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**Gukesh and Ding** play Game 7 today **SPORT** » PAGE 15

# Logjam ends; Parliament to debate Constitution

At meeting called by Speaker, ruling side agrees to allow certain controversial topics to be raised during Zero Hour; Congress decides not to cause any disruption over Adani indictment issue

**Sreeparna Chakrabarty** NEW DELHI

n a breakthrough to end the logjam that had plagued the functioning of Parliament for over a week, the government and the Opposition reached a consensus on holding a discussion on the Constitution in both Houses. The Lok Sabha will hold the discussion on December 13 and 14 and the Rajya Sabha on December 16 and 17. The ruling side agreed to allow certain issues such as the Bangladesh situation and the violence in Sambhal to be raised during Zero Hour, but did not accede to any discussion on the Adani indictment.

The main Opposition party, the Congress, decided not to disrupt Parliament over the Adani issue,



Major breakthrough: Floor leaders of various parties at a meeting at the chamber of the Speaker in Parliament on Monday. ANI

RE

but it will hold a protest outside the Makar Dwar of the Parliament complex at 10.30 a.m. on Tuesday.

Before the protest, at a meeting of INDIA bloc leaders, the Congress would ask other parties also to join the demonstration, sources said.

The breakthrough came

at a meeting of floor leaders of all parties called by Lok Sabha Speaker Om Birla, where the government conceded to the demand for holding a discussion on the Constitution. Congress president Mallikarjun Kharge and Leader of the Opposition Rahul Gandhi had made the demand in

separate letters to Rajya Sabha Chairperson Jagdeep Dhankhar and Mr. Birla, respectively, last

"The Lok Sabha Speaker met with floor leaders of all the parties. Everybody expressed their frustration on Parliament not functioning. Everybody was of the view that it was not appropriate to waste people's money. The Opposition also put forward their demand, there was a proposal in Business Advisory Committee to have discussion on the Constitution, the government has agreed to it," Union Parliamentary Affairs Minister Kiren Rijiju told presspersons.

**CONTINUED ON** » PAGE 10 **BOTH HOUSES STALLED** » PAGE 11

# BJP meet likely to choose Maharashtra **CM** tomorrow

**Snehal Mutha** Vinaya Deshpande Pandit MUMBAI

With the swearing-in ceremony of the Mahayuti government in Maharashtra two days away, Caretaker Chief Minister and Shiv Sena chief Eknath Shinde is recovering from illness and his party is yet to decide on the Deputy Chief Minister.

The BJP appointed Union Finance Minister Nirmala Sitharaman and former Gujarat CM Vijay Rupani as central observers for a meeting of its MLAs-elect who will appoint the legislature party leader and the Chief Whip of the party at a meeting on Wednesday at the Central Hall of the Vidhan Bhavan here. On Monday evening, Nationalist Congress Party leader Ajit Pawar reached New Delhi. Mr. Shinde's son, Shrikant Shinde, MP, took to X to

deny reports about his name being considered for the Deputy CM's position.

"The swearing-in ceremony of the Mahayuti government has been delayed, which has led to a surge in the discussions and rumours. Hon caretaker CM Shri Eknath Shinde had to take rest at his native place for two days due to health issues... There have been speculations about me becoming the DCM. But these news reports are baseless and un-

founded," he posted. Top sources in the Shiv Sena told *The Hindu* that the decision on the Deputy CM had not been made yet and it is not yet clear if Mr. Eknath Shinde will take the post or appoint someone else. "We have asked for the Home portfolio," said a senior leader.

