Daily current affairs

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Solar wind

- NASA's Parker Solar Probe, launched Saturday, will study the Sun's outer atmosphere as well as the stream of particles known as the "solar wind"
- This ejection from the corona (the aura surrounding the Sun) has been known for more than a century, and was first termed "solar wind" back in 1957 by University of Chicago Professor Eugene Parker, for whom the probe is named.
- Today, scientists know the solar wind streams off at about 400 km/s, and that this happens because the temperature of the corona is so high that the Sun's gravity cannot hold on to it.
- Part of what scientists do know came out of a probe by NASA's Ulysses spacecraft, which completed two orbits through the solar system before being retired in 2009.
- Passing over the Sun's poles, Ulysses provided measurements of wind speed, magnetic field strength and direction, and composition.
- The solar wind is not uniform, with its speed varying over different regions of the corona.

These high and low speed streams interact with each other, and these variations can produce storms in the magnetosphere surrounding Earth.

Coral reefs could survive global warming, says study-Their relationship with algae has endured numerous climate change events in the past

- There may be hope for marine reefs to survive modern-day global warming, say scientists who have found that coral-algal partnerships have endured numerous climate change events since the age of dinosaurs.
- The relationship between corals and the mutualistic micro-algae that enable them to build reefs is considerably older and more diverse than previously assumed, according to a study published in the journal Current Biology.
- Past estimates placed the initiation of these symbiotic relationships at 50 to 65 million years ago
- Research indicates that modern corals and their algal partners have been entwined with each other for much longer — since the time of the dinosaurs, approximately 160 million

years ago and faced severe episodes of environmental change, but have managed to bounce back.

- The micro-algae, commonly called **zooxanthellae,** lives inside the cells of corals, allowing them to acquire energy from sunlight and to build the massive, economically valuable reef formations upon which countless marine organisms rely for habitat.
- The fossil record shows that today's reef-building corals exploded in diversity around 160 million years ago
- Finding that the origin of the **algal symbionts** corresponds to major increases in the abundance and diversity of reef-building corals implies that the partnership with **Symbiodiniaceae** was one of the major reasons for the success of modern corals.
- The team used genetic evidence — including DNA **sequences, phylogenetic analyses** and **genome comparisons** — to calculate the micro-algae's approximate age of origin.
- They also used classical morphological techniques, in which they compared visual characteristics of these symbionts using light and electron microscopy, along with computer modelling and other methods, to discover that in addition to being older, the algae family is far more diverse than previously perceived.

Stock cover

- Also known as inventory cover, this refers to the amount of time that the available supply of goods in a company's inventory will last given the current rate of sales. Businesses which purchase and store goods in their inventory try to do so based on their forecast of the likely demand for these goods.
- A business with a low stock cover runs the risks of losing potential sales due to a stockout as it will not be able to meet customer demand properly.
- One with a high stock cover, on the other hand, may incur unnecessary storage and handling costs while also suffering lower return on capital as too much of its capital is tied up as inventory.

Arsenic trioxide (ATO)-An oxide of arsenic can help fight cancer

- Arsenic is an acknowledged villain because of the way it has contaminated groundwater reserves.
- Its reputation as a poison has a long history and stretches back to fourth century treatises on medicine.
- This has often led inventive physicians to use the metal's poisonous nature to treat infections.
- Its elusive nature has also complicated an understanding of the relationship between arsenic and cancer.
- Beyond certain thresholds in drinking water, arsenic is strongly linked to various cancers; however, at other doses, it has been linked to unusually low rates of breast cancer.

Anti Cancer Property Findings

- Arsenic trioxide (ATO) is an oxide of arsenic that was approved by the U.S. Food and Drug Administration in 1995, and when used in combination with another drug called all-trans retinoic acid (ATRA), it was effective against a kind of leukaemia called acute promyelocytic leukaemia (APL).
- However, it wasn't fully clear what cellular target(s) these drugs act on, how they interact with each other, or whether they might be effective against other types of cancer.
- U.S. researchers reported in Nature Communications that they had unearthed a vital clue: Arsenic in combination with an existing leukaemia drug worked to destroy Pin1, a unique enzyme that the same group of researchers had discovered more than 20 years ago.
- When given in clinically safe doses, the drugs effectively inhibited numerous cancer-driving pathways and eliminated cancer stem cells in cell and animal models as well as patient-derived tumour models of triple-negative breast cancer, which has the worst prognosis of all breast cancer subtypes.
- Pin1 is known as a master regulator of cancer signalling networks that activates more than 40 cancer-driving proteins and inactivates more than 20 tumour suppressing proteins.
- The enzyme was found to be over-activated in most human cancers and is especially active in cancer stem cells — a subpopulation of cancer cells believed to drive tumour initiation, progression, and metastasis, but not effectively targeted by current therapies.

Although the anti-cancer effects of ATO are potently amplified by ATRA co-treatment, ATRA has a very short time span of effectiveness. This insight could help hitch ATO to existing therapies particularly triple-negative breast cancer.
