypoxia research, a pertinent medical issue.

The Bajau people, groups of whom are spread among the islands of Indonesia, Malaysia and the Philippines, are often called 'Sea Nomads,' and traditionally lived on boats and harvested nearly everything they ate from the sea.

Some have been shown to spend as much as 60% of their work day diving for food — spearing fish and octopus and gathering crustaceans and sea cucumbers — at depths greater than 230 feet (70 m), using only a wooden mask.

Linguistic analysis suggests that they have lived this way for more than 1,000 years. A chronicler of one of Ferdinand Magellan's voyages recorded their unusual lifestyle in 1521.

"I suspected that the Bajau could have genetically adapted spleens as a result of their marine hunter-gatherer lifestyle, based on findings in other mammals," said study first author Melissa Ilardo, a doctoral student in the Centre for GeoGenetics at the University of Copenhagen.

"There's not a lot of information out there about human spleens in terms of physiology and genetics, but we know that deep diving seals, like the Weddell seal, have disproportionately large spleens. I thought that if selection acted on the seals to give them larger spleens, it could potentially do the same in humans."

The spleen plays a central role in prolonging free diving time as it forms part of what is known as the human dive response.

When the human body is submerged under cold water, even for brief amounts of time, this response is triggered as a method of assisting the body to survive in an oxygen-deprived environment. The heart rate slows down, blood vessels in the extremities shrink to preserve blood for vital organs, and the spleen contracts.

This contraction of the spleen creates an oxygen boost by ejecting oxygenated red blood cells into circulation and has been found to provide up to a 9% increase in oxygen, thereby prolonging dive time. In order to gain evidence for this study, Ilardo and colleagues spent several months in Jaya Bakti, Indonesia taking genetic samples and performing ultrasound scans of the spleens from both the Bajau and their land-dwelling neighbors, the Saluan.

The results clearly showed the Bajau have a median spleen size 50% larger than the Saluan. Enlarged spleens were also visible in non-diving Bajau individuals as well as those who regularly free dive.

The study authors therefore eliminated the possibility that larger spleens were simply a plastic response to diving and began to investigate the Bajau's genetic data.

They discovered that members of the Bajau have a gene called PDE10A which the Saluan do not. It is thought that the PDE10A gene controls the levels of thyroid hormone T4.

“We believe that in the Bajau they have an adaptation that increases Thyroid hormone levels and therefore increases their spleen size,” Ilardo said.

“It's been shown in mice that thyroid hormones and spleen size are connected. If you genetically alter mice to have an absence of the thyroid hormone T4, their spleen size is drastically reduced, but this effect is actually reversible with an injection of T4.”

This is the first time a genetic adaptation to diving has been tracked in humans. “Until now it has been entirely unknown whether Sea Nomad populations genetically adapt to their extreme lifestyle,” Ilardo said.

“The only trait previously studied is the superior underwater vision of Thai Sea Nomad children, however this was shown to be a plastic response to training, and was replicable in a European cohort.”

“The physical and genetic changes that have enabled the Bajau to dive longer and deeper is yet another example of the immense variety of human adaptation to extreme environments, in this case, environments with low levels of oxygen,” added co-lead author Professor Rasmus Nielsen, from the University of California, Berkeley.

“These examples can be key to understanding human physiology and human genetics.”

The study also has implications for the world of medical research. The human dive response simulates the conditions of acute hypoxia in which body tissue experiences a rapid depletion of oxygen. It is a leading cause for complications in emergency care and as a result is already the subject of several genetics studies, specifically in relation to people groups who live at high altitudes.

Studying marine dwellers such as the Bajau has great potential for researching acute hypoxia in a new way. “This is the first time that we really have a system like that in humans to study,” Professor Nielsen said.

“It will help us make the link between the genetics and the physiological response to acute hypoxia. It's a hypoxia experiment that nature has made for us and allows us to study humans in a way that we can't in a laboratory.”

These findings open up the possibility of further research on other Sea Nomad populations such as the Thai Moken population and the Haenyeo diving women of Jeju in South Korea.

Studying similar people groups could shed more light on the nature of the connection between human physiology and genetic adaptations to extreme lifestyles, and clarify whether these genetic adaptations have developed separately.

“This really tells us how valuable and important indigenous populations are around the world that are living extreme lifestyles, in terms of understanding the function of various genetic traits and finding the underlying genetic background for various physiological traits,” said co-lead author Professor Eske Willerslev, from St John's College, Cambridge and the University of Copenhagen.

“Most of these populations are completely understudied, and I think there is a huge benefit, not only potentially to them, but also to the rest of mankind by actually paying some attention to them.”

(Source:sci-news.com)

Giants of Madagascar Driven to Extinction by Humans and Climate Change

The entire endemic megafauna of Madagascar and the Mascarene islands was eliminated during the past millennium. To investigate possible drivers of this extinction, an international team of scientists constructed an 8000-year record of the islands' past climate. Result: The ecosystem was resilient to prior climate stress but collapsed with an increase in human activities.

Christoph Spötl from the Innsbruck Quaternary Research Group was part of the international team. The results have now been published in Science Advances. Nearly all of Madagascan megafauna – including the famous Dodo bird, gorilla-sized lemurs, giant tortoises, and the Elephant Bird which stood 3 meters tall and weighted close to a half ton – vanished between 1500 and 500 years ago.

Were these animals overhunted to extinction by humans? Or did they disappear because of climate change? There are numerous hypotheses, but the exact cause of this megafauna crash remains elusive and hotly debated. The Mascarene islands east of Madagascar are of special interest because they are among the last islands on earth to be colonized by humans. Intriguingly, the islands' megafauna crashed in just a couple of centuries following human settlement.

In a recent study published by Science Advances, a team of international researchers found that it was likely a "double whammy" of heightened human activities in combination with a particularly severe spell of region-wide aridity that may have doomed the megafauna.

The researchers rule out climate change as the one and only cause, and instead suggest that the impact of human colonization was a crucial contributor to the megafaunal collapse.

Hanying Li, a postdoctoral scholar at the Xi'an Jiaotong University in China and the lead author of this study, pieced together a detailed history of the regional climate variations. The primary source of this new paleoclimate record came from the tiny Mascarene island of Rodrigues in the southwest Indian Ocean approximately 1600 km east of Madagascar. "An island so remote and small that one will not find it on most schoolbook atlases," says Gayatri Kathayat, one of the co-authors and an associate professor of climate science at Xi'an Jiaotong University.

Analysis of Cave Deposits

Li and colleagues built their climate records by analyzing the trace elements and carbon and oxygen isotopes from each incremental growth layer of stalagmites which they collected from one of the many caves from this island.

The bulk of these analyses were conducted at the Quaternary Research Group at the Institute of Geology at the University of Innsbruck, led by Prof. Christoph Spötl: “Variations in the geochemical signatures provided the information needed to reconstruct the region’s rainfall patterns over the last 8000 years. To analyze the stalagmites we used the stable isotope method in our lab in Innsbruck.”

“Despite the distance between the two islands, the summer rainfall at Rodrigues and Madagascar is influenced by the same global-wide tropical rain belt that oscillates north and south with the seasons. And when this belt falters and stays further north of Rodrigues, droughts can strike the whole region from Madagascar to Rodrigues,” Hai Cheng explains, the study’s senior coauthor.

“Li’s work from Rodrigues demonstrates that the hydroclimate of the region experienced a series of drying trends throughout the last 8 millennia, which were frequently punctuated by ‘megadroughts’ that lasted for decades,” notes Hubert Vonhof, scientist at Max Planck Institute of Chemistry in Mainz, Germany and coauthor.

Resilient to climate stress

The most recent of the drying trends in the region commenced around 1500 years ago at a time when the archaeological and proxy records began to show definitive signs of increased human presence on the island.

“While we cannot say with 100 percent certainty whether human activity, such as overhunting or habitat destruction, was the proverbial last straw that broke the camel’s back, our paleoclimate records make a strong case that the megafauna had survived through all the previous episodes of even greater aridity. This resilience to past climate swings suggests that an additional stressor contributed to the elimination of the region’s megafauna,” notes Ashish Sinha, professor of earth science at California State University Dominguez Hills, USA.

“There are still many pieces missing to fully solve the riddle of megafauna collapse. This study now provides an important multi-millennial climatic context to megafaunal extinction,” says Ny Rivao Voarintsoa from KU Leuven in Belgium, a native of Madagascar, who participated in this research.

The study sheds new light on the decimation of flora and fauna of Mauritius and Rodrigues: “Both islands were rapidly stripped of endemic species of vertebrates within two centuries of the initial human colonization, including the well-known flightless ‘Dodo’ bird from Mauritius and the saddle-backed ‘Rodrigues giant tortoise’ endemic to Rodrigues,” adds Aurele Anquetil André, the reserve manager and chief conservator at the Francois Leguat Giant Tortoise and Cave Reserve at Rodrigues.

“The story our data tells is one of resilience and adaptability of the islands’ ecosystems and fauna in enduring past episodes of severe climate swings for eons – until they were hit by human activities and climate change,” the researchers conclude.

(Source:sciencedaily.com)

‘Lost’ river that ran through Thar Desert 172,000 years ago found

Researchers have found the evidence of a “lost” river that ran through the central Thar Desert, near Bikaner, as early as 172 thousand years ago, and may have been a life-line to human populations enabling them to inhabit the region.

The findings, published in the journal Quaternary Science Reviews, represent the oldest directly dated phase of river activity at Nal Quarry in the central Thar Desert.

The study by researchers from The Max Planck Institute for the Science of Human History in Germany, Anna University in Tamil Nadu, and IISER Kolkata indicates that Stone Age populations lived in a distinctly different Thar Desert landscape than we encounter today.

This evidence indicates a river flowed with phases of activity dating to approximately up to 172 thousand years ago, nearby to Bikaner, Rajasthan, which is over 200 km away from the nearest modern river.

These findings predate evidence for activity in modern river courses across the Thar Desert and dried up course of the Ghaggar-Hakra River, the researchers said.

The presence of a river running through the central Thar Desert would have offered a life-line to Paleolithic populations, and potentially an important corridor for migrations, they said.

The researchers noted that the potential importance of ‘lost’ rivers for earlier inhabitants of the Thar Desert have been overlooked.

“The Thar Desert has a rich prehistory, and we’ve been uncovering a wide range of evidence showing how Stone Age populations not only survived but thrived in these semi-arid landscapes,” said Jimbob Blinkhorn from The Max Planck Institute for the Science of Human History.

