

GK BULLETIN (2nd week FEB 2016)

The bulletin includes

- 1. Important news from the field of science, technology, environment , current affairs.**
- 2. Source- TOI, Science Daily**
- 3. links for more information**
- 4. questions after articles to test your knowledge.**
- 5. Kindly note any article can be asked in any exam.**

Article 1

Indian women boxers swept the golds at the South Asian Games.

MC Mary Kom, Pooja Rani and Sarita Devi grabbed all the three gold medals on offer in women's boxing for an overall clean-sweep of top honours in the 12th South Asian Games on Tuesday. London Olympics bronze-medallist Mary Kom (51kg) packed a powerful punch against her seasoned Sri Lankan rival Anusha Kodituwakku Dilrukshi to be adjudged winner via Technical Knockout in a bout lasting less than 90 seconds. (TO1 17 FEB)

Questions

1. When & where were the south Asian games held?
2. Name a few countries participating in the games.
3. To which states do the inners belong to?
4. Sports are an integral part of a student's life. Do you agree? Justify?
5. On which date were the winners awarded their medals?

Article 2

1,50,000 penguins have been killed in Antarctica after colossal iceberg left their colony landlocked.

The penguins used to live near a large body of open water, but the arrival of the iceberg in East Antarctica and fast ice expansion had dramatically increased the distance they must travel to feed. Scientists predict the colony will be gone in 20 years unless the sea ice breaks up or the giant iceberg is dislodged. (TO1 14 EB 16)

Article 3

Prime Minister Narendra Modi inaugurated the Make In India Centre at the MMRDA Grounds in Mumbai.

The Make In India Centre showcases some of the country's most innovative and trendsetting products and manufacturing processes to the world. With this event, PM Modi also kicked off the 'Make In India Week', which will revolve around the theme of innovation, design and sustainability. (TO1 13 FEB 16)

1. When was Make in India week celebrated?
2. Give full form of MMRDA.
3. State the importance of Make in India.
4. state the theme of the project.
5. do you think it will help our country? Justify

Article 4

Air pollution is responsible for the premature deaths of more than 5.5 million people globally, a new research says. However, over half of these deaths occur in China and India, which are two of the world's fastest-growing economies. Findings of the American Association for the Advancement of Science show that conditions caused by air pollution killed 1.6 million people in China and 1.4 million people in India in 2013. (TO1 13 FEB 16)

New research shows that more than 5.5 million people die prematurely every year due to household and outdoor air pollution. More than half of deaths occur in two of the world's fastest growing economies, China and India.

New research shows that more than 5.5 million people die prematurely every year due to household and outdoor air pollution. More than half of deaths occur in two of the world's fastest growing economies, China and India.

Power plants, industrial manufacturing, vehicle exhaust and burning coal and wood all release small particles into the air that are dangerous to a person's health. New research, presented today at the 2016 annual meeting of the American Association for the Advancement of Science (AAAS), found that despite efforts to limit future emissions, the number of premature deaths linked to air pollution will climb over the next two decades unless more aggressive targets are set.

"Air pollution is the fourth highest risk factor for death globally and by far the leading environmental risk factor for disease," said Michael Brauer, a professor at the University of British Columbia's School of Population and Public Health in Vancouver, Canada. "Reducing air pollution is an incredibly efficient way to improve the health of a population."

For the AAAS meeting, researchers from Canada, the United States, China and India assembled estimates of **air pollution levels in China and India and calculated the impact on health.**

Their analysis shows that the two countries account for 55 per cent of the deaths caused by air pollution worldwide. About 1.6 million people died of air pollution in China and 1.4 million died in India in 2013.

In China, burning coal is the biggest contributor to poor air quality. Qiao Ma, a PhD student at the School of Environment, Tsinghua University in Beijing, China, found that outdoor air pollution from coal alone caused an estimated 366,000 deaths in China in 2013.

Ma also calculated the expected number of premature deaths in China in the future if the country meets its current targets to restrict coal combustion and emissions through a combination of energy policies and pollution controls. She found that air pollution will cause anywhere from 990,000 to 1.3 million premature deaths in 2030 unless even more ambitious targets are introduced.

"Our study highlights the urgent need for even more aggressive strategies to reduce emissions from coal and from other sectors," said Ma.

In India, a major contributor to poor air quality is the practice of burning wood, dung and similar sources of biomass for cooking and heating. Millions of families, among the poorest in India, are regularly exposed to high levels of particulate matter in their own homes.

"India needs a three-pronged mitigation approach to address industrial coal burning, open burning for agriculture, and household air pollution sources," said Chandra Venkataraman, professor of Chemical Engineering at the Indian Institute of Technology Bombay, in Mumbai, India.

In the last 50 years, North America, Western Europe and Japan have made massive strides to combat pollution by using cleaner fuels, more efficient vehicles, limiting coal burning and putting restrictions on electric power plants and factories.

"Having been in charge of designing and implementing strategies to improve air in the United States, I know how difficult it is. Developing countries have a tremendous task in front of them," said Dan Greenbaum, president of Health Effects Institute, a non-profit organization based in Boston that sponsors targeted efforts to analyze the health burden from different air pollution sources. "This research helps guide the way by identifying the actions which can best improve public health."

Video: <https://youtu.be/Kwoqa84npsU>

Background:

The research is an extension of the Global Burden of Disease study, an international collaboration led by the Institute for Health Metrics and Evaluation (IHME) at the University

of Washington that systematically measured health and its risk factors, including air pollution levels, for 188 countries between 1990 and 2013. The air pollution research is led by researchers at the University of British Columbia and the Health Effects Institute.

