Analysing Scientific Miracles in the Qur'an: A Barrier Between Two Seas

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The claim that the Qur'an contains scientific knowledge unavailable to seventh-century humanity has become a prominent argument in modern Islamic apologetics. One of the most frequently cited examples concerns Qur'an 55:19–20 and 25:53, which describe two bodies of water meeting while separated by a *barzakh* (بَرْزَخٌ), commonly translated as a barrier, partition, or boundary. Modern apologists often interpret these verses as describing the interaction between freshwater and seawater, arguing that the Qur'an anticipated modern discoveries concerning salinity gradients, density stratification, and the limited mixing of different bodies of water.

However, there is an important distinction between the existence of a real physical phenomenon and the claim that an ancient text miraculously predicted its modern scientific explanation. Freshwater and seawater can indeed form stratified layers or transition zones under certain conditions, and differences in density can inhibit their mixing. Yet this phenomenon does not correspond neatly to an impermeable barrier separating two bodies of water. Moreover, neither the Qur'anic text nor its traditional interpretations uniquely identifies the phenomenon with modern oceanography. Therefore, the scientific-miracle argument relies heavily on the modern, Islamic-apologist reader's interpretation.

Scientific Fact

The scientific phenomenon itself is real, but it is more complicated than the popular "two seas do not mix" formulation suggests.

Freshwater and seawater have different densities, largely because seawater contains dissolved salts. When they meet under suitable conditions, this density difference can produce stratification, with less-dense freshwater tending to remain above denser seawater. Estuaries can therefore contain pronounced gradients in salinity and density, and mixing can be relatively limited in particular circumstances. The National Oceanic and Atmospheric Administration describes estuaries precisely as places where freshwater from rivers meets and mixes with saltwater from the ocean. Their circulation depends on tides, wind, river discharge, and density differences.

Fresh and salt water do not instantaneously become homogeneous when they meet. At the same time, they are not separated by an impenetrable wall. Diffusion, turbulence, currents, tides, and other physical processes all contribute to mixing. The result is often a transition zone in which salinity varies continuously rather than a permanent barrier that prevents the two waters from interacting.

Thus, if *barzakh* is interpreted as a literal physical boundary, the scientific phenomenon is at most a partial analogy. A density or salinity gradient can function as a boundary in a loose descriptive sense, but it is not equivalent to a wall that prevents the two bodies of water from mixing.

The existence of stratification does not establish that the Qur'an contains a scientifically precise description of the physics producing it.

Underdetermination in the Qur'an

The first difficulty is that Qur'anic language is far less specific than the scientific interpretation imposed on it. Qur'an 55:19–20 speaks of two seas or bodies of water (*bahrayn* (ٱلْبَحْرَيْنِ)) meeting and having a *barzakh* between them. Qur'an 25:53 similarly describes one body of water as fresh and pleasant and the other as salty and bitter, with a barrier between them.

Nothing in these passages explicitly identifies salinity gradients, density differences, diffusion, turbulent mixing, or any other complex mechanism recognised by modern oceanography. The text does not explain what the barrier consists of, how it functions, or why the waters remain distinguishable. These concepts enter the interpretation from modern scientific knowledge rather than from explicit statements in the verses themselves.

This underdetermination is the source of a more general problem, which can be expressed as a simple distinction: **compatibility is not prediction.** Suppose a seventh-century text says that two bodies of water meet but are separated by a boundary. Modern science later discovers that freshwater and seawater can form stratified transition zones because of differences in density and salinity. The modern phenomenon is compatible with the ancient description. But the ancient description has not thereby predicted the scientific explanation.

A scientific fact being compatible with an ancient statement is not equivalent to the ancient statement predicting that fact. If a statement is sufficiently broad, it may be possible to reinterpret it in light of numerous later discoveries. The relevant question is therefore not simply whether the Qur'anic description can be made compatible with oceanography, but whether it contains sufficiently specific information that modern oceanography could reasonably be regarded as having been anticipated by the text. The evidence for such specificity is weak.

For the latter claim to be compelling, one would expect the text to contain some information that is both specific and non-obvious: perhaps an identifiable description of density-driven stratification, a mechanism for the persistence of the boundary, or some other feature that could not easily be derived from ordinary observation.

The Qur'anic verses provide none of these details. They do not state that the waters differ in density because of dissolved salts, that one layer is less dense than the other, or that turbulent diffusion gradually produces a transition zone.

