STUDIES OF SOME TETRAKINATA (THIPS)
OF THE SUDAN

BY

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ABSTRACT

A list of thrips species recorded in the Sudan is given including species found in Shabat area during the present investigation. Methods of collection, preserving and counting are explained.

Eighteen species of thrips are described considering the female adults.

Keys to the genera of Thripidae and Phlaeothripidae and to the species of Panisothrips, Caliothrips and Thrips are given.

In the discussion some suggestions for future work were included.
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**FAMILY: THripsidae**

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Thrips are very minute slender insects with wing margins densely set with cilia forming a marginal fringe. They are members of the Order Thysanoptera, this name being derived from the hairy nature of the wing margins. The thrips were also called "physopoda" because of the vesicle organ at the tip of the turni (Friesner 1960). They generally measure about 0.5 mm. to 5 mm., but the normal size of African species is about 1 mm. to 1.5 mm.

The first report of thrips damage by the presence of "dry moss" on cotton leaves in the Sudan, was recorded as early as 1911 and 1912 at Tuyika Research Station (quoted by Tethill, 1948). Corbett (1920) and Bedford (1921, 1923 and 1925a) were probably the first entomologists who worked on this pest, pertaining to its damage, morphology, biology, seasonal incidence and control. On ecological aspects, the factors affecting prevalence were studied by Cameron (1930, 1931a and 1931b). The species of thrips attacking cotton were identified as *Dalalothrips junciperella* (Bagwell and Cameron) and *C. sundomensis* (Bagwell and Cam.) both of which were determined by *T. M. S. F. T. B. D. E. K. O. N.*

*indicus* (Bedford 1925a) and *(Bagwell and Cameron 1932)*. Besides these two species, *Thrips tubaci Lind.* was reported as seriously affecting onion cultivation in the Sudan. Later on, both the
species of Cellothrips were found to be responsible for considerable losses in yield of groundnuts in the Sudan (Clinton 1962). In the Sudan up till now about 20 species of thrips have been recorded (Friesner 1936 & 1960; Hound 1960; Schmutzer 1969). Among the Thysanopterists who had worked on African species, were Paulian, Basilewsky and Strosser for whose findings were reviewed by Faure (1955, 1958 & 1960). Hound (1932) & Bagwell (1933) also contributed to the knowledge of Thysanoptera in Africa. Hartvig (1948) described six new species of thrips in South Africa. He also made statistical study on taxonomy of South African species (Hartvig 1958).

Friesner (1932, 1936, 1949, 1956 and 1960) gave the most extensive taxonomic synopsis of Thysanoptera of Egypt.

Little work has been attempted so far, in this country, on the taxonomy of this important group of insects. In the present thesis, the results of studies on the collection of thrips made during the last 2 years have been incorporated. The identification and description of the species in this thesis were based on the standard work, like Friesner's Monograph of Thysanoptera of Egyptian Deserts including species recorded in the Sudan, and Stannard's work on Thysanoptera of Illinois.
Phylogeny

The most recent investigations of Thysanoptera have been done by several workers. Stannard (1968) presented an analysis of the head and mouthpart of Thysanoptera according to previous work done by Dekester (1941), Pessona (1951), Jones (1956), Davies (1958) & Melis (1956). Priesner (1960) also compared his morphological observations with those of Dekester.

The head of Thysanoptera is peculiarly shaped. It is strongly hypognathous i.e., produced below into a mouthcone or rostrum composed of the mouthparts. The length and width of the head vary greatly, it is mostly broader than long, though it is much elongate in Anglothrips serv. and most strongly transverse in Dendrothrips Usei. In the larvae, prepupa and pupae the head is of similar form though smaller than in adults. The ocelli are always absent in larvae and their presence in adults associated with the development of the wings e.g., wingless forms have no ocelli (Priesner 1960). Antennae of Thysanoptera have a variable number of segments: 6 to 9 and in most species, the third antennal joint is often constricted at apex and base i.e., vesiform. Antennae tend to serve as one of the principal key characters among those used at the family level. This will be referred to, later in appropriate places.
The mouthparts are characteristic because of their asymmetry. Their elements are difficult to homologize with those of other insects. They are of the rasping sucking type. There is only one mandible which is strongly sclerotized and has its base always on the left side of the rostrum. The asymmetry of the mouthcone is due to this odd organ.

Hetcalf et al. (1962) mentions the various opinions held with respect to the functions of the mouthparts of thrips. Earlier views were that thrips rasps the leaf tissues and suck up the sap as it exudes (Bedard 1921). Wardle and Simpson (1927b) stated that the insect does not rasps the epidermal cells by the mandible, they believe that thrips prefer the lower surface of the leaf and this is due to the difference in thickness of the epidermis between the lower and upper surfaces and the negative phototropism of the insect. The hairy Indian and American varieties of cotton are more heavily attacked than the smooth leaved Egyptian variety. Grinfield (1959) explained the mode by which thrips use their fore-tibiae in transporting the pollen grains to their mouth. Priesner (1950) found Pedothrips arenarium Pr. feeding on fungus spores of granidone, while some Tuberifer feed on fungi. The gut of Pedalothrips sp. was found containing spores of fungi. Feeding occurs among the larvae and adults, never in the pupal stages. (Giannard 1968).
Thrips by their feeding cause serious injury to plants. "Silver top", "bad head", "white ear", shrivelled and malformed growing points, are among the various symptoms ascribed to thrips attack (Bailey 1948). Pearson (1936) is of the opinion that oviposition adds to the damage done by feeding when the eggs are deposited near the feeding place. Bailey (1936) has listed some predacious and phytophagous species biting man. Williams (1921) recorded the occurrence of a thrips sucking human blood in Trinidad. This species was later identified by Food (1927) as Xeomyothrips flavipes (Jones). In the Sudan Johnston (1928) found thrips species feeding on human blood.

Among recent workers who studied the injury caused by thrips to plants, whether direct or indirect, are Bailey (1936 and 1940), Ganeshkhrishnan (1956), Sakimura (1940) and Lall and Singh (1968).

Thrips also indirectly injure the plants by acting as vectors of plant disease. Among vector species known are Thrips tabaci Lind. Franklinella insularis Frankl., Franklinella fusca (Hinds) which transmit tomato wilt virus (Kenneth 1932), (Sakimura 1963) and (Smith 1952).

There are four types of wings according to their development: fully developed (macropterus), shortened (hemimacropterus), somewhat reduced to small pads (brachypterus) and wanting (apterous). Most Thysanoptera are always macropterus in both sexes. (Food 1940). Fully developed wings are elongate and
slender, strap-shaped and never folded. At rest they lie closely side by side on the abdomen in Terabrunia but distally cover each other in Tubulifera. The hind wings always lie beneath the fore-wings.

Wing venation is reduced in Thysanoptera. In Terabrunia veins present in the fore-wing are: a costal vein (marginal); an upper vein (principal), a lower vein (second longitudinal) and a vein separating the basal wing scale, the allula, from the wing blade (scale vein); in addition are cross veins up to five in number (may not be present). The veins are set with cilia and bristles varying greatly in size, shape, position and number. There is usually a marginal fringe of hairs which are often undulating or twisted spirally or crossing one another. The number of bristles on the veins which are always inserted dorsally are very important to differentiate the genera and the species.

