



Star Stories of the Dreaming

Astronomy of the Kamilaroi and
Euahlayi Peoples and their neighbours

A Study Guide for K-10 students

Acknowledgements and Credits

The stories recited in this study guide were made available to the author by the owners/responsible persons, namely Ghillar Michael Anderson, Greg Griffiths, Rhonda Ashby, Lachie Dennis, Paul Gordon, Brenda McBride and Jason Wilson. Stories are part of the cultural heritage of Australian Indigenous peoples, along with song and art, all of which are fundamental to their spirituality. The author acknowledges that the stories recited in this study guide are the intellectual property of the owners/responsible persons listed.

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Study Guide Teaching and Learning Activities developed by Sarah Donnelley, Primary School Teacher.

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Fig 1 - Clark Planetarium

Fig 2, 3, 4, 9, 10, 14, 15 - *Australian Aboriginal Studies*, 2014/2, published by AIATSIS

Fig 5, 6, 7, 8 - *Journal of Astronomical History and Heritage*, 2014 Vol 17(2), pp. 171-179, published by NARIT

Fig 11 - <http://www.abc.net.au/science/starhunt/tour/virtual/>

Fig 12 - www.eso.org

Fig 13 - www.oneminuteastronomer.com/JackNewton

Fig 16 - MPhil Thesis 2014, Robert S. Fuller, Macquarie University

Fig 17 - [www.new.nationalgeographic.com/AP Photo/Tourism Queensland](http://www.new.nationalgeographic.com/APPhoto/TourismQueensland)

Fig 18 - <https://astrobioblog.wordpress.com/2011/04/20/what-is-a-solar-system/>

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1. How to use this study guide

When you are reading the stories in *Star Stories of the Dreaming*, try to imagine you are hearing them in the night, around a campfire, looking at the stars and the sky on a clear night. If possible, dim the lights in the classroom and ask students to sit on the ground, in a circle (if practical).

Encourage students to ask their parents or other relatives what stories they can tell them about the night sky. You might even find a story that no-one else has reported, and it may add to the knowledge about indigenous astronomy.

You may also be able to show students some of the same story objects against a background of the sky using the free Stellarium computer planetarium. If you run the time forward quickly, you can see many of the objects in this guide appear at different times of the year including the Milky Way and Western constellations such as Scorpius and Orion.

The teaching and learning activities in this guide are designed to support quality teaching of Aboriginal perspectives within the NSW K-6 Science Syllabus. Whilst the activities have been created with Stage 2 and 3 students in mind, the content of the guide provides understanding that would enrich conversations about Aboriginal histories and cultures, and can be tailored to suit K-10 students.

Activities range across the KLAs (Key Learning Areas) to allow students a variety of ways to reflect on the content, and to encourage meaningful connections. They are designed to encourage students to engage with the content, to elaborate on the information and develop higher order thinking skills.

This guide encourages teachers to connect with their local Aboriginal community to enrich learning with local stories. Building relationships and partnerships with communities provides an invaluable resource for teachers. Information is provided in a footnote with suggestions of where to start to make community connections.

2. Introduction

Star Stories of the Dreaming tells some of the rich cultural astronomy stories of the Kamilaroi (pronounced kah-mee-lah-roi) and Euahlayi (pronounced you-wally-yay) peoples.

The Kamilaroi, Euahlayi and their neighbours, the Murrawarri, and the Ngemba, are Aboriginal language groups that form a large cultural grouping in the north central and northwest of New South Wales. Like other Aboriginal groups, they are descendants of people who may have come to Australia between 40 and 50,000 years ago. Their country once extended from the Hunter Valley north into central Queensland, west of the Dividing Range, and east of the Culgoa and Castlereagh Rivers. When Major Mitchell first explored this area, there may have been a population of 15,000 people, which dropped to as low as 1,000 in the mid-1800's. These days, approximately 26,000 people identify as Kamilaroi and Euahlayi heritage, and possibly 2,000 as Murrawarri and Ngemba.

3. What is cultural astronomy?

Many people were interested in the culture of the Kamilaroi and Euahlayi peoples and their neighbours. The Reverend William Ridley studied their languages in the middle of the 1800's, and late that century, an early anthropologist, Robert Mathews, travelled in this area and wrote about their culture and ceremonies, particularly the male initiation ceremony, the *bora*. Katie Parker, the wife of an early grazer north of Walgett, collected their stories and published them in a series of popular books.

One common theme that these three people found was stories of the night sky which were very important in the culture of the Kamilaroi and Euahlayi peoples and their neighbours. They included these stories in many of their books and publications, so we are lucky today to have that information. These days, the study of the sky knowledge of ancient and traditional people is called "cultural astronomy", and it looks at how the knowledge of the night sky was important in peoples' culture, ceremonies, and daily life. Since Aboriginal and Torres Strait Islander people have been living for so long in Australia, they are considered to have the oldest continuous culture on Earth. If knowledge of the night sky was an important part of that culture, then they could also be considered to be the world's first astronomers. Cultural astronomers are studying people like the Kamilaroi and their neighbours to try and find and record their astronomy from people who have this knowledge passed down from their ancestors. This study guide is a summary of some of the information which has been collected in a recent project.

Teaching and Learning Activity 1: Activate Prior Knowledge

Whole class activity:

Work together to create a brainstorm to define astronomy

- What is astronomy?
- What do you know about astronomy?

Introduce the definition of cultural astronomy - the study of the sky knowledge of ancient and traditional people.

Model a KWL chart, as a class adding something that is known, and something that they would like to know.

Independent activity:

Students complete their own KWL chart to explain what they know about cultural astronomy and what they want to know. Students will reflect on what they know after working through this guide and fill in the final column to share what they have learnt.

K What I K now	W What I W ant to Know	L What I have L earnt

Sky Stories from the Kamilaroi and Euahlayi peoples and their neighbours

Here are some of the stories collected from people as long ago as the 1800s and as recently as this decade. First there is a description of the sky object, and then the Kamilaroi and Euahlayi and neighbours story. When a name is in italics, it is the spelling from the Gamilaraay/ Yuwaalaraay/ Yuwaalaryaay Dictionary (these spellings are technical linguistic spellings of the tribes).

