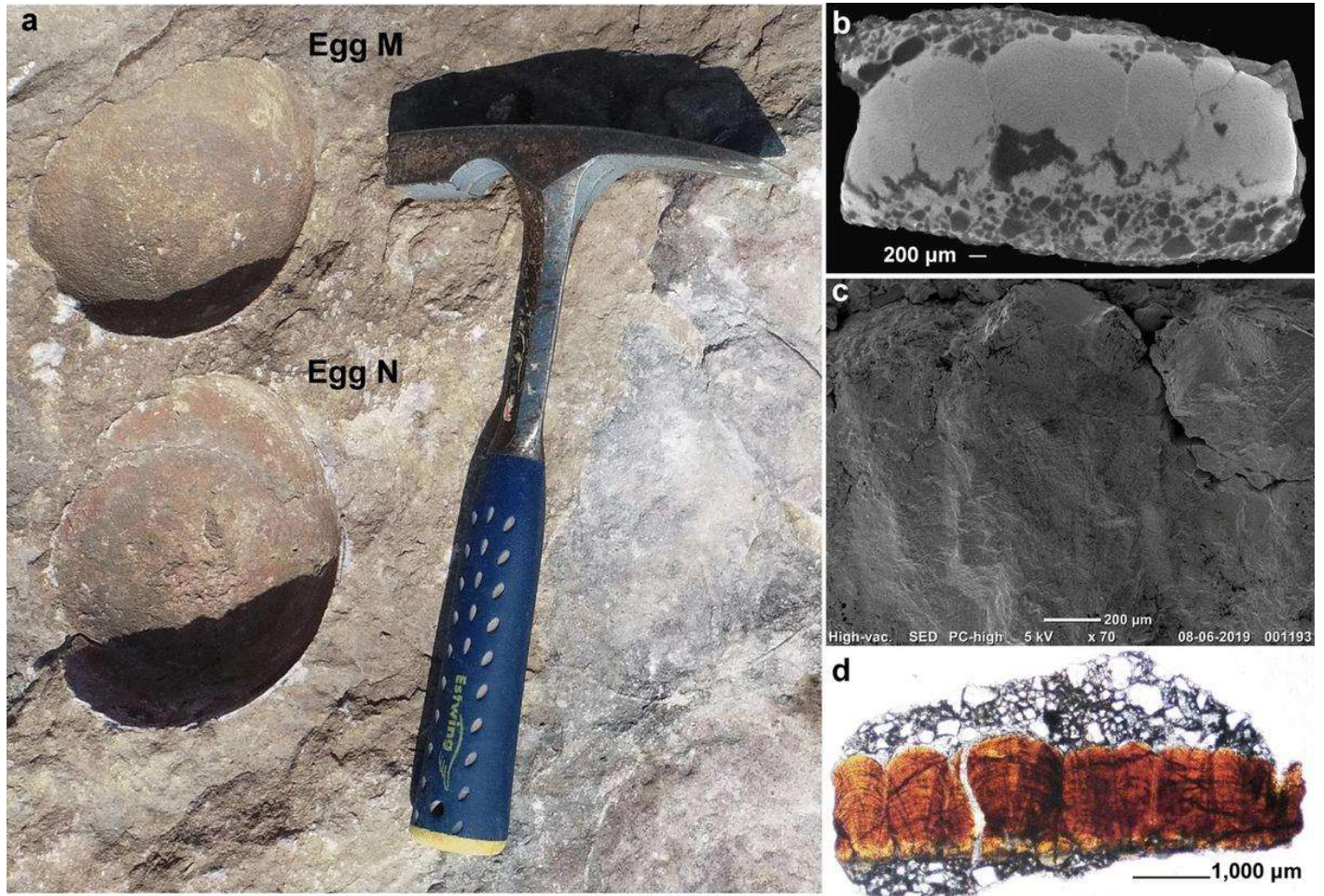


'Abnormal' dinosaur egg in India digs up new questions for evolution (GS Paper 3, Science and Tech)

Why in news?

- A team of researchers from the University of Delhi has discovered a unique set of fossilised dinosaur eggs, with one egg nesting within the other at the Dinosaur Fossil National Park, in Dhar District of Madhya Pradesh.



Dinosaurs in Central India:

- Dinosaurs of the Sauropod family were among the largest land animals that have ever lived and were widespread millions of years ago in the territory that is now India. Fossils of these animals have been found in Gujarat, Madhya Pradesh as well as Meghalaya.
- The Upper Cretaceous Lameta Formation of Central India is long known for its dinosaur fossils (both skeletal and egg remains), and scientists, documented 52 titanosaurid sauropod nests near Padlya village close to Bagh town in Madhya Pradesh. One of these nests consisted of 10 eggs, one of which was the “abnormal” egg.

