THURSDAY, AUGUST 20, 1891.

THE CONGRESS OF HYGIENE.

THE proceedings of this Congress were brought to a close on Monday, it being generally conceded that the importance of the conclusions arrived at and of the discussions on the more important topics were on a level with the numbers and eminence of the men of science taking part in the deliberations.

So far as space permits, we shall endeavour to give an account of some of the most salient subjects touched in the different Sections. To get a general idea of the enormous area of the ground covered, it is only necessary to glance at the resolutions adopted. It will be generally conceded that the members of the Congress are by these resolutions supplied with much food for thought in the interim which will elapse till the next meeting, which has been fixed at Budapest and for 1894.

We note with the greatest pleasure that Her Majesty and the University of Cambridge have shown their appreciation of the honour done to the nation by the presence of so many foreigners; and that other bodies and individuals have not been lacking to render possible gatherings of a less severely scientific character than the Sectional meetings.

Her Majesty's action in inviting many of the most eminent representatives of different nationalities to Osborne—an action, we believe, suggested by the Prince of Wales—has been so well received, that one regrets that the nation has had to wait so long for such a precedent. We regret it, not so much for the sake of men of science, but because the result has been that Royalty here has always lived apart not only from science but from national culture generally. The Queen, indeed, on the present system, never need know anything, except by some happy accident, of Britain's greatest men.

The party which went to Osborne left early by a special train, and were taken over from Portsmouth in the Queen's yacht. They were accompanied by Sir D. Galton, Dr. Poore, Prof. Corfield, and Mr. S. Digby. Luncheon was provided at 2, and Her Majesty later on received the visitors, of whom the following is an official list:—

Austria-Hungary.—Dr. Emil Kusy, Ministerialrath, Sanitats referent, delegated by Minister of the Interior; Hofrath Franz Ritter von Gruber, Professor of Architecture, elegated by Imperial Council of Health; Dr. Ernst Hofrath Ludwig, Professor of Applied Chemistry at Pathological Institute, delegated by Minister of Finance; Dr. J. Fodor, Professor of Hygiene, University of Budapest, delegated by Minister of Public Worship and Education.

Belgium.—M. E. Beco, Secretary-General of the Department of Agriculture, Industry, and Public Works, delegated by Minister of Agriculture and Public Works; D. E. Janssens, Inspecteur en chef de l'Hygiène à Bruxelles, Membre de la Commission Centrale de Statistique de Belgique, de l'Académie Royale de Médecine et du Conseil Supérieur d'Hygiène.

Denmark.—Dr. J. Lehmann, Dean of the Royal Sanitary Council, delegated by the Danish Government; Hans V. Berg, Medical Director of the Navy, delegated by Danish Naval Department; Sur.-Col. Laub, delegated by the Danish Army Department.

Egypt.—Dr. Hassan Pasha Ibrahim, Inspector Sanitary Department, and Professor of Hygiene.

France.—Dr. Etienne Jules Bergeron, Secrétaire perpétuel de l'Académie de Médecine, Vice-Président du Comité Consultatif d'Hygiene Publique, delegated by Ministry of Public Instruction M. le Dr. Brouardel, Doyen de la Faculté de Médecine de Paris, Président du Comité Consultatif d'Hygiène Publique, delegated by French Government; M. le Dr. Auguste Chauveau, Membre de l'Institut, delegated by the Ministry of the Interior, of Public Instruction, and of Agriculture; M. le Dr. Béranger Féraud, Président du Conseil Supérieur de la Marine, delegated by the French Government; Dr. Levraud, Président du Conseil Municipal de la Ville de Paris, delegate of City of Paris; M. Roux, Pasteur Institute, Paris.

Germany.—Dr. Büchner, Professor at Munich University, delegated by the Bavarian Government; Dr. von Coler, delegated by the Army Medical Department, Prussian Army; Prof. Sell, Geheimrath, delegated by the German Empire; Dr. Pistor, Geheim Medicinalrath, delegated by the Prussian Government; Prof. Dr. W. Roth, President of German Committee of the International Congress, Generalarzt des XII. K. S. Armée Corps, delegated by War Ministry of Saxony; Prof. von Koch, delegate of Government of Würtemberg.