4. The Milky Way

The Milky Way is a spectacular sight in the night sky, with it's many stars and dust lanes, stretching across the sky from horizon to horizon. It is, of course, our own Milky Way galaxy, seen from inside, and looking towards the centre, where it is brightest. It is believed to be a spiral galaxy like this:

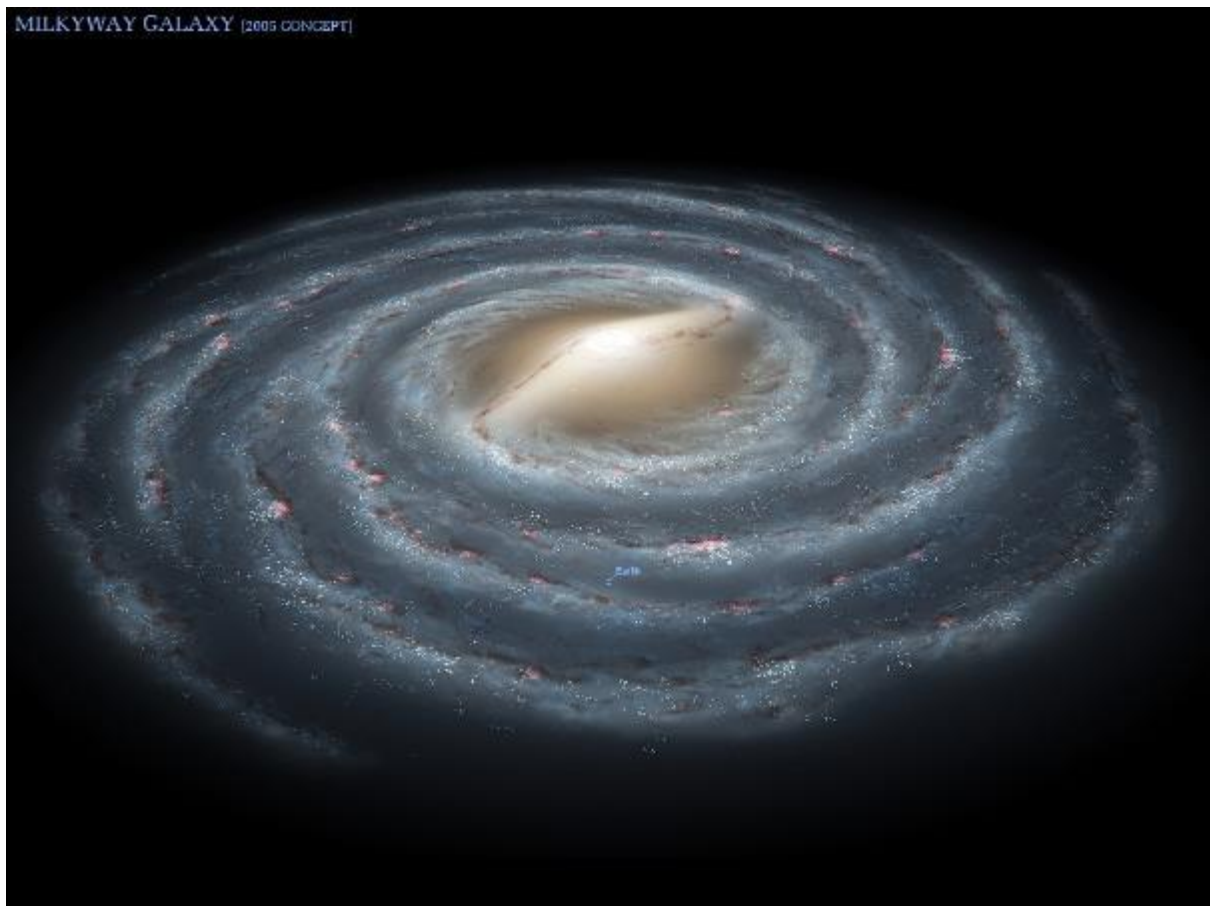


Figure 1. Milky Way Galaxy

The Kamilaroi called the Milky Way *Warambul*, which was translated to English as "stream". Parker was told it was *Warrambool*, which was "water overflow, the stars are fires, and the haze is smoke from them". Others say it is the big river in the sky, which has no water,

which is caught on Earth. Some people have questioned whether *Warambul* is *Bulimah*, or Heaven, but it is believed that *Bulimah* is the “Sky Camp” behind the Milky Way. There are not many stories about the Milky Way, but it represents where things are – campsites, tribes, ancestral places, in other words a sky atlas and a big library. Other culture figures, the Emu, the Kangaroo, and the Crocodile are located there.

Some people say that “everything up there (in the sky) is also down here (on Earth)”, so the *Warambul* in the sky has it’s mirror on the ground, which is the *Big Warrambool*, a floodway that runs from Queensland down to the Barwon River in New South Wales.



Figure 2. Warambul in the sky/Big Warrambool on Earth (sky image Alex Cherney)

One story of the Milky Way is about the sons of the culture hero, Baiame, who, after his sons disobeyed him, turned them into large rocks which can be seen today on either side of the fish traps on the Barwon River at Brewarrina, New South Wales. The two bright patches on either side of the Milky Way in the constellation Sagittarius are the spirits of the sons, but their bodies are the rocks.



Figure 3. One of Baiame's sons at the Brewarrina fish traps

Teaching and Learning Activity 2: Visual Arts

Whole class activity: Discuss features of importance in your local community.

Independent activity:

Students create a 'sky atlas' of their own community. Using 'Figure 1 Milky Way Galaxy' as inspiration, students create their own map of the Milky Way. Within their Milky Way students represent features of their community that are important to them.

Materials:

Black construction paper
White pencils or crayons
Glue
Glitter or sand

Art appreciation:

Look at a range of Aboriginal artists' representations of the Milky Way. Discuss shape, line, texture and use of colour. Discuss use of symbolism. Students create symbols to represent the features of their community that they have identified as being important (e.g. football pitch, local swimming pool).

Artmaking:

Working on some old newspaper, place the black construction paper on top and get students to draw a rough sketch of the Milky Way. The galaxy is a spiral galaxy with five arms. The centre is a dense disk containing many older stars. You can demonstrate to

students on the board. Students include the symbols they have designed.



Step 2

Students trace over their galaxy drawing with glue.

Step 3

Sprinkle glitter or sand on the paper. Tilt the paper onto the newspaper to shake off the loose glitter or sand. This becomes their picture of the Milky Way, with each grain of glitter or sand representing a single star in the galaxy.

Teaching and Learning Activity 3: History

Whole class activity:

Invite a local Aboriginal community member to speak to the class and share local stories of the sky. Visit your regional AECG (Aboriginal Education Consultative Group)¹ website to find the nearest contact to help you connect with your community. Have the class brainstorm questions and provide them to the guest before if appropriate.

Teaching and Learning Activity 4: Science

Whole class activity:

Visit the CSIRO Sydney Aboriginal Rock Engravings website. Choose an image and use the See Think Wonder Harvard Visible Thinking Routine². Encourage students to make observations about the rock engravings. Students can analyse and interpret the images, making connections between the rocks and the images of the Milky Way.

¹ AECGs (Aboriginal Education Consultative Groups) provide advice on all matters relevant to education with the mandate that this advice represents the Aboriginal community viewpoint. Search for your nearest AECG, there are many consultative groups out there for example NSW - <https://www.aecg.nsw.edu.au/about/> ACT - <http://www.betteroutcomestogether.org.au/> Victoria - <http://www.vaeai.org.au/who-we-are/dsp-default.cfm?loadref=12>

² Harvard Visible Thinking Routines are designed to encourage deep thinking. These are simple structures that can be used across a range of ages and content. http://www.visiblethinkingpz.org/VisibleThinking_html_files/03_ThinkingRoutines/03b_Introduction.html

5. The Emu in the Sky

The Coalsack is a dark cloud just below the Southern Cross. For many Aboriginal people across Australia, this is the head of the Emu in the Sky, which stretches from the Southern Cross along the dust lanes of the Milky Way to the constellation Scorpius. Unlike non-Aboriginal people, the Kamilaroi and their neighbours see the dark spaces (dust lanes) of the Milky Way, rather than the stars, as important, because this is where the Emu in the Sky is seen. The Kamilaroi call the Emu *Gawarrgay*, rather than *Dhinawan*, which is the name for the emu bird. The Guringai people of Sydney saw the Emu like this, with the legs stretched out behind:



Figure 4 the Guringai Emu in the Sky

For the Kamilaroi and their neighbours, the Emu in the Sky had important ceremonial and resource meaning. At different times of the year, the Emu may or not be seen, or may be seen differently, due to the tilt of the Earth and the seasons, when the Milky Way's position in the sky changes.

