Lost hormone is found in starfish

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Magnificent star, a member of Paxillosida. Credit: Dr. Dwayne Meadows, NOAA/NMFS/OPR

Biologists from Queen Mary University of London (QMUL) have discovered that the evolutionary history of a hormone responsible for sexual maturity in humans is written in the genes of the humble starfish.

The onset of puberty and sexual development in humans is triggered by

the release of a brain hormone known as gonadotropin-releasing hormone or GnRH. Scientists at QMUL's School of Biological and Chemical Sciences, working in collaboration with teams at the University of Warwick and KU Leuven in Belgium, have found that the history of this important sex hormone is a tale of loss.

It was already known that fruit flies (*Drosophila*) have two GnRH-like hormones - one that mobilises stored fats to power flight (adipokinetic hormone or AKH) and another that makes insect hearts beat faster (corazonin). What was missing was information from other invertebrate animals that are more closely related to humans than insects. Research on the starfish published today in the *Nature* journal *Scientific Reports* has provided the missing link.

The team have discovered that starfish have two GnRH-like hormones, just like in fruit flies. Professor Maurice Elphick from QMUL's School of Biological and Chemical Sciences, who led the research team, said: "About half a billion years ago there were animals swimming in the oceans that would have had just one gene that coded for a GnRH-type hormone.

"But then this gene duplicated and the two copies ultimately gave rise to the two GnRH-like hormones that we find in fruit flies and starfish. But somewhere along the evolutionary lineage that gave rise to humans, the corazonin-type hormone was lost."

What is not clear yet is how it is that the ancestors of humans were able to get by with just one GnRH-type hormone. To address this question more research needs to be done to find out more about the roles of GnRH-like hormones in starfish and other invertebrates.

First author and PhD student Shi Tian, also from QMUL's School of Biological and Chemical Sciences said: "We are investigating where the

genes encoding the two GnRH-like hormones are expressed in the strange five-sided bodies of starfish. With this information it may then be possible to find out what these hormones do in starfish."

More information: Urbilaterian origin of paralogous GnRH and corazonin neuropeptide signalling pathways, S. Tian, M. Zandawala, I. Beets, E. Baytemur, S. Slade, J. Scrivens, & M. Elphick, *Scientific Reports*, 2016.

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