“We know how important rivers can be to living in this region, but we have little detail on what river systems were like during key periods of prehistory,” Blinkhorn said.

River channels

Studies of satellite imagery have shown a dense network of river channels crossing the Thar Desert, according to the researchers.

“These studies can indicate where rivers and streams have flowed in the past, but they can’t tell us when,” explained Professor Hema Achyuthan of Anna University.

“To demonstrate how old such channels are, we had to find evidence on the ground for river activity in the middle of the desert,” Achyuthan said.

The team studied a deep deposit of river sands and gravels, which had been exposed by quarrying activity near the village of Nal. The researchers were able to document different phases of river activity by studying the different deposits.

“We immediately saw evidence for a substantial and very active river system from the bottom of the fluvial deposits, which gradually decreased in power through time,” Achyuthan said. The researchers used a method called luminescence dating to understand when quartz grains in the river sands were buried.

The results indicated that the strongest river activity at Nal occurred at approximately 172 and 140 thousand years ago, at a time when the monsoon was much weaker than today in the region.

River activity continued at the site between 95 and 78 thousand years ago, after which only limited evidence for the presence of a river at the site, with evidence for a brief reactivation of the channel 26 thousand years ago, the study found.

The river was flowing at its strongest during a phase of weak monsoonal activity in the region, and may have been a life-line to human populations enabling them to inhabit the Thar Desert, the researchers said.

The timeframe over which this river was active also overlaps with significant changes in human behaviour in the region, which have been linked with the earliest expansions of Homo sapiens from Africa into India, they said.

“This river flowed at a critical timeframe for understanding human evolution in the Thar Desert, across South Asia and beyond,” said Blinkhorn.

“This suggests a landscape in which the earliest members of our own species, Homo sapiens, first encountered the monsoons and crossed the Thar Desert may have been very different to the landscape we can see today,” he added.

(Source:BusinessLine)

More and more babies are being born without wisdom teeth

The age of 'microevolution' is upon us, a new Australian study claims

"Microevolution" is a thing. And it's happening as we speak.

A new study published in the Journal of Anatomy found that humans are increasingly being born without wisdom teeth. Researchers also found that the median artery in the forearm, which used to form in the womb but disappear after birth, is sticking around more often after birth. These changes are showing up far more often than typical human evolution would suggest — and indicates that the human race may be evolving faster than it has at any point in the last 250 years.

"This is what we call 'microevolution of modern humans,'" said Dr. Teghan Lucas, a professor at the College of Medicine and Public Health at Flinders University in Adelaide, Australia, who worked on the study.

Lucas, along with University of Adelaide professors Maciej Henneberg and Dr. Jaliya Kumaratilake, found that as human faces have gotten shorter, our mouths have consequently become smaller — thus, less room for wisdom teeth. Humankind's increased ability to chew food, along with the rise in processed foods, also seems to have accelerated this evolutionary trait.

In a news release from Flinders University, the researchers gave additional details about the median artery, which provides additional blood flow to the human forearm and hand. Typically, this artery disappears in utero as the fetus develops its radial and ulna arteries. But this is changing.

People born in the mid-1880s, for example, retained this artery approximately 10% of the time. For those born in the late 20th century, however, the prevalence is 30%, the Independent reported.

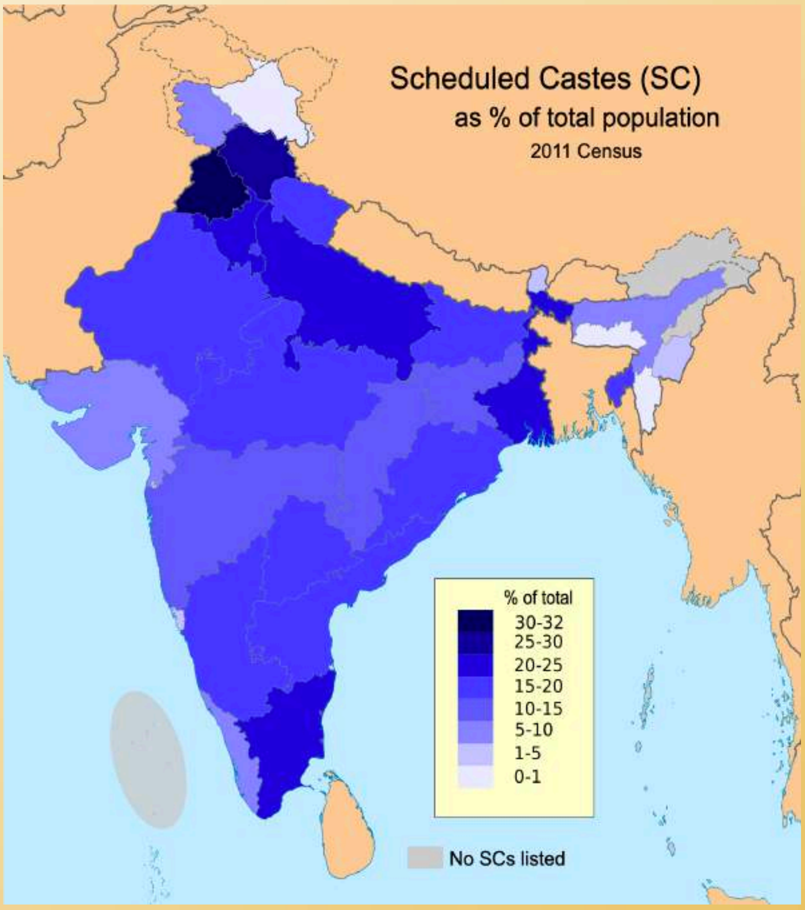
"So that's a significant increase in a fairly short period of time, when it comes to evolution," Lucas said, adding that the increase may have come from mutations of genes involved in median artery development and/or health problems in mothers during pregnancy.

If this trend continues, Lucas said a majority of people will have a forearm median artery by the year 2100.

The study also revealed an increased prevalence in spina bifida occulta, abnormal connections of two or more bones in feet, and the fabella (a small bone in the back of the knee joint). Presence of the thyroidea ima artery was found to decrease over time, then disappear completely by the end of the 20th century.

Data: More than 90% of the 'Crimes against SCs' are pending in Courts

In an earlier story, we analysed the trends related to reporting of Crimes/atrocities against the Scheduled Castes (SCs) in India. The trends indicate a 19% increase in the number of crimes reported in the 5-year period between 2015 & 2019. However, few study reports highlight the issues with under reporting as well as the quality of reporting of these crimes.



In this story, we look at the disposal of these reported cases by the police and in the courts, which would provide a better perspective on the state of justice to the marginalized communities. The data provided in NCRB's Crime in India reports have been considered for this analysis.

Pendency Rate of the cases with Police decreased ever so slightly

In the earlier story, we had observed that there is an increase in the number of new cases being registered involving crimes against SCs. This has led to an increase in the number of new cases being investigated by the police & courts every year.

In 2015, around 52 thousand cases were investigated by the police which increased to 62 cases in 2019 i.e. an increase by 19%, similar to the increase to the number of new cases.

The pendency rate of cases with the police has come down, although there is an increase in the actual number of pending cases. In 2015, 29.7% of the cases that were being investigated by the police were pending, which fell to 28.7% by the end of 2019. This is because of the slight increase in the disposal rate of the cases being handled by the police.

In 2019, around 15% of the cases were closed by the police by filing a final report. Meanwhile, police filed a charge sheet in 56% of the cases. This is higher than the charge sheeting rate of the all IPC crimes in 2019 i.e. 47.5%.

Police filed a final report without a 'Charge Sheet' in 22% of the crimes categorized as 'Other IPC Crimes'

The pendency rate (at the police) of crimes against SCs was around 25% by the end of 2019 for most of the major crime heads. In 2019, out of the 4,420 rape cases against SCs investigated by the police, 25% are still pending by the end of the year. Even in the case of 'Assault on Women', around a quarter of the cases are pending investigation by the end of the year.

While in the case of Rapes, around 9% of the cases were closed by the Police without a charge sheet, it is higher in cases of 'Assault on Women' where around 13% were closed without a charge sheet.

Higher Pendency rate are also observed among cases relating to Riots and Murder. 'Simple Hurt', which is the category with highest number of Crimes reported against SCs, has a lower rate of Charge sheeting with only 57%.

In the ambiguous category 'Other IPC Crimes' under which the second highest number of crimes against SCs were reported, about 22% the cases were closed by police without a charge sheet, raising more doubts about the nature of this categorization.

Court disposal rate of Crimes against SCs down to 6.1% in 2019

By the end of 2019, the pendency rate of all Cognizable IPC crimes is around 89% in courts, whereas it is 94% in the case of crimes against SCs. In fact, the pendency rate of these crimes has increased over the years. In 2015, the pendency rate was around 87%. The increase in the pendency rate has come at the cost of decrease in the disposal rate of courts. In 2015, around 12% of the pending cases were disposed by the courts, which nearly halved over the five-year period with the disposal rate in 2019 being only 6.1%.

While the disposal rate has reduced to almost half, the conviction rate among the disposed cases has increased slightly from around 27.6% in 2015 to around 32% in 2019. However, this is still much lower than the overall IPC conviction rate of around 50%.

Higher Conviction rate in the case of ‘Rape’ & ‘Murder’

Among the crimes against SCs, the convictions in the case of ‘Riots’ were only 0.79% of the total cases up for trial in 2019. On the other hand, the acquittal rate is seven times the conviction in the case of ‘riots’. Among the various categories of crimes against SCs, the conviction rate (over 40%) was high in the case of ‘rape’ & ‘murder’. One common theme across various crime heads is that the pendency rate in courts by the end of 2019 is over 90%.

Procedural lapses, investigation issues, and burden on special courts increasing pendency. Data (as per NRCB reports) and various other study reports indicate the challenges faced by the marginal communities in getting justice for the crimes committed against them. In an assessment of implementation of SC/ST PoA (Prevention of Atrocities) Act, in its 2016 Annual Report, the Ministry of Social Justice highlighted some of the problems with the implementation of the act. It notes the negligence on behalf of public servants in discharging of their duties (registration of complaints, recording statements, investigation etc.)