'Egg-in-egg' phenomenon:

- The findings, talk about the 'egg-in-egg' phenomenon in a titanosaurid dinosaur egg found from the Bagh area of Dhar District.
- While eggs-within-eggs are rare phenomena, they are so far known to occur only in birds and have never known in reptiles. This discovery brings out newer connections between reptilian and avian evolution.

Key observations:

- The egg has two continuous and circular eggshell layers separated by a wide gap like that observed in birds. Until this discovery, no egg-in-egg fossil egg was found in dinosaurs and other reptiles such as turtles, lizards, and crocodiles.

- It was believed that dinosaurs had a **reproductive function similar to that of turtles and other reptiles** (unsegmented oviduct) in contrast to segmented reproductive tract of crocodiles and birds with separate regions of membrane and shell deposition.
- Although crocodiles have separate regions of shell membrane and mineralised shell deposition, they ovulate and release all the eggs simultaneously like turtles and other reptiles. In birds, ovulation is sequenced and eggs are laid one at a time.

Oviduct morphology:

- The new discovery of an ovum-in-ovum egg, characteristic of birds in titanosaurids are for a segmented oviduct as in crocodiles and birds and possible sequential laying of eggs as in birds.
- The finding of ovum-in-ovo egg from a titanosaurid nest opens up the possibility that sauropod dinosaurs had an oviduct morphology similar to those of crocodiles or birds and they may have adapted to a mode of an egg-laying characteristic of birds.

Way Forward:

- The new find highlights the fact that Central and Western India hold great potential for dinosaur fossils which may offer important information on dinosaur diversity, nesting behaviour and reproductive biology, the authors note.

ICMR guidelines for children and adolescents with Type-1 diabetes

(GS Paper 3, Science and Tech)

Why in news?

- India has the highest number of incident and prevalent cases of Type-1 diabetes in the world as per recent estimates from the International Diabetes Federation.
- Recently, the Indian Council of Medical Research (ICMR) has published a comprehensive document providing advice on care of diabetes in children, adolescents and adults with Type 1 diabetes.

What is Type I diabetes?

Type I diabetes, also called juvenile diabetes is a chronic condition in which the pancreas produces little or no insulin.

It typically appears in adolescence and symptoms include increased thirst, frequent urination, hunger, fatigue and blurred vision.

Treatment is aimed at maintaining normal blood sugar levels through regular monitoring, insulin therapy, diet and exercise.

The new guideline document states that individuals with Type-1 diabetes need support to survive, using insulin and other therapies, and to live their entire life without stigma, restrictions, or disabling complications due to their illness.

Key Guidelines:

- The patients should inform the physician in advance, preferably four to six weeks before the planned travel and should have medications and blood testing materials for the whole trip plus reserve supplies for at least two to four weeks if unforeseen circumstances extend the travel.

- They also advise carrying comfortable shoes and socks to avoid straining the feet while on travel.
- The patients should avoid walking barefoot. Alternating between two pairs of shoes can decrease the risk of blisters and calluses. New shoes, if purchased, should be used for at least two to three weeks before travel. Patients with a medical identification bracelet should have information on the disease, use of insulin, and disclose any allergies, besides this valid travel insurance should be ensured for international travel.
- The patients who have language problems should have cards or other means to communicate that they have diabetes, these are their medications, what to do if they have hypoglycemia.

Meals and snacks:

- Being aware of the serving time of meals and snacks and putting a request to serve as per personal schedule to avoid fluctuations in glucose due to perturbed schedule is also advised.
- Patients should check their blood glucose level as soon as possible after landing and jet lag can make it hard to tell if one has very low or very high blood glucose said the guidelines.

Special care in case of traveling east or west:

- Diabetes management depends on a 24-hour medication schedule, and medication adjustments are needed only when the patient is traveling east or west, not north or south.
- Traveling east results in a short day, and requires a potential reduction in insulin. Traveling west increases the day length, possibly requiring an increase in insulin dose. The insulin adjustments are usually required if crossing more than five time zones and staying for more than three days abroad,'.

Burden of diabetes in India:

- India is home to the world's second largest adult diabetes population and every sixth person with diabetes in the world is an Indian.
- The past three decades witnessed a 150% increase in the number of people with diabetes in the country and the growing prevalence of pre-diabetes indicates a further increase in the disease in the near future, according to the Council.
- What is also worrying is the fact that diabetes, in India, has traversed from high to the middle income and underprivileged sections of our society.
- A matter of immense concern is the progressive lowering of age at which Type 2 diabetes is presenting, with an inflection in disease prevalence becoming apparent in the age group of 25–34 years in both urban and rural areas.

The FATF and Pakistan's position on its 'grey list' **(GS Paper 3, International Organisation)**

Why in news?

