

DRAGONFLY DEATH BY ENTANGLEMENT ON HOOKED AND BARBED PLANT SURFACES (ANISOPTERA: LIBELLULIDAE)

M.J. SAMWAYS

Department of Zoology & Entomology, University of Natal, P.O. Box 375,
Pietermaritzburg 3200, South Africa

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Entanglement and death of young and old male *Trithemis arteriosa* and *T. dorsalis* on the hooked trichomes on the seed pods of the indigenous plant *Desmodium repandum* and on the barbed points on the seed heads of the exotic *Bidens pilosa* are illustrated and described from South Africa. These hooks and barbs, although probably having evolved for epichory (= epizoochory) in fur and feathers, are lethal traps for these dragonflies.

INTRODUCTION

It is well known that plants are often well endowed with epidermal hairs or trichomes (JUNIPER & JEFFREE, 1983; LEVIN, 1973). Often these are hooked, and not only impede insect movement, but also hook into the intersegmental membranes of the abdomen and limbs, totally immobilizing the insect (RICHARDSON, 1943; JOHNSON, 1953). Such mechanical defences are effective enough to have potential in the control of some agricultural insect pests (PILLEMER & TINGEY, 1976, 1978). Hooked trichomes are often associated with creeping plants and may immobilize heliconiid butterfly larvae on *Passiflora adenopoda* (GILBERT, 1971; JEFFREE 1986) and various insects, including adult butterflies, on *Desmodium uncinatum* and *D. intortum* (SUTHERST & WILSON, 1986).

The date, there appears to be no reference to dragonflies becoming fortuitously hooked or impaled on trichomes or other plant projections. I report here such entanglement on both an indigenous and an exotic plant in southern Africa.

OBSERVATIONS

On 15 February 1990 at Black Lake, Yengele Forest, Mpenjati, Natal, South Africa, two teneral male *Trithemis arteriosa* (Burm.) were entangled but still alive on the surface of the seed pods of *Desmodium repandum* (Vahl) DC. (Fig. 1), about 2 m from the side of a pond. This plant is indigenous and characteristic of damp ecotonal areas between forest and open areas. To the human touch, it feels sticky, but its adhesion is due to hundreds of minute hooked trichomes (Fig. 2A). On contact with the seed pods, the dragonfly becomes caught by a few of these hooks (Fig. 2B) as they curl around the wing veins (Fig. 2C, D). Once entangled, the dragonflies are unable to escape, with the wings becoming crumpled and further caught up. The trichomes did not damage or penetrate the wing membrane (Fig. 2B).

On 21 April 1990 at the Bird Sanctuary, Pietermaritzburg, Natal, four old male individuals of *T. arteriosa* and one of *T. dorsalis* (Rambur) were dead and entangled on the seed heads of the exotic weed *Bidens pilosa* L. ("blackjack") (Figs 3 & 4A), beside a pond. The wing membrane was penetrated (Fig. 4B, C) and damaged, as were some of the wing veins (Fig. 4C, D). Once the wing was penetrated, the barbs held the insect fast.

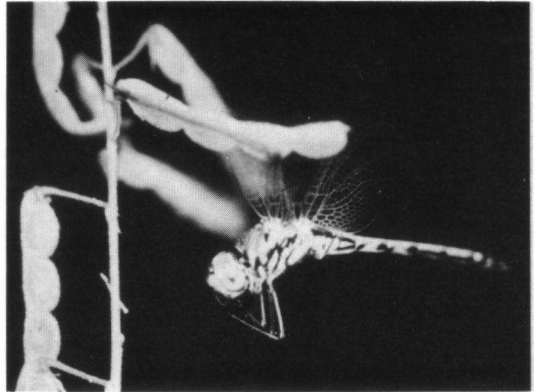


Fig. 1. A teneral male *Trithemis arteriosa* entangled on the seed pod of *Desmodium repandum*.

DISCUSSION

Trithemis spp., especially *T. arteriosa*, appear to be particularly susceptible to entanglement. Both young and old individuals were affected, and these were all males. The entanglements were near to the edge of the water, where dragonfly densities were high. These may have been chance events simply because densities were high, or they may have been the unfortunate outcome of aerial manoeuvres during territorial disputes.

Brushing against the plants may not necessarily result in entanglement, but once hooked, there appears to be little chance of escape. With blackjack, being caught up also means considerable wing damage.

