



Indigenous Science Network Bulletin

<http://members.ozemail.com.au/~mmichie/network.html>

December 2014 (Volume 17, Number 6)

ISSN 1449-2091

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Tiwi designs by Jennifer Coombs, Melville Island, NT

NEWS and VIEWS

Stories from the sky: astronomy in Indigenous knowledge

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Night sky over Lake Tyrrel in Western Victoria – home of the Wergaia people.

Alex Cherney, CC BY-NC-ND

Indigenous Australian practices, developed and honed over thousands of years, weave science with storytelling. In this Indigenous science series, we'll look at different aspects of First Australians' traditional life and uncover the knowledge behind them – starting today with astronomy.

This article contains the names of Aboriginal people who have passed away.

Indigenous Australians have been developing complex knowledge systems for tens of thousands of years.

These knowledge systems - which seek to understand, explain, and predict nature - are passed to successive generations through oral tradition.

As Ngarinyin elder David Bungal Mowaljarlai explains: “Everything under creation [...] is represented in the ground and in the sky.” For this reason, astronomy plays a significant role in these traditions.

Western science and Indigenous knowledge systems both try to make sense of the world around us but tend to be conceptualised rather differently. The origin of a natural feature may be explained the same in Indigenous knowledge systems and Western science, but are couched in very different languages.

A story **recounted** by Aunty Mavis Malbunka, a custodian of the Western **Arrernte** people of the Central Desert, tells how long ago in the Dreaming, a group of women took the form of stars and danced a corroboree (ceremony) in the Milky Way.

One of the women put her baby in a wooden basket (coolamon) and placed him on the edge of the Milky Way. As the women danced, the baby slipped off and came tumbling to Earth. When the baby and coolamon fell, they hit the ground, driving the rocks upward. The coolamon covered the baby, hiding him forever, and the baby’s parents – the Morning and Evening Stars – continue to search for their lost child today.

If you look at the evening winter sky, you will see the falling coolamon in the sky, below the Milky Way, as the arch of stars in the Western constellation **Corona Australis** – the Southern Crown.

The place where the baby fell is a ring-shaped mountain range 5km wide and 150m high. The Arrernte people call it **Tnorala**. It is the remnant of a giant **crater** that formed 142 million years ago, when a comet or asteroid struck the Earth, driving the rocks upward.



Tnorala (Gosses Bluff crater). Dementia/Flickr, CC BY-SA

Predicting seasonal change

When the **Pleiades** star cluster rises just before the morning sun, it signifies the start of winter to the **Pitjantjatjara** people of the Central Desert and tells them that dingoes are breeding and will soon be giving

birth to pups.

The evening appearance of the celestial shark, **Baidam** traced out by the stars of the Torres Strait Islanders that they need to plant their gardens with sugarcane, sweet potato and banana.

When the nose of Baidam touches the horizon just after sunset, the shark breeding season has begun and people should stay out of the water as it is very dangerous!



Torres Strait Islanders use constellations, such as the shark 'Baidam' pictured here, for practical purposes.
Brian Robinson

Torres Strait Islanders' close attention to the night sky is further demonstrated in their use of stellar **scintillation** (twinkling), which enables them to determine the amount of moisture and turbulence in the atmosphere. This allows them to predict weather patterns and seasonal change. Islanders distinguish planets from stars because planets do not twinkle.

In **Wergaia** traditions of western Victoria, the people once faced a drought and food was scarce. Facing starvation, a woman named Marpeankurric set out in search of tucker for the group. After searching high and low, she found an ant nest and dug up thousands of nutritious ant larvae, called bittur.

This sustained the people through the winter drought. When she passed away, she ascended to the heavens and became the star Arcturus. When Marpeankurric rises in the evening, she tells the people when to harvest the ant larvae.



Arcturus (Marpeankurric – on the lower left) and the Milky Way over Lake Hart.
Alex Cherney

In each case, Indigenous astronomical knowledge was used to predict changing seasons and the availability of food sources. Behind each of these brief accounts is a complex oral tradition that denotes a moral charter and informs sacred law.

