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## EXTRA-TERRESTRIAL BIOSPECIMEN COLLECTION AND BIOBANKING

By Cassandra Griffin

### Live Long and Prosper

On a Wednesday morning like any other, a specialist military team is deployed to recover a satellite that has returned to Earth unexpectedly. At 11am they miss a scheduled check-in with mission control. By midday it's established that they are dead, along with everyone else in the surrounding town. A new pandemic has reached earth and the rules of the game have changed...

The Andromeda Strain. Interplanetary contamination. Little green men. It makes for a fascinating science fiction thriller, especially in the hands of Michael Crichton. Science Fiction aside, could our increasingly frequent ventures into space lead to an extra-terrestrial contaminant? And what of the biospecimens returned to earth for scientific investigation? Are we as a species prepared to deal with the complexities of extra-terrestrial sample collection and biobanking?

The short answer is, yes. While many of us continue to be frustrated by the lack of biobanking protocol harmonisation this is one area of our field that has dedicated international guidelines and implementation requirements. The committee on Space Research (COSPAR) was established in 1958 by the international council for scientific unions. Since its inaugural meeting, COSPAR has hosted CETEX, the committee on Contamination by Extra-terrestrial Exploration who are responsible for the ongoing review of planetary protection policy – the internationally agreed standard covering quarantine and extra-terrestrial biobanking.

The COSPAR guidelines cover two forms of interplanetary contamination, forward and backward contamination; the introduction of organisms or contaminants into space or our earthly biosphere respectively. The Apollo 11 mission was the first mission to which these guidelines were employed and involved biobanking on a number of fronts.



## Ground Control to Major Tom

Prior to the receipt of any specimens into the earth's biosphere, biological samples were collected and banked from all personnel who may have future contact with lunar samples. This collection was intended to serve as a baseline for exposure related biological changes that may occur years later. On arrival at the Lunar Receiving Laboratory, samples were subjected to a gauntlet of tests summarised in the diagram below.