Italy.—Dr. Angelo Mosso, Professor at Royal University, Turin, delegated by Italian Government; Dr. A. Corradi, Professor at Royal University, Pavia, delegated by Italian Government.

Japan.—Dr. Shimpei Gotoh, Official Expert in Ministry of Interior, Tokio, delegated by the Government of Japan.

The Netherlands.—Dr. G. van Overbeek de Meyer, Professor of State University, Utrecht, delegate of Government; Dr. W. P. Ruysch, Conseillier pour le Service Sanitaire, Department de l'Intérieur, delegated by Government of the Netherlands.

Roumania.—Dr. J. Felix, Professeur Université de Bucarest, Membre du Conseil Sanitaire Supérieure de Roumanie, Membre en chef de la Ville de Bucarest, delegated by Government of Roumania and City of Bucharest.

Russia.—Prof. Constantin Kowalkowski, Professeur d'Hygiène à l'Université Impériale de Varsovie, delegated by Imperial University, Warsaw.

Spain.—Don Juan Vilanova y Piera, President of Health Section of Royal Academy of Medicine, delegated by Spanish Government.

Sweden and Norway.—Dr. Linroth, Chief Medical Officer, Stockholm, delegated by Swedish Government and by City of Stockholm; Dr. Gotfried E. Bentzen, Director of the Civil Medical Service, Christiana, delegated by Government of Sweden and Norway.

Servia.—Dr. Georgevitch, delegated by Servian Government.

Switzerland.—Dr. Guillaume, Director of the Federal Bureau of Statistics, delegate of the Swiss Government; Col. Dr. Göldlin de Tiefenau, Instructeur en chef des Troupes Sanitaires Suisses, delegate of the Swiss Government.

United States of North America.—Major Alfred Woodhull, Medical Department, United States Army, delegated by United States Government Army Department; Lieut.-Col. Philip S. Wales, Medical Director United States Navy, delegated by United States Government Naval Department; Dr. Salmon, Chief of Bureau of Animal Industry in the United States Department of Agriculture, delegated by Department of Agriculture.

India.—Dr. Simpson, Sanitary Officer of Calcutta; Mancherjee Bhownaggree, C.I.S., member of the Bhavnagar Judicial Council, delegate of Maharajah of Bhavnagar; Dr. Prasanna Kimar Ray, Professor at Presidency College, delegated by Chancellor and Syndicate of Calcutta University.

Ceylon.—Dr. Solomon Fernando, delegate of Government of Ceylon, and of Medical College.

Canada.—Dr. Covernton, delegated by Ontario, Canada.

New South Wales.—Dr. J. Ashburton Thompson, delegated by Government of New South Wales.

Victoria.—Dr. Aubrey Bowen, delegated by Government of Victoria.

The visit to Cambridge took place on Saturday. The University authorities did all in their power to make it an agreeable one. Not only did hospitality abound, but even in the Long Vacation degrees were conferred (this, unfortunately, is impossible at Oxford) on Drs. Brouardel, Corradi, and Fodor.

The speeches made by the Public Orator were as follows:—

DIGNISSIME domine, domine Procancellarie, et tota Academia:—

Nescio quo potissimum exordio hospites nostros, qui de salute publica nuper deliberaverunt, senatus nomine salutare debeam. Ad ipsos conversus, illud unum dixerim:—qui aliorum saluti tam praeclare consuluistis, vosmetipsos omnes iubemus salvere. Ea vero studia, quae vobis cordi sunt, gloriamur in Britannia certe Academiam nostram primam omnium adiuvisse. In salutis publicae ministris nominandis valent plurimum diplomata nostra, valent etiam aliarum Academiarum, quae, exemplo nostro incitatae, laudis cursum eundem sunt ingressae. Hodie vero collegarum vestrorum nonnullos, qui gentium exterarum inter lumina numerantur, diplomate nostro honorifico decorare volumus. Nemini autem mirum sit, quod viros medicinae in scientia illustres iuris potissimum doctores hodie nominamus. Etenim Tullium ipsum in libris quos de Legibus composuit, scripsisse recordamini populi salutem supremam esse legem.