**CONTINUED ON** » PAGE 10





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# **SPOTLIGHT**



#### A major hurdle: The School

Education Department has started the Aadhaar through Schools initiative to ensure that every child in the school system gets the Aadhaar card and opens a bank account linked to the former. However, most children of migrant workers could not do so owing to various reasons. C. VENKATACHALAPATHY

# The heavy burden of proof

While Tamil Nadu is among the better performers in gross school enrolment, there seems to be a fly in the ointment. The requirement of an Aadhaar card to complete admission formalities has made things difficult for children of migrant workers. **Meghna M.** dives deep to find out how disruptive this mandatory step is for some students

eachers have been asking R. Mikkel, a Class V student of a government school in Chennai, to get an Aadhaar card for the past four years. It would help him complete his admission formalities and open a bank account to receive scholarships that the Tamil Nadu government offers. However, Mikkel does not have a birth certificate, which is mandatory for getting an Aadhaar card. Mikkel's parents are daily wage labourers from Bihar who do odd jobs in Chennai. "We have asked the parents to get the birth certificate from Bihar so that we can get an Aadhaar ready for him. It would help to complete his admission process. This would show him to be a student of the school, allowing him to further his education," says Mikkel's teacher.

But his parents are reluctant to go home and finish the formalities. "It will mean losing my salary. The salary helps us sustain our lives. How can we skip work to get a document? Who will pay us?" says Ram S., Mikkel's father. Mikkel's story is not an isolated one. With no Aadhaar card or other identity documents, teachers are having hard time enrolling children of migrant workers in government schools.

In 2019, the School Education Department mandated that every student's Aadhaar number be linked to the Educational Management Information System (EMIS). Although admitting a student under the Right to Education (RTE) Act of 2009 does not require certificates, the EMIS requires schools to upload documents such as Aadhaar, community certificate, nativity certificate, and birth certificate, besides maintaining attendance and the prizes won in the *Kalaithiruvizha* competitions. A completed profile means that a student is successfully enrolled.

"But most students do not have Aadhaar cards and some don't have birth certificates either. This means we can't complete the admission formalities. We get four or more calls a day from the department asking us to enter the Aadhaar details," says a teacher of a government school in Mogappair, Chennai.

# The case of the twins

A 12-year-old girl turns to Vaishnavi S., pointing to a Tamil word in her notebook and asking her to help pronounce it. "That's *Ooru* [place]," replies Vaishnavi, a Class IV student of a government school in Chennai. Vaishnavi and Bhavani, both aged 12, are twins. Their father has been trying to get Aadhaar cards for both of them for three years now, but the problem is that the twins do not have birth certificates. Though their father's family members have been living in Chennai for years, their mother moved to the city from Uttar Pradesh after marriage. So, she went back to her parents' home in Uttar Pradesh for delivery.

"We didn't get a birth certificate. So, when the school told us that an Aadhaar card was required for the children to complete admission, we knew we had to visit our village. This we can't do because my husband cannot leave his daily wage job as painter," says their mother Rindha Devi.

So the school gave them a bonafide certificate stating that the students were residents of Tamil Nadu and studying in the school. Their father was expected to take leave later and get the Aadhaar cards for them.

"Earlier this year, the application went through. But only Vaishnavi got her Aadhaar card. Bhavani didn't. The officials suspected that we were creating a duplicate Aadhaar because most of the details were the same and they had identical faces. So Bhavani does not have a card. They are no longer accepting a bonafide certifi-



labourers
entering the
State find it
tough to get
the Aadhaar
cards for
their
children.
They do not
have proof
of address
because
they stay in

the factory **s. RAKESH,**a labour from
Bihar working

in Salem

small houses

provided in

cates either. We are tired of running from pillar to post," Ms. Rindha Devi says.

In June this year, the department started the Aadhaar through Schools initiative to ensure that every child in the school system gets the Aadhaar card and opens a bank account linked to the former. However, most children of migrant workers could not do so owing to various reasons – missing documents, no digital copy of birth certificates, different addresses, and wrong pincodes.

