# How erroneous scientific terms persist and spread in the age of AI



In recent years, the rise of artificial intelligence (AI) in scientific research and publishing has led to an unexpected phenomenon: the persistence and spread of erroneous terms within academic literature, sometimes referred to as "digital fossils." One striking example is the nonsensical phrase "vegetative electron microscopy," which has appeared repeatedly in scientific papers despite having no basis in actual scientific terminology.

The origins of this phrase trace back to historical scanning errors and translation mishaps. In the 1950s, two papers published in the journal Bacteriological Reviews were digitized using Optical Character Recognition (OCR) technology. During this process, the separate terms "vegetative" and "electron microscopy," which appeared in adjacent columns, were mistakenly merged, creating the phrase "vegetative electron microscopy." Later, in 2017 and 2019, the term reemerged due to a translation error from Farsi to English; specifically, the words for "vegetative" and "scanning" differ by a single dot in Farsi script, leading to further unnecessary confusion.

An investigation by Retraction Watch in February brought these issues to light. Despite the term’s nonsensical nature, it has since been found in at least 22 different scientific papers. Although some of these papers have been corrected or retracted, the mistake had already permeated the scientific corpus. Notably, the phrase even appeared in a 2023 article by El País, one of Spain’s leading newspapers.

The problem has been exacerbated by the methods used in training AI models. AI systems designed to assist in writing and research are trained on vast datasets comprising published literature, and they often replicate terminologies encountered within those sources. Since "vegetative electron microscopy" appeared in multiple legitimate publications, AI models such as GPT-4o and Anthropic’s Claude 3.5 began to incorporate the erroneous phrase into their knowledge bases, using it in generated text without recognising it as incorrect. Aaron J. Snoswell and colleagues, writing for The Conversation, noted: “We also found the error persists in later models including GPT-4o and Anthropic’s Claude 3.5. This suggests the nonsense term may now be permanently embedded in AI knowledge bases.”

The presence of such digital fossils highlights wider challenges facing the integrity of scientific knowledge as AI-assisted research and writing become increasingly common. Researchers have responded by developing detection tools like the Problematic Paper Screener, an automated system that analyses approximately 130 million articles weekly. This tool employs nine different detectors to identify AI-generated content or anomalous terminology. For example, it identified 78 problematic papers in Springer Nature’s Environmental Science and Pollution Research journal alone.

Despite advances in detection, the problem remains formidable. The volume of scientific publishing is immense, with close to three million research papers released annually, many now incorporating AI in their preparation. Moreover, some scientific journals have been reluctant to retract or challenge questionable content to preserve reputations, as seen in the case of the publisher Elsevier, which initially defended the use of "vegetative electron microscopy" before issuing a correction.

The core concern is that once these errors are digitised and integrated into academic literature, they become entrenched. Given that AI models learn incrementally from existing data, such mistakes can be perpetuated and amplified, potentially distorting the scientific record on a broader scale. The issue serves as a demonstration of how even nonsensical errors can achieve a form of permanence in the digital age, with significant implications for research reliability and knowledge development.

The findings and ongoing discussions emphasise the need for vigilance in managing AI’s role in scholarly communication, ensuring the accuracy and authenticity of the scientific record in the age of digital information.

Source: [Noah Wire Services](https://www.noahwire.com)

## Bibliography

1. <https://retractionwatch.com/2025/02/10/vegetative-electron-microscopy-fingerprint-paper-mill/> - This article details the discovery and investigation of the phrase "vegetative electron microscopy" appearing in at least 22 scientific papers, its suspicious origins including paper mill involvement, and how some publishers, including Elsevier, initially defended its usage before corrections or retractions. It corroborates the claims about the phrase's prevalence, the controversy around its scientific validity, and responses from publishers.
2. <https://www.sciencebase.com/science-blog/vegetative-electron-microscopy.html> - This blog post supports the information on the phrase originating from an OCR error in digitizing a 1959 two-column paper, where the words "vegetative" and "electron microscopy" were mistakenly merged, illustrating how such errors can propagate in scientific literature, and raises concerns about quality control in academic publishing.
3. <https://retractionwatch.com/2025/03/04/vegetative-electron-microscopy-phrase-farsi-typo/> - This source explains the additional origin of the phrase as a Farsi translation or typographical error due to the similarity of Persian script characters, confirming the 2017/2019 reemergence related to translation mistakes, as well as discussing how text reuse in Iranian papers helped perpetuate the error.
4. <https://www.zmescience.com/science/news-science/ai-wrong-science-term/> - This article describes the concept of "digital fossils" in scientific literature, focusing on how AI training datasets incorporated the erroneous phrase "vegetative electron microscopy," leading to its use in AI-generated text, the persistence of the error in AI models like GPT-4o and Claude 3.5, and the broader implications for scientific knowledge integrity.
5. <https://boingboing.net/2025/02/12/fancy-science-journal-caught-publishing-nonsense-term-vegetative-electron-microscopy-doubles-down.html> - This piece highlights the role of a Russian chemist and software engineer in exposing the nonsense term's spread, Elsevier's defense of the phrase as an acceptable shorthand, and the social media and community backlash, confirming the article's points about publisher reluctance to retract and the term's embedding in research culture.
6. <https://www.noahwire.com/article/artificial-intelligence-scientific-publishing-digital-fossils> - This source from Noah Wire Services provides an overview aligned with the presented article, summarizing the rise of AI in scientific publishing, the resulting spread of erroneous terms like "vegetative electron microscopy," the challenges faced by researchers and publishers, and the development of detection tools such as the Problematic Paper Screener to combat these issues.
7. <https://news.google.com/rss/articles/CBMiekFVX3lxTE9kZnZzYTczVGpnelBmd2h5Y0tJTFM0a3F1WHl0NThfOENHV1pCN3lEWklFSEE0ZGpuZ05mWk9MOGlYQjhNSmN5LTFVZnE5ZXRpMVZYZjQzZWNPRVR6dFota1hfb253TnVWeV9EenllQW5RQWtMTnpJMU9B?oc=5&hl=en-US&gl=US&ceid=US:en> - Please view link - unable to able to access data