In Tubulifera venation of wings is strongly reduced and the allula has no veins. Wings are without microtrichia, with only few basal bristles.

Echology:

Several collectors of thrips have observed that females are the most common sex and males of many species are rare or still unknown. However, reproduction in Thysanoptera is primarily by bisexual union. The apparent paucity of the males has
led to the belief that parthenogenesis is also frequent (Bailey 1923). (Stevy and Clarke 1930).

Depositing of eggs in Thysanoptera is governed by the nature of reproductive organs. Fresson and Pantal (1964) reported that the females of Terebrantia, which are characterized by having a saw-like ovipositor, split the plant epidermis by the ovipositor and deposit the eggs within the tissues.

In Tubulifera the females secure the eggs by a gelatinous material to the plant surface. Though many species of thrips are oviparous, ovoviviparity has been observed in Megathripsinae, Fr. where the eggs are retained within the body of the female until fully formed larvae have developed (Bournier 1957). The first and second stages which follow after hatching are considered as larval stages. The quiescent phase which follows the larva is non-feeding and called the prepupa. Stemann (1958) who had described the morphology of the immature stages mentioned the quiescent periods. Egression in Terebrantia as reported by Stemann occurs in the soil while in Tubulifera, it occurs on or near the substrate where the larva has fed.

Ecology:

Pastorm affecting prevalence.

Thrips like many other insects are adversely affected by cold weather. Cold storms kill thrips whereas normal wind may
not as means of distribution and help in migration and dispersal, even among wingless Thysanoptera (Harris et al. 1956; Glick 1956). Subtropical species withdraw deep into cracks and cavities of bark during cold weather. (MacGill 1927) Hibernation of thrips tabaci induced by cold weather was reported by Guzmán (1958); the same author indicated that rain decreased thrips population.

Lightly watered and late sown cotton was more attacked by thrips than heavily watered and early sown cotton (Bedford 1925b). Heavy watering and flooding will pupae in the soil (Cameron 1930 & 1931ab). Tarrle & Simpson (1927a) stated that the soil exerted a greater influence on thrips population than heavy rains and flooding. The more cohesive the soil after drying the fewer adults will emerge. Good (1940) postulated that in some species of thrips that form wingless colonies, large proportions of wingless insects are produced when the substance on which they feed deteriorates. Despite their small size thrips are definite parts of the food chain of many biotic communities (Stannard 1968).

Control:

Early in the Sudan cultural methods were attempted to control thrips. Corbett (1920) suggested ploughing, cutting and burning of old cotton crop at the end of each season. Heavy watering about the beginning of November and eradication of the vegetation growing in the vicinity of cotton reduces the infestation. The cotton crop may be sown at an early date so that it
will be advanced before the arrival of thrips, it may be soon later but in such a way that the damage will be reduced to a minimum; it may be soon later still so that when the infestation ceases the crop may make a good recovery (Cameron 1930 & 1931a & b). Pyridine and quinoline and nicotine sulphates spraying were used in the Sudan by Corbett (1920). It was noticed that spraying DDT against jassids exerted a considerable degree of control on thrips (Thothill 1942).

Greenslade et al (1950) suggested systemic insecticides such as disulphophen and phorate. Hopkins et al (1958) attempted a special method of placing systemic insecticides into the planting holes. Zipper and George (1962) had discussed the work of Greenslade and Hopkins. Nowadays chlorinated hydrocarbons such as DDT, HCH, dieldrin, aldrin and toxaphene used as foliage sprays result in better control of thrips than organophosphorus insecticides such as azinophen-methyl malathion (Davis et al 1958).

Systemic insecticides used for seed treatment gave satisfactory results. The insecticides are applied on or in the proximity of the seeds. They are then translocated into the foliage of the plant, making it toxic to the thrips for 3 to 4 weeks or more (Adkinson 1958, Ruttle and June 1959). An activated phorate used as seed coating for cotton seed effectively reduced the onion thrips, Thrips tabaci and Frankliniella tritici pitch for 5 to 7 weeks respectively (Ivy et al 1957).
Faresnica et al (1957) found that phorate and disyston gave phytotoxic symptoms in cotyledons 3 to 4 weeks after seedling emergence. Hanna (1955) observed that cotton seeds treated with disyston were protected from tobacco thrips, F. fusca Hinds and F. citrici, 4 to 5 weeks after planting and receiving another two weeks of variable control. He also noted some reduction in stand as well as slower fruiting and maturation of plants which had been seed treated.

Hopkins et al (1958) showed that seed treatment of phorate and disulphoton adversely affected stands but that furrow applications of phorate granules did not. Race et al (1961) noticed that early season thrips control on cotton in New Mexico significantly increased yields, and in furrow application of disulphoton were specially effective. But Leigh (1963) realized that Race's method had some drawbacks e.g. delay in maturity. Investigations conducted for cotton using systemic insecticides have been reported by Faresnica et al (1957), Reynolds et al (1957), Hopkins et al (1958) and Johnson (1958). They agreed to its success to ensure cotton normal yield although non significant adverse effects upon germination, emergence and vegetative growth of cotton were also noted. Leigh (1963) noticed that the greater rate of toxification per acre used in granular application than by seed treatment appeared to provide more lasting control.
Hussei and Shemb (1966) found that phorate, aldrin, hepta-
chlor or dieldrin applied as seed dressing on cotton seeds sati-
sfactorily controlled *Thrips tabaci* for 4 to 5 weeks. Aldrin com-
bined with organic fungicides was more effective when applied to
soil before sowing. In Bihar, Verma (1966) noticed that reduc-
tion in onion seed production and in viability was overcome by
spray with insecticides, dieldrin (0.02%) giving the best results.

The best control of thrips was given by disulphoton, phorate
and fenvalerate in granular form in furnaces, as seed treatment
against *Frankliniella fusca*, *P. thripodictyal* and *Thrips tabaci* in
cotton (Watson 1965). The same result was obtained by Aziz and
(1966) in Iraq; phorate and disulphoton over the seed at planting
gave good protection against *Thrips tabaci* for two months.

Many species of parasites and predators belonging to
different orders e.g. Hymenoptera, Diptera, Orthoptera, Hemiptera,
Coleoptera and Pleuroptera were observed to feed on thrips. (Shahm
1948, Frieseer 1963 and Standard 1968). Though these natural
enemies somewhat reduced the thrips population, they have not so
far been considered as a means of control of the pest.
MATERIALS AND METHODS

Wild and cultivated plants previously recorded as host plants of thrips in the Sudan were examined from time to time in and around Shambat and specimens were collected and recorded.

Method used for collection:

An insect sweeping net of white dense linen was used to collect insects from field crops. A broad white cotton cloth was stretched under trees for receiving thrips dislodged by beating the branches, and an aspirator originally designed by Poos (1929) was used for sucking the insects directly, one by one from the leaves, flowers or shoots. Thrips which were lodged inside the growing points, between the leaf sheaths and in closed flowers were brought to be the laboratory with their host plants. In the laboratory, insects along with host plants were kept inside a collecting box, with one side made of glass to admit light and the other sides closed.