# Linkage crucial

A bank account is crucial for students to receive welfare benefits - be it the ₹500 given to students of Most Backward Classes and Denotified Communities from Class III or the ₹1,000 given a month to a higher secondary student under the Tamil Nadu Chief Minister's Talent Search Exam. However, it is mandatory to link the bank ac count with the Aadhaar. "My child, Umang, was born at Gorakhpur, Uttar Pradesh. Through the initiative, we decided to get the Aadhaar card for Umang. The official denied us an Aadhaar card because my child's name was written in Hindi in the birth certificate. All other details on the birth certificate were in English except his name. He asked me to get the card from my village," says Sonam Pandey, mother of the Class III student.

Deepak Guhain from Assam has been working in Chennai for the past two years. He has been trying to get an Aadhaar card for his son, but officials insisted on a digital copy of the birth certificate. "I cannot afford to miss work to go back to Assam to get it. I don't know what to do," he says.

# Teachers in trouble

"We tried counselling the parents and consistent follow-up to ensure that every student completed the formalities; but, as they are daily wage labourers, it is difficult. If they were born here, we would help," says a teacher of the government school at Mogappair.

Teachers say they would give a bonafide certificate so that a child could pursue further education. "But this certificate cannot be used any

In 2019, the School Education
Department mandated that every
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to the Educational Management
Information System (EMIS). The
EMIS requires schools to request
documents such as Aadhaar,
community certificate, nativity
certificate, and birth certificate

more. The formalities [such as uploading of Aadhaar] should be completed as proof of student strength of a school. We have over 20 children of migrant workers in our school, but we cannot provide proof of enrolment on the EMIS. This would prompt the department to assume that we have poor student strength and our teachers can be moved out," says a teacher of a government school at Shenoy Nagar, Chennai.

When the child enters Class X, the teacher has to follow up continuously to ensure that they can sit for the exam. In 2018, the Supreme Court directed that the Aadhaar could not be made mandatory for writing exams or enrolment. However, teachers say this has not been the case in Tamil Nadu. While no student has been denied the welfare benefits, education, or their right to sit for exams, the road leading to all of them has been anything but smooth.

"In a primary school, the teacher might have just marked zero in the Aadhaar card field to make a valid entry into the EMIS. A student automatically makes it to Class X. Then the real task begins. Last year, a teacher travelled with some students to their birthplace to get the birth certificates and then made sure that they got their Aadhaar cards. Only then were the students able to write the exam," says a teacher of a government school at Puzhal, Chennai.

S. Rakesh, a migrant labour from Bihar, has settled at Periyar Pudur in Salem. He says, "With the help of house owners, we were able to get the LPG cylinder bill. Using it, we are changing our address in Aadhaar and it is also used for our children to get Aadhaar cards," he says.

Casual labourers entering the State find it tough to get the Aadhaar cards for their children to get admission in a primary school. "They do not have proof of address because they stay in small houses provided in the factory. As they are new to work, the owners do not help them either," adds Mr. Rakesh.

## A task for schools

"The schools can compile the list of students who don't have the documents and take it up with the Collector and the Revenue Department to ensure that they get their Aadhaar cards. We are ensuring that school students have their Aadhaar cards linked to the EMIS because it would help them get scholarships in Class VI and IX. We have covered 30 lakh children so far and hope to complete the process by January," says a senior official of the School Education Department.

Subulakshmi, a field worker of Social Awareness and Voluntary Education (SAVE), a non-governmental organisation in Tiruppur, visits 75 children of migrant workers at Koilvazhi in Tiruppur district almost every day. Their parents are employed with the Tiruppur Corporation. They are all from the areas along the Karnataka-Maharashtra border. "The elders go to work early in the morning and return home by 2 p.m. or 3 p.m. They cannot take a day off or skip work to get an Aadhaar card for the children," says Ms. Subulakshmi.

SAVE founder A. Aloysius says parents lack awareness of the need for Aadhaar to register the children at school. "They will have the card, but will not share the details; they may have left the cards at home; they will not even remember whether they have secured the Aadhaar card for a child; they will not have proper identity papers to get it here. There is a sense of fear and uncertainty among them always," he says. "So, these children remain excluded from the education system"

# A universal problem

Getting an Aadhaar card is difficult not only for children of migrant workers but also for some local residents and nomadic tribes. A government higher secondary school teacher at Nagapattinam says, "We receive children from the Adhiyan community, known as *Boom Boom Mattukarar*. As they do not have community certificates, they could not access education and jobs. As their families move from one district to another to sell toys and bangles, they take their children along. When they attempt to admit their children to a government school, it becomes impossible because they lack the Aadhaar, birth, caste, and nativity certificates."

