

The conclusions are identical, but I find the comparative evolutionary approach builds a more solid framework for investigating language origins than does the cognitive simulation approach adopted in this eccentric book.

As part of their journey exploring the evolution of human social institutions, the authors also probe the concepts of deceit and intentionality. I strongly doubt that Quiatt and Reynolds intended to deceive the readers, but the main title of their book transmits misleading information. Despite the title, this book is *not* about primate behaviour, but concentrates on describing the origins of human social institutions, as indicated in the subtitle. The pedestal for the book is the linking of social cognition with complex societies, this link premised on the idea that a large neocortex evolved for rapid and efficient information processing that fosters complex social relationships. While not disputing the potential veracity of this reasonable perspective, one should remember Charles Darwin's⁶ thoughts on the subject: '...no one supposes that the intellect of any two animals or of any two men can be accurately gauged by the cubic contents of their skulls.

It is certain that there may be extraordinary mental activity with an extremely small absolute mass of nervous matter...Under this point of view, the brain of an ant is one of the most marvellous atoms of matter in the world, perhaps more so than the brain of a man.'

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'no attempt to pursue an exhaustive review of all the literature that is relevant to such theoretical debates'. He realizes that most of his own field studies have been 'short and intermittent'. Indeed, the fragmentary and incongruent nature of the data make comparison difficult. So the unbroken-polygyny issue is ultimately left pending: the fact that multiple queens occur in both primitively eusocial societies of *Ropalidia* wasps, as well as 'highly eusocial' swarming species (containing morphologically distinct castes) does not necessarily support a hypothesis of continuous polygyny as suggested (p. 134), since both could be secondary to a monogynous stage, as argued by Carpenter³. This issue cannot be settled without reference to phylogeny (see Ref. 4). Furthermore, it is probably a mistake to visualize mutualism as an interpretation opposed to kin selection and the occurrence of dominance interactions; I know of no way to explain the persistence of sterile castes in a mutualistic society except as a consequence of social dominance, with kin selection favoring the collaboration of (sterile) subordinates.

In spite of the present weakness of support for Itô's argument, it may accomplish the author's primary aim, which is to stimulate further research. It is clear from reading this book, for example, that there is still no conclusive demonstration of permanent polygyny in any species of social wasp – a major gap in research on this group, since permanent polygyny is a prominent feature of theoretical discussions.

This book develops ideas first presented in an earlier one (1986) titled *Karibati no syakai-sinka*. Any supposedly expert reviewer who, like me, cannot even guess that this means 'social evolution of wasps' must acknowledge the achievement of Itô and others now writing so lucidly in a language (English) so distant from their own native tongues. For this, extra credit is due.

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Sociality of Wasps

Behaviour and Social Evolution of Wasps: The Communal Aggregation Hypothesis

by Y. Itô, Oxford University Press, 1993. £30.00 hbk, £13.50 pbk (viii + 159 pages) ISBN 0 19 854683 / 0 19 854046 9

The social insects have long served to test theories of social evolution, yet the evolution of insect sociality is still the subject of intricate controversy. This book unabashedly attempts to generate still more debate, and with it to 'stimulate new approaches ... even if the findings do not support [the central] hypothesis' – namely, the 'communal aggregation hypothesis' of wasp sociality. Called the 'mutualistic aggregation hypothesis' in the text, this is an extension of the 'semisocial' hypothesis of Lin and Michener¹, who proposed that eusociality originated in the Hymenoptera (wasps, ants and bees) via a 'semisocial' stage, with mutualistic females of the same generation, not necessarily close kin, living in groups due to the advantages of communal defense. Itô extends this idea to

visualize a history of unbroken polygyny, with permanently multiqueen ('polygynous') colonies of highly social swarming wasps evolving from primitively social groups, without the single-queen ('monogynous') stage usually thought to have occurred.

Although unbroken polygyny was earlier mentioned as a possibility², neither corroborated or denied by evidence available at that time (1978), a cladistic analysis of social wasps by Carpenter³ suggested that long-term monogyny probably intervened before the evolution of the polygynous swarming species. In this book Itô challenges Carpenter's conclusion. He attempts to focus renewed attention on the importance of polygyny and mutualism (as opposed to dominance hierarchies and kin selection) in discussions of social wasp evolution.

Itô's defense of the mutualistic aggregation hypothesis is only partly successful, for reasons freely admitted by the author himself. He states at the outset that his evidence is 'incomplete' and that he will make