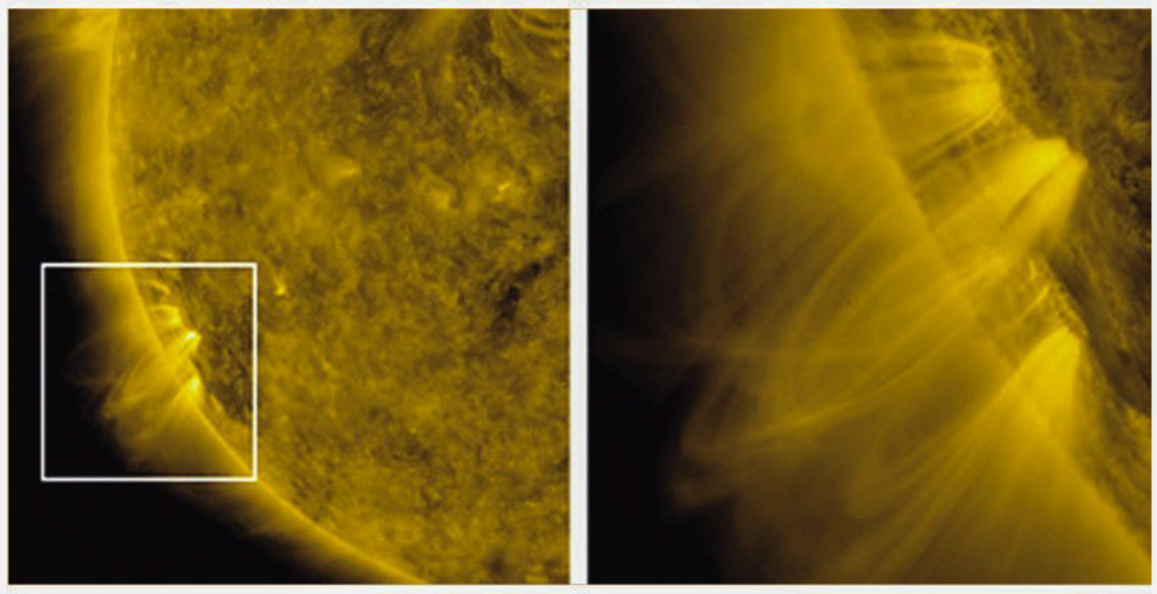
The Daily Star

SCIENCE & LIFE

DHAKA TUESDAY JANUARY 11, 2011, E-MAIL: science&life@thedailystar.net

Superhot solar puzzle



New observations reveal that the sun's corona, or outer atmosphere, is heated by jets of gas, which may explain why the sun's corona is so much hotter than the sun's surface. A spacecraft saw evidence of coronal heating (left, with close-up at right) just seconds after another craft detected jet activity.
NASA's Solar Dynamics Observatory

FOUNTAINLIKE jets of hot gas that shoot into the sun's outer atmosphere may explain why this outlying region is millions of degrees hotter than the sun's roiling surface a puzzle that researchers have struggled to explain since they first took the solar corona's temperature seven decades ago.

The newly discovered jets, too narrow and short-lived to have been seen with older instruments, were imaged in visible light by a high-resolution telescope aboard Japan's Hinode craft, launched in 2006. Ultraviolet observations with NASA's recently launched Solar Dynamics Observatory revealed that just seconds after the appearance of the jets in the sun's chromosphere the region just above the visible surface the outer atmosphere, or corona, briefly brightened at temperatures ranging from 100,000 to as high as 2 million kelvins.

Although only a small fraction of the jets may carry hot gas, calculations show that the jets can transport enough high-temperature material to keep the corona heated to several million kelvins, says Bart De Pontieu of the Lockheed Martin Solar and Astrophysics Laboratory in Palo Alto, Calif. He and his colleagues describe their findings in the Jan. 7 Science.

