Homologous Structures: A Reappraisal of Evolutionary Interpretation

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ABSTRACT

This paper explores homologous structures as a point of dialogue between evolutionary biology and Islamic thought. While evolution interprets these similarities as evidence of common ancestry, Islamic perspective views them as signs of Divine unity and wisdom. Drawing on the works of Darwin, Paley and Rasail Ikhwan al-Safa, the paper puts homology within the context of epistemological pluralism. It proposes that science and faith, when approached holistically, are not in conflict but rather offer harmonising insights into creation.

Keywords: Evolution, epistemological pluralism, Rasail Ikhwan al-Safa, Islamic perspective, homologous structures

INTRODUCTION

The relationship between Islam and the theory of evolution has long been the centre of scholarly and theological debate. One of the main areas of tension arises from the way evolutionary theory frames causation. From a scientific perspective, evolution explains the development and diversification of species through natural processes, including genetic variation, mutation and natural selection. It does not recognise Allah Ta'ala as the cause of these processes. This can appear to conflict with the Islamic belief that Allah Ta'ala is the creator of all things.

Objective

The objective of this paper is to explore how the Islamic perspective interprets homologous structures as reflections of Divine unity, thereby demonstrating a profound harmony between science and faith.

Background to the Problem

Darwin (1859) placed homologous structures as evidence of shared ancestry and evolutionary processes. While compelling scientifically, this view leaves out acknowledging Allah Ta'ala as the Creator, which raises concerns for Islamic thought. Important sources like Rasail Ikhwan al-Safa and the teachings of the Duat Kiram [RA] stress that the order and similarity in nature point directly to the Divine wisdom. Hence, homologous structures can be seen as both biological evidence and signs of Divine intervention, as well as a manifestation of unity in diversity. The challenge lies in reconciling these perspectives so that scientific explanations are not seen as a threat to faith, but rather as a means of understanding creation.

Homologous Structure: Darwinian Perspective

According to Darwin, humans and all other species on Earth share a common ancestry, much like members of an extended family tree. Anatomists in the mid-19th century increasingly recognised that the diversity of life shared fundamental structural patterns, despite the apparent differences in form and function (Darwin, 1859).

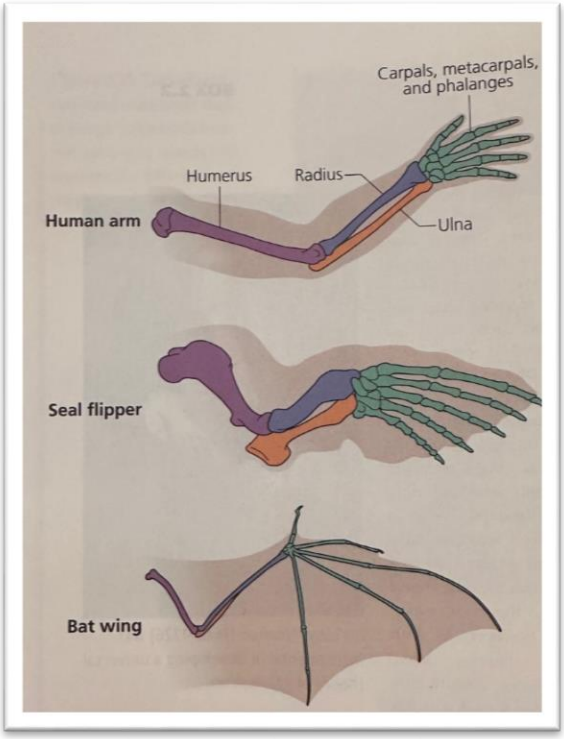
For example, the forelimbs of different species exhibit similar homologies. A seal uses its flippers for aquatic locomotion, a bat for flight, and humans utilise their arms for tasks such as cooking, writing and driving. Although these appendages perform distinct functions, they share a deep structural similarity. Each begins with

a long bone (the humerus) extending from the shoulder, followed by two parallel bones (the radius and ulna) that connect to the elbow. This structure ends in a cluster of wrist bones and five digits (Carroll, 1997).