The Emu first becomes visible as the Milky Way rises in the evening in April and May, and at this time the Emu appears to be running. The Kamilaroi see this as when the emus on Earth are breeding, and the female is chasing the male. This also means that the female emu will be laying eggs, so it is time to start collecting emu eggs for food.

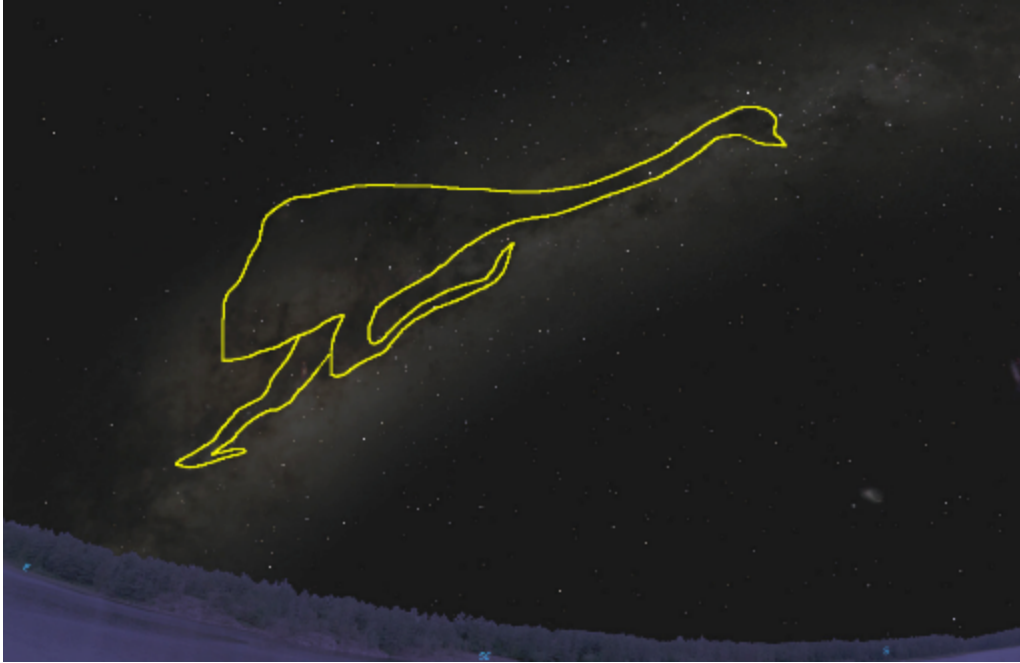


Figure 5 the running Emu of April and May

In June and July the male Emu is sitting on the nest, brooding the chicks, so it is still time to collect eggs.



Figure 6 Emu sitting on its nest in June and July

Come August, everyone has been in their winter camp, and it is time to start planning ceremonies for the summer, particularly the *bora*, the male initiation ceremony. Because the male emus care for the chicks, there is a connection with the *bora*, where the men care for the young men, so the Emu in the Sky is vertical over the South, which is the direction that the *bora* site, which is two circles connected by a path, is oriented. The Emu can also look like two eggs, which is a sign that the eggs are hatching, and should no longer be collected.

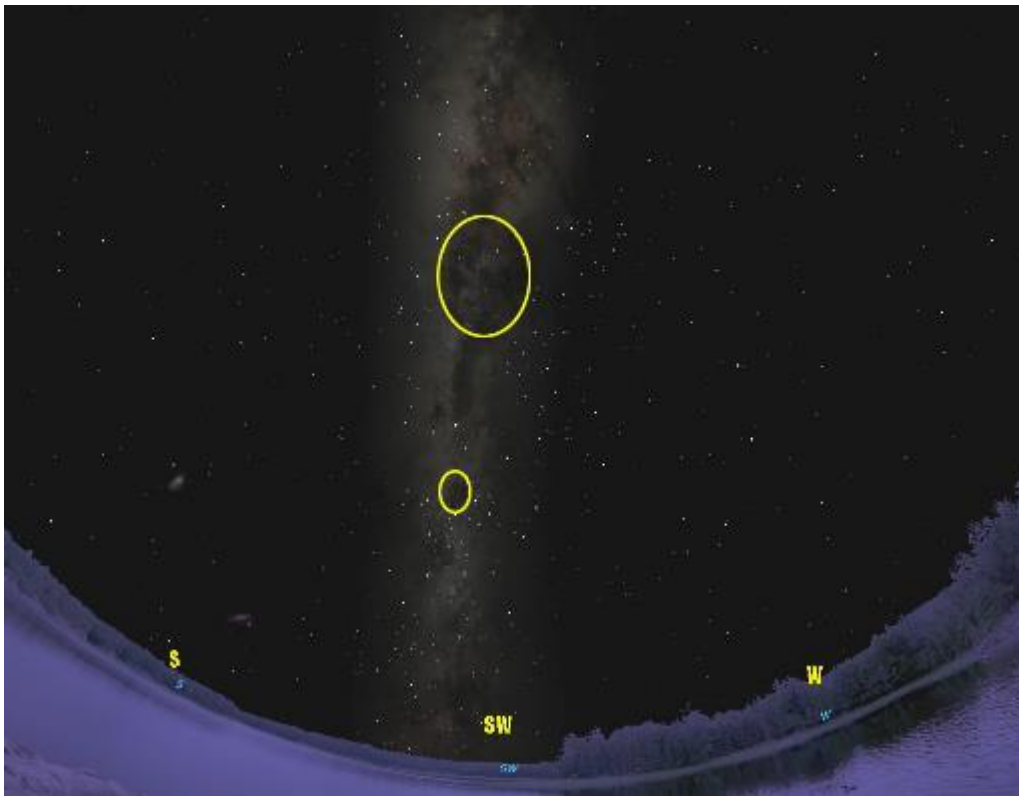


Figure 7 the Emu eggs in August over the South/Southwest

Later in the year, the Milky Way and the Emu dip close to the Earth, and the Emu is thought to be sitting in a waterhole, which is full from the spring rain. The Emu is also thought to be a featherless emu which travels to waterholes and looks after everything that lives there. The Euahlayi also call this Emu *ngurran.gali*, which translates to "emu in water".

After the Emu in the Sky is no longer seen during summer, the Kamilaroi and Euahlayi say that the Emu has travelled to Earth, and is seen as the black emu bird, which is very rare.

