SEARCHING FOR THE ASTRONOMY OF ABORIGINAL AUSTRALIANS

RAY P. NORRIS

Abstract

It is widely accepted that the traditional culture of Aboriginal Australians has a significant astronomical component, but it is unclear whether this component extended beyond ceremonial songs and stories. Here I summarise a growing body of evidence that there was a deep understanding of the motion of objects in the sky, that this knowledge was used for practical purposes such as constructing calendars, and there may even be evidence for careful records and measurements.

Key words: Australia Aboriginal.

Introduction

Amongst the 400 indigenous cultures in Australia, each with its distinct mythology, ceremonies, and art forms, threads a strong interest in the night sky. Since Aboriginal cultures stretch back unbroken for 50,000 years or more, it has been suggested (e.g. Haynes 1992) that the Australian Aboriginal people were the world's first astronomers. This argument rests upon two hypotheses: one is that the Aboriginal people were practicing astronomy, and the second is that these practices stretch back 50,000 years. The project described here aims to test the first hypothesis in a systematic way.

The word "astronomy" implies more than a passing interest in the phenomena in the sky, or recognising a few stars or their patterns. It implies a quest to understand the sky, to ask questions about the motion of the Sun and Moon, to ponder what would cause phenomena like eclipses or comets, and to ask whether events in the sky are connected to those on Earth. So the aim of this project is to explore whether there exists evidence for such a deep interest amongst traditional Aboriginal people. The project has two key components.

In some parts of Australia, such as Arnhem Land in the North of Australia, these cultures are flourishing. For example, Yolngu people still maintain traditional aspects of their lifestyle, and continue to conduct initiation ceremonies, at which much of the traditional lore is passed from generation to generation. The first thread of the project aims to record their stories and ceremonies, and as much of the astronomical lore as might be told to an uninitiated white person.

In other parts of Australia, the Aboriginal culture was badly damaged by the arrival of Europeans some 200 years ago. For example, the Aboriginal people around Sydney disappeared within a few years of the arrival of Europeans, due to a combination of introduced disease, exclusion from their sources of food and water, and even deliberate genocide. In these regions, little is known of the original culture of the Aboriginal people, but we can study it by examining their art and artefacts. Thus the second thread of the project focuses on surveying and recording the rock engravings of the Sydney basin region and the stone arrangements of Victoria.

Aboriginal astronomy was first described by Stanbridge (1857), and subsequent important works include those by Mountford (1976), Haynes (1992), Johnson (1998), and Cairns and Harney Yidumduma (2003). Most of these works focus on how objects in the night sky represent events or characters in Dreaming stories, and only touch briefly on practical applications or on interpretation of the motion of the sky.

For example, several Aboriginal groups tell how the Pleiades are a group of sisters chased by a young man in the constellation of Orion. Although this similarity between Aboriginal and Greek stories suggests early cultural contact between Aboriginal and European people, it is unlikely that such contact took place. It is more likely that the Aboriginal people independently devised the stories in a sort of cultural convergent evolution. But more interesting to this project is the report by Harney Yidumduma (1959) that the Kuwema people used the heliacal rising of Orion to tell them when to harvest dingo puppies, which were an important food source.