Additional facts about air pollution:

- World Health Organization (WHO) air quality guidelines set daily particulate matter at 25 micrograms per cubic metre.
 - At this time of year, Beijing and New Delhi will see daily levels at or above 300 micrograms per cubic meter metre; 1,200 per cent higher than WHO guidelines.
 - While air pollution has decreased in most high-income countries in the past 20 years, global levels are up largely because of South Asia, Southeast Asia, and China. More than 85 per cent of the world's population now lives in areas where the World Health Organization Air Quality Guideline is exceeded.
 - The researchers say that strict control of particulate matter is critical because of changing demographics. Researchers predict that if air pollution levels remain constant, the number of deaths will increase because the population is aging and older people are more susceptible to illnesses caused by poor air quality.
 - According to the Global Burden of Disease study, air pollution causes more deaths than other risk factors like malnutrition, obesity, alcohol and drug abuse, and unsafe sex. It is the fourth greatest risk behind high blood pressure, dietary risks and smoking.
 - Cardiovascular disease accounts for the majority of deaths from air pollution with additional impacts from lung cancer, chronic obstructive pulmonary disease (COPD) and respiratory infections.
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Story Source:

The above post is reprinted from [materials](#) provided by **University of British Columbia**. *Note: Materials may be edited for content and length.*

Questions-

1. State the causes of air pollution.
2. What is the population of India and china?
3. Ho does air pollution affect us?
4. Recently Delhi govt initiated a plan to curb air pollution . name the plan.
5. Can air pollution be prevented ? justify

Article 5

Improved agricultural water management could halve the global food gap by 2050 and buffer some of the harmful climate change effects on crop yields.

For the first time, scientists investigated **systematically the worldwide potential to produce more food with the same amount of water by optimizing rain use and irrigation**. They found the potential has previously been underestimated. Investing in crop water management could substantially reduce hunger while at the same time making up for population growth. However, putting the findings into practice would require specific local solutions, which remains a challenge.

"Smart water use can boost agricultural production -- we've in fact been surprised to see such sizeable effects at the global level," says lead-author Jonas Jägermeyr from the Potsdam Institute for Climate Impact Research. In a water management scenario the scientists call ambitious, global kilocalorie production could rise by 40 percent, while according to UN estimates roughly 80 percent would be needed to eradicate hunger by the middle of this century. But even in less ambitious scenarios, results show that integrated crop water management could make a crucial contribution to filling the plates of the poor, says Jägermeyr. "It turns out that crop water management is a largely underrated approach to reduce undernourishment and increase climate resilience of smallholders."

Large yield increase potential in China, Mexico, Australia

The scientists have run comprehensive biophysical computer simulations, constraining these in such a way that croplands do not expand into forests and no additional water resources are needed. As it is a global study, it provides detailed vegetation dynamics and water use effects in river basins -- certainly too coarse to simulate farm-level conditions but suited to identify regional hotspots. For example, the yield increase potential of crop water management is found to be particularly large in water-scarce regions such as in China, Australia, the western US, Mexico, and South Africa.

"Assessing the potential is tricky: **If upstream farmers reroute otherwise wasted water to increase irrigation and production, less water returns to downstream users and consequently this can affect their production,**" says co-author and team leader Dieter Gerten. "Below the line, we found that the overall production increases. Still, this of course poses quite some distributional challenges. Also, a lot of local government regulation and incentives such as micro credit schemes are needed to put crop water management into large-scale practice."

Mulching and drip systems to counter climate change impacts

The scientists took into account a number of very different concrete water management options, from low-tech solutions for smallholders to the industrial scale. **Water harvesting by collecting excess rain run-off for instance in cisterns -- for supplementary**

irrigation during dry spells -- is a common traditional approach in some regions such as the Sahel region in Africa, but is under-used in many other semi-arid regions such as Asia and North America. Mulching is another option -- the soil gets covered either simply with crop residues left on the field, reducing evaporation, or with huge plastic sheets. Finally, a major contribution to the global potential is upgrading irrigation to drip systems.

It is especially under **ongoing climate change that water management becomes increasingly important to reduce food risks. The reason is that global warming is likely to increase droughts and change rainfall patterns, so water availability becomes even more critical than before.** Assuming a moderate CO2 fertilization effect -- plants take up CO2 and could hence benefit from higher concentrations in the air, but the magnitude of this effect is still under debate -, the study shows that in most climate policy scenarios water management can counterbalance a large part of the regional warming impacts on farming. Yet if greenhouse-gas emissions from burning fossil fuels are not reduced at all, in a business-as-usual scenario, water management will clearly not suffice to outweigh the negative climate effects.

Given the planetary boundaries, decision-makers should look into water use

"Water management is key for tackling the greater sustainability challenge," says Wolfgang Lucht, co-author of the study and co-chair of PIK's research domain Earth System Analysis. "It has been an issue in many local and regional studies and its effects on farm level have been well demonstrated, but on the global level it has been somewhat neglected. The renewed Sustainable Development Goals -- while stipulating sustainable agriculture among all nations -- need to be based on more evidence on how to achieve it; they do not focus on water use very much. Since we're rapidly approaching planetary boundaries, our study should indeed draw the attention of decision-makers of all levels to the potential of integrated crop water management." (to env news 16 eb 2016)

Story Source:

The above post is reprinted from [materials](#) provided by **IOP Publishing**. *Note: Materials may be edited for content and length.*

Article 6

It's official: There really was a giant, flightless bird with a head the size of a horse's wandering about in the winter twilight of the high Arctic some 53 million years ago

The confirmation comes from a new study by researchers from the Chinese Academy of Sciences in Beijing and the University of Colorado Boulder that describes the first and only fossil evidence from the Arctic of a massive bird known as *Gastornis*. The evidence is a single fossil toe bone of the 6-foot tall, several-hundred-pound bird from Ellesmere Island above the Arctic Circle. The bone is nearly a dead ringer to fossil toe bones from the huge bird discovered in Wyoming and which date to roughly the same time.

