

A perspective on systems biology applications in livestock species

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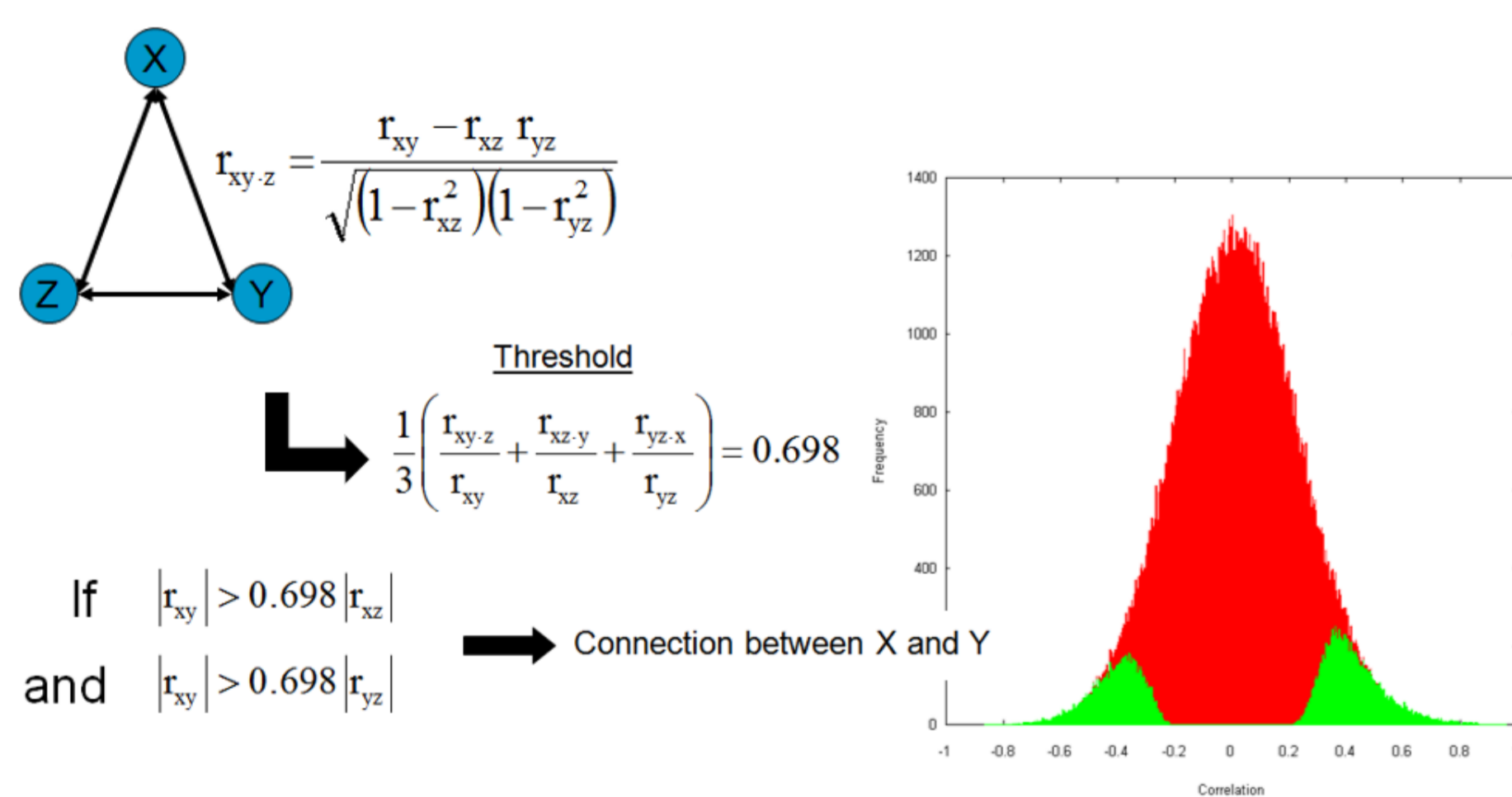
- The human genome sequence project over 20 years ago signified a massive boost to other species-specific biotechnology studies, including non-model organisms such as livestock.
- Since then, high-throughput gene expression technologies have been a popular choice. They evolved from microarray assays in the 2000's to next-generation sequencing in the 2010's.
- However, soon we realized that isolated lists of differentially expressed (DE) genes which, by simply comparing genes to themselves, have the pitfall of taking molecular information out of context.
- The need for systems-level explanations of biological phenomena prompted us to adopt gene network approaches and to analyse rigorously the connectivity patterns within the network.
- We present algorithms developed by our group to reverse-engineer and analyse gene networks including: PCIT (partial correlation and information theory), RIF (regulatory impact factors) and AWM (association weight matrix) and provide examples within the realms of growth, reproduction, and disease resistance in livestock studies.

