Chick genomics

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The chicken has been an integral part of human society since it was first domesticated around 8000 years ago in Asia from where it gradually spread across the globe. Today there are few places in the world where the chicken has not become established as an important food resource. Chicken is a major source of protein globally and there are around 8 billion chickens consumed every year in the United States alone.

In addition to the unquestionable importance of chicken in the human food chain, the chicken and in particular it's readily accessible embryos have been both the inspiration for and the enabler of research since the first tentative steps towards developing a formal system of scientific enquiry. The ready supply of chickens and their fertilized eggs allowed Hippocrates to examine developing embryos around 460BC and imagine that he could see a steady progress from a less to a more developed state. Eighty years later Aristotle took up this concept of progressive development and following careful examination of chicken embryos suggested an epigenetic origin of embryonic structures in his treatise Historia Animalium.

Hippocrates and Aristotle had the curiosity and intellect to delve deeply into these profound questions but were ultimately constrained by the technical limitations of the day and had to satisfy themselves with observations using the naked eye.

It was not until two millennia later in the 17th century that knowledge of optics would progress to the level where primitive microscopes would enable detailed observations of the sequential development of the chick. In 1672 Marcello Malpighi published detailed microscopy observations of plant histology in Anatome Plantarum and in an appendix to this volume entitled Observations de ovo incubato recorded

the first detailed microscopic observations of the sequential development of embryonic chick anatomy. This remarkable publication in which structures such as the blastoderm, neural groove and somites were described set the standard for countless later studies which are now considered the foundations of modern embryological anatomy.

This example is an illustration of the fact that we exist in a continuum of scientific discovery, with each generation of researchers dependent on discoveries of prior generations that stretches back to the time before Hippocrates and Aristotle. Malpighi's remarkable progress was made possible by technical innovations which sent ripples through the entire scientific community. Progress along the discovery continuum has always been marked by technological advances and while there have been many profound advances since Marcello Malpighi opened his first egg, we are living through a period impacted by one of the most pervasive and revolutionary new technologies ever to emerge. The influence of genome sequencing technology has rapidly cascaded through every discipline of the life sciences allowing us to not only do experiments that previous generations were unable to attempt but even more importantly to do experiments that previous generations could not even conceive.

In this special issue of genesis, The Journal of Genetics and Development focused on chick genomics we present a series of reviews and technical reports on current approaches being applied to uncover the complexities of biology in this post-genomic era that highlight the enduring strength of the chick as a model system. In highlighting these strengths, it is our hope that those already using the chick system will see new directions in which to proceed and those yet to embrace the chick system will be convinced, just as Hippocrates and Aristotle were, that the chick system has many technical advantages that inspire and foster new discoveries.