every fourth day) and live in well-built houses at a distance from the native dwellings. The railway employees suffered most from malaria, but even in their case, thanks to the persistent instruction given on hygiene, the incidence was not great. The public health generally can never be really satisfactory till the native quarter is completely separated from the European dwellings.

Ankylostomiasis.

This disease fortunately has not attacked the Europeans, but among the natives working on the plantations of the coast districts it is the cause of much inefficiency and many deaths. The measures adopted with a view to eradicating the disease were as follows: (1) Instruction as to the nature of the disease, its path of infection, and its consequences, was given to Europeans and natives both by lectures and the distribution of pamphlets printed in German and Swahili. (2) Proper latrines were constructed for all natives living in the infected districts. The form usually adopted was a large hole 4 or 5 ft. deep with a narrow opening at the top lined with tin to prevent soiling of the ground. (3) Protection of the water supplies from infection. (The last two measures were carried out by the planters.) (4) The detection of all infected persons by microscopic examination of the faeces; this was carried out by the medical staff. (5) The treatment of all persons harbouring the parasite; this was carried out by the medical staff assisted by the overseers of plantations.

In one district 2,433 natives were examined, and 1,502 (66 per cent.) were found to be infected. The treatment carried out in the Tanga district was as follows: First day, in the afternoon, 5 to 7 grains of calomel. Second day, three doses of thymol, each of 30 grains, with an interval of one to two hours between each dose; the drug was crushed and given wrapped in a wafer or cigarette paper. On the third day a purgative was given if required; for this purpose castor oil was preferred as calomel often failed to effect its purpose, and if the dose was increased symptoms of stomatitis were liable to occur. These large doses of thymol sometimes produced an effect similar to alcoholic intoxication, but were never followed by any serious symptoms.

Leprosy.

This disease is found in many districts, but fortunately does not show any tendency to spread and is not likely to have any prejudicial effect on the industrial development of the colony. The former system of collecting all lepers into a few asylums and keeping them strictly isolated there has therefore been abandoned in favour of a scheme of leper villages. These villages are located at some distance from the main roads. Each man is given a hut and a small piece of land on which he grows his own food. In most districts the natives, except those in the very early stage of the disease, were quite willing to remove to the leper villages and to remain there. A policeman is placed in charge of each village and has his hut near the entrance so that he can supervise the inhabitants.

Sleeping Sickness.

In the middle of 1907 the investigations of Koch's commission revealed the fact that along the German shores of Lake Victoria sleeping sickness was fairly widespread. A special commission consisting of five medical officers, one sister and ten medical subordinates was at once appointed to deal with this district, as also that on the shore of Lake Tanganyika. The work which the commission was ordered to carry out was, first to get rid of the *Glossinae* by clearing the shores of the lake from all "bush" and trees, and next to endeavour to segregate all infected natives in special camps, where also attempts to cure the malady could be made. Most of the infections appear to have taken place in Uganda or the Congo; strenuous efforts were therefore made to stop all intercourse with these countries. Some of the more intelligent natives were trained to examine suspects for enlarged glands and afforded the commission much assistance, especially in the examination of travellers.

In Duala district (Cameroons) there is a sleeping sickness focus. The disease is said to have been imported from Fernando Po some thirty years ago. It does not show any tendency to become epidemic. Only a few cases occurred during the year, but all of them were very acute in character.

The most important part of the report on the colony of Togo is that dealing with sleeping sickness. The disease is supposed to have been first introduced by the Ashantees in 1869. A commission was appointed by the Imperial Government in 1908 to investigate the extent of the disease, and to suggest measures for its control. By the end of 1909, 164 cases had been detected. These occurred in a comparatively small area of the colony bordering the Volta. They were collected into a segregation camp, and placed under the treatment of a special medical officer. *Glossina palpalis* is found in large numbers in the "bush" country, which covers approximately one half of the colony. In view of the existing conditions it seems strange that the disease has not become generally disseminated throughout the colony, and its failure to do so is probably to be explained by the fact that it is only in very recent years that the native has ventured to travel beyond the limits of his own village. With the security now prevailing in the colony, the natives are beginning to move about the country freely, hence the great importance of isolating all infected persons while the number is still small.

Experiments with Citronella grass have shown that it does not possess any power of deterring the *Glossina palpalis*. On one occasion, when a number of them attacked a native assistant, he was told to try the effect of moving into the centre of a plantation of this grass; the flies did not on this account allow themselves to be disturbed in their efforts to obtain a blood meal.

New Guinea.