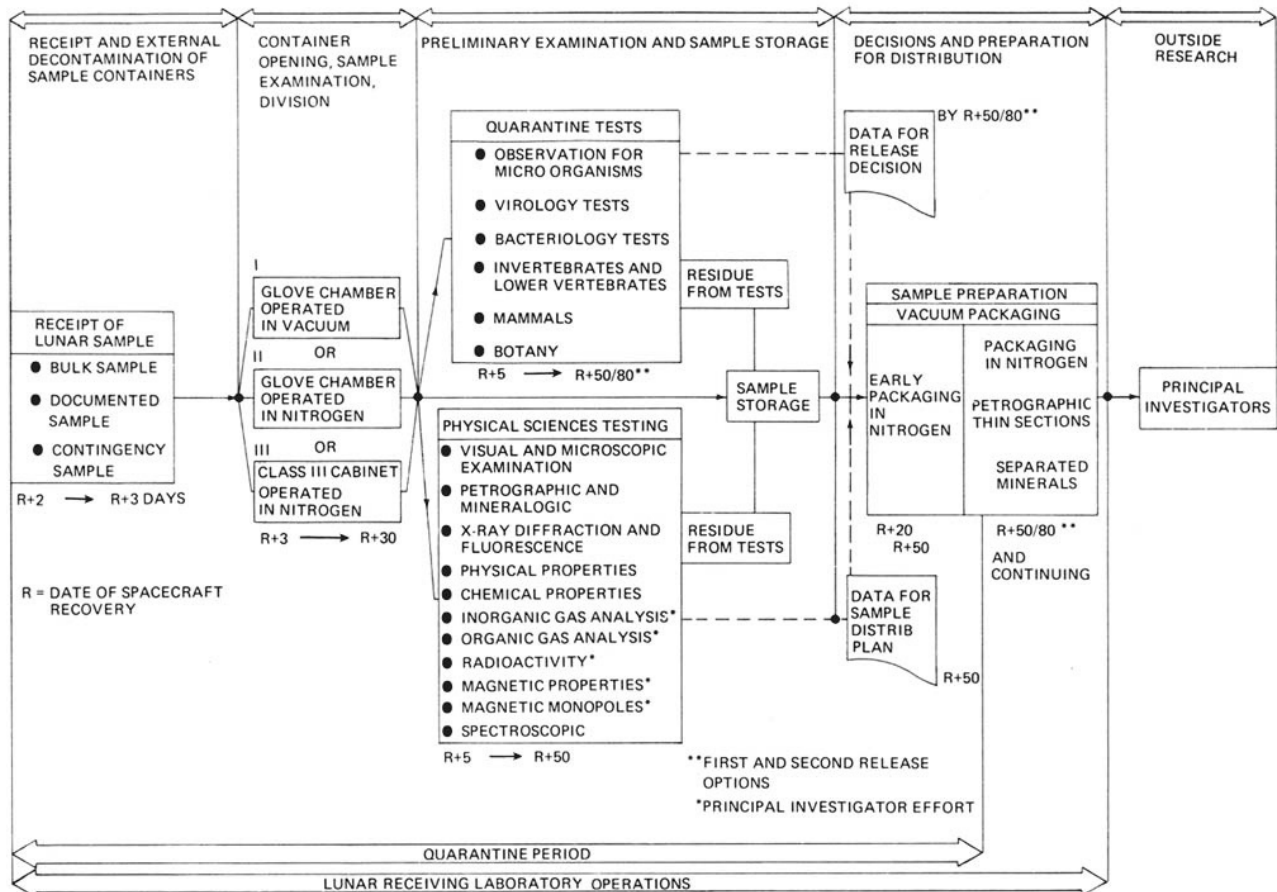


Image source: <https://history.nasa.gov/SP-368/p422a.htm>

Representative samples were committed to quarantine testing and time sensitive tests, however the balance of the material was sealed and protected for later use in the Lunar Sample Laboratory Facility – see box below.

## LUNAR SAMPLE LABORATORY FACILITY

The Lunar Sample Laboratory Facility (LSLF) is a repository and laboratory facility at NASA's Lyndon B. Johnson Space Center in Houston, Texas, opened in 1979 to house geologic samples returned from the Moon by the Apollo program missions to the lunar surface between 1969 and 1972.

In excess of 110,000 specimens, or 382 kilograms of geologic samples, returned from the Moon by the Apollo lunar surface missions (1969-1972), have been processed and banked. Pristine samples, those continually in NASA custody, are stored and handled in stainless steel glove cabinets purged by high-purity nitrogen gas. Approximately 500 subdivided samples are distributed each year for approved research protocols with all remnants returned to NASA following use.

Further information on this collection can be found [HERE](#)

## Not the droids you were looking for?

The lunar bank is just one of the many biobanks curated by NASA. Others collections include;

- The Lifetime Surveillance of Astronaut Health – serial collections of samples and medical data from all active astronauts. Many are actively screened for medical conditions while others are monitored as part of long-term follow-up after space flight.
- The NASA Institutional Scientific Collection: Non-Human Biospecimens – stored at the Ames Research Centre, the ISC stores non-human biospecimens from spaceflight investigations and associated ground controls. Samples are available for use through their biospecimen sharing program and include specimens from mice, rats, quails and microbial organisms stored with detailed metadata.
- Jet Propulsion Laboratory Material Archives – both biological materials and organic materials isolated from sampling events during spacecraft assembly, test and launch operations. The intention of the repository is to monitor forward contamination and ensure that researchers recognise future earth sourced microbial and organic contaminants for both extra-terrestrial samples analysed robotically on planets and in samples returned to earth. Avoiding a false positive indication of life negates the need for future unnecessary increased planetary protection measures.

## My favourite Martian

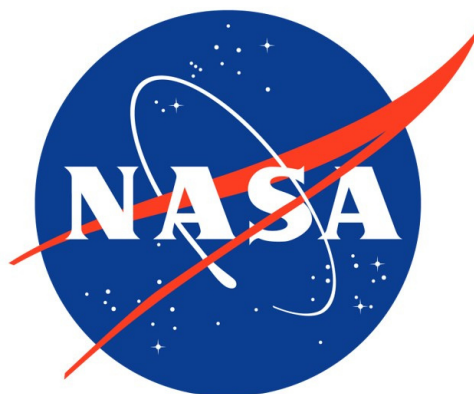
Last month, the Mars Perseverance Rover – affectionately known as Percy – successfully landed on Mars. Percy's primary goal is to seek signs of ancient life and collect samples of rock and regolith. Samples are stored within Percy and hermetically sealed until deposition at a time and place of NASA's choosing for collection and possible return to earth. While it's understood that Percy himself may never return to earth and may ride out his days with Mork or Uncle Martin, the idea that samples could be safely returned for analysis and biobanking is an exciting one.

Many have argued that due to the regular exchange of meteorite material between Mars and Earth the risk of back contamination when retrieving samples is negligible, however concerns persist among the scientific community. Should a decision to return Percy's samples to earth be made, NASA has proposed a specially designed level 4 biosafety containment biobanking facility known as the Mars Sample-Return Receiving facility.

Far from an endeavour exclusive to Wookies, extra-terrestrial biobanking is a complex and highly regulated discipline of biobanking. High risk for high reward and certainly a source of fascinating data for years to come.



