

# Dan-erik nilsson: a research paper critical analysis

[Science](#), [Biology](#)



How truly complex and remarkable structures such as the human eye could evolve has almost always been one of the direst questions that have puzzled biologists around the world. We know that human sight relies on the ability of our eye to be able to form a clear and focused image on the retina. There are many researchers who have studied this issue, most of which who have suggested that prior to the evolution of the lens, there was a “ regulatory link between two tiers of genes, those that would later become responsible for controlling lens development, and those that would help give the lens its special physical properties...it is...

This combination of genes which appears to have then been selected in an early vertebrae during the evolution of its visual system, giving rise to the lens” (Current Biology, 2005). The history of research on this matter is long and extensive, and although there are really no evolutionary biologists known better than Charles Darwin, who stated that “ To suppose that the eye, with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by natural selection, seems, I freely confess, absurd in the highest possible degree” (Ridley, 2004). There are also many other evolutionary biologists who must be taken into consideration here, one in particular to be referenced in this report, Dan-Erik Nilsson.

When it comes to a subject such as evolutionary biology, there are plenty of critics and skeptics that are present in this regards. Through natural selection, there have been many very different types of eyes which have emerged in evolutionary history in general, and for instance Darwin, who

was one of the first truly recognized, acknowledged from the start that “ the eye would have been a difficult case for his new theory to explain. Difficult, but not impossible.

Scientists have come up with scenarios through which the first eye-like structure, a light-sensitive pigmented spot on the skin, could have gone through changes and complexities to form the human eye, with its many parts and astounding abilities” (Evolution Library, 2007). Biologists in general use the range of less complex light sensitive structures that exist in living species today in order to come to hypotheses regarding the various evolutionary stages that eyes may have gone through over time.

One evolutionary biologist in general who has sparked much controversy, especially regarding the issue of the evolution of the eye, is Dan-Erik Nilsson. I chose this individual to focus on for this assignment because he has been so renowned and recognized in terms of his contributions to this matter. Specifically, his major contribution to evolution was his demonstration that a primitive optical sense organ could “ evolve into a complex human-like eye within a reasonable period (less than a million years) simply through small mutations and natural selection” (Nilsson, 1994). His demonstration involves discussing how the complex human eye could have possibly evolved through natural selection acting on certain and specific, small variations.

He began with a simple patch of light sensitive cells, from which his model evolves until a clear image is produced as a result. Nilsson found that “ eyes corresponding to every stage in this sequence have been found in existing living sequences. The existence of this range of less complex light-sensitive structures supports scientists’ hypotheses about how complex eyes like ours

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could evolve. The first animals with anything resembling an eye lived about 550 million years ago. And, according to one scientist's calculations, only 364, 000 years would have been needed for a camera-like eye to evolve from a light-sensitive patch" (Evolution Library, 2004).

It was found from his discoveries that every change had to confer at least some sort of survival advantage, regardless of how slight each change actually was. Eventually from this what Nilsson found was that eventually the light-sensitive spot evolved into a retina, which is the known term for the layer of cells and pigment at the back of the human eye. Then, " Over time a lens formed at the front of the eye. It could have arisen as a double-layered transplant tissue containing increasing amounts of liquid that gave it the convex curvature of the human eye" (Evolution Library, 2007).

I agree with Nilsson's views because he shows in all of his work how much time and consideration he has put into the matter and he has solid, concrete proof behind every one of his theories. His life in retrospect also solidifies him as an intelligent, reliable evolutionary biologist, and also his work involving Darwin's theories, as Nilsson and fellow evolutionary biologists worked to basically disprove many of his known theories. In particular they simulated a model of the eye to find out how difficult evolution really is. Nilsson allowed the shape of the model eye to change at random, in steps of no more than 1% change at a time.

" The model eye then evolved in the computer, with each new generation formed from the optically superior eyes in the previous generation; changes that made the optics worse were rejected, as selection would reject them in nature...The work illustrates the value of building models to test our

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institutions” (Ridley, 2004). Nilsson’s research has absolutely had a great and significant impact on the field of evolutionary biology because his theories have all been so new and innovative and incredibly sufficient of proving that there is in fact an evolution of the eye.

Overall from this report we can conclude a number of things, in particular that over his life Dan-Erik Nilsson made some seriously significant contributions to the field through his work in the evolution of the eye theories, and this is not only on his own but in accompaniment with other evolutionary biologists as well.

## References

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