The *Gastornis* (formerly *Diatryma*) fossil from Ellesmere Island has been discussed by paleontologists since it was collected in the 1970s and appears on a few lists of the prehistoric fauna there, said Professor Thomas Stidham of the Chinese Academy of Sciences in Beijing. But **this is the first time the bone has been closely examined and described, he said. *Gastornis* fossils also have been found in Europe and Asia.**

"We knew there were a few bird fossils from up there, but we also knew they were extremely rare," said Eberle, an associate professor in geological sciences who conducts research on fossil mammals, reptiles and fishes. In addition to the *Gastornis* bone from Ellesmere, another scientist reported seeing a fossil footprint there, probably from a large flightless bird, although its specific location remains unknown, Eberle said.

A paper by Stidham and Eberle appears in the most recent issue of *Scientific Reports*, an open access, weekly journal from the publishers of *Nature*.

About 53 three million years ago during the early Eocene Epoch, the environment of Ellesmere Island was probably similar to cypress swamps in the southeast U.S. today, Eberle said. Fossil evidence indicates the island, which is adjacent to Greenland, hosted turtles, alligators, primates, tapirs and even large hippo-like and rhino-like mammals.

Today Ellesmere Island is one of the coldest, driest environments on Earth, where temperatures can drop to minus 40 degrees Fahrenheit in winter, said Eberle, also the curator of paleontology at the University of Colorado Museum of Natural History.

Originally thought to be a fearsome carnivore, recent research indicates *Gastornis* probably was a vegan, using its huge beak to tear at foliage, nuts, seeds and hard fruit.

A second Ellesmere Island bird from the early Eocene also is described by Stidham and Eberle in the new paper. Named *Presbyornis*, it was similar to birds in today's duck, goose

and swan family but with long, flamingo-like legs. The evidence was a single humerus, or upper wing bone, collected by the same paleontology team that found the *Gastornis* bone.

Like *Gastornis*, *Presbyornis* was mentioned in several lists of Ellesmere Island fauna over the years but the bone had never been described, said Stidham.

Stidham compared casts of *Presbyornis* bones excavated in ancient Wyoming to the single bone from Ellesmere Island, including all of the marks for muscle attachments. "I couldn't tell the Wyoming specimens from the Ellesmere specimen, even though it was found roughly 4,000 kilometers (2,500 miles) to the north," he said.

While the diversity of plants and animals on Ellesmere was surprisingly high in the early Eocene, one of the biggest challenges to life on the island may have been the Arctic winters, said Eberle. "Since Ellesmere Island is high above the Arctic Circle, the lights still went out there for several months of the year, just as they do today."

It is not known whether *Presbyornis* migrated north to Ellesmere Island every year or lived there year-round, said Stidham. "Given the fossils we have, both hypotheses are possible," he said. "There are some sea ducks today that spend the winter in the cold, freezing Arctic, and we see many more species of waterfowl that are only in the Arctic during the relatively warmer spring and summer months."

The paleontology team working on Ellesmere Island in the 1970s and who found the *Gastornis* and *Presbyornis* bones in the 1970s included Mary Dawson, Robert "Mac" West, Howard Hutchinson and Malcolm McKenna.

The new study has implications for the rapidly warming Arctic climate, primarily a result of greenhouse gases being pumped into Earth's atmosphere by humans.

"Permanent Arctic ice, which has been around for millennia, is on track to disappear," Eberle said. "I'm not suggesting there will be a return of alligators and giant tortoises to Ellesmere Island any time soon. But what we know about past warm intervals in the Arctic can give us a much better idea about what to expect in terms of changing plant and animal populations there in the future."

Story Source:

The above post is reprinted from [materials](#) provided by [University of Colorado at Boulder](#). *Note: Materials may be edited for content and length.*

Article 7

Garden Plant Residues Can Improve Soil Intentionally or unintentionally, many gardeners have left plants in their gardens over the winter. The Soil Science Society of America (SSSA) February 15 Soils Matter blog post explains this is actually a good thing... and something everyone should consider on a yearly basis. (science daily 15 feb)

According to blog writers Kelley House and Kate Norvell, both certified professional soil scientists, **plant "litter" that remains after a harvest is called "residue." Leaving the residues in place over the winter, instead of pulling them up or tilling them into the soil surface, provides numerous benefits for the soil and your garden.**

- Plant residues reduce erosion and the loss of valuable topsoil.
- Having plant residues on the soil surface prevents something called soil crusting.
- Residual plant material reduces weeds by covering and shading the soil.
- Plant residues provide shade, regulating soil temperature.
- Cooler soil temperatures also aid in the retention of soil moisture, which in turn is favorable for seed germination in the spring and crop growth.
- Crop residues provide micro-habitats that protect and benefit the germinating plant seeds and establishing seedlings.
- Plant residues provide a source of organic matter for the soil.

