Biomining study could unlock future settlements on other worlds

Experiments on the International Space Station have shown that the process of “biomining” will work in microgravity; a discovery that could help the first space settlers gather the minerals they need to build a long-term presence beyond Earth.

The BioAsteroid experiment will take up match-box sized containers carrying asteroid rock, that will then be used to grow bacteria and fungi in an incubator for three weeks to investigate how gravity affects interaction between the microbes and rock in reduced gravity. Scientists will investigate how the microbes extract materials from rocks in space.

On Earth, microbes are used in some mining as an environmentally friendly way to access metals. They digest the rock and what is left behind are the metals that miners need.

If successful, this method would support efforts to explore the Moon and Mars, allowing humans to extract building materials, water or rocket fuel. Experimenting on the International Space Station (ISS) allows scientists to conduct unique investigations on the effects of microbes on asteroidal material in conditions that can’t be replicated on Earth.

Libby Jackson, Human Exploration Programme Manager at the UK Space Agency, said:

> If we want to keeping exploring space and pushing the boundaries of what is possible, then we will need to make or find the essential elements required to support life.
>
> Through our membership of the European Space Agency, UK scientists are able to take advantage of the unique scientific facilities available on the ISS and are at the forefront of efforts to recreate the foundations of life on Earth.
>
> The new Bioreactor Express programme – which this experiment forms part of – is going to change the way we are able use this unique laboratory, opening up new opportunities for UK scientists and organisations to undertake science in space.

Scientists at the University of Edinburgh and Kayser Space, based at the Harwell space cluster in Oxfordshire, have collaborated on the project – the first European experiment to be fast-tracked through the Bioreactor Express programme, which is dedicated to biological, biotechnological and biochemistry experiments.

Prof. Charles Cockell, University of Edinburgh, said:

> To sustain humans permanently beyond Earth we need to get access to useful materials. This experiment advances our ability to do that. It will also yield new fundamental insights into processes that are useful here on Earth, such as biomining and how microbes form biofilms that foul our pipes and industrial plants.

David Zolesi, Kayser Space Managing Director, added:

> BioAsteroid confirms how much added value there can be in a commercial access to space and Kayser’s high level of expertise in carrying out biology experiments onboard the ISS. Going from signing the contract to launch in less than 18 months was only possible by exploiting the ISS on a commercial basis.

UK Government Minister for Scotland, Iain Stewart, said:

> It’s fantastic scientists at the University of Edinburgh have worked on this monumental UK-led project.
>
> We are living during a very exciting time for the space industry. Continued UK Government investment into the space sector will cement the UK as a global leader in space.
>
> Last week, the Chancellor committed £14.6bn in funding for R&D in the Spending Review, which means investment in Scotland’s world-leading universities will continue to grow.

The experiment is due to launch to the ISS on the SpX-21, a Commercial Resupply Service mission contracted by NASA and flown by SpaceX using a Cargo Dragon 2.

The UK Space Agency funds the Bioreactor Express programme through its £374 million per year contribution to the European Space Agency (ESA). This membership enables the UK to collaborate with space agencies across the world on projects like the International Space Station.

Early next year we will see the first significant UK industrial contribution to the ISS. The ColKa communications terminal, built by MDA UK, will be installed by astronauts on a spacewalk in January.

This terminal will significantly upgrade the communications abilities in the Columbus module, where many of the UK science experiments take place as it will enable experiment data to be ‘beamed’ down to Earth.

Over half a million people taking part in pioneering COVID-19 research

- Over half a million people across the UK have taken part in COVID-19 research
- Participation has allowed UK-led research to deliver the world's first effective COVID-19 treatments
- 4 COVID-19 vaccine trials are currently underway across the UK due to ground-breaking participant recruitment

The UK is on the front foot of its commitment to understand how this virus spreads, and find treatments and vaccines, with the total number of British people involved in COVID-19 urgent public health research soaring from 100,000 in June to over half a million today.

Recruiting participants at unprecedented pace and scale has led to the development of life-saving treatments for COVID-19 hospitalised patients, including the recently announced findings that arthritis drug tocilizumab can be effective in treating the sickest COVID-19 patients.

