

CMMA Monthly Seminar

第33回 CMMA 月例セミナー

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Recent genetic and archaeological studies on the range expansion of modern humans and the demise of Neanderthals suggest 1) their interbreeding, that must have resulted from their co-existence, and 2) a diversity of cultures/behaviors in associations with the spread of modern humans. It was not a simple spread of homogeneous "modern human behaviors." This study aims to explain a possible relationship between the two aspects (i.e., demographic changes and cultural dynamics) through eco-cultural modeling. In our model, carrying capacities depend on their cultural levels. Both population densities and the densities of skilled individuals in Neanderthals and in modern humans are spatially distributed and subject to change by spatial diffusion, ecological competition, and cultural transmission within each species. Our model is formulated by reaction-diffusion equations. We analyze the resulting range expansion dynamics in one-dimensional space. Of special interest is the case of cognitive and intrinsic-demographic equivalence of the two species. The range expansion dynamics consist of multiple wave fronts of different speeds. Properties of these wave fronts are mathematically derived. Depending on the parameters, these traveling waves can result in replacement of Neanderthals by modern humans. The first wave of intrusive modern humans is characterized by a low population density and a low density of skilled individuals, with implications for archaeological visibility. The first invasion is due to weak interspecific competition (i.e., niche difference). The second wave of invasion may be induced by cultural differences between moderns and Neanderthals. Spatially and temporally extended coexistence of the two species, which would have facilitated the transfer of genes from Neanderthal into modern humans and vice versa, is observed in the traveling waves, except when niche overlap between the two species is extremely high. Our study proposes a complicated process of modern human range-expansion due to ecological and cultural factors.

"Ecocultural Range-Expansion Model of Modern Humans in Paleolithic"

日時：2019年6月4日(火) 16:30-17:30

場所：明治大学 中野キャンパス高層棟6階 研究セミナー室3

主催：

文部科学省 共同利用・共同研究拠点
明治大学先端数理科学インスティテュート
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