To read the entire blog post, visit <https://soilsmatter.wordpress.com/2016/02/15/what-is-the-effect-of-leaving-some-of-the-vegetable-crops-up-over-the-winter-how-does-that-improve-soil-conditions/>

Story Source:

The above post is reprinted from [materials](#) provided by **American Society of Agronomy (ASA), Crop Science Society of America (CSSA), Soil Science Society of**. *Note: Materials may be edited for content and length.*

Article 8

IN addition to precipitation, clouds influence the climate in various ways: they cover 70% of Earth's surface and represent nearly 15% of the volume of the atmosphere. Scientists need to understand their underlying chemical and physical mechanisms in order to better integrate them into climate change models. (Science daily 15 feb 16)

An international team of researchers at the Laboratoire interuniversitaire des systèmes atmosphériques (CNRS/Université Paris-Est Créteil/Université Paris Diderot) and the Laboratoire chimie de l'environnement (CNRS/Aix-Marseille Université) thus demonstrated for the first time the role played by cloud droplets in the atmospheric transformation of volatile organic pollutants. Volatile organic compounds, in gaseous form, condensate in these droplets to form secondary organic aerosols, which are a mixture of gas and solid or liquid particles.

This work is published on 15 February 2016 *in Atmospheric Chemistry and Physics*.

Story Source:

The above post is reprinted from [materials](#) provided by [CNRS \(Délégation Paris Michel-Ange\)](#). *Note: Materials may be edited for content and length.*

Article 9

Four billion people affected by severe water scarcity

*Date:*February 15, 2016

*Source:*University of Twente

*Summary:*There are four billion people worldwide who are affected by severe water scarcity for at least one month a year. That is the conclusion after many years' extensive research. This alarming figure is much higher than was previously thought.

There are four billion people worldwide who are affected by severe water scarcity for at least one month a year. That is the conclusion of University of Twente Professor of Water Management, Arjen Hoekstra, after many years' extensive research. This alarming figure is much higher than was previously thought. His ground-breaking research was published in *Science Advances*.

Professor Hoekstra's team is the first research group in the world to identify people's water footprint from month to month and to compare it to the monthly availability of water. "Up to now, this type of research concentrated solely on the scarcity of water on an annual basis, and had only been carried out in the largest river basins," says Hoekstra.

He defines **severe water scarcity as the depletion of water in a certain area. "Groundwater levels are falling, lakes are drying up, less water is flowing in rivers, and water supplies for industry and farmers are threatened.** In this research, we established the maximum sustainable 'water footprint' for every location on earth, and then looked at actual water consumption. If the latter is much greater than what is sustainable, then there can be said to be severe water scarcity."

More than previously thought

Until now, it had always been assumed in the scientific community that 2 to 3 billion people were affected by severe water scarcity. "Previous research looked at the availability of water on an annual basis, but that paints a more rosy and misleading picture, because water scarcity occurs during the dry period of the year," explains Hoekstra. In his research, he describes for **each place the number of months in a year that people are affected by severe water scarcity. That varies from zero to twelve months per year.**

Problem areas Of the four billion people referred to, a large proportion feel the effects of water scarcity directly. **Particularly in Mexico, the western US, northern and southern Africa, southern Europe, the Middle East, India, China, and Australia, households, industries and farmers regularly experience water shortages.** In other areas, water supplies are still fine but at risk in the long-term.

Alarming

Hoekstra describes the figures as alarming and notes that the subject of water scarcity is climbing higher and higher on the global agenda. "The fact that the scarcity of water is being regarded as a global problem is confirmed by our research. For some time now, the **World Economic Forum has placed the world water crisis in the top three of global problems, alongside climate change and terrorism.**" Professor Hoekstra continues, "All over the world, it is clear that the **risks associated with high water consumption are being increasingly recognized. The growing world population, changes in consumer behaviour, and climate change are having a significant impact on the scarcity and quality of water.**"

Milestone

Hoekstra started his research in 2010, together with his University of Twente colleague and post-doc researcher Mesfin Mekonnen, from Ethiopia. They fully immersed themselves in modelling and in gathering input data on climate, use of land, soils, crop growth, irrigation, population densities, and industry. Hoekstra says, "This publication is a milestone for us, something to be proud of, but at the same time, it is just the beginning.

Water is 'hot' in the scientific world, with many research groups currently working on the subject. The relevant knowledge is becoming more robust and that is a good thing. We are continuing with the next phase of our research, where the models are even more advanced, where we will understand the problem with even greater precision, and where we will be putting forward solutions."

Story Source:

The above post is reprinted from [materials](#) provided by [University of Twente](#). *Note: Materials may be edited for content and length.*

Article10

You may as well learn the expression "**carbon-negative technology,**" or **Bio-CCS, right away, because it has become a talking point in technological circles.** Gemini explains why.

There exists a method, or technology, that is capable of reducing the level of carbon dioxide in the atmosphere.

"In practice, the methods consists of capturing carbon dioxide emitted by "climate-neutral" processes such as the combustion of organic waste, pellets or sawdust," explains SINTEF research scientist Mario Ditaranto, a specialist in combustion technology.

It is then stored safely underground for ever, thus reducing its concentration in the atmosphere, because it has been eliminated from the natural carbon dioxide cycle. This is the only method we have to lower the level of atmospheric carbon dioxide, which is an important cause of our climate problems.