The insects orientated themselves in the direction of light and were mostly gathered on the glass side of the box. Thrips were carefully sorted out by means of a brush and an aspirator. This method of sorting out the thrips was used in case of sweeping net method. Thrips collected by the aspirator either directly from the field or from the above mentioned box were kept in 70% alcohol and transferred singly with the help of a fine camel hair
brush into vials containing the preservative A.C.A. (8 parts 95% alcohol + 5 parts water + 1 part glycerine + 1 part glacial acetic acid). This preservative helped the insects to be kept in a relaxed condition, allowing them to be easily mounted. Some of the thrips were preserved and stored for future use in a mixture of 95 parts of 75% alcohol and 5 parts glycerine. The collection from each host plant was kept separately in glass vials labelled bearing the name of the host plant, the date of collection, the locality and the name of collector. Specimens falling over the surface of the cloth used under high trees, were shaken carefully on a dark piece of white or light coloured paper according to the nature of specimens. The thrips were then transferred by means of a wet brush or by the aspirator and stored in A.C.A or in a mixture of glycerine and alcohol and labelled as above.

Mounting method:

Some specimens were mounted directly on a clean slide in a drop of the preservative or water for observing the natural colour. Preserved specimens however did not show distinct fading of colour even after storing for more than one year. Permanent slides were prepared using Mayer’s Medium. This seems to be an excellent mountant which has been suggested by Stannard (1960). It consists of 50 gm. distilled water, 30 gm. gum arabic (Crystal), 200 gm. Chlora hydrate and 20 gm. glycerine. It is a modification of Ferris solution and in the United States National Museum,
this mountant was reported to keep specimens for 20 years without deteriorating (Baker and Marten 1952).

Fine pointed needles and a dissecting binocular were used for carefully spreading the parts of the specimen on the slide.Most specimens were laid flat on the slide with their dorsal side upwards. Some were also mounted with the ventral side up. When the specimen was thick and darkly colored it was kept in 10% KOH over-night. They were then washed several times with distilled water and then 70% alcohol and mounted using Meyer's medium. Slides labelled with necessary details were kept for 4 to 5 days in an oven at 45°C. Clear dry slides were then used for morphological study. A series of such slides was made from the lot from each of the host plants.

Morphological descriptions were based on the examination of at least 10 specimens from each species. Measurements of different features were taken using a stage slide and eye piece micrometer. Average measurements were calculated in millimeters. Drawings were made by the aid of a Camera Lucida.
A list of thrips species recorded in the Sudan

The following list contains all species of *Thysanoptera*, so far, recorded in the Sudan. (Round 1968, Frisener 1936 & 1960, Schuettler 1960). Species found in Shambat area during the present investigation are included. Species which have not yet been identified will be further dealt with in the future.

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<th>Insect species</th>
<th>Host plant</th>
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<tr>
<td><em>Allelothrips cineticornis</em> Bagn.</td>
<td>Cymbopogon sp.</td>
</tr>
<tr>
<td><em>Aeonothrips okeni</em> Karny</td>
<td>Acacia mellifera Benth.</td>
</tr>
<tr>
<td><em>Alethrius aernikiae</em> Fries.</td>
<td>Arnia sp.</td>
</tr>
<tr>
<td><em>Anaphthrips nubicus</em> Karny</td>
<td>Acacia sp.</td>
</tr>
<tr>
<td><em>Anaphthrips sudanensis</em> Trybom</td>
<td>Gramineae (diverse genera)</td>
</tr>
<tr>
<td><em>Apterygothrips</em> sp.</td>
<td>Antirrhinum sp.</td>
</tr>
<tr>
<td><em>Asterothrips connaticornis</em> Karny</td>
<td>Jasminum sp.</td>
</tr>
<tr>
<td><em>Asterothrips rubricornis</em> Bagnall</td>
<td><em>Climbing plant</em> (Frisener 1936)</td>
</tr>
<tr>
<td><em>Ballothrips melanurus</em> Bagnall</td>
<td>Boraginaceae Pers.</td>
</tr>
<tr>
<td><em>Bolciopthrips granis</em> Fries.</td>
<td>Antirrhinum sp.</td>
</tr>
<tr>
<td><em>Brayaletthrips neocarica</em> Bagn.</td>
<td>Cymbopogon sp. (Naal)</td>
</tr>
<tr>
<td><em>Callothrips fusipennis</em> (Bagn. &amp; Cam.)</td>
<td><em>Cosycymum</em> spp. (cult.)</td>
</tr>
<tr>
<td><em>Callothrips sudanensis</em> (Bagn. &amp; Cam.)</td>
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<tr>
<td><em>Callothrips helini</em> Hood</td>
<td>&quot; &quot;</td>
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<tr>
<td><em>Callothrips granicola</em> (Bagn. &amp; Cam.)</td>
<td>Cymbopogon sp. &amp; <em>Secale</em> sp.</td>
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<tr>
<td><em>Chironothrips sudanensis</em> Fries.</td>
<td>Sterculia sp.</td>
</tr>
</tbody>
</table>
Dendrothrips arenicolor Pries.
Doreasthrips oeseritzi Pries.
Martothrips coffeae Williams
Dolichothrips varius Sasm.
Frankliniella schultzei (Trybom)
Frankliniella intercellaris Karny
Nephotrips leptadeniae Pries.
Nephotrips faurianus Pries.
Nephotrips (nervea) audrenensis Pr.
Nephotrips syngomorus L.
Abutilon sp.
Paniceum colonum Link.
Coffee arabica L.
Abutilon sp.
Dolichos lablab L.
Sesamum indicum L.
Leptadenia spiratae Wight.
Cymbopogon sp. (Zaal)
Adoxa
Cymbopogon, nerussus Chiov.
Dolichos lablab L.
Gramineae (diverse genera)
Pulicaria crispata heat.
Gossypium sp. (cult.)
Dolichos lablab L.
Sorghum sp.
Corhyncha tinctoria L.
Caesalpinia sp.
collected from a leaf in Kadugli (Priesner 1936)
syzyphyus spina christi L.
Liothrips englesi Fries.
Liothrips postocularius kary.
Liothrips willcooki (Bagn.)
Liothrips gymnosporiae Fries.
Liothrips kingi Bagn.
Mycterothrips fuscus Fries.
Odontothrips karnyi Fries.
Perionothrips levis Hood
Psacalothrips cameroni Bagn.
Philothrips oxyocori Fries.
Reithrips syriacus (Kayet)
Sericostethrips occipitalis Hood
Relemothrips rubrocinatus Giard.
Sericostethrips bedfordi Bagnall
Scirtothrips mangiferarum Bagn.
Scirtothrips australis Feeke
Scirtothrips rubicenus Fries.
Sericostethrips brevipilis Fries.
stenochaetothrips melanurus Bagnall
Soricostethrips longistylus Trybôc
Thamnotothrips cameroni Fries