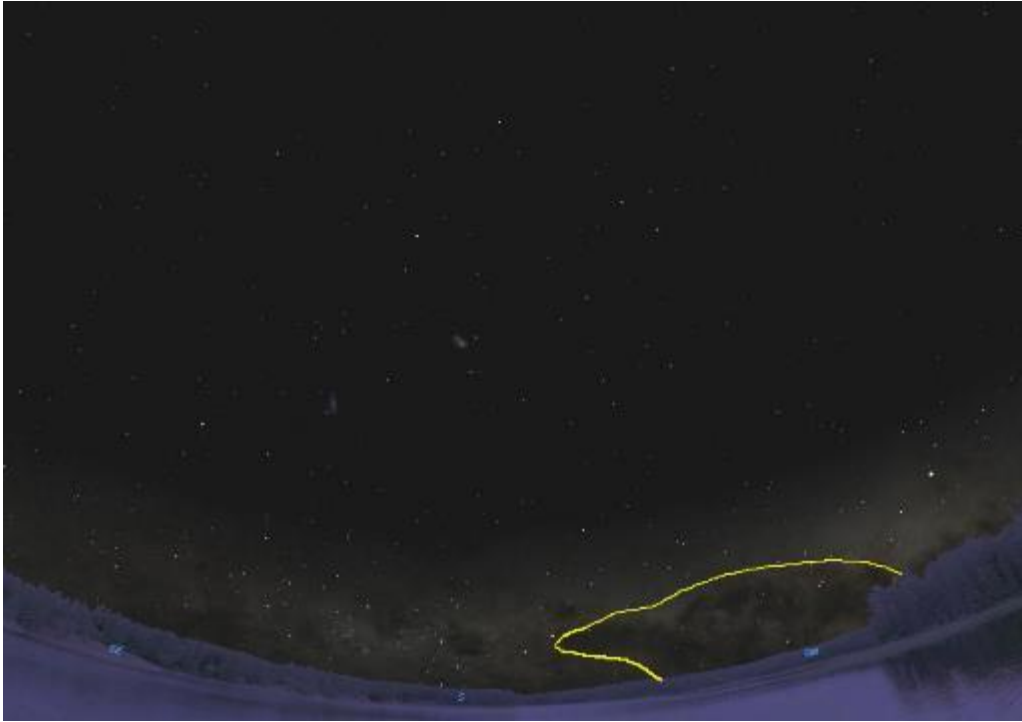


Figure 8 the Emu in the waterhole in November

You can see how important the Emu in the Sky was to the Kamilaroi and their neighbours as a sign to collect emu eggs, and as a connection to ceremony.

Teaching and Learning Activity 5: Science

Whole class activity:

As a class create a table that outlines the months of the year, the location of the Emu in the Sky and what this means for the people.

Using the above information, students can draw up and complete this table in their books:

Month	Location of Emu	What this tells us

Teaching and Learning Activity 6: English

Small group activity:

In small groups, students must find a way to communicate this information to their wider school community (e.g. by creating an informative blog), their peers (e.g. create an animation, short film, write an information report or newspaper/school magazine article) or

for younger students (e.g. a picture book that could be given to another class or stored in the school library).

Teaching and Learning Activity 7: Drama

Small group activity:

In groups of 4-5, students create still image/freeze frames (a form of tableau) to represent the location of the emu and what this means for the people. When these are presented to the class the audience (rest of the class) try to guess which month the group had chosen to represent, using clues from the image to support their conclusion.

6. The Kangaroo and the Crocodiles in the Milky Way

Not so easy to see, the Kangaroo in the Milky Way can be seen in the middle of the year, just below and towards the tail of the Emu in the Sky. It is quite a bit smaller, and it faces away from the Emu towards the ground. The kangaroo is very important in the region as a resource, and while there are no public stories about the Kangaroo, it probably has ceremonial importance.



Figure 9 the Kangaroo under the Emu in the Sky

Also important in the Milky Way in late summer is the Crocodile (actually two crocodiles). When the Emu, and then Kangaroo disappear, the Crocodile forms in their place, with the belly of the Emu forming one of the Crocodile heads. The Kamilaroi and Euahlayi see the Crocodiles as laying in the “water” of the Milky Way, and use it as a signal to travel to ceremonies.

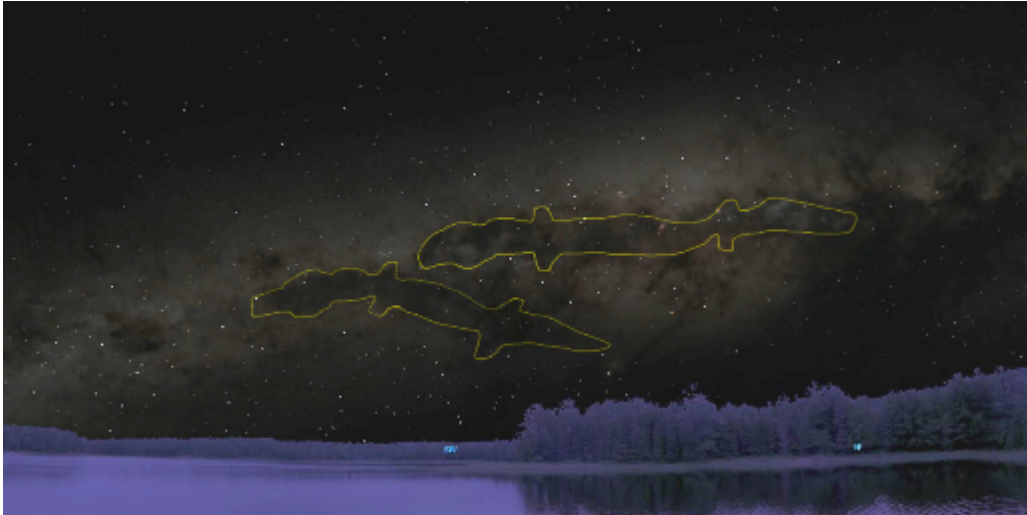


Figure 10 the Crocodiles in late summer

The Crocodiles are called *gariyas*, and there is an important story about *Baiame*, whose wives were swallowed by two *gariyas* at Coorigal Springs, near Lightning Ridge, New South Wales. *Baiame* caught the *gariyas* in the Narran River, where he killed them and freed his wives. In thrashing about, the *gariyas* formed the Narran and Coocoran Lakes. *Baiame* said the *gariyas* must stay on Earth, protecting women's sacred grounds. There is also thought to be a connection between the Crocodiles in the Milky Way, and *kuria*, which is seen by other Aboriginal groups like the Wiradjuri as the Rainbow Serpent.

7. The Southern Cross and the Pointers

The Southern Cross in most stories is connected with a story of the first man to die on Earth. The common theme of stories from all the Kamilaroi and neighbours is that during the Creation time, two men and a woman came from the red country, and had been shown which plants they could eat. There was a big drought, and becoming hungry, one man killed a wallaby. The other man said he should not do that, as he didn't know the law of the wallaby totem. That man left the man and woman, who ate the wallaby. The one who didn't, came to a big *yarran* (gum) tree, where he lay down and died. A spirit saw that he didn't break the law, and put him in the hollow of the tree, and then lifted the tree into the sky, followed by two cockatoos (who were roosting in the tree). The tree was placed in the Southern Cross, where it faded so that only the eyes of the man and the spirit can be seen. The two cockatoos still fly after the Southern Cross, and are the two Pointer stars.