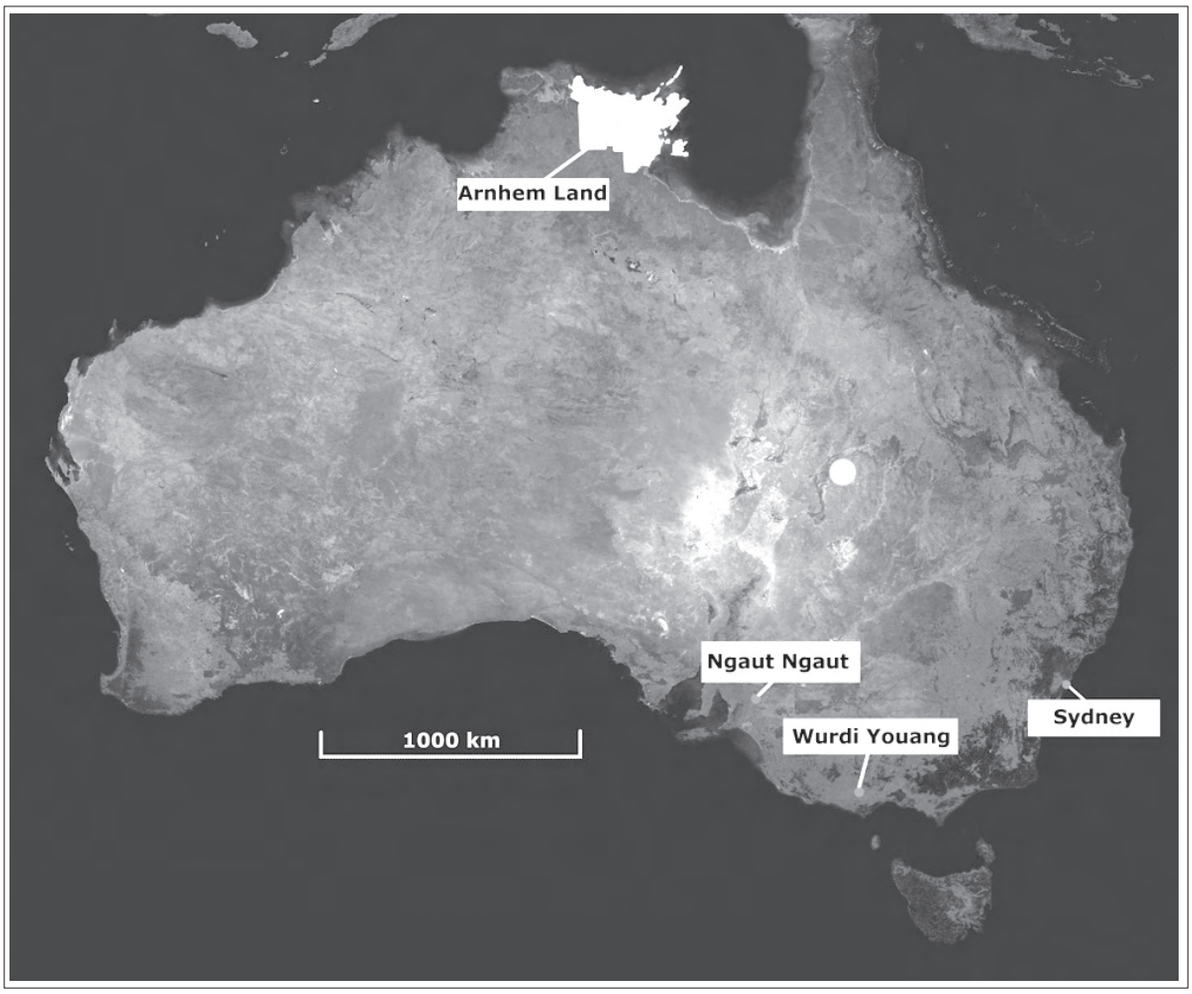

Fig. 1. Map of Australia.

Cultural Background

The many Australian Aboriginal cultures are quite distinct from each other, and their languages can be as different as Chinese is from Italian. Nevertheless, there are some common threads.

For example, most Aboriginal cultures are centred on the idea that the world was created in the "Dreaming" by ancestral spirits who have left their symbols all around us. If one can understand these symbols, then one has a complete understanding of the world, of the meaning of life, and of the rules by which one must live – a sort of user manual for existence. Naturally, the night sky is an important chapter of this manual.

The southern sky is striking compared to that of the northern hemisphere, often dominated by the magnificent river of the Milky Way weaving across the zenith, crossed by numerous dust lanes. For those living in Australia before the advent of streetlights, the night sky would be an important and integral part of their understanding of the world. Naturally, they would notice that particular stars or patterns are seen only at certain times of the year. Furthermore, since many chose to travel in the cool of the night, they would quickly find that stars are useful for navigation.

An impediment to this study is the misinformation permeating the literature, dating from an era when racial stereotypes were widespread even amongst academics. For example, Blake (1981) states categorically "No Australian Aboriginal language has a word for a number higher than four". Having watched Aboriginal children counting in the Tiwi language to see who could hold their breath longest underwater, I very much doubt this. More importantly, complex Aboriginal number systems have since been well-documented in the literature (e.g. McRoberts 1990; Tully 1997). Such ingrained attitudes state equally misleadingly that Aboriginal people "don't measure things", and so would not be interested in or capable of careful astronomical measurements. Rather than relying on such assertions, this project concentrates on exploring the available evidence.

