

Observations on the blood-sucking Reduviid *Triatoma rubrofasciata* (DeGeer) in Java

by

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Blaricum

Observations at Bogor.

In 1930, Mr. INEN, principal Indonesian assistant of Dr. S. LEEFMANS, Director of the Institute for Plant Diseases and Pests at Bogor, West Java, reported the occurrence of a large blood-sucking Reduviid bug in the houses of the villagers there. Mr. INEN, feeling concerned about the presence of the bug in his own house and in others nearby, collected some additional information and encouraged



Fig. 1. *Triatoma rubrofasciata* (DeGeer), about 4 \times . Buitenzorg (Java), 1937. C. FRANSSEN leg. Phot. Dr. R. H. COBBEN

the control of the bug among his fellow villagers. By the end of 1933 further observations and breeding of the bug in the laboratory were in progress, and Mr. INEN and one of his helpers volunteered to feed a few specimens on their own hands. Later the bugs were induced to suck the blood of a live chicken. Each period of feeding lasted 5—10 minutes. Mr. INEN wrote a report in the Indonesian and Dutch languages which contained the following particulars.

The bug was rather commonly found in bamboo houses in the villages ('kam-

pongs'). During day-time it hides mainly in the space between the two partitions of plaited bamboo ('gedeg', 'bilik') which form the outer walls of the dwellings. At night, at about 20.00 to 21.00 hours, the bugs leave their abodes to feed on the blood of the human inhabitants. The adult bugs are yellowish-black, 20—23 mm in length. The rostrum has a length of 4 mm. The eggs are deposited separately on the 'gedeg' or the wooden frame of the houses, 2—13 every three to four days. Newly laid eggs are 1.5—1.55 mm long, white at first and then darkening to a reddish colour in the next 15—20 days, the incubation period. At the top of the egg a cap is distinguishable. The first-instar nymph is 2 mm long, its anterior part is blackish and its posterior part reddish (fig. 2). The antennae are black with white apical joints. When fully engorged the body of the nymph is visibly swollen; in contrast its head looks very small. After some 56—70 days the nymph, when fed on chicken blood five times, reached the second instar.

The bugs could not be induced to feed on *Cimex*, not even when these had taken a fresh meal of human blood; neither did they show any interest in caterpillars.

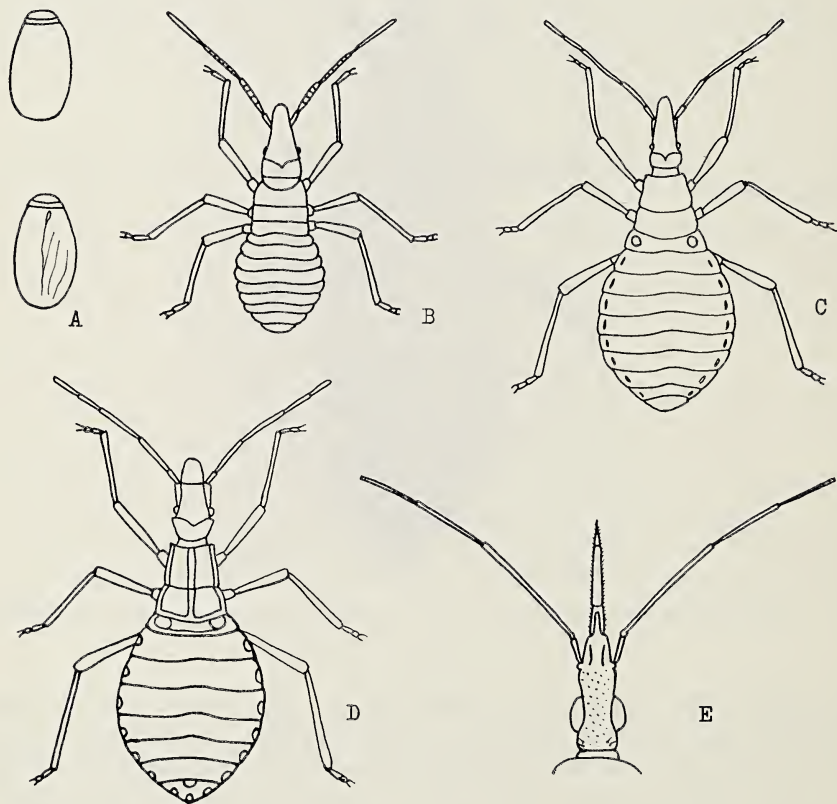


Fig. 2. *Triatoma rubrofasciata* (DeGeer), A: egg, just laid and (below) when reddish (8 \times). B: first-instar nymph (12 \times). C: second-instar nymph (8 \times). D: third-instar nymph (8 \times). E: head of adult (4 \times). From drawings made by Mr. SOEKARDI in 1933.

Dr. LEEFMANS captured a specimen at lamp-light in his own stone house. He identified the species as *Triatoma (Conorhinus) rubrofasciata* (DeGeer).

There is no vernacular name for the bug; the name 'radja tumbila' (= king of the bed-bugs) appears appropriate, except that the term bed-bug is normally applied to species of the family Cimicidae.