If students do not have a bank account, the EMIS requires the school to open a post office account for them. Without the Aadhaar or other documents of identity, opening a post office account is impossible. A minimum deposit of ₹200 is required too. "If it is for one child, it's manageable. But how many children can I support," asks the headmaster of a school in a Cauvery delta district.

A teacher from Karur helped a student from the Kallodar community to enrol. This community is largely engaged in rock-cutting. Since the student's parents did not have a mobile phone, she gave her own number for Aadhaar verifica-

> (With inputs from M. Soundariya Preetha in Coimbatore, M. Sabari in Salem, and Nacchinarkkiniyan M. in Tiruchi.)



**Herculean task:** If students do not have a bank account to receive welfare assistance, schools are required to open a post office account for them. Without the Aadhaar or other documents of identity, opening a post office account is impossible. C. VENKATACHALAPATHY

CM (

# When a DNA analysis reveals a closely guarded family secret...

<u>DNA</u> analysis can create a 'narrow biologised notion of inheritance', to use the words of Projit Mukharji, for no reason other than that the molecule can reveal more than what we wish to tell. If this isn't a problem enough, consider what it means for laws we have, or don't, to protect our privacy

D.P. Kasbekar

he Centre for DNA
Fingerprinting and Diagnostics
(CDFD) is a government
laboratory in Hyderabad. It
provides DNA-based investigative services
to the police, the judiciary, and to
hospitals that offer organ transplant
procedures. Recently, the CDFD handled
the case of a family in which the father
offered to donate an organ to his ailing
son. CDFD technicians generated DNA
profiles of the donor, the patient, and also
the patient's mother.

While the DNA profiles of the mother and the son were consistent with their claimed mother-son relationship, those of the father and his son were not. The DNA showed that the woman's husband was not the actual father of the patient but a close paternal relative, possibly a brother of the actual father. These findings didn't preclude the organ transplant procedure but by revealing the practice of levirate they created a potentially awkward situation for the family.

Levirate is the custom in some families in which a woman who is widowed or one whose husband is mentally or physically incapacitated has children fathered by her husband's brother. Understandably, the family would prefer to keep such knowledge private. The report from the CDFD was meant to tell doctors they could proceed with the transplant operation because the donor and the recipient belonged to the same family. But by explicitly revealing the woman's husband was not her son's father, it created the risk of an unwanted breach of the family's privacy.

#### What are DNA profiles?

Every cell in our body has a nucleus that contains two copies of each of the 23 chromosomes, numbered 1 to 23. This 1-23 lump is our genome. One chromosome of each pair is inherited via the mother's egg and the other via the father's sperm.

When we make our own reproductive cells – eggs or sperm – each egg or sperm receives only one chromosome from a pair, i.e., one genome set. When a sperm cell and an egg fuse, they create a cell with two genome sets. This cell, called the zygote, divides to produce all the other cells of the baby.

Every chromosome contains a single DNA molecule that runs from end to end. A DNA molecule has two strands. Each strand is a long, linear sequence of four chemicals: adenine (A), cytosine (C), guanine (G), and thymidine (T). The As on one strand form bonds with the Ts on the other, while Gs bond with the Cs. The As, Cs, Gs, and Ts on one strand are called the DNA's bases and the A-T and G-C combinations are the DNA's base-pairs.

The largest chromosome in humans, chromosome 1, has more than 240 million base-pairs; the shortest, chromosome 21, has more than 40 million. The 23 chromosomes together have 3.2 billion base-pairs.

