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L'héritage maternel d'une araignée subsociale : une toile pour la prédation collective des jeunes

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Résumé

La construction d'une retraite assurée est le premier pas vers la vie sociale chez les araignées. Dans le cas d'*Amaurobius ferox* (Araneae, Amaurobiidae), une araignée subsociale, les jeunes restent dans le nid maternel après consommation de leur mère (matriphagie). J'ai étudié le bénéfice que les jeunes sont susceptibles de retirer de la présence de la toile maternelle dans la capture collective de leurs propres proies. L'ensemble des résultats a mis en évidence la valeur adaptative de la toile maternelle. La capture des proies a été beaucoup plus efficace lorsque les jeunes ont bénéficié de la toile maternelle que lorsqu'ils ont dû eux-même construire leur toile. La toile maternelle semble aussi assurer une meilleure transmission des informations sur l'état de la proie et l'activité des congénères, puisque plus de jeunes ont été recrutés pour contacter et maintenir la proie sur une période de temps plus courte. L'héritage de la toile maternelle est l'un des facteurs cruciaux par lesquels la mère intervient sur la phase post-maternelle. ***Pour citer cet article : K.W. Kim, C. R. Biologies 328 (2005).***

Abstract

Maternal inheritance in a subsocial spider: web for collective prey capturing of the young. Construction of a safe refuge is the first step toward the evolution of social organization in spiders. In the case of the subsocial spider *Amaurobius ferox* (Araneae, Amaurobiidae), the young remain in the natal nest after consuming their mother's body (matriphagy). The benefit that the young could obtain from the maternal web was investigated in their collective prey capture. The results demonstrated the adaptive value of the maternal web. The prey capturing activity was more effective when the young were allowed to stay on the maternal web than when they used the web constructed by themselves. Maternal web may also provide a better transmission of information on prey state and clutch mates' activities, because more spiderlings were recruited to contact and hold the prey in a shorter period of time than when they were on a spiderling-constructed web. The young's inheritance of the maternal nest is probably one of the crucial ways in which the mother influences the post-maternal social period of the young. ***To cite this article: K.W. Kim, C. R. Biologies 328 (2005).***

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Keywords: Maternal inheritance; Web; Subsocial spider; Collective predation

Abridged English version

Most of the parental behaviors that increase fitness of the offspring have been demonstrated in the presence of the parents. A parental contribution that effects their young's survival can exist even after the death of the parents. The mother of the subsocial spider, *Amaurobius ferox* (Araneae, Amaurobiidae), is sacrificed for its young who actively cannibalize her. After matriphagy, the siblings do not leave the maternal nest and live in a group until 3–4 weeks later, when they disperse, in contrast to other subsocial spiders leaving the natal nest as soon as the mother disappears. During this post-maternal period, the siblings develop capturing ability and show collective capturing activity against large prey.

Why do the young of *A. ferox* remain in the natal nest when the mother is no longer present? I investigated the benefits that the young obtain from the maternal web in their collective prey capture. During the maternal period, females of *A. ferox* build their largest webs, using adhesive and elastic cribellate silk, the production of which is very expensive compared to ecribellate silk.

I compared collective capturing behaviors of the young against a prey 10 times larger than a single spiderling. The experiment had two treatments: presentation of the prey within the maternal web ($n = 10$ clutches) and presentation within a web built by the siblings ($n = 14$ clutches). From video-recorded capturing sequences, I observed the proportion of the clutches that paralyzed the prey, counted the number of participants, and analyzed successive attacks (contacts) and seizures against the prey. I also compared the treatments' effects on agonistic interactions between siblings.

The adaptive value of the maternal web was evident in the results. Prey-capturing activity was more effective when the young remained on the maternal web than when they used the web constructed by themselves (70% vs. 28%). Maternal webs may also provide better transmission of information on the prey's state and siblings' activities, because more spiderlings were recruited to contact and seize the prey in a shorter time. Time taken by the first individual within the clutch to attack and seize the prey did not differ between the two treatments. However, the time intervals between the first and second attacks and between the first and second seizures were shorter on the maternal web. Moreover, the second, third and fourth attacks and seizures occurred more rapidly on the maternal web. Agonistic interactions between the siblings were rarely observed in either treatment.

Amaurobius ferox has traits characteristic of an intermediate evolutionary stage between the maternal social stage and permanently social stage in spiders. Hence the species provides an opportunity to understand how sociality might evolve via a subsocial pathway. The young's inheritance of the maternal nest is probably one of the crucial ways in which the mother influences the post-maternal social period of the young. With her web, the mother shares in the cost of web construction, protects her young against predators, and assists in prey capture well after her death.

1. Introduction

L'aspect adaptatif des soins parentaux est de plus en plus perçu [1–4]. Ces comportements parentaux, qui augmentent le *fitness* des jeunes, sont mis en évidence en présence de leurs parents. Une contribution des parents, même après leur mort, peut toujours exister, en intervenant sur la survie des jeunes (par exemple, [5]).

Chez *Amaurobius ferox* (Araneae, Amaurobiidae), la mère se sacrifie pour ses jeunes, qui cannibalisent activement leur mère environ une semaine après l'émergence du cocon [6]. Après avoir dévoré la mère (matriphagie), les jeunes d'*A. ferox* ne quittent pas le nid maternel. Ils vivent en groupe pendant encore trois à quatre semaines avant la dispersion [7], contrairement aux autres araignées maternelles étudiées, pour lesquelles les jeunes quittent le nid dès que la mère disparaît [8–10]. Environ une semaine après la matriphagie, les jeunes effectuent leur seconde mue et présentent une activité prédatrice vis-à-vis d'une proie