

Formic acid agar was then made containing the same proportion of formic acid as was found in the first sample of buckwheat honey, and weaker formic acid agar containing the same percentage of formic acid as was present in the first sample of clover honey; and spores placed upon the stronger formic agar did not germinate, while on the weaker formic agar the germination was only slightly retarded; and after the weaker agar was two days in the incubator, there was a large growth. Spores transferred from the strong formic agar (after being in contact with it for six days in the incubator) failed to grow on the weaker formic agar within two days; but after four days in the incubator they grew abundantly. The culture growing on the weaker formic agar was then transferred to the strong formic agar, to ascertain whether the germ could be accustomed to more unnatural food by previous cultivation on the weak formic agar. This transfer was, however, unsuccessful.

The germs used in these tests were isolated from samples of diseased comb from Ontario, Austria and Florida, U.S.A.

Formic acid bouillon was also made containing .15% of formic acid; and spores kept in this broth for eight months continued to germinate when transplanted to suitable material.

Formic acid agar was likewise made in the same proportion as suggested by Bertrand (59); that is, formic acid 10, water 90; and a tablespoonful of this mixture to a litre of syrup; but instead of syrup, agar was used. Fifteen c.c. of this acid agar was poured into each Petri plate, and the surface inoculated with spores.

Results: On 14 plates, no growth.

On 2 plates, very restricted growth, limited to one-eighth of an inch of the needle track (60 hours).

On control plates, abundant growth.

From these investigations, viz., the analysis of the honey, the experiments based thereon, and the tests with agar made in the proportion suggested by Bertrand, we would note three things: (1) That the amount of formic acid recommended by Bertrand for the cure of foul brood is almost identical with the amount found in buckwheat honey; (2) that formic acid is a good antiseptic; (3) that the formic acid in buckwheat honey may possibly tend more or less to ward off foul brood.

We may add that our analysis, showing a larger proportion of formic acid in buckwheat honey than in clover honey, is an interesting explanation of a fact well known among practical bee-keepers, viz., that the sting of bees when working on buckwheat is much more irritant than when working on clover.

In conclusion under this head, we may say that formic acid has given good results when used in the treatment of foul brood; and it is in a sense a natural remedy, being manufactured to some extent by the bees themselves.

(12) *Other substances used for treating this disease.* Among other substances that have been used for treating this disease are sulphuric acid, sulfaminol, various modifications of substances already mentioned, and some recommended in the McLean method (80), the Muth method, and others; but these have not had so wide application as those referred to in the preceding paragraphs.

#### EXPERIMENTS ON THE USE OF DRUGS FOR COMBATTING THE DISEASE.

I have already mentioned that, in one of my experiments, I endeavoured to find out if the virulence of the germ was attenuated by prolonged culture in artificial media, with the result that considerable attenuation occurred

after a  
endeav  
of my  
growing  
but the  
in the  
T  
and ph  
H  
H  
TH  
put into  
suspens  
syrup a  
and was  
for the  
of the p  
combs o  
symptom  
ferent p  
end of t  
ordinary  
typical  
well est  
no disea  
manifest  
This exp  
which is  
confirms  
infected  
tion of t  
it in the  
Fro  
cases the  
ures, suc  
sary or u  
but other  
In some  
be advisa  
I en  
from a tw  
would en  
filtrate w  
weeks. T  
amount g  
combs. A  
fed, and s  
toxin had