"This is an important and startling breakthrough in understanding how the solar corona may be heated, and I am certainly convinced by it," comments solar researcher Eric Priest of the University of St. Andrews in Scotland.

Researchers had assumed that the corona acquires its heat from interactions that occur in that outer region for instance, from the energy unleashed when tangled magnetic fields in the corona snap like rubber bands and reconnect. But the new observations suggest instead that high-speed jets of gas originating in the chromosphere are heated to high temperatures before they arrive at the corona, providing a substantial source of hot gas to the sun's outer atmosphere, Priest notes.

Solar physicists had known about bigger, slower jets of gas in the chromosphere for decades, says De Pontieu, but these had been discounted as a heat source because studies showed that they did not reach the high temperatures typical of the corona. It took a new generation of solar-staring craft to discover the faster, narrower and shorter-lived jets that not only reach high temperatures but zoom to higher altitudes, he adds.

De Pontieu cautions that the coronal puzzle isn't entirely solved, because no one knows what produces the jets or how the gas gets heated. Theorist Spiro Antiochos of NASA's Goddard Space Flight Center in Greenbelt, Md., concurs with that view. "This is a great step forward," he says, but "we still need a strong theoretical understanding of the processes that are going on."

A detailed understanding of how the corona is heated should provide a more accurate assessment of how much X-ray and ultraviolet light the sun radiates, which has a profound impact on the extent and density of Earth's upper atmosphere, says Antiochos. It's also likely that any mechanism that can explain the sun's hot corona could account for the high-temperature coronas of other stars, he adds.

One possibility that could now be tested, says Priest, is that tens of thousands of small bundles of magnetic fields known to carpet the sun's surface (SN: 11/8/97, p. 295) may power the jets. The energy released when these bundles move around the sun and become stretched or tangled might provide enough oomph to explain the jets, he suggests.

Source: Science News

TEA TROVE

Brighter side of green tea

Regularly drinking green tea could protect the brain against developing Alzheimer's

REGULARLY drinking green tea could protect the brain against developing Alzheimer's and other forms of dementia, according to latest research by scientists at Newcastle University.

The study, published in the academic journal Phytomedicine, also suggests this ancient Chinese remedy could play a vital role in protecting the body against cancer.

Led by Dr Ed Okello, the Newcastle team wanted to know if the protective properties of green tea -- which have previously been shown to be present in the undigested, freshly brewed form of the drink -- were still active once the tea had been digested.

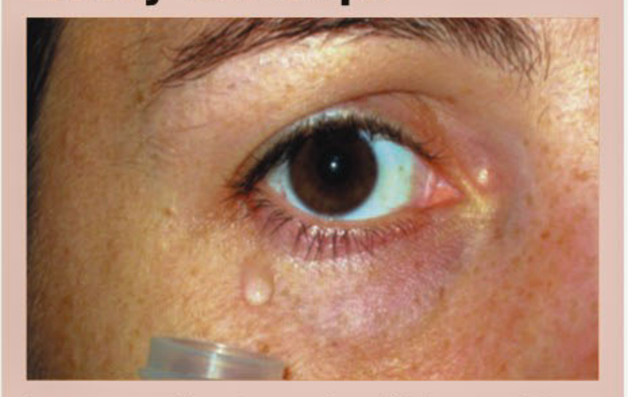
Digestion is a vital process which provides our bodies with the nutrients we need to survive. But, says Dr Okello, it also means that just because the food we put into our mouths is generally accepted to contain health-boosting properties, we can't assume these compounds will ever be absorbed by the body.

"What was really exciting about this study was that we found when green tea is digested by enzymes in the gut, the resulting chemicals are actually more effective against key triggers of Alzheimer's development than the undigested form of the tea," explains Dr Okello, based in the School of Agriculture, Food and Rural Development at Newcastle University.