Percy takes a drive – this image was taken by the rover's navigation cameras during the first drive of Perseverance rover on Mars on March 4, 2021. Image credit: NASA/JPL-Caltech





# ISBER INDO-PACIFIC RIM REGIONAL AMBASSADOR

## Introducing the IPR-RA from Indonesia, Jajah Fachiroh

Jajah (read: Yayah) has headed up the Biobank Development team at the Faculty of Medicine, Nursing and Public Health Universitas Gadjah Mada (FK-KMK UGM), Yogyakarta, Indonesia since 2015. She is an Assistant Professor at the Histology and Cell Biology Department FK-KMK UGM, with research centered on Epstein-Barr Virus related nasopharyngeal carcinoma, molecular epidemiology on cancer, as well as the biobank itself. Jajah is an active member of ISBER and BCnet. She has presented her biobank research at European Biobank Week (2017, Stockholm-Sweden) and annual ISBER meetings. Jajah has been one of ISBER's Regional Ambassadors for the Indo-Pacific Rim since 2019.



Biobanking is a new concept in Indonesia, while the common conception of a biobank / biorepository is simply as a "collection of biospecimen in ultra freezer", Jajah and her team of six staff started to build both infrastructure and expertise to support biobanking. Building of expertise was done through the sharing of knowledge gained via active membership of international societies such as ISBER and BCnet (Biobank and Cohort Network organized by WHO-International Agency for Research on Cancer). Infrastructure and the provision of space to house it is provided by FK-KMK UGM. This supporting environment, then in turn now provides advocacy and education for stakeholders; through discussion and workshops internally at the faculty and externally to alike institution, such as the Faculty of Medicine (and its academic hospital) as well as large hospitals in Indonesia.

Four years from conception, the FK-KMK UGM Biobank was formally opened in 2019, with a few ultra low temperature freezers, a liquid nitrogen tank, and the capacity for processing blood samples as well as DNA extraction. This small facility operated by 3 technicians utilizes a self-made data management system and provides technical assistance and storage system for scientists at UGM, while promoting common use of biospecimen collection through its website (<https://research.fk.ugm.ac.id/biobank/>).

From 2015 - 2019, UGM Biobank has coordinated annual workshop for national network for biobank in medical research. These workshops, in collaboration with BCnet (Maimuna Mendy, PhD) and RUG Groningen-NL (Bart Scheerder) who provided teaching materials from technical and ELSI discussions, were run with the objective of building a common understanding biobanking from both technical and non technical perspectives.



Above: Participants at the 2019 5th Biobank Network for Health Research National Workshop  
Top right: Stakeholders from government and the public visit to UGM biobank facility (2019)  
Bottom right: Part of the technical wet workshop on sample handling (2019)

# REGISTRATION FOR THE ISBER 2021 ANNUAL MEETING IS NOW OPEN!

The ISBER 2021 Virtual Annual Meeting will feature live and on-demand sessions, oral and poster abstract presentations, networking opportunities, and an exhibit hall. Furthermore, the Program Committee has built a program that ensures all delegates will have opportunities to interact with speakers and invite questions, regardless of which time zone you are in.

Highlights of the virtual meeting program:

- Expert speakers from around the globe and multiple opportunities for live interaction with speakers
- Poster and oral abstract presentations
- Full exhibit hall with opportunities to video conference with exhibitors
- Multiple networking opportunities throughout the meeting to enable connection between biobankers across time zones
- All sessions recorded and available for on-demand viewing

We hope to see you online!

**View the preliminary program:** <https://www.isber.org/page/ISBER2021ProgramAET>

**For more information and to register:** <https://www.isber.org/page/ISBER2021AnnualMeeting>

Pricing:

Early Bird – Virtual Only (Register by April 11, 2021)

- \$295 USD ISBER members
- \$370 USD Non-members
- \$185 USD Student/Technician

Regular Rate – Virtual Only (Registration after April 11, 2021)

- \$370 USD ISBER members
- \$460 USD Non-members
- \$230 USD Student/Technician

Group Discounts – Bulk discounts available for organisation members registering 5 or more staff

