THYSANOPTERA.

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1. *General Remarks.*

The insects of the order Thysanoptera are perhaps less studied than those of any other well-defined group. This is partly accounted for, perhaps, by the fact that they require special collecting and preserving, and partly also by the minute size of most thrips. Whilst the Thysanopteron is difficult to understand morphologically and certain parts are yet but incompletely understood, it is recognized, and has for some time been recognized, as an insect of decided economic importance, and in view of this it is indeed strange that the order should have been so long neglected by entomologists. The pioneer work of Haliday, Heeger, Jordan, Uzel, Reuter, Trybom, Hinds, is bearing fruit, however, and to-day many entomologists (though fewer than we would wish) are energetically working at the Thysanoptera[1].

It is only recently that the forms outside of the Palaearctic and Nearctic regions have received attention, but from material we have examined from India, the Malay Archipelago, Africa, Central America, etc., it is evident that the Thysanopterous fauna of the tropical and sub-tropical regions will prove to be a very rich one. And it is only natural to suppose that wherever a district is botanically rich, it will also be wealthy in these insects, the majority of which infest flowers and leaves of different plants.

They should be searched for on and under the leaves and stalks of all grasses, ferns, flowering plants, shrubs and trees; in flowers, on lichens, amongst moss, etc., and under bark of decaying trees; a few forms are found in galls and others live in fungoid growths. Most thrips live gregariously and all stages are frequently found together.

[1] Trybom (Sweden); Karny and Schmutz (Austria); Buffa (Italy); Crawford, Franklin, Hood and Moulton (U.S.A.).

If carded these insects dry and curl up very quickly and are of but little use for study, it is therefore necessary to collect them by means of a small camels' hair brush into a weak solution of formalin, or in from 60 to 70 °/₀ alcohol. The majority of flower-living thrips are very small—not infrequently less than a millimetre in length—and therefore require careful search. The best plan is to shake plants, leaves, flowers, etc., or the contents of one's sweep-net, on to a sheet of white paper, where the most minute insect can be readily seen as soon as it moves.

As might have been expected, excepting for the description of two species given in a recent short paper by the late Mr Kirkaldy, the Thysanoptera of the Hawaiian Islands are unknown. The material upon which the present contribution is based has all been collected by Dr R. C. L. Perkins, and consists chiefly of about seven dozen dried and mounted specimens, though later a small collection in alcohol was submitted; and because of the difficulty of satisfactorily dealing with dried material this latter collection, though small, has been very helpful indeed[1].

Altogether twenty-one species are recorded; fifteen of these are new; two are those described by Kirkaldy, whilst the other four are well-known pests and two of them almost cosmopolitan in their distribution. This is probably only a small proportion of the Hawaiian Thysanoptera; it is quite possible that energetic and systematic search, giving particular attention to the minute forms attached to the various plants, will bring to light five or six times this number.

Further and considerable material would be very useful and welcome; not only will new forms be discovered but we shall be able more fully and perfectly to describe some of those species which through lack of material have herein been erected on single and, in more than one case, imperfect specimens.

It is evident that the Thysanopterous fauna of the Sandwich Isles is by no means poor. In his Presidential Address for 1906, to the Hawaiian Entomological Society, taking as his subject the "Insects at Kilauea, Hawaii[2]," Dr Perkins in speaking of the Thysanoptera says that, as everywhere in the islands, they are very abundant and the species are probably numerous.

Distribution. A study of the distribution of these insects in the islands forming the Hawaiian group cannot but be interesting. The chief feature lies in the number of species that are peculiar each to a certain island, a feature already strongly shown in other groups of more familiar insects and which, though shown perhaps in an exaggerated form here owing to want of material, will we think be substantiated to a large extent when the Thysanopterous fauna is better known. Under the name of each island we

[1] We are indebted to Mr Dudley Moulton for the records of *Heliothrips rubrocinctus* and *Scolothrips 6-maculatus*.

[2] Proc. Hawaiian Ent. Soc., vol. I. pt. 3, p. 89.

give a list of the known thrips, drawing attention to the precinctive forms, and following this up by a table showing the distribution, and by general remarks on the distribution.

KAUAI. It will be seen from the following list that no species herein recorded are peculiar to Kauai; all of these occur also on Hawaii, and the three last-named are apparently introduced forms.

Dermothrips hawaiiensis (forma *aptera*), *Heliothrips haemorrhoidalis*, *Thrips multispinus* and *Limothrips cerealium*.

OAHU. The following species are recorded from the Island of Oahu; the macropterous form of *Dermothrips hawaiiensis*, *Oedemothrips laticeps*, *Nesothrips oahuensis*, *Dolerothrips bicolor*, *Trichothrips nigricans*, *Agnostochthona alienigra*, *Diceratothrips brevicornis*, *Heliothrips rubrocinctus* and *Scolothrips* 6-*maculatus*.

A total of nine species, of which *Oedemothrips laticeps*, *Nesothrips oahuensis*, *Dolerothrips bicolor*, *Trichothrips nigricans*, *Agnostochthona alienigra*, *Diceratothrips brevicornis*, *Heliothrips rubrocinctus* and *Scolothrips* 6-*maculatus* are peculiar to the island. Of these *Heliothrips rubrocinctus* and *S.* 6-*maculatus* are introduced species, *Diceratothrips brevicornis* is most probably not indigenous, and the type specimens of *Dolerothrips bicolor*, *Trichothrips nigricans* and *Diceratothrips brevicornis* are unique.

MOLOKAI. *Dolerothrips angusticeps*, *D. lanaiensis*, *D. dubius* and *Thrips multispinus* are all we are able to record from Molokai. The first-named is peculiar to that island.

LANAI. *Dolerothrips perkinsi*, *D. dubius* and *D. lanaiensis* are the only forms received from Lanai; *D. perkinsi* is unique and therefore peculiar to the island, whilst *lanaiensis* is apparently a common form on Lanai but occurs more sparingly on Hawaii and Molokai also. *D. dubius* also occurs on Hawaii and Molokai.

MAUI. This Island possesses four species: *Dermothrips hawaiiensis* (forma *aptera*), *Dolerothrips flavipes*, *D. ovatus* and *D. intermedius*. All excepting *Dermothrips* are peculiar to Maui; *Dolerothrips flavipes* and *D. ovatus* are well-marked species and apparently common in the island; the type specimen of *D. intermedius* is unique.

HAWAII. *Dermothrips hawaiiensis* (forma *aptera*), *Dolerothrips barbatus*, *D. lanaiensis*, *D. dubius*, *Trichothrips laticornis*, *Anthothrips usitatus*, *Heliothrips haemorrhoidalis*, *Thrips multispinus* and *Limothrips cerealium* are recorded from this island.

Dolerothrips barbatus, *Trichothrips laticornis* and *Anthothrips usitatus* are peculiar to the island and the type specimens of the first two are unique.

Heliothrips haemorrhoidalis and *Limothrips* are pests of wide distribution, whilst *Anthothrips usitatus* and *Thrips multispinus* are probably, almost certainly, not endemic forms though their introduction may date a long time back.

Table showing the species and their distribution in the islands:

Name of Species	Kauai	Oahu	Molokai	Lanai	Maui	Hawaii
TUBULIFERA						
**Dermothrips hawaiiensis*, forma *aptera* ...	+	—	—	—	+	+
* „ „ „ **macroptera**	—	+	—	—	—	—
***Oedemothrips laticeps**	—	+	—	—	—	—
***Nesothrips oahuensis**...	—	+	—	—	—	—
***Dolerothrips barbatus** (m)	—	—	—	—	—	+
* „ **flavipes**	—	—	—	—	+	—
* „ **ovatus**	—	—	—	—	+	—
* „ **perkinsi** (m)	—	—	—	+	—	—
* „ **angusticeps**	—	—	+	—	—	—
* „ **bicolor** (m)	—	+	—	—	—	—
* „ **intermedius** (m) ...	—	—	—	—	+	—
* „ *lanaiensis*	—	—	+	+	—	+
* „ *dubius*	—	—	+	+	—	+
***Trichothrips laticornis** (m)	—	—	—	—	—	+
* „ **nigricans** (m)	—	+	—	—	—	—
***Agnostochthona alienigra**	—	+	—	—	—	—
Anthothrips usitatus	—	—	—	—	—	+
Diceratothrips brevicornis (m) ...	—	+	—	—	—	—
TEREBRANTIA						
†*Heliothrips haemorrhoidalis*	+	—	—	—	—	+
† „ **rubrocinctus**	—	+	—	—	—	—
Thrips multispinus	+	—	+	—	—	+
***Scolothrips 6-maculatus**	—	+	—	—	—	—
†*Limothrips cerealium*	+	—	—	—	—	+

In the above table those marked with an asterisk may be regarded as endemic, whilst a † indicates species of economic importance that have almost certainly been introduced.

The genera *Dermothrips*, *Oedemothrips*, *Nesothrips*, *Dolerothrips* and *Agnostochthona* are peculiar to the Hawaiian Islands; of these *Dermothrips* and *Oedemothrips* are striking forms bearing no very close relationship with any allied genera; *Dolerothrips* very closely approaches *Trichothrips* and its allies. We do not know *Nesothrips*

and *Agnostochthona* except from Kirkaldy's description, from which *Agnostochthona* would appear to be an *Anthothrips*, and *Nesothrips* would appear to come near *Oedemothrips*; the species of the genera *Trichothrips*, *Anthothrips* and *Thrips* are world-wide in their distribution.

A large proportion of species are each peculiar to one particular island; such are denoted in the table by their names appearing in black type instead of in italics. Now, probably owing to the comparative paucity of material, we have had to describe a number of unique types (these being denoted by an "m" in parenthesis), but even taking these into consideration we find several outstanding features worthy of note, though we are not yet in a position to make generalisations with any degree of certainty. The first and perhaps most striking feature is in the distribution of *Dermothrips*. The wingless form is found more or less commonly in three islands, including the two most widely separated islands, Kauai and Hawaii, whilst the winged form is found in a fourth island, Oahu. No winged examples have been taken in any one of the islands where the wingless form occurs, whilst the winged form which is larger and more robust than the wingless form, is peculiar to Oahu, where the wingless form is unknown. We might, in fact, regard this macropterous form as a distinct local race.

The preponderating genus is *Dolerothrips*, and of the nine described species seven are confined each to a single island, whilst *lanaiensis* is, one might almost say, peculiar to Lanai, as the specimens recorded from Molokai and Hawaii are referred to that species with some little doubt. *D. dubius* occurs in the same islands as *lanaiensis*.

Neither *Dolerothrips* nor any of its allied genera is represented in Kauai, in fact *Dermothrips* is the only Tubuliferon we are able to record from that island; but three Terebrantians (in two cases, if not all, introduced) occur, these same species being found again in Hawaii.

So far we can only regard *Heliothrips haemorrhoidalis*, *H. rubrocinctus* and *Limothrips cerealium*, and more doubtfully *Anthothrips usitatus*, *Scolothrips 6-maculatus* and *Thrips multispinus*, as important from an economic point of view.

It is unfortunately certain, however, that more of these little pests exist, and unknown and unseen are causing damage in a greater or less degree upon the various valuable crops that are being cultivated in the Hawaiian Islands.

As an illustration of the decided economic importance of the Terebrantian Thysanoptera we might instance the Pear thrips, *Euthrips pyri* Dan. In 1895 this species appeared in such great numbers as to cause extensive damage to hundreds of acres of orchards in California, and ever since then it has occupied the attention of several American economic entomologists. Only last year we recorded its appearance in Great Britain[1], and within a year of its appearance we learn that much damage has been done to many pear and plum orchards in the south of England. Like most, if not all Thysanoptera, *E. pyri* is parthenogenetic, and in the countless thousands of Californian specimens examined not a single example of the male has been discovered;

[1] Bagnall, Journal of Economic Biology, LV. pt. 2.

amongst those found in England, however, we have detected a solitary example of that sex.