- Ahead of the plenary session of the Financial Action Task Force (FATF), in June, Pakistan is expecting its removal from the FATF's 'grey list' or the list of countries presenting a risk to the global financial system.
- In its last plenary meeting in March, the FATF had retained Pakistan's listing, asking it to expeditiously address the remaining deficiencies in its financial system.

What is the FATF?

- The Financial Action Task Force is **an international watchdog for financial crimes** such as money laundering and terror financing.
- It was established at the G7 Summit of 1989 in Paris to address loopholes in the global financial system after member countries raised concerns about growing money laundering activities.
- In the aftermath of the 9/11 terror attack on the U.S., FATF also added terror financing as a main focus area. This was later broadened to include restricting the funding of weapons of mass destruction.
- The FATF **currently has 39 members**. The decision-making body of the FATF, known as its plenary, meets thrice a year. Its meetings are attended by 206 countries of the global network, including members, and observer organisations, such as the World Bank, some offices of the United Nations, and regional development banks.

Functions:

- The FATF sets standards or recommendations for countries to achieve in order to plug the holes in their financial systems and make them less vulnerable to illegal financial activities.
- It conducts regular peer-reviewed evaluations called Mutual Evaluations (ME) of countries to check their performance on standards prescribed by it. The reviews are carried out by FATF and **FATF-Style Regional Bodies (FSRBs)**, which then release Mutual Evaluation Reports (MERs).
- For the countries that don't perform well on certain standards, time-bound action plans are drawn up. Recommendations for countries range from assessing risks of crimes to setting up legislative, investigative and judicial mechanisms to pursue cases of money laundering and terror funding.



What are FATF's 'grey' and 'black' lists?

- While the words 'grey' and 'black' list do not exist in the official FATF lexicon, they designate countries that need to work on complying with FATF directives and those who are non-compliant, respectively.
- At the end of every plenary meeting, FATF comes out with two lists of countries. The **grey countries are designated as "jurisdictions under increased monitoring"**, working with the FATF to counter criminal financial activities. For such countries, the watchdog does not tell other members to carry out due-diligence measures vis-a-vis the listed country but does tell them to consider the risks such countries possess. Currently, 23 countries including Pakistan are on the grey list.
- As for the **black list, it means countries designated as 'high-risk jurisdictions subject to call for action'**. In this case, the countries have considerable deficiencies in their AML/CFT (anti-money laundering and counter terrorist financing) regimens and the body calls on members and non-members to apply enhanced due diligence.
- In the most serious cases, members are told to apply counter-measures such as sanctions on the listed countries. Currently, **North Korea and Iran are on the black list**.
- Being listed under the FATF's lists makes it hard for countries to get aid from organisations like the International Monetary Fund (IMF), Asian Development Bank (ADB), and the European Union. It may also affect capital inflows, foreign direct investments, and portfolio flows.

Why is Pakistan on the grey list?

- Pakistan was retained on the grey list in March as it was yet to address **concerns on the front of terror financing investigations and prosecutions targeting senior leaders** and commanders of UN designated terrorist groups.
- In Pakistan, steps had been taken in this direction such as the sentencing of terror outfit chief Hafiz Saeed, prosecution of Masood Azhar, arrest of about 300 other designated terrorists, and the seizure of more than 1,100 properties owned by terror groups. India meanwhile, a member of FATF, suspects the efficacy and permanence of Pakistani actions.
- Pakistan is currently banking on its potential exclusion from the grey list to help improve the status of tough negotiations with the International Monetary Fund to get bailout money.
- Pakistan has found itself on the grey list frequently since 2008, for weaknesses in fighting terror financing and money laundering. In 2009, the country began to cooperate with the FATF-like regional body, Asia Pacific Group (APG), for a ME process.

BrahMos, 21 and developing

(GS Paper 3, Defence)

Why in news?

- On June 12, 2001, the BrahMos supersonic cruise missile was first tested from a land-based launcher in Chandipur.
- In the 21 years since, BrahMos has been upgraded several times, with versions tested on land, air and sea platforms. It recently **bagged an export order from the Philippines**.

| MILESTONES | |
|---|--|
| <p>2001: Maiden launch from land-based launcher in anti-ship mode from ITR, Chandipur</p> <p>2002: Launch in land-to-sea configuration from ITR</p> <p>2003: Maiden launch from Naval warship</p> <p>2005: Navy receives first batch of BrahMos</p> <p>2007: BrahMos land system delivered</p> | <p>to Indian Army</p> <p>2013: Launch from a submerged platform in Bay of Bengal</p> <p>2017: Cruise missile's maiden launch from Su-30MKI</p> <p>2020: Su-30MKI equipped with BrahMos inducted in an IAF formation</p> <p>2022: First mega export order from Philippines Navy</p> |

