ferent places, as from gardens, rooms, barracks, sick-chambers, stables, and out-houses. With this dust was sown neutral *bouillon* sterilized by heat, and cooked potato, with the result of finding many curved bacilli in all the cultures.

3°. The curved bacilli do not exist in their characteristic form in 'atmospheric dust:' they are there present in the germ or spore condition. In fact, if this 'dust' be examined immediately after dilution with sterilized distilled water, very few curved bacilli can be made out; and these are hardly recognizable as such, being changed in appearance by the development of one or more spores at their ends, or somewhere in the middle of the rod. This sort of change is precisely what is seen in cultures. If what happens in these drops of diluted dust be observed from day to day, the number of curved bacilli will be seen to vastly increase until the third or fourth day, when the spore formation recommences.

4°. The presence of curved bacilli in water, and of their spores in the air, furnishes a sufficient explanation of the presence of these organisms wherever air or water can penetrate.

Intestinal dejections in simple diarrhoea, as well as in dysentery and typhoid-fever, broncho-pulmonary secretions in all diseases of the lungs, from simple catarrh to advanced tuberculosis, pus exposed to the air, the saliva of a sick or well man, — all substances, in fact, which can nourish the germs of bacteria, contain the curved bacilli, and oftentimes in much greater number than the other bacteria, which are also found in such culture-media. The mud of the streets, made up of dust and water, can also be considered to be a favorable medium in which they are numerous and active.

5°. These micro-organisms are decidedly *aérobie*, and only flourish on the surface of liquids. They are mobile, moving with the rapid oscillations of vibrios, and very refractive. They are easily colored by methyl violet in watery solution, and, thus stained, show all the described forms, — commas, curves, omega, S, spirals, etc. In general, they are from one-half to two-thirds as long as the bacillus of tuberculosis, but are thicker and less regular than these: in fact, no peculiarity of form or staining distinguishes them from the bacilli found in cholera dejecta. Sowing the *bouillon* with dust proves that the spores, whose formation was observed as above, are their *resting* stage: moisture seems to be the condition indispensable to their perfect development.

6°. Collected first on *bouillon* or cooked potato, and then cultivated on nutrient gelatine, these curved bacilli form rounded colonies with serrated edges composed of highly refractive granules. These colonies, kept at 20°–22° C., grow in the gelatine, and liquefy it, finally producing a colony of the shape of a glove-finger.

7°. Until conclusive inoculation experiments shall be made, proving the pathogenic properties of the curved bacillus of cholera, the conclusion to be reached is, that these latter are the same as are found in all secretions, normal or pathological, provided these have come in contact with water, which is the normal habitat of curved bacilli, or with air, which furnishes transportation for the germs.

[These experiments are exceedingly interesting, but no proof is offered to show the exact correspondence of the curved bacilli spoken of, with those of cholera. Johne's work (*Science*, June 5, 1885) speaks of the distinctive difference between Koch's comma bacillus and that of Finkler and Prior; and this latter will answer to all of the description given by Hericourt of the curved bacilli he has observed.]

HYPODERMIC INJECTION OF CULTURES OF CURVED BACILLI.

IN a paper on the effects produced in man and animals by the ingestion and hypodermic injection of cultures of the bacteria of choleraic diarrhoea (*Comptes rendus*, 1885, 1148), are given some interesting results obtained by Bochefontaine in experiments made with cultures obtained from choleraic diarrhoea in peptonized gelatine.

The first generations were found to liquefy the gelatine with a cup-shaped depression terminated by a deep point. None of the cultures contained the curved bacillus alone; but always, and in greater number than this, were found rods or spirilla fully developed. There were never found in the cultures the very short, rapidly moving bacteria which filled the watery discharges in cholera. Every successive generation showed an increase in the number of the simple curved bacilli.

I. The author has on four different occasions swallowed pure cultures of the curved bacillus of the third and fourth generation without ill effect.

II. Two adult guinea-pigs were inoculated in the flank with a fourth of a centimetre of a mixture of equal parts of water and gelatine containing the culture: both were found dead the next morning. The autopsy showed great effusion on the inoculated side and opposite abdominal wall, with nothing in the internal organs. Two other guinea-pigs were inoculated with an eighth of a centimetre of the same mixture, and the smaller one died in twenty-four hours, with appearances similar to the first two. The second showed no symptoms. Microscopic examination of the blood of the three dead animals showed nothing. The same injection was made in two larger guinea-pigs, with no result.

III. The experimenter injected three-fourths of a centimetre of the mixture under the skin of his left fore-arm, with the result of much oedematous swelling and some pain, with deep fluctuation in the region of the puncture, three days afterwards. Black blood obtained from this point showed no bacteria, either microscopically or upon cultivation.

The inferences that the writer draws are, that the ingestion of the cholera microbes produces no unpleasant symptoms; that their hypodermic injection will produce local symptoms if in sufficiently large dose; and that the blood of man and animals under normal conditions will destroy cultures of the bacteria of choleraic diarrhoea.