Vestigial Wings, etc. A distinct feature in the Hawaiian Thysanoptera is the exceptionally large proportion of apterous species or species wherein the wings have been reduced to a functionless pad. In the truly wingless species we find that the ocelli are absent, whereas in the brachypterous forms the ocelli are seldom if ever entirely lost. In some species of *Dolerothrips* the wings are reduced to such an extent that it is only by careful microscopical examination that the minute bristle-set scale-like pad can be distinguished, but in all species the ocelli are well-developed, larger than is usual in brachypterous forms.

Dermothrips is purely an apterous form on the islands Kauai, Maui and Hawaii, but, as mentioned before, a large winged form is peculiar to a fourth island, Oahu.

Unfortunately the material is not sufficient to warrant one in theorising on these interesting questions.

Taxonomy. Perhaps one of the greatest drawbacks in the study of the Thysanoptera is the want of definition in specific and generic characters. After the main divisions, which are comparatively well-marked, it has as yet been impossible to lay down any plan by which the genera may be readily and naturally divided on workable characters such as exist in, we think, all other orders. For instance in the Coleoptera we have well-marked and invaluable means of systematic grouping in such parts as mouth organs, the feet, the sternum, the abdomen, the genitalia, etc., whilst in other orders these and other parts such as wing-venation, antennal characters, etc., are equally important. Nor do the species of this order possess structural characters such as those so beautifully exemplified in that group of primitive soft-bodied wingless insects, the Collembola or Springtails, wherein we find the structure of the spring and foot, the eye-spots, etc., a very valuable aid to identification.

In fact we find several features, important in most orders, of little taxonomical importance in the Thysanoptera excepting perhaps in diagnosing the subordinal divisions. These remarks apply particularly to the sub-order Tubulifera, which so far as the Hawaiian fauna is concerned affect us more closely than the Terebrantia.

In the Terebrantia certain characters have been used in the separating of the two families *Aeolothripidae* and *Thripidae*, such as the form and segmentation of the antennae and the form of ovipositor in the female, but recent researches have brought to light several forms possessing antagonistic characters which have somewhat weakened their value. Nevertheless, compared to the Tubulifera, the insects of the sub-order Terebrantia are not so difficult to group systematically.

The satisfactory generic grouping of the species of the sub-order Tubulifera is one of much difficulty. The parts, as we have said already, that in many orders exhibit invaluable characters for the satisfactory and natural grouping of the species, are in this

sub-order chiefly remarkable by their similarity and want of definition. Thus the sternum, the mouth parts, the feet, the antennae and the wings can only play a comparatively unimportant part in the systematic arrangement of these insects. It is true that there are certain well-defined genera or groups of genera, such as *Megalothrips* Targ.-Tozz., and allies, wherein the sixth abdominal segment is laterally produced in the male; *Macrothrips* Bagnall and *Ecacanthothrips* Bagnall wherein the fore-coxae are curiously produced; *Dinothrips* Bagnall, remarkable for the bifurcate lateral mesothoracic appendages in the male; *Polyommatothrips* Buffa possessing the eyes large and contiguous or apparently so, and *Ecacanthothrips* and *Eupathithrips* Bagnall each having a distinctive and peculiar type of antennal sense-organ; but the fact remains that as a whole the sub-order is a difficult one to understand and classify.

Again we find instances of two groups of species which may be separated easily by the naked eye or under a comparatively low-power lens, but though one can have little doubt as to the distinctness of the two so-formed genera, yet the differences are exceedingly difficult to convey in words. Such is the case in the genera *Idolothrips* and *Dicaiothrips* Buffa. We have had a number of species of both genera through our hands from Central America, the Malay Archipelago and Africa, and whilst satisfied as to the value of the genera, we have found it very difficult to formulate the common characteristics of each genus.

As to specific characters, the relative length of the head and prothorax, and of the tube compared to its breadth at base and to the length of head and sometimes to the length of preceding segments, are apparently good characters in most genera. In our table of the genus *Dicaiothrips* in a recent paper on Neotropical Tubulifera[1] we found these characters invaluable; and the relative lengths of the seventh and eighth abdominal segments were also helpful.

We are, in a manner of speaking, in the early stages of this study, and it is therefore essential that all authors should describe and figure each species fully, and in addition briefly compare them with their allies.

Chaetotaxy. The number, form and arrangement of bristles on the head, prothorax and abdomen will prove to be characters of some taxonomical importance in the Tubulifera as well as in the Terebrantia, and it is well to draw attention to the chaetotaxy.

As an illustration we find in the genus *Dicaiothrips* already referred to that the post-ocular bristles are always present in the female but usually though not always absent in the male; thus we have found a useful character in our table of the Neotropical *Dicaiothrips*.

In the material now before us we may draw attention to certain features relative to the subject. *Dermothrips* (with one other known Phloeothripid genus) is peculiar on

[1] Bagnall, Journal Linn. Soc., Zoology, xxx. pp. 369—387, pl. 51—53, 1910.

account of the usual bristles being obsolete, thus approaching the condition seen in the *Urothripidae*; whilst *Dolerothrips* possesses a character common to all the species in the fore-coxa, which, instead of being furnished with one prominent bristle is very strongly spinose. In all the species of this latter genus too, we notice that the mid-lateral, posterior-marginal pairs of bristles and the pair at posterior angles of prothorax are more or less well developed, whilst the anterior-marginal and pairs at anterior angles are either poorly developed or obsolete.

In tabulating the species of *Dolerothrips* we have found characters connected with the bristles of decided importance; thus in *D. perkinsi* the lateral bristles of the eighth abdominal segment have been considerably reduced, in *D. intermedius* all the bristles are much shorter than in other species, excepting the extreme and interesting form *lanaiensis* wherein all the bristles are very weak and greatly reduced, approaching the condition seen in *Dermothrips*.

2. *Systematic Account.*

Order THYSANOPTERA.

Insects of the order Thysanoptera possess certain features which at once separate them from all orders; principally the semi-mandibulate and semi-suctorial mouth; the fringed wings and the bi-articulated foot, which latter is furnished with a retractile bladder-like organ, a characteristic embodied in the ordinal name Physapoda, a name adopted by many entomologists.

It is beyond the scope of the present contribution to go into the details of the anatomy, nor is it necessary when one can consult the excellent works of Haliday, Jordan, Uzel and Hinds[1]. But recently we have had the pleasure of describing a new type of Thysanoptera, *Urothrips paradoxus* Bagnall, differing in so many points from all other forms as to modify considerably our ideas as to the relationships and phylogeny of the thrips, and also their systematic arrangement; therefore, whilst adopting Haliday's very convenient classification herein, we cannot pass unnoticed an insect that will without doubt be an important factor in the future classification of the order[2].

Urothrips, whilst undoubtedly Tubuliferan in its affinities, differs from all known forms in both divisions of the Thysanoptera by the possession of single-jointed maxillary and labial palpi; of eleven pairs of well-developed stigmata instead of four pairs;

[1] Haliday, Entomological Magazine, III. pp. 439—451, 1837, and in Walker's Homopterous Insects, Brit. Mus. pt. IV. pp. 1094—1118, 1852; Hinds, Proc. U.S. Nat. Museum, XXVI. pp. 79—242, 1902; Jordan, Zeitschrift f. wissensch. Zoologie, XLVII. pp. 541—620, 1888; Uzel, Monographie der Ordnung Thysanoptera, 1895.

[2] Bagnall, Annales Musei Nationalis Hungarici, VII. pp. 125—136, pl. iii. 1909.

of whip-like terminal hairs in the male; and by the fact that the posterior pair of coxae instead of the intermediate pair are the most widely separated. The antennae, too, are distinctly typical in the family Urothripidae.

The sub-orders may be tabulated as follows:

I. Female without an ovipositor; last abdominal segment tubular in both sexes. Lower and upper wings, when present, similar in structure, with only one (partially developed and sometimes obsolete) median longitudinal vein which never reaches to tip of wing .....Sub-order **Tubulifera.**

i. Eleven pairs of stigmata present; hind pair of coxae most widely separated. Antennae broad, seven-jointed. Ninth abdominal segment elongate, longer than preceding; intermediate terminal hairs obsolete. Terminal hairs in male whip-like, in female simple .....Fam. *Urothripidae* Bagnall.

ii. Four pairs of stigmata present; intermediate pair of coxae most widely separated. Antennae more or less slender, eight-jointed, joints elongate. Ninth abdominal segment transverse, as long as or shorter than the preceding; intermediate terminal hairs present, terminal hairs simple in both sexes[1] .....Fam. *Phloeothripidae* Haliday.

II. Female with a saw-like ovipositor; last abdominal segment of female usually conical; that of male rarely like the female's, but usually bluntly rounded. Fore-wing with at least one longitudinal vein reaching from base to tip of wing .....Sub-order **Terebrantia.**

i. Antennae nine-segmented. Wings (when present) broad and rounded at the tips; fore-wings with cross veins. Ovipositor of female up-curved. Maxillary palpi geniculate, three- to seven-segmented; labial palpi two-, four- or five-segmented .....Fam. *Aeolothripidae* Haliday.

ii. Antennae six- to eight-segmented. Wings (when present) usually narrow and pointed at tips, without cross veins. Ovipositor of female down-curved. Maxillary palpi non-geniculate, two- or three-segmented, labial palpi always two-segmented.....Fam. *Thripidae* Haliday.

Only the latter family of each sub-order is represented in the Hawaiian fauna; representatives of the family Aeolothripidae may however be met with when further attention is given to the order.

We should here draw attention to the genus *Heterothrips* Hood, the species of which possess characters common to both families, and also to certain anomalous Indian and African material in our possession.

Sub-order *TUBULIFERA* Haliday.

Fam. PHLOEOTHRIPIDAE Haliday.

Dermothrips, gen. nov.

Surface rough and dull; head, prothorax, fore-coxae and all femora strongly scabrous.

[1] These characters in the main part apply also to species of the Sub-order Terebrantia.

Head large, longer than broad and nearly twice as long as the prothorax; cheeks parallel, roundly constricted at base. Antennae one and one-half times the length of the head, joints six to eight closely segmented. Mouth-cone rounded at tip, almost as long as the prosternum. Eyes small; ocelli absent in wingless forms, present but very small in winged forms; post-ocular spines absent.

Prothorax small, transverse; pterothorax transverse. Wings, when present, long and slender; fore-wing with a strong median vein the basal half of which is transversely ridged. Fore-coxa without a prominent spine, fore-tarsus unarmed in the female.

Abdomen elongate-ovate, much broader than the pterothorax; all bristles (excepting those at tip of tube) obsolete.

Male one-third smaller than the female, having the abdomen more slender and distinctly linear, the fore-leg stouter and the fore-tarsus armed with a tooth.

Species small.

Type. *Dermothrips hawaiiensis* mihi.

(1) *Dermothrips hawaiiensis*, sp. nov.

Forma *aptera*.

Plate XVII. figs. 1—5.

♀. Length 2·0 mm., breadth of mesothorax 0·43 mm.

Colour uniform dull black, tarsi tinged with brown.

