Robert Bruce Brinsmade, B.S. (Washington University), E.M. (Lehigh), has accepted the chair of mining engineering at West Virginia University, replacing Henry Mau Payne, who has gone into other lines of work.

Mr. O. T. Jones, of the Geological Survey of England and Wales, has been appointed lecturer in geology and physical geography in University College, Aberystwyth.

Mr. H. J. Seymour, B.A., of the Geological Survey of Ireland, has been appointed professor of geology in University College, Dublin.

Discussion and Correspondence

The Green Bug and Its Natural Enemies

Professor Woodworth has very kindly sent me in advance a copy of his review of "The Green Bug and Its Natural Enemies." The views advanced by him are interesting and his interpretations somewhat out of the usual order.

1. He does not understand why data from the experimental laboratory studies were not used to show the potentiality of the parasite, *Lysiphlebus tritici,* over the green bug, *Toxoptera graminum.* No attempt was made to use the data in that way, since the contest between the two forms took place, not in the experimental laboratory, but under natural conditions in the open, over territory from central Texas northward through Oklahoma to central Kansas. Accordingly, it was stated (page 135), "The average number of green bugs killed by a single parasite under natural conditions is probably much larger than the above figures show," and reasons were there given for this opinion. Since that time corroborative evidence on this point has appeared as follows: "The female *Lysiphlebus* is even more prolific than the female *Toxoptera.* Mr. Phillips has found females which had upwards of four hundred eggs in their ovaries and Mr. Kelly has reared in some cases 206 individuals from a single mother *Lysiphlebus.*[1]

Obviously, then, figures or tables, such as prepared by the reviewer, based on data obtained under artificial conditions, would not form a safe basis for conclusions upon the outcome of such a struggle in the natural environments of the contestants.

However, since the reviewer has placed special stress upon the value of his tables it should be noted, as showing their bearing upon the laboratory experiments, that he takes the minimum period, five days, for development of the green bug and considers that as the average. That is, among 140 green bugs reared in laboratory under daily observation, four, or 2.8 per cent., gave birth to young on the fifth day, and this percentage he rates as the average. As a result he obtains 95,571 progeny for one green bug in thirty days, whereas the author, using the average summer rate, seven days, of development for 80 green bugs reared in laboratory under daily observation, obtains for the same period 15,794 (page 95)—a difference of 79,777 on the first basis of comparison. As to the parasite, the reviewer takes the average rate (page 7 based on results of several observers) of development of parasite in the open field, seven days, for his computation on the parasite.

That is, the behavior of 2.8 per cent. of the green bugs observed in the laboratory and the behavior of the average of all parasites observed in the open, are the factors which he uses to compute the potentiality of the parasite. Obviously, basal factors so unlike in quantity and conditions furnish no reliable foundation for comparisons from which to deduct safe conclusions. Furthermore, these factors are not representative of the data from which they are supposed to be taken.

Consequently, the subsequent computations and deductions upon his table as brought out by the reviewer, unique in themselves, would not seem to require further consideration here.

The statement of the author regarding the outcome of the struggle between the parasite and its host was not based upon deductions from the experimental laboratory data, but from the records of continuous field observations made during the entire time of the struggle by eight different reliable observers. The seven from the university were stationed from central Oklahoma to northern Kansas, as

[1] Circular No. 93 rev., p. 15, U. S. Dept. of Agric., B. of Ent., June 23, 1909.

shown by pages 13 to 30 of the bulletin. The eighth, Agent Sanborn, of the Federal Bureau, who had been working by assignment on this problem for a year previous, was present at the original outbreak in Texas and made personal observations back and forth from central Texas through Oklahoma to central Kansas.

The pertinent portions of these various field observations are to be found on the pages just cited, and all agree without qualifications that *Toxoptera graminum* had been vanquished by *L. tritici*. Moreover, every entomologist whose observations on this undue multiplication of *T. graminum* have since been published agree on this point.

From the information, then, at hand bearing upon the statement, "That this parasite not only controlled, but in many cases practically exterminated, the green bug last season no one questions," it would seem that, with the exception of the reviewer, this statement maintains.

2. The reviewer suggests the probability of the disappearance of the green bug being due to meteorological influences and cites from the report to show that climatic conditions inimical to the green bug do arise. Such conditions do arise, but, as Glenn has shown later in this report (pages 176 and 180), it is the extremes of summer and winter temperature that affect the green bug, while the struggle between these forms took place and was decided during April and May, within which time, as the records show, no such inimical climatic conditions existed.

3. On pages 150–155 of this bulletin it was shown in the laboratory experiments that *L. tritici* did parasitize certain aphids other than *T. graminum*. On page 156 the original description of *L. tritici* Ashmead is published, in which appears, "Reared June 20, 1882, from wheat Aphis, *Aphis avenæ*." There does not, then, seem to be any evidence in this bulletin to support the reviewer's inference, that, "He [the author] considers the parasite to belong particularly with this species of Aphid."

