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# 热带地区相对湿度的季节性变化影响果蝇*Drosophila jambulina*体色多型性和水分平衡(英文)

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## Seasonal changes in humidity level in the tropics impact body color polymorphism and water balance in *Drosophila jambulina*（*In English*）

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摘要 在印度次大陆的亚热带地区， 秋天冷而干燥， 春天湿润。变温性果蝇所具有的抗干燥性有助于其度过较为干旱的气候条件。*Drosophila jambulina* 具有体色二型性。已有研究表明， 随湿度变化， *D. jambulina*热带种群始终保持体色多型性， 这与热条件下体色黑化相反， 且该热带物种中体色分化频率随季节性变化， 这符合黑化 干燥假说。但是两种色型的*D. jambulina*产生这类气候适应的机理尚不明了。为了检验干燥相关性状生理基础的分化与对气候条件的色型特异性适应相关这一假说， 我们利用分别在17℃和25℃、 低湿（40% RH）和高湿（80% RH）条件下饲养获得的两种色型的*D. jambulina*， 检测了其水分平衡对相对湿度、 温度、 及温湿度相互作用的反应。我们发现， 在低相对湿度下， 两种温度下饲养的深色型果蝇的生理和脱水性状数值显著高于浅色型。对两种色型果蝇的水分收支情况进行的比较分析表明， 在低相对湿度下， 深色型果蝇的含水量较高、 水分损失率较低、 抗脱水能力较强， 使其具有更强的抗干燥性。在干燥胁迫过程中， 两种色型的果蝇均以碳水化合物作为代谢燃料， 但是在低湿条件下， 深色果蝇中贮存碳水化合物的含量明显要高。而且， 在两种湿度条件下， 这两种色型果蝇之间的总能量收支显著不同。据此认为， *D. jambulina*的水分平衡相关性状表现出的色型特异性分化与其对湿热生境的适应相关。

关键词： *Drosophila jambulina* 水分平衡; 色型 多型性 相对湿度 能量收支 气候适应

Abstract: In subtropical parts of Indian subcontinent, autumn is cold and dry while spring is wet and humid and ectothermic drosophilids are expected to evolve desiccation resistance to cope with drier climatic conditions. *Drosophila jambulina* exhibits color dimorphism. Previous studies have described that in tropical populations of *D. jambulina*, body color polymorphism is maintained through humidity changes as opposed to thermal melanism and seasonal changes in the frequency of body color morphs in this tropical species supports melanism-desiccation hypothesis. But the mechanistic bases of such climatic adaptations in two body color morphs of *D. jambulina* are largely unknown. We tested the hypothesis that divergence in the physiological basis of desiccation-related traits is consistent with body color morph-specific adaptations to climatic conditions, for which we examined the response of water balance to relative humidity (RH), temperature, and their interaction in *D. jambulina*, using two body color morphs that had been allowed to rear at low (40%) or high humidity (80%) at 17℃ and 25℃. We found that, at low RH, dark body color morph had significantly greater physiological and desiccation trait values than light body color morph at both the temperatures. A comparative analysis of water budget of the two body color morphs showed that higher water content, reduced rate of water loss and greater dehydration tolerance confer higher desiccation resistance in dark morph of *D. jambulina* at low RH. We found that carbohydrates act as metabolic fuel during desiccation stress in both the morphs, but a higher level of stored carbohydrates was evident in dark morph at low humidity. Further, total energy budget differ significantly between these two body color morph at two humidity. Thus, body color morph-specific divergence in water-balance-related traits in *D. jambulina* is consistent with their adaptations to wet and dry habitats.

Key words: *Drosophila jambulina* water balance body color morph polymorphism relative humidity energy budget climatic adaptation

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