Head one and one-third times as long as broad and not quite twice as long as the prothorax; cheeks sub-parallel and rounded near base; vertex slightly raised between eyes. Eyes coarsely faceted, small, occupying laterally a little more than one-fifth the total length of the head; yellowish-brown in the dried specimens. Ocelli and post-ocular spines absent. Width between the eyes a little more than two and one-half times the width of an eye. Antennae one and one-half times the length of the head, separated at their bases and inserted on a raised prominence; second joint distally truncate, third to fifth clavate and sixth to eighth closely segmented; third joint one and one-half times the length of second; fourth, four-fifths of third; fifth, seven-eighths of fourth; sixth equal in length to the fifth, constricted at base and truncate at apex; seventh less than half the length of the sixth, and apical joint three-quarters the length of the seventh, the three apical joints together narrowing from about middle to tip. Sense-cones long and slender, a pair on each of the joints three to five, but apparently only one on the sixth joint, which is on the inner side of tip. In some specimens there appears also to be a long, slender sense-cone on the seventh joint at the tip within. Mouth-cone rounded at tip, three-quarters as long as wide at base and not quite reaching across the prosternum; labrum pointed. Surface of head scabrous, the irregular ridges most conspicuous laterally and taking the form of numerous small tubercles, each set with a weak and minute seta.

Prothorax transverse, only one-half as long as broad; setae obsolete excepting the posterior-marginal pair which are short and weak. Surface roughly sculptured with the disc irregularly depressed. Pterothorax as wide as the width across fore-coxae, about three-quarters as long as broad; fore-part of mesothorax scabrous, dorsal surface squamose and metathorax reticulated. Legs somewhat short, all femora slightly swollen; fore- and intermediate-coxae strongly projecting, fore-coxa scabrous, without any prominent bristle, and fore-tarsus unarmed. Sculpture of all femora the same as that of the head, all tibiae less markedly scabrous and more strongly and regularly setose.

Abdomen oblong-ovate, one and two-thirds as broad as the pterothorax, widening from base to the fourth segment and narrowing from the sixth segment to base of tube. Surface shagreened, very sparsely, irregularly and minutely setose; the second segment, a good part of the third and the sides of the succeeding segments having a squamose appearance as in the pterothorax. Tube about two-thirds the length of the head and about two and one-half times as long as broad at base, narrowing from apical third to tip, where it is only one-half as broad as at base. Surface of tube smoother and more shining than the rest of the abdomen, and showing signs of reticulate sculpture. Terminal hairs a little more than one-half the length of the tube; all abdominal hairs very weak and minute.

♂. Length 1·5 mm. There is a single specimen of what is apparently the male of *Dermothrips hawaiiensis*. It is only about three-quarters the average length of the female, and is much narrower in comparison to the length, having the abdomen linear and only about one and one-quarter times as broad as the pterothorax. The fore-leg is stouter, and the tarsus is armed with a short tooth. The tube is comparatively longer and narrower.

Forma *macroptera*.

♀. Length 2·1 to 2·5 mm. The winged form is on an average distinctly larger than the wingless specimens. The pterothorax is developed, whilst the abdomen is furnished with wing-retaining spines. The eyes are comparatively larger; the ocelli are present though very small, the posterior pair being on a line drawn through the posterior third of eyes, and near to their inner margins. The wings are long and narrow, reaching the ninth abdominal segment. They are of a smoky colour with a dark vein running for more than one-half the length, this vein being ridged for a little more than half its length from the base. In the specimens examined, all of which come from the island of Oahu, the wings lie so closely to the abdomen and seem so slender in comparison to the heavy body, as to suggest long disuse.

HAB. Kauai, Oahu, Maui, Hawaii.

Forma *aptera*, ♀. Hawaii, Kona, one specimen at 3000 feet and two others at 2000 feet, September 1892 (Perkins, Nos. 203 and 206); Kilauea, two, July 1895 (No. 531), two, August 1895 (Nos. 532 and 603), one, August 1896 (No. 656), and three at 4000 feet, September 1896 (No. 695). Kauai, Mounts. Waimea, six specimens at 4000 feet, June 1894 (No. 285). Koholuamano, one specimen, April 1895 (No. 523) and Makaweli, one at 2500 feet, February 1897. Maui, Haleakala, three specimens, over 5000 feet, October 1896 (No. 636). ♂. Kauai, one specimen at 4000 feet, October 1895 (No. 560).

Forma *macroptera*, ♀. Oahu, Waianae Mountains, one specimen at 2000 feet, April 1892 (No. 14); Mountains near Honolulu, two at 2300 feet, July 1900 (Nos. 667 and 786) and another specimen, back of Tantalus (mt.), November 1900 (No. 784).

OEDEMOTHRIPS, gen. nov.

Surface highly polished and shining.

Head scarcely as long as broad, slightly widened anteriorly. Antennae twice as long as the head. Mouth-cone broadly rounded, reaching about three-quarters way across the prosternum. Eyes small, ventrally produced posteriorly; space between them great. Ocelli absent; post-ocular spines long.

Wings absent. Legs moderately long and strong, fore-femur in the female very slightly longer than the tibia, and fore-tarsus unarmed (excepting the minute distal tooth).

Abdomen broad, lateral and sub-lateral bristles long and slender.

Male with the prothorax and fore-femora much enlarged and inflated, fore-tibia about two-thirds the length of the femur, and tarsus armed with a strong tooth.

Species small.

Type. *Oedemothrips laticeps* mihi.

(1) *Oedemothrips laticeps*, sp. nov.

Plate XVII. figs. 6—10.

♀. Length 1·5 mm., breadth of mesothorax 0·375 mm.

Colour shining black, polished; fore-tibia red and tarsi brownish, antennae with the second and third joints brownish, the third being yellow at base. Surface polished, especially the prothorax, head and femora.

The head is about as long as broad, widest across eyes; frons raised and rounded, and the cheeks, which are furnished with two or three minute setae, narrowed slightly from behind the eyes to base. Eyes small and moderately finely faceted, occupying laterally about one-quarter the length of the head, the space between them being about

three times the width of an eye. Surface highly polished and shining, and faintly and finely reticulated near neck. Ocelli absent; post-ocular bristles very long, and a pair of shorter bristles between eyes. Mouth-cone broadly rounded and reaching for about three-quarters the length of the prosternum. Antennae more than twice as long as the head, separated at base; second joint constricted at base, cyathiform; joints three to five claviform and practically sub-equal in length; sixth joint only slightly narrowed to base, about four-fifths the length of fifth; seventh narrowing to tip, about two-thirds the length of the preceding; apical joint as broad as tip of the penultimate joint and narrowed to apex. Antennal hairs very long and slender; sense-cones very difficult to distinguish in dried specimens, apparently rather long and acute, and one pair on each of the joints three to six.

Prothorax flat, about one and one-half times as broad as long; mid-lateral, anterior-marginal and spines at anterior angles minute, those at posterior angles apparently longer and stronger, and the posterior-marginal pair exceptionally long. Legs comparatively long, fore-femur as long as the head and slightly incrassate; fore-tibia almost as long as the femur, and fore-tarsus armed with a minute distal tooth. Hind and intermediate legs moderately stout. Pterothorax strongly transverse, wings absent.

Abdomen oblong-ovate, occupying nearly two-thirds the length of the whole insect, and nearly twice as long as broad, widening to the fourth segment and thence narrowing to the base of the tube. Tube three-quarters the length of the head and about twice as long as broad at base, evenly narrowed from base to tip. Surface of tube reticulate and the basal half (or thereabouts) of other segments similarly reticulated. Terminal bristles almost as long as the tube; abdominal hairs long, those on segments seven and nine being longer than the tube; all sub-lateral hairs more than usually long.

♂. The male has the prothorax very considerably swollen, almost globiform, and the fore-legs also much enlarged, the femora being very strongly incrassate and swollen. The fore-tarsus is also armed with a long and strong tooth, whilst the abdomen is longer and narrower in comparison to its breadth.

HAB. Oahu, one ♂, Waianae Mountains, 2—3000 feet, February 1896 (Perkins, No. 553); one ♂ and two ♀s, Mountains near Honolulu, 2—3000 feet, July 1900 (Nos. 667 and 789), and one ♂, Konahuanai Ridge, December 1900.

NESOTHRIPS Kirkaldy.

Kirkaldy, Proc. Hawaiian Entomological Society, I. p. 102, 1907.

"Allied somewhat distantly to *Liothrips* Uzel. Flat above, convex below. Strongly chitinized, with a shining, polished surface.

"Head dorsally about as long as the pronotum, a little longer than wide, lateral

margins sub-parallel. Antennae about twice as long as head. Ocelli present. Eyes not very prominent laterally. Face long, lateral margins sub-parallel, then narrowing apically. Pronotum anteriorly as wide as the head, posteriorly distinctly wider, warts absent. Flight-organs absent. Anterior legs unarmed, femora incrassate, more than twice as long as the tibiae."

Type. *Nesothrips oahuensis* Kirkaldy.

Nesothrips oahuensis Kirkaldy.

"Polished, shining, pitchy-blackish; apices of anterior tibiae, the tarsi, etc. paler. Face bristles absent. Antennae 5, 5, 9, 8½, 8, 6, 8. Two longish bristles (lateral and sublateral) near the posterior margins of at least five tergites.

"Tube with two terminal bristles.

"Length 1⅞ mm.

"HAB. Oahu, Mt. Tantalus, 1300 feet (O. H. Swezey), probably on flowers."

The genus *Nesothrips* would seem closely to approach the preceding genus *Oedemothrips*. In the present form however we find that the ocelli are present and face bristles absent. If the specimens described by Kirkaldy are females (presumably so on account of absence of fore-tarsal tooth) then the fore-femur is considerably longer than in *Oedemothrips laticeps*. The antennae are shown as seven-segmented; it is probable, almost certain, that the two apical joints were closely segmented and the suture thus escaped notice. The statement that the tube has only two terminal bristles is evidently erroneous.

DOLEROTHRIPS, gen. nov.

Allied to *Trichothrips* Haliday.

Head longer than broad, cheeks more or less sparsely spinose, eyes moderately small, ocelli present and post-ocular bristles usually long. Mouth-cone short, broadly rounded at apex. Antennae as a rule twice as long as the head. Fore-femur incrassate; fore-tarsus armed with a well-marked tooth and fore-coxa armed with numerous short stout spines. Anterior-marginal prothoracic bristles usually obsolete; others well developed.

Wings generally vestigial.

Abdomen broad; tube shorter than the head; abdominal bristles as a rule well-developed.

Male smaller, with abdomen not so broad.

Prothorax large and heavy and often strongly convex, as long as or longer than the head. Fore-legs very long and strongly incrassate or swollen, with stout tarsal tooth. The median grove on the prothorax is in most cases prominent, whilst the notum does not attain the lateral margins.

Male with scale (?) at base of tube.

Type. *Dolerothrips flavipes* mihi.

The following table, though rough, may be useful in separating the species[1]:—

I. All femora yellow ..... *flavipes*, sp. nov.

II. All femora concolorous with body:—

A. Abdominal bristles well developed:—

1. Size larger (3·5 mm.); cheeks slightly swollen and spinose near posterior third ..... *barbatus*, sp. nov.

2. Size smaller (1·6 to 2·5 mm.); cheeks more or less evenly spinose:—

(*a*) Abdomen dark brown, tube light reddish-brown, and almost as long as head ..... *bicolor*, sp. nov.

(*b*) Tube concolorous with rest of body; shorter than head:—

i. Tube twice as long as broad at base; lateral bristles on eighth abdominal segment obsolete ..... *perkinsi*, sp. nov.

ii. Tube three times as long as broad at base; lateral bristles on eighth abdominal segment present:—

(*aa*) ♀. Size smaller (1·65 mm.); hind angles of eighth abdominal segment acuminate; head long and narrow, one and one-half times as long as broad and slightly longer than prothorax; prothorax narrower; abdominal bristles weaker ..... *angusticeps*, sp. nov.

(*bb*) ♂. Size larger (2·0 mm.); eighth abdominal segment simple, head only a little longer than broad and slightly broader than the prothorax; prothorax large and convex; abdominal bristles stronger ..... *ovatus*, sp. nov.

