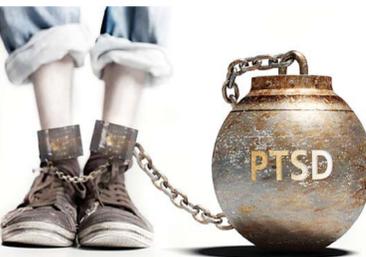


#RESEARCH

Cellular Aging & Mental Health Disorders

New research with military veterans finds a connection between DNA methylation signals of accelerated cellular aging and mental health conditions like post-traumatic stress disorder (PTSD).



From birth to death, a lot may change, but our DNA—the long, double-helix molecule that contains all of a person's genetic code—stays the same. The instructions for reading that code can shift, however, as the chemical tags on and around a DNA sequence change throughout our lives, depending on our age, environment, and behaviour. This outside influence on how our genes are read and expressed by cells is called epigenetics and researchers studying it have discovered clues that may show why some veterans live longer than others.

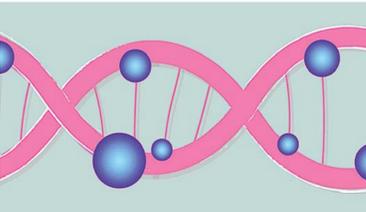
Scientists can interpret epigenetic changes and patterns by looking at DNA methylation (DNAm), a process that turns a gene "on" or "off." DNAm can also indicate a person's cellular age, which can be different from their numerical age, and point to risk factors associated with early death.

In a new study of military veterans published in *Translational Psychiatry*, researchers report findings that suggest former service personnel with PTSD are at greater risk of early death.

Our study found that PTSD and comorbid conditions, like substance misuse, are associated with a cellular marker of early death found in DNA methylation patterns," says Erika Wolf, a professor of psychiatry at the Boston University Chobanian&Avedisian School of Medicine and senior author of the study. An early death is one that occurs before the average age of death, which in the United States is about 75 years, but differs slightly between men and women.

The study included two samples of veterans that had representative levels of trauma and other psychiatric conditions, like substance use and personality disorders. One group included 431 veterans in their early 30s, who had served in post-9/11 conflicts; the other group included 647 middle-age veterans and their trauma-exposed spouses. Both groups were assessed for a range of psychological conditions, and had blood drawn to obtain genetic information and to test for levels of a variety of inflammatory molecules.

The data was then put into an existing algorithm called GrimAge—which is designed to predict time to death based on methylation data in a person's blood and other types of biomarkers—and correlated with a



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Awe, Wonder And Curiosity

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The Vedas provide the earliest glimpses of the human-rhino interface. We tread on firm ground in our search for the armoured giant when we encounter the Khadga. A pointer to the identity of the animal is that several Vedic passages situate it "in the realm of fierce wild beasts and suggest that its hide is armour-like", an observation that accurately describes the Indian rhino.

Our search for the Khadga, for instance, leads us to the scene of the ashvamedha sacrifice where animals dedicated to different deities are tied to the 21 yupas (sacrificial stakes) and in the intermediate spaces. While domestic animals are bound to the stakes, in the spaces between them are confined wild animals including the elephant and the rhinoceros. However, not all these animals are killed, some including the rhinoceros being temporarily confined till the culmination of the ceremony. In the enumeration of the animals assigned to different deities, the rhino is dedicated to the Vishvadevas (all gods) who are worshipping through the Vaishvadevahoma (rite).

Though such contexts do not suggest anything more than a ritual significance of the mighty animal, we can perhaps turn to more telling clues for allusions which reflect an interest in the use of the animal. One learns, for instance, about the Vedic use of rhinoceros hide (khadgakavacha) in a ritual dakshina or priestly gift at the one-day Soma rite known as the Apachiti. The SankhayanaShrautasutra mentions that "the sacrificial fee is a horse-chariot, coated with rhinoceros-hide, covered with tiger felt, with a quiver boar-hide, with a bow-case of panther-hide, drawn by brown horses. Similarly, in a ritual context, the Jainimuni Brahmana stipulates the use of armour of rhinoceros hide.

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In the oft-told Jataka parables narrating the stories of the Buddha's former births, the rhinoceros puts in an appearance in the SudhahabbajanaJataka as part of the setting of a hermitage.

"We know of some health behaviours that reduce inflammation, like exercise and stress reduction, good nutrition," Wolf says. "The ability to detect low levels of these molecules years before they may become clinically significant, and hopefully be able to intervene early on in disease trajectories, is critical for efforts to ultimately slow or reverse the adverse health consequences of traumatic stress."



Shreyansnath, the 11th Jain Tirthankar, has a rhinor his 'Chinha' or symbol. The standing statue is that of the Digambara sect of Jainism. Courtesy Sudhanva Kasliwa.

