Parametric design—evidence of creation

Michael Milroy

Evolutionary theory proposes that the apparent design seen in nature is the result of natural stochastic (chance-driven) selection processes. Nevertheless, mechanical engineers do not design by chance. Instead, they use parametric software, which allows them to specify constraints, relationships, and dimensions of the objects they design. This is similar to what we see in organisms, which are functionally and proportionally constrained ('symmetry'), have relational and balanced dimensions, and additional finely tuned parametric characteristics. This strongly suggests that organisms, like engineered systems, are designed for function and purpose, and did not evolve through blind natural processes.

There are two central premises to evolution:

1. According to Darwin, evolutionary changes are "formed by numerous, successive, slight modifications".[1]
2. According to Dawkins, things only appear to be designed. He said: "Biology is the study of complicated things that give the appearance of having been designed for a purpose."[2]

The first of these premises has lost credibility following Behe's books on irreducible complexity, which show the improbability of multiple complex new coordinated parts developing simultaneously in an organism.[3] For the second premise, this paper examines the shapes, symmetries, proportions, and fits of parts of organisms and concludes that these reflect indisputable design aspects that dwarf modern design methodologies. And that biological structures such as the skeleton require design capabilities that are mathematically staggering.

There is a lengthy book by Scottish mathematical biologist D'Arcy Wentworth Thompson (1860–1948), titled *On Growth and Form*. The book covers the mathematics underlying biology. The author was not a creationist, but neither was he an evolutionist. Wikipedia states "the book is weakened by Thompson's failure to understand the role of evolution and evolutionary history in shaping living structures".[4] It is no surprise that a scientist who studies biology has difficulty understanding how evolution can explain the design he sees in nature.

Parametric design, the most modern methodology

A common misperception is that the DNA in the egg and sperm determine the characteristics (phenotype) of a new organism. But zygote development is controlled not by the genome alone, but by everything that is in the zygote. So, the basis for zygote development is cellular, not genomic. "The zygote genome has no control over the laying down of its own body plan!"[5] Not only is the basis cellular, but the cellular control of the development spans two generations. "The mother thus places the germ cells for her grandchildren in a safe place within her child until it is time for them to develop!"[5]

While we have learned a lot about how embryonic development proceeds, much of how its cells do this and what the individual letters in the DNA in those cells do to define and control the 3D shape of tissues and bones is a mystery. (While development is under cellular control, the genome appears to carry most of the cells' information, so this paper will refer to the genome as the information source for organisms). The various alleles of a gene can specify different adult sizes of tissues and bones, but most aspects of the shape probably are not assigned to a gene with alleles. (It is not likely that the genes that control the shape of one's teeth would have alleles for every cranny and protrusion). This paper proposes that the 3D shape information may be held in the genome in a parametric fashion, where the DNA encodes the parameters digitally in a manner analogous to a parametric computer-aided design (CAD) program on a computer.

Modern parametric design is exemplified by the popular CAD software Solidworks™ used today by mechanical engineers. There are several aspects to parametric design:

1. The size and shape of parts (e.g. dimensions, curvature, and surface shapes) are specified by variables (parameters). Patterns of holes or protrusions can also be specified to reduce file sizes.
2. The parts are constrained to fit with other parts in a specified manner (e.g. an eyeball needs to be just slightly smaller than the socket it fits in, legs need to be the same length as other legs, a bird's upper beak must be the same length and width as the lower beak, and the two beak halves must be of comparable depth and must mate perfectly). These relations are also parameters.
3. The parts are constrained to meet design criteria that limit variations in the part itself (e.g. the left leg bone must be the mirror image of the right leg bone, beak shell thickness in the larger beaks must be adequate to crunch the

hardest seeds, and beaks need to be symmetric left and right). There are a few exceptions to the symmetric beaks, like the crossbills within the genus *Loxia*.[6] See also the problems with cross-beak chickens.[7]

Figure 1 shows a Solidworks™ model of a crude 'animal'. One dimension controls the length of all four legs. Another dimension controls the diameters of all four legs, as the rear legs are constrained to be 1.5 times the diameter of the front legs, as shown by the equation in the Modify box on the right. The left legs are constrained to be mirror-images of the right legs, both for position and size. One dimension controls the length of the head, which in turn determines the jaw length, constrained to be ⅓ of the head length. The width of the lower jaw will always match the width of the upper jaw. Just a few dimensions can control a lot of other dimensions, allowing changes to our 'animal' that maintain its viability. The software makes it easy for the engineer to make variations in the model, which explains its popularity.