Angiococcus leiosanthus (non Maluma & Parrott.)
Gymnospora englesi Fries.
Gymnospora englesi (Lam.) Excll.
Acacia mollifera Benth.
Gymnospora englesi (Lam.) Excll.
not known (Fries, 1936)
Conypus spp. (cult.)
Leguminosae (diverse genera)
abutilon sp.
Corema sp.
Floua spicosa Fries.
ytis vinifera L.
glycine javanica L.
Vangifera indica L., Feddium guajava, L. & Theobroma cacao L.
Vibicaria eubadiana L.
Vangifera indica L.
Acacia mubica Benth.
Thespea populnea Gol.
Sorghum vulgare Pers.
Cucurbitaceae (diverse genera)
Taeniothrips traegardi (Trybos)
Taeniothrips illarum Fries
Taeniothrips ajustedi (Trybos)
Taeniothrips sp.
Taeniothrips sp.
Thrips tabaci Lind.
Thrips microchaetum Karny
Polichos lablab L.
Raphanus sativus L.
Polichos lablab L.
Citrullus vulgaris Schrad.
Dianthus carpophyllum L.
Allium cepa L. Gonocapsa spp.
Trifolium flavescens Hochst.
& Pulicaria crispa Benth.
FAMILY: TERIPIDAE

1. Astrothrips connaticornis Pries.

Synonym: Genothrips connaticornis Ragnall

Adults of this species were collected from a climbing legume at 'Aad Medani and Gezeret el Hil. Larvae could breed on Pohl- chesia labiat L. (quoted by Friemor 1966). During the present investigation the species was found on Jasminum sp. (flower and leaves).

Description of female adult: (Fig. 1)

Body brown, tibiae and tarsi pale yellow brown. Wings brown at margins.

Head:

Strongly transverse, strongly reticulate, narrowed towards base. Ocelli situated on the dorsal anterior lump. Dorsum with an arched row of larger meshes. Mouthcone rounded at apex.

Length of head: 0.2150 mm.

Width of head: 0.1268 mm.

Antenna:

Slender, five jointed. Segment 2 globular, pale brown in colour. Segment 3 much longer elongate with narrow prebasal ring and narrow apex. Segment 5 formed of fused terminal segments.
irregular, with a pointed tip. Segment 3 & 4 with a fine simple sense cone on each. All segments except 2 are yellow.

Total antennal length 0.2850 mm.

Prothorax:

Twice as broad as long; 0.1420 mm. long, 0.2802 mm. broad; with an anterior dilation at the sides.

Legs:

Weak, tibiae thin at base all reticulate; tibiae and tarsal pales.

Fore-wing:

Narrow, hyaline at base, broadly margined with brown shading. Fore margin with fringe and thick bristles. Upper vein with 8 basal and 4 distal bristles, lower vein with 8 to 9 bristles.

Length of wing 0.4275 mm.

Abdomen:

Tergites transversely striate medianly, polygonally reticulate laterally. Bristles on abdominal segment 9 short, segment 10 elongate, conical, wholly split above, with one pair of conspicuous short terminal bristles.

M.M. Abdominal sternite 3 to 7 of the male with long circular glandular areas.
2. *Phytotrips syriacus* (Nayet)

Among the plants infected by this species recorded in Egypt are *Acalypha* sp. (Euphorbiaceae), *Coccothrips* sp. (cult.), *Pelicous communis* L. (cestor), *Rosa canina* L., (Priester 1950). The insect was recorded in the Sudan on *Vincas* (Schmutzler 1950).

In Shambat the species was found on cotton, roses and mango trees. It is a leaf thrasher.

Description of female adult: (Fig. 2)

Dark brown to blackish, the body is comparatively broad, depressed, reticulate. Legs short.

**Head:**

Strongly transverse with the ocellus born on the anterior hump. Mouth cone blunt, cheeks parallel. Maxillary palps two segmented.

Length of head 0.1450 mm.

Width of head 0.2333 mm.

**Antenna:**

Indistinctly eight segmented, the four apical segments forming a conical unit. Segment 1 pale grey, widened towards apex, 2 darker obliquely truncate, 3 pedicillate, broadly truncate at apex, light at base. Joint 4 somewhat broad with long sense cones, 6 and 7 obliquely truncate, segment 8 needle shaped.

Total antennal length 0.2915 mm.
Brothax:

Strongly transverse, without major bristles.

Length of prothorax 0.1916 mm.

Width of prothorax 0.2750 mm.

Tarsi of legs very short, hind tarsi with spurs.

Fore-wing:

Strongly shaded with brown, broad, thick, leathery; allula ubbly separated from wing. Surface sculpture with rows of microsetulae. Upper vein raised at base, callous. Costa with 2 or 3 small calli. Apex of wing rounded with long dark setae; fore margin without fringe cilia or bristles, hind margin with long fringe cilia up to 0.4266 mm.

Abdomen:

10-segmented, apex of segment 10 split dorsally towards apex.

**Synonym:** *Calothrips funipennis* (Naga. & Cam.)

This pest infests a very wide range of host plants including *Helichroa lablab* L. (lubia) and several other varieties of beans, *Heliotropium* sp. (Tanab al agrab), *Medicago sativa* L. (Sersa), *Arachis hypogea* L. (groundnuts), *Lens* sp. (lentils), *Sesbania aegyptiaca* Pers. (Leguminosae). It is a major pest of cotton *Gossypium* spp. (cult.) in irrigated and rain fed areas in central, eastern and Western Sudan. In Shambat besides the recorded host plants the pest was found on onions, *Soya* bean, haricot bean, *Manicoma* flower, *Gerstis* flower (annual ornamental plants); *Gaffflower*, *Cardamomum tinctorium* L. and *Sunflower, Helianthus annus* L. Adult specimens were collected from cotton leaves.

**Description of female adult:** (Fig. 3)

Dark brown to blackish. Body reticulate. Gizzard dark and prominent. Total length of the body 1.5000 mm.

**Egg:**

Broader than long, length 0.1175 mm., width 0.2055 mm. Vertex elevated between eyes. Intersegmental projections not very conspicuous. Eyes protruding and pilose, ocelli borne approximatively on the elevated vertex. Surface of head reticulate.

Maxillary palps two segmented.
Antenna:

Eight jointed. Segments 1 and 2 uniformly dark greyish brown, segments 3, 4 and 5 pale yellow with darker distal portions. Segments 6, 7 and 8 pale yellow. Bristles prominent. Segment 1 small, 2 heavy much longer and broader. Segments 3 and 4 stem-like at either end with forked trichomes. Segment 5 truncate, segment 8 long and slender. Segments 6, 7 and 8 closely united.

Prothorax:

Much broader than long, reticulate. Length 0.1050 mm., width 0.2375 mm.

Forewing:

Greyish brown with two pale patches, the first just beyond the basal fourth and the second at the distal fourth, with darker patches at the basal fourth and just beyond the subbasal light patch as well as at the tip of the wing. The principal vein is furnished with 4 bristles & 2 distal bristles near the tip. Arrangement of bristles varies within the species. Some of these bristles dark and some light. The lower vein has 5 bristles.

Abdomen:

Short and stout in female, segment 9 with short bristles, segment 10 split above.
4. *Calothrips sudanensis* (Bagn. & Cam.)