An important thing to consider is that small changes in star positions due to stellar **proper motion** (rate of angular change in position over time) and **precession** (change in the orientation of Earth's rotational axis) means that a few thousand years ago, these sky/season relationships would have been out of sync.

This means knowledge systems had to evolve over time to accommodate a changing sky. This shows us that what we know about Indigenous astronomical knowledge today is only a tiny fraction of the total knowledge developed in Australia over the past 50,000-plus years.

Moving forward

As we increase our understanding of Indigenous knowledge systems, we see that Indigenous people did develop a form of **science**, which is used by Indigenous and non-Indigenous people today.



Students in Albury/Wodonga learning about Indigenous astronomy through the Charcoal Nights initiative.
Murray Arts

Traditional fire practices are used across the country, **bush medicines** are being used to treat disease, and **astronomical knowledge** is revealing an intellectual complexity in Indigenous traditions that has gone largely unrecognised.

It is time we show our appreciation for Indigenous knowledge and celebrate the many ways we can all learn from this vast accumulation of traditional wisdom.

*Printed with the author's permission. Duane is speaking at **The Edges of Astronomy symposium** at the Australian Academy of Science in Canberra on December 4, 2014.*

Public Seminar on Indigenous Research Projects

Accessing information via the Internet: the strengths and limitations faced by indigenous communities
Friday 5 December
Adelaide, SA

We invite you to join us at a forthcoming public seminar on Friday 5th December. At the seminar, we are going to share with the ideas, aspirations, and outcomes of our research project undertaken with the Ngarrindjeri people living from the Lower Murray River Lakes and the Coorong areas in South Australia. The project was funded by the auDA Foundation and Division of ITEE ECR Research Development Grant.

The research focuses on 'Accessing information via the Internet: the strengths and limitations faced by indigenous communities'. Researchers will present the key findings of data collected via the questionnaires, interviews and field observation. The findings establish the importance of indigenous knowledge in framing community-training programs. The results may also assist in designing adaptable Internet services and applications for indigenous people.

Speakers include Ngarrindjeri Elders Major (Moogy) Sumner, AM and Auntie Ellen Trevorrow, and University of SA researchers Prof John Boland, Mr Bruce Underwood, Ms Jelina Haines and Dr Tina Du. Division of ITEE Dean: Teaching and Learning Associate Professor Brenton Dansie will be giving an opening talk.

Date : Friday, 5 December 2014

Start Time : 9.45 am
Finish Time : 3.00 pm
Venue : Room F1-24, Building F, Mawson Lakes Campus
RSVP Date : Tuesday, 2 December 2014
RSVP Contact : jelina.art@bigpond.com
Other information : Morning Tea, Lunch, and Afternoon Tea will be provided
Cost: FREE

Position vacant

CSIRO is seeking an **experienced science educator** to lead the **Inquiry for Indigenous Science Students** element of the five-year Indigenous STEM Education Project funded by the BHP Billiton Foundation (see www.csiro.au/indigenous-education). The Project aims to improve the participation and achievement of Aboriginal and Torres Strait Islander students in science, technology, engineering and mathematics. Recognising the fundamental importance of Aboriginal and Torres Strait Islander culture and identity in student achievement, a strong cultural, as well as a rigorous academic focus, is guiding the development, implementation and evaluation of the Project. The role will oversee the development and delivery of the Inquiry for Indigenous Science Students element. The leader will be responsible for a team of project officers who will work with teachers and students to implement student-centred inquiry-based STEM projects in primary and secondary schools across Australia.