The vast number of participants has meant some of the world's most promising vaccine candidates are being developed through UK-based studies, and has enabled initial results around vaccine effectiveness to be published at an unparalleled pace. It is due to rigorous clinical trials such as these that the Medicines and Healthcare products Regulatory Agency (MHRA) has been able to authorise Pfizer/BioNTech's vaccine for use in the UK, making the UK the first country in the western world to authorise a COVID-19 vaccine.

Three large-scale vaccine studies have been rolled out in the UK over recent months, while other promising new vaccines will be confirmed soon for delivery. Tens of thousands of people have already taken part in vaccine trials across the UK through these phase 3 trials.

Health Secretary, Matt Hancock said:

> I want to thank every single person – from staff members to participants – who have taken part in this research. Everyone's involvement has provided a vital link in the chain to help us better understand this virus and I am confident we will find a resolution through the ingenuity of science.
>
> The scale at which research into treatments for COVID-19 has taken place in the UK is unparalleled, and the determination for the country to come together to beat this virus is extraordinary.
>
> We understand this virus infinitely more than at the start of this pandemic and each of us must continue to look at what role we can take. By coming together and using our scientific prowess, we will prevail.

The dramatic rise in enrolment over recent months is testament to the world-leading research infrastructure in the UK, as well as the willingness of people to participate in vital COVID-19 studies. Dedicated hard work from the National Institute for Health Research, the NHS and the devolved nations has ensured as many UK patients as possible benefit from the latest innovations in science and medicine.

Since March, 73 urgent public health studies into COVID-19 have been set up to investigate a range of potential treatments, vaccines and observational studies to learn more about the disease, as well as research into new diagnostic technology. NHS hospitals have played a vital role in delivering studies at pace and scale, enabling hospitalised patients to benefit from the latest COVID-19 treatments, in addition to helping tens of thousands of people gain early access to vaccine candidates through trials running across the country.

Chief Medical Officer for England and co-lead of the National Institute for Health Research (NIHR), Professor Chris Whitty said:

> The willingness of the UK public to participate in COVID-19 research has been inspiring. Science is the only way out of this pandemic. It will find new ways to prevent and treat the virus, and this will allow us to gradually return to normal life. This science cannot happen without those who volunteer to take part in research.
>
> The National Institute for Health Research, as part of the wider UK research infrastructure, has been key to the UK's success in delivering research with actionable findings, which have had an impact on the treatment of COVID-19 patients in the UK and around the world.

Dr William van't Hoff, Chief Executive of the NIHR Clinical Research Network, which has managed these studies for the Department of Health and Social Care, said:

> Building on the fantastic progress we have made so far, coupled with the early positive results from the vaccine trials, it is vital that people continue to take part in the wide range of research the NIHR is supporting. We need more effective treatments, vaccines and better diagnostic tests to help not only people affected by this, but, critically, to also help the NHS manage this devastating infection. For that, we still need many thousands more participants to continue to volunteer for these vital studies. I encourage people to do this by visiting the Be Part of Research website or signing up to the NHS COVID vaccine register.

Advancing the science around how the virus spreads across the population is vital to tackling the pandemic. Findings from observational studies, such as the ONS COVID-19 Infection Survey, provide important metrics on where

infection rates are rising across the country and are shared with public health authorities and the Scientific Advisory Group for Emergencies (SAGE) in real time to inform policy and decision-making at the highest level.

Ensuring rapid, accurate and effective testing is widely available across the population is another key element in controlling the spread of the virus. Accurate diagnosis of infection, identification of immunity and monitoring the clinical progression of infection is of paramount importance. The government is ensuring key research within this area through the COVID-19 National DiagnOstic Research and Evaluation Platform (CONDOR). There is a range of diagnostic and observational studies currently underway through this platform, which will pave the way to the development of advanced new testing technologies.

Sir Simon Stevens, Chief Executive of the NHS, said:

> Helping so many participate in vital and urgent COVID-19 research is a phenomenal achievement by scientists and clinicians across the NHS. The speed and flexibility shown in these impressive studies now also should become the 'new normal' across the health service for wide ranging research on many other health conditions.

Today's milestone shows the remarkable national effort to tackle the pandemic. It is vital we maintain this speed of recruitment and the high uptake of participants to COVID-19 research to ensure ongoing and future studies are sufficiently powered to establish the very best vaccines that will work for as many people as possible, and to ensure we continue to find treatments for COVID-19 as quickly as possible.