B. Abdominal bristles abbreviated (tube short and very broad)..... *intermedius*, sp. nov.

C. Abdominal bristles obsolete ..... *lanaiensis*, sp. nov.

(1) *Dolerothrips barbatus*, sp. nov.

Plate XVIII. figs. 11—14.

♂. Length 3·5 mm.; breadth of mesothorax 0·6 mm.

Colour dark brown, tarsi, fore-tibiae and joints of hind and intermediate legs yellowish-brown.

Head one and three-quarter times as long as broad across eyes, and just as long as prothorax. Cheeks parallel for half their length behind eyes and then rounded out,

[1] *D. dubius* and *D.* sp. are not included in this table.

the swollen part being furnished with five or six spines; vertex slightly raised in the form of a hump.

Mouth-cone blunt and reaching only one-third way across the prosternum. Eyes small, occupying laterally more than one-fifth the length of head, moderately finely faceted; post-ocular spines placed far back and about twice as long as the eye. Posterior ocellus overhanging and looking forward, and the posterior pair on a line drawn through centre of eyes. The antennae are unfortunately broken off with the exception of the first four joints, the second and third joints are sub-equal claviform with the distal half practically parallel, and have the stems shaded with a reddish-yellow colour. There is a pair of short and somewhat obtuse sense-cones on each of these joints.

The prothorax is very massive, as long as the head and two-thirds as long as broad. The mid-lateral angles are broadly rounded, whilst the notum does not reach to the lateral margin, being only four-fifths as broad as the total breadth of the prothorax. All the spines are apparently present; the pair at the posterior margins are long, the mid-lateral pair slightly shorter, the posterior-marginal pair shorter again, and the pair at anterior angles shortest of all, and inwardly curved. The anterior-marginal pair are either very minute or obsolete.

The fore-coxa is armed with several short, stout spines. The fore-femur is nearly twice as long as the head and about two and one-quarter times as long as broad through the middle. The fore-tibia is very broad and placed in such a position on the type slide that its true length cannot be estimated, and the figure probably shows this tibia larger than it should be. The fore-tarsus is armed with a very broad, strong tooth.

The pterothorax is not as broad as breadth across fore-coxae, and only two-thirds as long as broad. The wings are vestigial and take the form of a small pad from which spring two bristles. The hind and intermediate legs are rather short and stout, each is furnished with a series of short spines and each tibia with several short and slender ones and a few longer bristles near tips.

The abdomen is slightly broader than breadth across fore-coxae and has the segments one to seven strongly transverse, narrowing from the sixth segment to the tube; the seventh segment is laterally rounded at its basal half. The tube is twice as broad at base as at its apex, longer than any abdominal segment, and five-sevenths the length of head. The terminal bristles are not strong and about three-quarters the length of tube, whilst the abdominal bristles are long but only moderately strong.

♀ unknown.

Hab. Hawaii; Kona, one male from under a rotten log, 4000 feet (Perkins). Dr Perkins makes a note that he saw no other specimen of that species.

(2) *Dolerothrips flavipes*, sp. nov.

Plate XVIII. figs. 15—19.

Length about 3 mm., breadth of mesothorax about 0·475 mm.

Colour of head yellowish-brown, darker at sides and near vertex; prothorax and pterothorax reddish-brown with sides darker, base and sides of the abdominal segments and the tube, excepting near tip, in most specimens blackish-brown; legs clear yellow; antennae with the two basal joints brown, third and fourth yellowish-brown, shaded darker at apical half, fifth and sixth brown but yellow at stems, and the apical joints wholly brown. In dried specimens the thorax and abdomen are blackish-brown with a light patch on the disc of the pterothorax and similar light patches at each side of at least abdominal segments five to eight, and the legs have also a reddish tinge.

Head only a little longer than prothorax and two-thirds as broad at base as long; surface rough; cheeks roundly narrowing behind eyes and converging to base. Eyes somewhat small and finely faceted, occupying laterally less than one-quarter the total length of head; postocular bristles placed at some distance behind the eyes, long and slender. Ocelli large, the anterior one at the extreme apex, which is slightly raised, and the posterior pair near to the inner margins of the eyes and on a line drawn through their centres. Mouth-cone broadly rounded at tip reaching about two-thirds the way across the prosternum. Maxillary palpi rather short and stout. Antennae about one and two-thirds the length of head; basal joints sub-approximate, second about as long as basal one, narrower and constricted near base; joints three to six broadly claviform, third joint one and one-half times as long as the second and twice as long as the breadth near apex; fourth, five-sixths of third; fifth, five-sixths of fourth; sixth, four-fifths of fifth; seventh joint much narrower than the preceding and four-fifths its length, slightly constricted at base; apical joint narrowed to tip.

Sense-cones acute and moderately long, a pair on each of the segments three to six, those on the sixth segment being longer and stouter than the others. Bristles slender, light coloured and inconspicuous.

Prothorax rapidly widened to the mid-line, dorsal surface moderately convex, about three-fifths as wide as long, and the anterior margin slightly emarginate. Bristles at each posterior angle, posterior-marginal and mid-lateral pairs very long and slender, colourless; anterior-marginal pair obsolete, and pair at anterior angles very short. Pterothorax about four-fifths as long as broad, broader than prothorax but not as broad as width across fore-coxae; sides of metathorax only slightly narrowed to base of abdomen.

Wings absent; legs moderately long, fore-coxa armed with several short and stout spines, fore-femur incrassate, fore-tibia stout and the tarsus armed with a strong tooth.

Abdomen much stouter than pterothorax with segments strongly transverse, gradually narrowing from fifth segment to the eighth and from thence roundly narrowed

to base of tube. Tube not quite twice as broad at base as tip, and two and one-half times as long as broad at base, about five-sixths the length of head; terminal bristles weak, about two-thirds the length of tube. Abdominal bristles short and weak, those at apex of ninth segment about half the length of tube; a longer and stronger dorsal bristle near each posterior angle of each of the segments two to seven. The dorsal surface is in parts weakly raised in irregular and broken longitudinal ridges.

♂. The male has the prothorax larger and more roundly raised than in the female, the fore-legs much more strongly incrassate; the fore-tibia comparatively shorter and stouter and the fore-tarsus armed with a very strong tooth.

The abdomen is a little narrower and the ventral side of the ninth abdominal segment is armed with a pair of short spines.

Forma *macroptera.*

There is a single carded specimen of the winged form in Dr Perkins' collection. The pterothorax is well-developed and the wings are long, reaching beyond the tip of tube, smoky coloured and darkly shaded towards the end.

HAB. Maui.—Forma *aptera*: several specimens including larvae and pupae in alcohol, no date (Perkins); Haleakala (mountain), numerous specimens from under bark, above 5000 ft., April 1894 (Perkins, No. 116); Forma *macroptera*: one female, Haleakala at 5000 ft., October 1896 (No. 661).

(3) *Dolerothrips ovatus*, sp. nov.

Plate XVIII. figs. 1—6.

♂. Length 1·9 to 2·0 mm., breadth of mesothorax 0·5 mm.

Colour dark chestnut-brown, fore-tibiae reddish-brown and all tarsi lighter with base of sixth, basal third of fifth and fourth, and the greater part of third joint yellowish.

Head not quite seven-eighths as broad behind eyes as long; sides sub-parallel then sharply constricted at base; set with a few small spines; frons slightly raised; surface striated transversely. Eyes moderately small and not very finely faceted, occupying laterally about one-fourth the length of head; post-ocular bristles long and set well back. Ocelli moderate in size, anterior ocellus at apex of raised part and the posterior pair on a line drawn through centre of eyes and not quite touching their inner margins. Mouth-cone about three-quarters as long as broad at base, broadly rounded at the tip and scarcely reaching one-half way across the prosternum.

Antennae twice as long as the head, joints three and four clavate; fifth constricted at basal third, subclavate; sixth constricted near base and with the seventh and eighth submoniliform, the apical joint being abruptly constricted at apex. A pair of sense-cones on each of the joints three to six.

Prothorax convex, very slightly longer than the head and about two-thirds as long as broad, surface smooth; mid-lateral and posterior-marginal spines and pair at posterior angles present, long and practically sub-equal. Pterothorax almost as broad as the width across fore-coxae and only about one-third as long as broad. Wings vestigial. Legs moderately long and stout, posterior coxa large and armed with a number of short, stout spines; fore-femur much swollen, smooth; tibia stout and tarsus armed with a strong tooth.

Abdomen broadly ovate, broadening to the fourth segment and thence roundly narrowing to the base of tube. Basal half of each segment excepting the ninth and tenth roughened with a fine reticulated sculpture. A single pair of very weak wing-retaining spines on each of the segments two to eight, and near the apical margin. Tube a little more than two-thirds the length of head, nearly twice as broad at base as at tip and narrowing evenly to apex. Terminal hairs about three-quarters the length of tube, and bristles at the apex of the ninth segment about the same length. Abdominal bristles long and moderately strong.

♀. The female differs from the male in having a shorter, narrower and flatter prothorax. The fore-femur is only slightly incrassate, the tarsus is armed with a smaller tooth; the fore-coxa is small and is only armed with a few short spines, one of which is distinctly longer than the others, whilst the abdomen is decidedly broader, being one and one-third as broad as the width across the fore-coxae. The tube is five-sixths the length of the head and not so slender as in the male.

Forma *macroptera.*

As in *D. flavipes*; one specimen has the wings stretching beyond tip of tube and the other only to the base of the tube. The wings are faintly iridescent with an obscure sulphur patch near base.

HAB. Maui; Haleakala, one male and two females at 9000 ft., April 11, 1894 (Perkins, No. 124), and two brachypterous and two macropterous females at 5000 ft., September 1896 (No. 661).

(4) *Dolerothrips perkinsi*, sp. nov.

Plate XIX. figs. 17—20.

♀. Length 1·8 mm., breadth of mesothorax 0·43 mm.

Colour very dark brown, almost black; fore-tibiae dark chestnut-brown and all tarsi brownish; antennae dark brown with the basal part of the third joint only yellowish.

Like *D. ovatus* but not so broad; has the head longer and the prothorax comparatively shorter, whilst the antennae, which have the joints three to six distinctly claviform, are only one and two-thirds the length of the head. The abdomen approaches that of *D. lanaiensis* in form, but has the bristles as in *D. ovatus*, though shorter and

slightly weaker, those on the eighth segment being very short and weak. The tube is short and stout, being two-thirds the length of the head and only twice as long as broad at base.

D. perkinsi may be recognized from all the allied species by the form and coloration of antennae; from *D. ovatus* by the characters outlined above, and from *D. lanaiensis* by the well-developed bristles.

♂ unknown.

HAB. Lanai, one female, 2000 ft., December 1893 (Perkins, No. 92).

(5) *Dolerothrips angusticeps*, sp. nov.

Plate XVIII. figs. 20—22.

♂. Length 1·65 mm., breadth of mesothorax 0·43 mm.

Colour chestnut-brown, abdomen with reddish-brown sub-lateral patches, fore-tibiae yellowish and all tarsi light brown. Antennae unfortunately broken in the type specimen.

Head linear, long and narrow, one and one-half times as long as broad and a little longer than the prothorax. Fore-coxae with but few spines, one of which is decidedly longer than the others. Prothorax a little more than three-quarters as long as broad, not dorsally convex; mid-lateral bristles and pair at posterior angles very long, posterior-marginal pair shorter and weaker.

Abdomen comparatively broad, segments more distinctly sculptured laterally; hind angles of the eighth segment prominent. Tube long and somewhat narrow, about four-fifths the length of the head and three times as long as broad at base.

♀ unknown.