The method is called Bio-CCS, and it is not new. Until now it has suffered from a rather mixed reputation as insignificant, expensive and limited in its range of applications. However, in the light of climate change and the recent COP21 summit in Paris, it is on the of everyone in the climatology field. In Norway, it has led to SINTEF, the environmental organisation Bellona and certain branches of Norwegian industry working together for a rapid breakthrough.

"Superlight" geoengineering

The reason for the growing popularity of Bio-CCS is that at the very least it can be regarded as an extremely mild and non-hazardous form of geo-engineering. The aim of geo-engineering is to counteract anthropogenic climaste changes by means of physical interventions. Launching huge sunshades into space and spraying >> millions of ?? tonnes of sulphur into the atmosphere to filter sunlight are a couple of suggestions. These have

naturally led to heated debates about both the ethics and safety of such solutions. After all, what might be the consequences if we fix things in ways that only make them worse?

Unavoidable

More than 1000 estimates brought together in the latest report from the Intergovernmental Panel on Climate Change (IPCC) (<https://www.ipcc.ch/report/ar5/>) show that even a significant but gradual brake on carbon dioxide emissions will not be sufficient if we are to avoid a serious climatic crisis.

If we are to stay on the right side of the two-degrees threshold, we will also have to remove some of the carbon dioxide that is already in the atmosphere, and that is where Bio-CCS enters the scene.

In box: If we are to keep global warming within the two-degrees upper limit, we need to be able to remove carbon dioxide from the atmosphere

The blue line in the figure above shows that we will actually need to remove carbon dioxide from the atmosphere if we are to stay within the two-degrees threshold. The red line indicates the climate scenario that we will face if we do not change our habits and continue to emit carbon dioxide at the same rate as today.

Source: Fuss et al., Betting on negative emissions. Nature Climate Change, 4, OCTOBER 2014

Need of negative thinking

"The Paris Summit has made it clearer than ever that zero emissions will not be enough. Even if we stopped all carbon dioxide emissions tomorrow, Earth would still have a climate problem," says Bellona's Marika Andersen, who was among those who followed the climate negotiations in Paris at close hand. Her day job is at Bellona's European office in Brussels, where she works on energy and climate policy, with special focus on bioenergy and carbon capture and storage (CCS).

"We simply cannot avoid using Bio-CCS, which is a solution that Bellona has been promoting ever since 2008. Today, we can see that more and more people are thinking in carbon-negative terms, which is just fine, because carbon dioxide remains in the atmosphere at levels that will have to be reduced," says Andersen.

According to Andersen, we now need to make active efforts to identify partners who are prepared to adopt this technology. For their part, the politicians need to take responsibility for developing infrastructure that will enable industry to deliver and transport carbon dioxide to safe storage sites.

"All this will have its price, though it will be lower than putting out the fire that climate change will bring on if we don't do what needs to be done."

Too expensive, and a source of fear?

But is the world ready to adopt technology based on storing carbon dioxide underground?

Yes and no, says Mario Ditarando of SINTEF, who brings up two factors that have meant that this technology has yet to be adopted on a large scale:

This first is cost. As with all new technology, it needs to be priced in such a way that it can carve out a viable place in the market. It costs a great deal to capture carbon dioxide from electricity generation or industrial processes. Optimistic estimates suggest that energy production will be about seven per cent more expensive than it is today if we capture carbon dioxide from emissions. But it may cost as much as 10 -- 15 per cent more before the technology has been fully commercialised.

We also need to take into account the cost of investing in constructing the capture facility and amortising these over the lifetime of the whole plant. This is a major risk for an energy supplier to take in a market for carbon dioxide-free energy that has yet to be established.

"In practice, this means that society will have to compensate the difference in price between cheap coal and clean energy with CCS. This will require political decisions that have a price in both financial and rhetorical terms," says Ditaranto.

The other factor is human fear, i.e. what the experts call "lack of" public acceptance, which is largely a matter of collective psychology and insufficient knowledge.

"But do we know that storing carbon dioxide in the ground is completely safe?"

"No-one has stored carbon dioxide in the ground for thousands of years, so we cannot be 100 per cent sure that it is completely safe. But the natural gas, of which Norway is the world's third largest exporter, has been safely stored by nature for millions of years, so I am in no doubt that the concept is quite safe. Technically speaking, while there are certainly risks involved, as in all industrial processes, geophysicists and engineers are capable of managing these. We ought really to be more afraid of the climate changes that are on their way. And these are what are going to go off the scale of what we regard as expensive today," he adds, and points to a scenario for the future that could become extremely relevant:

"We can already see how difficult it is in political and economic terms to deal with refugees from war-zones that we can only hope will become more peaceful as time passes. What is it going to be like when the flow of refugees increases because parts of the world become uninhabitable as a result of climate change?"

"What is the difference between "ordinary" CCS and Bio-CCS?"

"The principles involved are identical, but the technology needs to be adapted to suit each individual area of application, and what is just as important, it will have to be tested," says the SINTEF scientist.

One place where it would be useful to start is ethanol production, which is big in both the USA and Brazil, because among other applications, it is used as fuel for vehicles. When we produce ethanol from biomass, pure carbon dioxide is a by-product, which means that we are spared the costs of capturing this greenhouse gas.

"However, we are working on all potential solutions. One important area of focus for us is identifying where it would have the biggest payoffs in terms of technology, logistics and not least, sustainability. In other words, how can we get the most for the climate and our environment out of the least effort, and what are the technological challenges involved," says Mario Ditaranto. For example, bio-waste requires different solutions from wood and sawdust.

