Surveys of the scientific community on possible detection of extraterrestrial life: comparing the K2-18b and Cheyava Falls rock announcements

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Following two major 2025 announcements of possible extraterrestrial life – on exoplanet K2-18b in April and in the Cheyava Falls rock on Mars in September – we surveyed the astrobiology community to capture the spread of expert opinion. These datasets establish baseline measures of scientific confidence in each case, revealing that astrobiologists were notably more persuaded by the Martian evidence than by that from K2-18b.

Two significant announcements of possible extraterrestrial life were made in 2025. First, on 17 April 2025, a paper reported the "strongest hints yet" of biological activity on exoplanet K2-18b, citing possible detection of dimethyl sulfide (DMS) and/or dimethyl disulfide (DMDS) with the James Webb Space Telescope (Madhusudhan et al. 2025). Reuters captured the tone of the moment with the headline "Scientists find strongest evidence yet of life on an alien planet."

Second, on 10 September 2025, NASA announced that the sample nicknamed Sapphire Canyon, collected in 2024 from the rock dubbed Cheyava Falls in Jezero Crater, preserves a potential biosignature (Hurowitz et al. 2025). Time Magazine reported on 11 September 2025, that "NASA Discovery Is the 'Closest We Have Ever Come to Discovering Life on Mars'", quoting a statement by NASA administrator Sean Duffy.

These two announcements offered a rare opportunity to compare expert reactions to distinct kinds of 'potential biosignature' (Gillen et al. 2023). Both announcements were presented as landmark discoveries, often with headlines that implied stronger evidence than the underlying papers warranted. This coverage triggered a lively mix of optimism and scepticism in the media, with experts quoted on both sides. Yet such individual viewpoints reveal little about the overall distribution of expert opinion. Knowing that some are optimistic and others pessimistic is consistent with a wide range of possible community profiles, from near-consensus to deep division.

To move beyond anecdote, we surveyed a large, representative sample of the global astrobiology community shortly after each announcement, aiming to quantify the spread of scientific confidence. Building on our previous work (Vickers et al. 2025), we invited astrobiologists to respond to two statements:

1. Statement K2-18b: *Scientists have probably found extraterrestrial life on exoplanet K2-18b.*

2. Statement Mars: *Scientists have probably discovered (ancient) extraterrestrial life in the Cheyava Falls rock on Mars.*

Respondents indicated their level of agreement on a 5-point Likert scale ranging from ‘strongly disagree’ to ‘strongly agree’. Our key questions were how confident astrobiologists were in each claim, how their views differed across the two cases, and how willing they were to take a position rather than remain neutral. We used the same validated survey platform and methodology as in our prior work to ensure a high response rate, low opt-out rate, and comparability (see S.I.).

Results

First, we surveyed the astrobiology community on Statement K2-18b. Disregarding undeliverables, 1,270 astrobiologists were emailed on 25 April 2025, and 496 had responded when the survey closed 11 days later, on 6 May – a response rate of 39.1%.

The results are displayed in **Fig. 1**; overall agreement was 6.6%, and overall disagreement was 65.3%, with neutral standing at 28%.

Second, we surveyed the same community on Statement Mars. Disregarding undeliverables, 1,270 astrobiologists were emailed on 23 September 2025, and 424 had responded when the survey closed 11 days later, on 4 October – a response rate of 33.4%. These response rates are high relative to the norm (see Vickers et al. 2024 for discussion).

The results are displayed in **Fig. 2**; overall agreement was 15.1%, and overall disagreement was 44.6%, with neutral standing at 40.3%.

