

volume per cent. ;' but, after giving an account of his own experiments and of a number of those made by Dr. Koch, Dr. Sternberg writes :

'In view of the experimental data here recorded it is evident that the use of sulphur dioxide for the disinfection of spore containing material must be abandoned. This is the conclusion of Woffnengel on the basis of Koch's biological tests and his own experiments. He is, therefore, inclined to abandon entirely the use of this agent for disinfecting purposes.'

It appears that the germs of smallpox, diphtheria, cholera, scarlet fever, purpural fever, and yellow fever do not form spores; therefore, Dr. Sternberg still recommends sulphurous acid for destroying the infection of these diseases.

From the foregoing I think it will be admitted that bee-keepers cannot depend upon the fumes of sulphur to disinfect their hives. Dipping them in a solution of corrosive sublimate, 1:500, is sure death to all spores, but the hives must be rinsed afterwards, or the bees may get some of the poison.

May I be permitted to direct attention to another matter? On p. 407 of the present volume of the British Bee Journal the editors say: 'If wax is kept at a temperature of 212° for four minutes, it is stated the microbes are destroyed.' This is true as regards moist heat—that is, heat supplied when the spores are soaked with water, as is a seed when it is in a condition to germinate; but Koch and Woffnengel have shown that the same spores which are killed by a temperature of 212° for four minutes when soaked and in a moist condition, require a temperature of 284° for three hours to destroy their vitality when in a dry state.

I have been contending in the columns of the American Bee Journal that spores in wax melted in boiling water are dry spores, because, on account of being coated with melted wax, they are incapable of absorbing water. I believe that sheets of foundation often contain millions of live spores of foul brood; but, while they remain encased in the wax, and are thus prevented from absorbing moisture, they are harmless. I think it probable, however, that when the bees are drawing out foundation into comb, or when they are cutting down or rebuilding cells, or in some of the manipulations to which the wax is subjected, spores may occasionally become exposed to heat and moisture, and thus be the means of starting foul brood. The question is a difficult one to prove experimentally. If some of the readers of the British Bee Journal can find a way to test the vitality of spores in foundation, and thus settle the

question beyond dispute, we shall all feel under obligations.

I notice that in the item referred to above, the editors say, also that wax is kept at 212° for twenty-four hours in making foundation; probably basing their remarks on the statement of Mr. Newman, editor of the American Bee Journal, to that effect. Mr. Newman gives Mr. Dadant as his authority; but, on reference, it turns out that what Mr. Dadant says is that 'to get rid of impurities wax should be kept liquid twenty-four hours.' Mr. Newman's attention has been called to his error, but, up to the present, he has not corrected it.—S. CORNELL, Lindsay, Ont., Canada.

[It is very evident that the more we know of the subject the more difficult we find it to destroy the vitality of spores. The bee-keeper's hope, therefore, in contending with the disease, is to continue the use of disinfectants in order to destroy or neutralise crops of bacilli. Better to prevent them from coming into existence than to destroy them afterwards. 'Prevention is better than cure.' Most scientists are agreed that bacilli can be destroyed much more easily than spores. We cannot recommend the use of corrosive sublimate in an apiary, owing to its dangerously poisonous nature, for we must bear in mind that every bee-keeper has not received the scientific training which would enable him to exercise due care in manipulations with dangerous compounds, and were corrosive sublimate to be used, it would not fail to get into the hands of some careless individual, probably with disastrous results. Valuable as it is in the hands of the trained scientist, some eminent men consider that the value of mercuric chloride as an antiseptic is much overrated. It is possible, if wax were merely melted on the surface of the water, for the spores to remain dry, but we doubt very much if they have the coating of wax our esteemed correspondent imagines—this because the water is boiling, and the act of ebullition causes the water to pass through every portion of the wax. In fact, if any one will observe wax boiling in water, it will be seen that wax and water are constantly changing places. Then we think it probable that the spores are subjected to the moist heat necessary for their destruction. We apprehend that if the spores are in foundation, they would be encased in wax, and would then be harmless. We have never had a case of foul brood brought to our notice that could be traced to using foundation. We do not see that it would be impossible to test the matter, as a bacteriologist ought to be able to separate the spores from foundation, and if they are still alive he should