TEGEA ATROPICTA STÄL (HEMIPTERA, REDUVIIDAE), AN UNUSUAL PREDATOR OF TERMITES.

By M. Casimir, Entomology Branch, N.S.W. Department of Agriculture.

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Synopsis.

Observations made in the field and laboratory indicate that *Tegea atropicta* Stäl is an efficient predator of termites in the Sydney region. The unusual feeding behaviour observed in the laboratory is believed to be unique and it is concluded that the "fishing" technique used to entice termites within range is particularly well adapted for predation of certain termite species that cover infested timber with an extensive thin layer of woody carton material. Thus, *T. atropicta* is probably a specific predator of *Nasutitermes exitiosus* Hill and related species. Field records support this conclusion.

T. atropicta is widely distributed over at least the eastern half of Australia.

Introduction.

The well-insulated environment maintained by many species of termites generally serves to protect them from outside intrusion, and there appear to be few successful predators of termites in Australia, apart from ants, which are non-specific predators and whose attacks are limited to chance penetrations of the termites' gallery systems. However, observations carried out on the Reduviid bug, *Tegea atropicta* Stäl, indicate that this insect is probably a specific predator of certain termite species and that it overcomes in a unique fashion the formidable barriers of cemented earth erected by the termites for their gallery system.

A strikingly coloured red and black insect, *T. atropicta*, was originally described by Stäl (1863) from specimens collected in the Sydney region. Letherry and Severin (1896) also made reference to this insect, but in neither publication were any biological details given.

Distribution.

Information made available from collections of the Australian Museum, the museums of Queensland, Victoria and South Australia, and the Department of Agriculture of N.S.W., indicate that the species is widely distributed in at least the eastern half of Australia. Individual locality records are: Victoria: Belgrave; New South Wales: Forbes (1899), Tweed Heads (1903), Bogan River (1931), Neilson Park (1932), Wallacia, Penrith, Glenfield, Kurrajong (1942), Tamworth (1951), Sydney (1955), Finley, Sydney (1958), Sydney (1959); Queensland: Carnarvon Range (1939), Kuranda (1949), Bowen, Mount Garnet (1954); Northern Territory: Port Darwin.

Only a few of the above records were accompanied by additional data and these are: (*a*) Newport (Sydney), 1955—in large numbers in a garage. (*b*) Kurrajong, 1942—on termite mound. (*c*) Kingswood (Sydney), 1958—on fallen timber heavily infested by a *Nasutitermes* species. (*d*) West Pennant Hills (Sydney), 1958—in large numbers in a garage heavily infested by *Nasutitermes exitiosus* Hill. (*e*) Galston (Sydney), 1959—engorged nymphs under bark of dead Eucalypt, in galleries of *N. exitiosus*.

Field Observations.

On 4th March, 1958, large numbers of *T. atropicta* were observed by the writer at West Pennant Hills, an outer suburb of Sydney, in a garage heavily infested by the mound-building termite, *N. exitiosus*. The mound colony was located about 100 feet from the garage and the termites had constructed an extensive system of earthen galleries over many of the structural timbers inside. Much of the wood had been badly damaged.

Colonies of nymphal and adult *T. atropicta* were noticed clustering thickly around many of the galleries and individuals were even located inside the termite-infested timber. Wherever the bugs were numerous there appeared to be fewer termites in the associated galleries than in normally active galleries which, in some cases, were almost deserted. Most of the nymphal bugs observed had greatly distended abdomens as if they had been feeding heavily.

Laboratory Observations.

Several dozen specimens of *T. atropicta* were taken from the garage and maintained as a stock colony for several weeks. At the same time, small colonies of *N. exitiosus* were established. These were collected in the field from active mounds, separated from the earthy material by sieving as described by Gay *et al.* (1955), and finally transferred to eight-inch by one-inch test tubes provided with a moisture gradient by using plaster of paris columns (Pence, 1957) or moistened sand (Ebeling and Pence, 1957). Healthy groups of 10–20 termites were maintained for 2–3 weeks in the moistened sand without food, tunnels being quickly excavated by the termites, often next to the glass wall of the tube where tunnelling activities could be readily observed with the aid of a low power binocular microscope. The tubes containing moistened plaster of paris columns were used with less success, although groups of up to 200 termites were maintained for 4–5 days before accumulation of free moisture appeared to cause a quick decline in termite numbers.