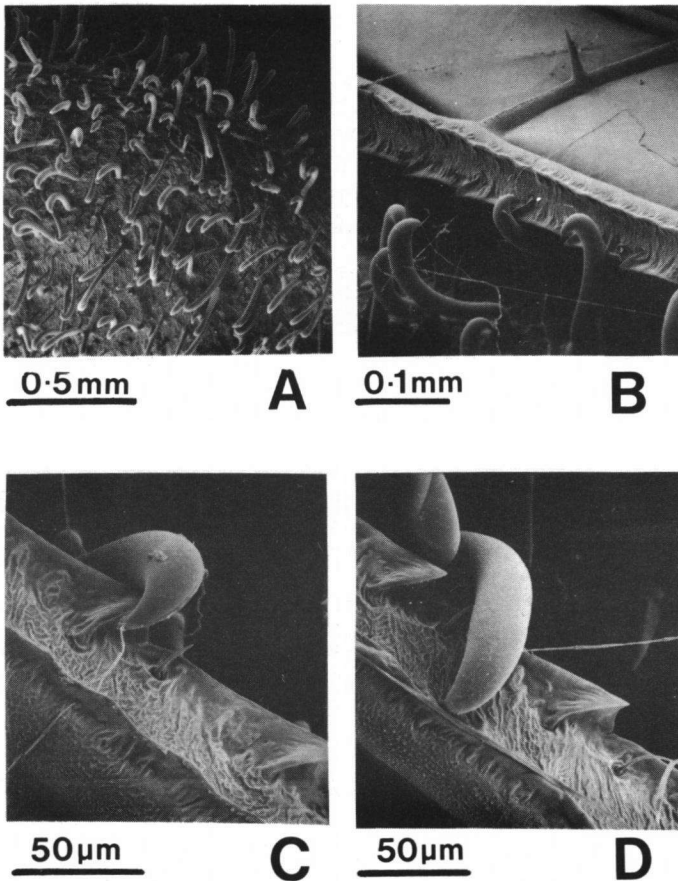


Fig. 2. The seed pods of *Desmodium repandum* are covered with hundreds of hooked trichomes (A), a few of which (B) are sufficient to entangle this individual of *Trithemis arteriosa*. The hooks are sharp pointed, and well able to curl around the rugosities of wing veins (C, D).

Entanglement appears to have no selective advantage for the dragonfly. For the plant, the primary purpose of the hooks and barbs is to promote epichory (= epizoochory) in mammal fur and bird feathers. For *Desmodium*, the hooked trichomes probably also confer protection from insect herbivores, as with other plants with similar structures (JEFFREE, 1986; SOUTHWOOD, 1986).

The dragonfly's cadaver, once fallen to the ground, may provide significant localized nutrients for the mother plant. It may be however, that other insects such as ants carry off the body. But if the dragonfly body, or at least the thorax after the fragile abdomen has inevitably broken off, is carried off still attached to the seed, it could provide an on-the-spot nutrient source for the new plant.

For *B. pilosa*, which is exotic, such a relationship could not have co-evolved, at least not with these African *Trithemis* spp. A more likely true relationship would be between the indigenous *D. repandum* and these dragonflies, especially as this genus is already known to immobilize insects elsewhere (SUTHERST & WILSON, 1986). Such events are at point four on the seven-point carnivorous syndrome list: (1) Attract, — (2) Trap, — (3) Retain, — (4) Kill, — (5) Digest, — (6) Absorb, (7) Use (JUNIPER, 1986). Point (1), however, appears to have been jumped, as all indications are that the dragonflies were trapped fortuitously.

Although large size begets protection from predators, it gives the flying insect greater momentum, making mechanical impalement more likely. For well-armoured insects such as beetles, being hooked by trichomes or spiked by points is unlikely. But for dragonflies, which are large and fast-flying insects with membranous wings, a patch of hooked or barbed seed heads is potentially a lethal trap.

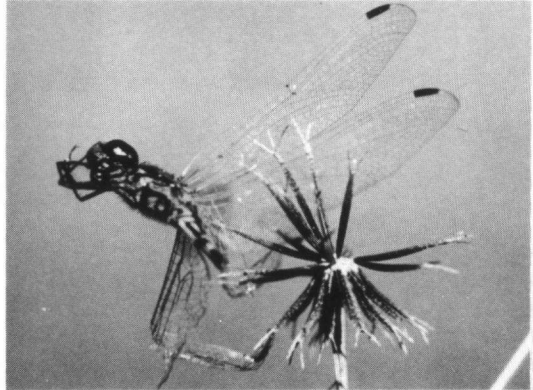


Fig. 3. A mature male *Trithemis arteriosa* dead and well-entangled on the seed head of *Bidens pilosa*.

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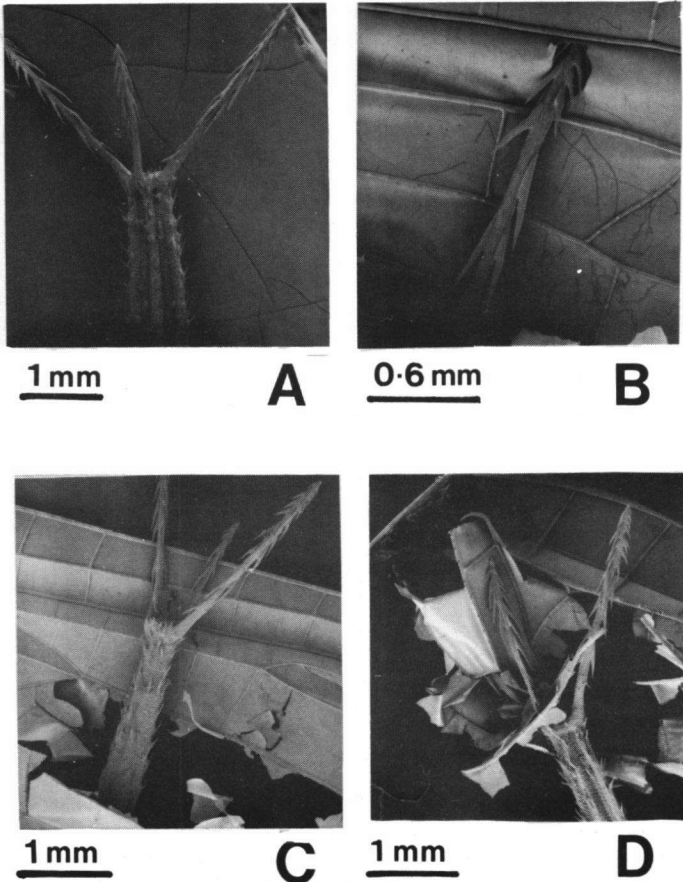


Fig. 4. The seeds of *Bidens pilosa* are hard and sharp (A), and well able to penetrate the wing membrane of *Trithemis arteriosa* (B). The barbs hold the insect fast (C), and attempts to free itself only results in extensive damage to the wings (D).

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