This pest occurs only in Sudan, more common in northern central and eastern Sudan. It is an important pest of late season cotton; its damage is identical to that of *C. funipennis*. Besides cotton it infests beans e.g. *Coliches lablab* L. It prefers the weed *Leucos urticifolia* Bentham. (Labiatas), to other weeds.

**Description of female adult from cotton leaves:** (Fig. 4)

Body grey to bluish brown but not as dark as *C. funipennis*; head and prothorax yellow brown. Vertex, between eyes, pale yellow. Hind tibiae pale.

**Head:**

Broader than long with vertex elevated between eyes. Intercapitular projection not very conspicuous. Ocelli on the elevated vertex. Surface of head reticulate. Maxillary palps two segmented.

Length of head 0.1250 mm.

Width of head 0.1800 mm.

**Antenna:**

Eight segmented. Segment 1 and 2 pale brown, 3, 4, and 5 yellow with darker distal end portion. Segment 3 with slender stem like trichomes. Segment 5 truncate, segments 6, 7 and 8 closely united, brown in colour. Trichomes are prominent and dark.
Brothurex:

Reticulate, 0.1050 mm. long, 0.2250 mm. wide.

Fore-wing:

Greyish in colour, brownish at extreme base, region next to base, pale, followed by a dark area occupying about two-fifths or more of the total length of the wing, the ends of which are darker than the median part, followed by a short clear area and ending in a distal dark patch. The tip of the wing is hyaline. Along the veins there are dark and pale bristles. Five bristles just before fork on the principal vein (1 dark and 4 pale). Lower vein with 5 to 6 bristles, regularly disposed. The Costa has 12 to 13 stout and 14 to 15 slender bristles.

Abdomen:

Segment 10 split above. Segment 9 with short bristles.
Fig. 4: *Gullothrips australensis*

A. Fore-wing.
B. Antenna.
5. Pericatirus bedfordi Megnell

Cameron in 1927 found this species in Khartoum on Luba, Cajanus cajan Spreng. and Parkiae, Vigna unguiculata L. (quoted by Frieseer 1960). In Shambat forms it was found on Mung bean, Haricot bean, and Brinjal sp. (ornamental plant).

description of female adult: (Fig. 5)

Yellow, with brown markings on head, prothorax, and anterior margins of the prothorax. Anterior margins of segments 1 to 5 of abdomen and the whole of segments 7 to 10 lightly shaded with grey.

Head:

Length 0.1250 mm.

Width across base 0.1690 mm.

Width across cheeks 0.1865 mm.

Cheeks straight, postocular setae conspicuous. Mouth-cake blunted, maxillary palps three-segmented. Eyes black with lighter anterior facets. Interantennal projection small.

Antennae:

Eight-segmented, style two-segmented. Joint 1 pale, 2, 3 and 4 grey except at the basal third. Joints 5, 7 and 8 shaded with grey. Joint 3 stellate at base. Segments 3 and 4 with forked sense cones, segment 6 with simple sense cone reaching nearly apex of segment 7. Bristles dark. All segments except segment 1 and style covered with rows of microtrichia.

Total antennal length 0.5165 mm.
Prothorax:

Bristles long and stout; two pairs of posteroangulars and two pairs of posteron primaries. The outer pair of the posteron primaries being long. One pair of anteroangulars and one pair along the anterior margin.

Length of prothorax 0.2085 mm.
Width of prothorax 0.2500 mm.

Pepro-Medial:

Gray at extreme base, covered with longitudinal rows of microtrichia. Middle band between the two veins hyaline. Costal margin with 22 to 25 bristles, upper vein with 18 to 19 and lower vein with 15 bristles.

Abdomen:

Abdominal tergites with a row of accessory bristles. Tergite 9 with 3 pairs of dorsal bristles. Longest bristle on segment 9 about 0.1410 mm. long.
Fig. 5: *Sericothrips bedfordi*

A. Fore-wing.
B. Head and prothorax (dorsal), /thorax cone ventral/.
C. Antenna.
D. *Abdominal tergite with accessory bristles.*
S. Scirtothrips mangifera Fries.

In Egypt this species was found on *Mangifera indica* L., (mango); *Parkinsonia aculeata* L., (Leguminosae), and stray specimens were found on *Citrus* foliage and *Vicus carica* L., (Moraceae); in the Sudan Cameron observed this species on cotton buds. (Prinsen 1960). In Shambat Demonstration Farm some specimens were collected from cotton buds.

Description of female adult: (Fig. 6)

Colour: pale yellow, ocelli crimson, eyes black, wings shaded with grey.

Head:

Broader than long 0.0750 mm. long and 0.1500 mm. wide.
Maxillary palps three segmented, mouthcone short.

Antenna:

Total length of antenna 0.8500 mm.

Prothorax:

Broader than long with 4 pairs of postero-marginal bristles.
Fore-leg:

Waxk unpaired pale yellow with dark short bristles.

Fore-wing:

Very feintly shaded with grey, upper vein with 10 to 11 basal - 3 distal bristles. Costal margin with 24 to 26 bristles. Lower vein with 5 distal bristles (1-2).

Abdomen:

Tergite 8 with comb, dorsal bristles on segments 9 and 10 pale.

N.B.: In the male there is a pair of pale horn-like structures attached to the lateral sides bent upwards and inwards (drapena), tergite 9 with 4 pairs of pale bristles, the exterior pairs shorter than the interiors.
Fig. 6: *Scirtothrips macciferreus*

A. Fore-wing
B. Terminal abdominal segments of male showing "droplets"
C. Antenna
D. Fore-leg
7. Frankliniella dampfi Pries.

Synonym: Frankliniella schultzei Trybom.

It is a very common flower thrips, widely spread in Northern Sudan on cotton buds. Besides cotton it attacks a_SCOPE, lobia, onion, carrots, radish and white beans. It was also found in Shambat on peas, cucumber, broad beans, squash, addai (Sida sp.) rosen, Alamanda flower and sweet potato.

Description of female adult from cotton buds and Alamanda flowers: (Fig. 7)

**Straw yellow to light brown, legs pale yellow.**

**Head:**

Narrow at base, broader than long, cheeks nearly arched with one pair of long postocular bristles and one pair of shorter interocellar bristles. Maxillary palps three-segmented. Interantennal projection not very much protruding.

Length of head: 0.1450 mm.

Width across base: 0.1750 mm.

Width across cheeks: 0.1875 mm.

**Antennae:**

Eight-segmented, slender, whitish yellow, segments 3, 4 and 5 except base shaded with pale grey; 6, 7 and 8 brown. Darker antennae found in dark specimens. Forked sense cones present on segments 3 and 4. All segments except 1 and style...
Covered with microtrichia. Bristles distinct.
Total antennal length 0.2895 mm.

Prothorax:
Broader than long, 0.1798 mm. long and 0.2390 mm. wide.
Two pairs of anterocorctal bristles are present, the inner 0.0500 mm., the outer 0.0325 mm. and one pair on the subocular region of prothorax.

Fore-wing:
Uniformly lightly coloured, not hyaline, upper vein with 15 to 16 bristles, lower vein with 13 to 15 bristles costal margin with double fringe.
Wing length about 0.4000 mm.