Specimens of *T. atropicta* from the stock colony were introduced into several of the tubes containing termites. Those placed into the plaster of paris tubes showed no interest in the termites and were, in fact, often attacked by the latter and driven to the top of the tube where they remained motionless until removed. Similarly, in the tubes containing moist sand, the termites tended to emerge from their burrows onto the sand surface and attack any bugs introduced. The latter were never observed to retaliate, but rather appeared to become frantic in their attempts to escape.

Normally, termites in these tubes containing sand left the mouths of their tunnels open and thus maintained free access to the sand surface. However, in one tube, the termites constructed a thin shelf of cemented sand particles over the wide mouth of the main burrow and continued tunnelling beneath. Adult and nymphal *T. atropicta* introduced to this tube moved about slowly over the sand surface and eventually congregated near the top of the sealed tunnel. Each bug appeared to test the sand shelf for vibration with the tips of its antennae and, when satisfied that there was some activity beneath, probed the shelf with its rostrum, leaving about one-third of the latter protruding into the tunnel. The intruding rostrum was then invariably attacked by termites guarding the entrance and grasped fiercely in their mandibles. However, they appeared unable to damage this chitinous structure and, after continual small and unsighted adjustments of the rostrum, the predator generally managed to pierce the attacking termite's head capsule in the region of the mouth parts. No sudden movements were made, the pointed rostrum sliding smoothly into the termite, and, although the rostrum itself did not appear to penetrate far, it was assumed that the stylets were introduced deep into the head or body cavity of the termite. The body contents were then sucked out by regular pumping movements of the predator which continued feeding for periods of up to one hour.

Bodies of termites killed in this fashion were quickly removed by other termites to an offshoot tunnel or little used section of the main tunnel, after having had all the appendages chewed off. The corpse was then walled off with a layer of cemented sand particles. This procedure was observed several times and the "colony" of twelve active termite workers was finally reduced to three by the predators. Both nymphal and adult bugs fed in this way, in every case observed the method of attack being similar.

Discussion.

Predation in the family Reduviidae ranges from the straight-forward hunting habit of many species to a wide variety of methods such as camouflage and mimicry to entice prey within range. However, there is no recorded instance paralleling the "fishing" technique adopted by *Tegea atropicta* to entrap termites.

Little is known about the biology of *Tegea* and related species belonging to the small subfamily Tegeinae Villiers 1948. According to Miller (1956) all four generic members of the group are confined to the Indo-Australian region; their habitats are trunks of trees, and, although no information is available regarding their food, from the shape of the rostrum it seems likely that they search for their prey by probing crevices and borings in the bark of trees. However, the laboratory evidence presented above indicates that *T. atropicta* is a predator of termites under some circumstances, and field records also indicate an association with termites under natural conditions.

The unusual feeding behaviour involving deliberate use of the rostrum to provoke attack by the intended prey which is never even sighted by the predator lends support to the conclusion that *T. atropicta* is a specific predator of termites. This specificity may be further restricted to certain termite species such as some of the Nasutitermes group which typically construct an extensive network of thin-walled galleries over the surface of an infested object and would therefore provide conditions approaching those in the laboratory where successful predation was observed. Other common and destructive termite species belonging to the *Coptotermes* genus would be less susceptible to attack because of their preference for attacking timber from the centre and packing gallery spaces with quantities of fine clay in contrast to the Nasutitermes habit which is to gouge the surface of timber to a rough face under cover of a thin layer of woody carton material. Field records also indicate a strong association between *T. atropicta* and *Nasutitermes* species, particularly *N. exitiosus*.

The wide distribution of the species in Australia and the observations of large numbers of engorged nymphs in close proximity to galleries of *N. exitiosus*, in an infested garage at West Pennant Hills and an infested tree at Galston, indicate that, under favourable conditions, this predator may be a significant factor in regulating termite numbers.

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