Medical interest.

Mr. INEN reported that, from his own experience, little is felt at the moment of the bite, but a slight swelling 10—12 mm across soon develops and a reddening of the skin follows, with considerable itching. After a couple of days the swelling dwindles to the size of a mosquito bite, and by the fourth day the itching almost stops and only a small reddish spot is left. In general, the villagers appeared to be little aware of the presence and bites of the insect; small swellings and punctures of the skin were taken for mosquito bites.

The late Professor C. BONNE, pathologist of the College of Medicine at Batavia (now Djakarta), was informed about the observations of Mr. INEN. He had become acquainted with the problems arising from *Triatoma* bugs in Surinam, where he lived from 1915—1923. He visited the Institute at Bogor in 1935, and in his presence three young *Triatoma* were placed on the hand of Mr. INEN where they readily fed for 5—10 minutes.

In Djakarta Prof. BONNE (1935) almost always found the crithidial stages of a trypanosome in the intestine of *Triatoma rubrofasciata*, and he wondered whether they were parasites of some mammal which were carried by the bugs. This problem was particularly interesting because a *Schizotrypanum* had been found in Javanese apes by MALAMOS, who succeeded in infesting some South American *Triatoma* with them. The problem arose whether people in the Orient harbour a species of *Schizotrypanum* as the natives in South America do. For experiments in this direction one needs *Triatoma* bred *ex ovo* and therefore not infected. It had appeared already that *Triatoma rubrofasciata* is as suitable for this 'xenodiagnosis' as the South American species. Prof. BONNE also planned to investigate whether *T. rubrofasciata* might play a role in the spread of plague, leprosy, leptospirosis or rickettsial or other diseases.

Observations by a medical team at Djakarta.

In November 1935 breeding of the bug in the laboratory was started at Djakarta for Prof. BONNE's research. The following particulars are from notes made by Mrs. J. BONNE-WEPSTER who conducted the experiments. Two females and a male, captured in Bogor, were put into a glass container, after having fed on a mouse. From that time the bugs were allowed to suck blood from the ear of a rabbit. They took their fill very readily, their abdomens swelling visibly, almost to the verge of bursting. In satiated adults the wings became extended broadly from the bodies.

In nine weeks the two original females produced 164 eggs, only a few which did not hatch, and the three original adults were still alive at the end of this period and still copulated. The main data obtained in this Djakarta work on the duration of the nymphal instars and the frequency of feeding are:

Second instar:	15—20 days,	3 feeds
Third instar:	40—45 days,	5 feeds
Fourth instar:	35 days,	5 feeds
Fifth instar:	40 days,	6—7 feeds.

Thus total development, including the egg stage and the first instar, occupied about 7 months in the conditions in which these experiments were conducted, with some 25 periods of feeding.

Many years ago Mrs. BONNE-WEPSTER told me that in a laboratory culture of *Triatoma* she had observed some younger nymphs of this bug sucking blood from the abdomen of their older colleagues. No details are known, however, of the conditions under which this evidently unusual behaviour occurred. It was never seen in the breeding experiments conducted at Bogor.

Breeding of *Triatoma* bugs, some of them fed on the blood of guinea-pigs (*Cavia*), was continued at the Veterinary Institute at Bogor until June 1942.

Notes from the literature.

The species under consideration was described under the name *Cimex rubrofasciatus* as early as 1773 by Charles DeGeer who characterized it as 'Punaise obscure ... rayée de rouge ... une des plus grandes espèces ... qui se trouve aux Indes'. In 1896 it was listed in LETHIERRY and SEVERIN's Catalogue under *Conorhinus* or *Triatoma*, living in Brazil, the Antilles, the Philippine Islands, China and India. DISTANT (1904) mentioned Burma, the Malay Peninsula, Madagascar and West Africa, in addition to India, as the area of distribution. He further added that these bugs are 'formidable insects', nocturnal in habits and usually found in the houses of the Bor Ghat. KIRKALDY (1904) gives about the same geographical details and specifies that the bug had been taken around labourer's houses in plantations in Oahu, Hawaii.

The first record from Java is found in KONINGSBERGER (1903), who remarks that the bug often enters houses on the wing in the evening and inflicts severe and painful punctures. He considered it to be very common and a useful species 'because it preys on caterpillars' (sic!). In 1908 in a second list of insects of economic importance KONINGSBERGER repeats these assertions. In his extensive survey of the animal world of Java (1915) he relates how he was badly bitten by the bug twice. The first time, when he was not yet aware of the bug's habits and tried to hold it between finger and thumb, the bug thrust its rostrum deeply under the nail of his thumb. The second time a bug, having got inside his mosquito curtain, attacked him in the upper arm. This caused intense burning and itching as well as swelling for weeks on end*).

MAXWELL-LEFROY, in his 'Indian Insect Life' (1909), states that the nymphs of this species are spiny and are partially covered in debris which they gather ... "probably when preying upon the small household insect life". It now seems probable that he mistook a species of *Acanthaspis* for *Triatoma*. This apparently erroneous statement was copied by FLETCHER (1914) in his big volume on 'Some

*) A specimen of *T. rubrofasciata* leg. KONINGSBERGER, is still present in the collection of the Laboratory for Applied Entomology, Amsterdam.

