

## What are Social Insects?

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The phrase *Social Insects* commonly brings to our mind the honey bee or ants, but sociality in one form or the other can be seen in many other insects also. Growing interest in the study of social insects has made it necessary to have precisely defined technical terms for different levels of sociality.

*Eusocial*, meaning truly social, represents, the most highly evolved level of sociality, defined by E. O. Wilson as the state where "Individuals of the same species cooperate in caring for the young; there is reproductive division of labour, with more or less sterile individuals working on behalf of fecund individuals; and there is an overlap of at least two generations in life stages capable of contributing to colony labour, so that offspring assist parents during some period of their life". Thus, three important characters namely, *Cooperative brood care*, *Reproductive caste differentiation* and *Overlap between generations* are essential for a species to be called eusocial. Ants, bees and wasps (Order: Hymenoptera) and termites (Order: Isoptera) are typical examples of eusociality. Recent evidence suggests that some aphids may also be eusocial. With the sole exception of a mammal namely, the naked mole rat which lives in underground tunnels in Africa, there is not a single example of eusociality outside the class Insecta - not even in birds and mammals which are generally considered as spectacular examples of social life. This is because while birds and mammals as also many other creatures cooperate in brood care and live in groups with overlapping generations, none other than the naked mole rat has evolved a sterile caste that works for the more fertile members of the species.

Among insects and other arthropods, there are several other levels of sociality which fall short of eusociality:

*Solitary*, of course is the term that characterises the absence of any extent of sociality so that members of a species may not interact with each other at all except during courtship and mating.

*Subsocial* refers to the adults caring for their own young ones for sometime. Subsociality is widely distributed. Examples may be found among crustaceans, spiders, mites, scorpions, millipedes, centipedes, cockroaches, crickets, bugs and beetles.

*Communal* species are those where members of the same generation use the same composite nest or nesting area, but show no cooperative brood care or any other feature of eusociality. Many spiders are excellent examples of this.

*Quasisocial* is one step higher than communal because it also involves cooperative brood care. Again spiders are good examples of this. Thus, quasisocial includes one of the three features of eusociality namely, cooperative brood care but not the other two.

*Semisocial* refers to a situation which incorporates two features of eusociality namely, cooperative brood care as well as reproductive caste differentiation but lacks overlapping of generations. Many wasps and bees are semisocial. Many of us tend to forget that most Polistine wasp colonies are merely semisocial at the beginning of the colony cycle. Only after the first daughters emerge and begin to work for the colony, is there an overlapping of generations to qualify for the title eusocial.

*Parasocial* is a relatively new term which includes communal, quasisocial and semisocial but excludes the subsocial. This term is useful because there appear to have been two routes in the evolution of eusociality namely, the *Subsocial route* and the *Parasocial route*.

*Pre-social*, however, refers to everything beyond the solitary and before the eusocial i.e., it includes the subsocial, communal, quasisocial and the semisocial.

Even among the eusocial, it is common practice to distinguish two levels.

*Primitively eusocial* refers to cases such as many wasps and bees where there is little or no morphological caste differentiation, and as a consequence, there is often considerable flexibility in social roles that a given animal may adopt. Reversal of roles from queen to worker and vice-versa is also sometimes seen. Caste differentiation takes place atleast partly after eclosion and usually involves simple behavioural mechanisms. The primitively eusocial species are being increasingly studied as there are obvious advantages in using them as model systems to understand the evolution of eusociality.

*Highly eusocial*, as the name implies, refers to the most advanced societies where there is clear cut morphological caste differentiation and little, if any, flexibility in the social roles that adult insects may adopt. Caste determination occurs almost exclusively before eclosion and involves rather complicated nutritional and hormonal mechanisms. All termites, most ants and many bees and wasps such as the honey bees and the vespine wasps, respectively, are highly eusocial. Without exception the highly eusocial state is restricted to the orders Hymenoptera and Isoptera in the entire animal kingdom.

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