Sun, Moon, And Eclipses

In most Aboriginal cultures, the Moon is male and the Sun is female. For example, the Yolngu people of Arnhem Land in the far north of Australia tell how Walu, the Sun-woman, lights a small fire each morning, which we see as the dawn (Wells 1964). She decorates herself with red ochre, some of which spills onto the clouds, creating the red sunrise. She then lights her torch, made from a stringy-bark tree, and travels across the sky from east to west carrying her blazing torch, creating daylight. As she descends at the end of her journey, again some of the red ochre dusts the clouds to give the red sunset. On reaching the western horizon, she puts out her torch, and starts the long journey underground back to the morning camp in the east. Thus the Yolngu people explained the daily motion of the Sun across the sky and back again under the ground.

The Yolngu people call the Moon Ngalindi and he too travels across the sky. Originally, he was a fat lazy man (corresponding to the full Moon) for which he was punished by his wives, who chopped bits off him with their axes, producing the waning Moon (Wells 1964; Hulley 1996). He managed to escape by climbing a tall tree to follow the Sun, but was mortally wounded, and died (the new Moon). After remaining dead for 3 days, he rose again, growing round and fat (the waxing Moon), until, after two weeks his wives attacked him again. The cycle continues to repeat every month. Until Ngalindi first died, everyone on Earth was immortal, but he cursed humans and animals so that only he could return to life. For everyone else, death would thereafter be final.

But the Arnhem Land stories go much further, even explaining why the Moon is associated with tides. When the tides are high, water fills the Moon as it rises. As the water runs out of the Moon, the tides fall, leaving the Moon empty for three days. Then the tide rises once more, refilling the Moon. So, although the mechanics are a little different from our modern version, the Yolngu people obviously had an excellent understanding of the motions of the Moon, and its relationship to the tides.

The Warlpiri people explain a solar eclipse as being the Sun-woman being hidden by the Moon-man as he makes love to her. On the other hand, a lunar eclipse is caused when the Moon-man is threatened by the Sun-woman who is pursuing him and perhaps catching up. These two stories demonstrate an understanding that eclipses were caused by a conjunction between the Sun and Moon moving on different paths across the sky, occasionally intersecting (Warner 1937). This realisation is found in several other language groups. For example, Bates (1944) recounted how, during the solar eclipse of 1922, the Wirangu people told her that the eclipse was caused by the Sun and Moon "becoming husband and wife together".

Fig. 2. A rock engraving showing a crescent.

Amongst thousands of beautiful rock engravings in Ku-ring-gai Chase National Park, just outside Sydney, are a number of crescent shapes, such as that shown in Fig. 2. Archaeologists (e.g. McCarthy 1983) have traditionally referred to these shapes as boomerangs. However, a detailed study (Norris 2008) has shown that these shapes are more likely to represent crescent moons than boomerangs. For example, boomerangs usually have two straight lengths rather than a single curved crescent, and rarely have pointed ends. Furthermore, it is unclear why a man and woman should reach up towards a boomerang in the sky. But if these shapes are moons, then why is the moon shown with the two horns pointing down, since that configuration is seen only in the afternoon or morning when the Sun is already high in the sky, and the moon barely visible?

One answer is that it might depict an eclipse. In Fig 2, the man stands in front of the woman, partly obscuring her. Such carefully-drawn obscurations are unusual in these rock carvings, and in this case may well represent the Moon-man obscuring the Sun-woman during a solar eclipse.

The Calendar

Aboriginal calendars tend to be more complex than European calendars, and those in the north of Australia are often based on six seasons. Some Aboriginal groups mark them in terms of the stars which appear during these seasons. For example, the Pitjantjatjara people say that the rising of the Pleiades in the dawn sky in May heralds the start of winter (Clarke 2003). Perhaps even more importantly, the heliacal rising of a star or constellation can tell people when it's time to move to a new food source. For example, when the Mallee-fowl constellation (Lyra) appears in March, the Boorong people of Victoria know that the Mallee-

fowl are about to build their nests, and when Lyra disappears in October, the eggs are laid and are ready to be collected (Stanbridge 1857). Similarly, the appearance of Scorpius told Yolngu people that the Macassan (Indonesian) fisherman would soon arrive to fish for Trepang.

