

Agriotypus armatus in the Wyre Forest.

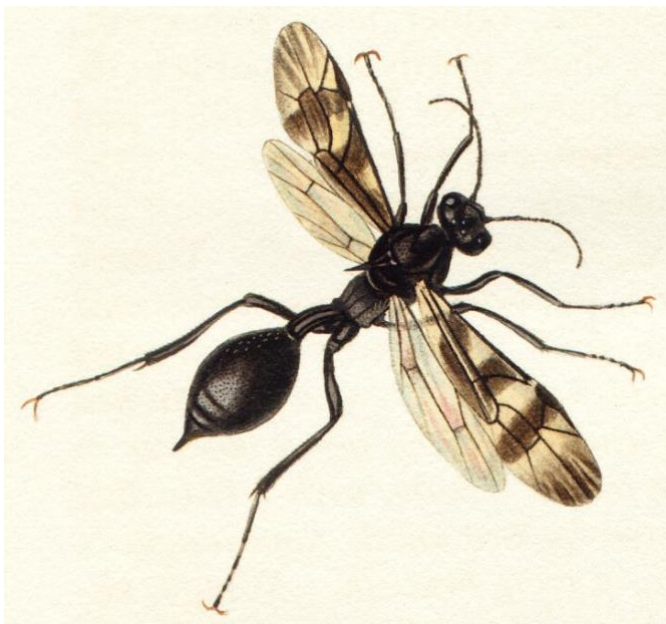
Brett Westwood

Dr Norman Hickin's *Wyre Forest Refreshed*, published in 1965, was a landmark title for me as a teenager growing up in north Worcestershire an area ignored by any wildlife book I'd read. His accounts of cycling trips to the Wyre Forest from his Birmingham home were doubly interesting, both for their local natural history and for details such as the "breathtaking and glorious freewheel down Hagley Hill".

Hickin's autobiographical notes were decorated with his scraperboard drawings and one in particular caught my attention. It was of a simple stone-built caddis case which had protruding from it a spiral ribbon-like structure. Hickin described this as "one of the most exciting finds in insect life" he had ever made - and this in a book featuring drawings of rhinos and a crocodile skull. The caddis was *Silo pallipes* and the strange strap-like growth was the breathing apparatus or plastron of a parasitic ichneumon *Agriotypus armatus*. Hickin re-discovered this ichneumon for the British Isles and he found it in a stream at Miserden in Gloucestershire, but there is no record of him locating it in the Wyre Forest.

Over the years, that odd illustration lodged in my mind. The idea of an ichneumon that could descend below the waterline to find a host for its larva fascinated me.

The picture (01) below is by John Curtis who died c 1865 - Curtis *British Entomology* 1828, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=4354405>



01. *Agriotypus armatus* from Wikipedia

Forty years on, in April 2016 I attended a caddis identification course led by Ian Wallace of Liverpool Museum, an authority on Trichoptera. The workshop, organised by the Wyre Forest Study group, was held at the Forestry Commission's education centre at Callow Hill, Bewdley. Specimens had been collected the day before in Forest streams and flushes. I asked Ian casually if he had ever seen *Agriotypus* and, equally casually, he replied that he had collected a parasitized case from Wyre only the day before. Sure enough, sealed in its glass tube, was the *Silo* case with its odd protuberance and trapped in a watery grave next to it, the adult ichneumon which had emerged overnight (02, 03). By now this insect had become near-mythical to me and I was delighted of the proof that *Agriotypus* lived in Wyre. Norman Hickin would have been delighted. But I still hadn't seen it in the wild. Later that day cases of *Silo pallipes* were found in Dowles Brook (04).



02. *Silo pallipes* with emerged parasite *Agriotypus armatus*. Rosemary Winnall



03. *Agriotypus armatus* emerged from Caddis host *Silo pallipes*. Harry Green.



04. *Silo pallipes* caddis cases on underside of stone in Dowles Brook. Harry Green

A year later, on 22nd April 2017, I was sitting by a fast-flowing section of Dowles Brook near Furnace Mill watching for hoverflies, including the freshly-emerged *Chalcosyrphus eunotus*, when I noticed a few small, blackish ichneumons flitting around on the sunlit pebbles at the water's edge (05). This seemed an odd place for them so I caught one and examined it. Wasp-waisted with a bulbous gaster and dark-flecked wings, it reminded me of the drowned insect in Ian Wallace's tube. But, with such a confusing and multitudinous group of parasites, I couldn't be sure.

