

# Leichhardt’s grasshopper / Alyurr, insects, scientific taxonomy, naming

More than 60% of all animal species scientifically described are **insects**. Almost a million insect species are known so far, and probably at least as many are still undiscovered. Many insects are benign, seemingly insignificant creatures; some thrive under the most unwelcoming of conditions. Small and inconspicuous, many become visible only if you look closely – but if you do, you might find them extremely beautiful. Some species are considered annoying or are seen as harmful pests by humans. On the other hand, we acknowledge today that they are of fundamental importance for the earth’s ecosystem.

**Insect sounds** and their modes of acoustic communication are as varied as the species themselves. There are many different ways in which insects use their body to produce sound: vibration or tremulation of wings or other body parts, percussion (striking one body part against another), click mechanisms and even air expulsion. Most common is stridulation, meaning frictional mechanisms involving the movements of two specialised body parts against each other in a systematic, patterned manner. This signalling, through scraping and grinding and knocking, shows a similarity to electronic sounds – simple patterns on micro levels are produced and varied in frequency and intensity. An interesting connection can be drawn to one of the most important digital sound synthesis / processing techniques today, granular synthesis, where small grains of sound are layered and become clouds of sound. In the same manner, overlapping structures of many short insect calls resonate in a landscape, or even in a few trees and bushes, thus creating temporal density and spatial multitude – a much more refined spatiality than one could ever create in the virtual electronic world.

**Insect sounds in archives.** Insect sound is also “marginalised”; many insect sounds are soft, nearly inaudibly soft – although when amplified by the microphone, they may become sharp, piercing and penetrating. (And when insects sound in choruses they mark the soundscape of a landscape or a season or time of day, for example cicadas.) Formerly, insect sound was rarely the focus of scientific research. Today, bioacoustics are becoming increasingly relevant, but there is still a lack of sound documents to be found in collections and archives. This is not only because sound recording only became possible from the beginning

of the 20th century, existing archival recordings also have often not yet been digitized or included in digital databases (for example in the The Atlas of Living Australia, the national biodiversity database, <https://bie.ala.org.au>). Sound recordings in the archives can have very different characteristics – some consist of long recordings taken in the field, with other species, environmental sound or even comments by the recordist in the background, but there are also many sound documents of insects in captivity, recorded in the sterile inside space of a laboratory, sometimes with electrodes attached to nerves in order to provoke sound producing mechanisms.

The multitude, diversity and specificity of insect sounds, and the questions of why and how they call – the “story” that is connected with their form of acoustic communication – are what makes composing with these calls interesting and rewarding. Insect sounds are highly adaptive to the environment and living requirements of an animal; even similar species can produce completely different calls – their uniqueness allows for an **artistic approach** that is less scientific but more speculative in a productive way.

The existence of **Leichhardt’s grasshopper** only became known to me after I had decided to research insect sounds for this project as a kind of methodology for the reasons named above. It was a *coincidence* that the species is native to Arnhem Land, and that it plays a very important role in local Indigenous Creation / Dreaming Stories.

The Jawoyn and Gundjeihmi (Gundjeihmi) people of Western Arnhem Land call the grasshopper **Alyurr**, children of the lightning man, Namarrkon, a powerful Indigenous creation ancestor. Namarrkon came from the Cobourg Peninsula with the storms of the north-west monsoon, together with his wife, Barrginj, and their children. The peak time for lightning in Arnhem Land is the “build-up” in November-December, when spectacular dry thunderstorms light up the skies. There is a famous Namarrkon painting at the Burrungkuy / Angbangbang (Nourlangie) rock art site in Kakadu. In many rock art paintings, Namarrkon is depicted with axes extending from each side of his body, which he uses to split clouds or lightning. The axes are striped bands that replicate Alyurr’s antennae.