Waste pioneers in Oslo

Some big players are already preparing to put these concepts into practice very soon. At the Klemetsrud energy recovery plant in Oslo, for example, Oslo City Council decided in July last year to construct a bio-CCS plant. Last month they opened a test facility that will collect carbon dioxide from parts of the plant, with both the press and politicians attending.

Klemetsrud is currently the biggest emitter of carbon dioxide in Oslo. The plant recovers household and industrial waste from Oslo and several nearby towns and produces almost 6 00 GWh of renewable district heating energy and about 160 GWh of renewable electric power a year. Approximately 60 percent of the waste is organic. The plant could potentially capture about 400 000 tonnes of carbon dioxide a year, this would make it the first carbon-negative power plant in the world.

These plans have made Bellona rejoice and have caused Johnny Stuen, the City of Oslo's technical director, to roll up his green shirtsleeves:

"We are already going full speed ahead with a feasibility study of full-scale carbon dioxide capture, financed by Gassnova," says Stuen on the phone from London, where he is giving a talk about the Klemetsrud plant.

"We are one of three participants in this study: the Norcem cement plant in Brevik and Yara's fertilizer plant in Porsgrunn also want to adopt Bio-CCS.

"The objective of the study is to design at least one technically and financially feasible carbon dioxide handling chain. For example, it will draw up cost estimates for construction and operation, with a uncertainty margin of $\pm 40\%$. That part of the work is due to be completed by the summer," he adds.

Facts: The Ministry of Petroleum and Energy will have overarching responsibility for the efforts of the feasibility study. Gassnova will be responsible for capture and storage, while Gassco will deal with the transportation aspects.

The government has stated that they will fund, but it is "open for shared funding" of the Petroleum and Energy department by its minister Tord Lien. The plan is that the facilities should be operational by the end of 2020.

Wants the politicians on board

On the SINTEF/NTNU campus at Gløshaugen, Mario Ditaranto gazes out over a winter-grey Trondheim.

"Technologically speaking we are a little bit behindhand, because this has not been the most wide-open door for CCS. But now it is time to tell the world that Bio-CCS is the most effective method at hand to do something about the level of carbon dioxide in the atmosphere. By adopting Bio-CCS, we can accelerate the reduction of our carbon dioxide emission," says the SINTEF scientist, adding that the Nordic countries are pretty active in this area: Nordic Energy Research recently funded a research project led by Chalmers University of Technology, in which SINTEF is also a participant. This project aims to look at how biomass can be utilised in one of the most promising CCS technologies, known as Chemical Looping Combustion (CLC).

Ditaranto challenges the politicians to give industry and energy suppliers unambiguous signals that society is now ready to take responsibility, so that the scientists can get on with making Bio-CCS a reality.

Fact-box

Nordic Energy Research funded a project with the name of "Negative carbon dioxide, to be carried out by a consortium led by Chalmers University of Technology that also includes SINTEF Materials and Chemistry, SINTEF Energy Research, VTT Technical Research Centre and Åbo Academy, University in Finland, Sibelco Nordic AB (Sweden) and the Norwegian environmental group Bellona.

The project is based on using biomass as a fuel and Chemical Looping Combustion (CLC), which is a combustion process in which the fuel is kept out of direct contact with air. In its place, a metallic oxide carries oxygen from an air-filled reactor to another reactor that contains the fuel. The only combustion products are water and carbon dioxide, which can easily be separated out by condensing the water.

This is BioCCS

- Biomass, i.e. plants and trees, bind carbon dioxide from the atmosphere as they grow.
- When biomass decays or is burned, the carbon is released to the atmosphere. These two stages thus make up a carbon-neutral circuit.
- If we capture, transport and deposit the carbon dioxide that is liberated when biomass is burned, and store it permanently in the ground, we can actually remove carbon dioxide from the atmosphere.
- The method known as BioCCS is now more than ever relevant as a result of the climate crisis.

Story Source:

The above post is reprinted from [materials](#) provided by **SINTEF**. *Note: Materials may be edited for content and length.*

Article 11

Solar cells help purify water in developing countries

Date: February 15, 2016

Source: Lund University

Summary: Researchers have developed a water purification plant that provides clean water far beyond the reach of the electrical grid – thanks to solar cells. These small and portable solar cell stations have now been placed across rural Bangladesh.

Researchers at Lund University in Sweden have developed a water purification plant that provides clean water far beyond the reach of the electrical grid -- thanks to solar cells. With the help of Nobel Peace Prize recipient Muhammad Yunus, these small and portable solar cell stations have now been placed across rural Bangladesh.

"750 million people lack access to clean water across the globe. Providing safe drinking water is one of the biggest challenges and one of the most important goals for humanity," says inventor Kenneth M. Persson, Professor of Water Resources Engineering at Lund University.

The environmental company Watersprint, founded in 2013 by Kenneth M. Persson and engineer Ola Hansson, has patented the technology that helps purify water by combining UV-LED technology with intelligent software and Wi-Fi. Its system of 12 volts is so effective that it can be run by a single solar panel. The solar cells also charge its battery, which means that the portable facility can be used around the clock and in rural areas without access to electricity.

Nobel Prize winner Muhammad Yunus and his organization Yunus Centre have ordered portable units as part of a pilot project. In October, the first unit was installed and by now, another 9 units have been delivered to the project in Bangladesh.

The portable purification units, so-called Micro Production Centres (MPC), are managed by local suppliers and help create jobs for young, unemployed people who

run the small facilities and sell clean water in exchange for a small fee. A large part of the population in Bangladesh currently use water contaminated by arsenic.