PCIT

Combining partial correlation and an information theory approach to the reversed engineering of gene co-expression networks

Antonio Reverter, Eva K. F. Chan

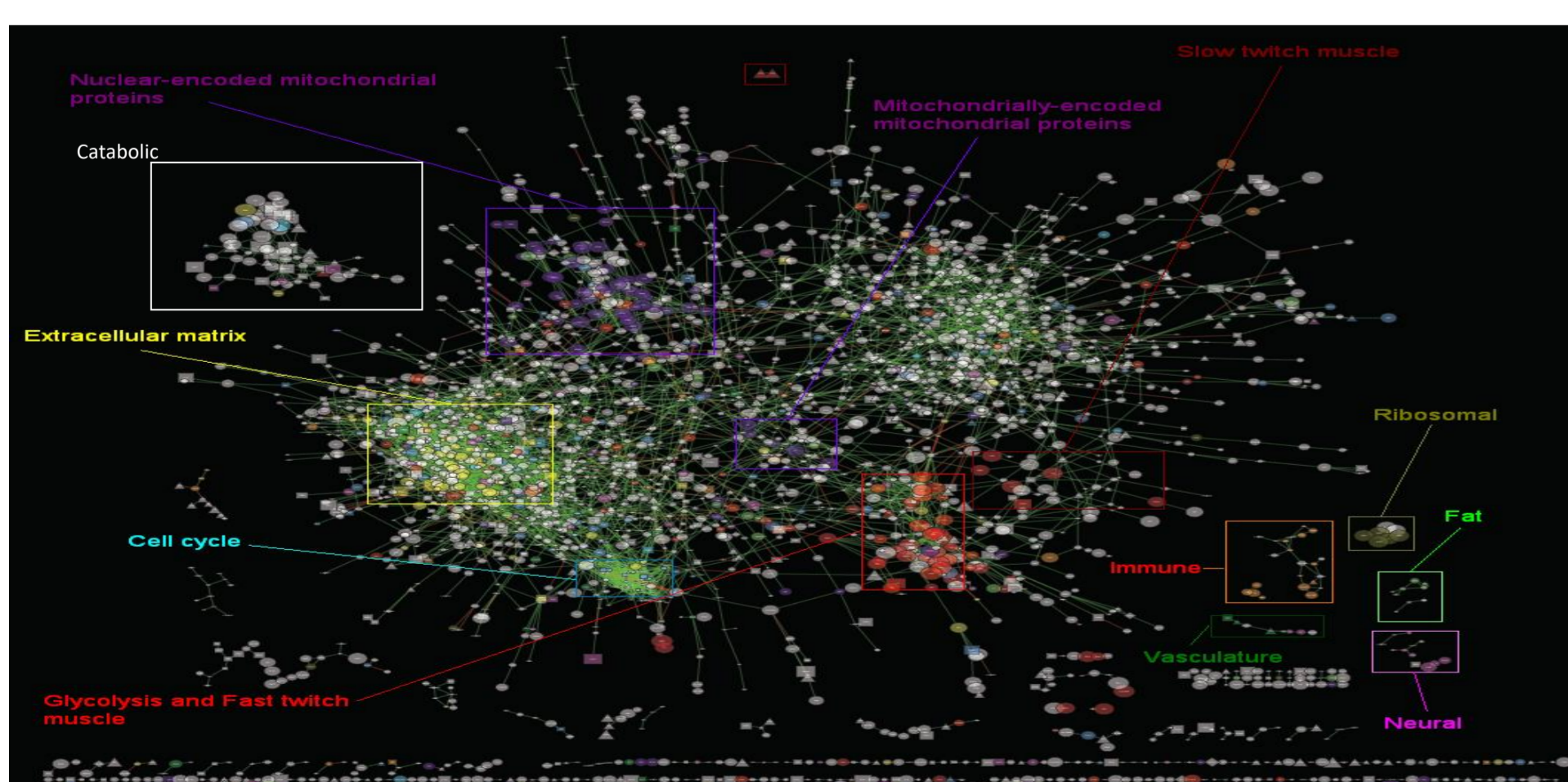
Bioinformatics, Volume 24, Issue 21, 1 November 2008, Pages 2491–2497,