Background and development:

- Since the early 1980s, the Integrated Guided Missile Development Programme, conceived and led by Dr A P J Abdul Kalam, started developing a range of missiles including Prithvi, Agni, Trishul, Akash and Nag, with a wide spectrum of capabilities and ranges.
- In the early 1990s, India's strategic leadership felt the need for cruise missiles, guided missiles that traverse the majority of their flight path at almost constant speed and deliver large warheads over long distances with high precision. The need was felt primarily following the use of cruise missiles in the Gulf War.
- An Inter-Governmental Agreement was signed with Russia in Moscow in 1998 by Dr Kalam, who headed the Defence Research and Development Organisation (DRDO), and N V Mikhailov, Russia's then Deputy Defence Minister. This led to the formation of **BrahMos Aerospace, a joint venture between DRDO and NPO Mashinostroyeniya (NPOM)**, the Indian side holding 50.5% and the Russians 49.5%.
- In 1999, work on development of missiles began in labs of DRDO and NPOM after BrahMos Aerospace received funds from the two governments.

- The first successful test in 2001 was conducted from a specially designed land-based launcher. The missile system has since reached some key milestones, with the first major export order of \$375 million received from the Philippines Navy this year.

Strategic significance:

- BrahMos is a two-stage missile with a solid propellant booster engine. Its first stage brings the missile to supersonic speed and then gets separated. The liquid ramjet or the second stage then takes the missile closer to three times the speed of sound in cruise phase.
- The missile has a very low radar signature, making it stealthy, and can achieve a variety of trajectories. The ‘fire and forget’ type missile can achieve a cruising altitude of 15 km and a terminal altitude as low as 10 m to hit the target.
- Cruise missiles such as BrahMos, called “**standoff range weapons**”, are fired from a range far enough to allow the attacker to evade defensive counter-fire. These are in the arsenal of most major militaries in the world.
- The BrahMos has three times the speed, 2.5 times flight range and higher range compared to subsonic cruise missiles. With missiles made available for export, the platform is also seen as a key asset in defence diplomacy.
- An extended range version of the BrahMos air-launched missile was tested from a Sukhoi-30 MKI recently.
- On January 11, an advanced sea-to-sea variant of BrahMos was tested from the newly commissioned INS Visakhapatnam.

Present and future:

- What makes the missile system unparalleled is its extreme accuracy and versatility. Land-based BrahMos formations along the borders, **BrahMos-equipped Sukhoi-30s at bases in Northern theatre and Southern peninsula**, and **BrahMos-capable ships and submarines deployed in sea together form a triad**.
- With requirements evolving in multi-dimensional warfare, the BrahMos is undergoing a number of upgrades and work is on to develop versions with higher ranges, manoeuvrability and accuracy.
- Versions currently being tested include ranges up to 350 km, as compared to the original’s 290 km. Versions with even higher ranges, up to 800 km, and with hypersonic speed are said to be on cards. Efforts are also on to reduce the size and signature of existing versions and augment its capabilities further.

Versions deployed in all three Armed forces are still being tested regularly, and so are versions currently under development.

Land-based:

- The land-based BrahMos complex has four to six mobile autonomous launchers, each with three missiles on board that can be fired almost simultaneously. Batteries of the land-based systems have been deployed along India’s land borders in various theatres.
- The upgraded land attack version, with capability of cruising at 2.8 Mach, can hit targets at a range up to 400 km with precision. Advanced versions of higher range and speed up to 5 Mach are said to be under development. The ground systems of BrahMos are described as ‘tidy’ as they have very few components.

Ship-based:

- The Navy began inducting BrahMos on its frontline warships from 2005. These have the capability to hit sea-based targets beyond the radar horizon. The Naval version has been successful in sea-to-sea and sea-to-land modes.
- The BrahMos can be launched as a single unit or in a salvo of up to eight missiles, separated by 2.5-second intervals. These can target a group of frigates with modern missile defence systems.

Air-launched:

- On November 22, 2017, BrahMos was successfully flight-tested for the first time from a Sukhoi-30MKI against a sea-based target in the Bay of Bengal. It has since been successfully tested multiple times.
- BrahMos-equipped Sukhoi-30s, which have a range of 1,500 km at a stretch without mid-air refuelling, are considered key strategic deterrence for adversaries both along land borders and in the strategically important Indian Ocean Region.
- The IAF is said to be integrating BrahMos with 40 Sukhoi-30 fighter jets across the various bases.

Submarine-launched:

- This version can be launched from around 50 m below the water surface. The canister-stored missile is launched vertically from the pressure hull of the submarine, and uses different settings for underwater and out-of-the-water flights.
- This version was successfully tested first in March 2013 from a submerged platform off the coast of Visakhapatnam.