Parametric design produces a compact file size, important when parts are numerous and complex, as they are in animals. It also can scale parts in size by varying a single parameter, which mimics the growth of an organism. One thing that Solidworks™ does not have is a feature to control the start of growth, rate of growth, and end of growth of parts. For example, bones start to grow in an embryo at a certain stage, then increase in size until adulthood. The rate of growth is species-dependent, slow for humans, faster for chimps, and very fast for steers (one year to maturity). Our teeth on the other hand, grow in full size (the enamel's width and length is fixed once the tooth breaks out of the gum), but are sequenced over 20 years to appear when there is room in the jaw.

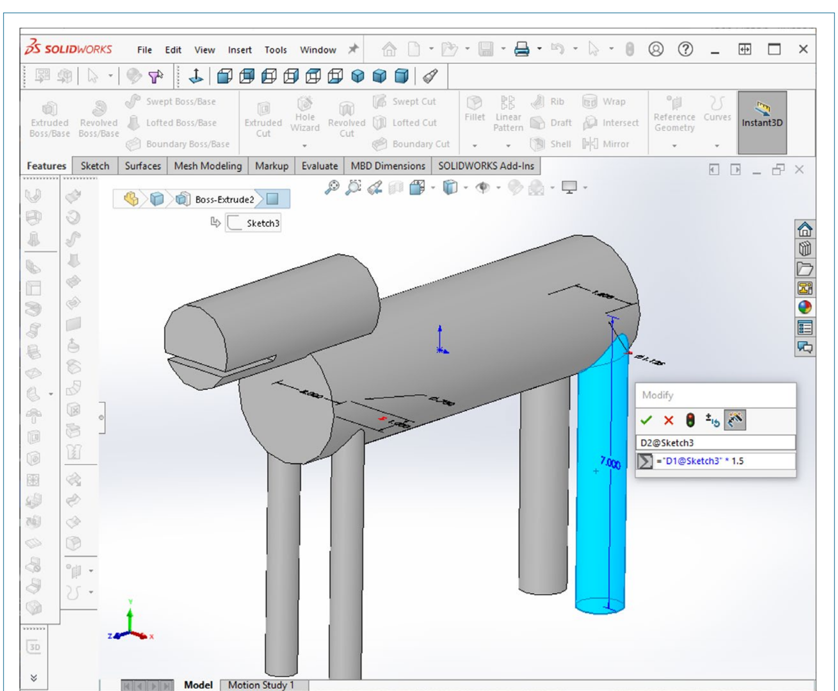

Figure 1 Solidworks™ model of an 'animal'

Alternatives to parametric design

Modelling without parametric capability

3D shapes used to be modelled by mechanical engineers on computers using non-parametric solid and surface models. As the models were input to the computers, the engineer would have to specify the size and shape of solids (composed of entities called 'primitives', such as cylinders and spheres) and surfaces (defined by entities like numerous cross-section curves) at the start, and then further changes were not possible. Design relationships within the part or relationships to other parts could not be specified. If the engineer wanted a ball and socket arrangement, the two parts were defined when they were input to the computer. The engineer would enter the dimensions as fixed values. Later, if the size of one part changed, then the mating part had to be recreated from scratch. Changes could not be made to just a few lines, as this often would affect large sections of the model. This made work for the engineer slow and frustrating. This dramatically changed when parametric modelling became available in the 1990s.

Biological systems cannot be using this non-parametric form of design data storage, as the parts cannot be grown from infancy to adulthood with fixed parameters. This also applies to embryological development. Specific cells are not predestined to become specific parts of the body. Instead, switching patterns, stressors, and chemical gradients dictate how any cell will develop in its relationship to its neighbours.