Location: Canberra, Sydney, Melbourne or Brisbane

Salary: \$106k - \$124k plus up to 15.4% superannuation

Tenure: Specified term of 5 years

Closing date: 7 December 2014

INDIGENOUS ASTRONOMY

Australian Society for Indigenous Astronomy (ASIA)

By Duane Hamacher, ASIA Chair

ASIA @ University of New South Wales

- Trevor Leaman presented a talk at University of Sydney Veterinary Science Department Indigenous Seminar Series entitled “The Seven Sisters are Rising; The Dingoes Now Have Pups!”
- Trevor Leaman presented a talk at the 3rd Annual FASS Postgraduate Conference, UNSW entitled “The Astronomy of the Wiradjuri People of New South Wales, Australia.”
- Duane Hamacher gave a public talk on Indigenous astronomy at the University of Missouri (USA) for “[Cosmic Conversations](#)”. Video of the talk will be online soon.
- Research by Duane Hamacher was featured in a blog by the Smithsonian: [To find meteorites, listen to the legends of Australian Aborigines.](#)
- The [Indigenous Science Education Program](#) at Nura Gili was a success. It introduced Indigenous students to STEM areas and showed them career paths and degree programs that would suit their interests.
- Nura Gili welcomes new research students undertaking research theses in Indigenous Astronomy. More to come next year.
- Students interested in learning about Indigenous Astronomy can take the course “[ATSI 3006: The Astronomy of Indigenous Australians](#)” at UNSW.

- Bob Fuller submitted his MPhil thesis on Aboriginal Astronomy to Macquarie University.
- Bob Fuller and Ray Norris completed the “[giving back](#)” of traditional astronomical knowledge during a ceremony at Lightning Ridge, NSW. This included a documentary, education booklet, and planispheres.
- Ray Norris gave a series of lectures at the [Museum of Contemporary Art](#) in Sydney on Aboriginal Astronomy.

Activities – Dr Ragbir Bhathal

Australian Institute of Physics: Dr Ragbir Bhathal gave the invited Annual Lecture on ‘Aboriginal Astronomy & The Clash of Cultures’ at the Annual General Meeting of the Australian Institute of Physics (NSW Branch). He discussed a number of case studies where Aboriginal social cultural astronomy and philosophy came into direct conflict with the traditions, laws and political system of the white invaders who took over their land. He also discussed the famous Mabo case which gave the Aboriginal and Torres Strait Islander people land rights but not sovereignty over their homeland. The question of recognising them in the Australian Constitution still remains a vexed question.

Rotary Clubs & community organisations: Dr Ragbir Bhathal gave a series of talks on Aboriginal Astronomy to Rotary Clubs in Western Sydney.

Student workshops: Dr Ragbir Bhathal conducted a series of hands-on workshops on some aspects of Aboriginal astronomy & engineering physics to Koori students from Western Sydney and Aboriginal students from rural NSW. The aim of the workshops is to encourage Aboriginal students to take an interest in science and engineering studies.

Postgraduate studies: Students and adult learners who wish to do a Master’s or a PhD in Indigenous Astronomy or Indigenous Astronomy & Education should contact Dr Ragbir Bhathal (r.bhathal@uws.edu.au). Their applications will be reviewed by Dr Les Vozzo (School of Education), Dr Ragbir Bhathal and Terry Mason (Badanami Aboriginal Centre). Mason is a member of the First People of Australia and very knowledgeable about Aboriginal culture and society.

Book on Aboriginal Astronomy or Dreamtime Astronomy: Dr Ragbir Bhathal is in the process of writing a book on Aboriginal astronomy from the perspective of the Aboriginal people. Too often we are given a European perspective which has an imposed layer of their own philosophies and norms. He will also examine the pseudo-science that is creeping into Aboriginal social cultural astronomy.

Pseudo-science & Aboriginal astronomy: Dr Ragbir Bhathal gave a talk on pseudo-science and Aboriginal astronomy at a seminar on Aboriginal culture and society at a private property at Hartley in the Blue Mountains. He illustrated this with a number of examples, for example, Mountford’s linking the Moon with the tides, etc. It is important that any deviation from the hypothetico-deductive system used by physicists must be treated as pseudo-science and cannot claim the mantle of science. The seminar was attended by a number of tertiary educated people of Aboriginal origin. It is important to remind ourselves what the late Wandjuk Marika, the well known artist and former Chairman of the Aboriginal Arts Board said. He noted that for the Aboriginal people “their cultural self is inextricably bound up with their stories and legends”. He also noted that, “Today we want to stand by ourselves, live on our land in accordance with our own beliefs and traditional ways, determine our own future”.