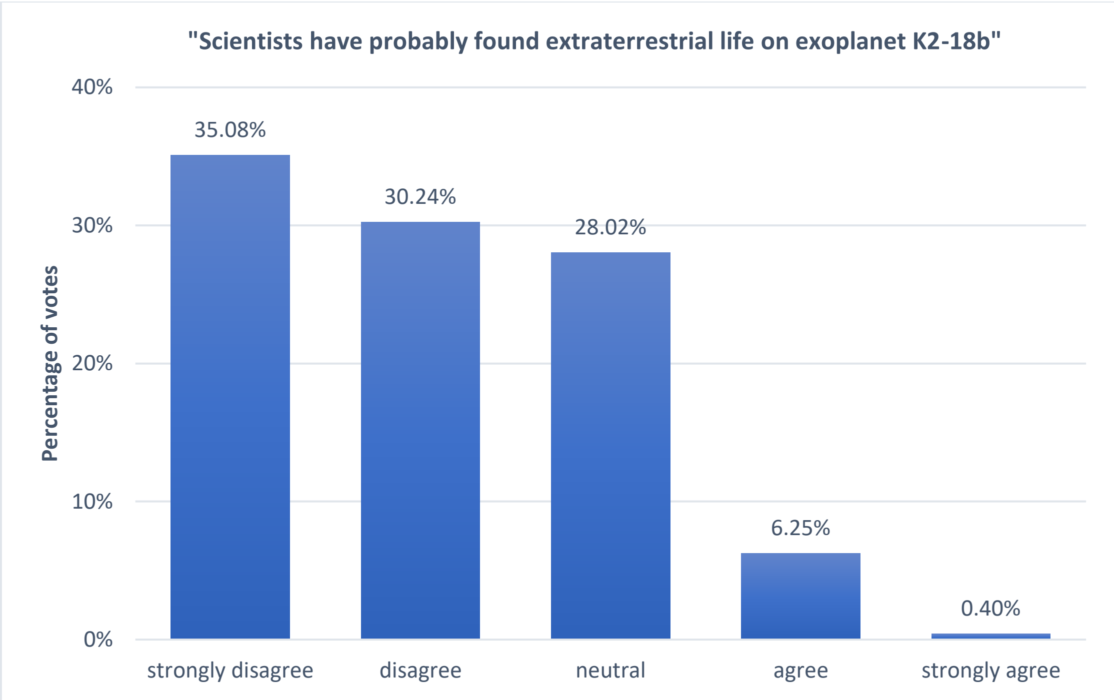

Fig. 1. Bar chart of Likert scale results for Statement K2-18b; N=496.

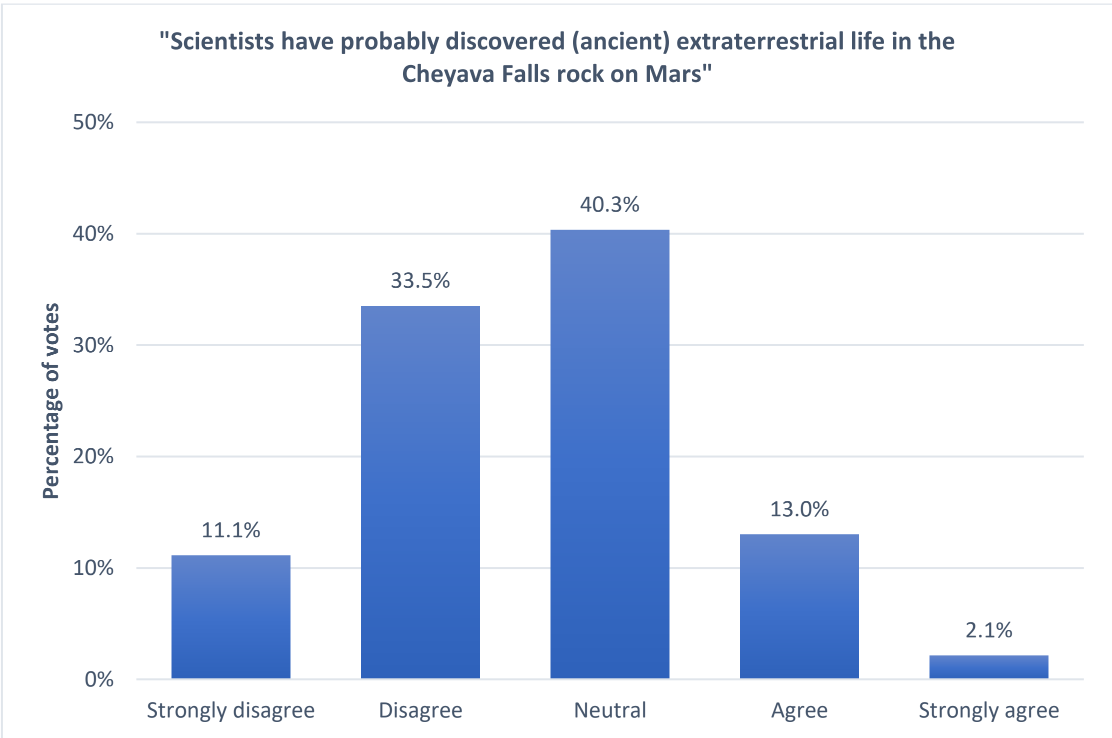

Fig. 2. Bar chart of Likert scale results for Statement Mars; N=424.

