

► scholars thought to be hopelessly lost,” says Ricciardo. “It seemed even more incredible because the letter was not in an obscure library, but in the Royal Society library.”

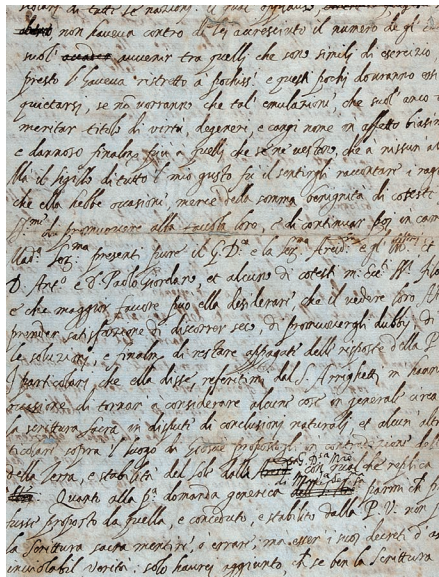
Ricciardo and his colleagues Franco Giudice at the University of Bergamo and Michele Camerota of the University of Cagliari in Italy describe the letter's details and implications in an article in press at the Royal Society journal *Notes and Records*. Some science historians declined to comment on the finding before they had scrutinized the article. But Allan Chapman, a science historian at the University of Oxford, UK, and president of the Society for the History of Astronomy, says: “It's so valuable — it will allow new insights into this critical period.”

MIXED MESSAGES

Galileo wrote the 1613 letter to Benedetto Castelli, a mathematician at the University of Pisa in Italy. In it, Galileo set out for the first time his arguments that scientific research should be free from theological doctrine.

He argued that the scant references in the Bible to astronomical events should not be taken literally, because scribes had simplified these descriptions so that they could be understood by common people. Religious authorities who argued otherwise, he wrote, didn't have the competence to judge. Most crucially, he reasoned that the heliocentric model of Earth orbiting the Sun, proposed by Polish astronomer Nicolaus Copernicus 70 years earlier, is not actually incompatible with the Bible.

Galileo, who by then was living in Florence, wrote thousands of letters, many of which are scientific treatises. Copies of the most significant were made by different readers and widely circulated. His letter to Castelli caused a storm.



The letter shows amendments in Galileo's hand.

Of the two versions known to survive, one is now held by the Vatican Secret Archives. This version was sent to the Inquisition in Rome on 7 February 1615, by a Dominican friar named Niccolò Lorini. Historians know that Castelli then returned the original 1613 letter to Galileo, and that on 16 February 1615 Galileo wrote to his friend Piero Dini, a cleric in Rome, suggesting that the version Lorini had sent to the Inquisition might have been doctored. Galileo enclosed with that letter a less inflammatory version, which he said was the correct one, and asked Dini to pass it on to Vatican theologians.

His letter to Dini complains of the “wickedness and ignorance” of his enemies, and lays out his concern that the Inquisition “may be in part

deceived by this fraud which is going around under the cloak of zeal and charity”. At least a dozen copies of the version Galileo sent to Dini are now held in different collections.

Beneath its scratchings-out, the signed copy discovered by Ricciardo shows Galileo's original wording — and it is the same as in the Lorini copy. The changes are telling. In one case, Galileo referred to certain propositions in the Bible as “false if one goes by the literal meaning of the words”. He crossed through the word “false”, and replaced it with “look different from the truth”. In another section, he changed his reference to the Scriptures “concealing” its most basic dogmas, to the weaker “veiling”.

This suggests that Galileo moderated his own text, says Giudice. To be certain that the letter really was written in Galileo's hand, the three researchers compared individual words in it with similar words in other works written by Galileo around the same time.

CHANCE DISCOVERY

The historians are now trying to trace how long the letter has been at the Royal Society, and how it arrived there. In the catalogue, the document was dated 21 October 1613, but when Ricciardo examined it, he saw it was actually dated 21 December 1613. That might be one reason why the letter has been overlooked by Galileo scholars, says Giudice. The letter was included in an 1840 Royal Society catalogue — but was also misdated there, as 21 December 1618.

For now, the researchers are stunned by their find. “Galileo's letter to Castelli is one of the first secular manifestos about the freedom of science — it's the first time in my life I have been involved in such a thrilling discovery,” says Giudice. ■

FUNDING

Scientist stripped of grant

Dinosaur discoverer disciplined by University of Bath, UK, after investigation into bullying.

BY HOLLY ELSE

A research-funding foundation has revoked a £1-million (US\$1.3-million) grant from prominent palaeontologist Nicholas Longrich, who was disciplined by his institution, the University of Bath, UK, after an investigation found that he had breached its anti-harassment policy.