At several locations, or loci, on each of the 23 chromosomes, some short DNA sequences are repeated multiple times. These loci are called simple tandem repeats (STRs). For example, one strand of an STR locus might have multiple repeats of GGCCA

(GGCCAGGCCAGGCCA...). These are

# When DNA creates a privacy issue

DNA has unwittingly opened a Pandora's box where the family skeletons could tumble out of the closet. You offer your DNA to further something that needs to be done and open a gaping wound



DNA analysis has the potential to cause very unpleasant situations. Illustrative image.

# AUTOSOMAL STR DNA PROFILES OF THE INDIVIDUALS

			,
Locus	Link Person	Patient	Donor
D3S1358	16,16	16,16	15,18
vWA	14,17	14,14	15,18
D16S539	11,12	11,12	11,12
CSF1PO	10,13	12,13	11,12
TPOX	8,11	8,11	8,11
Yindel	-	2	2
D8S1179	13,14	14,15	13,15
D21S11	29,33.2	29,33.2	28,32.2
D18S51	14,15	15,17	14,14
DYS391	-	10	10
D2S441	9,10	10,10	10,11
D19S433	13,13	13,13	13,13
THO1	7,8	7,9	6,9
FGA	24,24	24,27	23,27
D22S1045	11,17	11,17	11,17
D5S818	10,12	12,15	12,15
D13S317	8,12	12,12	11,12
D7S820	8,12	11,12	11,13
SE33	13,29.2	13,29.2	19,29.2
D10S1248	13,15	14,15	14,14
D1S1656	14,14	14,17.3	8,15.3
D12S391	21,24	17,21	17,17.3
D2S1338	19,22	21,22	19,21
AMELOGENIN	X,X	X,Y	X,Y

paired with complementary CCGGT repeats on the other strand (CCGGTCCGGTCCGGT...). The repeat number of STR loci can differ in the two chromosomes of a pair. For example, a particular chromosome derived from the father might have 30 repeats while the same one from the mother may have 35.

#### Y-CHROMOSOMAL STR DNA PROFILES OF THE INDIVIDUALS

DYS576         17         17           DYS389I         13         13           DYS389II         29         29           DYS4627         19         19           DYS460         10         10           DYS458         16         16           DYS19         14         14           YGATAH4         11         11           DYS391         10         10           DYS392         17         17           DYS390         23         23           DYS392         11         11           DYS518         40         40           DYS570         16         16           DYS437         14         14           DYS393         12         12           DYS449         31         31           DYS393         12         12           DYS439         11         11           DYS481         23         23           DYF387S1         36,39         36,39           DYS533         11         11	Locus	Patient	Donor
DYS635         23         23           DYS389II         29         29           DYS627         19         19           DYS460         10         10           DYS458         16         16           DYS19         14         14           YGATAH4         11         11           DYS391         10         10           DYS456         17         17           DYS390         23         23           DYS438         9         9           DYS392         11         11           DYS518         40         40           DYS570         16         16           DYS437         14         14           DYS385         12,16         12,16           DYS449         31         31           DYS393         12         12           DYS439         11         11           DYS481         23         23           DYF387S1         36,39         36,39	DYS576	17	17
DYS389II         29         29           DYS627         19         19           DYS460         10         10           DYS458         16         16           DYS19         14         14           YGATAH4         11         11           DYS391         10         10           DYS456         17         17           DYS390         23         23           DYS438         9         9           DYS392         11         11           DYS518         40         40           DYS437         14         14           DYS385         12,16         12,16           DYS449         31         31           DYS393         12         12           DYS439         11         11           DYS481         23         23           DYF387S1         36,39         36,39	DYS389I	13	13
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DYS439         11         11           DYS481         23         23           DYF387S1         36,39         36,39	DYS449	31	31
DYS481         23         23           DYF387S1         36,39         36,39	DYS393	12	12
DYF387S1 36,39 36,39	DYS439	11	11
	DYS481	23	23
DYS533 11 11	DYF387S1	36,39	36,39
	DYS533	11	11

The DNA profile of a person is simply the number of times the simple sequences are repeated in the STR loci. This number can be found by first creating lots of copies of DNA from a sample (using the polymerase chain reaction, PCR), then segregating the DNA fragments by size using a technique called

Levirate is the custom in which a woman who is widowed or one whose husband is mentally or physically incapacitated has children fathered by her husband's brother

capillary gel electrophoresis. It is sensitive enough to both accurately and precisely establish the number of repeats in an

For example, the table below shows the number of repeats of the father, the mother, and the son in the case illustrated above – i.e. their DNA profiles.