For Euahlayi, the tree is a *gulabaa* (coolabah), and for the Ngemba, a *nguu* (tea-tree). The Euahlayi say that when *Baiame* finished creating at Lake Eyre, he and his wives went south to the Southern Cross, which is a dead coolabah tree, where they camped on the way to *Bulimah*. Down here, we're looking up at the black hole on the side of the Southern Cross (the Coalsack); that's the hollow of the coolabah tree. Go up the hollow tree, and when you come out the other side you're home (*Bulimah*), all the people are there.



Figure 11 Southern Cross, Pointers and Coalsack

Teaching and Learning Activity 8: Visual Arts

Independent activity:

Place some photographs of the Southern Cross around the classroom. Ask students to map the stars in their books, to draw their own version of the Southern Cross. Students are then to illustrate their star map, by drawing the gum tree, the spirit and the man lying in the hollow of the tree, using the main stars to represent the eyes of the spirit and man. Ask students to draw the cockatoos where the two pointers are located.

Teaching and Learning Activity 9: ICT

Independent activity:

Students collect digital images of the Southern Cross. Using portable devices (iPads, laptops) students create a multimodal text identifying the gum tree, the spirit, the man lying

in the hollow of the tree, using the main stars to represent the eyes of the spirit, the man, and the cockatoos. For example, using the Explain Everything App³ students can insert an image they have found and use the laser to identify these elements as they record a voiceover explaining what they are.

Teaching and Learning Activity 10: English/Science/Visual Arts

Independent activity:

Students re-read information and find 'clue words' (text connectives) to help them sequence the Kangaroo, Emu and Crocodile into a correct yearly cycle. Students then design a visual calendar to reflect this.

8. The Clouds of Magellan

Close to the Milky Way, to the southeast and lower in the sky, are the Magellanic Clouds, two dwarf galaxies orbiting our galaxy. On a clear night, they look like cotton balls, but are made up of millions of stars. There are a number of different stories about the Clouds, including one that they are *burraalga*, brolga birds, which were originally a mother and daughter who were captured by *Wilbaarr*, the whirly wind spirit, turned into brolgas, and when they died, went into the sky and became the Clouds.

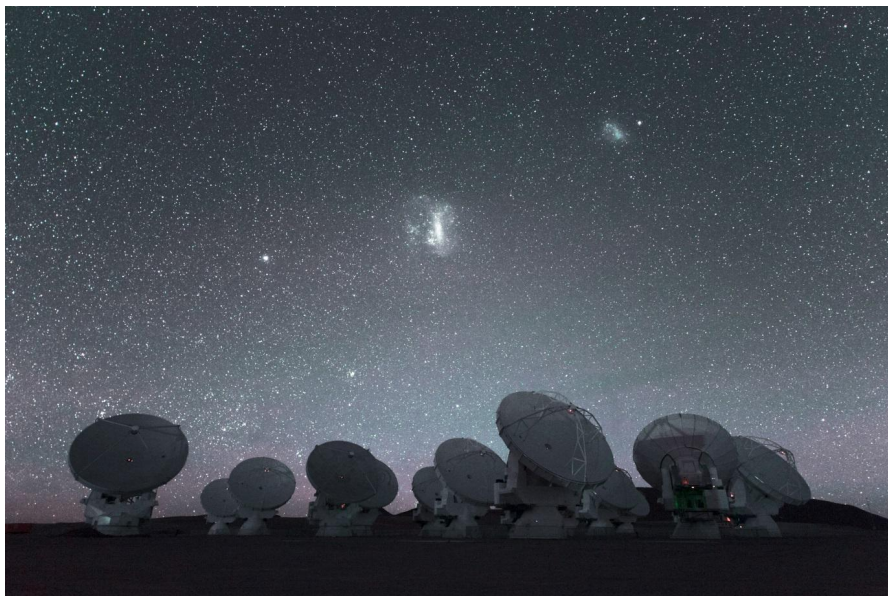


Figure 12 the Magellanic Clouds

³ Explain Everything <https://explaineverything.com/>

Many stories connect the Clouds to stories where people went after death, and some said the Clouds were openings to *Bulimah*, Heaven. There is more detail in one story, which says that the Large Magellanic Cloud is home to *Baiame's* third wife, who sings to women who are going to have babies. The Small Magellanic Cloud is an old man camping, and in all Aboriginal cemeteries on Earth, anyone buried there who has not been initiated, is guided by this old man to *Baiame's* wife in the Large Magellanic Cloud. This is because uninitiated people can't go to *Bulimah*, so *Baiame's* wife sends them back to Earth as new babies. In all cemeteries in this region is a wilga tree, which represents the old man in the The Small Magellanic Cloud.

Teaching and Learning Activity 11: English

Whole class activity:

Read through the *The Clouds of Magellan* information. Identify key information and highlight.

Independent activity:

Students summarise the information and create a question bank. Include literal and inferential questions (4H here, hidden, head and heart questions) or provide the question starters who, what, where, why, when and how.

Students share questions and compile a class set of questions to be provided to another class along with the information to share the learning activity.

9. The Pleiades

The Pleiades are an open star cluster of seven objects which can be seen in the low sky to the north during summer. They seem to be a very special object in the sky around the world, as many cultures, including the ancient Greeks, knew them as young women, and in particular, Seven Sisters. In fact, so many cultures have a similar story that some cultural astronomers think the original story may have come out of Africa with early man.

Many Aboriginal language groups have their own stories of the Pleiades, and the Kamilaroi and their neighbours are no exception, as they have a number of variations of their stories. The most common one is that the Pleiades, or *miyay miyay* (which means "several girls") were young women who lived on Earth, and were exceptionally beautiful. Orion (the constellation), which is known as the *birray birray* (which means "several boys", not initiated) were chasing them, and they prayed for protection from *Baiame*, who lifted them into the

sky. One of the girls is not as beautiful as the rest, and hides, which is why we only see six stars. The *birray birray*, for chasing the girls, were put into Orion as the Belt of Orion, where they still try and chase them. An old man was placed in the sky between Orion and the Pleiades (the star Aldebaran) to keep the *birray birray* from the Pleiades, and the upside down "V" of stars next to him (the horns of Taurus the bull) are his *gunya* (hut). The star Rigel is the fire of the *birray birray*, and the Sword of Orion is their fire poker.



Figure 13 Pleiades or Seven Sisters

There are many variations of this story among the Kamilaroi and Euahlayi and their neighbours. In many cases, the young women are chased by a *Wurunna*, a clever man, or by a number of *Wirringins* (also clever men), but manage to escape to the sky. Most stories of the Pleiades seem to be linked to stories about law, and about respecting young women.

