

After a brief introduction referring to the objections raised to Pasteur's method of inoculation by Koch and others, the paper goes on to remark:—"It is known that the cholera vibrio has only a minimum virulence, to the extent that M. Koch, who discovered them, has believed after numerous failures, that Asiatic cholera was not inoculable in animals. On the other hand, Pasteur's assistants only once succeeded in inoculating a fowl. Now it is easy to endow the cholera vibrio with an extreme degree of virulence; it is only necessary to inoculate a pigeon after its passage through a guinea-pig; it then kills pigeons in giving them a dry cholera with exfoliation of intestinal epithelium. What is still more important, the microbe also appears in the blood of pigeons which have died from it. After several inoculations this microbe acquires such a virulence that the blood of carrier pigeons in the dose of one or two drops, kills all fresh pigeons in the space of eight to twelve hours. The virus also kills guinea-pigs with still smaller doses; all animals of those two species similarly succumb to the infection. With this absolutely deadly virus we have been able to prove the existence of choleraic immunity. Thus we have inoculated a pigeon twice with an ordinary cholera culture (non-virulent), the first time in the pectoral muscles, the second in the abdominal cavity. This pigeon has become refractory to repeated infections of the most virulent virus. The fact of immunity is thus acquired.

Now, if one cultivates this virus (*de passage*) in a nutritive bouillon, and if one subsequently heats this culture to 120 C., for twenty minutes, to certainly kill all the microbes it contains, we prove then that heating has allowed to subsist a very active substance in the sterilized culture. This culture, in fact, contains a poisonous substance which causes characteristic phenomena in experiments in animals. Inoculated with the dose of four cubic centimetres to a guinea-pig, the sterilized bouillon produced a progressive lowering of the temperature, and death in twenty or twenty-four hours. At the autopsy we found a pronounced hyperæmia of the stomach and intestines, and, with reason, a complete absence of choleraic microbes. Pigeons succumb with similar morbid phenomena, only they are most decidedly resistant to this poison, and death only succeeds after an injection of 12 cubic centimetres. If on the contrary one intro-

duces this same quantity of 12 cubic centimetres, but in three, four, or five days: in injecting, for example, 8 cubic centimetres the first day and 4 cubic centimetres the day after, one does not kill them.

We have proved besides in these pigeons another phenomenon; they have become refractory to cholera. Inoculation does not kill them. Vaccination of guinea-pigs succeeds more easily; in injecting them with the toxic bouillon by doses of 2 cubic centimetres, they are vaccinated in three *séances* or with 4 or 6 cubic centimetres. We are thus in possession of a method of preventive vaccination against cholera. It is founded upon the principle of employing a sterilized vaccine and has all the advantages of chemical vaccination; certainly and securely, since the chemical vaccine can be measured in a perfectly exact manner and introduced by doses sufficiently small to be entirely inoffensive, while the total of these can give the desired quantity necessary for complete immunity.

Pasteur was authorized to state that Gamaleia was prepared to repeat all the experiments before him in the Paris laboratory.

In remarks made thereafter by M. Pasteur, he states that M. Gamaleia had been sent to his laboratory by the municipality of Odessa, to study under him experiments in inoculation against rabies, and this fruitful result has grown out of Gamaleia's labors.

CLIMATOLOGY

The Climate and Environment Best Suited to Old Age in Health and Disease.

OPENING ADDRESS BY PROF. A. L. LOOMIS, M.D., PRESIDENT OF SECTION ON CLIMATOLOGY, WASHINGTON MEDICAL CONGRESS.

In studying the therapeutics of climate, and its effects upon diseased processes, one soon realizes that *age* is a factor which enters very largely into the climatic problems which we are endeavoring to solve—much has been written on the climates best suited to the management of different diseases, but the literature of *the climate and environment best suited to old age in health and disease* is meagre and conflicting. I have thought that it might not be without interest, if I should at this time give you some of the results of my experience and observations on this subject.

The life of man is naturally divided into four periods—infancy, youth, manhood, and old age; each period has its mental and physical character-