"Thanks to these portable units, communities can now purchase inexpensive, clean water, and at the same time -- in accordance with Muhammad Yunus's model -- a lot of them can make a small profit by running the plants themselves," says Kenneth M. Persson.

Watersprint recently signed a contract with the United Nations about placing 500 portable units in Bangladesh. The units can be connected to Wi-Fi and they include software that monitors the machine. In case of malfunction, the unit will send out alerts via text message to any mobile phone that is connected to it, as well as through the LED lights on the machine.

"The installations are hopefully only the first step to set up similar structures in several other countries that lack access to clean water," says Kenneth M. Persson.

*Professor Muhammad Yunus received the Noble Peace Prize in 2006 for founding the Grameen Bank and for his work on micro-loans. He also coined the term "social business," which provides access to technologies and services for solving social or societal problems.

Story Source:

The above post is reprinted from [materials](#) provided by **Lund University**. *Note: Materials may be edited for content and length.*

Article 12

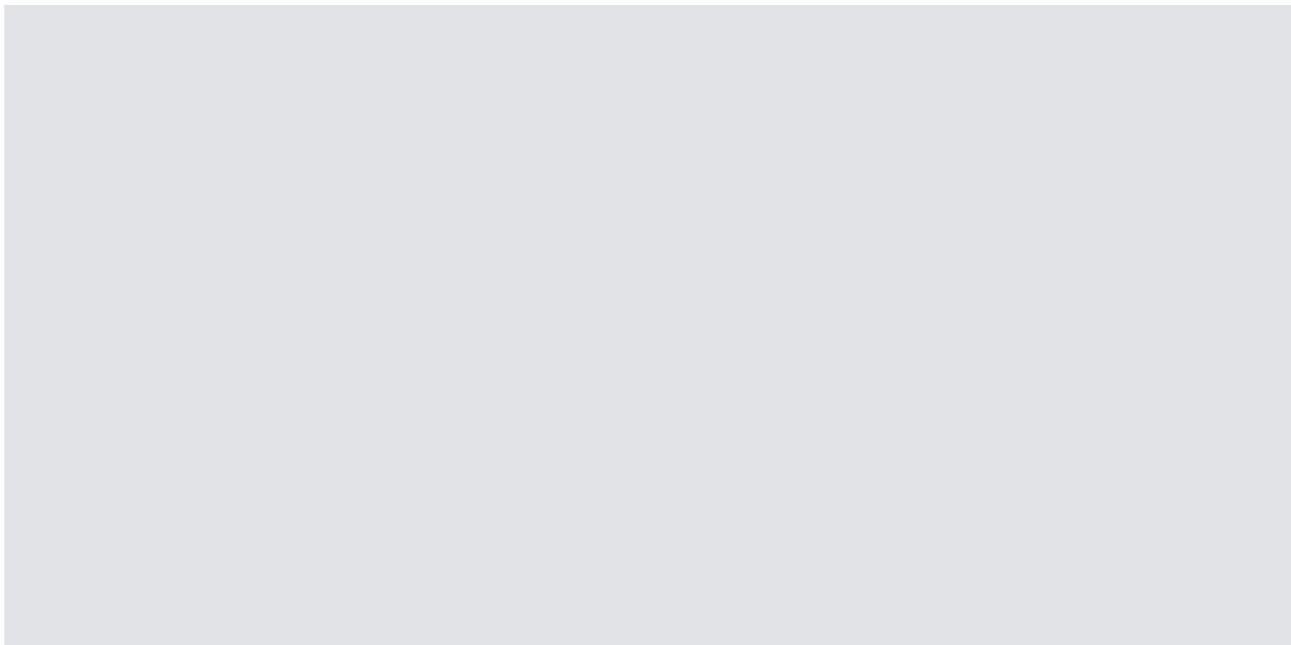
Skilled workers: Study shows the talents of leafcutter ants

Date:February 12, 2016

Source:University of Oregon

Summary:

Leafcutter ants are agricultural pests that range from the southern United States through much of South America. Their complex societies rely on a division of labor inside and outside their underground nests.



Schofield's six-member team — using multiple videos with each capturing one aspect of the ants' work — documented never-before-seen looks at the ants' prehensile skills — they're good at grabbing — and the layers of behaviors associated with gathering leaves, delivering them to the nests and processing them to grow the fungus that colony members eat.

Credit: Image courtesy of University of Oregon

Leafcutter ants are agricultural pests that range from the southern United States through much of South America. Their complex societies rely on a division of labor inside and outside their underground nests.

Studying them, says University of Oregon scientist Robert M.S. Schofield, not only leads to ways to reduce the damages they and their often-massive nests cause but also provides nature-based insights that could prove helpful to efforts to manufacture tiny machines and tools.

The latest findings from Schofield's lab appeared in a paper placed online Jan. 27 in *Royal Society Open Science*, an open journal that quickly publishes research across multiple disciplines.

In the study, Schofield's six-member team -- using multiple videos with each capturing one aspect of the ants' work -- documented never-before-seen looks at the ants' prehensile skills -- they're good at grabbing -- and the layers of behaviors associated with gathering leaves, delivering them to the nests and processing them to grow the fungus that colony members eat.

