

GENERAL.

Foul-Brood Spread by Comb-Foundation.

THE following articles on the above important subject by Mr. Corneil is taken from the American Bee Journal. The editor of that paper after putting Mr. Corneil's communication in type, sent a proof to each of the persons who replied to Mr. C's. former article and the criticisms which they made follow immediately:

Now, that some of the most prominent manufacturers of foundation, as well as several editors of the bee-periodicals have expressed their views on the question of infection in comb-foundation, I ask for space for a partial reply, and to give some additional facts bearing on the question.

Mr. Dadant is in error when he says (American Bee Journal, page 470) that the number of bee-keepers I alluded to as having raised the question of infection by means of foundation is only four. I wanted to show that the subject is one on which bee-keepers are not agreed, and I quoted four on one side of the question, and four on the other, which was quite sufficient for my purpose.

Since it is evident that Mr. Dadant has missed, or forgotten, these items in the bee-periodicals published in England, the fact that he does not recollect noticing only such items in the periodicals published in France, Germany, Italy, or Switzerland is not good proof that the bee-keepers in these countries have not raised the question. I am sure that bee-keepers "in Europe and America" will not soon forget their deep obligation to Mr. Dadant for the information that, "with Mr. Corneil England is Europe, and the United States America."

Mr. Dadant argues that because Pasteur taught that a temperature of 140 kills the "seeds of disease" in wine, therefore, 150 will kill the spores of foul-brood in wax. I do not so understand Pasteur. Troussart, in his work on "Microbes, Ferments and Moulds," quotes from Pasteur's book, "Études sur vins," as follows: "The source of diseases which affect wine consists in the presence of parasitic microscopic plants, which are found in wine under conditions favorable to their development, and which change its nature, either by the withdrawal of what they take for their own nutriment, or, still more, by the formation of fresh products which are due then to multiplication of these parasites in the wine."

From this it is plain that Pasteur does not teach that the spores or "seeds of disease" are killed by a heat of 140°, as alleged by Mr. Dadant, but that it is the growing microscopic plants which are destroyed by this temperature. The spores of these plants or ferments are air germs, introduced before the wine is put into the casks; like noxious seeds in the soil, they are harmless till they germinate and multiply, which they do by budding and bipartition, no spores being formed while the nutriment in the wine lasts.

Mr. Dadant is not the first who has failed to discriminate between spores and microscopic plants in active growth. Regarding such mistakes, Tyndal writes: "The failure to distinguish between these stubborn germs and the soft and sensitive organisms which spring from them, has been a source of error in writings on biogenesis."

In my article, on page 417, I stated that so far as I then knew the lowest temperature at which the spores of bacillus alvei, when in their most resistant condition, are invariably killed had not been determined, nor has it been so far as I yet know; but I now find that good work has been done in this direction, of which I was not then aware. I am indebted to my friend Dr. P. Burrows, of this place, for calling my attention to Vol. XIII, Papers and Reports of the American Public Health Association. This volume contains the report of Dr. G. M. Sternberg, Chairman of the Committee on Disinfectants.

Under the directions of Dr. Sternberg, experiments were made in the biological laboratory of Johns Hopkins University, Baltimore, to test the effects of chemicals on the spores of several kinds of microbes, including the microbe of foul-brood. Dr. Sternberg himself made experiments to test the effects of heat as a germicide, and in two of his experiments he included the spores of bacillus alvei.

His first experiment showed that the spores of foul-brood were not killed by a 10 minutes' exposure to 176°, nor by an exposure of the same duration to 194°; but it showed that they were killed by an exposure for 10 minutes to 212°. The results of the second experiment showed that the spores of bacillus alvei were not killed by an exposure of 2 minutes to 212°, but that they were killed by an exposure of 4 minutes to that temperature.

Such experiments require costly appliances, a great deal of time, patience, skill, and good judgment. The particulars furnished in Dr. Sternberg's Report on Disinfectants, show that his experiments were conducted with the care