This species is one of the smallest in the genus, and a very distinct one which may at once be recognized by the long and narrow head, and the form of the eighth abdominal segment. Otherwise it is somewhat similar in form to *D. lanaiensis* from which it may easily be separated by the character of the prothoracic setae and by the presence of well-developed abdominal bristles.

HAB. Molokai; Kalae, one male, August 7th, 1893 (Perkins, No. 172); and Molokai Mts., at 3000 ft., September 8th, 1893 (No. 171).

(6) *Dolerothrips bicolor*, sp. nov.

Plate XIX. figs. 21—22.

♀. Length 2·5 mm., breadth of mesothorax 0·5 mm.

Colour dark brown, head slightly lighter than body and shaded darker laterally and apically. Abdomen deepening towards end to a coal-black; tube light reddish-brown, thus contrasting strongly with the considerably darker coloration of the abdomen;

fore-femora yellowish-brown, lighter apically; all tibiae and tarsi yellowish, hind and intermediate tibiae shaded with brown. Antennae unfortunately broken in the type specimen.

Head with cheeks slightly swollen behind the eyes, one and one-third times the length of prothorax.

Prothorax flat, transverse, nearly twice as broad as long; mid-lateral bristles very long, those at hind angles, and the posterior-marginal pair respectively next in order of length; pair at anterior angles obsolete. Wings vestigial. Fore-legs incrassate; stouter than is usual in the female.

Abdomen almost as in *D. lanaiensis*, but not so broad as in the female of that species, and furnished with rather long bristles somewhat similar to those in *D. angusticeps*.

Tube long and slender, minutely and sparsely setose; almost as long as the head, three and one-half times as long as broad at base, where it is a little more than one and one-half times as broad as at tip.

♂ unknown.

Apart from the form of the head and the long narrow tube, this species may be readily distinguished by the light coloration of the latter segment.

HAB. Oahu; one female, Kaala Mts., over 2000 ft., January 1893 (Perkins, No. 56).

(7) *Dolerothrips intermedius*, sp. nov.

Plate XIX. figs. 7—9.

♂. Length 2·0 mm., breadth of mesothorax 0·45 mm.

Colour dark chestnut-brown, fore-femora lighter, yellowish at apex, and all tibiae yellowish-brown, lightest at knees and with hind and intermediate pairs shaded darker in the middle.

Antennae stout, twice as long as the head, third joint yellowish shaded with brown near apex, basal third of fourth and fifth yellow; joints three to five claviform, sixth narrowing from tip to base and six to eight closely jointed.

Head and prothorax as in *D. ovatus*, the latter irregularly foveolate on each side of disc; post-ocular and prothoracic bristles shorter, mid-lateral pair recurved. Fore-legs somewhat stouter than in *ovatus*.

The abdomen is only very slightly broader than the width across the fore-coxae, narrowing to tube from the third segment. The nature of the chitin appears to be tougher and stronger than in *ovatus*, *lanaiensis* and the other species, excepting *D. barbatus*, and has a duller appearance. Tube stout, three-quarters the length of the head and about twice as long as broad at base and quite twice as broad at base as at the extreme apex. Abdominal bristles moderately short, shorter than in *ovatus*,

perkinsi or *angusticeps*, between which species and *D. lanaiensis*, *D. intermedius* may be regarded as somewhat intermediate.

♀ unknown.

The single specimen is unfortunately not a good one, and is not figured as satisfactorily as one would wish. It may, however, be recognized with the aid of these figures.

HAB. Maui; one male, Haleakala, 3000 feet, 1900 (Perkins, No. 809).

(8) *Dolerothrips lanaiensis*, sp. nov.

Plate XIX. figs. 10—16.

♂. Length 1·8 to 2·0 mm., breadth of mesothorax 0·4 mm.

General colour as in *D. ovatus*, knees in most specimens with a brownish tinge. Antennae with the base of fifth joint yellow, basal third of fourth, and the greater part of third yellowish-brown; sternum yellowish-brown.

Head as long as prothorax and seven-eighths as broad as long, sides parallel, roundly constricted at base and set with a few minute spines; surface transversely striate. Eyes rather large and moderately finely faceted, occupying laterally a little more than one-quarter the length of head; post-ocular bristles short and slender, set well back. Ocelli small and widely separated, crimson; posterior pair on a line drawn through posterior third of eyes and touching their inner margins. Mouth-cone as long as its breadth at base, and reaching three-quarters way across the prosternum. Antennae slightly more than twice as long as the head; joints three to five clavate, six and seven fusiform and the eighth narrowed from base to a point at tip. A pair of sense-cones on each of the joints three to six.

Prothorax mildly convex about as long as the head, or slightly longer, and a little more than two-thirds as long as broad; mid-lateral spines moderately long, posterior-marginal and pair at posterior angles short and weak. Pterothorax as wide as the prothorax and strongly transverse. Wings vestigial. Legs moderately long and stout, fore-femur strongly crassate, smooth, and fore-tarsus armed with a stout tooth.

Abdomen elongate-ovate, broadest at third segment and narrowing gradually to the seventh segment and thence more strongly to base of tube. Surface very finely sculptured, a narrow band at the posterior margin of each segment smooth; wing-retaining spines as in *D. ovatus* but weaker. Tube about three-quarters the length of head, twice as broad at base as at tip and three times as broad at base as long.

Terminal hairs about three-quarters the length of tube, weak; abdominal bristles obsolete.

♀. The female is slightly larger and decidedly broader, and has the fore-legs as in the female *D. ovatus*. The mouth-cone reaches across the prosternum, the prothorax being decidedly shorter than in the male; the prothorax is also flat and the prothoracic

bristles, as well as the post-ocular spines are even less strongly developed. The bristles at the apex of the ninth abdominal segment are about one-third the length of tube which latter is two-thirds the length of the head and stouter than in the male.

HAB. Molokai, Lanai, Hawaii.—Lanai, six males and six females, 2000 feet, January 1894 (Perkins, No. 91); one female, 2000 feet, December 1893 (No. 92), and one female above Waipaa about 3000 feet, February 1894 (No. 102).—Hawaii, one male, Kona, 3000 feet, September 1892.—Molokai, Kalae, one male and one female, August 7th, 1893 (No. 172) and one female, Molokai Mountains, August 29th, 1893.

(9) *Dolerothrips dubius*, sp. nov.

Plate XIX. figs. 23—27.

Forma *macroptera.*

♀. Length 2·0 mm., breadth of mesothorax 0·48 mm.

D. capito closely approaches *D. ovatus* and may be separated by the form of head (fig. 23) and antennae (fig. 25) and the shorter and more slender fore-legs. The antennae have the stems of each joints 3—5 yellow, the prothorax has a shallow fovea on each side of the mid-line and is irregularly foveolate towards lateral margins, and has more slender bristles than in *ovatus*, the posterior-marginal pair being quite small. The intermediate tibia has a long hair at its distal third on the outside as in *D. ovatus.*

The wings are rather narrow and each fore-wing is tinged wholly with smoky-yellow whilst the hind-wing has the lower half tinged with the same colour for the whole of its length; there are 16 or 17 double hairs in the lower fringe of upper wing near tip. The tube is five-sixths the length of the head and two and one-half times as long as broad at base. The abdominal bristles are not quite so well developed as in *ovatus.*

Forma *aptera.*

Wings vestigial.

It is with reluctance that I give a name to this form—whilst it distinctly differs from any of the species heretofore described it must be acknowledged that we have too slight a knowledge as to the extent of variation in the species, especially as regards the winged forms.

HAB. Hawaii, Lanai, Molokai.

Forma *macroptera*, ♀ Hawaii, one, Kilauea, August 1895 (Perkins, No. 532); one, Kona at 3000 feet, September 1892 (in spirit); Molokai, one, Molokai Mountains at 4500 feet, September 21st, 1893; Lanai, one at 3000 feet (No. 93) and a doubtful specimen at 2000 feet (No. 89). Forma *aptera*, one specimen Molokai, Molokai Mountains, 3000 feet, June 1893 (No. 185).

Dolerothrips, sp.

Like *D. dubius* but having the prothoracic bristles as in the macropterous form of *D. flavipes* (Plate XVIII. fig. 18) and the tube slightly shorter compared to the length of head. Abdominal bristles longer.

This is a winged specimen which would appear to differ from *dubius*, chiefly on account of the long prothoracic bristles, and the presence of a pair of short ones at anterior angles. The chaetotaxy of the prothorax is a character upon which one places great reliance, otherwise it might be possible to class this form with the preceding. The single winged female was taken on the Molokai Mountains at 3000 feet in June 1893 (Perkins, No. 185).

We might here emphasize the difficulty of working out a genus like *Dolerothrips* satisfactorily from dried and carded specimens, and we hope that plenty of well-preserved material in alcohol will be placed at our disposal later.

Trichothrips Haliday.

There are two Hawaiian forms which may be tabulated as follows :—

i. Colour chestnut-brown; posterior ocelli remote from inner margins of eyes; tube about four-fifths the length of head and three times as long as broad at base.....*laticornis*, sp. nov.

ii. Colour black; posterior ocelli touching inner margins of eyes; tube less than two-thirds the length of head and only twice as long as broad at base.....*nigricans*, sp. nov.

(1) *Trichothrips laticornis*, sp. nov.

Plate XVIII. figs. 6—10.

♀. Length about 2·0 mm., breadth of mesothorax 0·45 mm.

Colour chestnut-brown, coxae, forehead, sides of head, prothorax and pterothorax and the apical third of each abdominal segment two to eight darker; fore-tibiae shaded with yellow, and all tarsi, and basal third and tip of third antennal joint yellowish.

Head as wide behind eyes as long, vertex rounded, slightly raised, and bearing the anterior ocellus on the apex; cheeks slightly swollen behind the eyes and roundly narrowed to base. Eyes finely faceted, occupying laterally about one-quarter the length of the head; pigment black; post-ocular bristles long. Ocelli large and widely separated, posterior pair on a line drawn through the centre of the eyes, and remote from their inner margins. Mouth-cone shorter than wide at base, evenly narrowed to tip, and almost reaching to the posterior margin of the prosternum; labium pointed; labial palpi rather large. Antennae almost twice as long as the head; joints three to six broad; joints three to five roughly and roundly obconical, sixth constricted at base, seventh fusiform and eighth narrowly pyriform. Sense-cones long and acute, a pair on each of the joints three to six.

Prothorax three-quarters the length of the head, and one and three-quarters as broad as long. Prothoracic bristles apparently obsolete; although all seta-pits are present I can only discern bristles at the anterior angles, and these are extremely minute. Pterothorax practically as broad as the width across the fore-coxae and slightly broader than long.

Legs moderately stout, fore-tarsus armed with a sharp tooth; intermediate tibia with a long, slender hair at the apical third (i.e. remote from the apex) without, and the hind tibia with a shorter hair near the apex without. Wings present, reaching to the eighth abdominal segment; of a smoky colour and apparently coriaceous.

Abdomen a little broader than the pterothorax, sides sub-parallel from the second to the sixth segments, seventh segment gradually narrowed apically, and eighth roundly narrowed to hind margin. Tube about four-fifths as long as the head, three times as long as broad at base and furnished with what appears to be a well-marked sense-area at apical fourth. Terminal bristles slender and about three-quarters the length of the tube; those at apex of the ninth segment also slender and about the same length as the terminal bristles. Lateral and sub-lateral abdominal bristles long and slender, those on segments six, seven and eight the longest.

♂ unknown.

HAB. Hawaii; Kona, one female, 3000 feet, September 1892 (in spirit).

(2) *Trichothrips nigricans*, sp. nov.

Plate XVIII. fig. 23.

♀. Length 1·8 mm., width of mesothorax 0·48 mm.

Colour black; all tarsi brownish. Antennae unfortunately broken in the type specimen.

