

CURE OF CONSUMPTION—AN INTERVIEW WITH PROFESSOR KOCH.

BY DR. CHARLES HACKS, IN "ILLUSTRATION."

"My hour of consultation is between 12 and 1 o'clock," signed "Koch." This is written on a little



Fig. 1.—THE BACILLI OF CONSUMPTION FROM NEW MUCUS EXAMINED UNDER THE MICROSCOPE.

square piece of paper fastened by four pins in a gray frame against the wall at the foot of the grand staircase in the entrance of the Imperial Hygienic Institute, in Berlin, and it was this that four European reporters were studying on the 5th of November, at 9 o'clock in the morning. Alas! what an illusion! Many others have been stopped by that little card, and gone no further. It is not easy, in fact, to reach this celebrated savant. From the porter to the secretaries, every one is extremely reserved in that house. It is almost impossible not to have one's card intercepted before it reaches its destination. We had the good fortune, nevertheless, to overcome all obstacles, and by exceptional favor obtained admission. We are going to try to lift a corner of the veil under which the German sphinx lies hidden, and to show to all the world the great question of the cure of consumption and by what intellectual and experimental processes the present condition of the science has been reached.

The intimate friend and adviser of Dr. Koch received us in his private study on the third floor of the institute. On the door is a little card on which are the words "Dr. Koch." The room is very small, and is partly filled by an enormous stove of faience, which reaches to the ceiling, and opposite to it is a large table covered with green and provided with two drawers. At the end of the room near the window is a little oak bureau, on which we perceived two proofs of photographs of which so much has been said, and which ought to be annexed to the report which is waited for with so much impatience. They represent two forearms with a hand showing the scars of tubercular lesions that have been cured, and photographs of which have been taken from day to day.

Prof. Koch immediately arose and stretched out his hand to me.

"I am very pleased to meet you," said he. "I remember very well our former intercourse at Marseilles at the time of the cholera in 1885. I remember also that you were the first one to translate my works and discoveries, but," and he held my card in his hand, "I guess the cause of your visit, and regret to say that I will not be able to tell you all I would like."

"Nevertheless," I replied, "the French public wish to know you, and to know and to see something of you and of what relates to your researches. That you will certainly grant me. In the first place, let me ask you for your photograph signed."

I then asked him for a tube containing some bacilli. Prof. Koch passed immediately into a neighboring room and came back holding in his hand a tube containing the culture, which he gave to me.

"Will you authorize me to say that these came directly from your laboratory and were given to me by you?"

"You know very well that I am a simple man, and how much I fear the notoriety which has arisen. Nevertheless, you desire it, and I give you the authority."

"Since you are in the vein, what would you think of letting me have a tube of the culture of comma bacilli of cholera? You are probably the only person in the world who has the germs of cholera bottled up, and it will be interesting to show as coming from the author of the discovery."

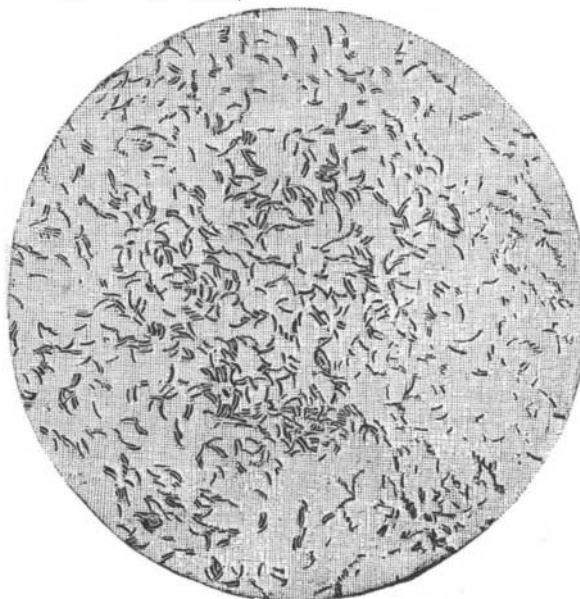


Fig. 3.—THE SIMPLE CULTURE OF BACILLI OF TUBERCULOSIS EXAMINED UNDER THE MICROSCOPE.

"It is not necessary for me to recommend to you the greatest prudence, as these bacilli are virulent."

"Certainly I shall destroy them just as soon as I finish using them. I would like to give photographs of the laboratory."