Leichhardt’s grasshopper’s scientific name is **Petasida ephippigera**. Leichhardt saw it on 17.11.1845 and sketched it in his field travelogue. After Leichhardt’s sighting of 1845, it was not spotted again (in the “official” records at least) until 1973, 128 years later. It is brightly blue- and orange-coloured and belongs to the family *Pyrgomorphidae* – Leichhardt’s grasshopper’s closest relative is found far off in the south-west of Western Australia, just as Alyurr has only been found in the Northern Territory, in small, isolated populations at three main locations in the “stone country”. Most sites are accessible only by foot, more than a day’s walk from any roads. Even though it is quite rare, the grasshopper can’t be covered by endangered species legislation because so much is unknown about its basic distribution, biology and ecology. Alyurr lives on one host plant – an aromatic resinous bush called Pityrodia – and often it stays on one particular bush.

Many other plant and animal species were named after Leichhardt (around 12 animals and 90 plants in 2012, see Landeck). But although he first described many plants and animals in his written notes, made sketches of them, etc., Leichhardt was able to publish almost none of his research. (Leichhardt’s grasshopper is a good example; he saw and described it in his field book, but it was named *Petasida ephippigera* by Adam White in 1845.) The link between **taxonomy** – the scientific process of naming, circumscribing and classifying groups of biological organisms – and other concepts of knowledge production, understanding and acknowledgement has been one of the concerns of this project (and thinking about the significance of “naming” led to Leichhardt in the first place, because in Australia, geographical features, highways, roads, towns, districts, buildings, shops, etc. are named after him – in stark contrast to how little he is known in Germany).

Should the “European taxonomic urge” be questioned? Robert Raven and Barbara Baehr, arachnologists from the Queensland Museum, both point out that because current scientific research is under increasing pressure to produce economic value, the description of new species is sometimes less honoured (one could see an analogy to artistic production – discovering and describing new species has aspects of a *l’art-pour-l’art* activity). But as much of the world’s biodiversity is vanishing, Robert Raven emphasises that basic scientific knowledge is needed in order to understand the importance of the single species in the “building blocks” of life, where everything is connected. And Barbara Baehr, who named several of her recently discovered spider species after Leichhardt, sees discovering and describing every “new” species as an expression of joy and respect for life.

Chaloupka, George. *Journey in Time: The World’s Longest Continuing Art Tradition: The 50000 Year Story of the Australian Aboriginal Rock Art of Arnhem Land*, Chatswood: Reed 1993.

Clarke, Geoffrey M. & Fiona Spier-Ashcroft. *A Review of the Conservation Status of Selected Australian Non-Marine Invertebrates*, Canberra: Dept. of the Environment and Heritage 2003.

David Dunn. *Chaos and the Emergent Mind of the Pond*, liner notes to CD *Angels and Insects*, Albuquerque: What Next? 1999.

Ewing, A.W. *Arthropod Bioacoustics: Neurobiology and Behaviour*, Ithaca, New York: Comstock Publishing Associates 1989.

Hartmann, Heike. Australien sammeln, in: Hartmann, Heike (Ed.), *Der Australienforscher Ludwig Leichhardt: Spuren eines Verschollenen*, Berlin: Be.bra 2013. 95–111

Landeck, Ingmar. Liste der bis zum Jahr 2012 nach Ludwig Leichhardt benannten Tierarten (gültige Namen mit Synonymen, Trivialnamen) sowie der von ihm selbst beschriebenen Arten. <http://ingmar-landeck.de/deutsch/frames/main/leichhardt/animalspecies.pdf>

Landeck, Ingmar. Listen der nach L. Leichhardt benannten Pflanzenarten (gültige Namen mit Synonymen, Trivialnamen) sowie der von ihm selbst beschriebenen Arten <http://ingmar-landeck.de/deutsch/frames/main/leichhardt/plantspecies.pdf>

Maaß, Yvonne. Natural history, names, nomenclature. The significance of name giving exemplified by the discoveries of Ludwig Leichhardt and Adelbert von Chamisso, in: *1001 Leichhardts*, Barrett, Lindsay, Lars Eckstein, Andrew Hurley and Anja Schwarz (Eds.), Queensland Museum, n.d. (2013) <https://leichhardt.qm.qld.gov.au/1001+Leichhardts>

Reese, Kirsten. Historical time and micro-time-archival insect sound and electronic music, lecture for the conference *Music and ecological time*, Sydney Conservatorium of Music 2019, publication forthcoming.