There are also some stories about the Pleiades being seven sisters with long hair and bodies of icicles. Thunder in the winter is the Pleiades bathing and playing. Another story was that one sister was carried off by a hunter, and the other sisters sent cold, wintry weather to force him to release her, but changed their minds, and went into the sky searching for the summer sun to melt the snow and ice. That is why the Pleiades appears in the summer each year, bringing warm weather. Some people say that if you mock the Pleiades, you'll get a cold wind and sleet.

Teaching and Learning Activity 12: English

Independent activity:

After reading students the different version of the Pleiades, ask them to pick one of the stories and retell the story in a chosen medium-

- Re-write the story and illustrate.
- Create a comic strip.
- Write a play.
- Create a storyboard.

10. Scorpius

The constellation Scorpius, which crosses the Milky Way, and looks like a scorpion, is known by the Kamilaroi and Euahlayi not so much for the star pattern, as for the dark spaces around it. While it is very difficult to see them, there are two or three dust patches in the vicinity of the tail and the claws, which someone with very good eyes and a dark sky might see. These are actually holes which the spirit of the whirlwind, *Wilbaarr*, uses to come to Earth in September, when whirlwinds are common. These whirlwinds which Australians call "willy willys" (from the Euahlayi *warrawilbaarru* for the same spirit) commonly come to northwest New South Wales in September. The story is that *Wilbaarr* has a reputation for madness and stealing souls. *Baiame* calls him back, but can't stop him coming to Earth, as he can come through any of the dark spots. September is also the time the sacred fire is lit, and young men travel, so *Wilbaarr* tries to catch them.

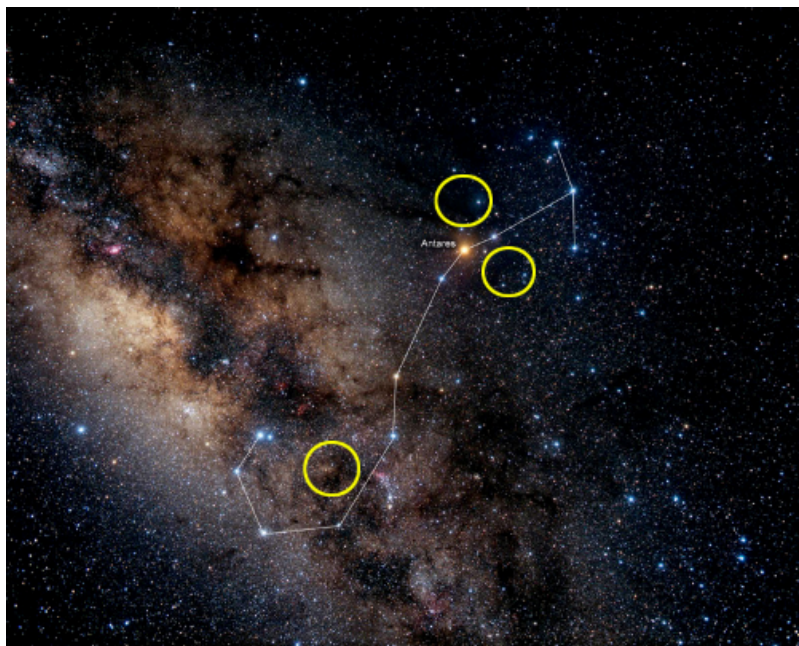


Figure 14 dark spots in Scorpius

Because “everything up there is down here”, the three dark spots in Scorpius have their equivalent in the Narran and Barwon Rivers country. There are three depressions in the ground, called *Buuliis*, which are located in a pattern very similar to that of Scorpius, overhead. The word *Buulii* also means “whirlwind” in Euahlayi.

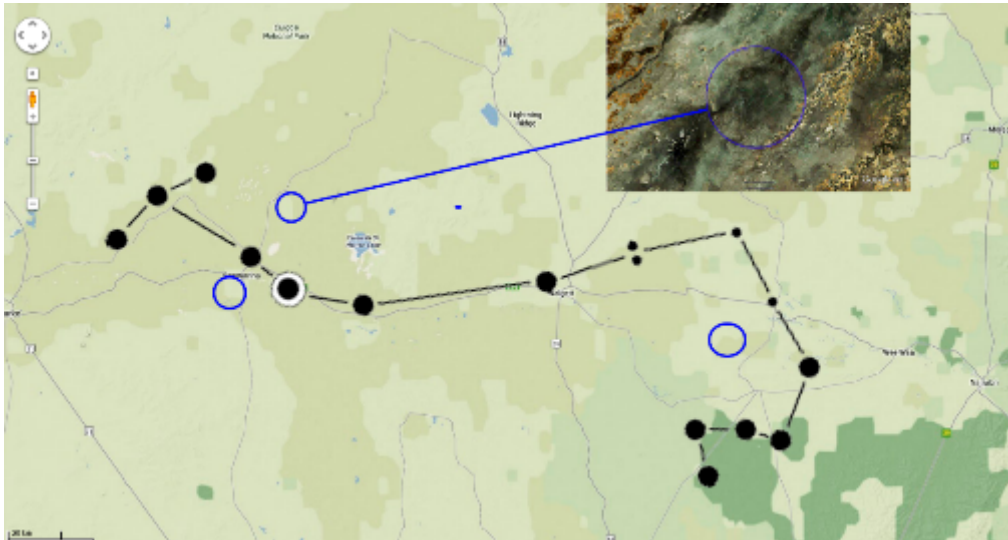


Figure 15 Buuliis in Narran and Barwon Rivers country with Scorpius pattern

Teaching and Learning Activity 13: English

Whole class activity:

Following a modelled read of the information, ask students to consider the following questions in a Think Pair Share (Harvard Visible Thinking Routine):

1. What is important about the constellation Scorpius for the Kamilaroi and Euahlayi people?
2. Who comes through the holes in Scorpius?
3. What does this spirit bring?
4. What is meant by “everything up there is down here”?
5. Where are the markings for Scorpius located on the earth?

Students create an information brochure to answer the questions, providing information about the constellation Scorpius.

Independent activity:

Students read the information individually, highlight key information on first reading and then answer questions.

Provide the questions to students first and use the activity as a skimming/scanning task.

11. Orion

The constellation Orion, as we know from the story of the Pleiades, was the home of the *birray birray*, the young men chasing the Pleiades. It also has a connection to *Baiame*. Most Kamilaroi culture men will say that you can't see *Baiame* in the night sky, but during the *bora* ceremony, in the early part of the year, Orion will, as the night progresses, go down in the west. The Greeks called Orion the Hunter, and saw him as a figure with two legs and two arms, a belt, and a sword. Of course, here in Australia, the Greek figure is upside down, so that figure is not usually seen the way the Greeks did. However, as Orion is dipping down to the western horizon, this can be seen as a figure of *Baiame*, upside down, with his arms reaching down to the Earth, so it is said that "*Baiame* is coming to the ground". This is the reason for the *Baiame* ground sculpture used during the *bora* ceremony. This is only representing *Baiame*, as everyone says that Orion is not *Baiame*.