Source: Science Daily

POWER OF TEAR

Lonely teardrops



In a new experiment, men who sniffed women's tears reported physiological declines in sex

CRYING women may literally turn men off. Odorless chemical signals in a woman's waterworks lessen any stirrings of sexual interest in a guy who whiffs her tear-stained cheeks, a new study suggests.

In a paper published online January 6 in Science, a team led by neuroscientists Shani Gelstein and Noam Sobel of the Weizmann Institute of Science in Rehovot, Israel, presents the first evidence that human tears contain pheromones, substances that influence behavior via smell. "Our experiments suggest that women's emotional tears contain a chemosignal that reduces sexual arousal in men," Sobel says.

Chemical compounds in tears that douse men's desire have yet to be identified.

"This new report makes a strong case for pheromones in women's tears, but the results clearly warrant replication," comments neuroscientist Robert Provine of the University of Maryland Baltimore County.

The reasons why people, but not any other animal, cry at sad thoughts or events remain poorly understood. Tears provide key visual cues to a person's inner emotional distress, Provine says. In a 2009 study that he directed, men and women rated the faces of crying people with visible tears as much sadder than the same faces digitally altered to remove tears. Tear removal made faces appear emotionally ambiguous, with participants saying that awe, concern or puzzlement often outweighed sadness.

Source: Science News

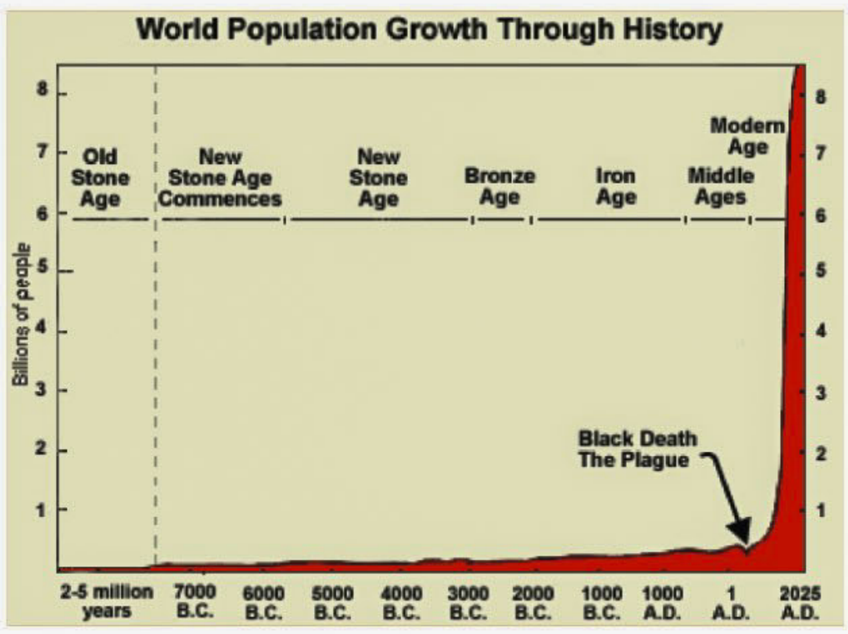
'THE END'S SO CLOSE!'

End of humanity in 100 years!

EMINENT Australian scientist Professor Frank Fenner, who helped to wipe out smallpox, predicts humans will probably be extinct within 100 years, because of overpopulation, environmental destruction and climate change.

Fenner, who is emeritus professor of microbiology at the Australian National University (ANU) in Canberra, said homo sapiens will not be able to survive the population explosion and "unbridled consumption," and will become extinct, perhaps within a century, along with many other species. United Nations official figures from last year estimate the human population is 6.8 billion, and is predicted to pass seven billion next year.

Fenner told The Australian he tries not to express his pessimism because people are trying to do something, but keep putting it off. He said he believes the situation is irreversible, and it is too late because the effects we have had on Earth since industrialization (a period now known to scientists unofficially as the Anthropocene) rivals any effects of ice ages or comet impacts.