Jina Shreyansnath depicted in the Svetambar sect tradition of Jainism. The Symbol remains unchanged - the rhino - though the sect is different. Courtesy Divesh N. Shah.

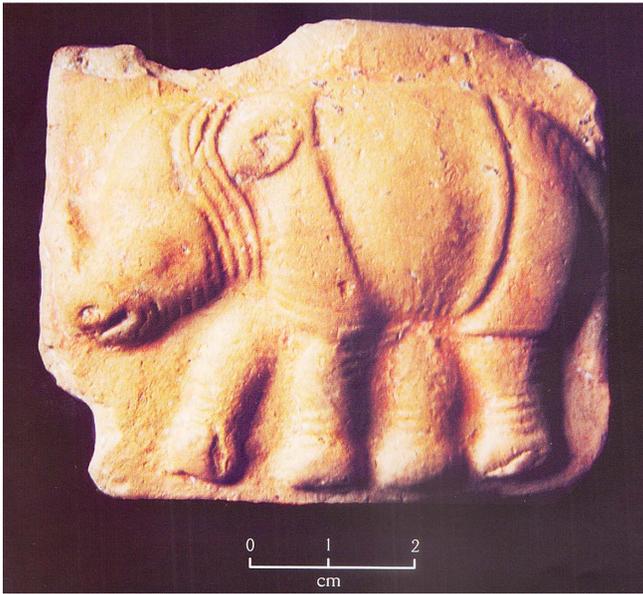
#STORY OF THE INDIAN RHINOS

Similarly, the Vidhurapandita Jataka envisions a captivating view of the landscape, rich in fauna including the rhinoceros, when it mentions a magic jewel through which the entire world could be seen. The contexts suffice to convey the ecological sensibilities of ancient India by situating the rhino in environs typically conducive as habitats.

Assigned to the 1st century CE, the narrative in the non-canonical Milindapanha centres around a chain of discourses between King Milinda and Nagasena the Elder regarding a number of points of Buddhist doctrine. An interesting allusion occurs to "an elephant hemmed in by rhinoceroses". Though clearly allegorical in the given context, it may be worthwhile to point out that the elephant-rhinoceros animosity (not conclusively proved in the wild is often referred to in later popular writings.

As in Buddhism, the animal elicits attention because of its solitary character in the Jaina world. The Kalpasutra, for instance, extols the fortitude of Mahavira by saying that he was "single and alone like the horn of a rhinoceros". The natural behaviour of the mega herbivore, thus, makes for an image which cuts across traditions. Significantly, ancient Indian texts suggest that an interest in the skin of the animal, as seen in the Shrautasutras, graduates to an interest in its meat. This, for instance, clearly comes through in the Dharmasutras of Apastamba, Gautama and Baudhayana, which widely forbid the eating of the flesh of "five-nailed" (pancanakha) or "five-toed" animals, except for a restricted list comprising the porcupine, hedgehog, monitor lizard, hare, tortoise and very often the rhinoceros. A similar injunction occurs in the ManavaDharmashastra. The rhinoceros, though, is a strange inclusion, since it has only three toes on each foot. Nevertheless, if we remind ourselves of the importance assigned to the animal in Vedic ritual contexts, it seems reasonable to argue that this inclusion was possibly an extension of a tradition which had firmly embedded itself in early human consciousness.

Overall, what manifests are attempts to sanction the eating of rhino meat which is further amplified when the Dharma texts unanimously reinforce its pre-eminence in appeasing ancestors. Apastamba, for instance, tells us that the meat of a rhinoceros (khadgamamsa) offered on a rhinoceros skin (khadgopastaran) is said to gratify ancestors for an unlimited time. In a similar vein,



Kushana-period terracotta plaque with the image of one-horned rhino, Chandraketugarh, West Bengal. Courtesy Archaeological Survey of India.

the ManavaDharmashastra spells out the periods for which the flesh of animals offered at rites for ancestors satisfies them, and rhinoceros meat is enlisted amongst the items that are "efficacious in perpetuity".

What clearly emerges from this maze of injunctions and the attempts to explain them is the interest ancient India had in the skin and meat of the rhinoceros. Though the allusion occurs to "an elephant hemmed in by rhinoceroses", the contexts' use in Brahmanical sources are primarily ritual and relate to socio-religious prescriptions, texts like the Charaka Samhita and Susruta Samhita (dated to the first half of the 1st millennium CE) and the Arhassastra (c. 300 BCE-200 CE) demonstrate how these extended to strategic and medicinal realms as well.

In an eightfold classification in the Charaka Samhita, based primarily on feeding habits and habitats, the rhinoceros belongs to the anupa class of animals or those which are inhabitants of marshy lands. The meat of the animal is said to impart strength and alleviate vatadosha (the body substance derived from the element air).