Some comparative results are worth noting. Overall agreement for Statement Mars was more than double the overall agreement for Statement K2-18b. ‘Strongly agree’ was more than 5x larger for

Statement Mars than for Statement K2-18b. Overall disagreement reduced by around 1/3 for Statement Mars compared with Statement K2-18b. Most significantly, the 'strongly disagree' result reduced by more than two thirds, dropping from 35.1% to 11.1%. It is also noteworthy that more than 55% of the Mars results went to neutral, agree, or strongly agree.

An additional feature of the dataset is a wider spread of opinion for the Cheyava Falls claim compared with K2-18b, indicating a higher degree of consensus in the K2-18b case. This is reflected in their respective Shannon entropy scores (See S.I.).

A point of curiosity in the results is the shift in participants voting 'neutral'. This result stands at 28% for Statement K2-18b, but rises to 40.3% for Statement Mars – a significant increase (see S.I.).

Discussion

We found a small but meaningful overall agreement of 6.6% that scientists probably had discovered extraterrestrial life on exoplanet K2-18b. Moreover, overall disagreement was less than two thirds at 65.3%, which is far from a (negative) consensus. Taking these two results together, it might well be true that the community considers this the "strongest evidence yet of life on an alien [exo]planet" (Reuters). In the future, such claims can be assessed by running new surveys and comparing their findings with earlier results. Whilst doubts can be raised regarding the numbers attached to any individual survey results (given survey methodology decision points[1]), these doubts don't obviously translate to comparative judgements across surveys (see S.I.).

Regarding the second set of results, we found a meaningful agreement of 15.1% that scientists probably have discovered (ancient) extraterrestrial life in the Cheyava Falls rock on Mars. Moreover, overall disagreement was less than half, at 44.6%. These two results, taken together, may well represent the greatest confidence astrobiologists have ever had vis-à-vis discovery of extraterrestrial life. However, we point out that, strictly speaking, one should not say that this is the closest we have ever come to discovering life on Mars (as was reported at the time): if it turns out that the geological features in question had an abiotic origin, and were not in any sense proximal to life, then we can't have come close to finding life on Mars.

It is clear that there is a significant difference between the two sets of results, with scientists overall much more optimistic about the Martian case. We can quantify this by converting the ordinal Likert-scale survey data into a numerical 'credence' or degree of belief. We start with a common and defensible mapping of Likert-scale responses to credences (Table 1).

[1] See Vickers et al. 2024 and Vickers et al. 2025. See Silberzahn et al. (2018) for a remarkable study showing how variations in analytic choices can affect results.

Response	Description	Credence Weight
Strongly Disagree	Almost certainly not true	0.05
Disagree	Probably not true	0.25
Neutral	50-50	0.50
Agree	Probably true	0.75
Strongly Agree	Almost certainly true	0.95

Table 1. Linear mapping from Likert-scale responses to credences.

Next we bring this to bear on the K2-18b and Mars data (Table 2).

Response	Credence Weight	K2-18b %	K2-18b Contribution	Mars %	Mars Contribution
Strongly disagree	0.05	35.1 %	1.76	11.1 %	0.55
Disagree	0.25	30.2 %	7.55	33.5 %	8.37
Neutral	0.50	28.0 %	14.00	40.3 %	20.13
Agree	0.75	6.3 %	4.73	13.0 %	9.75
Strongly agree	0.95	0.4 %	0.38	2.1 %	2.00
Total		**100 %**	**28.4 %**	**100 %**	**40.8 %**

Table 2. Mean credence calculations for K2-18b and Mars.

The mean credence results are therefore 28.4% for K2-18b, and 40.8% for Cheyava Falls rock. This can be visualized as in **Fig. 3**.