All these problems impact the trial of the cases in the courts, as observed by the low disposal rate & high acquittal rate compared to all IPC related crimes. This is corroborated by a study in 2014 by the National Campaign on Dalits Human Rights (NCDHR) on cases in five courts in Rajasthan, Andhra Pradesh, Tamil Nadu, Jharkhand & Uttar Pradesh. The study observed procedural lapses (delays in filing a FIR, investigation by incompetent authorities) to be the major behind acquittals under SC/ST PoA rather than other substantive reasons like lack of evidence, witness turning hostile etc. The study further highlights the discretionary nature of police and public prosecutor in applying the correct sections of law while framing the charges in courts.

SC/ST PoA has provisions for the establishment of Special Courts to conduct trials of cases relating to this act. As per Ministry of Social Justice’s 2019-20 Annual Report, there are currently 170 Exclusive Special Courts established across 12 states in the country. The act requires respective States to establish these Special courts, but the data indicates that most of the states do not have these exclusive courts.

The Study ‘Justice under Trial – Caste Discrimination in Access to Special Courts’ , further highlights that these special courts are burdened with cases which are non- SC/ST atrocity cases in spite of higher pendency of SC/ST atrocities cases.The study further highlights few important reasons for the higher pendency of these cases in courts:

Trials are delayed in the absence of judges appointed to the Special Courts, or if the judge is on leave, or if the judge has to attend any legal awareness programmesAbsence of the Special Public Prosecutors (SPPs) or their lack of full attention to atrocity cases. Volume of cases before the Exclusive Special Courts, also considering the fact that non-SC/ST atrocities related cases are taken up.Case overload affecting the preparedness of SPPs. Cases undergoing a large number of adjournments at every stage. One of the common reasons observed for adjournments is that the prosecution witnesses and investigating officers not attending trials.

The adjournments and delay in court trials result in influencing and coercion on the witnesses. The witnesses then are unable to clearly recall the incidents over time, tamper evidence due to external influences etc. The report also summarizes the challenges faced by marginalized communities in gaining access to justice.
These various factors influencing the registration, investigation and disposal of crimes against SCs is evident from the higher pendency rates, as well as other aspects like higher acquittals and lower convictions.

Establishment of more ‘Exclusive Special Courts’ and ensuring they are designated for only cases relating to SC/ST atrocities, along with reforms relating to reporting and investigation of these crimes can go a long way in improving the situation. A change in the attitude of police and public authorities in recognizing the rights of the marginalized communities is also necessary to improve the situation of the implementation of SC/ST PoA.

(Source:Factly)

Homo erectus, not humans, may have invented the barbed bone point

A type of bone tool generally thought to have been invented by Stone Age humans got its start among hominids that lived hundreds of thousands of years before Homo sapiens evolved, a new study concludes. A set of 52 previously excavated but little-studied animal bones from East Africa's Olduvai Gorge includes the world's oldest known barbed bone point, an implement probably crafted by now-extinct Homo erectus at least 800,000 years ago, researchers say. Made from a piece of a large animal's rib, the artifact features three curved barbs and a carved tip, the team reports in the November Journal of Human Evolution. Among the Olduvai bones, biological anthropologist Michael Pante of Colorado State University in Fort Collins and colleagues identified five other tools from more than 800,000 years ago as probable choppers, hammering tools or hammering platforms. The previous oldest barbed bone points were from a central African site and dated to around 90,000 years ago (SN: 4/29/95), and were assumed to reflect a toolmaking ingenuity exclusive to Homo sapiens. Those implements include carved rings around the base of the tools where wooden shafts were presumably attached. Barbed bone points found at H. sapiens sites were likely used to catch fish and perhaps to hunt large land prey.

The Olduvai Gorge barbed bone point, which had not been completed, shows no signs of having been attached to a handle or shaft. Ways in which H. erectus used the implement are unclear, Pante and his colleagues say. This find and four of the other bone implements date to at least 800,000 years ago, based on their original positions below Olduvai sediment that records a known reversal of Earth's magnetic field about 781,000 years ago. Another bone artifact dates to roughly 1.7 million years ago, the researchers say.

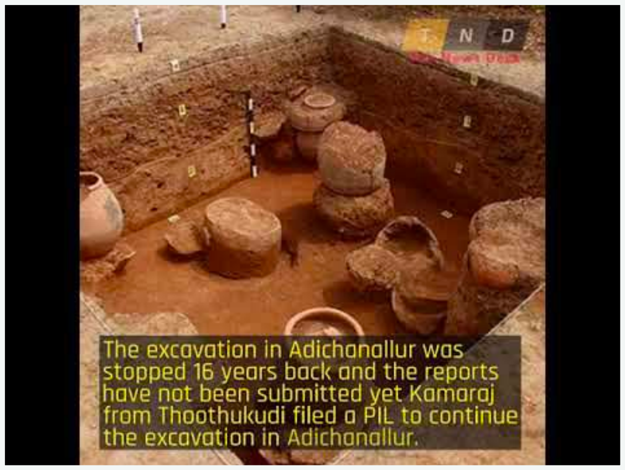
"The Olduvai point implicates H. erectus as the inventor of barbed bone point technology," Pante says, because stone tools previously excavated in the same Olduvai Gorge sediment resemble those that have been found at other African sites with H. erectus fossils. The bone tools described in the new study come from a collection of animal bones excavated in the late 1960s and early 1970s by Mary Leakey before being stored among thousands of fossils and artifacts at an on-site Olduvai facility. Pante discovered the set of 52 bones in 2007 while doing research at Olduvai Gorge. Still, archaeologist Christian Tryon of the University of Connecticut in Storrs, who did not participate in the new study, questions whether the Olduvai bone specimen can be definitively classed as a barbed bone point because it wasn't finished. But Pante's report shows that Olduvai hominids, whether they were H. erectus or some other prehuman population, carefully selected bones as well as stones for toolmaking, Tryon says. "They were expert craftsmen or women." New York University archaeologist Justin Pargeter agrees. Although it's unclear whether the Olduvai artifact was a pointed bone tool comparable to those later made by H. sapiens, he says, the existence of any bone toolmaking 800,000 years ago shows that this practice is far older than typically assumed.

Along with bone toolmaking, a series of critical behavioral advances in hominids occurred before the emergence of H. sapiens around 300,000 years ago. These developments include the invention of stone tools (SN: 6/3/19), controlled fire use (SN: 4/2/12) and the ability to survive in new environments (SN: 11/29/18). Exploiting bone to make tools such as barbed points would have aided ancient Homo groups migrating through unfamiliar regions where locations of stone sources were unknown, Pante suspects. Jewelry making, cave painting and other symbolic acts may represent "modern human behaviors" that eluded earlier hominids such as H. erectus, Pante says. But some researchers suspect that now-extinct Homo species also created symbolic items.

(Source:sciencenew.org)

Discovery of habitation site at Adichanallur is a milestone

The pivotal moment in this phase of excavations was the discovery of a habitation site at Adichanallur, according to exavation director J Baskar, who described it as a milestone discovery.


The excavation in Adichanallur was stopped 16 years back and the reports have not been submitted yet Kamaraj from Thoothukudi filed a PIL to continue the excavation in Adichanallur.

THOOTHUKUDI: Excavations in Adichanallur and Sivagalai, which the Tamil Nadu Archaeology department had commenced on May 25, concluded on September 30, and the trenches dug up for the purpose were closed on Wednesday. The pivotal moment in this phase of excavations was the discovery of a habitation site at Adichanallur, according to exavation director J Baskar, who described it as a milestone discovery. From the 72 trenches in the Adichanallur site, several urns, earthenware, black and red-coloured pots, stone objects, copperware, iron objects, terracotta materials, bone pieces and other antique materials were unearthed. They were later deposited at the Government Archaeological Exhibition Centre, adjacent to the site. A skull unearthed from Sivagalai and bones from Adichanallur were sent to the Madurai Kamaraj University for genetic testing, said a senior official.

Pivotal excavation

The discovery of an ancient habitation site and unearthing of Tamil Brahmi scripts, roofing tiles and over 500 graffiti marked a milestone in the history of the Adichanallur excavations, said excavation director J Baskar. Experts consider the discovery of the habitation site, a “breakthrough” in the 150-year excavation history in Adichanallur. Earlier surveys in Adichanallur -- from the first excavation by Jagor of Germany (1876) till the 2004-2006 survey by Archaeological Survey of India (ASI) Superintending Archaeologist Dr Thiyaga Sathyamurthy – had yielded only urn burials and associated artefacts, said writer Kamarasu.

The habitation site, located east of the burial site, had terracotta pipes for drains, potsherds with scripts, and another 500 with graffiti, Baskar said. Another key discovery was the circular-patterned lime kiln, confirming industrial activity at the site, he said, adding that a heap of oyster shells, corals and reefs were found over them, which could have been burnt to manufacture lime mineral. “The interesting fact,” Baskar said, “is the discovery of articles belonging to three different ages, layered on top of each other in the order of Sangam-era (early historic period), iron age and stone age.” While potsherds engraved with Tamil Brahmi scripts belonged to the Sangam era, a number of iron objects belonging to the iron age and microlithic tools belonging to the stone age were found, he added.

Intriguing connection

Mumbai-based Palmyra Mission Organiser Reverend Godson Samuel, who was on an excursion to find ancient antiquities in the State, visited the Adichanallur site on Tuesday. He told reporters that he had collected “lime-coated potsherds” in Authoor in Thoothukudi district and it was “interesting to find an ancient lime kiln in Adichanallur.” These monuments should be protected and the Centre should ensure that the announcement of establishing a world-class onsite museum in Adichanallur is implemented, he added.

‘Release excavation reports’

Stating that the department had only carried out excavations on private lands this year, Kamarasu urged the ASI to permit excavations at the 114-acre archaeological site under the agency’s protection. He also urged the State to release reports on the excavations, including from the 2004-2006 survey. In connection with a case filed by Kamarasu, the Centre had submitted the 2004-2006 Adichanallur archaeological report to the Madras High Court in 2019 but the reports have not been made public yet.

(Source:TheIndianExpress)

Farming is Indian, not Iranian

A research paper he co-authored—published in the September 2019 issue of Cell—had courted controversy by concluding that agriculture had developed indigenously in India, not through migrations from Iran's fertile crescent. While politicians have used the findings to support their beliefs on ancient India, Niraj Rai, 37, is clear that he will neither be influenced nor be intimidated by politics. Excerpts from an interview with the group head of Ancient DNA Lab at Birbal Sahni Institute of Paleosciences, Lucknow

Q/ How did you conclude that agriculture developed indigenously in India?
A/ The DNA we sequenced [from the remains of the woman found in Rakhigarhi] showed that it had separated more than 12,000 years ago from an ancestor common to Harappans and Iranians. Since farming in the fertile crescent of Iran developed only after that, Iranians could not have contributed to farming in India. This finding corroborates with other evidence of agriculture in the Indus Valley Civilisation, like fossils of charred grains discovered in the pre-Harappan settlement of Kunal, in Haryana, and Mehrgarh, a Neolithic site in Pakistan.