The modern scientific interpretation consequently supplies much of the explanatory content itself. This demonstrates that **the scientific conclusion does not follow from the text alone.**

The Problem of Falsifiability

A further problem concerns the evidential standards appropriate for claims of scientific foreknowledge. It would be unreasonable to demand that a religious text resemble a modern scientific paper. Ancient theological literature naturally uses metaphor, phenomenological description, and ordinary language. The issue is not whether the Qur'an contains equations or technical terminology. The issue is whether a particular interpretation provides evidence of knowledge that could not reasonably have been obtained through ordinary observation.

For that purpose, the relevant standard is specificity. A compelling example of scientific foreknowledge would ideally involve a claim that is sufficiently precise to distinguish the alleged prediction from alternative interpretations and sufficiently non-obvious that ordinary observation cannot readily explain it. The two-seas verses do not satisfy this standard. They provide no numerical information, no physical mechanism, no description of density, no account of diffusion, and no prediction that distinguishes modern oceanography from premodern phenomenological observation. The verses can therefore be interpreted consistently with modern oceanography, but they do not independently establish it.

This also illustrates why the argument is difficult to falsify. Almost any observed boundary between bodies of water can potentially be described as a *barzakh*. If the boundary is visible, it may be interpreted as the physical manifestation of the verse; if it is invisible, it may be interpreted as an unseen scientific barrier. The interpretive flexibility makes the correspondence difficult to test independently.

The Historical Inaccessibility Argument

The claim that such phenomena were inaccessible to premodern people is also historically questionable.

People living near rivers, estuaries, deltas, and coastlines could directly observe that freshwater and seawater behaved differently. They could taste differences in salinity, observe changes in water clarity, and see rivers flowing into seas without immediately becoming indistinguishable from them. Such observations do not require modern oceanographic theory.

There is also evidence that ancient naturalists made more sophisticated observations concerning the interaction of fresh and salt water. Pliny the Elder, writing in the first century CE, discussed the properties of seawater and freshwater in his *Natural History*. More strikingly, his account of the Bosphorus described opposing currents at different depths. Modern oceanographers recognise such behaviour as related to estuarine circulation, in which water of different densities can move in different directions.

This does not mean that Pliny possessed modern physical oceanography, nor does it establish that seventh-century Arabs possessed a modern understanding of salinity-driven circulation. The point is that **the basic observation that different waters can meet while retaining distinguishable characteristics was not uniquely beyond the observational capacity of ancient humanity.**

Thus, the claim that the phenomenon itself was unknowable before modern science is historically overstated.

Classical Qur'anic Exegesis (Tafseer)

Modern miracle arguments sometimes present the scientific interpretation as though the Qur'anic meaning was obvious all along and only modern science finally revealed its significance. The history of Qur'anic interpretation does not support such a simple narrative.

Ibn Kathir, one of the most influential Sunni exegetes, interprets the two bodies of water in Qur'an 55:19 as freshwater and saltwater. Yet in his discussion of the *barzakh*, he identifies the separation in geographical terms, describing land between the two bodies of water. This is significantly different from the modern claim that the verse specifically refers to an invisible oceanographic interface caused by differences in salinity and density.

Other traditional interpretations have understood the *barzakh* differently, including as a barrier that prevents the waters from overwhelming one another. The existence of these differing interpretations is significant not because one interpretation must necessarily be correct, but because it demonstrates that the verses do not unambiguously encode one precise scientific meaning.

Indeed, Qur'an 55:22 immediately adds that pearls and coral emerge from the two seas. Classical exegetes had to interpret this statement in conjunction with the preceding verses, producing their own solutions to the relationship between the freshwater and saltwater descriptions.

The historical record, therefore, reveals interpretation rather than a straightforward scientific decoding. The idea that the verses secretly contain modern oceanography is not simply being uncovered; it is being reconstructed through a particular modern interpretive framework.

Meaning of *Barzakh*

The Arabic word *barzakh* does not mean "halocline". Its semantic range is considerably broader, encompassing concepts such as a barrier, partition, boundary, separation, or intermediary. The Qur'an itself uses the word in different contexts. In Qur'an 23:100, for example, *barzakh* refers to a barrier separating the dead from returning to worldly life. In Qur'an 25:53 and 55:20, it concerns the separation between bodies of water.