Modelling as a cloud of data points

Another model that can define 3D objects is a data-point cloud, where numerous data points are specified on the surface of the part. Triangles are typically used to join the points and create surfaces. Biological systems cannot be using this form of design storage, as copious amounts of data are required to model parts, and smooth surfaces such as ball joints are difficult to model, and (as for the solid non-parametric model), the parts cannot be grown from infancy to adulthood with fixed parameters.

Therefore, in an analogical fashion to parametric design modelling, this paper proposes that the 3D shape information is held in the genome in a parametric fashion.

Evidence for the parametric design nature of the genome's data storage

Size variations over time and in related species or breeds

While much of the parameter storage in the genome is still a mystery, in many cases alleles have been identified that specify particular characteristics, like leg length, beak length and depth, fur length, skin colour, etc.[8] We have been designed (not by chance) so that large-scale variations like skin colour among a kind or species are controlled by just a small number of genes. This in itself is evidence of design. But the proof of design is most obvious by considering the way that size varies between species or breeds, and also over time as an organism grows. Design is also evident in the way that part constraints and relationships are maintained when variations occur between species or breeds, and as the organism grows.

Finch beak variations in related species and over time

Consider beaks in the various Galápagos finch species. Originally, these finches all descended from a pair of finches that came off the Ark. The Galápagos finches produced—and they are still able to do so—new beak sizes and shapes in just a few generations under the control of either genes and/or epigenetics. Epigenetics is a recent discovery which does not require changes in the genome (hence mutations are irrelevant), yet allows traits to be passed on.[9] Beak shape is also under the control of a gene,[10] and its shape changes in ways that show pre-engineered design variation in the genome.[11] However, in this paper, the evidence for design is shown not in genetics, but by showing that chance cannot be responsible for the changes.

Figure 2 shows some of the Galápagos finches. Design is evident because there were *no evolutionary missteps.* That is, no exception to the following was ever observed: in every generation, all the upper and lower beaks, whatever their size and shape, still matched each other. If the upper beak was extra deep, so was the lower beak. If the upper beak was wide, so was the lower beak. The curves of the beaks where they met each other remained the same, while the upper profile of the upper beak changed, as did the lower profile of the lower beak. The lengths of the two halves always matched, and the beak's left/right symmetry was maintained. As the birds grew from infancy to adulthood, the growth of the two halves was consistently matched. Did this happen by evolution? Not a chance (pun intended). If evolutionists wish to contest this, they must explain how the parametric design in the genome arose from nothing, from when its ancestor supposedly had no beak.

Design evidence from another beak

Figure 3 shows the beautiful, curved beak of the adult pied avocet, along with the stubbier beak of a pied avocet chick. Note the variable curve of the adult's bill, and the precise fit between the upper and lower beak halves. The width and depth of the two halves match beautifully. Likely dozens of parameters would have to be precisely matched to create this bill. The parameters must also be matched while the beak grows and changes shape rather markedly, an impossible task for evolution working by chance mutations. No transitional fossils exist that show this problem with beak development. In fact, no intermediate fossils exist! This is the well-known punctuated equilibrium problem, which is the mystery of the missing transitional forms throughout the fossil record.[12]

Human teeth

Human teeth require a huge number of parameters to define their topology and growth sequence. As babies, we grow 20 primary teeth in a sequence as our jaws grow. As with all other animals, our teeth are symmetrical on the left and right side, and are specialized for use (incisors, canine, and molars). The teeth 'magically' appear as space becomes available for them. They all grow to the same length, and