Q/ The findings have been controversial.
A/ Controversies are fun. Let people talk. Our findings are based on science. Cell accepted our paper within seven days of its submission, which is rare. Normally, it takes months, even years, to review and re-review a paper. I have noticed that western scholars are usually more open [to new findings]; in India there are political overtones. Here, the left wing is more accepting of new ideas, while the right wing is in a rush to prove its established ideas.

Q/ The paper is complementary to right wing ideology.
A/ This is science. Tomorrow, if my research shows something that is not in complement, I will still publish it. There seems to be more talk than action [by politicians]. There is furore over cow protection, but there are hardly any studies on the genetics of cow evolution in India. In Kasaragod, Kerala, there is a breed of dwarf cows, but there is no protection policy, let alone research on the breed. They are only protected by locals.

Q/ What project are you working on in Indonesia?
A/ It is a collaborative project with the Indonesian government on the ancestry of its people. We discovered 50 skeletons in Java and Bali; their burial style is megalithic, very similar to those in ancient south India. I am excited, as the findings seem to indicate that migrations from India to Southeast Asia are much older than we thought. There is a lop-sided focus on the peopling of India from the west, but the peopling of Southeast Asia from India is just as fascinating.

Q/ Apart from solving old mysteries, does work on ancient DNA have practical applications?

A/ If we have better databases of ancient DNA, we get a better understanding of the origin of diseases and there is higher scope for finding cures. For instance, when agriculture began in India, there was no diabetes. When and how did the mutations for diabetes occur?

(Source:TheWeek)

Indus valley had dairy production way back in 3rd millennium BCE

This is the first time it's been proved scientifically that dairy production was in place in the Indus Valley civilization in 2500 BCE, and the earliest known evidence of dairy production.

Dairy production in India began as far back as in the 3rd millennium BCE and may have been a factor behind sustaining the Indus Valley Civilisation, according to findings from a team of Canadian and Indian researchers. The study, published in the journal Nature, was led by Kalyan Sekhar Chakraborty, a postdoctoral researcher at the University of Toronto Mississauga, and dates dairy production to 2500 BCE. "This is the first time it's been proved scientifically that dairy production was in place in the Indus Valley civilization in 2500 BCE, and the earliest known evidence of dairy production," Chakraborty said in an interview.

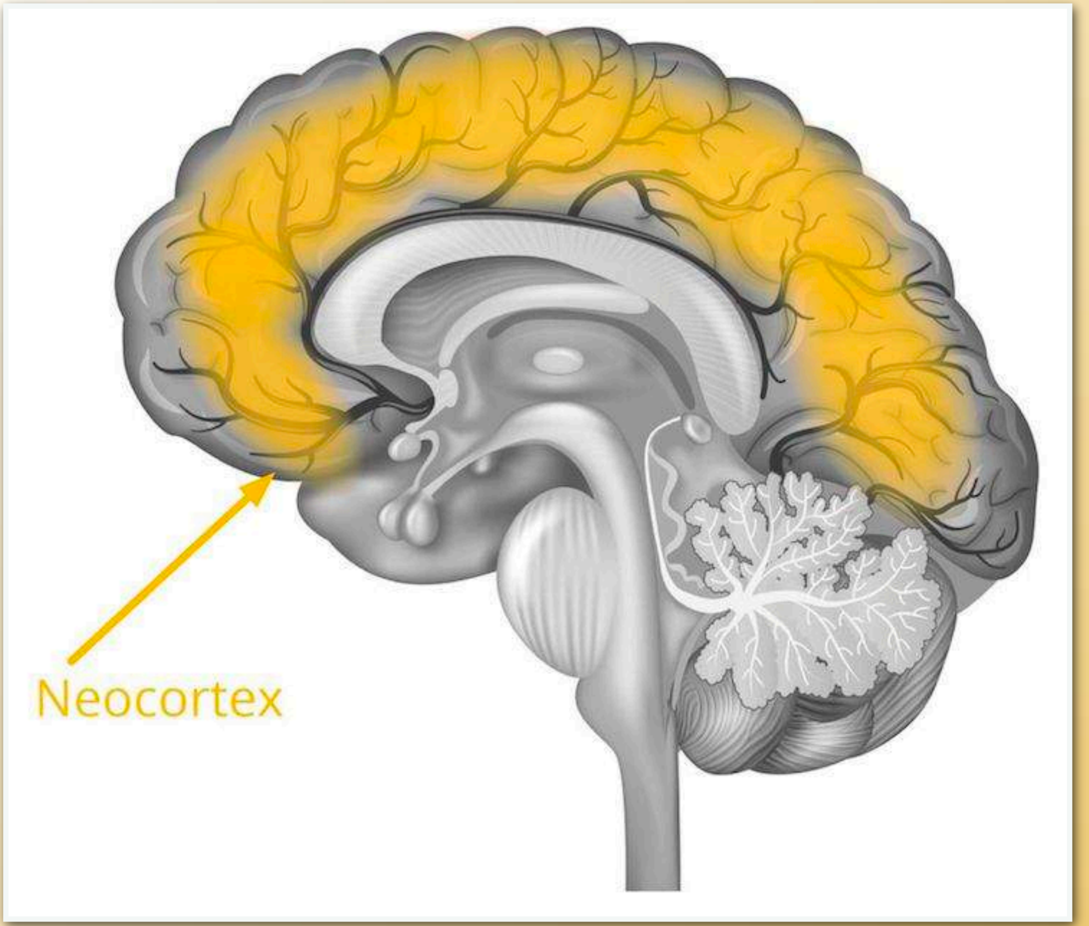
The results were based on molecular chemical analysis of residue in shards of pottery found at the archaeological site of Kotada Bhadli, a rural settlement located in Gujarat. Of the 59 samples studied, 22 showed the presence of dairy lipids. Through a process called stable isotope analysis, the researchers were also able to identify the type of ruminant used for dairy, and concluded that these were cattle, like cows and buffalo, rather than goats and sheep. The availability of dairy production may have helped sustain such ancient societies, as Chakraborty explained, "This would have allowed the accumulation of a surplus of animal protein, without affecting the number of animals in your herd." He said the level of production meant that this was "definitely beyond household consumption."

Chakraborty is with the Department of Anthropology at the university, and the study also involved Prof Heather Miller of the same department and Prof Greg Slater of the School of Geography and Earth Sciences at McMaster University in Hamilton, Ontario. The Indian participants in the research were Prof Prabodh Shirvalkar of the Department of Ancient Indian History and Culture and Archeology at Deccan College Postgraduate and Research Institute in Pune, who excavated the archaeological settlement, provided the samples, site photographs, and background information of the region, and Yadubirsingh Rawat of the State Department of Archeology and Museum in Gandhinagar, Gujarat.

Chakraborty pointed out such research was complex because it was simpler to identify animals used for meat from cut marks on their bones, but "uses like dairy are generally invisible." This was the first time such scientific analysis was used in India for this purpose. The type of vessels used pointed to the milk being processed rather than being used raw.
Chakraborty's interest in this project started in 2010 as he started excavating this rural site and became interested in applying chemistry to archaeology, especially since food habits were "embedded" in such material. He now intends to take the research forward, in this case further back into time to analyse even older remnants from Indus Valley settlements, potentially as far back as when animals were first domesticated.

(Source:HindustanTimes)

Explained: Evolutionary expansion of human neocortex



Chennai: A team of researchers led by Wieland Huttner at the Max Planck Institute of Molecular Cell Biology and Genetics, who is one of the institute's founding directors, has investigated the cause of the evolutionary expansion of the human neocortex in many studies.

During human evolution, the size of the brain increased, especially in the neocortex, which enables us to speak, dream and think.

A new study from his lab focuses on the role of the neurotransmitter serotonin in this process. Serotonin is often called the happiness neurotransmitter because it transmits messages between nerve cells that contribute to well-being and happiness. However, a potential role of such neurotransmitters during brain development has not yet been explored in detail. In the developing embryo, the placenta produces serotonin, which then reaches the brain via the blood circulation.

Looking for the causes underlying neocortex expansion, researchers at the Max Planck Institute of Molecular Cell Biology and Genetics in Dresden, together with colleagues at the University Hospital Carl Gustav Carus Dresden, previously identified a number of molecular players. These players typically act cell-intrinsically in the so-called basal progenitors, the stem cells in the developing neocortex with a pivotal role in its expansion.

The researchers now report an additional, novel role of the happiness neurotransmitter serotonin which is known to function in the brain to mediate satisfaction, self-confidence and optimism—to act cell-extrinsically as a growth factor for basal progenitors in the developing human, but not mouse, neocortex. Due to this new function, placenta-derived serotonin likely contributed to the evolutionary expansion of the human neocortex.

(Source:newstoday.net)

Like Humans, Chimps Prioritize Positive Relationships As They Age

Humans prioritize close, positive relationships during aging, which can support physical and mental health.

But these social aging behaviors are also found in wild chimpanzees, who seek interactions with other group members in increasingly positive ways as they get older, according to a new study published in Science Oct. 23.

The work—led by researchers at the University of Michigan, Tufts University, Harvard University and the University of New Mexico—uses data from the Kanyawara chimpanzee community living in Kibale National Park in Uganda. The animals have been studied for decades by the Kibale Chimpanzee Project, and researchers used this long-term dataset to test socioemotional selectivity theory.

The theory proposes that people shift their social behavior from a focus on forming new friends in young adulthood, to maintaining a smaller network of close, fulfilling relationships in old age.

“The proposal is that this shift happens because of our human ability to monitor our own personal time horizons—how much time we have left in our life—which causes us to prioritize emotionally fulfilling relationships when time is perceived to be running out,” said Alexandra Rosati, U-M professor of psychology and anthropology and the study’s lead author.

Rosati and colleagues discovered that aging male chimpanzees have more mutual and equitable friendships characterized by high, equitable investment. Younger adult chimpanzees, in contrast, are more likely to form lopsided relationships where their partner does not reciprocate. Older males are more likely to be alone, but also interact more with important social partners when they join the group. Males also showed a relative shift from more agonistic interactions to more positive, affiliative interactions over the lifespan, the researchers say.