The reports from German New Guinea lay stress on the fact that the population is not increasing, and is, in fact, in some districts actually diminishing. Various reasons are given for this condition of affairs. In one district it is stated that the natives deliberately prevent conception, produce abortion, or even kill newly born children. In the New Mecklenburg district repeated intermarriage of near relatives is stated to have produced a state of physical degeneration; female labour is also largely recruited for plantations; this in turn leads to a deficiency in the supply of marriageable women, and in consequence polyandry is now practised. The deficiency of population is very serious for the colony, as no large commercial undertakings are possible without a good supply of native labour. The question is receiving very serious attention from the authorities, and remedial measures are being considered.

Conclusion.

At the end of the volume there are a number of photographs of hospitals for natives recently constructed in the various colonies.

The report contains a mass of information on clinical medicine, sanitation, and public health. It speaks volumes for the very thorough and conscientious way in which the medical staffs of the German colonies are carrying out their duties.

THE GAS-WORKS PITCH INDUSTRIES AND CANCER.

In former publications^{1,2} we have described researches which have shown that the division of human lymphocytes, leucocytes, and certain epithelial cells can be induced under the microscope by means of certain chemical agents which have been called auxetics.³ These auxetics appear to consist of certain amidines, primary aliphatic amines, and amino-acids, which can be produced in the body by injury. In addition to this, other substances, which have been called kinetics, have been found which excite marked amoeboid movements in leucocytes and lymphocytes, and which, although they do not cause cell division by themselves, greatly augment the action of

¹ *Induced Cell-reproduction*, London, 1910.

² A Report on Cancer Research, BRITISH MEDICAL JOURNAL, October 23rd, 1909.

³ The fact that some of these auxetics cause the division of human lymphocytes was seen by Professor Ronald Ross and confirmed by him in a letter to the BRITISH MEDICAL JOURNAL of January 11th, 1911; and we can also state that Dr. Fantham, Parasitologist to the Liverpool School of Tropical Medicine, using our methods, has recently been able not only to induce divisions in *Entamoeba coli* with auxetics, but also to cause them to multiply through three generations entirely by the agencies of those substances.

the auxetics in inducing mitosis. Based on these points we formulated a theory that carcinoma might be due to this augmentation of what are apparently the chemical causes of cell division.

Soon after this was published, we received a letter referring to the incidence of cancer amongst the workmen employed in the manufacture of fuel "briquettes." The letter informed us of the proposed Home Office Regulations to prevent this incidence; that the Regulations only applied to workers with pitch made from gasworks tar, and not from blast furnace tar; and asked if we could indicate which ingredient caused the cancer, as it could no doubt be eliminated during the distillation of the tar.

As this letter was the first information which we had that the high incidence of cancer was caused only by the gasworks pitch and not by the blast furnace pitch, and as this point is obviously of great importance to cancer research, we communicated with the Home Office. Dr. Whitelegge, the Chief Inspector of Factories, kindly gave us full information, and sent us Dr. Legge's original reports on the subject. It seems that while cases of warts and swarthy skins are very common, and epithelioma fairly frequent, among the workers with gasworks tar pitch, Dr. Legge could not find these conditions among the comparatively small numbers of workers examined handling blast furnace tar pitch. Hence in the proposed Home Office Regulations the following clause appears: "I hereby . . . make the following Regulations, and direct that they shall apply to all factories and workshops in which the said manufacture is carried on, *except factories or workshops in which no pitch other than blast furnace pitch is used in the manufacture of briquettes*" (the italics are ours).

We have also made inquiries, and think that there appears to be strong evidence that the warts, epithelioma, etc., are caused only by the gasworks pitch. Blast furnace pitch is made from tar which is distilled at a lower temperature. The pitches are powdered, mixed with small coals, and compressed into briquettes. The proposed Regulations, if enforced, will provide for the establishment of bathing accommodation and overalls to protect the men from pitch dust.