Sarmiento-Ponce, Edith Julieta. Acoustic communication in insects, Quehacer Científico en Chiapas 9, 2 (2014).



Birndu, mosquito painting by Dallas Kelly from Inyalak Arts at Gunbalanya



mosquito recordings



Ground truthing is a term used in various fields to refer to information provided by direct observation.

sleeping on the ground, under a mosquito net, was the most profound experience of my trip

David Dunn writes in the liner notes to this CD that he can't "accept the assumption that the creatures themselves are mindless specks of protoplasm forever doomed to reiterate a few automatic mating calls or territorial assertions." He as a musician hears a "sense of urgency, expressing the self-enjoyment of being one among many", a vitality. And he speaks of "emergent patterns in a complex system".

<https://dr-pop.net/leichhardt-337.htm>  
**Northern Stubby Grass-ticker** *Terepsalta leichhardtii*, Ewart, 2013  
Species number (TNS): 337.  
Fore wing length: 13-16 mm.  
Distribution and seasonality: Known only from the Mount Isa district in north-western Queensland. Adults are present during January. Notable localities: Lake Moondarra Road (A. Ewart). Habitat: Open grassland and grassy woodland. Calling song and behaviour: A chirping call, punctuated regularly by soft rattles. Adults sit on the stems of grasses.

green ants in Darwin



green ant nest building



insects at the campground at Cobourg



The family name Tettigoniidae is derived from the genus Tettigonia, first described by Carl Linnaeus in 1758. In Latin tettigonia means a kind of small cicada, leafhopper; it is from the Greek ΤΕΤΤΥΓΟΝΙΟΝ, tettigionion, the diminutive of the imitative (onomatopoeic) ΤΕΤΤΙΞ, tettix, cicada. All of these names such as tettix with repeated sounds are **onomatopoeic**, imitating the **stridulation of these insects**. The common name katydid is also onomatopoeic and comes from the particularly loud, three-pulsed song, often rendered "ka-ty-did", of the nominate subspecies of the North American Pterophylla camellifolia, whose most common English name is the common true katydid.

systematisation

naming

classification

naming and sound - onomatopoeic naming

Orthoptera Species File Online: taxonomic database of the world's grasshoppers, locusts, katydids and crickets, both living and fossil. Full synonymic and taxonomic information for 23,700 valid species, 39,999 taxonomic names, 145,100 citations to 11,850 references, 44,000 images, 184 sound recordings, 37,980 specimens, and keys to 2,100 taxa.

Insects

- have three body parts: head, thorax and abdomen.
- have a single pair of antennae on the head.
- have three pairs of legs originating from the thorax.
- often have wings and can fly.

I asked **Hannelore Hoch**, **Museum für Naturkunde Berlin**, if there are "relatives" of Leichhardts Grasshopper in Brandenburg or Germany: there are none (no close relatives) he belongs to the family of **Pyrgomorphidae**, of which there is (almost) only one species in Europe: the species Pyrgomorpha conica; it's geographical distribution begins in southern France.

some websites with descriptions of Leichhardt's Grasshopper/Aljurr:

[http://www.ingmar-landeck.de/netscape\\_lip.html](http://www.ingmar-landeck.de/netscape_lip.html)  
"Heuschrecken Australiens", site of Brandenburg biologist Ingmar Landeck

<http://orthoptera.speciesfile.org/Common/basic/Taxa.aspx?TaxonNameID=1120816>  
[http://www.ces.csiro.au/aicn/system/c\\_3846.htm](http://www.ces.csiro.au/aicn/system/c_3846.htm)  
Commonwealth Scientific and Industrial Research Organisation, Australia's national science agency

Australia has hundreds of different species of grasshoppers. They are one of the greatest consumers of plant material in the Northern Territory. Grasshoppers and termites eat more than all other grazing animals combined, including cattle.