“These results show that chimpanzees share these special social aging patterns with humans, even though they do not have the same rich future time perspective and knowledge of their own mortality that we have,” said Zarin Machanda, professor of anthropology and biology at Tufts University and the study’s co-lead author.

The shared pattern between chimpanzees and humans could represent an adaptive response where older adults focus on important social relationships that provide benefits, and avoid interactions that have negative consequences as they lose competitive fighting ability, she said.

The research highlights how long-term behavioral datasets from wild animals like chimpanzees can help us understand and promote healthy aging in humans, Rosati said.

The study's co-authors are Lindsey Hagberg and Richard Wrangham, researchers at Harvard University; Drew Enigk, Melissa Emery Thompson and Martin Muller, researchers at the University of New Mexico; and Emily Otali, field director of the Kibale Chimpanzee Project.

(Source:Scienceblog)

Involve Traditional Healers In Public Health Initiatives To Mitigate Spread Of COVID-19

In a sunny afternoon of March 18, 2020, while lost in his dreams, Sukaldhar Yadav was jolted awake by an urgent knocking on his door. “My nephew is down with malaria, please help,” said the visitor. With no time to spare, the 76- year-old healer jumped on a motorcycle and sped off to treat another seriously ill patient living beyond the reach of modern medicine. Known to the world for a 40 year Maoist insurgency, the forest region of Bastar in Chhattisgarh in central India is a treasure trove of medicinal plants and traditional healing practices. The tropical hotspot is also home to a unique treatment for malaria involving the use of red ants (Oecophylla smaragdina). Known in the region as ‘Ved Raj‘ for his mastery over medicinal knowledge, Sukaldhar Yadav is one of the few remaining practitioners of the red ant treatment. In this treatment, the nests of red ants can be found on every other tree in Bastar. Once the nest is collected, the patient’s head and ears are covered with cloth, after which the nest is dropped over the body. The ants are left to bite for a while, after which they are knocked off and the patient is left to rest. “In the past, many people used to rely on red ant treatment for malaria, but now only people from interior villages approach me in their time of need. Only when every other treatment fails do family members come here to collect me,” he said.

Red ants are also a local delicacy in the region and came into the limelight when British celebrity chef Gordon Ramsay visited Bastar and treated himself to a paste made from red ants. “During the onset of fever, we make chutney (paste) using the ants, ginger, garlic, coriander and chilli. We have been using it as medicine for generations” said Yadav.

A 2015 study by V.V Vidhu and D.A Evans, of tribal people in Kerala. confirmed the presence of pharmacologically active compounds with antioxidant, anti-arthritic and antimicrobial activities in the abdominal glands of Oecophylla smaragdina (a species of arboreal ant), which helps the traditional healers in making medicated oils that are used as an effective remedy against various diseases.

Apart from its battle with bullets, Bastar is in the midst of another war. The region has an Annual Parasite Incidence (API) rate of over 10 confirmed cases of malaria per thousand population, one of the highest in the country. Even though the health department has been relentless in their fight against the disease every year, the growing number of cases and emergence of drug resistance are a cause for worry, leaving villagers in pursuit of traditional healers like Yadav as a last-ditch effort. If that too fails, patients must embark on a 300-kilometres journey to the nearest city of Visakhapatnam in the neighbouring state of Andhra Pradesh for medical treatment. The long journey, undertaken by the countless number of people in the region, paints a grim picture of how indigenous communities reliant on traditional healers are vulnerable to epidemics like COVID-19.

Why India's local health traditions need to be formalised

Traditional healers need to be brought into the public health systems as they function in a resource-strained ecology

A few months ago, Tony, a colleague of mine in Gudalur—a small tribal town in Tamil Nadu's Nilgiris district—complained of mouth ulcers. He whined about black circles, lack of sleep and loss of appetite. Maadhan, another colleague from the local Adivasi community, advised him to eat the tender fruits of manathakkali (Solanum nigrum), a wild herb. Tony ate the ripe fruits diligently for two to three days and the ulcers eventually disappeared. Normally, as a biomedically trained dentist, I would have prescribed an anaesthetic ointment and vitamin supplements. I did not realise the cure for the ulcers was right in the garden attached to my workplace.

Tony's ulcers happened at a time when I was enquiring, as a part of a research project, about the legitimacy of the Local Health Tradition (LHT) practices among Siddha vaidyars (healers) and Adivasi healers in Tamil Nadu. The study aimed to understand "LHT's revitalisation".

A few months ago, Tony, a colleague of mine in Gudalur—a small tribal town in Tamil Nadu's Nilgiris district—complained of mouth ulcers. He whined about black circles, lack of sleep and loss of appetite. Maadhan, another colleague from the local Adivasi community, advised him to eat the tender fruits of manathakkali (Solanum nigrum), a wild herb. Tony ate the ripe fruits diligently for two to three days and the ulcers eventually disappeared. Normally, as a biomedically trained dentist, I would have prescribed an anaesthetic ointment and vitamin supplements. I did not realise the cure for the ulcers was right in the garden attached to my workplace.

Tony's ulcers happened at a time when I was enquiring, as a part of a research project, about the legitimacy of the Local Health Tradition (LHT) practices among Siddha vaidyars (healers) and Adivasi healers in Tamil Nadu. The study aimed to understand "LHT's revitalisation". In Tony's case, the herbal treatment received was primary and affordable healthcare. There is community support for LHT in Gudalur, which perhaps, has kept this tradition alive, as must be the case in many other parts of India. In Tamil Nadu, LHT is practised by pacchamarundhu vaidyars ("green" or herbal medicine healer) among the Adivasis, and by paramparika Siddha vaidyars (traditional Siddha practitioners) elsewhere. For both types of healers, knowledge has been passed from one generation to another: healer families protect it as their intellectual property. In many places, I found that paramparika vaidyars enjoy a special social status entirely attributed to their ªpower of healingº which gives them traditional legitimacy.

Analysing Tony’s experience, besides other related research and interviews with healers, intricate nuances of the LHT practice came to the fore. Earlier last year, an Adivasi community worker accompanied me to the residence of an elderly healer in a remote tribal hamlet near Gudalur. He noted that ªmany people here, mostly tribals, still go to healersº. He also observed that the older the healer, the larger his/her patient following. The healers represent a parampara or tradition. According to a healer from Vellore, several Siddha traditions trace their origins to the wandering mendicants who passed it to the family of the Siddha vaidyars centuries ago. The traditional legitimacy which the lineage offers reinforces the thought that the older the practitioner, the richer the knowledge, and thus, the stronger the following.

Parampara denotes a succession of teachers and disciples in traditional Indian culture. It is the tradition of relationship and mentoring where teachings are passed on from a teacher to the student. The knowledge transfer and training is rigorous and starts as early as four years in the case of Siddha vaidya. The knowledge is transferred orally with emphasis on observation. Siddha vaidyars spend the early years as apprentices until they are ready, as opposed to a Siddha doctor who earns a Bachelor of Siddha Medicine and Surgery after five years of college education. The parampara is held in high regard and enjoys immense community support.

Healers typically do not demand monetary compensation for consultation— they accept whatever is given to them. Sometimes, clothes and fruits are given by a recuperated patient, or payment is made for the preparation of medicines. Healers don’t get monetary gains from healing—an important distinction from quacks.

For tribals, an Adivasi healer who is a member of their community will often enjoy greater acceptance than a western biomedicine-trained doctor. They are socially relevant in rural society and are the immediate point of contact, forming the fundamental part of primary healthcare. A successfully-treated patient refers the healer to more of his/her peers, as I learned from an elderly non-tribal healer in Gudalur who treated patients in far-off towns and cities. Healers are sympathetic to patients’ emotions. There is an unexplained vishwasam (faith) in the healers among patients. The healers are service-oriented and see the healing as a punyam (virtuous deed).

But there are contrasts between the practices of Adivasi healers and Siddha vaidyars—training, nature of practice and even clientele vary substantially. Adivasi healers do not see registration as a great deal, but it concerns the Siddha vaidyars. Siddha vaidyars’ main occupation is healing, whereas Adivasi healers do it in an ad hoc manner.

Further, Adivasi healers are rarely antagonistic towards hospital care. As one elderly Adivasi healer mentioned, “No one went to the hospital. It was all in the house, whatever happened. If nothing could be done, then we used to go to the hospital.” Integration is practised at the community level and encouraged by these healers, even though it may be neglected or dissuaded in official policy. In contrast, Siddha vaidyars often emphasise the inadequacies of western medicine and even codified systems like the Siddha degree.

Notwithstanding these differences, all healers acknowledge the distinct nature of their practice. As anthropologist Helen Lambert says, based on her work on haad vaids (traditional bone doctors), many LHT are experience based, where training is based on practice and observation rather than textbook or school learning. Haad vaids like pacchamarundhu and parramparika Siddha vaidyars are primary healthcare providers. They have been part of the public health system across the country, yet they operate on the margins as a subaltern practice because of regulations by the Indian medical boards. This is primarily due to state neglect of LHT and increased investments in western biomedicine.

What does this mean for legitimacy?

For the state, legitimacy is derived from certification from institutionalised training and standardised practices. So LHT is outside the strict legitimacy boundary for the state. But healers respond to the demands of legal-rational authority/legitimacy from various angles.

Our research suggests that the stronger a health tradition’s legitimacy, the greater the confidence in practice. In this scenario, some healers don’t seem to see the necessity for legal-rational authority. Others see its potential role in complementing the existing practice which has traditional legitimacy. As a Chennai healer put it: ªIf registration was there I could have practised it on a bigger scale. You can’t drive a vehicle without a licence,” he says.

Yet another healer didn’t seem to care about registration; he attributed his legitimacy to the success of his treatment evidenced by patients’ referral. For the traditional healers in Tamil Nadu, Kerala and Karnataka, legitimacy has come from myriad sources: the authenticity of the knowledge system they possess, allegiance to a larger organisation (like Tamil Nadu Paramparika Siddha Vaidya Sangam), and favourable results of treatment, which got them a loyal following. So most of the traditional healers have traditional legitimacy where the authority is legitimated by the sanctity of the tradition.