The 4 vaccine trials currently underway across the UK are:

Novavax Covid Vaccine Study: 11,955 participants

A phase 3 trial of NVX-CoV2373 – a recombinant spike protein nanoparticle vaccine developed by US biotech firm, Novavax. The world's first participants to receive the vaccine through this phase 3 trial were recruited in the UK through one the NIHR's new patient recruitment centres.

Oxford Vaccine Trial (COV002): 10,754 participants

A phase 3 trial of ChAdOx1 – an adenovirus vaccine vector. Jointly funded by NIHR and UK Research and Innovation (UKRI), COV002 was one of the world's first COVID-19 vaccines to move into phase 3 trials with fast-tracked research delivery support provided by NIHR.

Imperial Vaccine Trial: 414 participants

Jointly funded by NIHR and UKRI, this is an early stage (phase 2) trial of LNP-nCoVsaRNA – a self-amplifying RNA vaccine developed by Imperial College London.

Janssen Phase 3 Vaccine Study: study opened mid-November

The world's first phase 3 trial to test the safety and effectiveness of a new vaccine, developed by The Janssen Pharmaceutical Companies. The study will recruit 30,000 people worldwide.

Many more new studies, investigating some of the world's most exciting COVID-19 treatments and prophylactics to prevent disease are continually being added to the urgent public health research portfolio. These include cutting-edge studies into new monoclonal antibodies, inhaled antiviral treatments, and a range of promising potential vaccine candidates.

The ONS COVID-19 Infection Survey investigates the incidence of COVID-19 infection and prevalence of immunity to COVID-19 in the UK general population – assessed through repeated cross-sectional household surveys with additional serial sampling and longitudinal follow-up. The survey has now enrolled 297,988 participants.

Alongside the COVID-19 research, a wide and active portfolio of research into other conditions continues to be undertaken. 2,715 non-COVID studies have recruited participants since March 2020 and a further 1,000 studies are currently being set up. Over 210,000 participants have been recruited into these studies since March 2020.

It is important to note that patients can take part in more than one study – for example, in observational and interventional trials simultaneously. Therefore, the total number of participants does not equate to the same number of individual patients involved in studies. To ensure patient confidentiality, the NIHR does not keep data on individual numbers of patients.

You can take part in studies by visiting the Be Part of Research website or by signing up to the NHS COVID vaccine register.

New chair to lead task force on sustainable farming of peatlands

Robert Caudwell has been announced as the Chair of the Lowland Agricultural Peat Task Force – a group tasked with improving the condition of England's farmed lowland peat.

Robert, who currently chairs the Association of Drainage Authorities (ADA), will explore how lowland agricultural peatlands can be better managed to safeguard productive agriculture as well as contributing to the government's net zero by 2050 target. The Task Force will be a key component of the government's forthcoming England Peat Strategy.

Today's announcement coincides with World Soil Day, a UN-led campaign to raise awareness about the importance of healthy soil and the role it plays in our society.

Lowland peatlands provide some of the country's most fertile soils, which play a vital role in producing food for our nation. Centuries of draining these areas to support intensive agriculture have led to degraded peat soils, which emit more than 9 million tonnes of greenhouse gas emissions each year – the highest emissions of all peatlands in England.

Robert Caudwell, Chair of the Lowland Agricultural Peat Task Force, said:

> Climate change is posing new pressures for lowland peatlands – including more frequent and intense flooding events, and prolonged periods of summer drought. Under such trying conditions, now is the time to explore how we can farm these lands more sustainably to preserve their future and protect our climate.
>
> In the long-term we must harness innovation: exploring ways for our peatland to help us to be more resilient to flooding and drought and mitigate climate change by protecting the carbon stored in soil. The Task Force marks the start of a conversation between farmers, risk management authorities, conservationists and other key stakeholders, working with Government on a viable plan of action.

Robert will bring together key players including farmers, water management stakeholders, conservationists, academics, and government and its agencies, to co-ordinate work already underway to encourage sustainable farming of lowland peatlands and recommend new solutions. The findings of the Task Force will inform future agricultural policy.

Robert is a leading figure in water management and brings over 40 years' experience in arable and horticultural farming. Robert is uniquely placed to explore more sustainable measures, including innovative ways to re-wet farmed peatlands, effects on flood risk, farming profits and food production, and long-term opportunities for paludiculture (wet agriculture).

The Task Force will be supported by four regional sub-groups, which will advise on the circumstances of our most extensive lowland peatlands spanning North-East, North-West, South-West and East England. The Task Force will also be supported by a sub-group composed of experts in paludiculture.