RESOURCES

Indigenous Knowledge Systems Education (IKSE)

Are you an enthusiast (researchers, educators, students, practitioners and well-wishers) of IKS? Then you should join us on LinkedIn at Indigenous Knowledge Systems Education (IKSE) to share your views on IKSE. Sign in as you normally do an search for IKSE group; then click to join the group and begin an experience of sharing knowledge on IKS issues. We are waiting for you.

Femi Otulaja, PhD

International Journal of Environmental & Science Education

New issue of the International Journal of Environmental & Science Education is available at:

<http://www.ijese.com/currentissue.htm>

Dr. Mehmet Bahar

Editor-in-Chief, International Journal of Environmental and Science Education

E-mail: editorijese@gmail.com

<http://www.ijese.com>

Indigenous Engagement with Science: Towards Deeper Understandings Expert Working Group Report (August 2013)

Inspiring Australia Strategy

Questacon - The National Science and Technology Centre

Department of Innovation, Industry, Climate Change, Science, Research and Tertiary Education

You can access this report from the Department's Internet site at:

<http://www.innovation.gov.au/>

Key findings

The Expert Working Group on Indigenous Engagement with Science recognises the urgency of increasing the engagement of Aboriginal and Torres Strait Islander peoples in the development and communication of sciences in Australia. An important step in achieving this is understanding and valuing Indigenous knowledge systems, acknowledging the significant contribution that Aboriginal and Torres Strait Islander peoples have already made to the development of science in Australia, and sharing this within the Indigenous community as well as with the scientific and broader Australian community.

In our preliminary scoping study of this area, the Expert Working Group agreed that the interaction between Indigenous Australians, science and the broader science community is lacking in many areas and from all sides. Aboriginal and Torres Strait Islander peoples have unique knowledge systems that can contribute to all fields of scientific endeavour, including science-based activities such as the management of Australia's natural resources. While it was evident to the Expert Working Group that Indigenous knowledge systems have contributed significantly to research in Australia in the past and continue to do so today, it was also evident that this contribution is not always acknowledged or valued appropriately as a 'scientific' contribution. While Indigenous knowledge systems contain a wealth of scientific information their development is often poorly resourced in Indigenous communities as well as in the wider community and the transfer of traditional knowledge and skills to future generations is critically threatened.

Key findings continue in report.

Environmental Discourses in Science Education: Contributions to Democracy, Citizenship and Social Justice

We are delighted to announce the online publication of the special issue of Brazilian Journal of Research in Science Education entitled "Environmental Discourses in Science Education: Contributions to Democracy,

Citizenship and Social Justice”. This multilingual, international issue is now available at the journal website: <http://revistas.if.usp.br/rbpec/issue/view/47>

Recent books and papers

Joy Hendry. (2014). *Science and Sustainability: Learning from Indigenous Wisdom*. London: Palgrave.

Indigenous science is often dismissed as quackery or nonsense, out of touch with progress and current events. However, Indigenous peoples have passed down vital information for generations, from which local plants help cure common ailments, to which parts of the land are unsuitable for buildings because of likely earthquakes. These scientific practices that have been developed by Indigenous peoples around the world have been largely ignored by Western colonizers in their lands. From Japan and New Zealand to Australia and Canada, Indigenous science involves environmentally-focused, sustainable practices that allow people to live with the land rather than in spite of it. Here, Hendry examines science through these Indigenous roots, problematizing the idea that Western science is the only type that deserves that name and drawing attention to some of its shortcomings. She takes the reader with her on the learning process and shares a myriad of sustainable examples that can be put into practice.

Four Arrows (Jacobs, D. T.), England-Aytes, K., Cajete, G., Fisher, M., R., Mann, B. A., Mcgaa, E., Sorensen, M. (2013). *Teaching truly: A curriculum to indigenize mainstream education*. New York, NY: Peter Lang Publishing.

