

exposure to a lower temperature produced the same effect as an exposure to a higher temperature for a shorter time."

Dr. Sternberg shows that the death point in micro-organisms was from 122° to 212°, and that 5 out of 37 of the strongest of them required 4 minutes of moist heat to cause death, and one of that five was *bacillus alvei* (foul-brood microbes).

Now, instead of subjecting these microbes for 4 minutes to 222° in making comb-foundation, the wax is held at over 212° for 24 hours, as shown by Mr. Dadant's statement on page 470. Surely, this is more than sufficient to take the life out of even the strongest microbes; as they are for 360 times the length of time exposed to the temperature required to kill "one of the most resistant pathogenic germs known."

There is not, therefore, the slightest excuse for further agitation of the question, or for the suspicion that the use of comb-foundation, when properly made, can possibly aid in spreading the disease.—ED. AMERICAN BEE JOURNAL.]

FOR THE CANADIAN BEE JOURNAL.

Microbes, Ashes, Drugs.

BY ALLAN PRINGLE.

NOTICE that several writers in the bee journals (among them Prof. Cook,) deny that chilled brood rotted, or brood dead and decomposed from other causes, can cause foul brood. They emphasise the denial, but admit that the rotting brood may be the indirect cause of the foul brood. Prof. Cook, (C. B. J. vol. vii, p. 522), says "chilled brood may open the door for foul brood, but can never cause it." Outside of mathematics and demonstrated science, it is hardly safe to be dogmatic. This is really an open question. There are two theories in the premises. One is that the foul brood spore had but one origin—a creative origin away back in the past—and has ever since propagated its kind; that it is impossible to originate it without a parent spore—that it will propagate itself under certain favorable conditions—one of which is rotting brood in the hive from "chill," or some other cause—that the floating and well nigh omnipresent spore from without must find lodgment in the decaying mass, or there can be no development of spores there. The other theory is that the spore may possibly originate in the rotting mass, and not always be introduced from without. I think both are yet theories. Neither has been demonstrated. The present scientific position on the question is, I venture to assert, just this:—Foul brood is always caused by a microbe—the *bacillus alvei*. This bacillus, so

far as science knows, never now originates in decaying brood, or any other kind of decomposition. Unless the spore be introduced from without there will be no origin or multiplication of spores there. This is the scientific position, but it is certainly tentative and hypothetical. Science does not undertake to say that the spontaneous generation of the spore without a progenitor, under all circumstances and conditions, is impossible. Science only says that so far as she knows there has been no such spontaneous generation on the earth within the period of her life history—that is, within the period in which life has existed on the earth. It is quite true that the theological scientist, who believes that all living things, including foul brood microbes, small pox microbes, and all manner of parasites and vermin which pest and prey upon humanity, were created specially to increase and multiply, has no hesitation in denying the possibility of the spontaneous generation of anything. But the theological scientist is not to be taken into the account—his dogmatism at any rate. An overwhelming majority of the highest scientific authorities in the world have discarded the theological conception of special creation, and have adopted the philosophy of evolution, which they regard as being as well established by incontrovertible evidence as the law of gravitation or the motion of the earth. It is quite natural that the man who still believes in special creation should deny the possibility of spontaneous generation, either now, or at any time in the world's history.

It seems to me that the safe and reasonable view to take of this matter is this—that while it may be true that the foul brood spore was created originally once for all, or that it spontaneously originated once for all, never to so originate again; it may also be true that if it was possible for it once to originate under certain natural conditions, it is possible for it to so originate again. The facts before us would seem to point to the latter conclusion.

At all events it is practically safe to assume that foul brood may originate in rotting brood in the hive, and then there will be more care exercised to avoid the causes of dead and decaying brood in the hive.

When I commenced to write I intended to say something about ashes as a *packing*, and drugs as *ingesta*, but must defer that till another time.

Selby, Ont., June 22, 1891.

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