According to Charaka, it is sweet, unctuous (oily), nourishing, beneficial for the complexion, and relieves fatigue. Olivelle contends that strength here may well suggest sexual potency. Elsewhere, the physician is urged to give the well-spiced meat of the animal as a cure for emaciation. Apart from a restricted list comprising the porcupine, hedgehog, monitor lizard, hare, tortoise and very often the rhinoceros, a similar injunction occurs in the ManavaDharmashastra. The rhinoceros, though, is a strange inclusion, since it has only three toes on each foot. Nevertheless, if we remind ourselves of the importance assigned to the animal in Vedic ritual contexts, it seems reasonable to argue that this inclusion was possibly an extension of a tradition which had firmly embedded itself in early human consciousness.

animal is pleasing to ancestors, is sacred, imparts longevity, tends to suppress the discharge of urine, is dry and pacifies vata and kapha. Such classificatory system not only reflect an engagement with the ecology of the animal but also underline the preservation of the lore recommending rhino meat. The Sundarakanda of the Ramayana recounts how, as part of his quest for Sita, Hanuman explores Ravana's place, searches the harem as well as the drinking hall with the aroma of delicacies which also include "vardhranasakas". J.L. Brockington emphasizes as an oddity this sole occurrence of the rhinoceros- vardhranasa in the text, as one of the items in the banquet that Hanuman sees spread in Ravana's dining hall.

It may, however, be pointed out that the interpretation of the term "vardhranasakas" as rhinoceros does not appear in the popular translations of the Ramayana. For instance, the Goldman translation refrains from interpreting the term and uses it verbatim, expounding that no commentator could specify with certainty what sort of a creature it was. Hence, notwithstanding the thrill of finding the rhinoceros amidst the gastronomic spread for Ravana, the presence of the animal in the text in general, and in the banquet hall of Ravana in particular, should best be considered a possibly rather than a certainty.

The Adiparvan of the Mahabharata preserves a rather quaint reference to the animal. Vashista consecrates the Paurava as the sovereign of all baronage "to become the one horn (vishanabhutam) of the entire wide earth. The expression lacks clarity but has been interpreted as a reference

to the horn of the rhinoceros a symbol of uniqueness and solitude. It is, however, the Karanaparvan which unambiguously establishes the identity of the animal as our one-horned hero, when it describes a grim contest between Bhima and Ashvathama, where the latter strikes the Pandavas on the forehead with an iron arrow. Bhima is then said to have borne the arrow protruding from his forehead like a "proud rhinoceros ears his horn in the forest".

The epic saga also evinces an interest in the utilization of the animal itself. Karma is consecrated according to scriptural prescriptions on a seat covered with linen, with sanctified golden and earthen pots, with water-filled tusks/horns of elephants, rhinoceroses, great bulls and other animals filled with jewels and pearls and pleasant-smelling herbs. Yudhishtira questions Bhishma regarding the duration of offerings which gratify the ancestors, and it is told that the gratification received from the flesh of the rhinoceros (khadgamamsa) was inexhaustible. The animal finds use even in the Arthashastra of Kautilya which spells out as forest produce: "Skin, bones, bile, tendons, eyes, teeth, horns, hooves and tails of the lizard, seraka, leopard, bear, dolphin, lion, tiger, elephant, buffalo, camara, samara, rhinoceros, bison and gavaya, and also of other deer, beasts, birds and wild animals. Nistrimsa, mandalagra and asyast are swords whose hilts are made of the horn of the rhinoceros and buffalo, the tusk of the elephant, wood and bamboo roots. It is further expounded that "a coat of mail of metal rings or metal plates, armour of fabrics and combinations of skin, hooves and horn of dolphin, rhinoceros, dhenuka, ele-

phant and bull are armours." Beyond the use of its flesh and body parts, the animal seems to have been used in contests to entertain the sovereign as well as a befitting item of gift from him. Chandragupta Maurya enjoyed seeing animal fights in his arenas. These included wild bulls, tame rams, rhinos, tusked elephants and more. We are also told that the animals brought to the king as gifts included stags, antelopes, gazelles, oryxes and rhinos.

Our next encounter with the armoured giant is in the fifth pillar edict of Emperor Ashoka (268-232 BCE). Amplifying the principle of ahimsa or non-destruction of life, the proclamation suggests that human deprivations on wildlife had begun as it decrees: "(When I had been) anointed twenty-six years, the following animals were declared b me inviolable, viz parrots, mainas..., the rhinoceros, white doves, domestic doves, 9and) all the quadrupeds which are neither useful nor edible." Ashoka's word for the rhino is palasata.

Garbled allusions to the animal also occur in the fabulously exaggerated classical Western accounts regarding classical Western accounts hovering between legend and history. More captivating is the fragment where he recounts how the "great King of the Indians" chose a day every year for fighting between men as also between brute animals which were horned, and included "unicorn's asses".