"As you please. You can have what you wish ex-

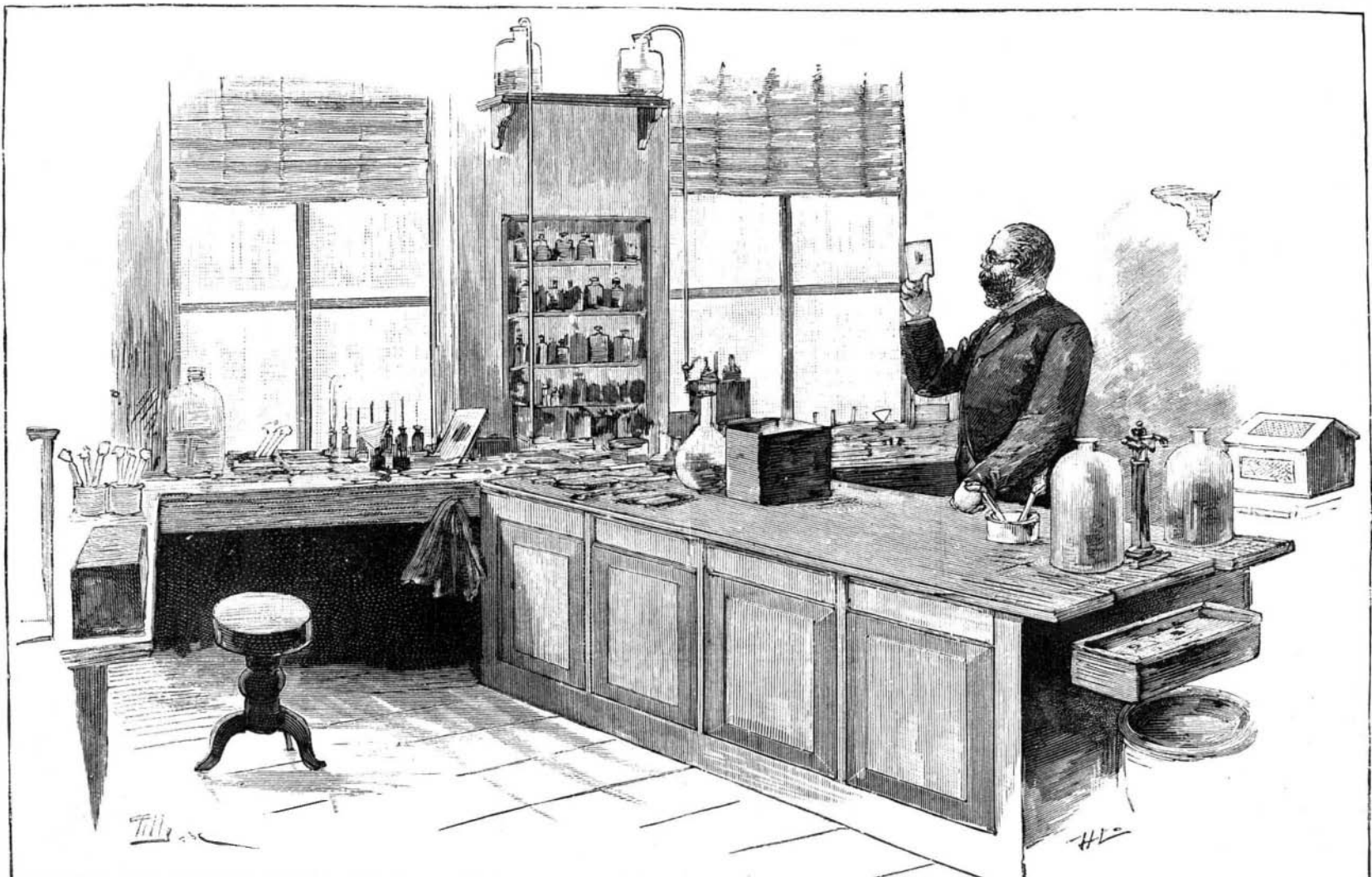
cept the small room at the rear. I am going to ask Dr. Pfeiffer to assist in making photographs of my laboratory of bacteriology, especially that part of it which relates to my work and where my experiments are made. He will give you all the information you need."



Fig. 2.—THE SAME BACILLI EXAMINED UNDER THE MICROSCOPE AFTER A PERIOD OF DEVELOPMENT OF FOURTEEN DAYS.

Dr. Koch was born December 11, 1843, at Clausthal, where he first attended school. From 1862 to 1866 he studied medicine at Goettingen; then, having become a professor of medicine, he commenced his practice at Posen.