Close to the Southern Cross (a possum in a tree, according to the Boorong people) is a dark cloud of interstellar dust, called the Coalsack by astronomers. To the Wardaman people, it's the head of a lawman (B. Yidumduma Harney, personal communication, 2005), but to many others, it's the head of the Emu in the Sky. The emu's body stretches down to the left towards Scorpius, dominating the southern Milky Way. In Ku-ring-gai Chase National Park is an engraving of an emu, which appears to be oriented (Cairns 1996) to line up with the Emu in the Sky, in the correct orientation, at just the time of year when real-life emus are laying their eggs.

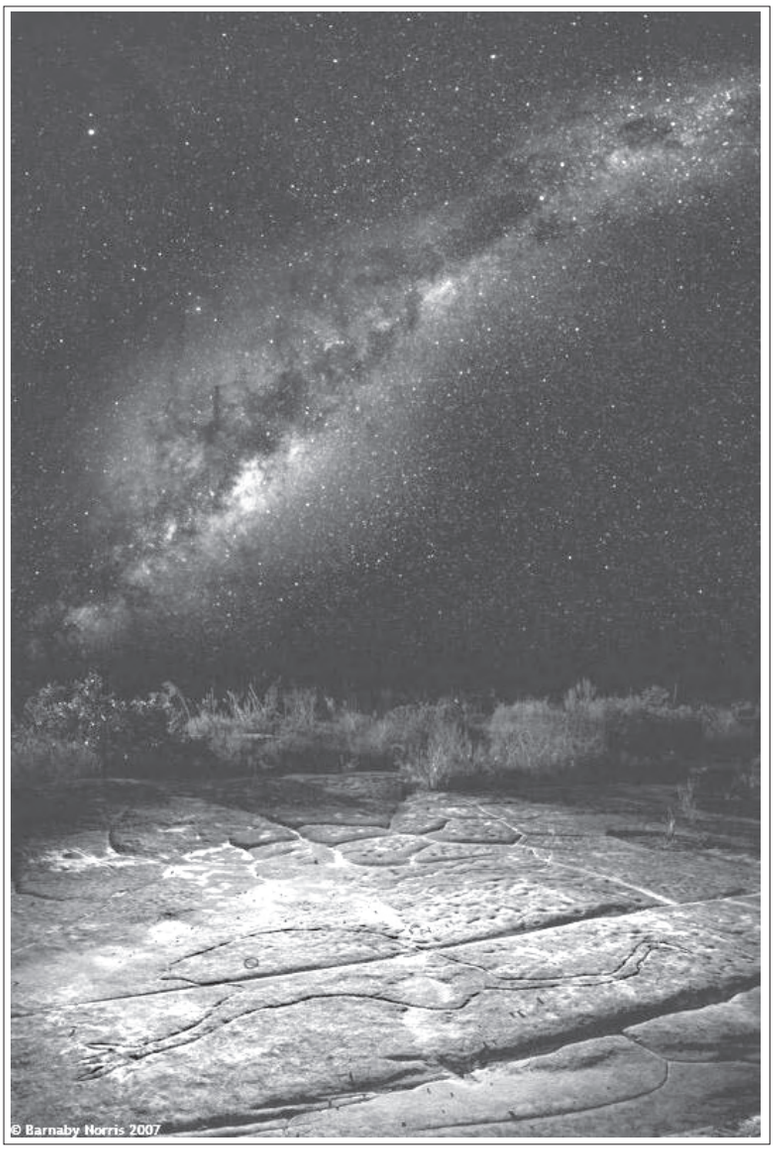

Fig. 3. The emu in the sky above her engraving. © Barnaby Norris.

The Planets

Yolngu people call the planet Venus "Banumbirr", and tell how she came across the sea from the east in the Dreaming, naming and creating animals and lands as she crossed the shoreline, and continued travelling westwards across the country, leaving as her legacy one of the "songlines" which are important in Aboriginal cultures.

In an important and beautiful "Morning Star Ceremony", earthly Yolngu people communicate with their ancestors living on Baralku, the island of the dead, with the help of Banumbirr together with a "Morning Star Pole". The ceremony starts at dusk and continues through the night, reaching a climax when Banumbirr rises a few hours before dawn. She is said to trail a faint rope behind her along which messages are sent, and which prevents her from ever moving away from the Sun. This faint line in the sky is probably zodiacal light, which is caused by extraterrestrial dust in the plane of the solar system. Although difficult to see for most of us in our polluted skies, it is easily visible in the clear dark skies and low latitude of Arnhem Land.