Abdomen:
Tergite 8 with marginal comb.
Fig. 7: Frankiniella dampfi

A. Fore-wing.

B. Head and prothorax (dorsal),
   Mouth cone ventral.

C. Antenna.
O. penbrothiae sp.

This species was found on Jasminum sp. (flowers) in Shambat.

Description of female adult: (Fig. 8)

Paler yellow, head grey, thorax shaded with grey, with brown markings. Abdominal segments 1 to 7 brownly shaded, abdominal segments 8 to 10 grey.

Head:

Strongly transverse, cheeks straight. Ocelli crimson, maxillary palps two segmented.

Length of head 0.1050 mm.

Width of head 0.1950 mm.

Antennae:

Eight segmented, style two segmented. Segment 1 light yellow, joint 2 shaded with grey, joints 3, 4, 5 and 6 grey, style darker grey. Segment 3 with atrachitic base, joints 3 and 4 bearing forked sense cones, 6 with simple slender sense cone reaching nearly apex of style. Segments 6 and 7 joined obliquely. Segments covered with rows of microtrichia and dark bristles. Total antennal length 0.2250 mm.

Prothorax:

Strongly transverse, 0.1250 mm. long and 0.2250 mm. wide. posterangular bristles absent.
Fore-wing:

Narrow, broad at base. Marginal fringe and bristles (35 bristles) inserted well inside margin. Vein bristles very short, hyaline. Upper vein with 5 basal - 3 + 2 distal bristles. Lower vein with 8 bristles.

Abdomen:

Segment 9 without conspicuous dorsal bristles. Marginal bristles on segment 9 of abdomen hyaline, straight, stout and pointed. Segment 10 only partially split above, bluntly rounded at apex.
Fig. 8: *Dendroctonus* sp.

A. Fore-wing.

B. Head and prothorax (dorsal).
   Youth cone ventral.

C. Antenna.

This is a grain pest in South and Central Africa. It prefers *Leguminosae*. Prusiner described this species from specimens found in Red Medani on *Panicum miliaceum* L. (April) and *Medicago sativa* L. (August), from Maj Abdalla on *Cratopis sinuata* (Leguminosae), and from Tayibe specimens of this species were collected from cotton leaves and buds, (Prusiner 1960). The following is a description of female specimens collected from *P. miliaceum*, *Papaver rhoeas* L. (lubia) and *Vicia faba* L. (broad bean).

**Description of female adult:** (Fig. 9)

Blackish brown, abdomen slightly lighter.

**Head:**

Nearly as broad as long, cheeks straight, interocellar bristles long, eyes distinctly pilose. Two pairs of small setae situated in front between eyes. Maxillary palps three segmented.

Length of head 0.1460 mm.

Width of head 0.1750 mm.

Length of interocellar bristles 0.0750 mm.

**Antennae:**

Eight segmented, slender. All segments dark except segment 3 and the subbasal ring of segment 4. Segments 3 and 4 constricted at base, vasiform, with long furred sense cones, segment 6
with one long slender sense cone reaching apex of segment 7. Segments are covered with bristles and row of microtrichia. Total antennal length 0.3152 mm.

**Prothorax:**

Nearly as broad as long with two pairs of anteroangular small bristles, 2 pairs of posteroangular bristles, the inner pair longer than the outer, and one pair of short postero marginal bristles within. Pronotum without conspicuous sculpture. Anteroangular bristles 0.0300 mm. Posteroangular bristles (inner) : 0.0900 mm. Posteroangular bristles (outer) : 0.0850 mm.

**Fore-wing:**

Fully developed. Wing base dark followed by hyaline subbasal band, then dark again somewhat paler at or just before apex but not hyaline. Fore margin is set with stout dark bristles. Principal vein set with a continuous row of 11 to 15 bristles + 3 distal bristles. The lower vein is furnished with 14 to 15 bristles.

Length of fore-wing 0.3350 mm.

**Abdomen:**

Sternites without accessory bristles comb on tergite 8 weak, interrupted at middle, bristles on segment 9 long 0.1353 mm, 0.1500 mm. Segment 10 split above.
Fig. 9: *Tasemithon obsoleti*

A. Fore-wing.
B. Head and prothorax: dorsal, mouth cone ventral.
C. Antennae.
D. Terminal abdominal tergites. Ovipositor (ventral).
10. *Terniothrips* sp.

This species was collected from flowers of *Dianthus caryophyllus* L. (carnation).

Description of female adult: (Fig. 10)

Brownish yellow, head dark brown, prothorax brown, wings, tarsi, and some segments of antennae yellow.

Head:

Broader than long. Cheeks straight, malar-cone long and slender. Maxillary palps three-segmented, eyes distinctly pilose. Occipit orange, interocular bristles about 0.035 mm.

Antenna:

Eight-segmented, style two-segmented. Segments 3 and 4 truncate, with forked sense cones. Segment 6 conical-like with one simple sense cone. Total antennal length about 0.250 mm. Antennal segments covered with short dark setae and row of microtrichia.

Prothorax:

Length about 0.183 mm, width about 0.220 mm. Posterior angles with two pairs of major bristles, the inner being the longer and 4 pairs of bristles inner to the posterolateral along posterior margin, the innermost being longer.
Fore-wing:

Fully developed, broad, with dark bristles. Postal margin furnished with 19 bristles, upper vein with 17 bristles, lower vein with 12 to 13 bristles.

Abdomen:

Sternites with accessory bristles. Bristles on segment 9 long, the longest about 0.1250 mm. Comb on tergite 8 complete with long teeth.
Fig. 10: Pseosiethriya sp. (on Plantago Caryophyllaceae)

A. Fore-wing.
B. Head and prothorax (dorsal).
C. Antenna.
Fig. 13: *Thrix pizzochaetus*

1. Fore-wing.
2. Terminal abdominal tergite.
4. Antenna.
Fig. 16b: *Ephlotrips derisor*

A. Terminal abdominal segments of female.

B. Abdominal tergite 1 with scuta.

C. Terminal abdominal segments of male.
17. **Myriotricha cameroni** Prisner

This species was first discovered by Cameron at Add Medani, found under the leaf sheaths of the grass *Cyperus dactyloides* Pers. (Prisner 1960). In Egypt Prisner found this species between the cole and the leaf sheath of *Nymphaea lotus* L. and on plants partly submerged in water. The following description is of a female adult specimen collected from *Cyperus dactyloides* leaves.

**Description of female adult:** (Fig. 17)

The body pale yellow brown with darker brown in some parts: the head, antennal joints 1 and basal half of 2, the middle and hind tibiae, a transverse band on abdominal segments 2 to 7 and the whole of segments 8, 9 and 10 of abdomen.

**Head:**
- **Length:** 0.1350 mm.
- **Width across eyes:** 0.1560 mm.
- **Width across cheeks:** 0.1915 mm.

Eyes almost broadly rounded, maxillary palps two segmented.

**Antennae:**
- **Total length:** 0.4464 mm.
  - Joint 7 broader than 8 with regard to apex and base respectively.
Prothorax:

Width without coxae: 0.1915 mm.
Length: 0.2350 mm.

The inner pair of the posteroangular bristles shorter than the outer pair. Fore tarsi unarmed. Felta more or less rectangular.