Head and prothorax as in *T. laticornis*; head with eyes slightly broader, the space between them less, and the posterior ocelli touching their inner margins. Surface reticulated finely.

Mid-lateral prothoracic bristles very long, those at posterior angles and posterior-marginal pair shorter; others apparently obsolete. A small shallow fovea on each side of mid-line. Legs rather short; fore-pair incrassate and tarsus armed with a short tooth. Wings reaching to the ninth abdominal segment, coriaceous, black, irregularly tinged with yellowish-brown; cilia black.

Abdomen oblong-ovate, broader than in *T. laticornis*, and more roundly narrowed to base of tube. Tube less than two-thirds the length of the head and only twice as long as broad at base. Abdominal bristles long and slender.

♂ unknown.

Apart from being a unicolourous black, *T. nigricans* may be easily separated from *T. laticornis* by its shorter and broader fore-legs, the broader abdomen, and the short and broad tube.

HAB. Oahu; one female, Kaala Mts., over 2000 feet, January 1893 (Perkins, No. 56).

AGNOSTOCHTHONA Kirkaldy.

Kirkaldy, Proc. Hawaiian Entomological Society, I. p. 102, 1907.

"Belongs to the Tubulifera and differs from *Anthothrips* Uzel by the vertex being very slightly longer than wide anteriorly and slightly though distinctly wider anteriorly than posteriorly; it is longer than the pronotum medianly. Face elongate, angularly rounded at the apex, reaching nearly to the base of the prosternum. First segment of antennae as long as, or longer than, the second, and is much stouter; third and fourth a little wider than the others. Tegmina not constricted medianly. Spine on the fore-tibiae somewhat large in the female."

Type. *Agnostochthona alienigera* Kirkaldy.

(1) *Agnostochthona alienigera* Kirkaldy.

"Sordid yellowish-brown, dark fuscous on head and pronotum and on the 6th—8th antennal segments. Eyes rounded, not protruding. Ocelli widely separated, large, posterior pair contiguous with the internal margin of the eyes, front one almost between first segments of the antennae, which are subcontiguous. Relative lengths (from base) 6, 6, 8, 10, 8, 8, 6, 5; 3rd—6th, basally subpedicellate; hairs moderate. Post-ocular bristles very long, one on each side. Cheeks without bristles. Pronotum roundly emarginate apically, rounded posteriorly, lateral margins distinctly diverging posteriorly, posterolateral angles rounded. Fringe-hairs of wings simple, long. Abdominal bristles sparse, slender, mostly large.

"♀. Tube about one-half longer than the preceding segment. Length about $1\frac{3}{4}$ mm."

There are many genera allied to *Anthothrips*, and, though in all probability the genus *Agnostochthona* is a valid one, the above characters are much too meagre upon which to erect a genus; in fact as the description now stands the type species may be relegated to any one of several genera, not a single character of generic value is emphasized in the diagnosis. From the short specific description it is clear that the species is not represented in the collection made by Dr Perkins. As yet we have not had the opportunity of examining Kirkaldy's types; this will be necessary before its true position can be made clear.

HAB. Oahu; Mt. Tantalus, 1500 feet, collected by Mr F. W. Terry from under the bark of a dead tree, where it occurred in numbers and in all stages.

ANTHOTHRIPS Uzel.

(1) *Anthothrips usitatus*, sp. nov.

Plate XVII. figs. 11—14.

♀. Length 1·9 mm., breadth of mesothorax 0·285 mm.

Colour uniform dark brown, all tarsi yellowish and fore-tibia shaded to yellowish-brown at tip; antennal joints three to five yellow, sixth tinted with brown and the apical and penultimate joints light brown.

Head about one and one-quarter as long as wide through eyes, and one and three-fifths the length of the prothorax, widest behind eyes with the cheeks slightly rounded and narrowed posteriorly. Eyes prominent, occupying laterally about three-eighths the dorsal length of head; obtusely rounded and composed of somewhat large facets, pigment deep shading from a rich crimson to a deep black; post-ocular bristles knobbed, short and slender, about as long as the eye. Ocelli large, the anterior one being placed at the extreme vertex of the head which is slightly raised in the form of a hump between the eyes; and the posterior pair placed above a line through centre of eyes, and touching their inner margins. Mouth-cone blunt at tip and only reaching a little more than half-way across the prosternum; maxillary palpus long and broad with the apical joint more than three times the length of the basal joint and furnished with several sense-bristles at tip. Antennae about one and one-half times as long as the head, sub-approximate at base, joints three to six somewhat broadly claviform, practically sub-equal, the fourth being the broadest, and the sixth decidedly shorter and narrower than either of the three preceding joints. Sense-cones slender, long and acute, two on each of the joints three to six; spines slender, rather short and light coloured and therefore inconspicuous.

Prothorax about five-eighths as long as broad, slightly widened to mid-lateral angles; anterior margin emarginate, all bristles present, slender and knobbed, those at each posterior angle longest, those at each anterior angle and posterior-marginal pair long and about sub-equal; anterior-marginal and mid-lateral pairs shorter again and also sub-equal. Surface of prosternum deeply reticulated.

Pterothorax broader than the breadth across fore-coxae, about one and one-quarter times as long as broad; sides of mesothorax sub-parallel, and the metathorax rounded laterally to base of abdomen. Wings present, long and slender, reaching to the sixth abdominal segment, apparently slightly narrowed near middle; median vein obsolete; posterior fringe near apex double for eight or nine hairs. Legs long, the fore-leg slightly incrassate, fore-coxa with one prominent bristle and fore-tarsus armed with a minute tooth.

Abdomen about two-thirds the total length of the insect, and about as wide as the pterothorax; sides sub-parallel to the eighth segment and from thence narrowed to the tube.

Tube about five-eighths the length of head, twice as long as broad at base with the sides narrowing to tip where it is a little more than one-half as wide as at base; bristles at tip rather long, but weak. Abdominal bristles weak, those on the seventh segment being the longest. There are two pairs of strong wing-retaining spines on each of the segments two to seven.

♂. Very slightly smaller and perhaps more slender, having the fore-legs slightly stronger.

Larva.

There are two larvae in a separate tube which may almost certainly be regarded as belonging to this species.

It is a very distinct grub; broadly speaking it is divided into five transverse zones of coloration, the first fifth crimson, second yellowish-white, third and fifth crimson and the fourth same as the second.

More specifically the head, prothorax and fore-part of mesothorax are crimson with the head tinged with brown, and eyes (which are very small and bead-like) darker; rest of mesothorax and the whole of the metathorax yellowish-white; first three abdominal segments crimson; fourth, fifth and part of sixth segment yellowish-white, and base of sixth, seventh, eighth, ninth and tube crimson, the last two segments being darker than the preceding. There are seven antennal joints, which are dirty yellow and apically darker, the legs too are yellowish and darker at knees.

The bristles are knobbed as in the imago.

HAB. Hawaii; Kona, several females, two or three males and two larvae found on Hilo grass at 2000 feet, September 1892 (Perkins).

The larvae were not taken with the imagines but occurred on another occasion with an acarid from Hilo grass on Mauna Loa (W.).

DICERATOTHRIPS Bagnall.

There is a single specimen, apparently a female, the type of a new species of this genus in Dr Perkins' collection. It is possibly not an endemic form.

We now know three species which may be tabulated as follows:—

Antennae twice as long as head, joints three and four much elongated; ante-ocular spines long; fore-femur with a few more or less strong, short spines within..... *bicornis* Bagnall, *armatus* Bagnall.

Antennae scarcely one and one-half times the length of head, joints three and four not strongly elongated; ante-ocular spines short; fore-femur without short spines within ..... *brevicornis*, sp. nov.

(1) *Diceratothrips brevicornis*, sp. nov.

Plate XVIII. figs. 1—3.

♀. Length about 3·0 mm., breadth of mesothorax 0·55 mm.

Colour shining black, fore-tibiae and all tarsi dark brown, apex of second antennal joint tinged with brown.

Head one and three-fifth times as long as broad behind eyes; anterior margin truncate with vertex raised in the form of a hump between the eyes; cheeks furnished with a few short bristles, slightly widened behind the eyes and gently narrowed to base; surface transversely striate. Eyes finely faceted, rounded and occupying laterally about one-quarter the length of head; post-ocular bristles long. Ocelli large, anterior ocellus on the extreme apex of vertex, overhanging; posterior pair on a line drawn through the anterior third of eyes and touching their inner margins. Pair of spines on forehead short, set close to the apical margins of the eyes and scarcely reaching to the apex of the first antennal joint. Antenna about one and one-half times the length of the head, separated at base, and inserted under the vertex; third joint only twice the length of the second and practically sub-equal with the fourth, being but very slightly longer; fifth about three-quarters the length of the fourth; sixth, five-sixths of fifth; seventh, four-fifths of sixth, and the apical joint about three-quarters the length of the penultimate. Sense-cones long and acute, apparently a pair on each of the joints three to six; hairs long and slender.

Prothorax about five-eighths the length of the head and one and three-quarters as wide as long; fore-margin narrowly emarginate, and a depressed transverse line near fore-margin slightly foveolate at each end. Sides diverging to base, and a shallow fovea behind each of these depressions. Bristles at each posterior angle long and very slender, moderately strong; posterior-marginal pair long, mid-lateral pair not quite so long and equally slender; those at anterior angles very short and stout, and anterior-marginal pair obsolete. Pterothorax a little longer than broad; side of metathorax conspicuously reticulated; wings coriaceous, reaching to the base of tube, wholly of a smoky-brown colour. Fore-coxa with one conspicuous but short spine, fore-femur swollen, and without strong spines within; fore-tibia moderately stout, with two short bristles below knee, and fore-tarsus armed with a short, sharp tooth. Hind and intermediate legs moderately long; femora broadened laterally, with a series of fairly long bristles on the outer edge; tibia with one long slender bristle without, near tarsus, and one long and one shorter bristle below knee. Intermediate-tibia with at least one, and hind-tibia with a few short and moderately stout spines near tarsus.

Abdomen slightly broader than the mesothorax, narrowing from the fifth segment to the base of tube. Tube about one and one-eighth times as long as the head and a little more than four times as long as broad at base, sharply constricted just before apex; terminal hairs weak and light-coloured, about two-thirds the length of the tube.

Abdominal spines very long, moderately stout, dark but light-coloured towards tip; those on ninth segment as long as tube. The surface of the tube is minutely asperate, having the appearance of being regularly set transversely with rings of minute scales.

♂ unknown.

HAB. Oahu; one female, in the mountains, Kawailoa gulch, April 1901 (Perkins, No. 768).

D. brevicornis very closely resembles *D. bicornis* Bagnall but may be recognized by its comparatively longer head, the short frontal cephalic spines, the shorter and comparatively stouter antennae, and the more slender tube.

In *D. bicornis* the head is broader, the antennae are twice the length of the head, the third joint being three times the length of the second (Plate XVIII. figs. 4 and 5), the frontal spines reach considerably beyond the apex of the first antennal joint, whilst the space between the eyes, and therefore between the posterior ocelli, is much greater. The form of the prothorax and the prothoracic bristles of both species are practically the same. The tube in *D. bicornis* is longer in comparison to the head but is only a little more than three times as long as broad at base. The surface is more shiny than in *D. brevicornis* apparently aciculate, or perhaps finely alutaceous and very sparsely, and very minutely setose. The bristles at the apex of the ninth abdominal segment are decidedly longer than the tube.

Suborder *TEREBRANTIA.*

Fam. THRIPIDAE Haliday.

HELIOTHRIPS Haliday.

(1) *Heliothrips haemorrhoidalis*, Bouché.

Syn. Hinds, Proc. U.S. Nat. Museum, 1903, XXVI. pp. 168—170.