(1) Primum omnium vobis praesento gentis vicinae, gentis nobiscum libertatis bene temperatae amore coniunctæ civem egregium, Parisiorum in Academia medicinae forensis professorem praeclarum, facultatis medicae decanum dignissimum, salutis denique publicae annalium editorem indefessum. Olim Caesar omnes medicinam Romae professos civitate donavit; nos non omnes certe, sed, habito delectu aliquo, unum e reipublicae Gallicae medicis illustrissimis, qui admirabilem in modum medicinae et iuris studia consociavit, corona nostra ob cives etiam in pace servatos libenter coronamus.

Duco ad vos PAULUM CAMILLUM HIPPOLYTUM BROUARDEL.

(2) Quo maiore dolore Austriae et Germaniae legatos illustres absentes desideramus, eo maiore gaudio Italiae legatum insignem praesentem salutamus. Salutamus Academiae Bononiensis, nobiscum vetere hospitii iure coniunctae, alumnum, tribus deinceps in Academiis, primum Mutinae, deinde Panormi, denique Ticini in ripa professorem, qui medicinae scientiam cum rerum antiquitus gestarum studiis feliciter consociavit, quique in Italiae scriptoribus eximiis, non modo in Boccaccio sed etiam in Torquato Tasso, artis suae argumenta non indigna invenit. Quondam imperator quidam Romanus Roma in ipsa augurium salutis per annos complures omissum repeti ac deinde continuari iussit. Quod autem salutis publicae concilio Londinensi etiam Italia interfuit, velut augurii felicis omen accipimus. Recordamur denique poetam antiquum urbis aeternae de nomine his fere verbis non inepte esse gloriatum:—

Roma ante Romulum fuit;
non ille nomen indidit,
"sed diva flava et candida,
Roma, Aesculapi filia." [1]

Duco ad vos Aesculapi ministrum fidelissimum, ALPHONSUM CORRADI.

(3) Quis nescit urbem florentissimam quod Hungariae caput est, nomine bilingui nuncupatam, fluminis Danubii in utraque ripa esse positam. Quis non inde nobis feliciter advectum esse gaudet salutis publicae professorem insignem, virum titulis plurimis cumulatum, qui etiam de Angliae salubritate opus egregium conscripsit. Idem, velut alter Hippocrates, de aëre, aquis et locis praeclare disseruit. Olim Hippocrates ipse corona aurea Atheniensium in theatro donatus est: nos Hippocratis aemulum illustrem laurea nostra qualicunque in hoc templo honoris libenter ornamus.

Duco ad vos bacteriologiae cultorem acerrimum, IOSEPHUM DE FODOR.

The final general meeting of the Congress was held on Monday, under the presidency of Sir Douglas Galton. There was a large attendance, and among those present were nearly all the foreign delegates.

The Chairman, in opening the proceedings, after some preliminary remarks, said:—The success of the Congress, as an international gathering, is due to the fact that we as a nation have many matters of interest to show to foreigners. I think I may say that the chief difference between our hygienic progress and that of our Continental neighbours is that, whilst they are especially fortunate in being able to pursue the theories upon which much of modern hygienic progress is based, with us public opinion has hindered the study of many physiological questions, the solution of which depends upon the examination of living tissue. Hence, we at present are in this respect somewhat behind the Continental schools, and we largely turn our attention to apply their theories to alleviate the wants of life. Hence we can show much of interest in practical hygiene in matters both of construction and administration. Our methods of water supply and drainage, our various plans for refuse disposal or utilization, our isolation hospitals and ambulance systems present many interesting features. The arrangements which are being made to introduce sanitary knowledge and efficiency of workmanship in trades (such as the plumber), upon whom the practical sanitation of parts of our houses largely depends, are deserving of consideration; and the health administrations of the large cities of Glasgow and Manchester is especially worthy of the study of our visitors. The organization of this Congress has differed from that of former Congresses in the increased number of Sections into which it was divided. In proportion as the study of hygiene and demography becomes more elaborate, the classification must necessarily be more detailed, and the number of Sections must either gradually increase or the Sections must subdivide. Independently of the increased number of Sections, it was found necessary to give two afternoons to the discussion of questions connected with the sanitation of our Indian Empire, which, for the first time in the history of these Congresses, was represented by a large number of delegates. The native Princes of India evinced deep sympathy with the Congress, and I trust that the interest which has been evoked in its object may lead to beneficial results in that great country. . . . A principal object of the Congress is, without doubt, to afford to scientific men in different countries the opportunity of conferring together. But it has another and most important object—viz. to excite the interest of the community at large in the knowledge of the laws of health. Your President the other day asked the pertinent question—Why, if diseases are preventable, are they not prevented? The answer to that question is that, whilst an instructed minority may understand the importance of observing hygienic laws, a very large section of the community is careless of and indifferent to their observance, and consequently the portions of those laws which are individual and personal in their application are left a dead letter. Acts of Parliament are of little avail so long as the people they are framed to guide do not realize their value or importance, and it is quite certain that the only way to stamp out preventable disease is to educate every member of the community to feel the importance of the laws of health. A great international Congress like this brings the subject prominently before the public and has a valuable influence on the country in which it is held. I have already detained you too long. But I must add, as chairman of the organizing committee, that we have endeavoured to make the Congress useful and agreeable to those who have honoured us with their presence. The success which we have had is mainly due to our secretary-general (Dr. Poore), our foreign secretary (Dr. Corfield), and, as far as India is concerned, to the energy of Mr. Digby. The excellence of the social arrangements is entirely due to the organizing power and tact of the secretary of the reception committee, Mr. Malcolm Morris. But you will have an opportunity of thanking the executive before the end of this meeting. If there have been shortcomings, the organizing committee much regret them. The only apology we can offer is that a voluntary organization suddenly created to fulfil the requirements of the moment may have been somewhat strained at first by the number who appeared on Monday morning—a number far in excess of that which former experience led us to anticipate, and I would say in conclusion, in the words of our poet Prior—