PLoS One, 2009 Oct 1;4(10):e7249.

Inferring the transcriptional landscape of bovine skeletal muscle by integrating co-expression networks

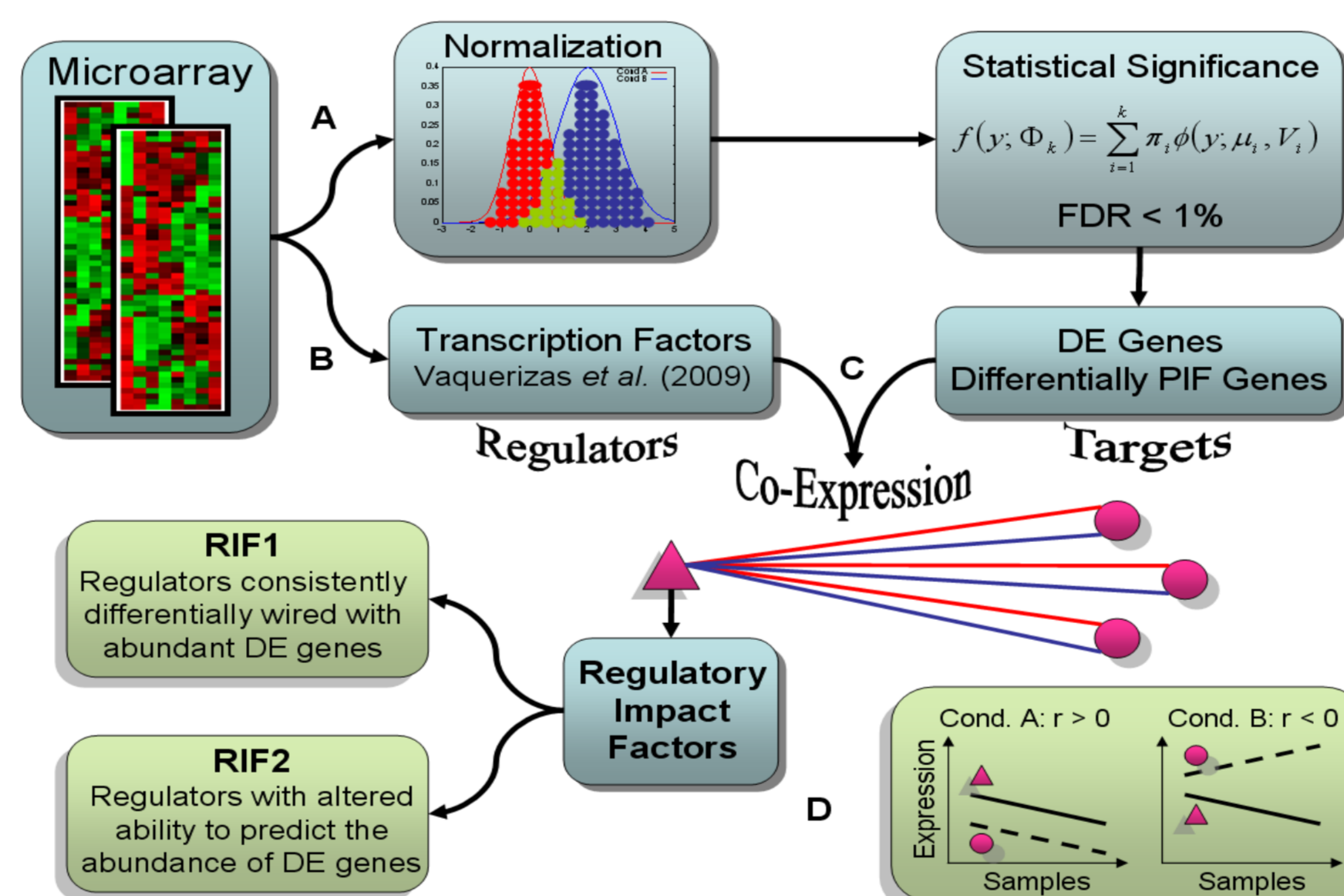
Hudson NJ, Reverter A, Wang Y, Greenwood PL, Dalrymple BP.