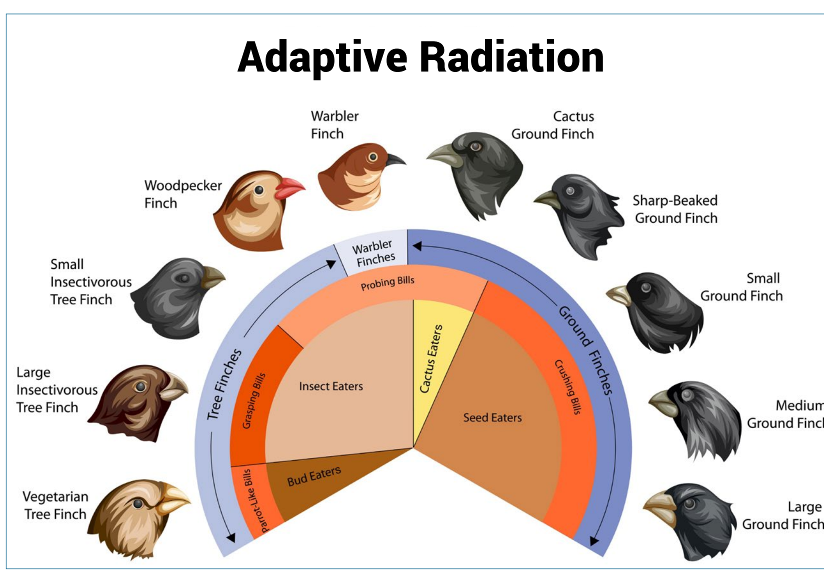

Figure 2. Adaptive radiation of Galápagos finches

Figure 3. Pied avocet adult and chick showing mature and immature beaks

mate nicely with the opposing teeth (this is a generalization; some of us need braces, perhaps because of mutations in our genome, a result of Adam's sin). This all seems very obvious, because that is what we usually see. But evolution says that the processes guiding this development originally came about by selection acting on chance mutations. How is it that most animals exhibit these common characteristics (teeth fitting jaws and mating with opposing teeth)? Where are the fossils of all the animals with deformed teeth that evolution was trying to fix? (Actually, there are numerous exceptions which make things even *more* difficult for evolution, like the elephant having just four molars that are replaced six times over the elephant's life by new ones that slide in from the rear).[13]

As we continue to grow, 32 permanent teeth appear in a sequence as space becomes available. These teeth probably utilize a different biological program from the primary teeth, as there are a different number of teeth, and the timing is different. The permanent teeth are shown in figure 4. As with our primary teeth, the adult teeth are specialized for use (incisors, canines, premolars, and molars). The fit between the teeth is precise, usually just enough to slide a piece of floss between. How do the teeth know to grow to just the right size? How do the upper teeth line up so neatly with the lower teeth? If each tooth required 22 parameters (a very conservative guess) to define its position, shape, and size (along with an appropriate number of roots), then for our 20 primary teeth and 32 permanent teeth we'd need (20 + 32) x 22 = 1,144 parameters; a big number to have found by chance and selection. But that does not include the complication of choosing the precise time at which to grow the teeth! Incidentally, chimpanzees have 32 permanent teeth, too, but the timing and the shapes are completely different than in humans.[14] So the number of parameters evolution must find is unchanged.

Other evidences of design

Inter-related fit of parts is evidence of design.

In evolution, there is no way that one part knows what size the mating part is. For example, eyeballs exactly fit sockets. (One might argue that the eyeball just grows until the socket is filled, but what about the bug-out eyes of animals like the tarsier?) In the skeleton, ball and socket joints exactly fit each other. In the skull, foramina (holes) neatly fit the nerves and blood vessels that pass through them.[15] Again, these fits are maintained throughout the growth of the organism.

Mirrored parts

Homology in evolution teaches that similar bone structures in different organisms 'prove' that one developed from the other or from a common ancestor. But evolution cannot explain how a mutation that changes the shape of a bone on the left side would be matched by a change on the right side. There are no mirrors in DNA. Do not think of the mirroring as a task that a simple algorithm could do for the whole body. Skin, fingernails, muscle, tendons, bone, cartilage, and blood vessels all need to be mirrored. However, other organs like the heart and appendix must not be mirrored. Could the algorithm that mirrors the fingernails work on the tendons? Not likely.