The fact that the word can refer to a metaphysical boundary in one context does not prove that it must have a metaphysical meaning in another. Nor does it prove that it cannot refer to a physical boundary. The important point is that the word itself does not encode the modern scientific concept of a halocline.

Equating *barzakh* directly with a halocline consequently requires an additional interpretive step. A halocline is a zone in a body of water in which salinity changes substantially with depth. Nothing about the ordinary lexical meaning of *barzakh* specifies salinity, density, depth, or diffusion.

The argument consequently proceeds backwards: modern oceanography supplies the concept, and the ancient word is then interpreted as though it had always specifically meant that concept.

The Psychology of Retrospective Pattern Recognition

Human beings are exceptionally good at detecting patterns and correspondences, including correspondences that become apparent only after the fact. A sufficiently general statement can often be mapped onto a later discovery once the discovery is already known. This does not imply that every person who accepts a scientific-miracle argument is irrational or dishonest, nor does it prove that a particular interpretation is false. Rather, it identifies a cognitive mechanism that makes retrospective interpretations particularly persuasive.

The same problem appears in many other contexts. Vague statements in horoscopes, prophecies, and ancient philosophical texts can acquire an appearance of extraordinary precision when interpreted in light of later events. The more interpretively flexible the original statement, the greater the number of possible future correspondences. Thus, scientific-miracle arguments require a particularly strong safeguard against confirmation bias: the interpretation should be formulated before the relevant scientific discovery is known, and it should contain enough specificity to distinguish the predicted phenomenon from other possible phenomena. The two-seas argument does not appear to meet that standard.

A More Defensible Interpretation

None of this requires concluding that Qur'an 55:19–20 and 25:53 are meaningless or erroneous.

A much more historically and scientifically defensible interpretation is that the verses describe an observable natural phenomenon in theological language. Rivers and seas possess different characteristics; bodies of water can meet while retaining distinguishable properties; and boundaries between them can exist without being literal walls. The Qur'an presents this arrangement as an example of divine order and power.

Such an interpretation is perfectly compatible with modern science. But compatibility is precisely the point. A theological statement can remain meaningful and even scientifically compatible without constituting a prediction of modern scientific theory.

Indeed, insisting that every scientifically compatible description must represent miraculous scientific knowledge imposes a standard that would be extraordinarily difficult to apply consistently. Ancient literature contains countless observations of nature that modern science can reinterpret using contemporary concepts. The existence of such correspondences does not, by itself, demonstrate supernatural knowledge.

Conclusion

The "two seas" argument does not establish that the Qur'an contains miraculous knowledge of modern oceanography.

The physical phenomenon underlying the argument is real: freshwater and seawater can meet while remaining significantly stratified under particular conditions, owing in part to differences in density and salinity. Yet this does not mean that the waters are permanently separated by an impermeable barrier. Mixing still occurs through diffusion, turbulence, currents, tides, and other processes.

More importantly, the Qur'anic verses do not explicitly describe these mechanisms. They do not mention salinity, density, diffusion, haloclines, or estuarine circulation. Their language is sufficiently broad that the modern scientific interpretation must supply much of the specificity itself.

The historical evidence further weakens the claim of miraculous inaccessibility. Ancient observers could encounter the interaction of fresh and salt water directly, while classical naturalists such as Pliny recorded observations concerning marine circulation and the behaviour of different bodies of water. The phenomenon, therefore, did not depend upon the existence of modern oceanographic theory to become observable.

The history of Islamic exegesis presents an additional problem. Classical interpreters did not uniformly identify the *barzakh* with a modern oceanographic interface. Ibn Kathir, for example, understood the two seas as fresh and saltwater but interpreted their separation geographically. The diversity of traditional interpretations indicates that the modern scientific reading is not simply an obvious meaning that had been hidden in the Arabic text until science revealed it.

The strongest criticism of the miracle claim is that **a real phenomenon does not automatically constitute a prediction, and compatibility with modern science is not evidence of supernatural foreknowledge.**

The verses can reasonably be understood as theological and phenomenological descriptions of the natural world. They may inspire religious reflection on the order of nature. What they do not provide, however, is a sufficiently specific and independently identifiable prediction of modern oceanography to justify the claim of a scientific miracle.

Thus, the sea may possess a boundary, but the existence of that boundary does not establish that the Qur'an scientifically predicted why it exists.

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