The relative proportions of these bones differ across species. For instance, a seal's humerus is short, while a bat's is elongated. Nonetheless, the consistent arrangement of these skeletal elements across taxa underscores the principle of homology. Naturalists have termed this similarity 'homology,' reflecting the shared ancestry of these diverse species (Hall, 2007). Similarly, Al-Jahiz approached animal classification scientifically, arranging them in a linear series from the simplest to the most complex. He grouped them based on similarities and further divided them into sub-groups to identify the ultimate unit within the species. This approach paralleled Carolus Linnaeus's later development of the binomial nomenclature system, which also categorised organisms based on observable traits (Reid, 2009). However, according to Zimmer and Emlen (2016), many naturalists believed that this nested hierarchy reflected a preexisting structure in God's mind that was represented in creation.

In the decades following Darwin, the study of homology was further refined by comparative anatomists and evolutionary biologists. Owen (1843), who first applied the term 'homology' to biology and distinguished it from 'analogy,' defined homology as similarity of structure due to shared origin, in contrast with analogy, which arises from similar function without common ancestry. Later, advances in genetics and molecular biology expanded the concept of homology beyond anatomy to include genetic and developmental similarities. For example, Mayr (1982) emphasised the role of evolutionary mechanisms in shaping homologous traits, while Hall (2007) demonstrated how evolutionary developmental biology, 'evo-devo', explains the genetic and embryological foundations of homologous structures across species. Together, these contributions deepened and broadened Darwin's original insights, confirming homology as a central concept in evolutionary theory.

Figure 1: Humans, seals, and bats use their limbs for different purposes, yet their bone numbers and arrangements are the same. Darwin viewed this similarity as evidence of common ancestry.

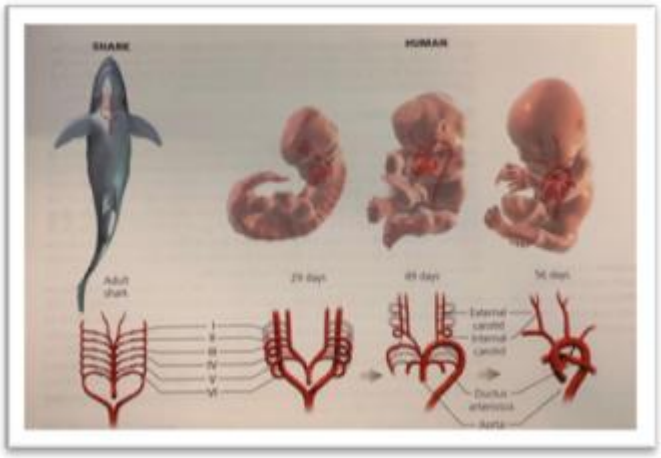


Reference: Zimmer, C., & Emlen, D. J. (2016). Evolution: Making sense of life (2nd ed.). W. H. Freeman and Company.

Furthermore, Darwin's insight that homologies are often most visible in embryonic stages has been confirmed by modern evolutionary biology. As Zimmer and Emlen (2016) explain, vertebrate embryos share common developmental structures, such as pharyngeal arches, that later differentiate into very different adult features, including gills in fish or components of the jaw and ear in mammals. This pattern suggests that embryonic

similarities reflect a shared ancestry, with subsequent modification shaping species-specific traits. Building on Darwin's observations, von Baer (1828) emphasised that vertebrate embryos pass through comparable stages before diverging, while contemporary evo-devo research has revealed that conserved genetic pathways, such as Hox genes, govern the formation of homologous structures (Carroll, 1997; Hall, 2007). Together, these findings demonstrate that embryology not only preserves evidence of evolutionary history but also provides a mechanistic basis for understanding how homologies arise and transform over time.

Figure 2: Fishes have a series of branching blood vessels to absorb oxygen in their gills. Human embryos (at 29 days) develop blood vessels in a similar arrangement, but later, the vessels change to allow us to absorb oxygen through our lungs.



Reference: Zimmer, C., & Emlen, D. J. (2016). Evolution: Making sense of life (2nd ed.). W. H. Freeman and Company.

A Reappraisal of Evolutionary Interpretation

If one leans on epistemological pluralism in understanding that there is not just one way of knowing or making sense of the world (Alcoff, 2007). It allows us to explore alternative and meaningful insights. That is, one may also conclude from the homologous structures that Allah Ta'ala has created living organisms in a fascinating variety of forms, but without exception, all the creatures of this vast and varied living world have similarities. This reflects the unity of the Creator and helps us understand the concept of **unity in diversity**. This can be elaborated from a philosophical standpoint, such order and harmony suggest that nature operates with purpose and direction, not by chance. Just as two scripts written by the same individual can be recognised by their handwriting style, the similarities in the structure of limbs across humans, seals, and bats point not only to a common design but ultimately to one Creator, Allah Ta'ala. Therefore, it is not sufficient to state that all species share a common ancestor; an alternative perspective can also be applied, which is to acknowledge the Creator and seek to understand His wisdom in creation.

