Galaxies: Some assembly required

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New research using the world's largest telescope at the Keck Observatory in Hawaii has revealed two distinct populations of star clusters surrounding galaxies that have radically different chemical composition.

An international team, led by Swinburne astronomers Christopher Usher and Professor Duncan Forbes, has measured the chemical composition of more than 900 star clusters in a dozen galaxies.

"This is ten times the number of star clusters previously examined, allowing us to confirm the existence of two chemically-distinct star clusters," Mr Usher said.

The star clusters were selected from images of distant galaxies taken with the Hubble Space Telescope.

Roughly half of them were found to contain ten times more heavy elements, such as Iron and Calcium, compared to the other star clusters.

The astronomers assert that this difference in chemistry indicates that the star clusters, and the galaxy that they orbit around, were formed in two or more distinct episodes.

"It seems that galaxies were assembled in at least two different stages," Professor Forbes said.

"Unfortunately, galaxies don't come with assembly instructions.

"Reproducing our observational results will be a challenge for theorists that seek to model the formation of galaxies using computer simulations."

Further observations are required to determine when the star clusters were formed and how they came to have such different chemical compositions. This will be the focus of future work for the Swinburne researchers.

The research team included Jean Brodie (University of California Santa Cruz), Caroline Foster (European Southern Observatory), Lee Spitler (Macquarie University), Jacob Arnold (UC Santa Cruz), Aaron Romanowsky (San Jose State University), Jay Strader (Michigan State University), and Vincenzo Pota (Swinburne University).

The research paper The SLUGGS survey: calcium triplet-based spectroscopic metallacities for over 900 globular clusters has been published in the 21 *October Monthly Notices* journal of the *Royal Astronomical Society*.

Provided by Swinburne University of Technology

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