However, the compulsory state professionalisation of medicine has pushed LHTs on the margins. Those belonging to this marginal space practise esoterically. There is an urgent need to formalise LHTS within the health system. LHTS are locally relevant and appropriate in a resource-strained system providing remedies within the vicinity just as seen in Tony's case. The conversion of these details into a policy prescription is challenging because of the fluid nature of the traditions. The current slogan of policy documents on revitalisation of LHTS need to take these traditions' vibrant nature into account and not literal impositions of standards and practices alien to such traditions.

(Source:Downtoearth)

Answer to Darwin's question

Axel Meyer from the University of Konstanz responds to questions of adaptation and speciation

In a paper published in Nature, evolutionary biologist Axel Meyer from the University of Konstanz analyses almost 500 genomes and provides answers to questions concerning the genomic basis of adaptations, the differences between species, and the mechanisms of speciation

How do new species arise, and how quickly does this happen? Evolutionary biologist Professor Axel Meyer from the University of Konstanz and his team have come one decisive step closer to answering fundamental questions in biology. Upon evaluation of an extensive data set collected during extensive research on extremely young species of cichlids in crater lakes in Nicaragua, empirical evidence suggests that the evolutionary divergence of a population in the same geographical area into a new species is more likely to occur when many genes across the genome are involved in producing species-distinguishing characteristics.

And, what is more, new species can emerge within only a few hundred years This contradicts the hitherto established theory that speciation is a slow process and that ecologically important interspecies differences with simple, genetically locally limited architecture are more likely to result in the formation of a new species than those on a so-called polygenic basis are. Ultimately, it is about the question that Darwin already asked: What is a species, and how and why do new species arise? The results of this large-scale multidisciplinary study have been published in today's issue (28 October 2020) of the scientific journal Nature that is available online at https://www.nature.com/articles/s41586-020-2845-0.

Which genes and how many of them are involved in speciation?

In genetics, the question of emergence of new species translates into: What is the pattern of changes in the genome that leads to the emergence of new species? What happens genetically during the continuum from initially no differences within a population up to the completed speciation of reproductively separate species? Since his doctoral thesis in the 1980s at the University of California, in Berkeley, USA, and since the end of the 1990s at the University of Konstanz, Axel Meyer has been researching the question of which and how many genes or genetic loci - i.e. regions on the genome - are involved in the development of adaptations and new species. Here, the focus is on the study of very young species of cichlids, often only a few hundred generations old, living in crater lakes in Nicaragua. Although all these fishes descended from the same older original populations in the two large lakes of Nicaragua, Lake Managua and Lake Nicaragua, there are fish populations or even small species complexes of several species in each of the crater lakes that live exclusively in the respective lake, with specific phenotypic differences that are sometimes found in very similar fashion in several lakes, i.e. seem to have developed independently several times.

Multiple phenotypes in the same crater lake There are fishes with pronounced lips and such without lips, gold-coloured and black-and-white fishes, fishes that differ from others by having particularly slender bodies or certain delicate or robust tooth shapes. These phenotypes originated within the crater lakes, thus in the same geographical area ("sympatric speciation"), without external barriers such as rivers or mountains favouring this by limiting gene flow by gene exchange through reproduction. This is, thus, no "allopatric speciation".

The variations regarding the lips, colour, body and tooth shape of the fishes are genetically rooted in the original population, as Axel Meyer and his team (especially Dr Andreas Kautt, Dr Claudius Kratochwil and Dr Alexander Nater) were able to show after analysing complete genomes of a total of almost 500 fishes from each of the small lakes. Thus, these represent not independently originated new mutations, but rather the sorting out and selective choosing of the same original gene variants, which have re-assorted themselves in the individual lakes. Previously, it was unclear whether these are new species that have individually evolved through adaptation to new ecological conditions. In fact, the phenotypically different populations in the lakes also prefer to mate among themselves.

Many genes have a large effect

For Ernst Mayr - known by his contemporaries as the "Darwin of the 20th century" who helped to develop the biological species concept - this would be an indication that this is a species in its own right. (Mayr, who was Axel Meyer's mentor from Harvard University, was awarded an honorary doctorate by the University of Konstanz in 1994 before passing away in 2005). However, the new results of genome sequencing suggest otherwise. After the sequencing of more than 450 piscine genomes, crossbreeding experiments and genome-wide association (GWA), it was found that the conspicuous differences, such as lip size and colour, in the genomes of these populations are determined by only one or two locally very limited genome regions via Mendelian inheritance. Fish with the same type of lips or colour reproduce almost exclusively with each other. These genes did not lead to genome-wide genetic differences as would be expected between species. In contrast, surprisingly, the other sympatric species with the phenotypically far less conspicuous differences in body shape and special tooth shape showed much greater genome-wide genetic differences.

This means that many genes at many positions in the genome each make a small contribution to genetic differentiation with the effects effectively adding up over the entire genome and leading to the emergence of new species. The number of mutations in the entire genome between these young species is ten times higher than in the physically very different polymorphisms of the large-lipped or golden versus black and white striped fishes, for example, that do not represent unique species. The combined effect of many genes thus has a stronger effect on the development of new species. "This is not what we expected. It also contradicts large parts of the theory according to which individual loci with a great effect on the appearance of species, such as pronounced lips or colouration, should cause new species to develop more quickly," said Axel Meyer. And, it is especially surprising here, where the loci impact both the ecology and the choice of partners. "At least according to the criterion of the average difference in the entire genome, fishes with such conspicuous phenotypical differences are nevertheless not different species, but are at the level of mere polymorphisms (diversity) on the speciation continuum."

Crater lakes constitute a natural experiment

The geographical situation makes the crater lakes studied a "natural experiment". The original fish populations originate from two much older neighbouring lakes, to which there is no connection. This chain of crater lakes has been colonised by the fish populations independently of each other. When and how specimens from the original population got into each of the seven smaller lakes can only be calculated by simulation. It took place, however, somewhere between just a few hundred and a few thousand generations ago, and there were not very many fish that colonised the crater lakes. The emergence of new species can thus, as demonstrated here, take place much faster than previously thought. Meyer compares the lakes with Petri dishes, all inoculated with the same initial genetic situation, which evolve independently over generations: "There are very few systems in the world, such as the Galapagos Islands or the crater lakes in Nicaragua, that are a natural experiment for evolutionary research."

(Source:Eurekalert)

How The Impact Covid-19 Has Reached Tribal Communities In India

India is home to 104 million tribal people in India, concentrated in 10 different states. Spread across 705 tribes, they account for 8.6% of the country's population. Tribal people rank the lowest in various health, educational, societal indicators.

According to the policy brief titled 'Tribal Health in India – Bridging the gap and a roadmap for future and published jointly by the Ministry of Health and Family Welfare and Ministry of Tribal Affairs, Government of India (2018), the tribals in India are facing a triple burden of diseases.

Malnutrition, nutritional deficiencies and communicable diseases such as malaria and tuberculosis are widespread among many tribal communities. With rapid urbanisation, environmental distress and changing lifestyles, there has been a rise in the prevalence of non-communicable diseases such as cancer, diabetes and hypertension. Besides, instances of addiction of tobacco and mental illnesses is also increasing.

Tribal and other forest-dwelling communities are inevitably getting affected by COVID-19 and the lockdown. The COVID-19 hotspots identified by the government include 19 scheduled districts, while positive cases have been reported from other tribal areas as well.

The lockdown measures have had a drastic effect on a large population of poor and marginalised communities as it has caused a loss of livelihoods, physical hardships, lack of food and shelter, and economic distress. There are reports from across the country of severe hardships being faced by tribal workers, including shortage or lack of supply of ration to these communities, combined with a loss of income.

Unfortunately, the lack of a targeted healthcare plan in place for the tribals to combat COVID-19 emergency raises serious concerns about spreading of the virus in trial communities.

Key Issues Of Tribal Communities

1. Lack of healthcare facilities, COVID-19 information and testing kits

Lack of information and awareness among the tribals about the pandemic and required protective measures is a major issue in tribal areas. Tribal settlements are remotely located, making it particularly difficult for information to reach these areas. The absence of healthcare facilities can severely limit the capacity to deal with a major COVID-19 outbreak in tribal areas, posing a serious threat to the tribal population.

It is a well-known fact that COVID-19 impacts people with compromised health conditions and low immunity. This further increases the risk of widespread infection to tribal population, many of whom are living in deprivation. Allocation and monitoring of testing equipment in tribal areas is a major challenge, as testing is mostly limited in tribal areas.

2. Food Insecurity, Loss of livelihood and Unemployment

Food insecurity, accompanied by malnutrition and micronutrient deficiencies, is a major cause of concern. Access to Public Distribution System (PDS) is poor as the tribals and OTFD (Other Tribal Forest Dwellers) reside remotely. Even if they are able to reach their nearby PDS centers, they are denied their share of the food material as they are not registered under the PDS center, or don't have ration cards or Aadhaar cards.

However, the story doesn't end here. The much publicised 'Direct Benefit Transfer' scheme of the government doesn't cover this community. Most of the tribal people either don't have a bank account or, due to their remote location, their bank accounts are not accessible to them, making the situation all the more difficult for them.

3. Loss of livelihoods from Minor Forest Produce (MFP) and Non Timber Forest Produce (NTFP)

The MFP collection season begins from April and lasts uptil June, accounting for 60% of the annual collection. Unfortunately, this time, it has coincided with the lockdown period, affecting collection and the sale of these products. Research suggests that approximately 100 million forest dwellers and tribals depend on MFP for food, shelter, medicines and sustainable income. Unfortunately, the lockdown will result in ripple effects on the general health of women forest dwellers and resilience of their family members who are actively involved in collection and sale of NTFP products including bamboo, cane, fodder, leaves, gums and waxes.

The condition of Mahua flower collectors in the Odisha is an example of tribals lurch in the lockdown. Trading of these flowers during the summer season is a major source of livelihood for some tribal communities in Odissha. The COVID-19 pandemic has hurt the trade and disrupted the tribal economy as there are no flower buyers and markets are closed too.

4. Tenurial insecurity and non recognition of forest rights

Due to a lack of awareness, education and resources, most of the tribals and forest dwellers don't have recorded legal rights over forest land and resources. The tenure security of tribals and forest dwellers is key to ensuring their livelihoods and food security. The Forest Rights Act has the potential to secure forest rights of at least 20 crore tribals and other traditional forest dwellers over 40 million ha (50% of India's forest land), covering 177,000 villages.