Numerous animals and plants were named after Leichhardt. Some examples:

Pristis pristis (Linnaeus, 1758) - Freshwater Sawfish - **Leichhardt's sawfish** - *Leichhardts Sägerochen* is found worldwide in tropical and subtropical coastal regions; it has declined drastically and is considered critically endangered

*Scleropages leichardti*, spotted barramundi - *Leichhardts Knochenzüngler* - freshwater fish, near threatened in NT

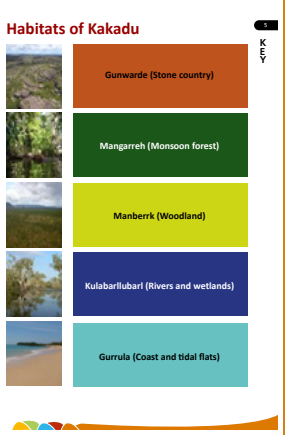
*Leichhardtia sisurnius* - pan-shell snail

*Leichhardtia macleayana*, stringy bark pine, cypress pine  
*Corymbia leichhardtii*, species of tree that is endemic to Queensland, can grow up to 15m high  
*Leichhardtia australis*, bush banana

Neolamarkia cadamba, with English common names burlflower-tree, laran, and **Leichhardt pine**, and called kadam or cadamba locally, is an evergreen, tropical tree native to South and Southeast Asia, very similar to Nauclea orientalis with the common name **Leichhardt tree**

**Guide to threatened species in Kakadu National Park** including other plants and animals of interest (National Environmental Research Program Northern Australia Hub for Kakadu National Park)

This guide is for Kakadu National Park staff and bininj (local Traditional Owners and other Indigenous people of Kakadu). The guide highlights listed threatened species and some of the other significant plants and animals of Kakadu National Park at the time of printing. There are many more species that contribute to the rich biodiversity of the park, but these represent many of the species that are least often seen, or are significant to bininj.



Keith Risk is one of the authors of the Gulmoerrgin/Larrakia Seasons calendar.



"harmful" species

Dunn has also picked up signals from bark beetles, noxious beetles that threaten vast expanses of California trees, the growing numbers of which are seen as a hallmark of climate change. He is researching acoustic means to help fight harmful bark beetles threatening North American forests (a development also heightened due to climate change's environmental impact).



Some of the rock art images found across the plateau depict **Namarrgon** in his usual **male** form, others show this being as a **female**, or even an animal-headed **hermaphrodite**, suggesting that many more details of the mythology existed in an earlier, more stable time. (Chaloupka)

There is a famous Namarrgon painting at Burrungkuy/Angbangbang (Nourlangie) rock art site in Kakadu (which we visited on the field trip).

*Petasida ephippigera* (Leichhardt's Grasshopper) is a grasshopper from the family **Pyrgomorphidae** (Brunner von Wattenwyl, 1882, 143 genera, 455 species - "Kegelkopfschrecken"). The family includes numerous species that are primarily native to Australia and Africa. *Petasida ephippigera* is the only species in the monotypic genus *Petasida*. Just like its sister genus *Scutillia* with its only representative *Scutillia verrucosa* (Giant Spotted Pyrgomorpha), it is endemic to Australia.