RIF

Regulatory impact factors: unraveling the transcriptional regulation of complex traits from expression data

By: Reverter, Antonio; Hudson, Nicholas J.; Nagaraj, Shivashankar H.; et al. BIOINFORMATICS Volume: 26 Issue: 7 Pages: 896-904 Published: APR 1 2010



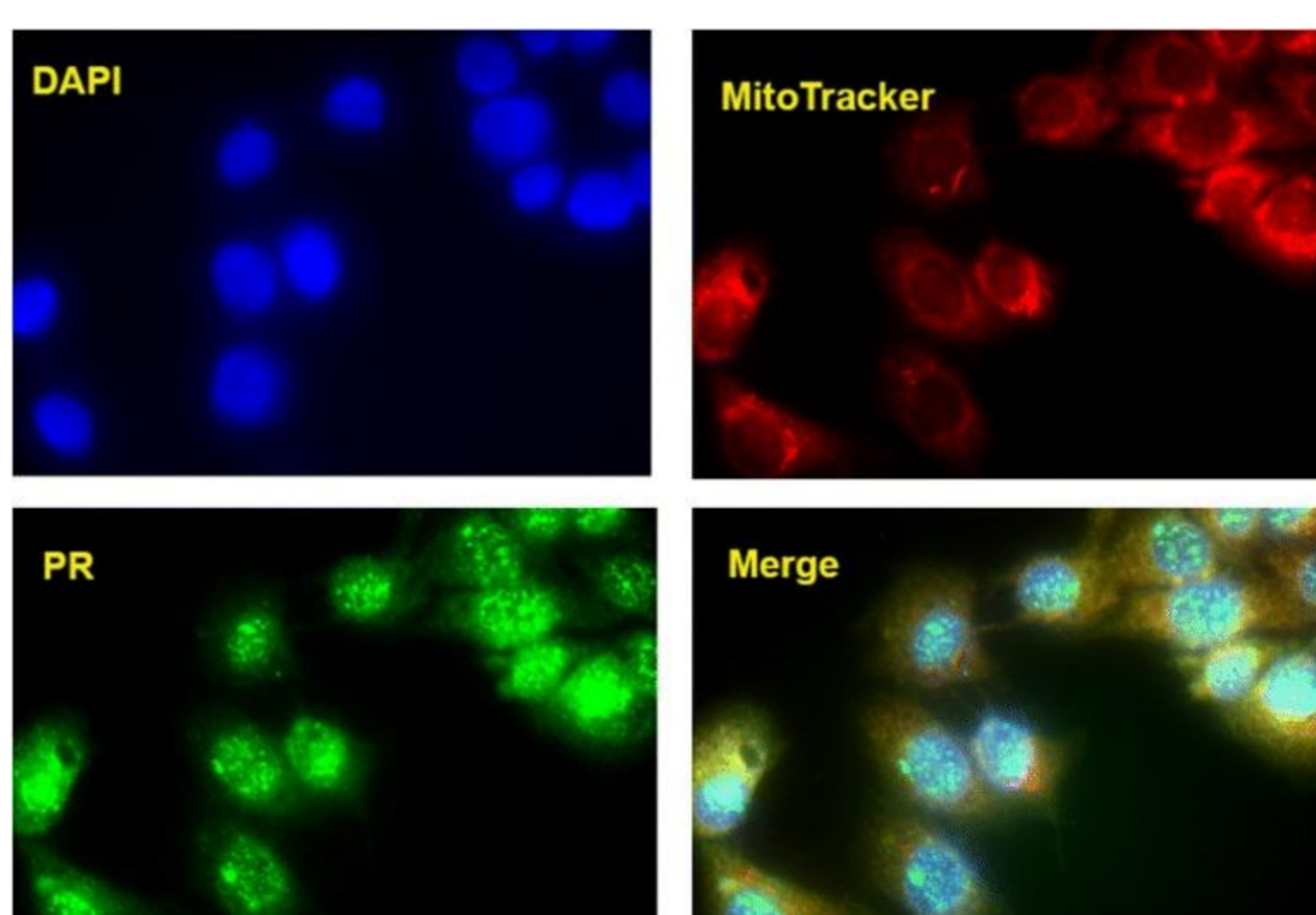
Progesterone signalling in broiler skeletal muscle is associated with divergent feed efficiency