There are now several examples of empowered Gram Sabhas with Community Forest Resource (CFR) rights under the Forest Right Act, who have improved the productivity of their respective CFRs and are sustainably managing them. Many of these Gram Sabhas, working in the Vidharba region of Maharashtra, have generated higher revenue from the collection and sale of NTFPs, benefiting tribal collectors, while also retaining some funds for village development activities. These funds are now being utilised in a number of cases to deal with the situation created by the lockdown.

Focal Points Of Action For Tribal Communities

A COVID-19 response plan for the tribal community must be designed by the Ministry of Tribal Affairs. Comprehensive guidelines must be framed by the central and State governments to address the issues of this section of population. These guidelines must converge the benefits of PDS and Direst Benefit Tranfer scheme for the tribals.

With the help of mobile health units and vans, adequate testing and healthcare facilities must be ensured. COVID-19 care centres must be set up in tribal locations.
Both the central and State governments must devise strategies to engage with forest produce traders to ensure purchase of MFPs. The tribal community collectors must connected with online buyers and sellers for their products.

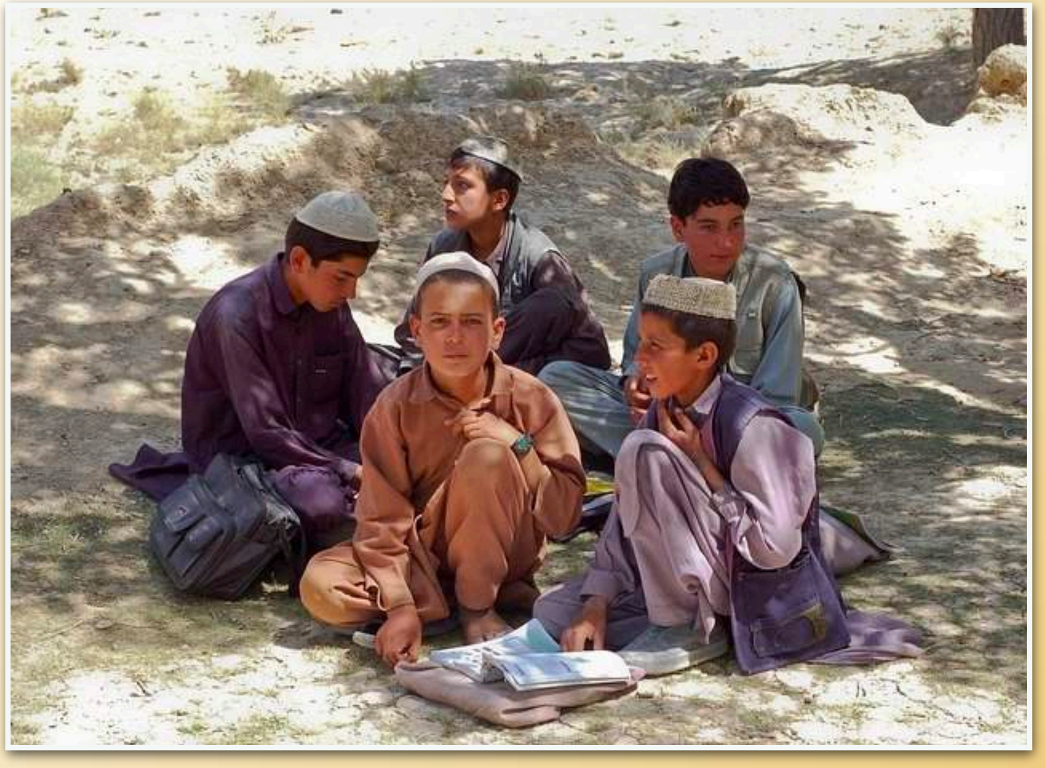
To prevent the violation of rights of tribal communities and forest dwellers, the environment ministry must withdraw the forest clearance decision and other such guidelines issued during the lockdown .

Compensatory Afforestation Fund Management and Planning Authority (CAMPA) should release funds to Gram Sabhas established with the tribal community for management of forest resources and livelihood activities to address the economic crisis due to COVID-19 lockdown. Post the lockdown, CAMPA should release job opportunities for tribal community members.

Effective implementation needs of the Forest Right Act needs to be in place to ensure tenurial security and recognition of forest rights of tribal people.

(Source:youthkiawaaz)

The Appalling Educational Status of Muslims in India Needs Urgent Attention



Education is one of the most important instruments for the development and empowerment of any marginalized community. Education plays an important role in helping people in gaining a respectful and dignified life within the society and is also helpful for enabling people to find a source of employment and livelihood. Sir Syed Ahmad Khan was a great socio-religious reformer and messiah of 'Muslims education' and he said, "It is the categorical verdict of all the nations and great seers of the world that national progress depends on education and training of the people. Keep in mind that life without education and training is like a bird without wings."

Muslims are the second largest populous religious group after Hindus in the country. The National Minority Commission has identified Muslims as minorities along with Christians, Sikhs, Buddhists and Jains on the basis of religion. Among the minorities, Muslims have the highest population with 14.2 percent, followed by Christianity 1.7 percent, Sikhism 0.7 percent, Buddhism 0.5 percent, Jainism 0.4 percent and others at 0.7 percent. There are many states such as Jammu and Kashmir, West Bengal, Assam, and others in which population of Muslims is above 20% (Censes, 2011).

Muslims, despite being the largest religious minority of the country are lagging behind as compared to the other religious minorities on all indicators of human development, such as living standards, financial stability, political existence, education and other aspects, thereby showing poor performance in most fields. Their socio-economic status is far behind that of other minorities and is also less than the national level.

The factors of their educational backwardness have not fully and satisfactorily been studied by scholars and other governmental and non-governmental agencies. Invariably most individual researchers, organizational surveys and government appointed committees find that Muslims are the most educationally backward community of the country.

In this regard, a high level committee was headed by the Prime Minister of India in 2006, popularly called the Sachar Committee. The Committee found that Muslims have low level access to educational opportunities and their educational quality is even lower or is as bad as the Scheduled Castes (SCs) and Scheduled Tribes (STs) and Other Backward Classes (OBCs). The report has also revealed that one fourth of Muslim children in the age group of 6-14 years have either never attended school or are dropouts. For children above the age of 17 years, the educational attainment of Muslims at matriculation is 17%, as against national average at 26%. Only 50% of Muslims who complete middle schools are likely to complete secondary education, compared to 62% at the national level' (Ministry of Education, GOI). Their literacy rate, mean year of education, representation in senior secondary education and higher education is below other communities in India. For example, the literacy rate among Muslims is 57.3%, which is far behind the national average of 74.4%. When we see other minority communities in India their literacy levels are far better than the Muslims. The majority Hindus have a literacy rate of 63.6%. Literacy among other minority such as Jains is 86.4%, Among Christians it is 74.3%, Among Buddhists it is 71.8% and among Sikhsit is 67.5% in India. This shows that the Muslims have the highest illiteracy rate of any single religious community in India. Although the literacy rate for Muslim women was higher than SCs and STs women, but lower than others (Times of India, 2020).

A study was conducted by S.M.I.A. Zaidi in 2006 and found that the highest literacy among Muslims was in Andaman and Nicobar Islands at 89.8%, followed by Kerala 89.4%, while lowest literacy was found in Haryana 40%, and Bihar 42%. In the major states of the country (i.e. Uttar Pradesh, West Bengal, Bihar, and Haryana etc.) Muslims are educationally the most backward in comparison with other religious communities.

As per National Sample Survey Report of the 75th Round (2018), reported by the Times of India (2020) the Gross Attendance Ratio (GAR) of Muslims was lower (i.e., 100) than SCs (101), STs (102), OBCs, and minorities. The same case is also at upper primary level; here the GAR was lower than other communities. The GAR of Muslims at Secondary level was 71.9%, which was less than STs 79.8%, SCs 85.8% and from OBCs also. Similarly, in the case of higher secondary level and the GAR of Muslims was lowest i.e. 48.3%, below the SCs 52.8%, STs 60% and lowest compared to other communities as well. At the level higher secondary and above, their GAR has been 14.5%, just above the STs 14.4%, but below from the SCs 17.8% and other communities. In the age group of 3 to 35 years, among all communities, Muslims have the highest proportion that had never enrolled in formal educational institutions or programmes.

The enrolment of Muslims in higher education is pathological. As per All India Survey on Higher Education Reports (AISHE) (conducted by MHRD, GOI), it was revealed that the representation of the community in higher education was also the lowest compared to the communities such as SCs, STs and OBCs.

From the above table, the growth rate of Muslims in higher education from the years 2010-11 to 2018-19 was 26.92%, while that of the STs was 20%, and that of the SCs was recorded at 25.50 %, and OBCs 23.96%. This clearly shows that, among all the minorities, Muslims have the highest growth rate, but in terms of proportion their enrolment is the lowest among these communities.

The importance of education and skill in the rise and fall of the communities is well known, and everyone also knows that in the present scenario (which is known as knowledge society) it is impossible to spend a self-dependent and dignified life without an education.

From the above discussion and evidences, and various reports, it shows that, in the matter of education, the condition of Muslims at all levels (i.e. primary, upper primary, secondary, senior secondary and higher education) of education remains pathetic in comparison with other religious group as well as among SCs, STs and OBCs group. It is a serious constraint in planning for the education of Muslims. A large population of Muslims is not only poor, but also deprived of the legacy of education. It is very difficult to get education for those Muslims who earn their livelihood through hard work and small businesses. There are only two ways for these poor and hard working class of Muslims to get education, either government schools and colleges or madarsas.

For this reason, in my opinion, there is an urgent need for intellectuals and philanthropists to come together, generate awareness about the importance of education and make them aware of the educational schemes, policies and programmes run by the government of India. Looking at the pathetic state of education among the muslims in India, state governments along with the Centre, need to pay special attention towards the education of Indian Muslims.

(Source:TheNewLearn)

Shri Arjun Munda launches two Centers of Excellence for tribal welfare in partnership with Art of Living

Strengthening of PRIs in tribal areas will empower them in matters relating to decision making and development of their community

The Union Minister of Tribal Affairs, Shri Arjun Mundalaunchedtwo Centers of Excellence for Tribal Welfare in a collaboration between Ministry of Tribal Affairs (MoTA) and Art of Living (AoL) through video conference here today.Gurudev Sri Sri Ravishankar, Art of Living graced the occasion. Minister of State for Tribal Affairs Smt. Renuka Singh Saruta, Secretary, MoTA Shri Deepak Khandekar and Js Shri Navaljit Kapoor were also present.

