

Does missing gene point to nocturnal existence for early mammals?

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A gene that makes cells in the eye receptive to light is missing in humans, researchers have discovered. They say that whereas some animals like birds, fish and amphibians have two versions of this photoreceptor, mammals, including humans, only have one.

The findings – published in the Public Library of Science journal *PLoS Biology* – reveal how our experience of the light environment may be impoverished compared to other vertebrates and fits with the suggestion that early mammals were at one time wholly nocturnal creatures.

“The classical view of how the eye sees is through photoreceptive cells in the retina called rods and cones,” explained Dr Jim Bellingham, who led the research at The University of Manchester.

“But, recently, a third photoreceptor was discovered that is activated by a gene called melanopsin. This melanopsin photoreceptor is not linked to sight but uses light for non-visual processes, such as regulating our day-night rhythms and pupil constriction.”

Although the melanopsin gene is present in all vertebrates, the version in mammals was unusually different to that found in fish, amphibians and birds.

“At first, we put this genetic anomaly between mammals and other vertebrates down to evolutionary differences,” said Dr Bellingham, who is based in the Faculty of Life Sciences.

“But we have now learnt that other vertebrates have a second melanopsin gene – one that matches the one found earlier in mammals and humans. The first melanopsin gene found in the other classes of vertebrates does not exist in mammals.”

It is not yet clear how the functions of the two melanopsins differ but having different cone genes or ‘opsins’ allows vertebrates to detect different wavelengths of light and allows them to see colour.

The Manchester team now hope to find out whether the two melanopsin genes in non-mammals play similar or different roles in non-visual light detection and so provide clues as to the implications of only having one melanopsin gene.

“The two genes and their associated proteins have been maintained in vertebrates for hundreds of millions of years, only for one of them to be lost in mammals.

“We are keen to discover why this might have happened – perhaps the early mammals were at one stage nocturnal and had no need for the second gene, for instance. We also want to find out what losing one of these genes means for humans.”

Source: University of Manchester

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