Acknowledging the creator is precisely the direction toward which Imam Ahmed al-Mastur [AS] guides the readers in Rasail Ikhwan al-Safa. He states:

واعلم يا اخي ايدك الله وايانا بروح منه بأن المصنوع المحكم يدل على الصانع الحكيم وان كان الصانع الحكيم محتجبا عن ادراك الابصار وكل عاقل اذا تأمل احوال النبات من فنون اشكال اصولها وامتداد عروقها في الارض وتفرع اغصانها في الهواء وتقطيع اوراقها في فنون الاشكال والوان ازهارها من الاصباغ واختلاف صور حبوبها واشكال اثمارها من الصغر والكبر واختلاف الوانها وطعومها ورائحها يتبين له ويعلم علما ضروريا بأن لها صانعا حكيما لان عقله يشهد له بأن الاركان الاربعة المتضادة القوى المتنافرة الطباع لا تجمع ولا تأتلف ولا تصير على هذه الاوصاف التي تقدم ذكرها الا بقصد صانع حكيم لا يشك فيه لكن اذا لم يتفكر في كيفية صنعته لم فعل هكذا ولم يفعل كذا وكذا لا يفهم ولا يدري ولا يتصور له ذلك

He explains that the intricate harmony found in creation, from the structure of plants to the diversity of their forms, colours and fruits, serves as clear evidence of a Creator. He further argues that such an order cannot arise from the mere interaction of opposing elements without deliberate intent and purpose.

Similarly, Robert Hooke (1665), assistant to Thomas Willis and later a physicist, argued that God furnished each plant and animal with 'all kinds of contrivances necessary for its own existence and propagation, as a Clockmaker might make a Set of Chimes to be a part of a Clock' (Ayala, 2013, p. 509). This perspective, which gained increasing influence in the eighteenth century, later became known as natural theology.

One of the most influential formulations of natural theology was articulated by William Paley (1802) in his work Natural Theology, or Evidences of the Existence and Attributes of the Deity Collected from the Appearances of Nature. Paley invited readers to imagine encountering a watch while walking across a heath. Unlike a rock, which might be dismissed as a natural part of the environment, the watch, with its intricate organisation of parts and clear function, would immediately suggest intentional design. For Paley, the complexity and purposeful arrangement of biological structures similarly indicated the work of a Divine Creator.

Paley extended this analogy by cataloguing anatomical structures that displayed remarkable complexity and functionality. He argued that, just as a watch implies a watchmaker, the intricate design of life implies a Creator. For instance, he compared the human eye to a telescope, both of which rely on the same physical laws to focus light through lenses (Paley, 1802).

Likewise, Imam Ahmad al-Mastur [AS] repeatedly draws attention to Allah Ta'ala's wisdom in endowing every creature with structures that are perfectly suited to its needs and environment. In Rasail Ikhwan al-Safa, he states:

ان الحكمة الالهية والعناية الربانية جعلت لكل حيوان من الاعضاء والمفاصل والعروق والاعصاب والغشاوات والاوعية بحسب حاجته اليه في جر المنفعة او دفع المضرة

This principle highlights the functional precision in creation: no organ is random, and every structure is formed with purpose. When considered in the context of homologous structures, this perspective explains anatomical variation. For instance, although the humerus bone exists across different species, its form is according to the alignment of the specific functions each creature is intended to fulfil.

If human beings were to possess a humerus shaped like that of a bat, elongated to support wings, they would not be able to carry out the diverse range of daily activities that require strength and skill, such as lifting, grasping, or writing. Conversely, the bat's humerus is perfect for flight, a function central to its survival. Thus, what may appear as a mere anatomical difference is, in fact, a manifestation of divine wisdom: ensuring that each species can prosper and benefit within its domain. As Behe (1996) argues, biological systems exhibit complexity, meaning that each part of a structure is essential and cannot be removed without rendering the whole non-functional. This implies that organs and faculties are never superfluous but are precisely arranged for purpose, a view that aligns with the Ikhwan al-Safa's principle that Allah Ta'ala's wisdom grants no creature an organ it does not need.