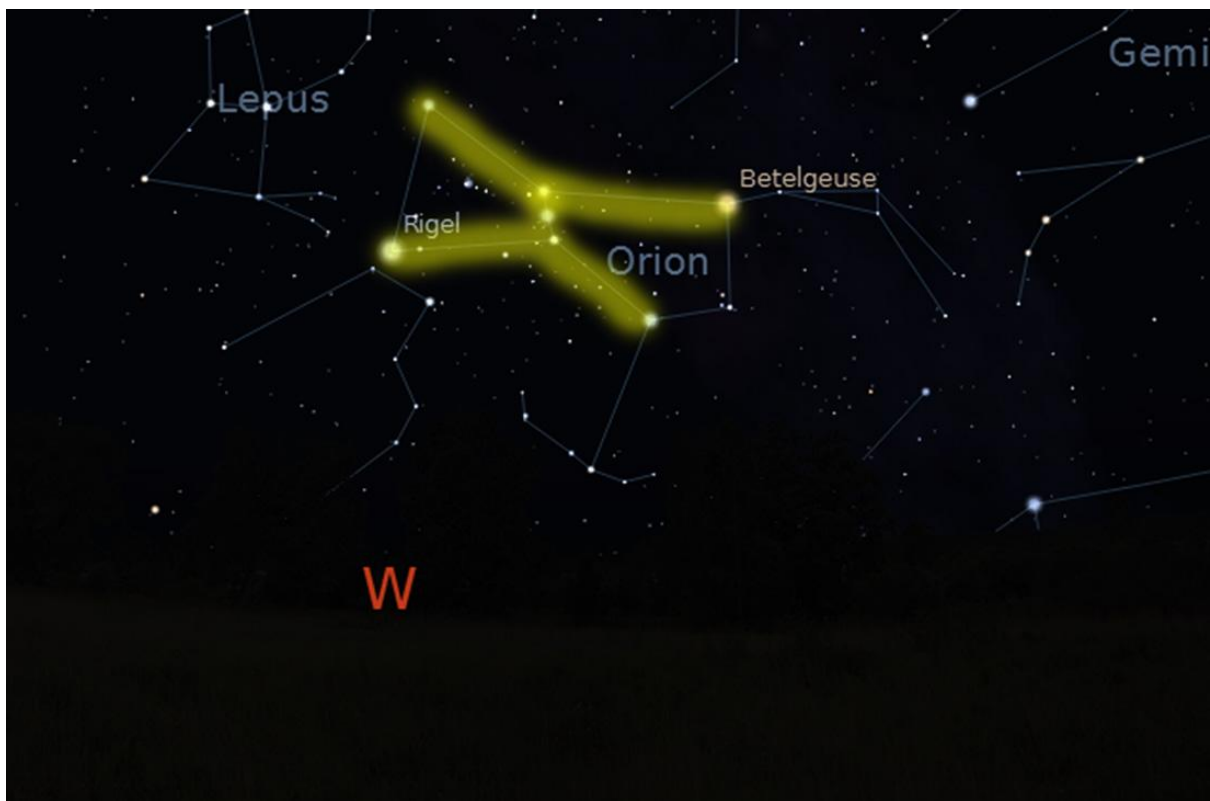


Figure 16 Orion from Australia

Other stories include a more recent one about the Saucepan, where we see the Belt and Sword of Orion making up a Saucepan. It is said that when it gets full, it will turn and tip. Since the rainy season in country New South Wales is usually February, the Saucepan (which filled up earlier) is tipping (as it appears late at night), and dropping the rain.

A Ngemba/Wailwun (connected to Ngemba) story says that Orion was the brolga put into the sky by *Baiame* after fighting with the emu (when the Sun was created). Orion could be

a brolga, an emu, or a turkey, depending on what country you came from, and that these birds were put in the sky to show that we shouldn't fight and should help each other. The emu was put with its head in the Coalsack, which became the Emu in the Sky.

Teaching and Learning Activity 14: English

Small group/pair activity:

After reading the information, students work together to fill out a Venn diagram, to compare and contrast the stories surrounding the constellation Orion. Students could conduct further research to find additional cultural perspectives and stories.

12. The Sun

As discussed above, there is a story which the Kamilaroi and Euahlayi and their neighbours all repeat, which was how the Sun (Yaay) was made. In this story, there was no Sun, no Moon and stars, no people, only animals. Depending on the version, either the brush turkey or the brolga, after some business with the emu, got angry, and went to the emu nest and took an egg, which she threw to the east. It hit a pile of logs or brush, which burst into flames. The flames lit up the country, forming the Sun. After it went across the sky the first time, that was the night, and the Sun returned each day. Another version of the story says that a spirit saw the fire, and seeing how beautiful the world was, collected wood every night for a new fire. When he had enough wood, he sent Venus (the morning star) to warn those on Earth the fire would soon be lit. Also, the kookaburra (*gugurrgaagaa*) laughed when this took place, which is why it reminds people of the story ever since by laughing at the break of dawn.

There is also a Euahlayi story about the Sun, who is a woman, and is always chasing the Moon (*Bahloo*), either because she wanted to kill him, or love him. He wants nothing of this, so is chased across the sky. It's possible that the Kamilaroi and Euahlayi thought that solar eclipses happened when the Sun caught up with the Moon, and the Sun is covered (which is scientifically correct), and certainly this is the view of other Aboriginal language groups.



Figure 17 Solar eclipse - Moon covering Sun

13. The Moon

The Moon is known by the Kamilaroi as *Bahloo*, and there are many stories about him as he is male. One story tells why men kill snakes. *Bahloo* tried to convince the first men to carry his dogs across a river. When they refused, the dogs became snakes, which bit them, and *Bahloo* said that men will stay on Earth and die, which is why men kill snakes whenever they see them. Another story concerned *Bahloo* and *Wahn*, the crow. *Bahloo* is the maker of girl babies, and *Wahn* sometimes helped. *Wahn* also wanted to bring dead people back to life, but *Bahloo* refused. *Wahn* got angry, and one day saw a gum tree with grubs, and proposed that he and *Bahloo* get them. While they were up there, *Wahn* breathed on the tree and it grew up into the sky, where *Bahloo* then stayed and travelled with it. He tried to get back down, but the Sun (*Yaay*) prevented it. He did however use the Emu in the Sky to help him to keep making girl babies. The Euahlayi say that if the Moon was late rising, he'd been making girl babies, and they knew when he was coming by the haze that precedes the Moon, saying "*Bahloo* is coming, there is his dust".

On a practical note, when they see a halo around the Moon the Euahlayi say it is "going to rain; *Bahloo* is building a house to keep dry". Others say that the Moon's rays are important in the spirit world; that children shouldn't stare at the Moon, as the Moon's rays will send them mad.

The Murrawarri (and possibly the Ngemba) have a different story about the Moon. *Gien*, who is a handsome young man who drowned, was revived and then massacred those who left him to drown. When the survivors identified him, he escaped into the sky, and still lives there (as the Moon). During lunar eclipses, the colour of the Moon is often red, which is his blood.