"Be to our virtues very kind,
Be to our faults a little blind."

[1] Mariani *Lupercalia*, p. 3[e]4 of Baehrens, *Frag. poet. Rom.*

The meeting next discussed the place of the next Congress; we have already stated that Budapest was fixed upon.

Votes of thanks completed the business. Among these, Dr. Sell (Germany) moved the following resolution:—

"That His Royal Highness the President be respectfully requested to convey to Her Majesty the Queen the dutiful thanks of this Congress for Her Majesty's gracious act in becoming Patron of the Congress, and for the magnificent hospitality shown by Her Majesty to members of the Congress during their sojourn in England."

Prof. Kusý (Austria) seconded the resolution.

Colonel Woodhall (United States) said that all members of the Congress must desire to express their gratitude for the way in which they had been received by that gracious lady Her Majesty the Queen, whose purity and dignity of life had enabled her to extend her empire of love and respect over even American citizens.

The resolution was unanimously agreed to.

His Excellency M. Gennadius, the Minister for Greece, moved the following resolution:—"That the best thanks of the Congress be dutifully tendered to His Royal Highness, the Prince of Wales, the President of the Congress, for the untiring interest which His Royal Highness has manifested in the Congress, and to which the success of the Congress is to be largely attributed."

Finally, the Chairman proposed a vote of thanks to the officers of the Association, whose unsparing work and indefatigable energy had so largely conduced to the success of the undertaking. He coupled with the vote the names of Dr. G. V. Poore, the hon. secretary-general, Prof. W. H. Corfield, the hon. foreign secretary, and Mr. Malcolm Morris, the hon. secretary of the reception committee.

The vote was warmly received, and was unanimously adopted.

The Permanent International Committee have appointed the following International Sub-Committee to prepare a scheme for the organization of future Congresses. The Sub-Committee consists of Prof. Dr. Brouardel, Hon. LL.D. Cantab. (France), Prof. Dr. Fodor, Hon. LL.D. Cantab. (Hungary), and Prof. Corfield (England), to represent Hygiene; and M. Körösi (Hungary) and Dr. Janssens (Belgium) to represent Demography.

It is understood that the Sub-Committee will consider the advisability of forming Permanent Committees in various country, the plan of having Committees outside the country in which the Congress is held having proved so successful in obtaining Foreign Members for the London Congress, at which it was adopted for the first time.

This week we give an account of the work done in the Section of Preventive Medicine.

