Primitive forms of complex human processes identified in Amoeba

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(Phys.org)—The evolution of multicellularity marks one of the most profound evolutionary developments contributing to the appearance of human and animal life on the planet. However, with relatively little known about this seminal event, a number of international genome research efforts have focused on identifying a timeline for the emergence of key genome features that contributed to multicellularity.

The findings of new research now adds to a growing body of data that the development of multicellular animals was, in many key respects, enabled through a re-purposing of existing facilities already present in unicellular organisms.

The Science Foundation Ireland (SFI) funded study led by Conway Fellow Professor Brendan Loftus, UCD School of Medicine & Medical Science sequenced the genome of a unicellular amoeba (*Acanthamoeba castellanii*).

The researchers found within the genome an intact signalling facility (tyrosine kinase signalling) long associated with multicelluar organisms and thought to have arisen much later in evolution. Tyrosine kinase signalling is a core means of intercellular communication and coordination. Its appearance in unicellular organisms indicates the necessity for a sophisticated level of interaction with one's neighbours even as a unicellular organism.

The study also demonstrated that pathogen recognition receptors, a key

element of the innate immune system of humans used to recognise and engulf pathogens, were already in use as part of a primitive form of self-defence in amoebae.

As many human pathogens evolve their virulence outside of human hosts through interactions in their environments, these findings inform how certain pathogens have evolved to evade or manipulate the innate immune system.

The research article is published in the current issue of the scientific journal, *Genome Biology* and highlighted as a 'paper of note' in the genomics portal, *GenomeWeb*.

More information: Genome of Acanthamoeba castellanii highlights extensive lateral gene transfer and early evolution of tyrosine kinase signalling. Clarke M, Lohan A et al. *Genome Biology* 2013, 14:R11 doi: 10.1186/gb-2013-14-2-r11

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