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CHALLENGES POSED BY AN “EXTENDED SYNTHESIS” OF EVOLUTIONARY BIOLOGY FOR INTERPRETING AND PRESENTING HUMAN ORIGINS

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ABSTRACT

Evolutionary biology is currently in the midst of a revolution. The so-called “Extended Synthesis” is radically reconfiguring understanding of the mechanisms and history of the evolution of life, including humankind. The Extended Synthesis represents the third stage in the history of the development of evolutionary biology and is beginning to answer many previously intractable questions with massive volumes of data. It has major implications also for the way anthropologists and archaeologists interpret conventional forms of evidence about human origins on all time scales and the content and presentation of narratives about our past as outlined in popular culture, including museums, and the mass media.

In this paper, I briefly outline the three major stages in the history of evolutionary biology, outlining their impact on ideas underpinning the study of human origins. As an illustration of the radical and far reaching nature of the Extended Synthesis, I will then discuss two widely held ideas in anthropology/archaeology often discussed in popular culture that have been challenged or require substantial revision due to recent research in evolutionary biology: 1) that evolution, including human evolution, is progressive, and 2) that culture has been the cardinal driver of human evolution.

As a major source of information about evolution, biodiversity and human cultural and biological history, museums are beginning to face the challenge of accessibly presenting and explaining the Extended Synthesis to the public. Because humans continue to be a core subject of evolutionary biology, the deep-time history of our species offers the perfect example for this purpose. Moreover, with International Museum Day providing a focus on the socially constructive role museums play worldwide, the Extended Synthesis provides new opportunities to show how the human endeavour we call science works and progresses, its positive role in society, and the challenges it can present for widely held, but sometimes poorly founded notions about humanity and our past.

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Jabatan Muzium Sarawak

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by

Darren Curnoe

Abstract

Evolutionary biology is currently in the midst of a revolution. The so-called “Extended Synthesis” is radically reconfiguring understanding of the mechanisms and history of the evolution of life, including humankind. The Extended Synthesis represents the third stage in the history of the development of evolutionary biology and is beginning to answer many previously intractable questions with massive volumes of data. It has major implications also for the way anthropologists and archaeologists interpret conventional forms of evidence about human origins on all time scales and the content and presentation of narratives about our past as outlined in popular culture, including museums, and the mass media.

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Keywords: Human evolution, history, genomics, Extended Synthesis

INTRODUCTION

The principles of evolutionary biology naturally underpin all scientific research into and broader notions about the biological history of humankind and other organisms. Irrespective of whether we study macroevolution – the history and processes at play at or above the species level – or microevolution – changes and history within species – the models and concepts of evolutionary biology must be central to our thinking. Yet, the very concepts underpinning this field of research are currently going through a major reconfiguration.

We live in the post-genomic era of biology. Truly remarkable developments in the molecular sciences have occurred over the last few decades, important among them the increased speed and accuracy, and reduced cost, of DNA sequencing. The massive volumes of DNA data and range of methods now available to scientists have profoundly altered knowledge of the human genome with major implications for the understanding of human growth and development, disease, and evolution. The breadth and depth of its impact on biology, and human

understanding of our past, is becoming so far reaching that the next phase in the development of the science of evolutionary biology has begun, dubbed the “Extended Synthesis” (Koonin, 2009a, b; Pigliucci, 2009; Pigliucci & Müller, 2010; Danchin *et al.*, 2012).

The transformation underway at present with the Extended Synthesis is arguably as profound as the discovery of natural selection by Darwin and Wallace during the 19th Century, at least from a scientific standpoint. It is having a major impact in biological science research across a wide range of organismal systems and fields of study, and is beginning to translate to anthropology and archaeology. During its 150-year or so history, evolutionary biology has also had a major impact socially and culturally, and we should expect similar impacts from the Modern Synthesis.

Clearly, those of us involved in the presentation of the history of life and evolution, including the origins of humankind, to the media and public, need to take on board these radical findings and be mindful of their implications. They have important potentials for a broad understanding of our past as well informing us about the direction we might be heading and challenges we face as a species in a world grappling with the consequences of anthropogenic climate change. They also serve to show how the human endeavour of science actually works, how knowledge and understanding about biology develop, and the crucial role that technology is playing in driving contemporary scientific research as an adjunct to broader changes in society. As one of the major repositories and disseminators of knowledge about science and history in most communities, museums clearly have a major role in translating the Extended Synthesis and its consequences to a public audience as well as to consider its potential social impacts.

This paper will highlight some of the remarkable developments presently underway in evolutionary biology and will consider some of their implications for both research into and public communication