Later though, all doubt was dispelled when one of the ichneumons walked down the side of a pebble and under the surface of the water where I was able to watch it for ten minutes as it crawled over the stones several centimetres below the waterline (06). Away from the faster flows, in the clear shallows, it proceeded along the stream-bed with ease, even passing over the head of an *Ecdyurus* mayfly larva which dwarfed it. At last, a female *Agriotypus* in search of prey! Although I didn't see her lay her eggs, there was no shortage of *Silo* cases to choose from: I counted around half a dozen adult ichneumons in the area. It was an unforgettable moment and it spurred me to discover more about these special insects.



05. *Agriotypus armatus* on stone alongside Dowles Brook. Brett Westwood.



06. *Agriotypus armatus* underwater. Brett Westwood.

Agriotypus armatus was first described by entomologists Walker and Curtis in 1832 after Walker had found it in the River Clyde near Lanark and watched the females descending beneath the water surface. It wasn't until 1857 that von Siebold reared the parasites from caddis cases sent to him from Munich, each with the tell-tale plastron attached (Klapálek 1889).

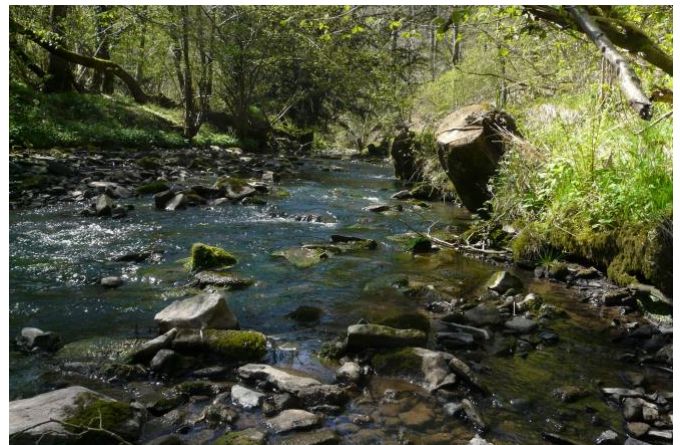
Writing in 1889, Professor Klapálek (1889) reports seeing adult *Agriotypus* in late April in eastern Bohemia flying above the water and "swarming in a manner like ants". He also refutes the accepted theory that the caddis larva produces the plastron and proposes that the ichneumon does this to help it breathe. We now know that this is true, but first the ichneumon has to find its host. She crawls on stones underwater until she finds a suitable case of *Silo pallipes* which she probes for suitability. What she's searching for is not a larva, but a case containing a caddis pupa or pre-pupa on which she lays her egg. Most egg-laying activity takes place in summer. In laboratory stream-tank experiments females regularly spent five

hours or more under water, wrapped in a film of oxygen which allowed them to breathe.

When it hatches the ichneumon grub lives for its first four instars as an ectoparasite on the caddis pupa. In its fifth instar, it consumes the pupa and builds its own inner pupal case inside that of the caddis. Previously, it had relied on the caddis pupa's movements to waft in oxygenated water, but now, dry inside its double layer of pupal walls, it manufactures its own breathing-tube which it pushes into the water outside. This tube is a dense mesh of flattened silk up to 30mm long, often longer than the caddis case. It pulls in dissolved oxygen from the water conveyed to the ichneumon as pressures alter between the outside water and the inner pupal chamber (Elliot 1983) and well illustrated by line drawings and scanning electron microscope pictures by Wichard et al 2002).

In the British Isles *Agriotypus armatus* pupates in winter or spring and the first specimens emerge in mid-April or May, though adults are around throughout summer. They are small with bodies only 5mm or so in length and it is certain that they are overlooked. Any streams which have *Silo* or other members of the *Goeridae* caddis are worth checking for this attractive and under-appreciated insect. Rosemary Winnall and I saw another specimen further along the Dowles Brook on the border between Worcestershire and Shropshire on 9th May 2017 so it is likely that it is well-distributed in the Wyre Forest along suitable streams.

The picture (07) is of Dowles Brook near Furnace Mill on 22nd April 2017. The *Agriotypus armatus* were on stones in the foreground.



07. Dowles Brook near Furnace Mill. Brett Westwood.

Acknowledgements

I am grateful to Harry Green for providing me with a number of references.

References

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