

on *Pinus inops* and *P. taeda*; and fine blown and alcoholic specimens are in the Museum, collected by Mr. Koebele.

Prof. Riley then presented the following :

ON THE TIME OF TRANSFORMATION IN THE GENUS LACHNOSTERNA.

BY C. V. RILEY.

At the late meeting of the Association of Economic Entomologists, at Champaign, one of the most interesting papers read was that by Prof. S. A. Forbes on the larvæ of *Lachnosterna*—the paper being a summary of several years' study of the larvæ of different species. Prof. Forbes had found certain satisfactory larval characteristics that permit the distinguishing of the different species in the arrangement and character of the stiff hairs on the underside of the anal segment. This fact will prove of great value to us, for it has always been extremely difficult to refer any particular *Lachnosterna* larva to its species. I have heretofore endeavored to do so by the characters of the head and trophi, but have never felt great confidence when it came to closely-allied species. How generally applicable the distinguishing features recorded by Prof. Forbes will prove to be experience alone will determine; but his studies cover several well-known species that occur in Illinois. The feature, however, of Prof. Forbes's paper which I wish more particularly to call attention to relates to the time of year when transformation takes place in this genus. From recent experiments, Prof. Forbes is inclined to believe that the history of the White Grub, as given by authors, is a comedy of errors, and that the transformation invariably takes place in late summer or early autumn. The fact that transformation in some species, notably *fusca*, takes place normally in the fall has been quite generally known, at least to the members of this Society, and was brought out in a discussion of Mr. Smith's paper, presented before the Society at its October (1888) meeting, in which he showed the value of the genitalia in determining the different species. In my earlier writings on *fusca*, notably in the first Report on the insects of Missouri, (1868), I mentioned the spring transformation as the normal and the fall transformation as the exceptional, having up to that time had more occasion to obtain the insect in spring, with the turning up of the ground, than in the fall. In later articles (notably in the New York Semi-Weekly Tribune of November 12, 1875) I

drew more attention to the fall transformation, and for many years have been convinced that, so far as the latitudes of St. Louis and Washington are concerned, this last is the more common. Prof. Forbes himself, in 1883, followed closely my statement in 1868. In looking up my MS. notes, however, I find positive evidence that fall transformation is not the uniform habit, as Prof. Forbes's conclusions would lead one to suppose; because what has been taken for *fusca* has sometimes been found in the spring, and in one instance the full-grown larva of what was in one case *fusca* and in the other either *fusca* or *ephelida*, was found and pupated in spring. Considering all the facts, I am inclined to believe that those species which appear early in summer transform, as a rule, the previous autumn, such for instance as *arcuata*, *hirticula*, *fraterna* and *tristis*. These have all been found in the imago state at Washington in the fall or winter, and Mr. Schwarz tells me that the same is true of *dubia* and *hirticula* in Michigan. The later-appearing species, *i. e.*, *gracilis*, *gibbosa* and *crenulata*, are not found as beetles in the ground in the fall, the legitimate inference being that they transform as a rule in spring. According to Mr. Schwarz's experience some of the early appearing species, *viz.* *inversa* and *micans*, which are quite common in Washington, have not yet been found in the fall, and, so far as the negative fact goes, it would militate against this generalization and indicate that in these instances the transformation is vernal. Of the undetermined larvæ, a certain number collected near Washington in the fall of 1888, all of the same size, remained untransformed during the winter—one having changed to pupa in May and the others having died during the spring.

Prof. Forbes records in his paper having found pupæ or larvæ beginning to pupate in the month of June, the species, if I recollect rightly, being *inversa*, which is one of those which appear early with us; but such early pupation, if of a late-appearing species, would not necessarily argue that the imagos would remain inactive until the following year, but might apply to late-appearing species, such as *gibbosa* and *ephelida*, which are recorded in the latitude of Washington as late as August. In fact, a well advanced pupa of what is without doubt the latter species (it is a ♂, and shows the characteristic tibial spur) is in the collection taken in August. The records, as published by Smith, show that *ephelida* occurs in July and August, being our latest species, and it is safer to assume that the imago from this pupa would have issued and paired the same season, than that the imago would have remained practically inactive till the subsequent July. The

whole question is interesting and somewhat involved, on account of the length of time covered by the appearance of the different species, and while I felt impressed, on hearing the paper, with the fact that a great deal of excellent original work had been done at Champaign, and that the statements in the current literature (which is so largely unacknowledged compilation) would be effectually modified thereby, yet the authoritative statements, which have been based on observation, have not been materially impugned.

Further investigation will doubtless show that the fall or spring transformation is dependent to some extent upon latitude, and that, on this account, great irregularity may be looked for. There is here a rich field for careful study and experiment in different parts of the country, and it may turn out that the three-year period, which is pretty fully substantiated for the full life-cycle of some of the commoner forms, may be either shortened or lengthened according to latitude or species.

In this connection I would also put on record the fact that, according to Mr. Webster, from whom specimens have been received as having been obtained from *Lachnosterna* larvæ, an undescribed Tachinid and *Ophion bifoveolatum* may be added to the list of parasites which I have already recorded as attacking the larva of *fusca*.

Mr. Townsend presented the following paper :

NOTES ON NORTH AMERICAN TACHINIDÆ SENS. LAT.,
WITH DESCRIPTIONS OF NEW SPECIES.

PAPER I.

BY C. H. TYLER TOWNSEND.

In the first families of the *Tachinidæ s. lat.* much confusion has resulted from the descriptions of the earlier authors, due in great part to the fact that the two sexes of these flies exhibit marked differences, which would lead one to consider them distinct species. From a critical study of descriptions and material I have collected a considerable number of notes, synonymical, relating to distribution, etc., which I here present, together with descriptions of some new species.

Phasia atripennis Say. This is not a *Phasia*. The description shows that the apical cell is petiolate, and compares the venation to that of *Phasia semicinerea* Meig., which however