4. In referring, however, to whether *Lysiphlebus* maintains a general distribution on these other hosts the reviewer calls attention to a pertinent question. The author believed and so stated many times during this outbreak prior to the middle of April, that this parasite existed quite generally over the country, supposedly on other aphid hosts. The author's opinion was modified during April by the cumulation of the following data:

(Pages 31 and 32.)

(*a*) The green bug was present in Kansas in December, 1906.

(*b*) During the first two weeks of April, eight widely separated localities throughout the wheat area of the state showed parasites present in but one place, and subsequent examination proved that to be a spot of very small area.

(*c*) During the same period of April an expert from the Federal Bureau of Entomology, sent here to study the situation, examined wheat fields in nine different parts of the state (Kansas) and found those places free from parasites, except at one point on the southern border, where, he states, "they are beginning to appear."

(*d*) Field experiments showed that parasites were absent until introduced.

(Pages 29 and 30.)

(*e*) Sanborn reported that *T. graminum* had continued to multiply during December and January over a comparatively large area of northern Texas under conditions favorable to the existence of the parasite and yet no parasite had appeared.

Then, later in the season, further evidence tended to confirm the opinion that *T. graminum* did not maintain a general distribution on other aphids: First, early in June, after weather favorable to both the artificial and natural distribution of the parasites, a conservative, trained observer found a large area in the northern part of the state (Kansas) where green bugs were present, but parasites, with one possible exception, only where introduced. Second, a serious outbreak of the green bug was reported from Washington, D. C., unattended by the parasite, and this at the close of July, a season most favorable for the activities of the parasite (page 32).

Since the meteorological conditions of the spring of 1907 were unusual, the author was

still of the opinion that in normal years the parasite would, in all probability, maintain a general distribution (page 26). During the spring and summer of 1909 a notable exception to this opinion existed in southwestern Oklahoma. Here the green bug was abundant over about one hundred square miles. This area was examined, first by a representative from the federal bureau about the middle of April and then by a member of the entomological department of the university of Kansas a month later, and neither of these entomologists found any evidence of the presence of the parasite. Reliable reports subsequently made to the author showed the green bugs present and the absence of the parasite during the entire growing season and this in a locality where parasites were superabundant two years previous and in a climate favorable to the existence and natural distribution of the parasite.

These are the evidences upon which the opinion was based that this parasite does not maintain a general distribution.

5. What the reviewer says regarding the Australian lady bird in California is important. The only reference to this insect in the bulletin is in connection with a historical summary of entomological endeavor in the control of one insect by the use of another. Since this lady bird is not referred to in the discussion of the green-bug problems, there does not appear to be anything to show that the behavior of this lady bird was used as corroborative evidence to strengthen any conclusions regarding the green bug and its parasite.

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GAMETOGENESIS OF THE SAWFLY NEMATUS RIBESII. A CORRECTION

In the *Quarterly Journal of Microscopical Science,* Vol. 51, 1907, p. 101, I described observations on the gametogenesis of *Nematus ribesii,* some of which subsequent work has shown to be erroneous. Since my statements have been quoted in several recent papers, I think it necessary to correct the mistakes as far as possible, although I have not yet reached a satisfactory solution of the phenomena. The errors arose partly through misinterpretation of the phenomena observed, and partly through imperfect fixation, for I find that, unless the material is very accurately fixed, the chromosomes tend to adhere together and give the appearance of a smaller number than the true one. The same cause has led other observers to make similar mistakes.

Reinvestigation of *Nematus* shows, in the first place, that there is only one division of the spermatocytes; the first division described in my paper is not a true mitosis, but is probably comparable with the abortive division observed in the spermatogenesis of the bee. I have not yet been able to determine the chromosome number with certainty. In the spermatogonia the number appears to be about sixteen, and that in spermatocyte mitoses about eight, but if eight is the true reduced number, the occurrence of sixteen in the spermatogonial mitoses of larvæ derived from parthenogenetic eggs is unexplained. In the bee, and as I find, also in a cynipid (to be published shortly), the spermatogonial number is the same as that of the spermatocytes.

I have not yet obtained fresh material for reinvestigation of the maturation of the egg, but the results of my recent work on the spermatogenesis make it clear that my observations on the chromosomes in the polar divisions also require revision.

But the behavior of the chromosomes in *Nematus ribesii* is so difficult to follow that it is possible that the true interpretation will be obtained only by the discovery of some nearly related species in which they are more clearly distinguishable.

Leonard Doncaster
University of Birmingham, England,
November, 1909

MOUNTAIN AND VALLEY WINDS IN THE CANADIAN SELKIRKS

To the Editor of Science: Report has been brought from British Columbia by Mr. C. T. Brodrick, of Harvard University, of an interesting case of the daytime descent of air