Walter Botje¹, Byung-Whi Kong¹, Antonio Reverter², Ashley J. Waardenberg³, Kentu Lassiter¹ and Nicholas J. Hudson^{2*}

Botje et al. BMC Systems Biology (2017) 11:29

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BMC Systems Biology



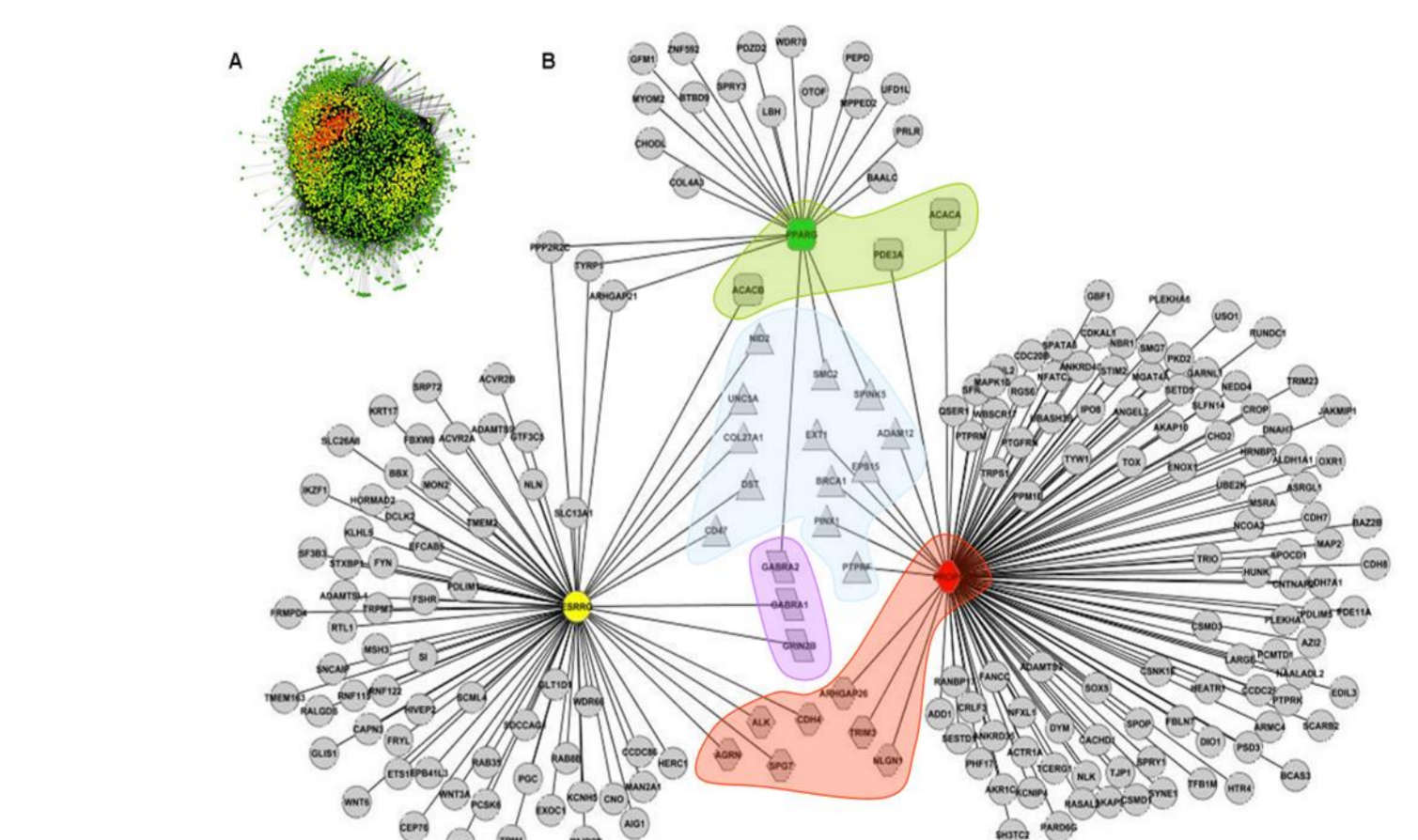