Wings:

Greatly reduced to pads.

Abdomen:

Tube short conical.
Length of tube: 0.1214 mm.
Width at base of tube: 0.0714 mm.
Width at apex of tube: 0.0428 mm.
Length of anal setae: 0.1140 mm.
Fig. 17: *Heliothrips casserotii*

A. Head and prothorax (dorsal).
B. Pelta.
C. Antenna.
10. *Aphelinus varipes* Rugall

This species was originally discovered in India (Rajend 1926). In Egypt it infests leaves of *Abutilon purpureum* Del. (Malvaceae) producing white spots. The insect is polyphagous. (Friesner 1936). The insect was found in Shamsat farms on *Abutilon figuroides* (hambak).

Description of female adult: (Fig. 16)

Dark brown with red pigment over the whole body except the appendages. Darker are the femora, middle and hind tibiae and the bristles. Fore tibiae and tarsi yellow. Wings clear, base very faintly infumated.

Head:

Length about 0.2670 mm.

Width across eyes 0.1840 mm.

Width across cheeks 0.1990 mm.

Length of mouth-cone 0.2670 mm.

Cheeks parallel constricted at base, front cecillus on hump. Mouth cone very long and pointed. Maxillary palps two segmented.

Postocular bristles well developed.

Antennae:

Eight segmented, total length 0.4325 mm. Segments 1 and 2 dark, 3 somewhat pale at apex, 2, 4, 5, 6 and 7 lemon yellow, 8 shaded with grey. Segment 3 with two small sense cones.
Segment 4 with 2 + 2 sense cones, segments 5 and 6 obliquely truncate at apex, 8 conical, broadest at base.

Prothorax:

0.1250 mm. long and 0.2030 mm. wide. Anteroangular bristles well developed, open at tip. Delta triangular, dome-shaped. Legs very slender, unarmed.

Wings:

Narrow, about 0.6920 mm. long, distinctly constricted beyond middle, with about six stria duplicated. Small bristles 1 and 2 knobbed.

Abdomen:

Bristles on segment apicoid, the longest measuring about 0.1800 mm.

Tube length 0.1407 mm.

Width across base 0.0784 mm.

Width across apex 0.0464 mm.

Anal setae about 0.1250 mm.
Fig. 16: *Polichthrips variipes*

A. Head and prothorax (dorsal). (Youth cone (ventral).
B. Fore tibia and tarsus.
C. Antenna.
D. Palpa.
Family: THripsidae \textit{Bals.}

Antennae 5 to 9 segmented, the terminal segments often slender forming mostly a one or two, seldom three, jointed style.

Sense cones on segments 3 and 4 often forked. Auxillary palps two to three segmented, labial palps two segmented. Wings slender, pointed, often slightly curved.

**Key to the genera of Thripidae:**

1 (8) Body dorsally with conspicuous reticulation. Terminal antennal joints often needle shaped.

2 (13) Head broader than long with anterior bump bearing the front ocellus.

3 (4) Head strongly constricted at base, cheeks convex, antenna 6 jointed, joints 5 and 7 fused. Joints 3 and 4 with simple sense cones ..................... \textit{Abbrotthiopsis} Ehrny

4 (3) Head not constricted at base, cheeks parallel, antennae 6 jointed, joints 5 and 6 united, joint 4 with two long simple sense cones. ..................... \textit{Reithripus} March

5 (16) Antennae 8 jointed, terminal joints united, joints 3 and 4 with forked sense cones, joints 6 with a simple sense cone.
6 (7) Maxillary palp two segmented. Fore-wings with pale patches. Tenth abdominal segment not split above. ... *Salixthrips* mali

7 (6) Maxillary palp three segmented. Fore-wings without pale patches. Tenth abdominal segments partially split.

8 (1) Body surface without conspicuous reticulation. Apex of antenna rarely needle shaped.

9 (10) Fore vein of fore-wing evenly set with setae abdominal tergites with complete costa on posterior margins. Wristles on abdominal segment 9 numerous. .............. *Salixthrips* mali

10 (9) Fore vein of fore-wing with setae interrupted. Abdominal tergites with no scabae. Abdominal segment 9 with only 3 pairs of wristles. Abdominal segment 9 of male with a pair of internal appendages (drapena). (Fig. 6) .............. *Salixthrips* shull.
11 (12) Prothorax with well developed major setae at angles. Fore-wing with two veins uniformly set with cilia. Abdominal segment 10 split above. **...Frankliniella Harris**

12 (11) Prothorax with no major bristles. Fore-wing with characteristic chaetotaxy. Bristles on posterior margin deeply set with-in margin. Abdominal segment 10 partially split above. **...Bemirithripa Weal.**

13 (2) Head nearly as broad as long.

14 (15) Prothorax with two well developed pairs of posteroangular bristles only. **...Mactothripa Dvory and Serville.**

15 (14) Prothorax with two long major bristles at each hind angle and two long marginal pairs in between.

16 (5) Antenna 7 jointed, style one segmented. Segments 3 and 4 with posterior forted sense cones. Abdominal tergite 8 with posterior comb. **...Purina Jumene.**
Family: PHILOCENTRIPIDAE Need.

Fore and hind wings little differing in length and width; membranes without microtrichia with fine fringes cilia deep inserted. No marginal veins, only a rudiment basal vein bearing 3 setae. Antennae mostly 8-segmented, sometimes 6 and 7 fused. Sense cones never forked several sense cones may be on one segment. Maxillary palps and labial palps one segmented. Fore-legs frequently enlarged in male. Abdominal segment 10 tubiform never divided. Abdominal tergite 1 with delta usually closely joined to tergite 2. Abdominal segments without pleural plates.

Key to the genera of Philocentripidae:

1 (7) Youth cone rounded at apex.

2 (6) Prothorax much shorter than head, fore tarsi unarmed, femora not enlarged in male.

3 (5) Wings evenly wide, broad with only one or two cilia duplicate. .......... genodectis Price.

4 (2) Prothorax nearly as long as head, fore tarsi toothed, femora of male enlarged.

5 (3) Wings narrowed in the middle, male shaped.
6 (8) Flinta triangular or rectangular transversely reticulate. .......... Hoplothenius Serv.

7 (2) Mouth cone comparatively long, slender at apex, surpassing the postornum.

8 (8) Flint always triangular less scleritized. ................. Delmenobius ne.
Genus: Callothrips Daniel

Body reticulate, head broader than long. Eyes distinctly protruding, pilose. Prothorax transverse without strong bristles. Wings slender, costal bristles and costal fringe distinct. Abdomen not sharply constricted basally.

Key to the species of Callothrips:

1 (2) Body grey blackish brown. Extreme tip of fore-wing hyaline. Wings broad. .......................... C. apsangusia (Sage, & Gmu.)

2 (1) Body dark blackish brown. Extreme tip of fore-wing dark. Wings narrow. .......................... Cucinella (inplastrum) (Sage & Can.)
Genus: Taeniophthirina Serv.

Synonyms: Physococcus Pries.
- : Pthirina Parny
- : Crythria Trel
- : Physothrissa Parny

Antennae 8 segmented, style 2 segmented. Maxillary palps 3 segmented. Prothorax at posterior angles with 2 major bristles on either side. Bristles at apex of abdomen long.