For the first time in educational publishing, Teaching Truly offers K-16 teachers course-specific guidelines for indigenizing mainstream education. The goal is to facilitate greater educational integrity and relevance in the classroom now, without waiting for more «reforms» to policy, standards or curricula in general. Incorporating reality-based teaching common in traditional Indigenous learning cultures, each chapter first exposes educational hegemony, including that existing within the new «common core standards», and then offers alternative, time-tested perspectives and exercises to counter and/or counter-balance such hegemony. Addressing eight common subject areas, the material can be adapted for different grade levels and can be applied to other mainstream courses. (I have a copy of a review of this book if you want to see it, [Ed.](#))

Zane Ma Rhea. (2014). *Learning and managing indigenous education in the postcolonial world*. Routledge. <http://www.routledge.com/books/details/9780415870481/>

This book brings together the academic fields of educational leadership, educational administration, strategic change management, and Indigenous education in order to provide a critical, multi-perspective, systems level analysis of the provision of education services to Indigenous people. It draws on a range of theorists across these fields internationally, mobilising social exchange and intelligent complex adaptive systems theories to address the key problematic of intergenerational, educational failure.

Ma Rhea establishes the basis for an Indigenous rights approach to the state provision of education to Indigenous peoples that includes recognition of their distinctive economic, linguistic and cultural rights within complex, globalized, postcolonial education systems. The book problematizes the central concept of a partnership between Indigenous people and non-Indigenous school leaders, staff and government policy makers, even as it holds this key concept at its centre. The infantilising of Indigenous communities and Indigenous people can take priority over the education of their children in the modern state; this book offers an argument for a profound rethinking of the leadership and management of Indigenous education.

Leading and Managing Indigenous Education in the Postcolonial World will be of value to researchers and postgraduate students focusing on Indigenous education, as well as teachers, education administrators and bureaucrats, sociologists of education, Indigenous education specialists, and those in international and comparative education.

CONFERENCES

2015 Korean Association for Science Education International Conference

5-7 February 2015

Busan Metropolitan City, Korea

http://www.koreascience.org/english/2013_conference.asp

The Korean Association for Science Education (KASE) would like to kindly invite you to participate in 2015 KASE International Conference. The theme of the conference is "**Creativity and Science Education.**" The conference will be held at Pusan University in Busan Metropolitan City, Korea from Feb. 5 till 7, 2015. We are also pleased to announce that we have recruited 17 invited talks and plenary sessions from 7 different countries. The plenary sessions develop the conference theme, while the invited talks address various research topics such as the nature of science, scientific models, teacher professional development, STS, and so on. We invite attendance and research presentations. The submission of presentation proposals will be accepted in December 2014 online.

International Conference on Education in Mathematics, Science and Technology (ICEMST)

April 23-26, 2015

Antalya TURKEY

<http://www.icemst.com>

We would like to invite you to the International Conference on Education in Mathematics, Science & Technology (ICEMST) which will take place on April 23 - 26, 2015, at Queen Elizabeth Elite Suite Hotel in Antalya, Turkey. The conference will be organized in partnership with the International Journal of Education in Mathematics, Science, and Technology (IJEMST).

The aim of the conference is to bring together scholars, students, and administrators from different countries, and to discuss theoretical and practical issues in the fields of information and communication technologies in education, science education and mathematics education.

Your prospective, valuable contributions on this field will be evaluated by the Scientific Committee and the ones approved to be presented will also be published in the Proceedings.

We will be pleased to generate an atmosphere where you can share your expertise, experience, and resources with your colleagues.

IOSTE Eurasia Regional Symposium & Brokerage Event Horizon 2020-Science with and for Society

24-26 April 2015

Istanbul, Turkey

We would like to inform you that the IOSTE Eurasia Regional Symposium & Brokerage Event Horizon 2020-Science with and for Society, which will be held in Istanbul-Turkey on April 24-26, 2015.