According to the table, the mother's versions of locus D18S51 had 14 and 15 repeats, while the son's versions had 15 and 17 repeats. But the father's versions of D18S51 had 14 and 14. The son received his 15-repeat version from his mother and the 17-repeat version from his father. But the woman's husband didn't have a 17-repeat variant, so this man couldn't be the actual father. Likewise, for three other STR loci, the son received paternal variants that were absent from the donor.

The son and the man still had identical Y-chromosome profiles, plus identical variants in 19 of the 23 non-Y STR loci. This indicated that the woman's husband is closely related to the biological father – possibly a brother. Thus the marriage is levirate.

#### Levirate marriages in India

Projit Bihari Mukharji, a historian of science at the University of Pennsylvania and Ashoka University in Haryana, ably discussed the practice of levirate marriage in India in his 2022 book 'Brown Skins, White Coats Race Science in India, 1920-66.'

Mukharji cited the pioneering anthropologist and writer Irawati Karve (1905-1970) when he wrote that she spoke "of the three debts that any Hindu man owed and upon the repayment of which his ultimate liberation depended. These debts were respectively to the gods, the sages, and the ancestors.

Each of these ... required the making of regular offerings. These offerings could only be made by a son. Hence, the function of a son was the making of ancestral offerings, rather than the maintenance of a biological or genetic lineage."

This pushed families to explore all possible ways, including levirate, to beget a son.

Mukharji added that families are reluctant "to divulge information... not simply... by a modern desire to avert scandal. Rather, it was because, within an older customary framework of kinship, 'descent' itself worked differently and to other ends. ... The refusal... to share sexual information was tacitly rooted in a more radical refusal to accept a narrowly biologised notion of inheritance."

Unfortunately, in the end, DNA analysis appears to have allowed the "narrow biologised notion of inheritance" to win for no reason other than that DNA just doesn't know when to shut up. And if this isn't a problem enough, consider what it could mean for the laws we have – or don't – to protect our genetic privacy.

(D.P. Kasbekar is a retired scientist.kasbekardp@yahoo.co.in)

Please send in your answers to

science@thehindu.co.in

A photo taken on July 5 by the New Zealand Department of Conservation shows rangers beside what appears to be the carcass of a rare spade-toothed whale after it was discovered washed ashore on a beach near Taieri Mouth,

# Scientists in NZ gather to decode puzzle of rarest whale

**Associated Press** 

It is the world's rarest whale, with only seven of its kind ever spotted. Almost nothing is known about the enigmatic species. But on Monday a small group of scientists and cultural experts in New Zealand clustered around a near-perfectly preserved spade-toothed whale hoping to decode decades of mystery.

"I can't tell you how extraordinary it is," said Anton van Helden, senior marine science adviser for New Zealand's conservation agency, who gave the spade-toothed whale its name to distinguish it from other beaked species.

Van Helden has studied beaked whales for 35 years, but Monday was the first time he has participated in a dissection of the spade-toothed variety. In fact, the careful study of the creature, which washed up dead on a New Zealand beach in July, is the first ever to take place.

None has ever been seen alive at sea. The list of what scientists don't know about spade-toothed whales is longer than what they do know. They don't know where in the ocean the whales live, why they've never been spotted in the wild, or what their brains look like. All beaked whales have different stomach systems, and researchers don't know how the spade-toothed kind processes its food.