The Morning Star ceremony tells us two important things. One is that Yolngu people had already observed that Venus never strays far from the Sun, which they explain in terms of the rope binding the two bodies together. The other is that the Morning-Star ceremony has to be planned well in advance, since Venus rises a few hours before dawn only at certain times of the year, which vary from year to year. So the Yolngu people also track the complex motion of Venus well enough to predict when to hold the Morning Star Ceremony.

Astronomical Measurements

Having established that traditional Aboriginal cultures embodied a deep interest in the motion of heavenly bodies, can we find any evidence to support the "Stonehenge hypothesis " that careful observations

Fig. 4. The carvings at Ngaut Ngaut, said to represent lunar cycles.

were made, records kept, or structures set up to point to the rising and setting places of heavenly bodies?

On the banks of the Murray River, north of Adelaide, is a site called "Ngaut Ngaut". It belongs to the Nganguraku people, and engraved images of the Sun and Moon testify to its astronomical connections. Close to the engravings are a series of dots and lines carved in the rock, which, according to the traditional owners, show "cycles of the Moon". This oral tradition has been passed through generations from father to son, but since initiation ceremonies were banned (along with the Nganguraku language) by Christian missionaries over a hundred years ago, only this fragment of knowledge survives, and it is not known exactly what the symbols mean. The rich record engraved on the walls of Ngaut Ngaut has so far defied attempts at decoding it. So, for the moment we must label it as intriguing, but not conclusive evidence of Aboriginal astronomy.

Even closer to the Stonehenge Hypothesis is the Wurdi Youang stone arrangement in Victoria, which was built by the Wathaurung people before European settlement, but all records of its use have now disappeared. This egg-shaped ring of stones, about 50m in diameter, has its major axis almost exactly East-West. At its Western end, at the highest point of the circle, are three prominent waist-high stones. Morieson (2003) pointed out that some outlying stones to the West of the circle, as viewed from these three stones, seem to indicate the setting positions of the Sun at the equinoxes and solstices. Norris et al (2008) have confirmed these alignments and have shown that the straight sides of the circle also indicate the solstices.

However, a sceptic might still raise some doubts. First, the outliers are only accurate to a few degrees - could these alignments have occurred by chance? Second, although the stones of the circle are large and immovable, the outliers are small and could have been moved.

