Webb’s Exoplanet Life Claim Sparks Fierce Debate in Astronomy

Astronomy’s biggest thriller of 2025 began with a tantalising signal from 120 light-years away and is now playing out in labs and preprint servers around the globe. On 17 April a team led by University of Cambridge astrophysicist Nikku Madhusudhan announced that the James Webb Space Telescope (JWST) had detected dimethyl sulfide and its chemical cousin dimethyl disulfide in the atmosphere of K2-18 b, a super-Earth orbiting a cool red dwarf in Leo. On Earth, both molecules are produced almost exclusively by living organisms, mainly marine phytoplankton. Their apparent presence on another world, the researchers said, offered “the strongest evidence yet” that life may thrive beyond the Solar System.

The observation came from JWST’s Mid-Infrared Instrument, which looked at K2-18 b during a six-hour transit and teased out faint absorption lines in the 6–12 micron range. Those lines lined up with laboratory spectra of the sulfur-bearing gases and remained after exhaustive noise tests, the team reported. Even so, the result reached only three-sigma statistical significance—about a one-in-300 chance of being a fluke—well short of the five-sigma gold standard scientists demand before crying discovery. Madhusudhan argued that another day’s worth of JWST time could push the detection over the line and open “a new chapter in astrobiology.”

Within days, the push-back began. Jake Taylor, an atmospheric physicist at Oxford, re-analysed the publicly released data with a blind retrieval method that did not assume any particular molecules were present. His model produced what he called “a flat line,” suggesting that the putative spectral bumps were buried in noise. Taylor’s critique, posted as an un-peer-reviewed preprint on 22 April, quickly drew support from other exoplanet specialists who warned that JWST was being driven to its limits and that the Cambridge team’s atmospheric model may have overstated the signal.

The controversy goes deeper than one molecule. K2-18 b itself is still something of a planetary chimera—eight-and-a-half times Earth’s mass, 2.6 times its radius and shrouded in a hydrogen-rich atmosphere. In 2023 Webb detected methane and carbon dioxide in that atmosphere, hinting at a steamy “Hycean” world with a global ocean. Recent climate simulations, however, suggest the planet may roast under a thick greenhouse blanket, or even sport a molten surface beneath its clouds. If liquid water is absent, the biosignature argument collapses, regardless of what gases Webb sees.

For now, the field is divided into cautious optimists and cheerful sceptics. Supporters note that DMS had been predicted as a plausible biosignature for Hycean planets years before Webb launched, and that the new signal appears in a wavelength band untouched by the earlier measurement—a rare independent line of evidence. Critics counter that the sulphur-bearing gases should be accompanied by ethane and other hydrocarbons, none of which show up in the spectrum, and that a stray instrumental artefact could masquerade as an absorption feature.

The stakes are enormous. JWST was never built to detect life directly; yet its 6.5-metre mirror is the sharpest tool astronomers have for prying open alien atmospheres. Confirmation of a biosignature would rank among the great scientific discoveries—or, if overturned, could trigger a rethink of how researchers interpret low-signal data in the noise-plagued infrared. Either way, more photons are needed. The Cambridge group has applied for an additional 24 hours of telescope time in the next observing cycle; rival teams have filed competing proposals aimed at cross-checking the claim with different retrieval codes and broader wavelength coverage.

Meanwhile, K2-18 b will remain under the microscope of scientific scrutiny. Scheduled upgrades to Webb's data pipeline, along with next-generation ground-based instruments on the Extremely Large Telescope, should tighten the error bars in the next two years. Farther out, NASA's Habitable Worlds Observatory—now in early design studies—could bring ozone and nitrous-oxide channels into play, offering multiple biosignature cross-checks instead of a single chemical hint.

Whether the dimethyl-sulfide signal survives that gauntlet or evaporates into statistical dust, the episode has already reshaped the culture of exoplanet science. It has showcased the speed with which independent teams can pounce on open data, the power of social media to amplify both excitement and scepticism, and the essential value of humility when confronting the unknown. As one veteran astrobiologist put it in a recent workshop: "We might have glimpsed life—or we might have fooled ourselves. Either outcome moves us forward."