14. Jupiter

The planet Jupiter doesn't have any big stories, but the Kamilaroi and Euahlayi must have noticed that it has a different path in the sky compared to the background stars. A Euahlayi story is that Jupiter is a young boy wandering about the heavens. He is disliked by his mother, the Sun, so much so that she sends men to spear him when he is moving low down in the western sky. If she succeeds, people think the grasses will not set their seeds, and people would starve, or even become blind.

Other stories, where Jupiter may be confused with Mars, talk about Jupiter being red due to living on roasted yams. Jupiter is also called a "red-eye fella", and that kids shouldn't play with fire, otherwise "the red-eye fella will follow you and stay all winter".

15. Venus

The planet Venus is usually known to Western astronomy as the Morning and Evening Star, due to its being inwards from Earth towards the Sun, which means it is always close to the sun (at sunset and sunrise). There is some question whether the Kamilaroi and Euahlayi and their neighbours believe that Venus is the Morning Star, as there is some evidence that the Morning Star is red, and connected to a ceremony where the planet Mars may actually be the Morning Star.

One thing for sure is that Venus is known by many different names, according to early studies. Some include *Zindigindoer* and *Yindigindiwa*, and were said to mean "you are laughing". Current Kamilaroi for "laugh" is *gindama-y*, so maybe they are the same. In any case, there is a consistent story about Venus, one of the Kamilaroi words for it being *Gindamalaa*. The story is that Venus was a rude man who once made some incorrect comments about a woman and laughed. For his misbehaviour, he was put into the sky as Venus, and as Venus twinkles (being near the horizon, and because its light comes through more of the atmosphere), it is said that the rude man is laughing.

Venus is also said to be *Maliyan.gaalay*, the eaglehawk (*Maliyan*), who became the Morning Star. He once lived in a giant *yarran* (gum) tree near the Barwon River, and hunted people for food. Some young men managed to set his home on fire, and he died, becoming *Maliyan.gaalay*, the Morning Star.

16. Meteors

There are several stories about meteors. The Kamilaroi call a meteor *mirii yanan* (literally "star go" or shooting star). Most of the people say that a meteor is a sign that someone has died. If a big meteor falls, followed by a thunderclap, this is a sign that a great man has died. If a number of stars shoot off from the meteor, that's a sign that a man has died leaving a large family. If someone died, the old people would sit up all night and wait for a meteor to appear, to let them know that the person had reached camp. A meteor appeared when a life was taken and life given; the meteor also brings a new baby. The Murrawarri believe that a baby is conceived with only a physical body, no spirit. When it is born, it gets a spirit, which comes back on a meteor, and waits behind a *yarran* tree, which is a birthing area.

Teaching and Learning Activity 15: Science

Small group activity:

Design and make challenge - create a model of our Solar System that shows the relationship of the planets. Your model must also display creativity, sharing the planets' relevant stories (cultural astronomy) e.g. models made out of paper mache might have the stories written on them, whereas a model made out of clay might hang from a coat hanger with information dangling next to it.

Teaching and Learning Activity 16: English

Independent activity:

After examining the above features, show students maps of the Solar System which show where the planets are and how they are related to each other. Once they are familiar with the makeup of the Solar System, get students to create a map of the Solar System, labelling the sun, earth, earth's moon, Jupiter, Venus, some meteors and the other planets.

Write a mnemonic to help you remember the relationships of the planets to each other (order, distance from the sun etc.) and relate to the stories you have read.

Pair activity:

Students create a double page spread to tell the story of one of the planets, the sun or the moon. Scientific information, diagrams and pictures/illustrations could also be included. These would become part of a class book.

Teaching and Learning Activity 17: Drama

Small group activity: Imagine you are creating a film to tell the Aboriginal stories of the sky. Create a movie trailer for the film.

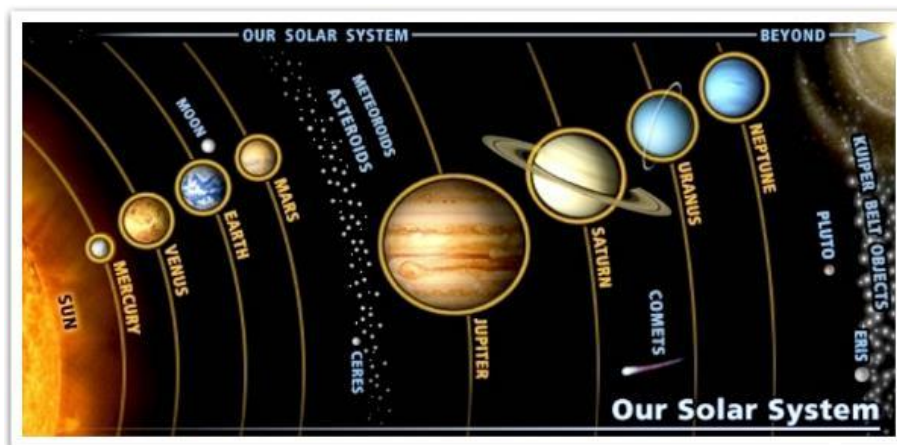


Fig 18 Example map of the Solar System

17. What now?

By now, you will understand that the Kamilaroi and the Euahlayi, and their neighbours, the Murrawarri, and the Ngemba, had a very complex understanding of the night sky, some of which could even be considered scientific, such as the understanding of eclipses. For them, way before the age of television, the night sky was entertainment, a storybook to explain law and a mirror of their country. It was also a guide to the seasons, when to look for resources, when to plan for ceremonies and a guide to everyday life. Next time you are sitting under a beautiful night sky, maybe at a campfire, look up and try to fit the stories you have read to the sky that you can see. Once you have seen the Emu in the Milky Way, you will never again be able to look at the Milky Way as just a lot of stars. The stories about the night sky are not just history either, they are living stories for the Kamilaroi and Euahlayi and their neighbours, and help them remember their culture, their ceremonies, and their connection to country. Whether you are an Indigenous Australian or not, this is a part of your heritage, as an Australian who has inherited possibly the oldest astronomy knowledge in the world.

If you have access to people who know their culture, ask them to look at these stories and maybe they can tell you more than what you have read here. Maybe you will be lucky enough to have the chance to learn more about your culture, as well as participate in the scientific culture of the non-Indigenous culture. There are opportunities for you to continue to learn current science while not forgetting about the knowledge of thousands of years of Aboriginal and Torres Strait Islander culture. There's no reason you can't become a western scientist while still valuing the cultural astronomy of the first Australians.

Teaching and Learning Activity 18: Sharing and Reflecting

Independent activity:

Students complete an individual research task choosing an inquiry question that involves researching other cultural or religious stories relating to the sky. This is an opportunity for students to collect additional stories from family and friends as well as researching books and websites. Using this information, students create a storybook, eBook, website or blog to share an informative discussion about cultural astronomy. At the end of the unit students present their resource to the class explaining how they created it as well as presenting their discussion.

Teaching and Learning Activity 19: Conclusion

Students individually or as a class complete the KWL chart created in activity 1, reflecting on what they have learnt about cultural astronomy (the Astronomy of the Kamilaroi and the Euahlayi Peoples and their neighbours).