corn field. Six days after the bugs commenced travelling to the corn, the bugs covered three feet of every stalk about ten rods into the field. On the seventh day I noticed there were not so many bugs on the stalks. I then noticed that the bugs got less in numbers every day until the tenth day when I could scarcely find a bug on the stalks. As the bugs were not more than half grown, it seemed to me a strange act that they left the corn entirely without killing it.

I wondered what became of the bugs and I turned over some lumps of dirt and out flowed piles of dead bugs and live ones also. By taking close notice I found that the bugs had not left the field but had crawled down in the dirt to die. Half of the bugs were at that time dead. In a few days there came a heavy rain which baked the ground. I have not seen a bug there since."

In making their reports as to the benefit received from the use of the infection, 495 of the 1050 successful experimenters gave their own estimates of the number of bushels of grain saved by the experiment. The sum of these estimates amounts in cash value to $89,176.65 or an average of $180.00 for each farmer. It is fair to presume that this average may be safely applied to the remainder of the 1050 successful experiments. This gives an aggregate saving of $189,000. This amount saved by the farmers means additional profit for the railroads and the millers, so that $200,000 is a very conservative estimate of the actual value of the experiments in 1891.

CONCERNING THE "BLOOD-TISSUE OF THE INSECTA.—II.

BY WILLIAM MORTON WHEELER, WORCESTER, MASS.

Among the Pterygota oenocytes are of very general, perhaps universal occurrence. Wielowiejski found them in Rhynchota, Aphaniptera, Coleoptera, Lepidoptera, Hymenoptera and Diptera. They had previously been noticed by Graber in Orthoptera, Coleoptera and Trichoptera. I have found them in a number of orders in which they have not hitherto been observed and here subjoin a brief account of my observations together with a few notes on oenocytes in some of the orders in which they have been studied by others.

ORTHOPTERA. The oenocytes of Blatta and Xiphidium are very similar and may be regarded as typical for this order. Arising, as above described, by immigration from the ectoderm just caudad to the abdominal stigmata, they remain at their place of origin throughout embryonic life, but later some of the anterior cells wander into the thoracic cavity. In the adult the metameric arrangement seems to be lost and the oenocytes lie irregularly scattered along the pleural and sternal walls. The separate elements never show any ten-

dency to fuse with one another.

The size of the oenocytes in a given species appears to vary directly as the age of the insect. This is shown by the following measurements:

	cytoplasm.	*nucleus.*
Xiph. ensiferum embryo-revolution ½ completed.	11 μ	7–9 μ
Xiph. ensiferum hatching	26.5 μ	11 μ
Xiph. fasciatum larva 10 mm. long	33.5 μ	11 μ
Xiph. ensiferum adult.	37 μ	12–13 μ

Not only do these measurements show a gradual increase in both cytoplasm and nucleus, but they also show that the cytoplasm grows relatively somewhat more rapidly than the nucleus.

EPHEMERIDEA. Fig. 4 represents the pleural portion of a section through one of the abdominal segments of a nearly mature Blasturus nymph. Nearly the whole of that portion of the pleural hypodermis which is included between the insertions of the tergosternal, or respiratory muscles, is seen to consist of oenocytes. The hypodermal cells proper are reduced to small chromophilous elements filling the interstices between the large clear adenoid cells and covering them with a thin layer externally. That the oenocytes are really still completely imbedded in the hypodermis and do not protrude freely into the body-cavity is apparent from an examination of their inner surfaces, where traces of the inner ends of the hypodermal cells still persist as plates of protoplasm. When the abdomen is slit sagittally and spread out, the pale oenocytes are seen to line the pleural angles of the segments as an even pavement-like layer. The area covered by these cells is so large that the metameric masses are interrupted only by the constrictions separating the segments. In the first abdominal segment the oenocytes are heaped up into a mass instead of forming a single layer. It may be further noted that the stigmatic trunks of the abdominal tracheae pass into the gills at the posterior edges of their respective segments, so that the oenocyte clusters lie in front of the stigmata. This is the reverse of their position in the embryos of Orthoptera, Coleoptera and Lepidoptera and were it not that the insect under consideration was nearly mature, we might doubt whether the position of the oenocyte clusters with respect to the tracheae was of much morphological significance. On the other hand the oenocytes of Blasturus certainly show a very embryonic condition in that they are still imbedded when the insect is practically mature in the hypodermis from which they differentiated.

The separate oenocytes measure 15—23 μ in diameter; their nuclei 7 μ. They are perfectly distinct on the one hand from the blood corpuscles which measure only 3.5 μ and on the other from the fat-body.

In the nearly adult nymph of a very different species (an Ecdyurus-like form, probably the same as the one figured in Eaton's monograph Pl. 59) the

oenocytes are very similar to those of the Blasturus nymph. They measure 13-14.5μ — their nuclei 12μ. In this species also the difference in size between the oenocytes and the blood-corpuscles is very great. There is nothing whatever to indicate that the latter originate from the former.

