

“Social structures and functions in squid schools”

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Cephalopods (octopus, squid, cuttlefish, etc.) are an attractive animal that has a well-developed information processing system. The system is constituted with the high-resolution lens eyes, centralized brain constructed with a similar number of neural cells with small mammals and neural controllable chromatophores wrapping the whole body. Using this disproportionate system in terms of invertebrates, they exert higher cognitive abilities. They show observational learning (a learner can solve newly encountered challenges with just watching behaviors of a trained animal that solves the same tasks), self-control and future-dependent foraging, tool use, precise navigation and so on. What happened to their molluscan ancestors more than three hundred million years ago? To answer this big evolutionary question, the social brain hypothesis indicates one direction of investigation. Depend on the hypothesis that complicating social relationships in animal groups accelerates development of the brain, uncovering sociality of cephalopods may shed light on the evolutionary mystery about their 'intelligence'. In the cephalopods, squids usually show grouping behavior, so-called school. The reef/oval squids (genus *Sepioteuthis*) had been known as a social squid from some episodic records through field works. In a band-shaped school formation like a bird flock during migration, size-dependent arrangements and sentinel/scout-like behaviors of school members were reported. To deeply understand their sociality, inter-individual relationships among members should be analyzed. The social network analysis could be one of a suitable choice to meet the need. Since squids usually keep a certain distance between each other in a school, an inter-individual distance can be useful as a criterion to evaluate a relationship between pairs. After comparing observed data with null model data obtained through a randomization about squid positions in a school, well-structured social networks emerge. The social networks of squids have two sides of the same coin based on selectively proximate and separate relationships, and both contain a few hub individuals (connecting with many members) and many peripheral individuals (connecting with only one member). The relationships between social networks and structures/functions of schools will be discussed.