<http://www.ioste2015.org>

The aim of the brokerage event is to provide information about Horizon 2020 and Erasmus + calls for proposals related to science, technology, engineering and mathematics (STEM) education and bring all stakeholders together (universities, research institutions, civil society organizations, SMEs, public bodies,

science centers etc.) to promote partnerships among potential coordinators and partners in a fruitful networking environment.

Abstract submission is now open and the deadline for abstract submission is on January 15, 2015.

Strands for the IOSTE Eurasia Regional Symposium:

Strand 1: Science Learning: Understanding and Conceptual Change, Contexts, Characteristics and Interactions

Strand 2: Science Learning in Informal Contexts & Science Communication

Strand 3: Science Teaching: Characteristics and Strategies

Strand 4: Critical Analysis of School Science Textbooks

Strand 5: Pre-service Science Teacher Education

Strand 6: In-service Science Teacher Education

Strand 7: Curriculum Development, Evaluation, and Assessment

Strand 8: Cultural, Social, and Gender Issues

Strand 9: Information and Communication Technologies in Science Education

Strand 10: History, Philosophy, and Sociology of Science

Strand 11: Environmental Education

Strand 12: Innovation & Entrepreneurship in Science Education

Strands for the Brokerage Event Horizon 2020:

Strand 13: [Brokerage Event H2020-Science with and for Society](#) (Proposal ideas for the new calls)

Strand 14: [Brokerage Event H2020-Science with and for Society](#) (Presentation of the already funded EU projects (e.g. H2020, FP7 or LLP Projects))

CONASTA 64 - Science: A Kaleidoscope of Wonder and Opportunity

5-8 July 2015

Perth WA

<http://asta.edu.au/conasta>

CONASTA 64 will be held from 5-8 July 2015 at Mercedes College, Perth WA. Keynote presentations include:

- Professor Fiona Wood, whose work in the development of 'spray on skin' has revolutionised treatment for burn victims.
- Professor Steve Tingay, Director of the International Centre for Radio Astronomy Research.
- Professor Iain Walker, whose work focuses on the use of social science to solve pressing sustainability problems.
- Dr Kate Trinajstić, vertebrate paleontologist and ARC Fellow.

With a special Stanhope Oration, 'Maritime Archaeology: The Preservation of Ancient Artifacts Using Electrochemical Processes' presented by Dr Ian Macleod.

CALENDAR OF EVENTS

This is mostly a summary of upcoming conferences. More details may have been given in this or previous bulletins as shown. A web-based contact is usually included. Inclusion of conferences in this list is not to be read as an endorsement of the conference.

2014

December 2014

4-7 December: 2nd International History, Philosophy and Science Teaching (IHPST) Asian Regional Conference, Taipei, Taiwan (<http://www.sec.ntnu.edu.tw/ihpst2014/index.html>) (Aug14)

2015

February

5-7 February: 2015 Korean Association for Science Education International Conference, Busan Metropolitan City, Korea (http://www.koreascience.org/english/2013_conference.asp) (Dec14)

April

11-14 April: National Association for Research in Science Teaching (NARST) conference, Chicago IL (<https://www.narst.org/annualconference/2015conference.cfm>)

23-26 April: International Conference on Education in Mathematics, Science and Technology (ICEMST), Antalya, Turkey (<http://www.icemst.com>) (Dec14)

24-26 April: IOSTE Eurasia Regional Symposium & Brokerage Event Horizon 2020-Science with and for Society, Istanbul, Turkey (<http://www.ioste2015.org>) (Dec14)

June

30 June – 03 July: Australasian Science Education Research Association (ASERA) conference, Perth (host: University of Western Australia) (<http://asera.org.au/2015-conference/>)

July

5-8 July: CONASTA 64 - Science: A Kaleidoscope of Wonder and Opportunity, Perth WA (<http://asta.edu.au/conasta>) (Dec14)

2016

April

14-17 April: National Association for Research in Science Teaching (NARST) conference, Renaissance Baltimore Harborplace Hotel, Baltimore, MD, USA

June-July

Australasian Science Education Research Association (ASERA) conference, Canberra (host: University of Canberra)