Very different is the condition of the oenocytes in the mature nymph of Hexagenia. Here they may be detected only with considerable difficulty in the pleural fold between the insertions of the respiratory muscles as a few scattered cells, differing only in size and clearness from the hypodermal cells in which they are imbedded.

ODONATA. In the nymph of an Agrionine species of this group oenocytes were detected after considerable search. They are present in clusters consisting of a very few small elements (cytoplasm 12-14μ; nucleus 4.5μ) imbedded, as usual, in that portion of the pleural hypodermis which is included between the insertions of the tergo-sternal muscles. They seem not to be completely covered over by the hypodermis but to project into the body cavity. Their greater size and pale color distinguish them from the hypodermal cells.

PLECOPTERA. In a beautiful black and yellow Perlid larva (perhaps an Acroneura) the oenocytes are quite as inconspicuous as they are in the Odonata. The specimens studied in section were young, measuring only 6 mm, whereas the mature larva of this same species measures fully 25 mm. Each of the metameric clusters consists of from 5-6 cells and these are imbedded in the hypodermis surrounding the occluded stigmata. They measure 18.5μ; their oval nuclei 11μ. In their affinity for stains they differ but slightly from the hypodermal cells.

The imago of a small unidentified Perlid presented very different conditions, oenocyte sbeing present in great numbers and distributed through the abdomen and thorax. They lie in niche-like excavations in the hypodermal wall, either singly or in groups. Sometimes they appear to form syncytia. They vary considerably in size (cytoplasm 14-55μ; nucleus 5-30μ). The nucleus contains a nucleolus— the only case in which I have found nucleoli in the oenocytes. Compared with their homologues in other forms these cells stain very deeply in borax carmine.

CORRODENTIA. The bright yellow oenocytes of *Psocus venosus* (imago) are massed in metameric clusters about the stigmata. The cytoplasm measures about 18.5μ in diameter; the nucleus 6μ. They are not imbedded in the hypodermis, though they lie in contact with it.

The fat-body which stains very intensely in Delafield's haematoxylin and is loaded down with minute urate concretions, extends with hardly any interruption through the whole body — from the cavity in front of the brain to the terminal abdominal segments. The pericardial fat-body is well developed and very distinct from the fat-body proper.

In the workers of *Termes flavipes* the oenocytes are much more difficult to detect. They are flattened cells imbedded in the pleural hypodermis near the stigmata. It is their size which mainly distinguishes them from the hypodermal cells; the latter measuring only 8 μ while the former measure 37 μ.

THYSANOPTERA. Oenocytes occur in compact metameric clusters in a species of Phloeothrips very common on the blossoms of *Chrysanthemum leucanthemum* during July and August. These clusters occur in at least six of the abdominal segments, possibly in eight, but as they diminish in size very rapidly from before backwards, I am not sure that I have found them in the 7th and 8th metameres. The clusters lie in the pleural region well out in the body cavity and each consists of some 8 or 10 cells which from mutual pressure are often very irregular. The cells measure 18.5-26 μ in diameter — their nuclei 3-6 μ. They are perfectly distinct from the fat-body and blood corpuscles.

A NEW GENUS AND SPECIES OF TABANIDAE.

BY J. M. ALDRICH, BROOKINGS, SOUTH DAKOTA.

The general appearance of the fly is that of a particularly fine large silvery Hippoboscid, with brown wings. Nevertheless, an examination shows it to be truly Tabanid in every respect; in fact, I was at some loss for a while to fix upon a set of generic characters which would clearly separate it from all the present genera of Tabanidae. The venation is normal; the antennae resemble Pangonia in shape and number of annulations; the face is that of Chrysops. The upper corner of the eye, making an angle of about 70 degrees, and not *in the least* rounded off at the tip, but rather produced a little in a very fine point, beyond which is an impressed line, running to the occiput, is one of the best characters. The general proportions of the body, also, are different from those of any other members of the family known to me.

Its habits are unknown, but from its appearance the conclusion looks probable that it lives like a Hippoboscid upon some bird or mammal. Still, there are no modifications of structure that give strong support to this theory. Its claws are distinctly larger than those of Tabani of its size, and the large pits at the bases of the hairs on the first and second antennal joints seem to indicate an unusual development of the sense of touch in this region; both of which peculiarities are not without weight.

GONIOPS n. gen.

Spurs present on hind tibiae, absent from front ones. Eyes narrow, terminating above in an acute angle. Ocelli present. Front broad in female, the callosity longitudinal. Proboscis in repose directed forward. Thorax strongly arched, subglobular. Abdomen (from tip of scutellum) not longer than, and head but about half as wide as, the thorax.