Charaka Samhita.

rhino by a Western author. A brief reference to the "one-horned Indian ass" by Aristotle (384-322 BCE), a contemporary of Alexander of Macedon, is also a likely allusion to the Indian rhinoceros.

In the histories of Alexander compiled several centuries after his death, it is from Quintus Curtius Rufus (100 CE) that we learn that, following the arduous yet memorable triumph at Hydapes, when Alexander was rousing his soldiers for the conquest of the East, they were told that the region was abundant in timber and also had the rhinoceros, an animal rarely found elsewhere."

Despite its occasional inaccuracies, the Indika of Megasthenes, which can be retrieved only through the works of later writers, is perceived as more reliable than the mosaic of images culled from writers who never visited themselves, and were writing on the basis of wisdom received from diverse sources. Strabo (circa 60 BCE-19 CE) for instance, cites Megasthenes when he mentions "one-horned horses with heads like those of deer". The observations of

Megasthenes can also be found in the work of Claudius Aelianus (Ailian), who lived around the middle of the 2nd century CE, and described a one-horned animal called the kartazaon. The description, though inaccurate, unmistakably relates to the rhinoceros, referring to its horn and solitary behaviour, and associating it with secluded pastures.

The horn of the rhinoceros, which seems to have enthrilled without exception all classical writers, also figures frequently in the items of trade mentioned in The Periplus of the Erythraean Sea attributed to an anonymous writer of the 1st century CE. An embassy comprising a group of Western merchants trying to buy silk exchanged, ivory rhino horn and tortoise shell-all available in India.

In his on the Peculiarities of Animals, Ailian mentions a horn brought from India to Ptolemy the Second, which held three amphorae (about 26 gallons). He presumes it to have been from an ox "which grew a horn so prodigious", and attributes to report the breeding of one-horned horses and one-horned asses in India. He affirms that drinking cups were fashioned from the horns of these animals, adding that if a deadly poison was thrown in, the drinker would escape unharmed since the horns of the horse as well as the ass were an antidote against poison. More captivating is the fragment where he recounts how the "great King of the Indians" chose a day every year for fighting between men as also between brute animals which were horned, and included "unicorn's asses".

#ART ATTACK

Doodle Art for Wildlife Co-existence

Jaipur based artist and art entrepreneur, Harshi Agarwal has created a one-of-its-kind doodle art installation to give the message of wildlife conservation and co-existence. Her art work 'Accommodate', is being exhibited at the Mayo Alumni Artists Group Exhibition in Mayo College in Ajmer till 26 November.



Doodle Artist Harshi Agarwal with her art installation 'Accommodate.'

Ajmer till 26 November. The artist is also an alumnus of Mayo College Girls' School. **Intrigued with Nature**

Deeply fascinated and intrigued with nature, Harshi has a special love for animals. Her doodle and Zentangle art works often feature and celebrate the majesty and beauty of tigers, lions, elephants and other animals, which she considers to be more than just creative muses.

Tryst with Art
In 2013, Harshi left her job in the PR industry to pursue her calling for art and went on to become one of India's first professional doodle artists. She is also an art entrepreneur and organizes art workshops and events, especially for children. "While teaching children, I use fun ways to help young minds navigate the nuances of art. My objective is to empower them to capture their thoughts through different creative mediums," tells Harshi.

Accommodate the Wild
By doodling wild animals, trees, plants, flowers etc. on a car, Harshi has tried to give the message that the earth does not belong to human beings alone and there is a need to accommodate other species as well. Aptly entitled 'Accommodate', the installation was made in a short span of just 2-3 days and is currently being exhibited at the Mayo Alumni Artists Group Exhibition in Mayo College in

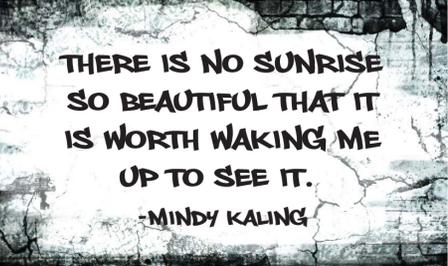


A view of the Doodle Car.

Her company 'Brushes n Strokes' has worked with several companies and organizations such as UNICEF, Asian Paints, Akshay Kumar Productions, Viacom 18 etc. Harshi also works actively with NGOs across the country to make improvements in government schools. Her recent projects include the upgradation and revamp of primary and pre-primary government schools in Bikaner, Mumbai and Hyderabad.

By Jerry Scott & Jim Borgman

THE WALL



BABY BLUES



ZITS



BY RICK KIRKMAN & JERRY SCOTT



BY JERRY SCOTT & JIM BORGMAN