South Indian Insects', but he added the important information that the bug had also been found in squirrels' nests and perhaps was a natural parasite of these animals. DAMMERMAN in his handbook on agricultural zoology of the East Indies (1919; English edition, 1929) unfortunately repeats LEFROY's statement.

AWATI (1921) was the first to suspect *T. rubrofasciata* of being a carrier of the 'kala-azar' disease in India; on one occasion he found a specimen in the bed of a patient. MISRA (1924) also mentions that the bug was believed to be a carrier of *Leishmania donovani* which causes 'kala-azar', a severe disease very prevalent in Pusa and its vicinity; he found a specimen in the Pusa collection dated August 1904.

A curious note was published in Hawaii by ILLINGWORTH (1937), who reported having found the bugs in hundreds in an old lumber pile. In turning over the lumber one bug was found with its beak inserted in a dead American roach. It was considered to be 'an introduced species, long in the Islands, and apparently rather abundant'.

Distribution in Indonesia and neighbouring countries.

I have examined the data on the bug's distribution in the museums of Leiden, Amsterdam and Wageningen, where labelled specimens are numerous. By far the largest number originated from various localities in Java, mainly in the plains and lower hills all over the island, but a few came from mountainous districts, viz. Sindanglaja, Tjibodas and Lembang (1100—1400 m) in West Java and Nongkodjadjar on Mount Ardjuno (up to 3000 m) in East Java. The concealing and nocturnal habits of the bug, and the fact that it is commonly attracted to artificial light, suggest that all these specimens were collected in houses in the evenings at lighted lamps. Relatively few of the museum specimens originated from Sumatra, and these were mainly from the Deli area with its extensive plantations. The number of specimens from less densely populated and cultivated islands like Borneo, Bali and the Moluccas (particularly Ambon) is equally small.

The collections further confirm the occurrence of the species in Malaya, Cambodia, Ceylon and India. The northernmost locality of eastern Asia is situated in Ryukyu Islands south of Japan.

Mr. W. J. KNIGHT has kindly provided me with a list of data taken from labels on the *Triatoma rubrofasciata* specimens in his charge.

A summary of all the available data from these museum specimens follows:

	Java, Bali	Sumatra	Borneo	East-Indonesia	Malaya & adjacent countries	India, Ceylon	Philippine Islands	China
Ent. Lab., Wageningen	35	3						
Rijksmuseum, Leiden	76			2	2	15	2	4
Zool. Mus. Amsterdam	16	2	2				2	
British Museum	3		2		3	13		2
Mus. Zool., Bogor	5							
	135	5	4	2	5	28	4	6

Information from Manila.

To complete these notes I requested information from the University of Malaya, Kuala Lumpur, and the University of the Philippines, Manila. In Kuala Lumpur no specimens of *Triatoma* were found in the collections and the medical entomologists consulted had no particulars at their disposal.

From Manila the Institute of Hygiene most kindly sent me typed copies of two relevant papers (AFRICA, 1934; GALLARDO, 1940), besides a reference to a record in a paper by BANKS (1919) of a person bitten by *Triatoma* bugs in 1914. The other two papers deal mainly with clinical aspects which agree in several details with the experiences of Mr. INEN and Dr. KONINGSBERGER in Java. An interesting feature mentioned in connection with the habits of the bugs is that they frequent vines like squash and other plants growing around the houses. The danger of the introduction of flagellate diseases with spreading of the bug is discussed at length by AFRICA (1934).

Allied Indo-Australian species.

Triatoma migrans Breddin was described in 1903 from single specimens collected in Java and Sumatra. It is similar in size and general appearance to *T. rubrofasciata*. The Leiden Museum has four specimens from Borneo and Sumatra collected about 1890, and the Amsterdam Museum has a specimen from Pangandaran, Java, coll. DRESCHER. LENT (1953) mapped its distribution from India to W. Australia, but it is much scarcer than *T. rubrofasciata*.

In 1933 *T. (Conorhinus) leopoldi* was described by SCHOUTEDEN from two specimens collected in New Guinea.

MILLER in 1956 described *T. novaeguinea* from New Guinea (leg. LIEFTINCK, 1948; holotype and two paratypes in the Leiden Museum).

In 1953 LENT described *T. pugasi* as a new species, closely allied to *T. migrans*. The holotype, collected in Java by LUCHT, is in the British Museum.

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Luffia ferchaultella Stephens (Lep., Psychidae). De reeds een aantal jaren bekende populatie van deze zakdrager in het bosgebied „De Doort” te Echt, was in 1969 zeer talrijk. In een hele rij populieren was één boom massaal bezet, terwijl op de overige bomen nauwelijks een zakje te vinden was.

Na jarenlang vergeefs gezocht te hebben, vonden BOGAARD en ik in 1969 deze soort eindelijk ook in Montfort. Ook hier weer: in een lange rij populieren één massaal bezette boom, op de overige niets te vinden.

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