NOTES ON THE BIOLOGY OF ATYPUS AFFINIS Eichwald

(ARANEAE - ATYPIDAE)

by D.J.CLARK.

An admirable account of the habits of Atypus affinis Eichwald was published by Frederick Enock in 1885, and additional notes in 1892. In 1933 W.S.Bristowe published a paper attempting to clear up the systematic position of Atypus in Britain, and included notes on distribution and biology. Finally, in his entertaining book "The World of Spiders" (1958), Dr. Bristowe summarised our knowledge of the habits of this species in Britain.

The following notes have been accumulated over a number of years and, though I am woefully aware of their incomplete nature, it was thought best to publish them in the hope that they might stimulate further observations.

The main difficulty in observing the habits of this spider lies in the fact that it spends its entire life closeted in a silk tube underground, hidden from view. At various times I have contrived an assortment of glass cages, in an attempt to persuade Atypus to construct its tube in such a way that its movements would be visible, all more-or-less without success. I have, however, kept Atypus in ordinary corked glass tubes, 80 mm. long and 16 mm. in diameter, or, about the width of the natural tube. Once the spider has coated the inner surface with a thin covering of silk, she will settle down and feed on flies quite happily.

Into such a tube I introduced the female of a pair dug out from a colony at Oxshott, Surrey, on 30th October 1960. The tube was then placed on its side in a dark place and left overnight so that she could cover the inner surface with silk. The next day she was resting at the bottom of the tube and I introduced the male, allowing him to walk in and taking care not to precipitate the reunion, after which I gently re-corked the tube. Almost at once the male began to exhibit signs of excitement, tapping with the palps and front legs. He then began to run rapidly up and down the tube, eventually stopping in front of the female. Tapping vigorously with the legs he rapidly explored, climbing all over her. The female was then seen to be in a state of collapse, her legs folded against the body, and quite motionless, and the male began roughly to push and pull her about, apparently trying to lift her up. I then realised that the glass tube was lying on its side, which was an unnatural position, and I carefully stood it up vertically so that the female was now, as it were, sitting on her spinnerets, the ventral surface directed inwards. The male now

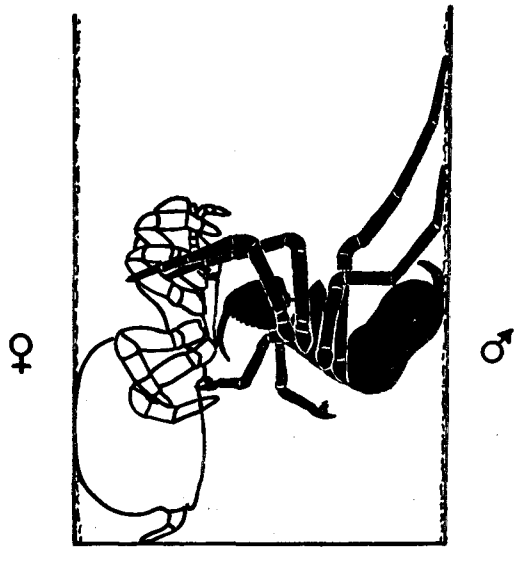

Fig. 1. The mating position of Atypus affinis Eichwald.

seemed satisfied and, clinging to the opposite wall of the tube, facing downwards, he proceeded to press her against the side with his partially opened fangs. In order to do this he bent over backwards and, because of the narrowness of the tube, the dorsal surface of the carapace almost touched the abdomen. In this remarkable position he began to insert a palp in the vulva of the female (see fig. 1.). At this point, much to my annoyance, I was called away by the arrival of a visitor and on returning later found the male had left the female and was resting a little distance away from her. Having no more time that day for observation, I thought it best to remove the male in case conflict should ensue from too close a confinement with the female. All attempts at later dates to repeat the performance resulted in failure. However, the main part of the mating technique was observed and did not seem to differ from that of Atypus muralis Bertkau, described by Gerhardt in 1929, and mentioned by Bristowe in 1958, and I would expect the time periods of inserting the palps, etc. to be much the same for A.affinis Eichwald, differing perhaps only in small details.

Throughout the autumn and winter, the male can be found with the female, in her tube, and, in my experience, digging up a dozen or so of the larger tubes in a fair sized colony will certainly provide one or two males. They are often quite active in winter and on several occasions I have found the male moving about in the upper part of the tube. A great variation in size between individual males can be found. The largest male I have seen was 15 mm. in body length, the smallest 8 mm., these measurements including the chelicerae. I have not managed to discover an adult male in its own tube, but a small specimen, which I took to be a female, was dug up at Box Hill, Surrey, on the 14th April 1956. It was introduced into a flower pot of soil, where it constructed a fine tube and fed well until the middle of July, when no amount of teasing the aerial portion of the tube could provoke any response. On the 31st July, thinking some tragedy had occurred, I dug it up and was surprised to discover a fine mature male. The tube was 12 cm. long.

I have only once found the male wandering in the open, on the 1st March 1958 in Happy Valley, Box Hill, Surrey. The day was overcast, blustery, with a heavy cold drizzle, and the spider had some difficulty in making its way through the wet grass.