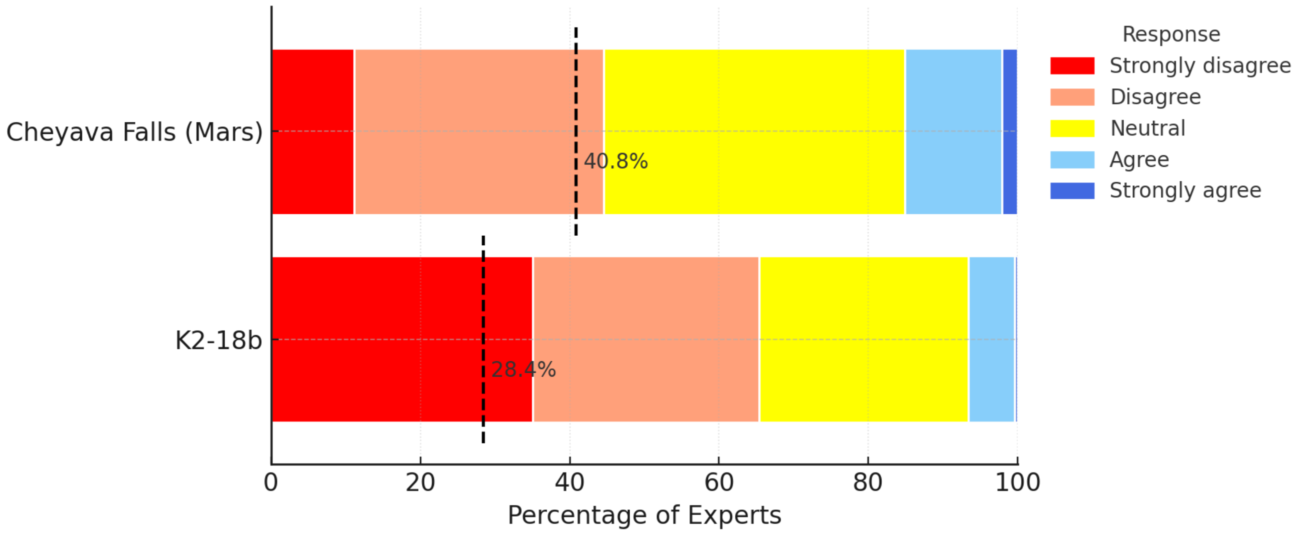

Fig. 3. Distribution of opinions for the two surveys, with mean credences.

As can be clearly seen in **Fig. 3**, the mean credence for K2-18b is comfortably within the 'strongly disagree' category, whereas the mean credence for Cheyava Falls is at the top end of the 'disagree' category, close to neutral. Whilst alternative mappings of Likert-scale responses to credences could be defended, the final results are robust across reasonable choices (see S.I.).

Finally, we consider how willing astrobiologists are to 'take a side' on these issues, as opposed to voting neutral. As noted previously (Vickers et al. 2024), neutral votes can arise for at least two reasons: (i) a respondent holds an intermediate credence, or (ii) they judge it imprudent to speculate and prefer to abstain politely. The increase in neutral votes from 28% (K2-18b) to 40.3% (Mars) is unlikely to reflect greater reluctance to speculate, since each involves a tentative detection that could plausibly have an 'unconceived alternative' abiotic explanation (see Vickers et al. 2023).

Instead, this pattern is consistent with a redistribution of responses away from the two disagreement categories toward neutrality. The 'disagree' proportion rises slightly across the two surveys (30.2% → 33.5%), but this may mask opposing movements: some respondents shifting from 'strongly disagree' to 'disagree', and others from 'disagree' to 'neutral'. The net effect is a contraction of strong disagreement and an expansion of neutrality, without a comparable increase in agreement. Our methodology does not track individual participants, so it is not possible to observe such shifts directly.

This asymmetry suggests that respondents were more comfortable relaxing their level of disagreement than committing to agreement. In other words, the community appears epistemically conservative – willing to soften rejection, but hesitant to endorse claims until confidence is strong or overwhelming. This can be interpreted in terms of something that has long been known: scientists are notoriously cautious about agreeing to claims until the evidence is very strong (Hansen 2007; Washington 2013, p. xi).

This epistemic conservatism can also be visualised dynamically, as if belief states were particles moving through a medium. Movement away from rejection seems relatively unconstrained, but progress beyond neutrality encounters friction, as if belief adjustment slows under congested conditions. The analogy is heuristic: it captures how shifts in collective confidence may display nonlinear dynamics, with increasing evidential or social reassurance required before opinion moves into the region of agreement. Such dynamics are consistent with bounded-confidence models of opinion change (Hegselmann and Krause 2002) and mirror well-known congestion effects in traffic-flow systems (Treiber and Kesting 2013). The result is a form of epistemic viscosity that could be examined directly in future survey waves.

Outlook

As with our prior work, this study establishes an essential baseline for future surveys. We plan to run identical surveys again three years later (April and September 2028) to see how opinions have shifted during that time. The high-profile nature of these two cases makes it inevitable that they will receive increased scientific attention, thus creating a useful opportunity to observe how new research and subsequent discussion influence expert opinion. Whether the shifts (if any) are mostly due to new evidence, or sociological factors, or a combination of the two, is something we plan to investigate.

In addition, we will run exactly similar surveys approximately one week following other major announcements of possible extraterrestrial life detection, if they occur.

Beyond their scientific value, such surveys can inform public understanding of scientific claims. By quantifying expert confidence, they help distinguish between media portrayals of ‘groundbreaking discoveries’ and the actual, more cautious assessment within the expert community. Over time, greater visibility of such survey results may help shape how future announcements are reported, tempering exaggerated headlines and promoting more accurate communication of scientific uncertainty.

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