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Photography of Trichoptera in flight

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Abstract

Whereas photography of insects at rest is used for a wide variety of purposes, including illustrating publications and aiding their identification, photography of insects in flight is more challenging and little practiced. This paper describes a system that uses a digital single-lens-reflex camera combined with commercial-level flashes (with electronic power settings to give very short exposures) and simple electronics in a rig that can be used to capture high quality images of night-flying insects. With such a rig, hundreds of images of free flying Trichoptera have been obtained. Preliminary observations of night-flying *Athripsodes bergensis* (Leptoceridae) indicate that this system could be used for studying the mechanics of flight, wing beat frequency, aerodynamics, flying speed, aerial activity, and behavioural ecology of night-flying insects in their natural environment.

This paper briefly describes the technique as applied at a site on the banks of the Groot River in the southern Cape region of South Africa between October 2008 and April 2009 and presents a selection of the images obtained.

Key words: Trichoptera, Leptoceridae, flight, photography technique

Introduction

Whereas photography of insects at rest is used for a wide variety of purposes, such as illustrating publications and aiding identification, photography of insects in flight is much more challenging and is not often attempted. In many studies, photographs have been obtained under artificial conditions, for example, tethering the insect glued on a pin or on a string or wire harness (Wooton 1992). Such conditions were obviously prone to result in distortions of natural behaviour and induced abnormal air currents. In the 1970s, valuable pioneering work on capturing photographs of free-flying insects was undertaken by Dalton (1975, 1982) who developed advanced high speed techniques using specially designed equipment. Brackenbury (1995) elucidated the remarkable aerodynamics and mechanics of insects in flight by means of photographs. Significant contributions to our understanding of flight kinematics and wing deformations in Trichoptera have been made with high speed cinematography and flashlights, flat-sheet illumination and laser speckle photography in a wind tunnel (Brodsky & Ivanov 1983, 1984; Ivanov 1985a, 1985b, 1989, 1991; Stocks 2009).

Daylight photography of insects in flight is hampered by the technical demands of requiring an ultra-fast shutter response, which is needed to minimise the delay between initiating the shutter and its full opening to record the image. The response time (shutter delay) of commercially available single-lens-reflex (SLR) camera shutters (whether using film or digital media) usually results in the

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