This is a common hot-house pest throughout Europe and North America in which parts of the world it is almost, if not entirely, confined to green-houses[1]. Franklin considers that *H. haemorrhoidalis* is evidently a tropical species, and recently records it in a wild state from St Vincent and the Barbados[2].

Some of its food plants in St Vincent, he says, are Cacao and Kola, whilst in Barbados it is found on date palms.

There are three specimens in the Perkins collection, one from Kauai and the others from Hawaii, and as Dr Perkins makes no mention of finding them in hot-houses and states that one of the specimens was taken by sweeping, I presume that they were taken in the open, though, at the same time, *H. haemorrhoidalis* is most certainly not an endemic form.

[1] I have just received numerous examples from Spain where they infest banana palms.

[2] Proc. U.S. Nat. Museum.

HAB. Kauai, Hawaii.—Kauai, 1 ♀, Halemanu, 4000 ft., May 25th, 1895 (Perkins, No. 525); 2 ♀, Hawaii, one from Kilauea, August 1896 (No. 656), and the other taken by sweeping, Kona, 2000 ft., September 1892 (in alcohol).

(2) *Heliothrips rubrocinctus*, Giard.

Physopus rubrocincta Giard, Bull. Soc. Ent. France, 1901, pp. 263—265.
Heliothrips rubrocinctus Franklin, Proc. U.S. National Museum, XXXIII. p. 719, Pl. LXIV. figs. 10 and 14, Pl. LXV. figs. 17, 20 and 21, 1908.

In a recent consignment of named *Thysanoptera*, mostly co-types, Mr Dudley Moulton has sent me larvae and imagines of *H. rubrocinctus* labelled Honolulu, where it occurs on mango. *H. rubrocinctus*, so named because of the bright red band of hypodermal pigment crossing the base of the abdomen on the upper side in the larval and nymph stages, is a very injurious species and is reported as a great pest on cacao in the West Indies; it is found also on Cashew tree, the guava, Liberian coffee (see Franklin) and mango as well as other plants.

Franklin fully describes this species, which is very evidently not an endemic form, and also its earlier stages.

HAB. Oahu; Honolulu, on mango, June 10th, 1909.

THRIPS L.

(1) *Thrips multispinus*, sp. nov.

Plate XVII. figs. 15—20.

♀. Length 1·0 to 1·3 mm. Breadth of mesothorax about 0·24 mm.

General colour brown, legs lighter and fore-tibiae and all tarsi yellow. Antennae uniform brown with the third joint in one specimen apparently lighter.

Head distinctly transverse, cheeks slightly arched behind the eyes and frons faintly arcuate between them. Eyes large and coarsely faceted, sparingly but strongly pilose; pigment deep black. Ocelli large, widely separated, posterior pair above a line drawn across the posterior margin of eyes. Two strong bristles between the anterior ocellus and posterior pair, and another equally long bristle behind each eye. Cheeks furnished with a few short bristles. Maxillary palpus three-segmented. Antennae moderately stout; joints three and four sub-equal with the outline laterally wavy, fifth smaller than three or four and five-eighths the length of sixth, and jointed with a broad surface to base of sixth, the sixth roundly, narrowing to tip; style short, being only about one-quarter the length of the sixth joint, blunt at apex.

Prothorax decidedly longer than dorsal length of head which latter is considerably retracted into prothorax; margins seemingly slightly depressed. Two long bristles at each posterior angle; moderately long anterior-marginal pair and similar pair, on each

side of the mid-line at the posterior margin. One short stout forwardly-directed spine at each anterior angle, and two similar though slightly longer downwardly-directed lateral spines.

Mesothorax widely rounded to juncture of the metathorax, a short spine at each humeral angle; metathorax strongly transverse and only about three-quarters the length of mesothorax. Legs moderately stout and strongly spinose, each coxa armed with one or two curved spines, fore-femora short and broad; bristles long on outer edge of fore-tibia and all forwardly curved. Hind and intermediate tibia with a series of stronger spines for two-thirds the length within, and ending with a couple of very stout spines at the tip within; first joint of tarsus armed with a couple of short stout spines near the tip within, and a long and more slender spine at base without. Wings considerably over-reaching tip of abdomen; both longitudinal veins of the fore-wing armed with a series of regularly placed bristles each consisting of about 17 spines; hairs composing posterior fringes long, slender and wavy.

Abdomen slightly wider than mesothorax, oblong-ovate, strongly narrowing from the seventh segment to tip, tenth segment sharply contracted about the middle; spines at tip of abdomen arranged as in *Thrips tabaci*, long and strong.

♂. Apart from the sexual characters the ♂ differs by its much smaller size, being only about 0·65 mm. in length; totally yellow head and thorax with a reddish-brown tinge; antennae with a greyish-brown tinge; legs yellowish-white; abdomen narrower and shorter, wings long, considerably over-reaching the tip of abdomen.

Hab. Kauai, Molokai, Hawaii.—Hawaii, three females and one male, Kilauea, July 1895 (Perkins, No. 575), one female (No. 686). Kauai, one female Kauai on a high plateau, August 1896. Molokai, Mts., 4000 ft., one female, September 1893 (No. 163), and two females, Kalal, August 7th, 1893 (No. 172).

Genus Scolothrips Hinds.

(1) *Scolothrips 6-maculatus*, Pergande.

Thrips 6-maculata Pergande, Trans. St Louis Acad., v. p. 543, 1894.

Thrips pallida Beach, Proc. Iowa Acad. Sciences (1895), III. pp. 226—227, 1896.

Scolothrips 6-maculata Hinds, Proc. U.S. Nat. Museum, XXVI. pp. 157—158, Pl. IV. figs. 42—45, 1902.

Mr Dudley Moulton tells me (in litt. October 24th, 1910) that he has specimens of this species from Honolulu. It is a very distinct form and the genus is easily separated from *Euthrips* by the presence of six pairs of prothoracic bristles, all very long, strong and sub-equal in length, and by the almost obsolete fore-fringe of the fore-wing, the cilia of which are very much shorter than the extremely long spines on the fore-margin.

It is a Nearctic form and is recorded by Miss Beach from bean, blackberry, elm and hop, by Pergande as having been found on many plants infested with red spider (mite), on which it had repeatedly been observed to feed, and by Bruner as feeding on mites in fold of cottonwood leaf.

From these records it will be seen that *S. 6-maculatus* is an interesting insect, and one of the very few thrips that have been observed to be predaceous in their habits.

HAB. Oahu, collected by Mr D. T. Fullaway on *Psidium* at Honolulu and sent by him to Mr Dudley Moulton of the Californian State Commission of Horticulture, Sacramento, California, to whom our thanks are due for this record.

LIMOTHRIPS Haliday.

(1) *Limothrips cerealium* Haliday (*avenae* Hinds).

Syn. Uzel, Monographie der Ordnung *Thysanoptera*, Koniggratz, 1895, p. 89.
Limothrips avenae Hinds, Proc. U.S. Nat. Museum, 1903, XXVI. p. 138, Pl. I. figs. 10—12; Pl. II. fig. 13: *cerealium* vide Bagnall, Ann. Soc. Ent. Belgique, 1908, p. 351.

Limothrips cerealium chiefly infests cereal crops and has a wide European range, whilst Hinds records it (under the name *avenae*) from Pennsylvania as very abundant on oats during the summer of 1898. I have specimens collected by Mr Champion in Central America, though not yet recorded, and believe that the species will most probably be found wherever cereal crops are cultivated. I have also found it in various grasses and recently recorded it from the flower of the bittersweet (*Solanum dulcamara*); from the sap of a felled pine tree, and in large numbers from the witches broom, on birch[1]. There are two examples of this cosmopolitan species in the collection made by Dr Perkins.

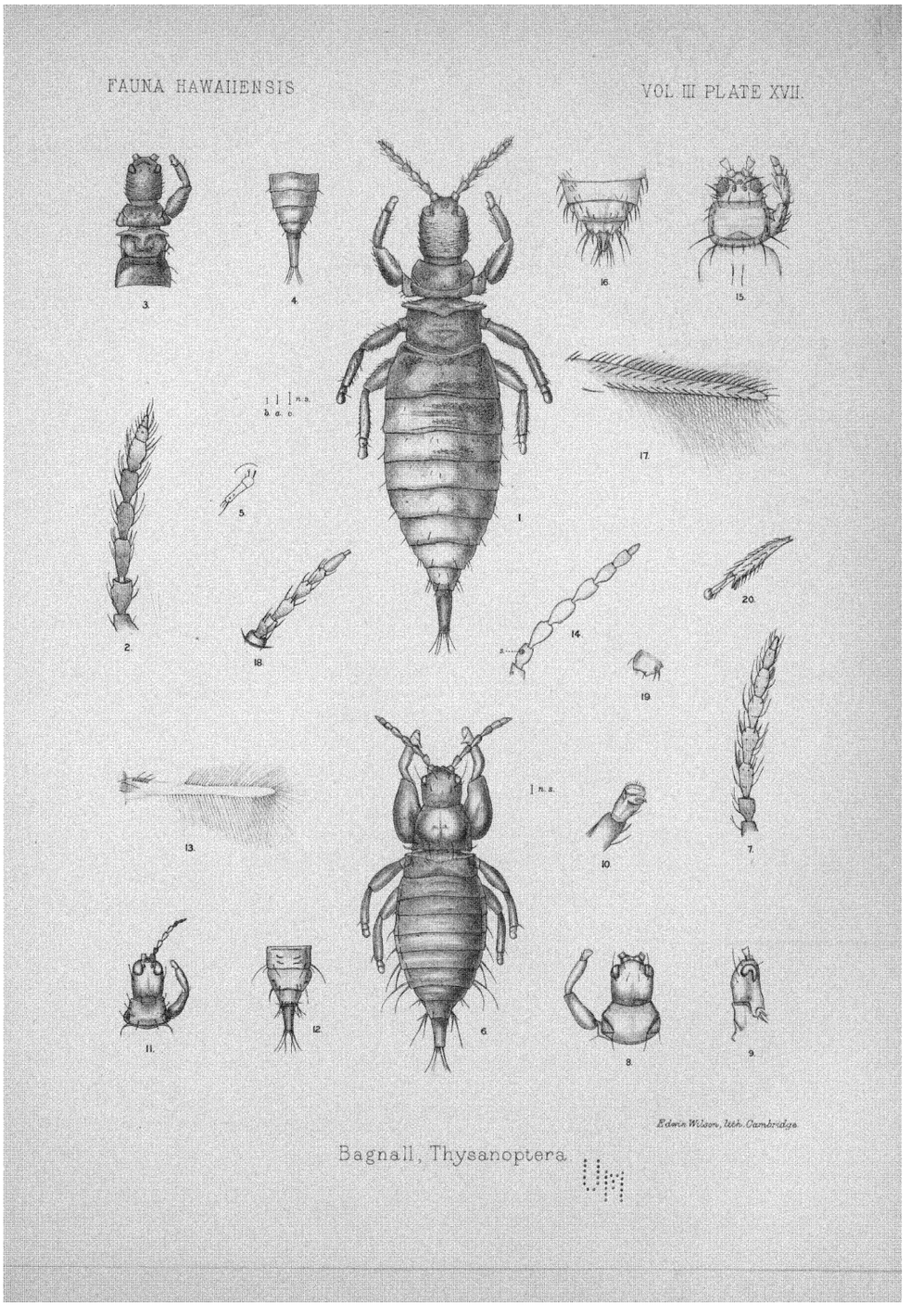
HAB. Kauai, one ♀, Makaweli, 2500 ft., February 1897 (Perkins, No. 703). Hawaii, one ♀, Kona, 2500 ft., September 1892 (in alcohol).

[1] The Journal of Economic Biology, June 1909, LV. pt. 2.

DESCRIPTION OF PLATE XVII. (VOL. III.)