Over the next week, researchers studying the 5-metre male at a research centre near Dunedin hope to find out.

"There may be parasites completely."

"There may be parasites completely new to science that just live in this whale," said van Helden, who thrilled at the chance of learning how the species produces sound and what it eats. "Who knows what we'll discover?" Only six other spade-toothed whales have ever been found, but all those discovered intact were buried before DNA testing could verify their identification.

The dissection will be slower than usual, because it is being undertaken in partnership with the Maori, for whom whales are a precious treasure, and the creature will be treated with the reverence afforded to an ancestor

New Zealand is a whale-stranding hotspot, with more than 5,000 episodes recorded since 1840, according to the Department of Conservation. The first spade-toothed whale bones were found in 1872 on New Zealand's Pitt Island. Another discovery was made at an offshore island in the 1950s, and the bones of a third were found on Chile's Robinson Crusoe Island in 1986.

DNA sequencing in 2002 proved that all three specimens were of the same species and that it was distinct from other beaked whales. But researchers studying the mammal couldn't confirm whether the species was extinct until 2010, when two whole spade-toothed whales, both dead, washed up on a New Zealand beach.

On Monday, the seventh of its kind, surrounded by white-aproned scientists who were measuring and photographing, appeared relatively unblemished, giving no clue about its death. Researchers pointed out marks from cookiecutter sharks – normal, they said, and not the cause.

The dissection will be quiet, methodical, and slower than usual, because it is being undertaken in partnership with Maori, New Zealand's Indigenous people. To Maori, whales are a precious treasure, and the creature will be treated with the reverence afforded to an ancestor.



For feedback and suggestions for 'Science' please write to

for 'Science', please write to **science@thehindu.co.in** with the subject 'Daily page'

# THE SCIENCE QUIZ

# Forty years since the Bhopal disaster...

weapon.

**QUESTION 4** 

# Vasudevan Mukunth

# QUESTION 1

X leaked from the Union Carbide India, Ltd. (UCIL) plant in Bhopal on the night of December 2 and early on December 3, killing more than 4,000 people and injuring upwards of 5.7 lakh. Name X.

## QUESTION 2

The UCIL facility in Bhopal was built in 1969 to manufacture a pesticide called Sevin, the brand name of a compound called 1-naphthyl methylcarbamate. The facility did so by reacting X (from Q1) with Y. Name Y. Y is also used to make the antidepressant sertraline.

**QUESTION 3**A different way to make carbaryl is

to humans even at very small concentrations. Although it doesn't have a specific smell even at a concentration of 5 ppm, it is strongly \_\_\_\_\_. Fill in the blank with the name of a property that induces tears in eyes.

to react Y (from Q2) with a large

naphthylchloroformate, which, when

it reacts with methylamine, creates

used to kill more than 85,000 people

X (from Q1) is a gas that's very toxic

carbaryl. Name Z —which France

during World War I as a chemical

quantity of Z to produce

# QUESTION 5

The trigger for the Bhopal disaster was personnel at the UCIL plant

adding a large quantity of \_\_\_\_\_ to a tank containing X (from Q1). Fill in the blank with a compound whose reaction with X produces heat, which can cause more of the X to react and eventually to boil.

Answers to November 28 quiz:

1. Material of which ATOW1996 is made – **Ans: Gravel**2. Antarctic ice shelf abutting

Ans: Ross ice shelf
3. Western terminal of longest
motorable straight line on land –
Ans: France

southernmost piece of open ocean

4. Mountain whose peak is farthest point on land from earth's centre –
Ans: Mt. Chimborazo
5. World's largest city located below

sea level – **Ans: Baku, Azerbaijan** Visual: **Ojos del Salado** First contact: Jose Joji | Rahul Nair | Anmol Agrawal | K.N. Viswanathan

Visual: Name this comet. Ten years ago a robot touched down on it, and, a year later, scientists used the data it collected to report the first presence of X (from Q1) on a comet. ESA (CC BY-SA 4.0)