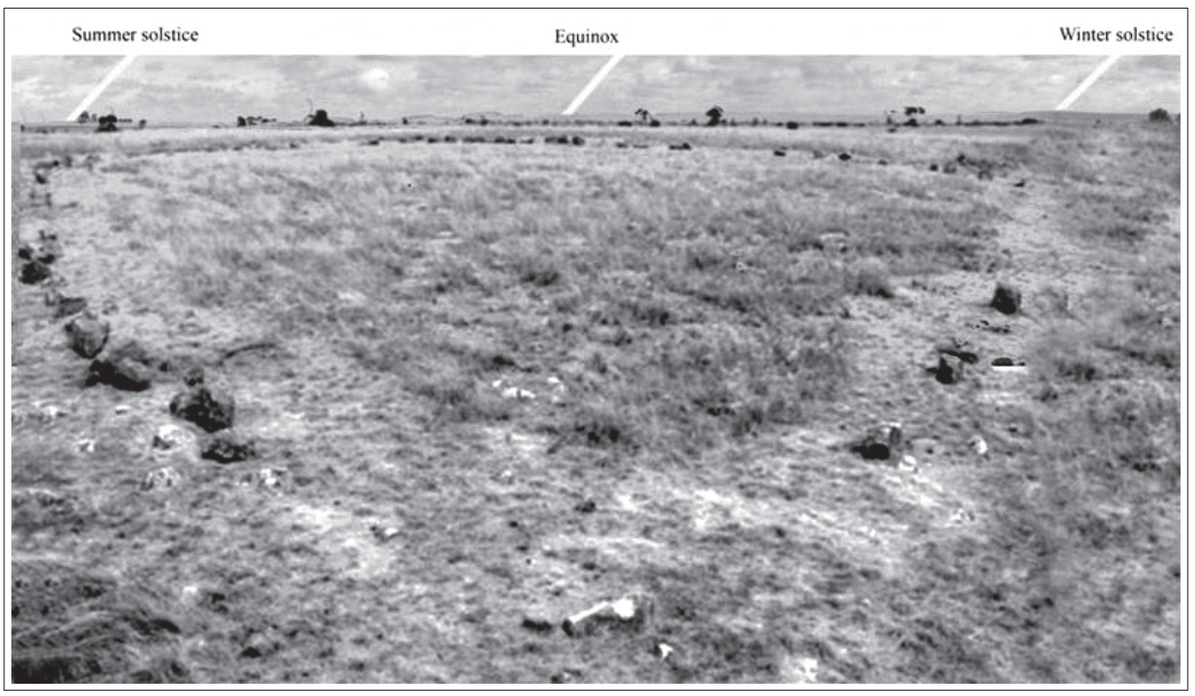

Fig. 5. The view across the Wurdi Youang stone circle, showing the positions of the setting sun at the solstices and equinox. Lower part of the composite. © John Morieson.

Third, besides the outliers indicating the solstices and equinox, there is an additional outlier whose significance is unclear. While these doubts may seem contrived, they have to be answered, and the best way to do so would be to find another site with similar astronomical alignments. Other stone arrangements in Victoria also indicate the cardinal points, from which we may conclude that the local Aboriginal people knew these directions with some precision, presumably by observing celestial bodies. But are there other sites which point to the position of the solstices? The search continues.

Conclusion

There is a growing body of evidence that traditional Aboriginal people were deeply fascinated by the sky, and the motion of the bodies within it, and had a far richer and deeper knowledge of the sky than is usually appreciated. However, while the evidence for actual measurements or records is suggestive, it remains unproven, although the clues are sufficiently tantalising to fuel the search for more evidence.

Acknowledgements

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AUSTRALIJOS ABORIGENŲ ASTRONOMIJOS BEIEŠKANT

Ray P. Norris

Santrauka

Australijoje egzistuoja apie 400 skirtingų vietinių kultūrų, turinčių savitą mitologiją, ritualus, meno formas. Daugelyje iš jų aptinkama ryškių astronominių žinių elementų. Vis dėlto šioms įvairioms kultūroms yra būdingi ir bendri vaizdiniai, kaip antai, „Emu danguje“ (emu – Australijos paukštis *Dromaius novaehollandiae* – vert. past.) – tamsių debesų telkinys Paukščių Take, taip pat žinomi įvairūs visiems bendri pasakojimai apie Saulę, Mėnulį, Orioną, Sietyną. Nors Saulės užtemimų buvo bijomasi, žinomi mažiausiai du nepriklausomi liudijimai, kad vietiniai žmonės užtemimus siejo su Saulės ir Mėnulio jungtimi.

Mūsų projektas skirtas šių kultūrų studijoms dviem pagrindinėmis kryptimis. Viena kryptis – darbas su vietinėmis kultūromis, tokiomis kaip Yolngu, Šiaurės

Australijoje, kurių tradicinė kultūra klesti. Įrašinėjame pasakojimus ir fiksuojame astronomines žinias tiek, kiek jų gali būti pateikta nenusimanančiam baltajam asmeniui.

Kita kryptis skirta Pietryčių Australijos vietinių žmonių astronomijos studijoms. Šias kultūras per keletą metų smarkiai apnaikino europiečių gyvenvietės. Čia tiriami ir fiksuojami petroglifai Sidnio baseino regione, taip pat akmenų konstrukcijos Viktorijoje. Sidnio uolų menui, iš visko sprendžiant, būdingas ryškus astronominis simbolizmas: čia paminėtinas emu atvaizdas uoloje (labiau primenantis „Emu danguje“ nei tikrovišką paukštį emu) bei dažnai vaizduojamas Mėnulio pjautuvas. Nustatyta, kad Viktorijoje esantis akmenų ratas apytikriai orientuotas į saulėgrįžas ir lygiadienį, bet turima ir kitų pavyzdžių, kur akmenys gana kruopščiai orientuoti pagal pasaulio šalis. Toliau vykdant tyrimą siekiama nustatyti, ar šie pastebėjimai gali būti pagrįsti statistiškai.

Vertė Jurgita Žukauskaitė