

The Status and Study of the Insect Group 'Thysanoptera' in India.

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Introduction. There are sufficient evidences to show that in India there exist numerous forms of the insect order *Thysanoptera*, known popularly as 'Thrips' but unfortunately our knowledge of these insects is extremely meagre. Neither Lefroy in his monumental work on 'Indian Insect Life,' nor Fletcher in his pioneer publication on 'South Indian Insects,' has done sufficient justice to this group of insects; the former makes mention of only two species from India, while the latter does not refer to even a single species of the order. While in other countries the group had attracted the serious attention of Entomologists long ago, as may be seen from the early works of eminent scientists like Uzel, Karny, Buffa, Haliday and Bagnall in Europe, and Hood, Hinds, Morgan and Moulton in America, we in India did not have a single worker on this group until comparatively recent years. Evidently the reasons for this neglect were perhaps due to the ignorance of the importance of this group in many ways.

General features and peculiarities. In spite of their small size the members of this insect order possess not only some remarkable structural characters which are absent among other insects, and worthy of study from the point of view of the pure entomologist, but the group possesses also some real importance to attract the interest of the economic entomologist. It may be noted that this group is one of the few insect orders of the original nine order classification, which have retained their primitive independent status unlike most others which have undergone radical changes at the hands of taxonomists. This feature of retaining the original status through decades is possibly due to the possession of some unique and striking morphological features quite characteristic and fundamentally different from members of the other insect orders. Speaking of their features, the structure of their wings and their peculiar feeding apparatus alone would afford ample room for intensive studies on the anatomy and physiology of these creatures. The members of this group are minute insects, the biggest among them not measuring more than $\frac{1}{3}$ " in length. The general form and the variations in the structural armature of their wings are quite characteristic. They are four winged like most of the insects, but these organs are small, narrow and provided with fine long fringes along the margins, a feature which is quite unique and which has gained for this order the name 'Thysanoptera' or 'fringewinged insects.' Here again in connection with the wing structure there are found numerous variations, some showing rudiments of wing veins, others quite veinless and then others which are megapterous, micropterous, brachypterous or even apterous; Trybom divides such forms into 8 groups in relation to their wing structure alone. The study of the wings alone of Thysanoptera might, therefore, be found a very

interesting study. In the same way the mouth parts are also curiously built in them; and the function performed by such a mechanism has not yet been sufficiently explained. Unlike as in other groups of insects the mouth parts show a curious asymmetry of the component structures; the right mandible is vestigial and not fully developed as the left one. The general features of the trophi appear to occupy a midway stage between the piercing sucking type and the biting chewing type and is generally called the rasping and sucking type. This asymmetry of the mouth parts and their evolution are worth special investigation, since such characters are not found among the members of any other insect order. Then again the structure of the limbs, which is also unique in one feature, has also gained for these insects the special designation 'Physopoda' or bladder-footed forms. This is characterised by the absence of claws to the tarsi and in its absence the presence of a bladder-like structure at the tarsal tips.

Life history and habits. Coming to the life histories and modes of behaviour of these little creatures we again find various features which are worth investigation. Among these insects reproduction takes place sexually and by oviposition, though some workers suggest that there are some viviparous forms. Though the order is brought under the category of 'Heterometabola' with regard to the phenomena of metamorphosis it is very interesting to find that the young ones before assuming the adult condition pass through what is called a 'Prepupa' stage, though the general formation, etc., of this stage are not at all similar to that in the Holometabolous groups like Lepidoptera or Hymenoptera. Almost the great majority of the Thysanoptera are vegetable feeders found on the softer tissues of various plants, their chief haunts being flowers; some exceptions have, however, been noted with regard to their food habits, a few species having been discovered feeding on mites, white flies and larvae of scale insects. Williams has recorded a blood sucking species in Trinidad, and another has been noted by Senevet as attacking man in Algeria. Some of the plant feeding forms have also developed a capacity for producing galls on their food plants, similar to gall flies or cynipids and we have some examples of these in India also. Very little is known of the natural enemies of these insects though the writer has noted a small anthocorid bug *Montadoniola thripoides*, B. feeding on a species of thrips in S. India and one internal Chalcid parasite (*Thripoctenus maculatus* W.) has recently been noted in the Punjab.

Economic importance. Since the food of most Thysanoptera consists of vegetable material, some species have developed tendencies to feed on cultivated plants of different kinds and occasionally assume the status of important crop pests. Studies so far made have also shown that we have some species of thrips which possess potentialities to become serious plant pests and cause appreciable loss to the cultivator. Among the more important of these in S. India are the *rice thrips*, the *chillies thrips* and the *grape thrips*. In some foreign countries some species of thrips are found

as very serious pests of important crops such as the bean thrips, the cacao thrips, olive thrips, etc. Apart from their status as plant pests, recent studies have also shown that Thysanoptera possess other potentialities also; some species have been found as effective weed controllers, some as vectors of virus diseases from plant to plant and some even as plant pollinators. In these various ways the group is developing economic importance both from the injurious and beneficial aspects of view.

Conclusion. A few words may be added (before I conclude this brief paper) on the work so far done on this group in India and the possibilities for future work. Until the year 1915 when the writer was attracted to this group only 14 species of Thysanoptera were known from the whole of India, though the earliest record of a species from India was in the year 1856. Within thirteen years (1928) through the efforts chiefly of one or two workers, the number of recorded Indian species rose from 14 to 126 and such work consisted chiefly in exploring only the plains of peninsular India. We can, therefore, have some idea of the possible wealth of Thysanopterous forms we can certainly expect, if the various regions of this large country are properly explored. The idea of presenting this brief note is, if possible, to attract the attention of young entomologists in India to this virgin field of entomology, possessing as it does not only avenues for investigation on many interesting scientific aspects and problems regarding a group of insects, but also the various economic features connected with these insects, a proper study of which, in these days, would go a great way to help the material welfare of our country.

EXTRACTS

Silage from sugarcane tops. A case in point is the almost universal practice of burning off sugarcane tops and trash each year after the harvest to facilitate ratooning operations or preparation for the next crop. This material is made up largely of the sugarcane top which is still in the green state at the time of cutting. Quite apart from the loss of potential humus this represents a loss of animal fodder which would be a valuable accessory in time of shortage of natural grazing.

From weighings carried out at the Agricultural College, Queensland, during 1940, it was found that the green weight of the cane top at the time of cutting was from one-third to one-half that of the cane cut from the same stem. A small area of cane at the College, comprising the varieties P. O. J. 2878, Co. 290, P. O. J. 213, Orambu and P. O. J. 2725 was consequently harvested and the tops ensiled in July 1939 in a shallow pit silo, 6 feet deep and 12 feet in diameter. A composite sample was chaffed and forwarded to the Agricultural Chemist for analysis. The tops were packed as uniformly as possible in the silo built 3 feet above the ground. After a few days of settling, more were added and 18 inches of soil placed on top to seal the silo. Considerable sinking took place as the silage settled down and fermentation set in and additional earth had to be placed on top. The temperature taken from the middle of the silo at no time exceeded 95°F.

The silo was opened in May, 1940. It was found that there was a wastage of 18 inches around the sides and on top of the silo, but the silage in the middle of the mass was of excellent colour and slightly acid in flavour. Owing to the small