Dog breed sizes

Researchers recognize that most of today's more than 400 breeds of domestic dogs have only arisen in the past 200 years or so as the products of artificial selection.[16] Dog breeds come in many sizes, but all four legs on a dog are the same length, illustrating a parametric constraint. As a dog grows, the legs are always right for it. If evolution was doing this by chance, the front legs might be short and the back legs long, or the left front leg might be longer than the others. Similarly for all the parts of the dog (like the skeletal balls and sockets), which always appear in a size appropriate for the dog. (It could be argued that sausage dogs have disproportionate legs, but their necks are also short, maintaining

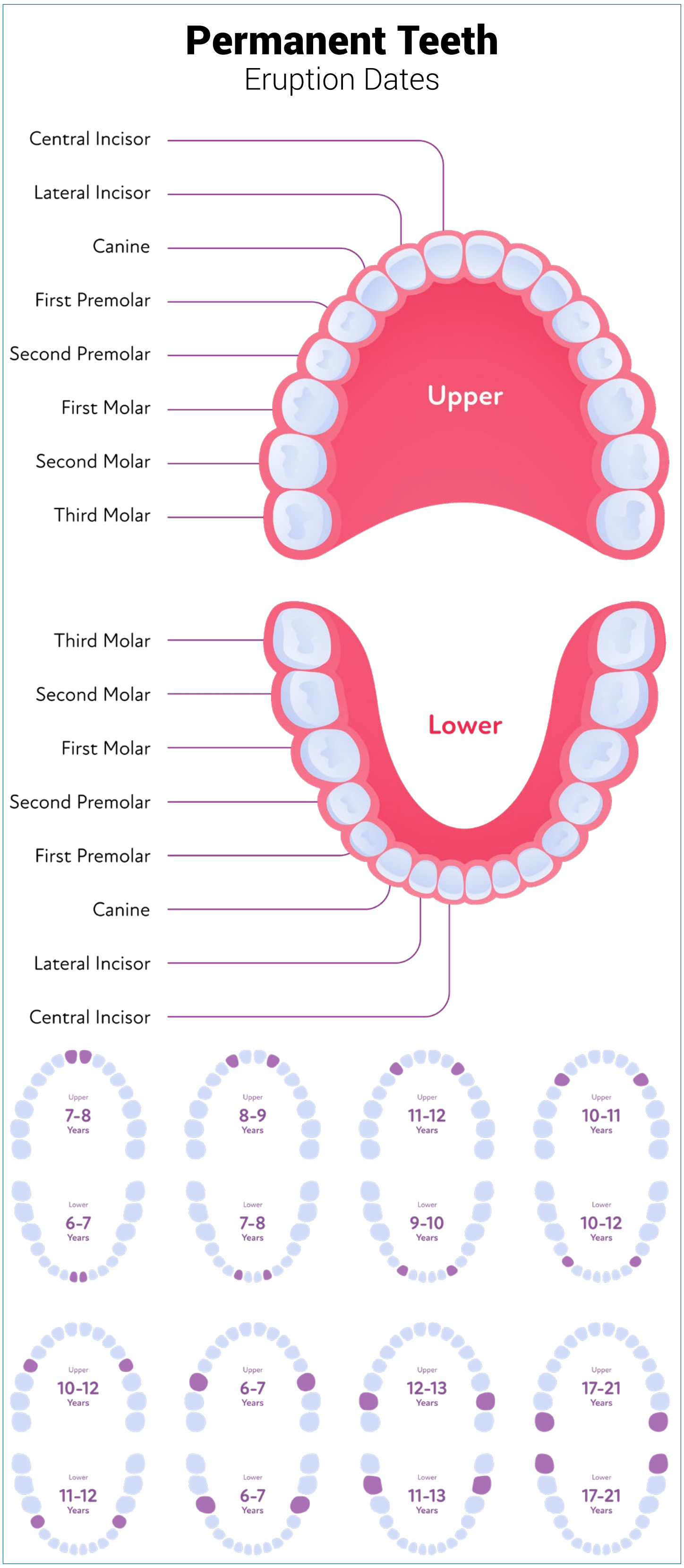

Figure 4. Type and sequence of our permanent teeth

an overall proportionate look). Colouration also comes in a huge variety, but patterns are varied, distinct, and colour-coordinated for each species (e.g. Dalmatian, white husky, golden retriever, corgi). Teeth in upper and lower jaws fit together whether jaws are wide, long, or short (for the most part, though inbreeding can produce bad hips and undershot jaws). How could evolution pack all this diversity into an original wolf-like creature if it needed to arise in stepwise function by mutations? For most of the diversity of the dog breeds to occur in 200 years, evolution would have had to be working at a fantastic rate. If it was evolution, where are all the harmful mutations, which even evolutionists admit would greatly outnumber the beneficial ones?[17]

Automatic adjustment of parameters?

