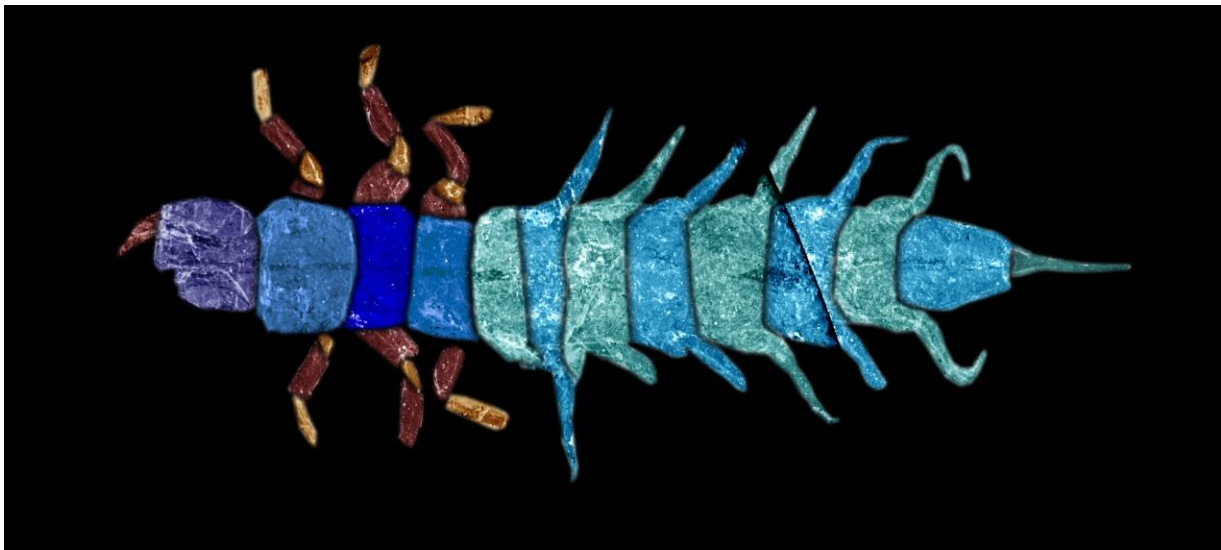


NOTA DE PRENSA

Scientists describe new prehistoric aquatic insect species living in the ancient forests of Australia

- In 2022, the scientists, led by the Australian Museum in Sidney participated in the discovery of a spectacular Lagerstätte in Australia. This study provides the first detailed analysis of the community of aquatic insects from this deposit
- The study provides new information about what the insects of Australia were like before the continent went through a process of aridification



Larva of Slidaea // Viktor Baranov

Seville. 27th August 2024. A scientific team led by the Doñana Biological Station – CSIC has described for the first time one new species and several morphotypes of aquatic insects from the Miocene Epoch found in the McGraths flats, in New South Wales, Australia. The Australian Museum Research Institute and the University of Canberra have collaborated with CSIC on this study, which was published in the journal [Papers in Palaeontology](#).

Findings of the study shed new light on the long term changes in Australian climate and biota. Today, a large part of Australia is arid, with vast extensions of shrublands, grasslands and deserts. However, in Miocene,