Defra will invite members to the Task Force and the four regional sub-groups over the coming month. The Task Force will meet for the first time in early 2021 and report to Government in 2022.

Update

Membership of the Task Force is as follows:

- Andrea Kelly, Broads Authority
- Charles Shropshire, G's Global
- Chris Evans, UK Centre For Ecology & Hydrology (UKCEH)
- Daniel Johns, Anglian Water
- Deborah Land, Natural England
- Ian Moodie, Association of Drainage Authorities (ADA)
- Julie Foley, Environment Agency
- Olly Watts, RSPB
- Philippa Arnold, National Farmers Union (NFU)
- Richard Lindsay, University of East London (UEL)
- Stephen Briggs, Innovation for Agriculture
- Colleagues from Defra and the Environment Agency

For queries or engagement, email the Task Force mailbox at LAPTF@defra.gov.uk.

Seeking a deeper and broader partnership between the United Nations and African Union

Thank you, Your Excellency, and my thanks also to Secretary-General Guterres and Chairperson Faki for their informative briefings as part of this important debate.

As the UK's Minister for Africa, I am keen to work closely with the African Union and this is a personal priority for me. In fact, I made the first overseas trip of any UK Minister after the first wave of the COVID-19 outbreak when I visited the AU Commissioners in July.

The UK is investing up to $27 million in the AU COVID-19 Response Fund to tackle COVID and save lives.

In my remarks, I will focus on three key aspects of how the UN-AU partnership can bolster the UN's fundamental purpose – that is to say, to maintain international peace and security.

Firstly, the early identification of risks to regional peace and security.

Secondly, coordinated efforts to mediate and encourage peaceful resolutions to conflict.

And thirdly, coherent support to implement peace agreements, consolidate democratic governance and build peace.

Mr President, both the UN and the AU would benefit from more integrated

analysis to identify the emergence or re-emergence of conflict. We should not shy away from identifying underlying drivers of instability and conflict and having honest conversations about where we must act.

The UK is proud to support the AU's Continental Early Warning System, and I look forward to visiting the Early Warning Centre on my next trip to Addis. But accurate and timely information needs to be coupled with plans for effective and early action, and that needs to happen at state, regional or continental level. AU support to elections in Madagascar, for example, two years ago and mediation in Sudan last year were impressive examples of what the AU can do. However, in other cases, action from the AU or UN has come too late or we have not acted at all. The key to greater shared success is consistency in our approach.

Mr President, this brings me to my second point. When conflicts do emerge, the UN and the AU bring complementary skills to the table.

We are all deeply concerned by the situation in Tigray, and the immediate priorities are to secure greater humanitarian access and ensure the protection of civilians and human rights.

The UK will continue to support AU-led efforts. I urge all parties to accept credible offers of support to establish the conditions for a sustainable political solution.

This brings me to my third point, Mr President. Once conflict is brought to an end, the real work of building and sustaining peace begins.

Continued partnership between the UN and the AU is vital to see through the peace agreement in the Central African Republic, brokered through their joint efforts. The next milestone is credible, inclusive and peaceful elections later this month.

Strong cooperation is particularly important during peacekeeping transitions, as the UN or AU presence reconfigures to meet evolving conditions.

I hope the AU will be able to provide their expertise and political support for the work of UNITAMS, helping Sudan's transition to democracy.

AU forces currently play an invaluable role in Somalia; I pay tribute to the brave men and women of AMISOM, the AU-led peace operation. Looking ahead, Somali Security Forces are now stronger but still need support. I will encourage greater work in that regard from the AU and the UN and others to ensure that the AU-led mission evolves in response to Somalia's increasing capabilities.

Predictable and sustainability in financing is an important element of the AU's ability to deploy operations like AMISOM. The United Kingdom supports, in principle, access to UN assessed contributions for future AU-led peace support operations, on a case-by-case basis and subject to certain key conditions.

Mr President, it is abundantly clear that a deeper and broader partnership

between the UN and the AU is indispensable as we strive towards our shared goal of a conflict-free Africa. The UK remains committed to supporting that partnership.

Thank you.

COVID-19 vaccinations and care homes: programme launch

[unable to retrieve full-text content]A letter from the Minister for Care to local authorities, directors of adult social services and managers of care homes for older adults.