Paley's analogy, however, has been strongly critiqued by modern evolutionary biologists. Dawkins (1986), in The Blind Watchmaker, argued that Paley's reasoning rests on a false assumption: that complexity must necessarily imply a designer. Instead, Dawkins proposed that natural selection itself functions as a 'blind watchmaker,' capable of producing intricate biological adaptations without foresight, planning, or purpose. Whereas Paley saw complexity as direct evidence of divine craftsmanship, Dawkins insisted that evolution by cumulative selection explains how small, gradual changes accumulate into sophisticated biological structures. In his view, the apparent design in nature is an illusion generated by blind evolutionary processes rather than intentional creation. This contrast illustrates the ongoing tension between theological interpretations of natural order and scientific accounts of evolutionary mechanisms.

By contrast, al-Dai al-Ajal al-Fatemi Syedna Aali Qadr Mufaddal Saifuddin [TUS,] during Ashara Mubarakah 1447 H (2025), emphasised the importance of understanding the relationship between science and faith. He narrated that al-Dai al-Ajal al-Fatemi Syedna Taher Saifuddin [RA], the 51st al-Dai al-Mutlaq, a distinguished scholar, theologian, and the luminary of Aljamea-tus-Saifiyah, initiated his tenure with an emphasis on the educational and spiritual reclamation of his followers. When asked whether scientific advancements posed a threat to faith, he clarified that such a view arises from a limited perspective. He explained that, when approached correctly, science and faith are not in conflict but in harmony. Scientific discoveries, rather than undermining faith, unveil dimensions already encompassed within it. Any perceived contradiction stems from human misunderstanding or misinterpretation of science. In reality, science serves to deepen and reinforce one's faith.

Syedna al-Dai al-Ajal [TUS] highlights the essential qualities one should possess while contemplating the creation. Imam Ahmed al-Mastur [AS] expounds those qualities in Rasail Ikhwan al-Safa. He states:

فلنبدأ اولا بذكر الدهرية ثم نقول هؤلاء كانوا اقواما قد كان لهم من الفهم والتمييز قدر ما فنظروا الى الموجودات الجزئية المدركة بالحواس وتأملوا واعتبروا لها احوالها فوجدوا لكل مصنوع اربع علل علة هيولانية وعلة صورية وعلة فاعلية وعلة تمامية فلما فكروا في حدوث العالم وصنعته طلبوا لها هذه الاربع العلل وبحثوا عنها وهي هذه ترى من عمله ومن أي شيء عمله وكيف عمله ولم عمله وايضا متى عمله فلم يبلغ فهمهم الى ذلك ولم يتصوروه لقصور نفوسهم عن فهم دقة معانيها لان الباحث عنها يحتاج الى نفس زكية فاضلة في العلم والعمل ويحتاج الى ذهن صاف خلو من الغش او الدغل ونظر دقيق وبحث شديد ليدرك هذه العلل ومعانيها وحقائقها كما بينا في رسالة المعارف ولما نظروا في هذه المباحث ولم يعرفوها دعاهم جهلهم واعجابهم بآرائهم الى القول بقدم العالم وازليته وانكروا العلة الفاعلية لما جهلوا الثلاث الباقية ولم يعرفوها

Therefore, it can be inferred that individuals who do not cultivate essential qualities, such as moral integrity, clarity of thought, precision in observation, and rigour in inquiry, are less likely to apprehend the underlying coherence between scientific knowledge and faith. Moral integrity here refers to an openness to truth, honesty in acknowledging evidence, and humility in recognising the limits of one's own understanding. As McIntyre (2019) notes, the strength of science lies not only in its methods but in the attitude of honesty that scientists bring to their work. Clarity of thought requires the ability to distinguish core principles from superficial reasoning. Precision in observation, as Chalmers (2013) explains, requires a careful attention to detail and a willingness to let reliable evidence guide conclusions rather than assumptions. Likewise, rigour in inquiry involves perseverance and intellectual discipline, pushing beyond surface-level interpretations to a deeper understanding. In the absence of these attributes, the relationship between science and faith may be easily misinterpreted, leading to their perception as mutually incompatible domains.

Suggestions and Further Reading

Future discussion can be extended by examining other biological concepts, such as embryology, adaptation, and ecological interdependence, as additional points of dialogue between science and faith.

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