No record of a parasite of Atypus has ever been published and the following may therefore be of interest. In October 1961 my wife and I spent a short holiday on the Isle of Portland, Dorset. A small colony of Atypus was discovered in Church Ope Cove. The actual site of the colony was in a small, shallow, grassy depression, directly below the ruins of Rufus Castle. The tubes were amongst grass on the slopes and in the side of a low bank. Six tubes were dug out, two of which contained males in addition to the females. Finally, a large tube was discovered in a difficult place under a small bush. When digging out a tube, the spider can often be captured quite quickly, near the top, which saves a great deal of time and trouble, but in some cases the spider drops to the bottom and the tube has to be dug out along its whole length. This particular tube was such a one, and digging was further hampered by roots which threatened to tear the silk, also a common occurrence. Eventually, after a considerable lapse of time, the bottom of the tube was reached, about 260 mm. down, and the whole thing gently lifted out. The base of

the tube, which is of extremely thin silk, and very delicate, was intact, but, on feeling along the whole length of the tube, no spider could be detected, which was most puzzling. Starting from the top, I tore the tube open along its length, and near the base discovered some debris and a brown cigar-shaped cocoon, about 15 mm. long, obviously belonging to some kind of hymenopterous insect. Needless to say, I was much excited by this. On closely examining the debris, I found some pieces of the legs and a chelicera belonging to an Atypus. During April 1962 a small reddish-black wasp with dark, smoky wings emerged from the cocoon. This wasp was identified as Aporus unicolor Spinola by Dr.I.H.H.Yarrow, and I am most grateful to him for all his help with my queries.

Saunders, in 1896, records this species of wasp as very rare and gives the following localities:- Surrey, Woking; Isle of Wight, Steep hill, Ventnor; Devon, Sidmouth; Essex, Southend; Norfolk, Pakefield, near Lowestoft; Dorset, Middlemarsh, and Portland (a female collected by F.Enock!). However, a pencilled note in the margin of p.57 of one of the copies of this work, belonging to the Entomological Library of the British Museum (Nat.Hist.), records that a number of males and females of this species were taken in Happy Valley, Box Hill, Surrey in 1925, and a single female in 1926. As far as I can discover, the biology of this species is unknown, but the family Pompilidae (Psammocharidae) to which it belongs also includes the species Homonotus sanguinolentus Fabricius, the biology of which is known and has been described by Nielsen in 1936. In my opinion the habits of Aporus unicolor Spinola can reasonably be expected to be similar, based on the available evidence, though I am fully aware of the dangers of supposition.

Briefly, the life-history of Homonotus sanguinolentus is as follows. The gravid female wasp searches for the breeding-nest of Cheiracanthium erraticum (Walckenaer). This nest is large, composed of layers of thick white silk and spun up in folded leaves or, more conspicuously, in the spikelets of tall grasses. I have often found them in the folded leaves of Coltsfoot, almost on the ground, in waste places. The wasp, having found a nest, bites a hole in the thick silk, and enters without hesitation. She attacks the spider, which is also gravid, and stings it several times, between the coxae and sternum. The spider is paralysed, and the wasp lays an egg at the base of the abdomen, just above the pedicel. The wasp then leaves the nest. The spider recovers and is active again within an hour of being stung. The wasp's egg hatches in about two days and the larva feeds on the blood of the spider until nearly full grown, when it kills the spider and devours it almost entirely, leaving only a few pieces of the legs and, most frequently, the strongly chitinised chelicerae. The time which elapses from the hatching of the egg until pupation is about two or three weeks.

It is possible that Aporus unicolor may attack Atypus in much the same way. There are certain similarities, particularly if one considers that in order to reach the spider, the wasp must bite its way through the wall of the tube and attack it in its lair. There are many fascinating questions to be asked here. For instance, how does the wasp escape being impaled on the fangs of the Atypus as soon as it touches the silk tube? Is the Atypus deceived by the tapping antennae of the wasp, a characteristic habit, believing it to be a male come a-courting? Or, much more likely, does the wasp simply tear its way boldly into the tube?

- which may not be so dangerous as one would think, as the usual reaction of a spider confronted by a pompilid wasp is one of terror, often total collapse, or at most a half-hearted resistance.

The answers to these questions must inevitably await future investigations, which, I fear, may well be difficult, due to the apparent rarity of the wasp, coupled with the retiring nature of Atypus, a combination which has undoubtedly prevented, until now, the discovery, albeit very incomplete, of their habits.

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REPORT ON THE JOINT MEETING OF THE BRITISH ARACHNOLOGICAL SOCIETY WITH THE LONDON NATURAL HISTORY SOCIETY

by R.ALLISON.

A joint meeting between the two Societies was held on Tuesday, 25th March 1969, when Dr. John Cooke gave an illustrated talk entitled 'An Introduction to the World of Spiders'. The meeting was a great success, being attended by some 60 people, including 15 B.A.S. members.

Dr. Cooke gave an excellent account of the anatomical differences between spiders and insects, and went on to describe aspects of the spider's life, ecology, courtship and reproductive methods, etc.

The introductory talk was followed by four excellent spider films made at Oxford by Messrs. Thompson and Skinner. The films exhibited a remarkable degree of technical ingenuity, particularly one sequence showing the prey-catching techniques of Atypus, with views of the action inside the silken tube. Other sequences showed courtship and mating of a number of species, and all these insights into the spider's behaviour must have required a great deal of skill and patience to capture on film.

After the films Dr. Cooke answered questions and a vote of thanks was proposed by Mr.B.Byerley. It will be a sad loss to British arachnology when Dr. Cooke departs to take up his new post in America, but I am sure we all wish him well in his new appointment.