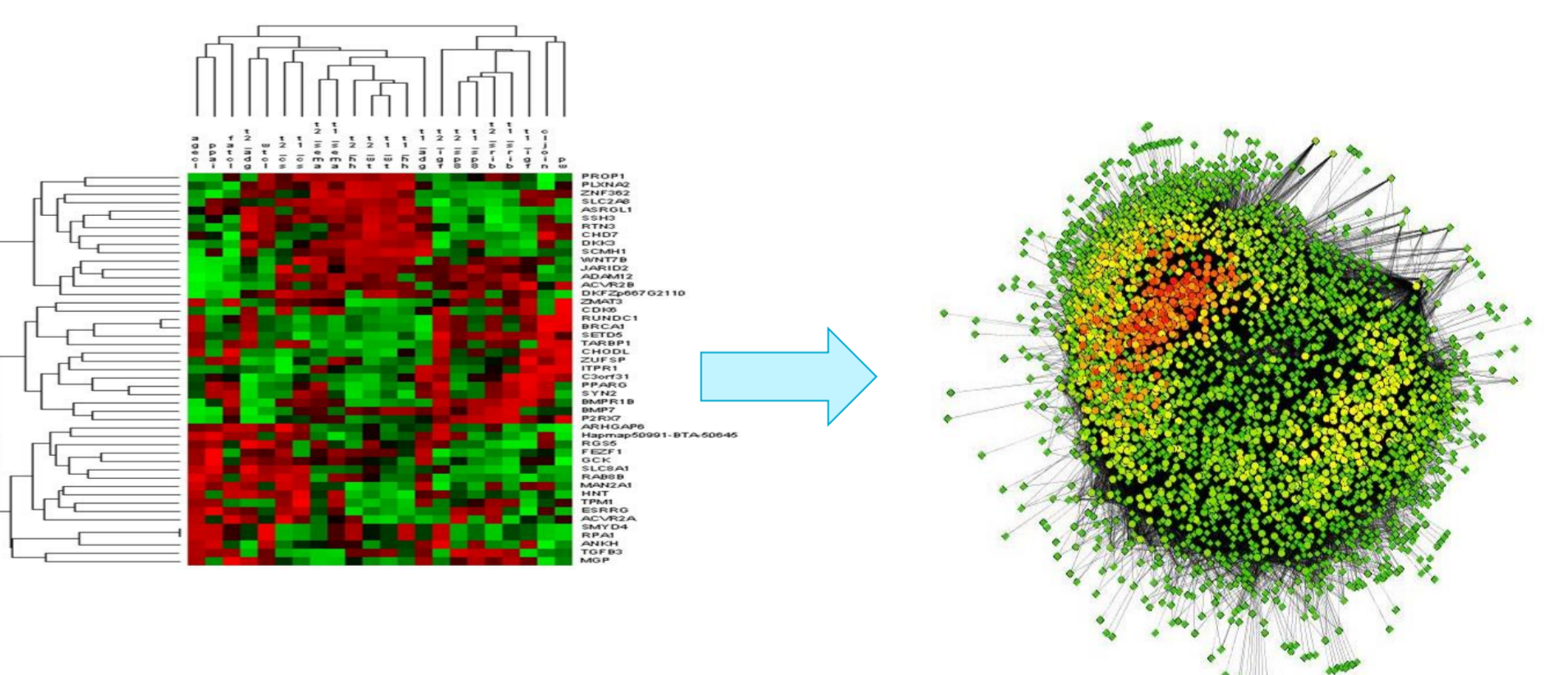
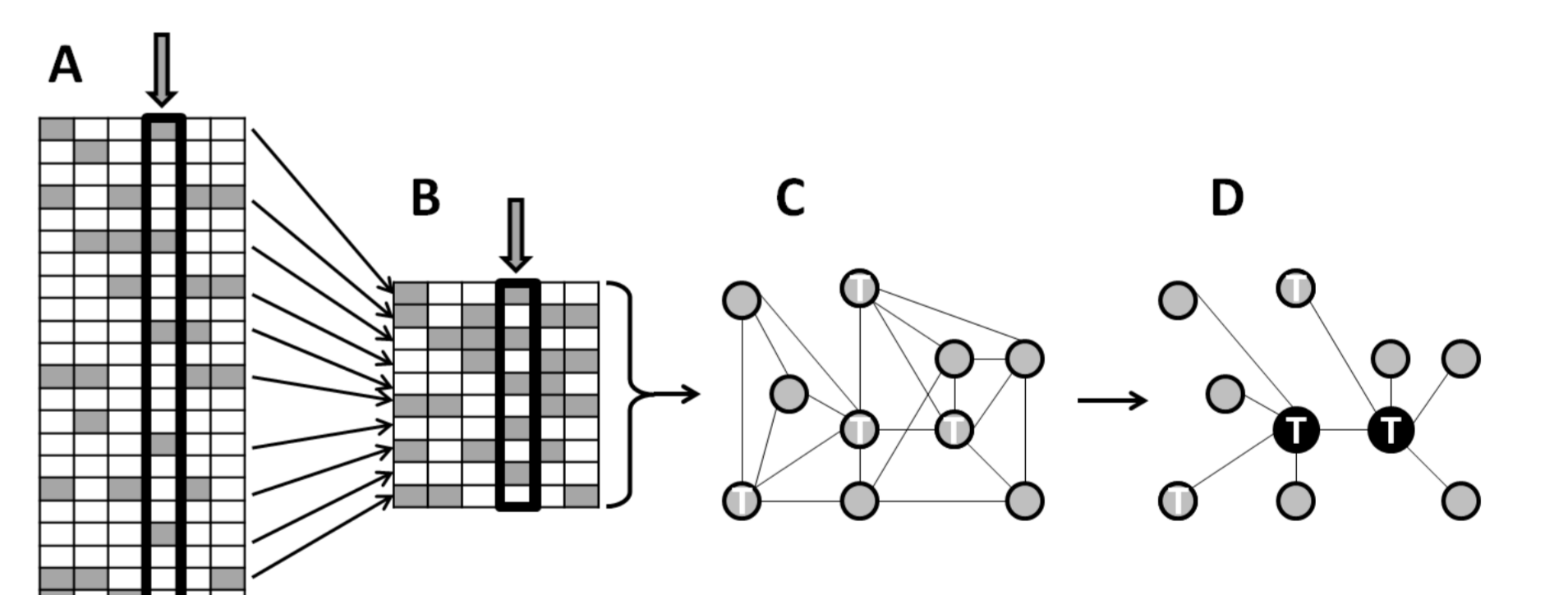
AWM

Association weight matrix for the genetic dissection of puberty in beef cattle

Marina R. S. Forte^{a,b,c}, Antonio Reverter^{a,b}, Yuandan Zhang^{a,d}, Eliza Collis^{a,b}, Shivashankar H. Nagaraj^a, Nick N. Jonsson^{a,c,e}, Kishore C. Prayaga^{a,b,f}, Wes Barris^{a,b}, and Rachel J. Hawken^{a,b,c}

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FOR FURTHER INFORMATION

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