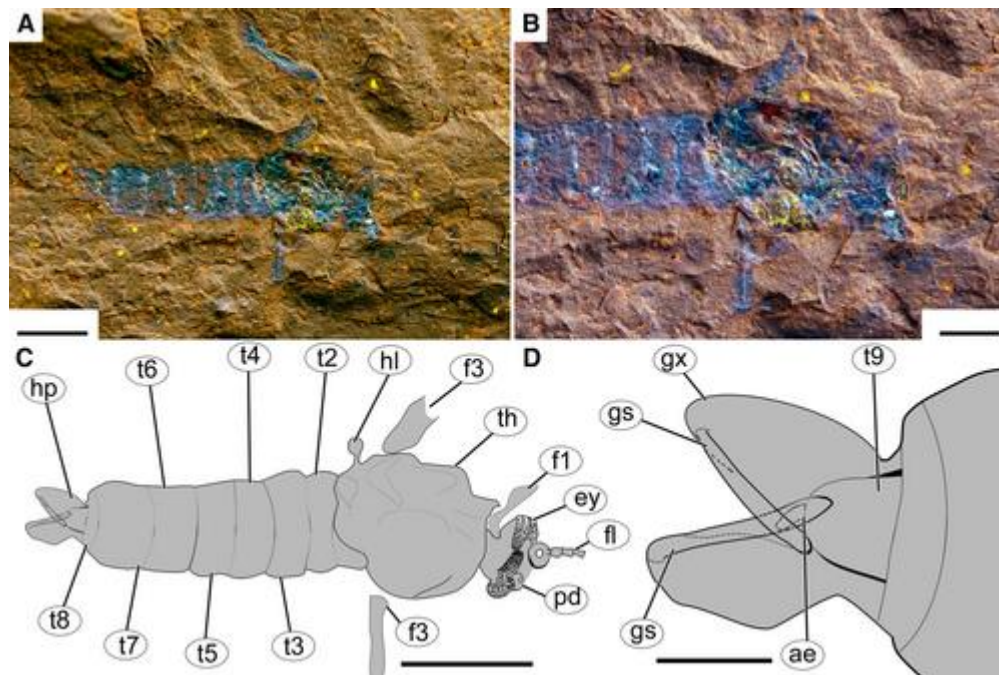


between 16 and 11 millions ago, the region was dominated by mesic (wet) forests. Today, due to changes in temperature and rainfall, these wet environments only exist in small patches in the north of the continent, close to the coastline. “A lack of well-preserved fossils has made it difficult to study climate and biota of Australia”, explains Viktor Baranov, a researcher at the Doñana Biological Study and first author of the study.

It was in 2022 when a scientific team, led by the Australian Museum’s Curator of Palaeontology, Dr. Matthew R. McCurry and including Dr. Baranov and many other colleagues, revealed an extraordinary discovery. In central New South Wales, eastern Australia, Nigel McGrath found a great variety of unique rocks on its property. Fossil organisms were visible, as if printed, on the rocks. After several rounds of excavations, scientists confirmed that they were in the presence of one of the most spectacular Lagerstätte, (deposit of fossils rich with the remnants of the soft-bodied organisms) in the world, named McGrath Flat after its discoverer. Deposit’s fossils are exceptionally preserved a rich diversity of plants, insects, spiders and vertebrates. This discovery enabled scientists to deepen their understanding of the organisms that once lived in the region before the Miocene’s cooling and reduced rainfall led to the disappearance of wet forests.

***Chaoborus abundans* reveals how fossilization process may occur**

The new paper is the result of Baranov’s field work and collection work in the Australian Museum in early 2020. The team have identified one new species of Chaoboridae or “phantom midges”, named *Chaoborus abundans* after its great abundance, with thousands of larvae and pupae found in the McGraths Flat deposit. Likewise, they have described several morphotypes of other groups of aquatic insects. The team have found three new morphotypes of family Chironomidae (non-biting midges), one of Limoniida (Crane flies) and another one of Sialidae (Alderflies).



Details of adult male of Chaoborus abundans //Viktor Baranov

In addition to taxonomic results, the fossils have also provided some clues about the ecology of the animals from McGrath Flat. Representatives of the genus *Chaoborus* were especially informative, as their abundance allowed detail analysis of the species’ morphology and development (ontogeny). “We have shown that all four larval instars of the *Chaoborus* were present in the fossil record of McGraths Flat. That indicates that

fossils were deposited in-situ rather than brought by water from elsewhere”, says Viktor Baranov. “This is important, because Chaoborus representatives have rather well-defined ecological preferences. Their larvae tend to live in the standing water-bodies with little to no fish. This ecological preference of the Chaoborus larvae, tells us about kind of environment in which the preservation of the fossils happened – a small lake, or likely an oxbow”

McGrath Flat, a window into the past and the future

Fossils of McGraths Flat serve as a window into a unique time in the history of the Earth – the Middle Miocene Climatic Optimum – warm and wetter period that followed with gradual cooling and drying of the planet’s climate. Australian climate has been getting drier and drier ever since, but at much higher rate as of late, due to the climate change. With this study of this fossil deposit, scientist can better understand the impact of aridification of natural ecosystems over large periods of time, a task that is pertinent to understanding future changes in the environment.

“Spain in particular is grappling with aridification of many areas. In these conditions, observing progression of environmental change in the past, is one of the best tools we have to estimate where our own environment, agriculture and societal adaptations are heading in the future”, points Baranov. “The fossils of McGrath flats are more than just traces of the past, they are the proverbial canary in the mine, showing us, how lush forest turns to dry, semid-deserted grasslands. Hopefully, being more informed about long-term effects of aridification will make us more prepared to deal with its consequences.”

References:

Viktor Baranov, Michael Frese, Robert Beattie, Tara Djokic, Matthew R. McCurry. **New aquatic insects form the Miocene of Australia with notes on the ecology and ontogeny of a new species of *Chaoborus* (Diptera, Chaoboridae).** *Papers in Palaeontology*. <https://doi.org/10.1002/spp2.1580>

Matthew R. McCurry, David J. Cantrill, Patrick M. Smith, Robert Beattie, Mary Dettman, Viktor Baranov, Charles Magee, Jacqueline M. T. Nguyen, Marnie A. Forster, Jack Hinde, Ross Pogson, Helen Wang, Christopher E. Marjo, Paulo Vasconcelos, Michael Frese. **A Lagerstätte from Australia provides insight into the nature of Miocene mesic ecosystems.** *Science Advances*. <https://doi.org/10.1126%2Fsciadv.abm1406>