World population growth chart

World population growth chart

Fenner said that climate change is only at its beginning, but is likely to be the cause of our extinction. "We'll undergo the same fate as the people on Easter Island," he said. More people means fewer resources, and Fenner predicts "there will be a lot more wars over food."

Easter Island is famous for its massive stone statues. Polynesian people settled there, in what was then a pristine tropical island, around the middle of the first millennium AD. The population grew slowly at first and then exploded. As the population grew the forests were wiped out and all the tree animals became extinct, both with devastating consequences. After about 1600 the civilization began to collapse, and had virtually disappeared by the mid-19th century. Evolutionary biologist Jared Diamond said the parallels between what happened on Easter Island and what is occurring today on the planet as a whole are "chillingly obvious."

While many scientists are also pessimistic, others are more optimistic. Among the latter is a colleague of Professor Fenner, retired professor Stephen Boyden, who said he still hopes awareness of the problems will rise and the required revolutionary changes will be made to achieve ecological sustainability. "While there's a glimmer of hope, it's worth working to solve the problem. We have the scientific knowledge to do it but we don't have the political will," Boyden said.

Source: Pysorg1.com

CHRISTMAS SHOCK

Dead crab mystery

PILES of crabs have been washing up on England beaches along the rocky Thanet Coast in recent days, a phenomenon that has puzzled scientists for the past few years.

"It's been a phenomenon for probably a third year in a row," Tony Child, Thanet Coast project manager, told LiveScience. He estimated about 25,000 of the dead velvet swimming crabs (Necora puber) were in piles this year, where birds are now ferociously feeding on their carcasses. [Image of beaches littered with dead crabs]

Last year, about 40,000 of the crabs washed ashore on the Thanet Coast, which is a long coastline of chalk reefs in Kent, England. This year, more starfish also washed ashore.

The velvet swimming crab has bright red eyes, with a coat of fine hair on its shell giving it a velvety texture. The crabs come closer to shore at this time of year, Child said, where they feed on the seaweed.

In the past, environmental scientists ran tests to check for disease or other physiological problems with the crabs, coming up empty-handed. But Child said every year the die-offs have occurred after there was snow on the beaches. The meltwater causes temperatures near shore to drop, and Child said the deaths must be linked to hypothermia.

"I don't really know the cause but it seems to be cold-related," Child said.

Reports of the crabs washing ashore began around Christmas, but it wasn't until the recent few days that they've been piling ashore. The crabs will remain on the beach, where they'll be feasted on by birds and otherwise decay and enter back into the system's life cycle.

Source: LiveScience

Starfish have also washed ashore on England's beaches, along with the velvet swimming crabs

ANOTHER MOON

Stunning lunar eclipse

A blood-red moon hung in the black sky on the darkest night of the year last night (Dec. 20).

The total lunar eclipse was the only one this year and the only one in the last 372 years to coincide with the winter solstice in the Northern Hemisphere, which is the longest and darkest night of the year.

Skywatchers around the country got some gorgeous views of the moon, as long as it wasn't obscured by clouds.

"The blue edge to Earth's shadow set against the reddened moon was indescribably beautiful!" Jimmy Westlake, an astronomy professor at Colorado Mountain College in Steamboat Springs, Colo., said of the view moments before the beginning of totality, when the moon is fully engulfed in Earth's shadow. Westlake was viewing this eclipse from near Dublin, Ga.

Source: LiveScience

DID YOU KNOW?

Why is a 10-watt bulb called zero bulb?

Technically, it is not possible to light an electric bulb without drawing input greater than zero watts. Zero watts is actually not zero, but refers to the minimum wattage. The inaccurate electric meters of the early days could not measure such a negligible amount of consumption as during those days, the watt hour meter had a rotating disc and when all the other lights were switched off, the disc would have only minimum rotation, which would not record even a 10W consumption. This led to the origin of the term 'zero-watt', though it is incorrect. Nowadays, electric meters can record even electricity used as indicators in switches.