"We show that the many-jointed leg tips, or tarsi, of ants can be prehensile, like many-jointed human fingers, grasping and manipulating work pieces with precision," said Schofield, a research professor in the UO Department of Physics. "The ants are remarkably handy, often using three legs as a tripod to stand on and the other three legs to handle leaf pieces as they cut, scrape, lick, puncture and chemically treat them. When the processing is complete, the ants rock the leaf fragments into the comb, much like stonemasons building a wall."

Accompanying videos -- shot during more than 70 hours of observations in a leafcutter colony in Schofield's UO lab -- helped the researchers details their findings on how leafcutters hold, lick, scrape, cut and puncture the leaves they use. The study found that the ants are selective, choosing leaf pieces that are small and easy for them to transport, and that 90 percent of processing takes place in their nests.

Schofield's team also analyzed the cutting, carrying and preparation of the leaves done by the ants to understand their energy expenditure. Much of this analysis involved fieldwork at leafcutter sites in Colombia and Ecuador.

The task-shared process, the researchers conclude, suggests that energy conservation and the ants' division of labor are important to the overall health and survival of the ants.

Schofield's five co-authors were former UO undergraduate students Ryan W. Garrett, who was supported by the McNair Scholars Program and a Gilman scholarship, Katherine A. Carlson and Christopher Shepard; Matthew S. Goggans, a courtesy research assistant in the UO physics department; and Michael H. Nesson of Oregon State University. All of the undergraduate students have since graduated.

Story Source:

The above post is reprinted from [materials](#) provided by **University of Oregon**. The original item was written by Jim Barlow. *Note: Materials may be edited for content and length.*

Article 13

First detection of gases at super-Earth show a light-weight, dry atmosphere - with a hint of carbon too?

Date: February 16, 2016

Source: Europlanet Media Centre

Summary: The first successful detection of gases in the atmosphere of a super-Earth reveals the presence of hydrogen and helium, but no water vapor. The exotic exoplanet, 55 Cancri e, is over eight times the mass of Earth and has previously been dubbed the 'diamond planet' because models based on its mass and radius have led some astronomers to speculate that its interior is carbon-rich. Now researchers have been able

to examine the atmosphere of 55 Cancri e, also known as 'Janssen', in unprecedented detail.

This artist's impression shows the super-Earth 55 Cancri e in front of its parent star. Using observations made with the NASA/ESA Hubble Space Telescope and new analytic software scientists were able to analyse the composition of its atmosphere. It was the first time this was possible for a super-Earth. 55 Cancri e is about 40 light-years away and orbits a star slightly smaller, cooler and less bright than our Sun. As the planet is so close to its parent star, one year lasts only 18 hours and temperatures on the surface are thought to reach around 2000 degrees Celsius.

Credit: ESA/Hubble, M. Kornmesser

The first successful detection of gases in the atmosphere of a super-Earth reveals the presence of hydrogen and helium, but no water vapour. The exotic exoplanet, 55 Cancri e, is over eight times the mass of Earth and has previously been dubbed the 'diamond planet' because models based on its mass and radius have led some astronomers to speculate that its interior is carbon-rich. Now, using new processing techniques on data from the NASA/ESA Hubble Space Telescope, a UCL-led team of European researchers has been able to examine the atmosphere of 55 Cancri e, also known as 'Janssen', in unprecedented detail. The results will be published in the *Astrophysical Journal*.

"This is a very exciting result because it's the first time that we have been able to find the spectral fingerprints that show the gases present in the atmosphere of a super-Earth," said Angelos Tsiaras, a PhD student at UCL, who developed the analysis technique along with colleagues Dr Ingo Waldmann and Marco Rocchetto in UCL Physics & Astronomy. "Our analysis of 55 Cancri e's atmosphere suggests that the planet has managed to cling on to a significant amount of hydrogen and helium from the nebula from which it formed."

Super-Earths are thought to be the most common planetary type in our galaxy and are so-called because they have a mass larger than Earth but are still much smaller than the gas giants in the Solar System. The Wide Field Camera 3 (WFC3) on Hubble has already been used to probe the atmosphere of two super-Earths, but no spectral features were found in these previous studies.

55 Cancri e has a year that lasts 18 hours and temperatures on the surface are thought to reach around 2000 degrees Celsius. The planet is located in a solar system around 55 Cancri, also known as 'Copernicus', a star in the Cancer constellation that is around 40 light-years from Earth. Because 55 Cancri is such a bright star, the team were able to use new analysis techniques to extract information about its planetary companion.

Observations were made by scanning WFC3 very quickly across the star to create a number of spectra. By combining these observations and processing through computer analytic 'pipeline' software, the researchers were able to retrieve the spectral fingerprints of 55 Cancri e embedded in the starlight.

"This result gives a first insight into the atmosphere of a super-Earth. We now have clues as to what the planet is currently like, how it might have formed and evolved, and this has important implications for 55 Cancri e and other super-Earths," said Professor Giovanna Tinetti, also from UCL.

Intriguingly, the data also hinted at a signature for hydrogen cyanide, a marker for carbon-rich atmospheres.

"Such an amount of hydrogen cyanide would indicate an atmosphere with a very high ratio of carbon to oxygen," said Dr Olivia Venot, KU Leuven, Belgium, who developed an atmospheric chemical model of 55 Cancri e that supported the analysis of the observations.

"If the presence of hydrogen cyanide and other molecules is confirmed in a few years time by the next generation of infrared telescopes, it would support the theory that this planet is indeed carbon rich and a very exotic place," said Professor Jonathan Tennyson, UCL. "Although, hydrogen cyanide or prussic acid is highly poisonous, so it is perhaps not a planet I would like to live on!"