Reverting to the theory that cancer may be due to chemical auxetics and augmentors of cell division, we undertook some experiments to see whether any such substances could be found in the tars and pitches. We procured samples of both. The method employed need not here be described in detail; but we may mention that in the case of the tars 10 c.cm. of each was mixed with 90 c.cm. of a 5 per cent. solution of HCl, shaken up, filtered, and neutralized. In the case of the pitches, each form was finely powdered, and then 10 grams of it was mixed with 100 c.cm. of the 5 per cent. solution of HCl, filtered and neutralized. Certain quantities of the filtrates were added to "coefficient jelly,"^{*} which also contained 1 c.cm. of a 5 per cent. solution of sodium bicarbonate; the total was boiled and allowed to set as films on microscope slides. A drop of fresh citrated blood from the finger was then mounted on to each film, which was incubated for ten minutes at 37° C., when the lymphocytes were examined. Briefly, the result may be tabulated thus:

	Contains Exciters of Cell Division (Auxetics).	Contains Augmentors of Cell Division (Kinetics).
Gasworks tar ...	Yes (0.3 c.cm.)*	Yes (1 c.cm.).
Gasworks tar pitch ...	Yes (1 c.cm.) (if augmented by atropine)	Yes (1 c.cm.).
Blast furnace tar ...	Yes (2 c.cm.) (if augmented by atropine)	No.
Blast furnace tar pitch ...	Yes (1 c.cm.) (if augmented by atropine)	No.

* These numbers refer to the quantities of the filtrates to be added to the jelly.

Hence it appears that gasworks tar contains a powerful excitor of cell division, and also an augmenting substance (kinetic). The same can be said of gasworks tar pitch. Blast furnace tar, and pitch made therewith, however, while containing a weak substance which will induce divisions if its action is increased by atropine, do not con-

tain any augmenting kinetics which, from previous work, appear to be the cause of pathological (unsymmetrical) cell division. We submit, therefore, that this is strong evidence that the chemical agents which cause augmented cell division of lymphocytes under the microscope have something to do with the causation of cancer, because, in addition to other evidence already published, these agents appear to exist only in the one form of tar and pitch which causes the larger incidence of the disease in the industries where it is employed. The gasworks tar and pitch are among the most effective substances we have yet found for inducing mitotic figures in lymphocytes.

The experiments have been repeated with a 20 per cent. solution of ordinary soot, and both auxetics (1 c.cm. with atropine) and kinetics (0.2 c.cm.) can be extracted from it, although it is not so effective as gasworks tar for inducing mitosis. Lastly, it may be mentioned that these auxetics can also be extracted by water instead of hydrochloric acid, but cannot be extracted by alkali. What their exact nature is we do not yet know.

The question now arises: Can these principles be eliminated from the tar without injuring the pitch; and, if so, will the pitch then no longer be dangerous to the workmen other than those who deal with it prior to such treatment? We have tried to answer the first question by experiment on a small scale in the laboratory by washing the pitch, and then again mixing it with water to see if more auxetics and kinetics can be extracted. Extracts of washed pitch so treated no longer induced cell division or excitation.

The question whether pitch from tar so treated is no longer dangerous can only be answered by the use of such pitch (provided it is still suitable for the manufacture of fuel) in briquette works for a period of several months, to see if the incidence of warts, ulceration, and epithelioma is reduced. Unfortunately, the Home Office Regulations, if imposed, would render fallacious such an experiment, because it would be impossible to ascertain whether any amelioration of the incidence of cancer—if such occurs—is due to the use of pitch made from the so-treated tar, or to the bathing accommodation and overalls supplied for the workmen. In our opinion the Regulations, which are based on the obvious principles of hygiene and cleanliness, are very necessary, but it might be of great value to cancer research if this could be definitely ascertained, before the Regulations were imposed. An inquiry is to be held on the subject shortly, to consider some objections to the Regulations raised by the Patent Fuel Companies; and it is possible that this experimental corroborative evidence as to there being cell-division-inducing agents in the tar and pitch may be useful to the parties concerned.

We wish to acknowledge the information and assistance received from Dr. Whitelegge and Dr. Legge of the Factories Department of the Home Office. The expenses connected with the experiments have been defrayed by Sir William Hartley, of Liverpool, and Mr. John McFadden, of Philadelphia.

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THE BATTLE OF THE CLUBS IN BELGIUM.

[FROM A CORRESPONDENT.]

THE great success of the Cercle Médical of Antwerp in organizing the medical profession to resist the exploitation of the clubs has only been achieved against the most determined opposition. The Cercle Médical has been prosecuted on several occasions. On one of these enormous damages were claimed by a practitioner who had been put under ban, but the court allowed merely nominal, almost contemptuous, damages for some slight technical error on the part of the officials, while in other cases the Cercle has been completely victorious and has legally vindicated the right of the profession under the Belgian law to combine for self-protection and for the betterment of fees and general conditions of practice. One of the points insisted on has been payment per attendance according to a fixed scale of fees, details of which were given a few months ago. The clubs and various workmen's organizations and sickness insurance societies have resolutely opposed this, but owing to the solidarity of the profession in Antwerp several of these clubs have been unable to obtain any