A few years later he was chosen professor and commenced his first work on the study of tuberculosis. He discovered the bacilli, he studied it, and settled the fact that consumption is caused by a bacillus. This work at once put him in the very first rank, so that in 1883 he was sent by the Prussian government to India to make a study of cholera and to discover the cause of that infectious malady. This time again success crowned his efforts, and it is admitted to-day without doubt that cholera is caused by comma bacilli (a name which Dr. Koch himself gave it on account of its resemblance to the comma), as tuberculosis is caused by the Koch bacilli. As a reward for his services, on his return the state voted him a purse of \$25,000. The importance of the work of this German savant was thus recognized, and it appears that he is justly entitled to be considered one of the most extraordinary persons of our time. It may be well to mention at this point that according to Koch there is no fear of cholera returning to Europe, or at least it will not pass beyond some of the countries of the South. Berlin with its remarkable system of sewerage, and Paris also, have nothing to fear from that terrible malady. This is certainly reassuring. Thus it may be seen that the object of all of Professor Koch's work is the discovery of the cause of infectious diseases. He is satisfied that what he has done for tuberculosis and cholera, and what others have accomplished for other maladies that are less deadly, such as erysipelas, could also be done



DR. KOCH AT WORK IN HIS LABORATORY.

for all diseases, whatever they may be. From this it may be seen that his labor on behalf of science is not yet finished. It appears in fact that Koch has for the time being abandoned the examination of microbes for that of their destruction in the living human body. It is well known, thanks to him, that consumption is occasioned by microbes whose presence in the lungs, as, for example, in the case of pulmonary tuberculosis, occasions the phenomenon of phthisis. It is useless in treating this disease to repeat the errors of the past by the use of tonics and by telling patients to avoid taking cold, and even, when some new specific has been discovered, to force the patient to swallow it; all this and the use of a hygienic regime, and certain remedies resorted to in the treatment of phthisis, have accomplished nothing, and patients continue to suffer and resist the disease a longer or shorter period of time. Dr. Koch abandoned this well-beaten road, he threw aside everything which did not rest upon the solid scientific basis; all the experiments that had been made, from the benzoic acid to the hot air method, all that is an illusion because it is based on a misconception.

Prof. Koch first commenced experiments with a tube which we represent. It is an ordinary test tube, such as is used in all ordinary experiments. It is, in the first place, sterilized over the fire, then a bouillon of sterilized culture is poured into it, that is to say, culture which does not contain any germ. This bouillon is prepared with agar-agar, a sort of gelatine. When this has been done the microbe, which is taken directly from the mucus of a consumptive, is placed in the tube and the orifice is closed with cotton, thereby permitting the air to pass into the vessel, but retaining the organisms, which are held suspended therein. The tube thus prepared is subjected to an even temperature in an oven. After a certain length of time the microbes begin to develop and increase, and assume the clotted appearance which we see in one of the engravings, and which is one of the characteristic peculiarities of consumption. But in order to experiment effectually it is necessary to have the culture absolutely pure, and it is obtained in this manner: In the first place take some of that treated as above and place it in another tube. This is repeated, and after

50 or 60 successive changes of this nature a residuum is obtained which is called pure culture, that is to say, it contains absolutely nothing but the microbe which it is desired to study. The pure culture of bacilli of tuberculosis is represented in the photograph which we have reproduced, Fig. 3, the negative of which came from the Koch laboratory. It gives perfectly the idea of what may be seen in the field of the microscope. Each one of the black points which are seen in the photograph represents a bacillus, that is, a pathogenic organism, which is the cause of the disease and which was discovered by Koch. It was upon these pure cultures that Koch made his first experiments, to try upon each one a long series of chemical reagents, of which the following are the principal: In the series of ethers, etherized oil; of the series of aromatics, *B* naphthaline, para-toluidine, xylydine, fuchsine; among the colors, gentian violet, methylene blue, China yellow, aniline yellow, orimene; of metals, tin, silver, and gold. He found the action upon the last of these the most energetic of all.

