In conclusion we will endeavor to answer the question as to the suitability of the country for immigration. The Shiré highlands, with their cold, bracing air, have proved by the test of many years to be well adapted to the conditions of European life. Scotch and English ladies have lived there in excellent health, and their children are robust and healthy. If this be so, we think that the still higher plateaus farther inland should prove healthy, and capable of producing the vegetables and other minor necessities of European life. But to attain these highlands, the malarious coast district must be passed through, and the graves of many ladies in this area prove its deadly influence. The first requisite, therefore, is a means of rapid conveyance from the coast, together with more fully developed means of accommodation and comfort. The opening-up of the navigation of the Zambezi from its mouth, thus establishing a direct communication with the sea-going steamers, would largely effect this, and the new steamer of the Lakes Company now put on the river leaves nothing to be desired for comfort. Enthusiasts may even picture the time when the railway — already projected — from the Cape shall be extended from Kimberley to the Zambezi, and so the malarious coast district be avoided altogether. But even the coast area itself has long been peopled by British Indian settlers, who have penetrated the whole length of the Kwakwa. The shores of the lake would be admirably suited for Indian immigration. We would, however, urge that such immigrants be drawn for northern India.

Nyassa-Land is a country, as Lord Salisbury recently said, discovered by British, opened up and to some extent civilized by us, and its possibilities we honestly believe to be great. Its climate is for the most part good, its scenery picturesque and enchanting. The time has come for its development and gradual civilization, and Britain must decide now or never, whether this opportunity is to be ours, or whether this land — historical in its past associations with the names of Livingstone and his many successors, and full of promise for the future — is to be ours, or to be left to the Arab slave-dealer for the present, and the fortuitous exploitation of some European nation in the further future.

HEALTH MATTERS.

Immunity and Immunization.

DR. H. BUCHNER has recently published a new study of this subject, and *The Sanitarium* gives the following *résumé* of it: Immunity in its full meaning signifies a condition of the body which permanently opposes the development of infectious processes; but there are conditions which act transiently in the same way against the danger of infection already existing. Buchner exemplifies this by a person attacked with typhus. In this case the disease, the continuous multiplication of bacilli, is not terminated before all tissues acquire transient immunity against the fungi. But what are the means by which the organism acquires immunity in a permanent or transitory way? To answer this question, Buchner first refers to Pasteur's protective inoculation, the actual efficiency of which is generally admitted at the present time. Buchner calls it a great triumph that it should be possible to immunize a living organism in this way without hurting its tissues.

Again, another means of immunization comes from France. Chamberland and Roux have injected intra-peritoneally the chemical substances of bacteria (ptomainia) in experiments on animals affected with malign œdema and with anthrax, without taking the bacteria themselves. The animals were actually rendered resistant to inoculation with living bacilli of the corresponding disease. This discovery is practically very important, inasmuch as the effects of chemical agents for the purpose of immunization are certainly more accurately measurable than those of living fungi. Theoretically the discoverers neglected drawing the necessary consequences from their results, and this has been done by Buchner with zealous energy. He prefaces his developments with a discussion of the means by which transitory immunity may be obtained. It might be possible to neutralize specific ptomaines in the organism by means of certain substances, just as Behring succeeded in decomposing the ptomaine of cholera-vibrios, cadaverine, by means of iodoform. Nature uses inflammation as an antidote against the invasion of fungi. Ten years ago Buchner pointed to this re-action of the organism by which it acquires transient immunity, but at the present day he disposes of proofs for his hypothesis. In a former paper, Buchner has described anthracic pneumonia produced by the inhalation of anthrax bacilli. Its symptoms are those of a sero-fibrinous hemorrhagic pneumonia. In the alveoli there is found an exudation abounding in cellules and an immense quantity of anthrax bacilli. On the other hand, the pulmonary capillaries and the larger vessels were absolutely devoid of bacilli, the spleen containing only a very few of them.

For the purpose of investigating the modus by which the agents of infection are arrested in their further invasion, Buchner has lately instituted some experiments, which led to the conclusion that "inflammatory re-action not only possesses the power of arresting the passage of bacteria through the pulmonary surface, but actually to cause degeneration of the infectious bacteria, and consequent destruction." It is not permitted here to give in detail the interesting experiments which Buchner, jointly with Dr. Schickhardt, has performed on animals infected with anthrax bacilli. The microscopical result confirmed Buchner's hypothesis that inflammation originates in consequence of the bacillus, but that conversely, once originated, it induces degeneration in the bacillus, and may doubtless cause its complete decay. The latter hypothesis is corroborated by the shapeless agglomerations of granules which are found, and which represent a transformation of the bacilli.