Bones automatically increase in density when stressed. It is possible that the body has sensors that automatically adjust other parameters in the body. There is so much we don't know about how bodies develop.

Parametric complexity

The term 'parametric complexity' for biology is coined here to describe the huge amount of data needed to specify the 4D (3D plus time) topology of an organism. The term was chosen to be similar to the term 'irreducible complexity', which has been so devastating to evolutionary theory. In this section, the mathematical improbability of evolution will be shown.

Consider the number of parameters needed to define the 33 vertebrae in the spine of a human. If you have seen a replica of the spine you were probably fascinated by the way each vertebra interlocked with its neighbour, permitting some rotation and bending while ensuring that excess movement is limited and the spinal cord is protected.[18] Figure 5 shows a human spine and a detailed view of one of the lumbar vertebrae. The interlocking mechanism in the vertebra is hard to figure out from the picture, but it is obviously precise and intricate. It would not be easy to create a parametric model of this in a CAD program like Solidworks™, because of the complexity of the shape. Every facet, bump, and curve requires additional parameters to define it. As the part cannot be constructed with simple geometric solids like cylinders and extruded shapes, the part model would have to be modelled

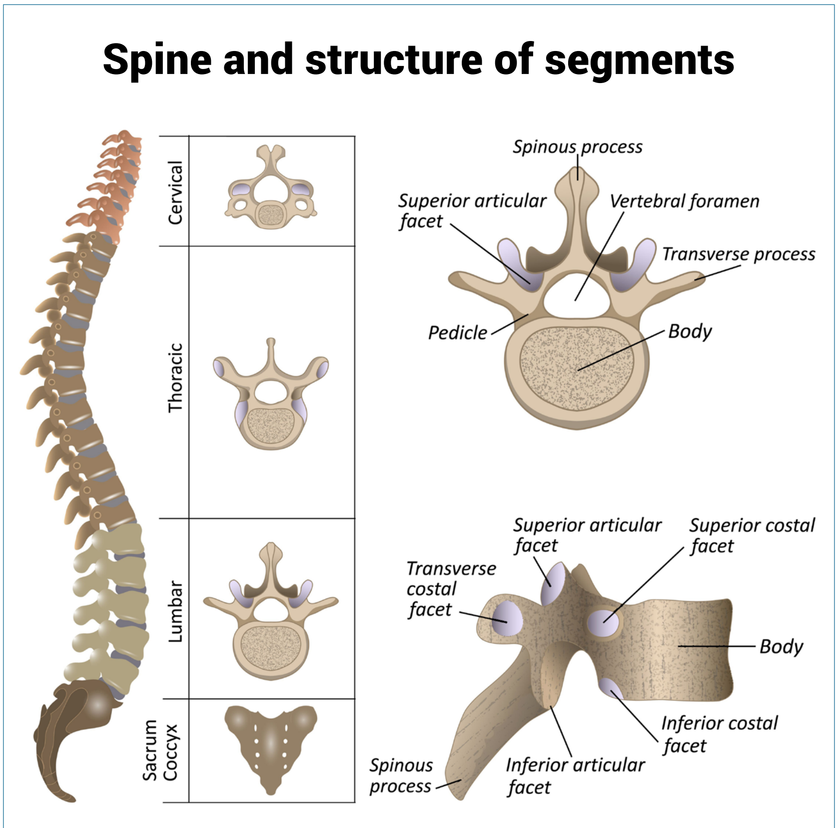

Figure 5. Human spine, showing detail of a lumbar vertebra

using surfaces, which could be as simple as triangles covering the part. There are three parameters required to specify each triangle (one x, y, and z coordinate for a corner of each triangle, typically only one corner needs to be defined). It would take at least 30 triangles (90 parameters) to make a very crude approximation of the left half of a vertebra, plus 1 parameter to specify that the part is mirrored. To be ultra-conservative, let's assume that the shape could be specified in the genome with 50 parameters.

