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Anjalai Ponnusamy

The Prime Minister has condoled the passing away of the distinguished Indian National Army (INA) Veteran Anjalai Ponnusamy from Malaysia.

- Though she was not born and raised in India (but in Malaysia), Madam Anjalai joined the INA's **Rani of Jhansi regiment**, at the age of 21 (1943).
- [INA's Rani of Jhansi regiment is the first Women's army in the world.]
- She was trained in **combat operation**.
- She has the experience of following the troops right up to the Burma-India Border in the effort to liberate India from the British Rule.
- She was also awarded with the title "**Veera Thaai**" (Valiant Mother) by the Netaji Service Centre, Malaysia.

Reference

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Artillery Rockets

The U.S. would send its most advanced artillery rocket launcher HIMARS to the Ukrainian military in the hope of giving it an edge over Russia.

- **Artillery rocket** is a weapon that is typically propelled by a solid-fuel motor and can carry a variety of warheads.
- In the 1970s, the US designed the Multiple Launch Rocket System (MLRS) for use in the event that Russian armored vehicles massed for World War III on the border of Western Europe.
- The M270 MLRS launcher was an armored vehicle that could carry two "pods" of munitions, including a guided missile for Army Tactical Missile System (ATACMS).
- **HIMARS** - Later, the US introduced a more easily transportable version called M142 High Mobility Artillery Rocket System (HIMARS) truck.
- HIMARS are a high-tech, lightweight rocket launcher that is wheel mounted, giving it more agility and manoeuvrability on the battlefield.
- Major advantage is that it the GPS guided rockets can be reloaded in about a minute with only a small crew.

- Unlike its predecessor, the HIMARS truck carries only one pod of munitions. But it can move much faster on and off-road.
- **GMLRS** - The warhead in each M31 Guided MRLS (GMLRS) rocket contains a single charge of about 200 pounds of high explosives, while the 155 mm shells fired by howitzers contain about 18 pounds.
- The GMLRS rockets can be fired singly or in a ripple of all six in just seconds, rivaling the power of an airstrike dropping guided bombs.
- Using the HIMARS and GMLRS together can offer an amount of firepower that is similar to an airstrike.

Reference

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Nanoalloys

Under the 'National Supercomputing Mission', scientists have used Machine Learning to develop a design map of alloys at the nanoscale which can help predict the match of pairs of metals that can form bimetallic nanoalloys.

- Nanoalloy is an alloy consisting of dispersed nanoparticles of two or more **metals**.
- In these nanoalloys, one metal forms the core and another stays on the surface as a shell. So, they are called **core-shell nanocluster alloys**.
- The following factors play a part in which metal forms the core, and which stays on the surface as a shell in the core-shell structures,
    1. Cohesive energy difference,
    2. Atomic radius difference,
    3. Surface energy difference and
    4. Electronegativity of the two atoms.
- Relative importance of the key factors depends on the subset combinations like alkali metal-alkaline earth, transition metal-transition metal etc.
- If the difference in the cohesive energies between the two types of atoms is very small, the nanoclusters constitute a random mix of both the metals.
- If the difference in the cohesive energies is very large, the atoms get segregated into a structure having two faces.
- The faces will be one face of A atoms and another face of B atoms called the **Janus structure** named after two-faced Greek God.
- Using 'machine learning', the computers can be programmed to predict the behaviour of these nano alloys and more.
- **Use** - Machine learning was used to search for cheaper substitutes of naturally occurring rare earth material, whose supply is monopolised by the countries where their mines happen to be located.

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Nanobots for Deep-cleaning Teeth

Theranautilus, a startup incubated at Indian Institute of Science (IISc), has shown that nanobots can be used to deep clean teeth by manipulating them using a magnetic field.

- These nano-sized robots can help **kill bacteria deep inside dentinal tubules** and boost the success of root canal treatment.
- Root canal is a procedure involving removal of infected soft tissue inside the tooth, called the pulp, and flushing the tooth with antibiotics or chemicals to kill bacteria that cause the infection.
- But often the treatment fails to completely remove all the bacteria - especially antibiotic-resistant ones such as Enterococcus faecalis - remain hidden inside the dentinal tubules.
- [The dentinal tubules are microscopic canals in the tooth.]
- **Working** - The helical nanobots made of **silicon dioxide** coated with **iron** can be controlled using a device that generates a **low intensity magnetic field**.
- These nanobots were then injected into extracted tooth samples and their movement was tracked using a microscope.
- By tweaking the frequency of the magnetic field, the nanobots can be made to move at our will, and penetrate deep inside the dentinal tubules.

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Pollution-related Workplace Deaths & GDP

A report by the Lancet Commission on Pollution and Health has found that most of the pollution-related workplace deaths are found in countries with the highest Gross Domestic Product (GDP).

- This report was based on 2019 data.
- Most of the highest GDP countries had a low proportion of pollution deaths in the overall population: 90% of pollution-related deaths occur in low-income & middle-income countries.
- This underscores the disparity in which these places treat pollution within the four walls of workplaces and outside.
- While the majority of these people are in the developing world, the blue-collar workers in rich countries also face consequences of hazardous pollution.
- **Findings** - Occupation-related premature deaths due to pollution was the highest in the United Kingdom (UK) among the top-10 GDP countries. The UK has the fifth-highest GDP in the world.
- The United States - the world's biggest economy - ranked 18th overall and 12th within countries over 10 million population.
- China, which is the second-biggest economy, has ranked 17^{th}.
- Japan, which is the third-biggest economy, has ranked 19^{th}.
- India, the sixth-largest economy, ranked 40th position globally with 12.15 pollution-related occupational deaths every 100,000 workers.
- The report counters the popularly promoted notion and theory that technology and working ambience in the developed countries are much better than that of the developing and under-developed countries.

Other Findings

- In the past two decades, deaths caused by the modern forms of pollution have increased by 66%, driven by industrialisation, uncontrolled urbanisation, population growth, fossil fuel combustion.
- This also includes the factor of an absence of adequate national or international chemical policy.
- Despite declines in deaths from household air and water pollution, pollution still causes more than 9 million deaths each year globally. This number has not changed since 2015.
- More than 90% of pollution-related deaths occur in low-income and middle-income countries.
- Most countries have done little to deal with this enormous public health problem.
- The triad of pollution, climate change, and biodiversity loss are the **key global environmental issues** of our time. These issues are intricately linked and solutions to each will benefit the others.

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