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BEHAVIORAL THERMOREGULATION AGAINST THE DIURNAL HEAT STRESS UNDER WATER SCARCITY IN COMMON BROWN LEMURS: IMPLICATIONS FOR THE EVOLUTION OF CATHEMERALITY

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In Malagasy lemurs, two genera, *Eulemur* and *Hapalemur*, exhibit cathemral activities, active in both day and night. Previous studies have demonstrated that lemurs often decrease diurnal activities when nocturnal activities increase. However, mechanisms for decreasing diurnal activities have rarely been analyzed as determinants of cathemerality. Therefore, I observed a troop of *Eulemur fulvus* during 1-min interval scannings at Ankarafantsika National Park, Madagascar, for one year and analyzed relations between their diurnal and nocturnal activities, diet, ambient temperature, solar radiation, water availability, and canopy cover. Diurnal activity budgets were affected negatively by the amount of solar radiation and positively by water availability in the forest. Although lemurs were active throughout daytime during rainy season, they rested in midday and activities peaked in morning and evening during dry season. During the latter dry season, lemurs exclusively consumed succulent leaves of *Eulophia* sp. in daytime despite their frugivorous diet during other seasons. In contrast, during night, lemurs ate fruits but never ate *Eulophia* leaves, and traveled more to visit fruit patches. Prolonged midday resting during dry season probably provided advantage of avoiding heat stress from solar radiation and minimizing water loss of evaporative cooling. Lemurs also needed to engage in diurnal leaf-eating for water intake. These behavioral thermoregulatory activities put pressure on diurnal activity budgets and, therefore, probably led to nocturnal fruit-eating to compensate energy requirements during the drought season. Cathemerality in *E. fulvus* may have evolved as an adaptive strategy against stressed diurnal activity budgets caused by heat stress under water scarcity.

Keywords: activity patterns, solar radiation, water intake, compensation of energy