For the spine to evolve, evolution must find 50 parameters for each of 33 distinctly different vertebrae. This is 50 x 33 = 1,650 parameters that must be found by chance. But if the spine is evolving from a chimp-like ancestor we will already have many of these parameters correct, so assume that just 20% of the parameters must be adjusted, giving 1,650 x 20% = 330 parameters.

So, could this be done by 330 beneficial mutations? Not even close! Each parameter is not just a binary digit like a 0 or a 1. If it was in Solidworks™, it would be a floating-point number, requiring four bytes for a single precision float. Let's be conservative and say that we must find a parameter that is within one of a possible 256 values, which can be specified with eight bits. Then it would require 330 x 8 = 2,640 mutations to respecify the spine. (Actually, each base pair in the genome can take on one of four values, twice what a binary bit can, but then it would require more 'luck' to find the correct base pair value).

Is defining the spine as simple as getting 2,640 beneficial mutations? Again, this understates the problem. The places where the mutations are required are buried in a mass of other base pairs that make up the hugely complex genome. As was stated before, most of the genome's function is a mystery.

If an incorrect parameter is found during evolution's trial and error search (which will happen more than 999 times out of a 1,000 since beneficial mutations are rare), the organism must be selected against (by death) and a new parameter tried. If we gave evolution a huge concession and said that there was a 100% chance that a valid mutation would occur every time natural selection went to work, and magically fix itself in the entire population instantly, it would still take 2,640 generations to evolve the spine, or about 52,000 years if a generation is 20 years.

If we consider Haldane's Ratchet,[19] which showed that the deleterious mutations (which are more numerous than the beneficial ones) multiply and fix in the population faster than the beneficial mutations, then evolution has a hopeless task. And the spine is just a small part of our body. If we are evolving from a chimp-like ancestor, we also need a lot of time to evolve our teeth (as shown already), then there is our bigger brain, our lack of hair, our hands with a larger thumb,[20] our arched feet,[21] and the list goes on. Evolution has a lot of work to do, and it has no time to make mistakes. As Haldane's Ratchet shows, the mistakes destroy the human race faster than natural selection can improve it.

But there is yet more to the mathematical improbability! The parameters must be scaled in size over the growth of the organism, from infancy to adulthood, and this scaling must be correctly timed. Each vertebra must maintain its interlocking relationship as the spine grows. This makes the evolutionary story even more implausible.

With parametric design, mechanical engineers make designs that are not nearly as complex as the human body. When a new feature needs to be added to the model, many times the parametric relationships to existing parts are lost. These relationships have to be deleted and new relationships created. How could evolution delete and create new relationships each time a new feature arose?

The purpose of this paper was not to show that the genome stores its topology information in parametric form, only that there are similarities. Nor was its purpose to show that a human spine is quite different from a chimp's (it is!). This paper was written to show that the evidence of design in the genome is stunning. We have *no idea* how the genome is able to specify complex interconnected shapes that maintain their relationships from infancy to adulthood. One thing is certain, evolution's explanation of chance mutations with natural selection is not an explanation.

Conclusion

The genome specifies 3D topology in a manner something like a parametric design system, contrary to evolutionists' assertions that design is not involved. This is demonstrated by the variations in finch beaks and dog breeds, which always change in ways that preserve the organism's ability to function. This is not something explained easily as having arisen by evolutionary chance mutations, which would frequently produce deformities, not functional organisms. The concept of 'parametric complexity' was introduced, which shows the huge number of parameters that must be precisely specified over the growth of an organism. Clearly, the genome shows evidence of design by God, of whom it is said: "Do you not know? Have you not heard? The Lord is the everlasting God, the Creator of the ends of the earth. He will not grow tired or weary, and his understanding no one can fathom" Isaiah 40:28 (NIV).

