

Abstract

Thanks to the progress in genetic methods in population ecology, many critical discoveries were recently made in the field of reproductive strategies of social insect. Among them is the description of mixed reproductive strategies, combining advantages of sexual reproduction with thelytokous parthenogenesis. The queens of such species produce sterile castes through classical sexual process from fertilized eggs, while future queens develop asexually from unfertilized eggs. This original breeding system was first described in several genera of ants, but it was found very recently, that it is not restricted to social Hymenoptera, since it has been identified also in the phylogenetically remote eusocial clade of termites. Switching between the sexual process and thelytokous parthenogenesis, now known as Asexual Queen Succession (AQS), which enables a continuity of genetically almost identical queen generations after the death of the founding primary queen, was first reported only in one genus of lower termites, i.e. *Reticulitermes*. Recently, our research group participated at the identification of AQS in four other species from two subfamilies in higher termites. One of these species is *Silvestritermes minutus*. This species is locally abundant in French Guiana and lives in small, well shaped nests on localities with a middle degree of disturbance and AQS is an obligate element of its life cycle. We showed that this species obligatorily and very early replaces the founding primary queen with a harem of neotenic queens, boosting thus the reproductive potential of the colony and maximizing the investment into a single dispersal event, followed likely by the decline of the colony. Relatively short lifecycle, which rarely exceeds three years, is an original way how to benefit from the mixed reproduction, which is not used to extend the lifespan of the colony, but rather for an early maximum dispersal.

Genetic analysis showed, just as in other AQS termite species, the sexual origin of sterile castes and wing dispersers (alates) and parthenogenetic origin of neotenic queens with a high rate of conservation of heterozygosity, indicating anaautomictic thelytoky with central fusion. Direct observations, long-time experiments and morphometric analyses indicated that the neotenic queens develop from the fourth nymphal stage. Sexual dimorphism in alates, also studied by morphometric analysis, showed that all evaluated structures are larger in females, except for tibia, which was longer in males. The body mass was significantly and consistently larger in females. We also tested the hypothesis on kin selection-driven asymmetrical investment into alates and concluded that at the population level, the investment into the two sexes of alates is identical. It is consistent with our observations of the absence of colonies with inbred breeding structure, which might be the driving force for asymmetrical investment.

Keywords: social insects, termites, higher termites, Termitidae, reproductive strategies, Asexual Queen Succession, parthenogenesis