It only required one or two millionths of chloro-cyanide of gold to stop all development of bacilli of tuberculosis in pure culture. It is seen what an enormous amount of time and trouble was required to make all these tests. Koch saw not only that all the substances which we have cited, but many others with which he experimented—a list of which would be too long for us to give—have the power in a test tube of arresting the development of bacilli of consumption. He had, therefore, finished the first part of his programme in searching for the substances which when

mixed with pure culture of bacilli of tuberculosis were able to arrest their development. He passed on then to the second part of the programme, viz., experiments upon animals. He selected the guinea pig as a subject, because of all animals this is the most liable to

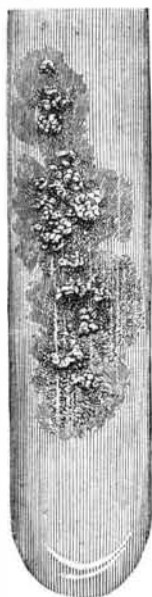


Fig. 5.



Fig. 6.

Fig. 5.—TUBE CONTAINING THE GERMS OF BACILLI OF TUBERCULOSIS FROM THE LABORATORY OF DR. KOCH.

Fig. 6.—TUBE CONTAINING THE GERMS OF COMMA-BACILLI OF CHOLERA FROM THE LABORATORY OF DR. KOCH.

tuberculosis when inoculated. He tried all the substances mentioned in the above list upon the guinea pigs thus rendered consumptive, and he observed that although the action of these substances was so remarkable in the test tube, there was no apparent result when they were applied to the animal. All the inoculated guinea pigs died of consumption. Without being discouraged, however, he undertook a second series of experiments, also upon living animals. He succeeded in discovering a substance (and it is here that the

secret begins) which, active in the test tube, preserves its action when it is transferred to the body of the animal. Upon the second series of guinea pigs which had been inoculated, the increase of the bacilli was stopped as soon as the substance was administered, and all were cured. Here it is necessary to rectify an error which the journals have spread. It is known that he made his experiments upon a large number of animals, and everyday one of this number disappeared, and it was supposed that it was one of those that had been inoculated. No, it was simply that he killed one from day to day because he wished to follow all the stages that were reached. In all the autopsies it was found that the lesion was stopped as soon as the substance was injected, no matter what stage of development the disease had reached. He was, therefore, able to let a certain number of ex-consumptives live, and they are to-day in a perfect state of health.

It was after these two series of investigations, which were so long, that having arrived at a definite result, he was enabled, before the Congress of Physicians held in Berlin in August last, to make his first communication, which caused so remarkable a sensation. This is what he said in concluding his remarks: "My researches are not yet entirely finished, and I am only able to affirm one thing, viz., that the guinea pig, which is, as every one knows, liable to consumption, became entirely free from it the moment that it had absorbed this substance, and from that moment the disease was arrested and its progress stopped, whatever may have been the stage previously reached, and that also without the constitution being in any way impaired. I am only able to draw one conclusion from these researches, viz., the possibility which exists from this day of paralyzing absolutely the action of the microbes in the animal. It is a new field open to experiment and observation." These were exactly, word

for word, the conclusions of Dr. Koch in the month of August last, and it is on a false interpretation, or rather on a premature conclusion, that the idea was created at that time that his researches had attained to the cure of consumption in the case of man. Dr. Koch had not even made allusions to this. It was only later, and following always the idea and the scientific methods which have always guided Dr. Koch, that he began to experiment upon man, guided by the definite results already obtained upon animals and with a feeling of certainty that like results would follow.

With a simple Pravaz syringe and drops of the liquid, the consumption disappears and the hectic flush is modified; the patient is cured; and if Dr. Koch is not yet willing to divulge his secret, it is because he is wise in his own opinion, founded on scientific principles, and that he is not willing to leave one iota of error. He was able to kill and to examine his guinea pigs when he wished to know the degree of advance in their cure; but he cannot follow the same course with men. He is no longer experimenting, he is curing. He is obliged to wait until his cure is complete and absolute. When the last of his patients is a well man, he will speak, and we shall know all. Before then he will say nothing. This is the cause of his delay in satisfying a public curious and anxious to know all. These are the sorts of discoveries that open up the infinite horizons of science and elevate to the highest pinnacle the one who has conducted the experiments; and one is compelled to respect the true savant, who fears notoriety, and who will quietly and modestly bestow, someday, this cure upon humanity, without any recompense (in spite of offers of all kinds, which come to him from every side), without any other profit than adding one more leaf to the already beautiful crown of that modern science of which the French genius, in the person of the great Pasteur, has furnished the elements, founded the principles, and brought about such magnificent results.



ROBERT KOCH, DISCOVERER OF THE CURE OF CONSUMPTION.