In accordance with the fact of an antibacterial, immunizing action of inflammation, Ribbert and Lahr have ascertained, after injecting staphylococcus avoreus into the trachea, that the local inflammation prevents the bacteria from penetrating into the organism, and subsequently causes them to degenerate and to die. Emmerich, and similarly Paulowski, have tried already to utilize these experiences in a practical way, — the former by his experiments with injection of erysipelas cocci in animals affected with anthrax, the latter by establishing the fact that even simple saprophytic fungi have a restraining curative influence on simultaneous anthracic infection. It may be possible in some other way, as tried already by Landerer by means of Peruvian balsam, to create in the organism a condition of excitation which might be used as a means of immunization. Through what kind of chemical and microscopical conditions an inflammatory excitation, or immunity acquired by protective inoculation, may act deleteriously on the bearers of infection, is explained on the results of Metschnikoff's well-known phagocytic theory. In Buchner's opinion, this theory constitutes one of the greatest additions to our morphological and physiological science of infectious processes.

Metschnikoff's doctrine, opposed from many sides, draws its principal importance from the fact of having demonstrated that viable, pathogenic bacteria may indeed be devoured by cellular elements. It explains how leucocystic and other cellular elements migrate into certain tissues in a condition of inflammatory excitation, and, exposed to infection, there display their phagocytic action. It is true, Buchner does not consider every thing explained by this process alone. On the contrary, a certain chemical reaction and concentration of the different tissue-fluids seems to be necessary for the debilitation and destruction of the fungi. Buchner, on the ground of experiment, is inclined to suppose the existence of fluid substances which, formed by the febrile process, have an antibacterial action.

This explanation being quite satisfactory for transient immunity, there are other processes to be considered in permanent immunity. Voit's experiments in Buchner's laboratory have recently furnished the proof that the organism possesses in the living blood-plasma chemical properties of this kind, deleterious for bacteria. Living blood, generally, is an unfit alimentary substratum, but by a change of its quality it may become a proper medium, and in this case a morbid affection of the organism would take place; the period of incubation would then be the time in which the blood is still possessed of those properties which arrest the bacteria in their growth, or possibly even destroy them. Immunity, then, would represent a permanent power of the organism to maintain the period of incubation. The question, in what way transition to actual morbidity is prevented, is answered by Buchner, availing himself of the experimental results obtained by Chamberland and Roux, by the suggestion that it is the adaptation of the organism to the spe-

cific virus which makes the latter gradually lose its pathogenic properties. This very supposition of adaptation underlies protective inoculation with attenuated specific fungi, as well as with dissolved specific products of decomposition.

INOCULATION AGAINST INFLAMMATION OF THE LUNGS IN CATTLE. — At the end of last year the Prussian minister of agriculture ordered experiments to be made on cattle, in order to decide the extremely important question whether inoculation affords protection against infectious inflammation of the lungs in cattle or not. These experiments, according to the *Lancet*, were carried out under the superintendence of Professor Schütz and the departmental veterinary surgeon Steffen, in the government district of Magdeburg, and have recently been finished. On Oct. 8 last, twelve young bulls were inoculated with fluid and particles from diseased lungs, — three with warm and three with cold fluid, three with warm and three with cold particles. Those inoculated with warm fluid contracted the disease most severely. On Oct. 26 all twelve, along with four uninoculated animals of the same age and breed, were placed among cattle suffering from infectious inflammation of the lungs, and their noses were repeatedly brought into the closest contact with those of the diseased animals for hours together. In December and in January all the animals were killed, and the post-mortem showed that the twelve inoculated animals had remained healthy, and that three of the four uninoculated ones had contracted the disease. The experiments were now repeated, special care being taken that all the animals (inoculated and uninoculated) were exposed to as nearly as possible equal degrees of infection, and that the fluid used for inoculation was taken warm from the lungs which had proved most effective. On Nov. 9 twelve young bulls were inoculated with different quantities (0.05 to 1.0 cubic centimetre) of warm lymph. The quantity of the fluid used did not affect the intensity of the local process. One bull died on the thirty-fifth day after inoculation, of peritonitis, caused by the spread of the inoculation process. On Dec. 1 the inoculated bulls were placed among bulls suffering from infectious inflammation of the lungs, but did not contract the disease. On Jan. 27 they were taken to another stall, and again placed among bulls suffering from the disease in question. On April 12 the eleven inoculated and two uninoculated bulls were inoculated with warm lymph between the neck and the breast, after which the two latter became severely ill, and one of them died. The previously inoculated animals, on the other hand, showed only slight symptoms at the place of inoculation. On April 12, twenty grams of warm lymph were mixed with 2,000 of warm sterilized flesh-broth, and sprayed before the nostrils of the inoculated animals. They remained healthy. On May 13 they were again placed among others which were suffering severely from the disease in question. After this, no morbid symptoms were observed in them. On June 26 one cubic centimetre of warm lymph was injected into the lungs of each of the inoculated and of two uninoculated bulls. The inoculated animals remained healthy, while the two uninoculated ones contracted the disease in a very severe form, and one of them died. At the end of July the inoculated animals were killed and dissected, and no abnormal developments were found. It therefore now seems to be proved that cattle inoculated with fresh warm lymph are protected against infectious inflammation of the lungs.

