

Signal Alternative to Body Size: Function and Evolution of Male-Specific Ornament Used in Ritual Fighting of Chameleons

Exaggerated sexual dimorphic traits that have evolved under sexual selection include ornaments to signal own 'quality' as a mate and weapons to deter rivals by physical attack. Some *Furcifer* chameleons have been known to possess exaggerated sexual dimorphic traits, i. e., male-specific ornament and color change pattern. This ornament is soft and is not used as a weapon. However, other *Furcifer* species do not have these sexual dimorphisms. The presence of the sexual dimorphism does not reflect the phylogenetic relationships, suggesting that these dimorphisms have evolved under strong selective pressure. *Furcifer oustaleti* males do not have the ornament, whereas *F. rhinocerotus* males have a long nose-like ornament. To explore factors that affect the outcome of male-male fighting, I conducted staged encounter experiments. Males of *F. oustaleti* did not change their body color, whereas *F. rhinocerotus* males change their body color markedly. In *F. oustaleti*, larger males won in the most ritual fightings. On the other hand, larger *F. rhinocerotus* males did not always win the fighting. The ornaments of *F. rhinocerotus* males become longer disproportionately with body length, resulting in allometric exponent, which is 1.57. Difference of the ornaments between males predicts the degree of escalation in male-male fighting better than difference in body length; larger difference results in lower degree of escalation.

Previous researches revealed that *F. rhinocerotus* shows quite short lifetime (< 1 year) that causes the population to compose single cohort within same period. In contrast, *F. oustaleti* shows longer (> 1 year) lifetime. Body size of *F. rhinocerotus* males is less variable than that of *F. oustaleti* males. Therefore, in *F. rhinocerotus*, the uniformity of body size among males, which is intrinsically caused by a short lifetime, may have driven the evolution of the ornament and rapid color change to settle down the fighting.

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