Addressing on the occasion, Shri Arjun Munda said that it is a very praiseworthy initiative of Art of Living (AoL) to launch two Centres of Excellence in partnership with MoTA– first CoE in the field of training tribal farmers in Aurangabad district of Maharashtra on sustainable natural farming based on Go-Adharith farming techniques; and second CoEin the field of 'Strengthening PRIs' in 5 districts covering 30 Gram Panchayats and 150 villages of Jharkhand. The Union government is fully committed to the welfare of tribal people of our country. Shri Munda said that a large amount of funds to the tune of more than Rs. 2 lakh crore is allocated exclusively for tribal development across the country.

Giving details, the Tribal Affairs Minister said that with the active participation of volunteers of Art of Living, the purpose of tribal welfare will be served. It will be a step towards fulfilling the Prime Minister's dream of Aatmnirbhar Bharat. He hoped that this work will be accomplished very soon and more and more people and institutions will get involved with such move. The tribal people are completely devoted to protect the nature and save the environment, the Minister elaborated.

Shri Arjun Munda explained that strengthening of tribal Panchayati Raj Institutions (PRIs)will also help to educate them about their constitutional rights. He hoped that this will empower the PRIs in matters relating to decision making and development of their community.

Smt. Renuka Singh Saruta in her address said that the Ministry of Tribal Affairs is running many programs for the welfare of tribals. The Ministry is working in collaboration with many NGOs and social organizations who are also doing a commendable job in this field. Art of Living has a vast network of volunteers who will make this program successful.

Gurudev Sri SriRavishankar in his address opined that we have to learn a lot from tribal people as they are very responsible towards cleanliness and conservation of environment. He dwelt upon the experience of running AoL School in Ghatashila, Jharkhand where skill development has been incorporated in educational curriculum. AoL is running 750 schools all over India. He emphasized that Dental Hygiene and Mental Hygiene both are very necessary in our villages. He assured that the volunteers of AoL will wholeheartedly work to make these tribal welfare schemes successful.

Secretary, MoTA, Shri Deepak Khandekar appreciated the already ongoing efforts of AoL in tribal areas. MoTA and AoL partnership will further help to expand these welfare activities, he added.SmtYatinder Prasad, JS (FA) conveyed vote of thanks to dignitaries.

The first initiative ‘Strengthening PRIs’ will be launched in 5 districts covering 30 Gram Panchayats and 150 villages of Jharkhand, in creating awareness among elected representatives of PRI about various Tribal Acts and Rulesand different welfare schemes available for these tribals and help them getting access to these schemes. The model is designed to create the youth volunteers among the tribal youths by giving them personality development training, instilling the sense of social responsibility among them and thereby creating the tribal leaders who will work for their community in spreading this awareness.

The second is about training 10000 tribal farmers in Aurangabad District of Maharashtra on sustainable natural farming based on Go-Adharith farming techniques. Farmers will be helped in getting the Organic certification and the marketing opportunities will be made available to them to make each of them Atmanirbhar Tribal Farmers.

(Source:PIB)

Discover Neanderthal footprints at Iran’s Do-Ashkaft Cave

There are relics and fossil evidence from Neanderthals in several parts of the Iranian plateau, including Do-Ashkaft Cave, the subject of this note.

A Middle Paleolithic cave site, Do-Ashkaft Cave is situated north of Kermanshah, near Taq-e Bostan, about 1,600 m above sea level. Its entrance faces south of Meywala Mount, overlooking the national park of Kuhestan.

The main chamber of the cave is 23 meters deep and 15 meters wide. The floor is covered with debris from modern use as a winter campsite by sheep and goat herders. Next to the mouth of the main cave, there is a small spring with a regular flow even in warm, dry summers, which seems to have played a major role in the geomorphological and archaeological history of the site.

The site was first visited in 1996 by Iranian researchers F. Biglari and S. Heydari-Guran and during the following four years, a series of surface surveys were made at one-month intervals, which resulted in a rich collection of Middle Paleolithic lithic artifacts.

Exposed breccia at the entrance and some patches on the walls indicate lateral percolation of water into the cave sediments. In some places, this breccia is about two meters above the present floor. The presence and position of the breccia suggest that a substantial amount of the cave sediments may have been washed away. The breccia at the entrance is rich in fragmentary animal bones, charcoal, and flint artifacts. Some Middle Palaeolithic artifacts, including a few side-scrapers and a Mousterian point, have been recovered from this breccia.

Animal bones are extremely fragmentary and some are burned, suggesting human involvement in their accumulation during the Mousterian occupation. They include a fragment of the right mandible of an adult specimen and an upper third right molar of a sub-adult ruminant, both allocated to wild Caprine (sheep or goat).

Thousands of pieces of flint have been collected from the entrance area and the talus slope. Since there is no sign of later industries, except a few bladelets and an end-scraper, the surface collection seems to be unmixed and to represent atypical Zagros Mousterian industry.

Primary observations indicate that lithic artifacts were predominantly made from raw material procured near the site, a fine glossy opaque red and green material which seems to be jasper. Survey located outcrops of this material and its two other variants along the southern slope of Maiwaleh Mountain.

The lithic assemblage at Do-Ashkaft comprises tools, flakes, trimming flakes, shatters, and cores. An emphasis on heavily retouched pieces characterizes the assemblage. Such heavy reduction and utilization are typical of the Zagros Mousterian assemblages. Single and convergent scraper (including Mousterian points) constitutes the largest percentage of the tools, followed by other scraper types, retouched pieces, notches/denticulates, burins, and miscellaneous artifacts.

To gather information about the distribution of other possible Palaeolithic sites in the vicinity. An area of about seven by one km was surveyed in 1999 and a total of 14 caves and rock-shelters with Upper Palaeolithic and later lithic assemblages were recorded. The only probable Middle Palaeolithic artifacts found include a convergent scraper from an abandoned limestone quarry and a few artifacts including a Mousterian point in a geological section. This section and another one near Tang-e Kenesht were recorded and sampled by S. Heydari. His study provides a paleoenvironmental sequence for the region with a late Middle Pleistocene to Holocene age.

A study, published in the Journal of Human Evolution in 2019, suggests that Neanderthals were roaming at the Iranian Zagros Mountain sometimes between 40 to 70 thousand years ago, it also refers to a human tooth discovered in 1999 in a cave called Wezmeh near Kermanshah, noting the tooth that previously thought to be modern human belongs to a Neanderthal child

In taxonomy, Homo sapiens is the only extant human species. The name is Latin for “wise man” and was introduced in 1758 by Carl Linnaeus (who is himself also the type specimen). Neanderthals are an extinct species or subspecies of archaic humans in the genus Homo, who lived within Eurasia from circa 400,000 until 40,000 years ago.

(Source:tehrantimes)

Denisovan DNA in the genome of early East Asians

Scientists identify 34,000-year-old Early East Asian of mixed Eurasian descent. Researchers analyzed the genome of the oldest human fossil found in Mongolia to date and show that the 34,000-year-old woman inherited around 25 percent of her DNA from western Eurasians, demonstrating that people moved across the Eurasian continent shortly after it had first been settled by the ancestors of present-day populations. This individual and a 40,000-year-old individual from China also carried DNA from Denisovans, an extinct form of hominins that inhabited Asia before modern humans arrived.

In 2006, miners discovered a hominin skullcap with peculiar morphological features in the Salkhit Valley of the Norovlin county in eastern Mongolia. It was initially referred to as Mongolanthropus and thought to be a Neandertal or even a Homo erectus. The remains of the "Salkhit" individual represent the only Pleistocene hominin fossil found in the country. Ancient DNA extracted from the skullcap shows that it belonged to a female modern human who lived 34,000 ago and was more related to Asians than to Europeans. Comparisons to the only other early East Asian individual genetically studied to date, a 40,000-year-old male from Tianyuan Cave outside Beijing (China), show that the two individuals are related to each other. However, they differ insofar that a quarter of the ancestry of the Salkhit individual derived from western Eurasians, probably via admixture with ancient Siberians.

Migration and interaction

"This is direct evidence that modern human communities in East Asia were already quite cosmopolitan earlier than 34,000 years ago," says Diyendo Massilani, lead author of the study and researcher at the Max-Planck Institute for Evolutionary Anthropology. "This rare specimen shows that migration and interactions among populations across Eurasia happened frequently already some 35,000 years ago.” The researchers used a new method developed at the Max-Planck Institute for Evolutionary Anthropology to find segments of DNA from extinct hominins in the Salkhit and Tianyuan genomes. They found that the two genomes contain not only Neandertal DNA but also DNA from Denisovans, an elusive Asian relative of Neandertals. "It is fascinating to see that the ancestors of the oldest humans in East Asia from whom we have been able to obtain genetic data had already mixed with Denisovans, an extinct form of hominins that has contributed ancestry to present-day populations in Asia and Oceania," says Byambaa Gunchinsuren, a researcher at the Institute of Archaeology of the Mongolian Academy of Sciences. "This is direct evidence that Denisovans and modern humans had met and mixed more than 40,000 years ago.” "Interestingly, the Denisovan DNA fragments in these very old East Asians overlap with Denisovan DNA fragments in the genomes of present-day populations in East Asia but not with Denisovan DNA fragments in Oceanians. This supports a model of multiple independent mixture events between Denisovans and modern humans," says Massilani. ***(Source: Max Planck Institute for Evolutionary Anthropology)***

The researchers used a new method developed at the Max-Planck Institute for Evolutionary Anthropology to find segments of DNA from extinct hominins in the Salkhit and Tianyuan genomes. They found that the two genomes contain not only Neandertal DNA but also DNA from Denisovans, an elusive Asian relative of Neandertals. "It is fascinating to see that the ancestors of the oldest humans in East Asia from whom we have been able to obtain genetic data had already mixed with Denisovans, an extinct form of hominins that has contributed ancestry to present-day populations in Asia and Oceania," says Byambaa Gunchinsuren, a researcher at the Institute of Archaeology of the Mongolian Academy of Sciences. "This is direct evidence that Denisovans and modern humans had met and mixed more than 40,000 years ago."

"Interestingly, the Denisovan DNA fragments in these very old East Asians overlap with Denisovan DNA fragments in the genomes of present-day populations in East Asia but not with Denisovan DNA fragments in Oceanians. This supports a model of multiple independent mixture events between Denisovans and modern humans," says Massilani.