References

1. Darwin, C., *On the Origin of Species*, John Murray, London, pp. 146, 1859.
2. Dawkins, R., *The Blind Watchmaker*, Random House, Penguin, UK, pp. 4, 1987.
3. Behe, M., *Darwin Devolves*, HarperCollins, New York, pp. 286, 2019.
4. On Growth and Form, en.wikipedia.org/w/index.php?title=On_Growth_and_Form&oldid=1034877897, accessed 22 July 2021.
5. Williams, A., Heredity is foundationally cellular, not genetic, and life's history is discrete, not continuous, *J. Creation* **28**(3):73–79, 2014; creation.com/heredity-is-foundationally-cellular-not-genetic.
6. Crossbill, en.wikipedia.org/wiki/Crossbill, accessed 7 October 2021.
7. Marie, Cross Beak: Causes and Management, meyerhatchery.zendesk.com/hc/en-us/articles/360017990812-Cross-Beak-Causes-and-Management, Aug 2021.
8. Mutchler, C., What Is an Allele? verywellhealth.com/allele-5088797, 6 Feb 2021.
9. McNew, S.M., How Do Darwin's Finches Change Their Beak Sizes So Quickly? forbes.com/sites/grrlscientist/2017/09/06/how-do-darwins-finches-respond-so-quickly-to-environmental-changes/?sh=77e94f8c5810, 6 Sep 2017.
10. Williams, S., Genomes of Darwin's finches may explain the shape of human faces, sciencemag.org/news/2015/02/genomes-darwin-s-finches-may-explain-shape-human-faces, 11 Feb 2015.
11. Purdom, G., Key to Galápagos finch beak variation discovered, but it's still not evolution, answersingenesis.org/blogs/georgia-purdom/2015/04/07/key-galapagos-finch-beak-variation-discovered-its-still-not-evolution, 7 Apr 2015.
12. Eldredge, N. and Gould, S.J., Punctuated equilibria: an alternative to phyletic gradualism; in: Schopf, T.J.M. (Ed.), *Models in Paleobiology*, Freeman, Cooper and Co., San Francisco, CA, pp. 82–115, 1972.
13. Roberts, A., What an elephant's tooth teaches us about evolution, *The Guardian*, 31 Jan 2016, theguardian.com/science/2016/jan/31/elephant-teeth-teach-about-evolution.
14. Thornton-O'Connell, J., The main differences between the skulls of humans and chimps. *mom.com*, animals.mom.com/main-differences-between-skulls-humans-chimps-8038.html, accessed 7 October 2021.
15. Santhosh, S., The Cranial Foramina, teachmeanatomy.info/head/osteology/cranial-foramina, 9 Oct 2020.
16. Guitard, C., Creationist modelling of the origins of *Canis lupus familiaris*—ancestry, timing, *J. Creation* **32**(2):20–28, 2018; creation.com/dog-origins.
17. Loewe, L., Genetic Mutation, *Nature Education* **1**(1):113, 2008; nature.com/scitable/topicpage/genetic-mutation-1127.
18. Hines, T., Anatomy of the Spine, mayfieldclinic.com/pe-anatspine.htm, Sep 2018.
19. Rupe, C.L. and Sanford, J.C., Using numerical simulation to better understand fixation rates, and establishment of a new principle: Haldane's Ratchet, *Proceedings of the Seventh International Conference on Creationism*, Pittsburgh, PA, Creation Science Fellowship, 2013.
20. Young, R., Evolution of the human hand: the role of throwing and clubbing, ncbi.nlm.nih.gov/pmc/articles/PMC1571064, Jan 2003.
21. Lichtwark, G.A. and Kelly, L.A., Ahead of the curve in the evolution of human feet, nature.com/articles/d41586-020-00472-z, 26 Feb 2020.

Michael Milroy *is a retired Mechanical Engineer. He grew up in a Christian home, was baptized at 14, but at 15 the thought hit like a sledgehammer, "What if there is no God?" This plagued him for 52 years. About 10 years ago he watched the "Truth Project" with Del Tackett and began to realize that evolution was impossible. Then in December 2020 the Lord really made a change in his life and he became completely convinced of the truth of the Bible and assured of his salvation. His ministry is convincing others of the truth of a 6-day creation.*