**Namarrgon**, the Lightning Man, reached **Cobourg Peninsula** and the plateau region with the first storms of the northwest monsoon after the seas rose at the end of the last Ice Age. He was accompanied by his wife, Barrgini, and their children. They came with the rising sea levels, increasing rainfall and tropical storm activity. The very first place where Namarrgon left some of his destructive essence was at **Argalargal (Black Rock)** on the **Cobourg Peninsula**. From there the family members made their way down the peninsula and then moved inland, looking for a good place to make their home. (Chaloupka)

In the rock paintings, **Namarrgon** is usually portrayed with stone axes protruding from his head, elbows and knees, though the axes may be attached to any part of his body. The striped band replicating **Aljurr's** bent antennae extends on each side of his body from head to toe, representing **bamihgeng** (the lightning). The stone axes are used to split the dark clouds, when he shakes the earth with lightning and thunder. He is capable of causing widespread devastation by arriving with a storm, shattering and uprooting trees, and frightening both the Aboriginal people and the **Mimi**, who bury their own stone axes in order not to attract the fury of this being. **Sometimes Namarrgon strikes and kills people**. (Chaloupka)



Reich > Stamm > Klasse > Ordnung > Familie > Gattung > Art

Phylum: ARTHROPODA (=Insects)  
Class: Hexapoda  
Order: Orthoptera  
Suborder: Caelifera (the other big suborder is *Ensifera*)  
Family: Pyrgomorphidae  
Genus: Petasida

Kingdom - Phylum - Class - Order - Family - Genus - Species

Since the emergence of the theory of evolution, efforts have been made to convert this partially artificial system into a natural system that better reflects the relationships of descent (**phylogenetics**). For this purpose, not only morphological and anatomical, but also biochemical and above all genetic similarity is used to determine family relationships.

**Leichhardt, Journal of an Overland Expedition to Port Essington, Nov. 17, 1845:** Whilst on this expedition, we observed a great number of grasshoppers, of a bright brick colour dotted with blue: the posterior part of the coarsely, and the wings were blue; it was two inches long, and its antennae three quarters of an inch.



<https://www.youtube.com/watch?v=O697KCNft4>  
video of Leichhardt's grasshopper *Petasida ephippigera*, Aljurr. Location: near Nourlangie Rock, Kakadu

Systema naturae, Carl von Linné 1735, **Linnaen taxonomy**: the basic concept is the typological definition of the species, that is, the reduction of the abundance of features to a few key features and the abstraction of the possible variations within a species to one type ("idealistic morphology"). Linnaeus assumed the immutability of the species and did not intend to create a phylogenetic system.

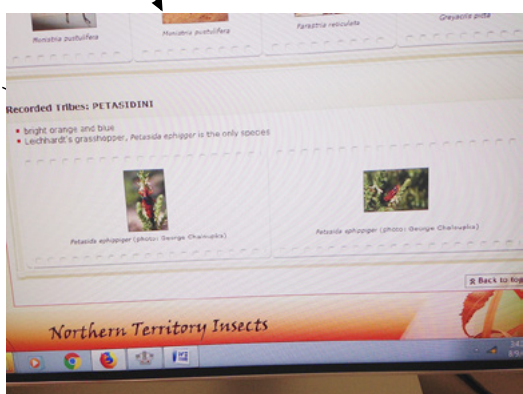


This other systematics approach I found in a digital insect lexicon for the Northern Territory. It also featured two photos of Leichhardt's grasshopper, taken by **George Chaloupka**.

Species that are:

- Colourful
- Unpleasant
- Biting
- Stinging
- Rash-causing
- Noisy
- Large
- Common
- Unusual
- Protected by legislation (mostly rare or endangered)

What about species that sound alike?



Leichhardt's Grasshopper belongs to the order Orthoptera and to the suborder Caelifera. Caelifera (short-horned grasshoppers) produce the signals by rubbing the inside of the hind legs and the outside of the front wings together; the sound is more of a "continuous rattle". The other of the two large groups of Orthoptera are the Ensifera (long-horned grasshoppers, i.e. locusts and crickets), they produce their acoustic signals by sliding the wings one on top of the other (with a *Schrilleste* or *Schrillkantele*) - therefore the signal is always two-syllable. Leichhardt's Grasshopper is said to be mute (because he shows no sound-producing devices).