Longrich was part of a team that in 2015 reported the first four-legged fossil snake, a high-profile discovery published in *Science*¹; in 2010, he grabbed the media spotlight with his discovery of the whimsically named *Mojoceratops perifania* dinosaur².

The Leverhulme Trust awarded the

£998,185 grant — at least three-quarters of which was dedicated to paying research assistants and postgraduate students — to Longrich in 2016 for research on a mass-extinction event that marked the end of the Cretaceous era 66 million years ago.

“We can confirm that Dr Longrich's grant has been withdrawn but his doctoral students will not be disadvantaged by this,” said a spokesperson for the foundation, which distributes £80 million of research funding each year. Leverhulme declined to add more details, and referred further queries to the University of Bath.

On 23 August, the university told *Nature* in a statement that it had received a formal

complaint about Longrich in late May 2018 relating to a “potential breach” of the university's dignity and respect policy, which aims to prevent bullying, harassment and victimization of students and staff.

In early June, it began a formal investigation, which ended in July. “The investigation panel considered written and oral statements, taking evidence from the complainant, the subject of the complaint and a number of others,” said the university. “The conclusion reached was that though there had been no malicious intent, the formal complaint should be upheld.”

The university issued Longrich with an oral warning and made changes to his “supervisory arrangements” with current students. It said

that the changes will apply to future students, too.

The university declined to give more details of the findings of the investigation. In its statement, it said: “We are providing further information only where we are satisfied that the privacy of individual students and staff would not be compromised and the necessary consents have been obtained.”

On 19 September, after Leverhulme’s decision to revoke Longrich’s grant, a university spokesperson told *Nature*: “We respect this decision by the Leverhulme Trust and appreciate the fact they will continue to support the existing PhD students.”

The spokesperson added: “All staff and students have a right to be treated, and have an obligation to treat others, with dignity and respect. The University has previously issued a statement about the result of a disciplinary hearing. We have been supporting students and staff throughout this period.”

Nature has asked Longrich for comment on the revocation of his grant and the investigation conducted by his university, and is awaiting his response.

A STRING OF ALLEGATIONS

The news follows two other inquiries into bullying at prominent UK research institutions in the past month, one of which also led to a grant being revoked.

On 17 August, the Wellcome Trust, one of the world’s largest research-funding charities, announced that it would revoke a £3.5-million (\$4.5-million) grant from leading cancer geneticist Nazneen Rahman, after allegations that she had bullied scientists and other staff members when she worked at the Institute of Cancer Research (ICR) in London. The ICR concluded that there was enough evidence for some of the allegations to be considered at a disciplinary hearing, but Rahman resigned and the disciplinary hearing did not take place.

And at the end of August, the Wellcome Sanger Institute in Hinxton, UK, confirmed that it was investigating allegations of bullying there. ■

1. Martill, D. M., Tischlinger, H. & Longrich, N. R. *Science* **349**, 416–419 (2015).
2. Longrich, N. R. *J. Paleontol.* **84**, 681–694 (2010).



A new species of sea-anemone-like *Relicanthus* clings to a sponge stalk on Pacific Ocean floor.

ECOLOGY

Deep-sea mining zone thrives with life

Discoveries come as nations prepare to mine sea bed.

BY AMY MAXMEN

Deep in the eastern central Pacific Ocean, on a stretch of sea floor nearly as big as the continental United States, researchers are discovering species faster than they can name them. And they are exploring newfound fossil beds of whales that lived up to 16 million years ago.

The findings — many reported for the first time last week at the Deep-Sea Biology Symposium in Monterey, California — have come as a shock. Some scientists had thought these vast underwater plains, 4,000–5,500 metres below the ocean surface, were relatively lifeless. But that is changing just as nations and corporations prepare to mine this patch of the Pacific sea bed for cobalt, manganese and other elements for use in technologies

such as smartphones and electric cars.

Researchers are now pushing the International Seabed Authority (ISA), the body that oversees mining in international waters, to limit environmental damage from future activity. The ISA, which is developing rules for mining in the ocean, is accepting comments on a draft plan until 30 September. Its goal is to release final rules by 2020, clearing the way for mining to start.

“What we do right now is going to have huge implications for decades,” says Diva Amon, a deep-sea biologist at the Natural History Museum in London. “We have a chance to do things as rigorously and responsibly as we can.”

The ISA began issuing contracts to explore the Clarion–Clipperton Zone (CCZ), a 6-million-square-kilometre swathe of the Pacific Ocean floor that stretches from ▶

D. J. AMON & C. R. SMITH


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