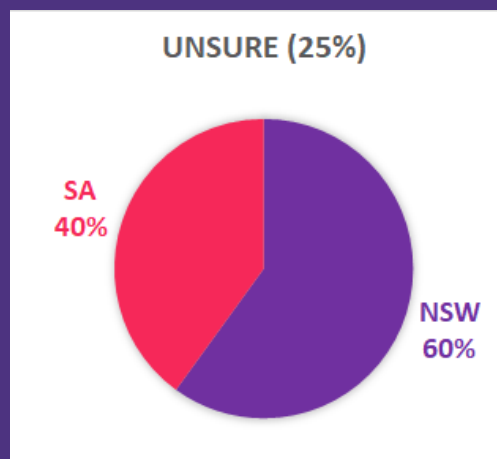
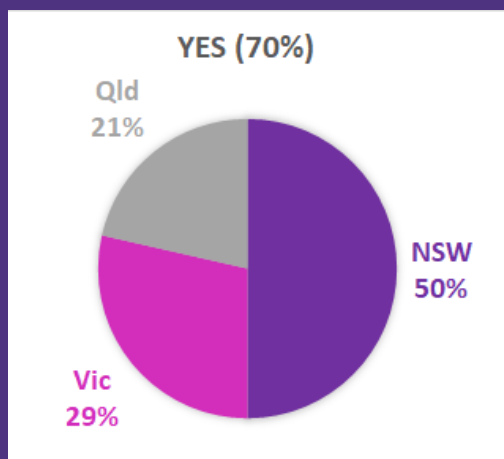
Low and Middle Income Countries – 25% – 50% discount

# NATA ACCREDITATION TO ISO 20387: ABNA POLL RESULTS

Thank you to all ABNA members who responded to our quick survey. 50% of our responses came from NSW, 25% from Victoria, 10% from South Australia and 15% from Queensland biobanks.

## Q: Is your biobank interested in gaining NATA accreditation to ISO 20387?

70% of respondents were interested in gaining NATA accreditation to ISO20387 and 25% were unsure – a break down by state for each of these responses is shown below. The one no response was from Victoria.



## Q: What advantages does the introduction of accreditation bring to biobanking activity?

Compliance, customer assurance (including industry partners), biospecimen consistency, standardisation, harmonisation were cited as the main advantage to accreditation. The engagement with hospital pathology and clinical systems was seen as an additional advantage. Interestingly, one biobank mentioned that accreditation "will add confidence that biobanks – as facilities – can and should function as part of the biomedical and clinical continuum, and not as some 'special' activity that is run by outsiders". The same advantages to accreditation were mentioned by biobanks regardless of their response to Question 1 regarding their interest in pursuing accreditation.

## Q: What do you think are the main roadblocks to gaining accreditation?

Time and/or cost were seen by all but two biobanks as potential road blocks to gaining accreditation. With the remaining two respondents identifying standardising inherently variable research protocols and convincing their employer that accreditation was worthwhile as potential road blocks.

We hope this survey has provided you with a brief snapshot of the views of your fellow biobankers on the NATA accreditation to ISO20387.





ISBER has released a position statement and supplement detailing key practices health agencies should consider to support the COVID-19 vaccine distribution with dedicated ULT freezers. The documents are titled “Ultra Low Temperature Freezers: Key Considerations” and “Ultra Low Temperature Freezers Key Considerations for COVID-19: Supplement” provide evidence based guidance for those responsible for distribution, storage, and management of the vaccine, to resources that detail the fundamentals of safe and efficient ULT freezer management, shipping and distribution. The documents draw on accepted practices known to ensure robust ULT product storage and distribution that are routinely used by biorepositories. The documents represent a consensus view from the biobanking community. The organization drew on the expertise of biorepository managers and industry vendors with further reference from the ISBER Best Practices, Fourth Edition. The statement intends to supplement guidance from national and local health agencies on managing the cold chain deployment of frozen COVID-19 vaccines.

**View the ISBER Position Statement here:**

[https://cdn.ymaws.com/www.isber.org/resource/resmgr/covid\\_19\\_vaccinations/bpcoldchain\\_v06\\_1.11.2020.pdf](https://cdn.ymaws.com/www.isber.org/resource/resmgr/covid_19_vaccinations/bpcoldchain_v06_1.11.2020.pdf)

**View the Supplement here:**

[https://cdn.ymaws.com/www.isber.org/resource/resmgr/covid\\_19\\_vaccinations/ColdChain\\_SuppDoc\\_final.pdf](https://cdn.ymaws.com/www.isber.org/resource/resmgr/covid_19_vaccinations/ColdChain_SuppDoc_final.pdf)



ISBER and ASCP BOC are pleased to announce the Qualification in Repository Science (QBRs) for biobankers. Upon meeting specific educational and experience requirements, candidates will be eligible to complete an online examination and, if successful, gain recognition for their skills and competencies as biobankers with a qualification termed the QBRs. Biobanks are vital to medical research and precision medicine and require qualified professionals to deeply understand and exhibit proficiency in the biobanking sciences in order to obtain high quality samples. ISBER expects that the new qualification will help further the advancement of scientific discoveries through the field of biobanking.

Applications are now open. For details on application resources such as eligibility, topic outline, reading list, and more, please visit: <http://www.isber.org/qualification>.

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If you have any suggestions for a short article for Bio-Babble, please contact: [abna.biobabble@gmail.com](mailto:abna.biobabble@gmail.com)

Content deadline for April edition: 23.04.21

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