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Darwin and Lotka
Two Concepts of Population

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VOLUME 21 - ARTICLE 16

Date Received: 6 Jul 2009

PAGES 469 - 502

Date Published: 13 Oct 2009

<http://www.demographic-research.org/volumes/vol21/16/>

doi:10.4054/DemRes.2009.21.16



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Abstract

Population was the subject of two major conceptual developments in the second quarter of the 20th century. Both were inspired by evolutionary biology. Lotka developed a mathematics of evolution in human and other species by analogy to thermodynamic models. His theory followed demographic practice in treating populations as closed units, commonly macro-scale, and in inferring underlying processes of change from aggregate outcomes. In contrast, the evolutionary synthesis – a collaborative product of research in experimental and population genetics, natural history, and related fields of biology – followed Darwin in insisting that close observation of small-scale population processes and local environments is necessary to understand population change. Because gene-environment interactions rely on expanding and contracting networks of individuals, the populations in question are by nature open. Despite the apparent conflict between these positions, the synthesis broke new ground in the history of population thought by showing how the two approaches could be combined. Demography, however, moved away from evolutionary and population biology as a source of theory in the early post-war era, and this conceptual redevelopment of population was scarcely remarked upon. More recently, the tremendous development of genetics has recalled demographers' attention to evolutionary theory as an inescapable element of modern population thought. This paper provides a historical introduction to mid-20th-century developments in Darwinian population thinking, and the implications of its dual conceptualisation of population for demography. Its potential importance extends beyond the problem of gene-environment interactions to many aspects of social network analysis.

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Keywords

biodemography, Darwin, evolutionary theory, fertility, history

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of population theories, history of population thought, Lotka, social networks


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