Key to the Species of Taeniophthira:
1. (5) Body yellow or light brown.
2. (2) Abdominal sternites with accessory bristles. .......... Species (on Citrullus vulgaris)
3. (2) Abdominal sternites without accessory bristles. .......... Millerus (Fr.)
4. (6) Tergite 8 with complete comb. .. Species (on Zanthus cyanobulum)
5. (1) Body dark brown.
6. (4) Tergite 8 with weak incomplete comb. .................. Sjostedti (Toryon)
Genus: *Thrips* L.

Antenna seven segmented, style two segmented, segments 3 and 4 with forked sense cones. Maxillary palps 3 segmented.

Prothorax at right angles with 2 pairs of bristles. Wings with two longitudinal veins. Bristles at apex of abdomen well developed. Tergite 6 with complete comb.

**Key to the genus Thrips:**

1. Pale yellow species or yellow with grey shadings.

2 (3) Accessory bristles very densely set in 3 or 4 rows. .................. *Microcentus Harnay*

3 (2) Sternites of abdomen without accessory bristles. .................. *tahari* Linna.
Genus: *Episthrix* Say.

Head nearly as long as or somewhat longer than prothorax. Ventrocoxae broadly rounded, maxillary palps two segmented. Tube short, conical.

Key to genus *Episthrix*:

1 (2) Tergite 1 with triangular pelta. Wings narrowed at middle, male shaped. ................. denticor pries.

2 (1) Tergite 8 with somewhat rectangular pelta. Wings greatly reduced, not extending beyond pterothorax. ........... emersei pries.
The thrips found in Shambat area belong to two families, Family Thripidae (Superorder Terebrantia) and Family Phleothripidae (Superorder Tubulifera). Friesen in his key divides the Terabrantia into four families: Aclothripidae Paul, being the most primitive group, has the ovipositor of the female curved upwards and the wings broad, rounded at tip, Family Pteroethripidae Good is characterized by the moniliform antenna, without style and without sense cones; the abdomen is blunt, the ovipositor is very weak and probably functionless. Family Pterothripidae Raga, in which the antenna are not moniliform and without, or with, very short sense cones; the ovipositor is well developed. In Family Thripidae Paul the ovipositor is curved downwards and the forewing is narrow and pointed at tip; it is characterized also by antennal sense cones, forked or simple.

In the Egyptian and Sudanese Thysanoptera the greatest number of species belong to the family Thripidae. On the nine genera distinguished among Thripidae during the present investigation the most important crop pests are those on cotton, bean grusses, sesam and borage. Eighteen species were examined and described: Astrotropha acomitcornis Fries., Abrotrophus gymnocerus (Keys.), Cyllothrips fuscipennis (Raga. & Cam.), D. sudanaensis (Raga. & Cam.), Paratropha sp., Frankliniella dospila (Fries.), Serinotrichus bedfordi (Cam.), Phleothrips moniliformis (Fries.),
Tepalothrips (Twy.), E. illaria (Fries.), Tepalothrips sp. (on watermelon), Tepalothrips sp. (on carnations), Thrips tabaci Lind., and Thrips microcephalus Fk. Besides the known species of Calothrips on cotton, Thripis aspera is found in large numbers on late mosaic cotton causing the same type of injury to Calothrips; the same species is also found on leaves and flowers of Sesu centfolia, (Plate 6). The cotton bud thrips, Frankliniella damselfi, which causes curling of leaves is also widespread in incescences of many crops and ornamental plants.

Thrips tabaci, the cotton thrips, was found on alfalfa, cotton and various other vegetables and ornamental plants. Another important genus under which none of our thrips fall is Tepalothrips. E. illaria occurred on Delphinium latham in April, on beets in August and on weeds for the rest of the year. E. illaria was found in large numbers on Delphinium salinas. These two species can easily be differentiated by their size and colour.

Two unidentified species are also reported, one in large numbers on carnations during winter. This could be mistaken for the famous E. Maculata Fries. It is characterized by the absence of ordinary bristles on the abdominal sternites and the difference in chelate form of the fore-wing. The other species was found on watermelon and other cucurbits. It has a pronotum covered with rows of small teeth, the comb on tergite 8 is complete and composed of long hairs. All species of Tepalothrips examined are small and pale except E. illaria which is bigger and dark.
In Suborder Tubufera only one family (three genera and four species) are recognized. Family paleothripidae, *Euplolepta* derleyi Pr. on sunflower leaves and flowers causing considerable damage and *A. cameruni* Pr. on grasses. The latter is distinguished by the reduced wings. *Acalolepta americana* Kans. causes significant type of injury to species of *Acalolepta*. Galls are formed due to curling of leaves at the growing points; inside these galls various immature stages are lodged. (Plate 1). Paleothripidae: *Acrotettix* var. *infests* *Ipomoea* *figtangium* but the damage is not serious.

In Paleothripidae a structure of unknown function known as the 'pelta' was used for differentiation. This is a disk varying in shape, size and sclerotization, situated at the first abdominal tergite lying with its base along the anterior margin of the second abdominal tergite. This has been used in Stenner's key of Tubufera (1968).

Due to the paucity of the families among the population of thrips and the scarcity of the females, the female adults were collected for study. This supplied the key with adequate data for differentiation.

Till now the study on Heteroptera in the guinea is meagre. On the taxonomy there is always a rich field for study owing to the abundance of thrips all over the country. As to the biology
and ecology work could be organized on *Thrips tabaci* and species of *Frankliniella* since they are known to be vectors of plant diseases all over the world. (Kenneth 1932, Sakiura 1953 and Smith 1932). Natural enemies that might help as a means of control was totally neglected, these should be surveyed and studied. Detailed study on *Heliothis ziricola* regarding various aspects should be conducted as it is now considered a cotton pest of equal importance as the species of *Calothrips*. 
REFERENCES


Baghall, R.S. (1939). Description of some new genera and species of African Thysanoptera (Thysanoptera).


Baghall, R.S. and Cameron, W.P.L. (1938). Description of two species of Paracothrips injurious to cotton in the British Sudan and of an allied species on grass.


Corkett, G.H. (1926). Observations on cotton thrips in the 

Davies, E.O. (1938). Observations on the morphology of the head 
Soc. Lond. (A) 32: 97-106.

Davies, E.O., Cozen, C.B. and Ferreira, C.R. (1957). Thrips con-
tral on cotton with phosphorus insecticides. J.
Crop Prot. 20: 574-578.

Eddy, G.C. and Clarke, W.H. (1939). The onion thrips on seedling 
of cotton with a seasonal record of posthatche-
tic development. J. Econ. Ent. 32: 704-706.


S. Afr. 32: 355-375.


Fransen, C. and Poelman, L.P. (1966). Notes on population of 


Leigh, T.F. (1963). Control of certain insects and mites on cotton with three systemic organophosphorus com-


Mac Gill, E.I. (1927). The biology of Thysanoptera with reference to the cotton plant. The relation between temperature and life cycle in a saturated atmos-


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* Seen as Abstracts.