THYSANOPTERA.

Fig. 1. *Dermothrips hawaiiensis*, gen. et sp. nov., forma *aptera*, ♀ × 27; *n.s.* natural size, *a*, ♀; *b*, ♂; forma *macroptera*, *c*, ♀.
Fig. 2. ,, ,, ♀, right antenna × 90.
Fig. 3. ,, ,, ♂, head, right foreleg, thorax and part of abdomen × 27.
Fig. 4. ,, ,, ♂, end of abdomen × 27.
Fig. 5. ,, ,, ♀, maxillary palpus × 120.
Fig. 6. *Oedemothrips laticeps*, gen. et sp. nov., ♂ × 27; *n.s.* natural size.
Fig. 7. ,, ,, ♂, right antenna × 90.
Fig. 8. ,, ,, ♀, head, prothorax and left foreleg × 27.
Fig. 9. ,, ,, ♀, lateral view of head × 27.
Fig. 10. ,, ,, ♀, left fore-tarsus × 60.
Fig. 11. *Anthothrips usitatus*, sp. nov., ♀, head, prothorax, right antenna and foreleg × 27.
Fig. 12. ,, ,, ♀, end of abdomen × 27.
Fig. 13. ,, ,, ♀, right fore-wing × 27.
Fig. 14. ,, ,, ♀, right antenna (outline) × 120; *s.* = sensoria.
Fig. 15. *Thrips multispinus*, sp. nov., ♀, head, prothorax and right foreleg × 40.
Fig. 16. ,, ,, ♀, end of abdomen × 40.
Fig. 17. ,, ,, ♀, right fore-wing × 40.
Fig. 18. ,, ,, ♀, right antenna × 60.
Fig. 19. ,, ,, ♀, right hind-coxa × 60.
Fig. 20. ,, ,, ♀, left hind-tibia and tarsus × 60.



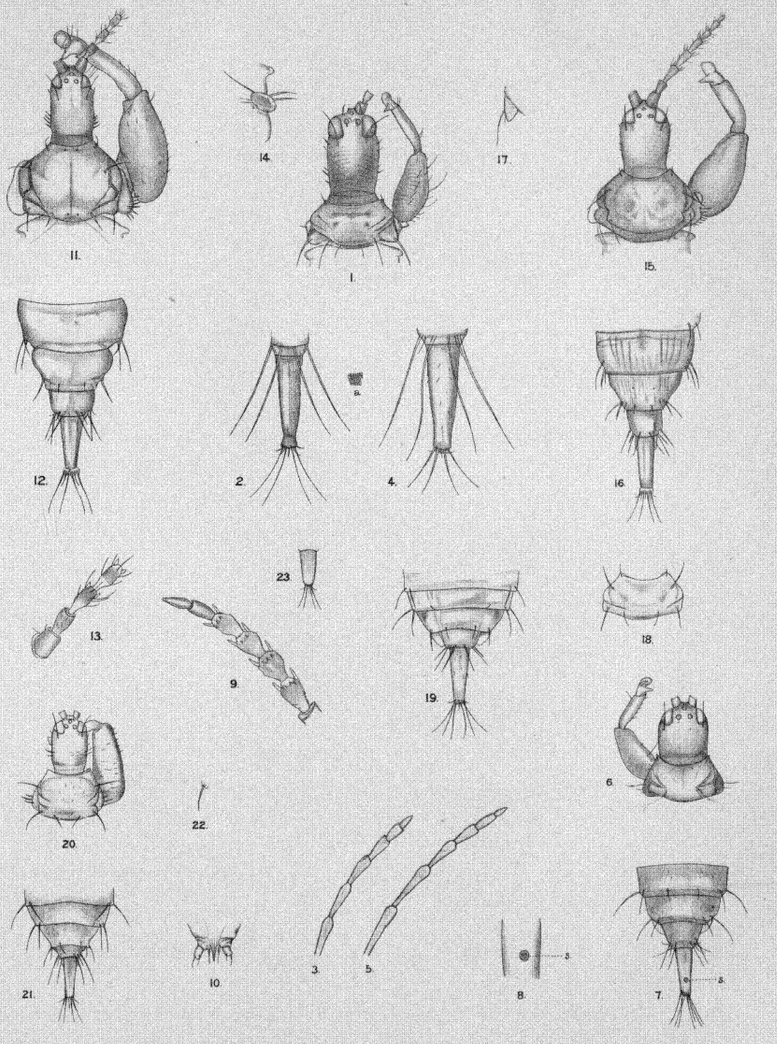
Edwin Wilson, lith. Cambridge.

Bagnall, Thysanoptera.

DESCRIPTION OF PLATE XVIII. (VOL. III.)

THYSANOPTERA.

Fig. 1. *Diceratothrips brevicornis*, sp. nov., ♀, head, prothorax and right foreleg × 27.
Fig. 2. ,, ,, ,, ,, tube × 27; *a* = surface sculpture.
Fig. 3. ,, ,, ,, ,, joints three to eight (outline) of right antenna × 40.
Fig. 4. ,, *bicornis* Bagnall, sp. nov., ♀, tube (for comparison) × 27.
Fig. 5. ,, ,, ,, ,, ,, joints three to eight of right antenna (for comparison) × 40.
Fig. 6. *Trichothrips laticornis*, sp. nov., ♀, head, prothorax and left foreleg × 27.
Fig. 7. ,, ,, ,, ,, end of abdomen × 27.
Fig. 8. ,, ,, ,, ,, part of tube showing *s.*, probable sense areas × 120.
Fig. 9. ,, ,, ,, ,, left antenna (outline) × 90.
Fig. 10. ,, ,, ,, ,, end of mouth-cone showing labial palpi × 120.
Fig. 11. *Dolerothrips barbatus*, gen. et sp. nov., ♂, head, prothorax, right foreleg and part of antenna × 27.
Fig. 12. ,, ,, ,, ,, end of abdomen × 27.
Fig. 13. ,, ,, ,, ,, antennal joints one to four × 60.
Fig. 14. ,, ,, ,, ,, right wing-pad × 40.
Fig. 15. ,, *flavipes*, sp. nov., ♂, head, prothorax, and right antenna and foreleg × 27.
Fig. 16. ,, ,, ,, ,, end of abdomen × 27.
Fig. 17. ,, ,, ,, ,, left wing-pad × 27.
Fig. 18. ,, ,, ,, ♀, prothorax × 27.
Fig. 19. ,, ,, ,, ,, end of abdomen × 27.
Fig. 20. ,, *angusticeps*, sp. nov., ♂, head, prothorax and right foreleg × 27.
Fig. 21. ,, ,, ,, ,, end of abdomen × 27.
Fig. 22. ,, ,, ,, ,, left wing-pad × 27.
Fig. 23. *Trichothrips nigricans*, sp. nov., ♂, tube × 27.



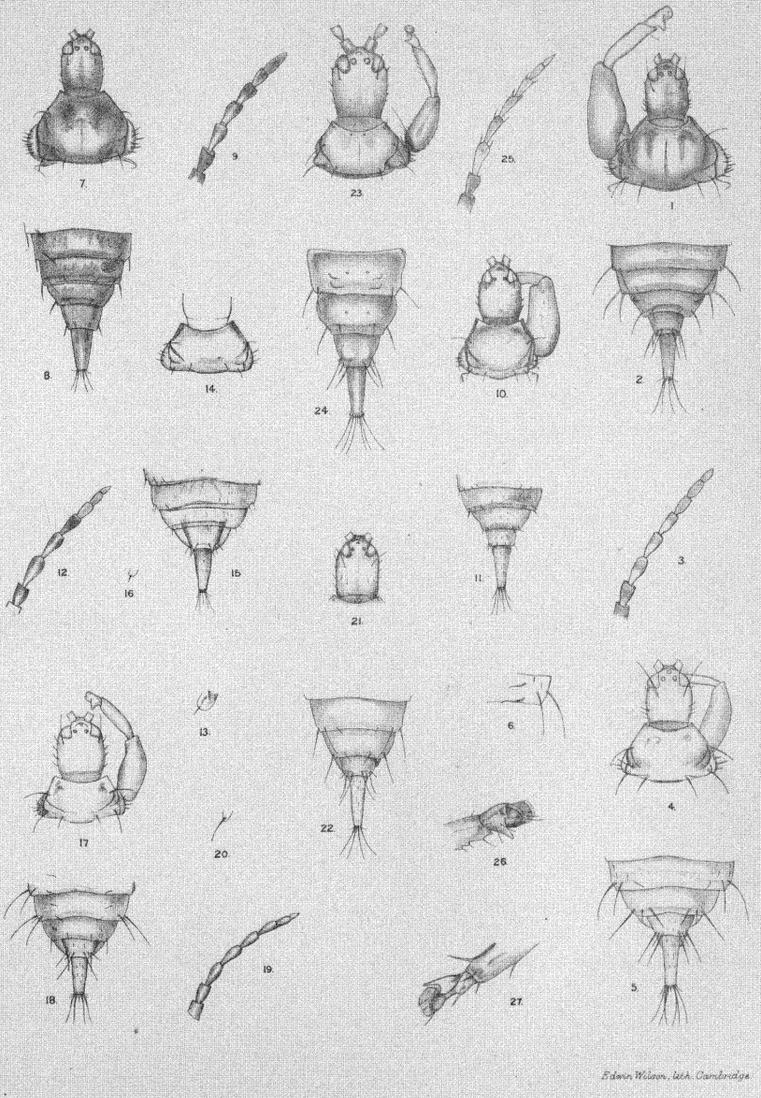
Edwin Wilson, lith. Cambridge

Bagnall, Thysanoptera.

DESCRIPTION OF PLATE XIX. (VOL. III.)

THYSANOPTERA.

Fig. 1. *Dolerothrips ovatus*, sp. nov., ♂, head, prothorax and left foreleg × 27.
Fig. 2. „ „ „ „ end of abdomen × 27.
Fig. 3. „ „ „ „ right antenna × 40.
Fig. 4. „ „ „ ♀, head, prothorax and right foreleg × 27.
Fig. 5. „ „ „ „ end of abdomen × 27.
Fig. 6. „ „ „ „ right wing retaining spines on seventh abdominal segment in the macropterous form × 27.
Fig. 7. „ *intermedius*, sp. nov., ♂, head and prothorax × 27.
Fig. 8. „ „ „ „ end of abdomen × 27.
Fig. 9. „ „ „ „ right antenna × 40.
Fig. 10. „ *lanaiensis*, sp. nov., ♂, head, prothorax and right foreleg × 27.
Fig. 11. „ „ „ „ end of abdomen × 27.
Fig. 12. „ „ „ „ right antenna × 40.
Fig. 13. „ „ „ „ left wing-pad × 27.
Fig. 14. „ „ „ ♀, prothorax × 27.
Fig. 15. „ „ „ „ end of abdomen × 27.
Fig. 16. „ „ „ „ right wing-pad × 27.
Fig. 17. „ *perkinsi*, sp. nov., ♀, head, prothorax and right foreleg × 27.
Fig. 18. „ „ „ „ end of abdomen × 27.
Fig. 19. „ „ „ „ right antenna × 40.
Fig. 20. „ „ „ „ left wing-pad × 27.
Fig. 21. „ *bicolor*, sp. nov., ♀, head × 27.
Fig. 22. „ „ „ „ end of abdomen × 27.
Fig. 23. „ *dubius*, sp. nov., ♀, head, prothorax and right foreleg × 27
Fig. 24. „ „ „ „ end of abdomen × 27.
Fig. 25. „ „ „ „ right antenna × 40.
Fig. 26. „ „ „ „ anterior tarsus × 60.
Fig. 27. „ „ „ „ posterior tarsus × 60.



Bagnall, Thysanoptera.