THE HEARING OF SCHOOL-CHILDREN. — Over nine thousand children have been examined in the schools of the following cities, — New York, Stuttgart, Bordeaux, Munich, and Glasgow, — and the average of defectively hearing pupils is 26 per cent plus. As a comparison test between children who were regarded as bright and those considered backward and dull scholars, teachers were requested to make a selection of seventy of each group. The results of the examination of the two sets, says the *British Medical Journal*, show twice as many with defective hearing among backward children as among the forward children. Some of the advice given to teachers would be, keep in mind the liability of existing impairment of hearing in the backward children. Children known to be suffering from defective hearing should be given seats nearer the teachers, and with their best ear towards the desk. When the defect is considerable or extreme, they should be taught in separate classes. All boxing of the ears of children should be stringently prohibited.

CONFECTIONERS' DISEASE. — A disease peculiar to confectioners has been recently observed in France. It occurs principally in persons engaged in the manufacture of candied fruits and *maron glacés* or candied chestnuts. Five cases observed by Dr. Albertin of Lyons, described in the *Gazette Hebdomadaire*, March 19, 1889, well illustrate the nature of the disease. The affection is restricted to the nails of the hands, and usually first makes its appearance at the sides of the nails, the periungual portion becoming loosened and raised up, the nail losing its polish and becoming black. In more advanced cases an inflamed swelling appears at the base of the nail. The nail is rough, scaly, and in some cases broken in several fragments, but is never cast off in its entirety. Finally the terminal phalanx also undergoes a change in form, and becomes flat and widened. In the earlier forms of the disease very little pain is experienced, and the patient is able to go on with his work. The disease disappears as soon as the work is discontinued, although a deformed nail and a flat or bent terminal phalanx are apt to remain. Albertin states that among the large number of candy-factories which he has visited, he has not found one in which from one to three workmen were not suffering with the disease. *The Medical and Surgical Reporter* suggests that the affection is caused by handling and working in the various substances employed in the manufacture of candies, among which are mallic, tartaric, and citric acids. The hands are also alternately in cold and hot liquids; and this, as well as the manipulation of the preparations, by means of which the irritating substances find their way under the nails, may be regarded as causative factors. It would be interesting to know whether this disease exists in this country, where the manufacture of candies is so extensive.

CURIOUS TRANSMISSION OF SCARLET-FEVER. — The *Boston Post* is responsible for the story that in 1846 a boy eight years old was taken down with scarlet-fever, and died. One of the principal amusements of his illness had been looking over a large picture-book. After his death, this, with several other useful playthings, was packed away in a trunk. Twenty-six years later, in 1872, the trunk was taken to England. The trunk was opened the second day after its arrival, and the picture-book was taken out and presented to a boy two years old. During the next fortnight the little fellow was attacked with scarlet-fever. It was a wonder to the doctors who were called in consultation how the disease had been contracted, as there had been no scarlet-fever in the town for years. At last it was suggested that the picture-book might have transmitted the disease; and the medical men in attendance, on being told the facts connected with it, agreed that it had retained the poison for twenty-six years, and then communicated it to the child. This appears, says *The Medical and Surgical Reporter*, to be one of the instances in which scarlet-fever from some unknown source developed coincidently with the handling of articles used by a patient who had the disease many years before.

MENTAL SCIENCE.

Mental Activity in Relation to Pulse and Respiration.

THAT the blood circulation in the brain is an important factor in its healthy activity, and that the intermittent supply of the same recorded by the pulse, and the intermittent purification of the blood by the lungs in breathing, must also play important parts in the maintenance of mental action, are admitted by all physiologists, though our knowledge of the precise nature of these influences is very limited. Professor Leumann of Strassburg (*Philosophische Studien*, v. No. 4) calls attention to the necessity of noting the pulse and respiration rates in psychological experiments; and, though he gives but few positive results, his treatment of the topic is highly suggestive.

Such general observations as that when out of breath, owing to running or severe exertion, not only articulation but the words themselves fail one; that in drowsiness or sleep both pulse and respiration are slackened, — indicate the connections of the two functions. Again, these rhythms make themselves felt in such ac-