In this Section the President, Sir Joseph Fayrer, K.C.S.I, F.R.S., commenced the proceedings by delivering the following inaugural address:—

My first duty on occupying this seat is to make fitting acknowledgment of the honour which has been conferred on me, and to assure those to whom I am indebted for it that, as I appreciate the distinction highly, so, with the aid of my colleagues in this Section, and the support of the many eminent men of science who will take part in its work, I hope to discharge faithfully the important trust reposed in me. My next and most agreeable duty is to offer to all who honour us with their presence, or who propose by co-operation to forward the objects of the Congress, a most hearty welcome and cordial recognition of the interest in it manifested by their presence; to express a hope that the deliberations and conclusions which result from their wisdom and experience may advance our knowledge, and tend to enhance the welfare of the human race. This hope is based upon the universal recognition of the need of, and capacity for, improvement in the conditions upon which physical well-being, immunity from disease, and prolongation of life depend; and this is evinced by the assembling together in this Congress of men of science from all parts of the world, who have devoted themselves to the great international, humanitarian purpose of ameliorating the conditions of mankind everywhere, so far at least as the application of the laws of health, and to some extent those of sociology, can affect this consummation. To all, then, we in this great city, who are interested in the progress of hygiene and demography, offer our cordial greeting, and express an earnest desire that our visitors may derive pleasure and benefit from their sojourn in London, and from the proceedings of the great assembly of which they form so important a part.

Before I invite Dr. Cuningham to open the first subject for discussion, it is right that I should make a few preliminary remarks on the general scope and objects of the work comprised in this section. I do not intend to occupy much of the short and valuable time at our disposal by discussing any special subject, or by anticipating that which those who follow me may have to say, but shall confine myself to a brief notice of the present aspects of preventive medicine, its recent development, how much it has operated and is now operating for the public good, how slowly but surely it is dispelling the cloud of ignorance and prejudice which has overshadowed and impeded the progress of sanitation, and how it is gradually imbuing the public mind with the conviction that prevention is better and often easier than cure, that health may be preserved, disease avoided, and life prolonged by the study and observance of certain well-known laws, which, correlating the individual with his surroundings, determine his well-being when conformed to, deteriorate or prevent it when neglected, and should enforce the maxim, "Venienti occurite morbo." Unprecedented progress in human knowledge characterizes the present century, and has not been wanting in preventive medicine. It is, however, during the last half of it that advance has been most remarkable, whilst it is in a later part of that period, that it has so established itself in the popular mind as to have passed from the region of doubt and speculation into that of certainty. It is now pretty generally understood that about one-fourth of all the mortality in England is caused by preventable disease, that the death-rate of large communities may be reduced much below that at which it has been wont to stand, the average duration of life may be made to approximate nearer to the allotted fourscore, and that the conditions of living may be greatly ameliorated. The chief obstacles to improvement have been ignorance and want of belief; a better knowledge of the laws of life and health, a more rational comprehension of the nature and causes of disease, are gradually but surely entailing improvement in the conditions of living and in the value of life, and the diminution and mitigation, if not extinction, of morbid conditions which have in past times proved so injurious or destructive to life. In short, as Dante says:

> "Se' I mondo laggiù ponesse mente
> Al fondamento che natura pone,
> Seguendo lui avria buona la gente."
> "Paradiso," viii., 142.

Such are the subjects contemplated in the work of this Section, and as far as time permits the most interesting of them will be discussed. Those selected are of great importance in their relations to public health; let us hope that observers who have formed their opinions from experience in other countries and under different circumstances may throw new light on them.

In the brief space of time at my disposal it would be impossible to give a continuous outline of the progress of preventive medicine during the past, or to trace its growth and development out of ignorance and superstition to its present well-established foundation on a scientific basis. It is of happy augury for mankind that the subject of public health is now fairly grasped by popular sentiment, and that, though ignorance, opposition, and vested interests still contest the ground, progress is sure, and the light of science is illuminating the dark places. It is now better appreciated than it ever has been, that the causes which induce disease and shorten life are greatly under our own control, and that we have it in our power to restrain and diminish them, and to remove that which has been called "the self-imposed curse of dying before the prime of life." It is, indeed, only recently that the resources of medical science have been specially devoted to the prevention as distinguished from the cure of disease, and how far successfully I hope in a few words to show, whilst I trust the proceedings of the various Sections of this Congress

will indicate how much remains to be done. Did time permit, I might illustrate the progress of preventive medicine by contrasting the state of England with its population of more than 29,000,000 during the Victorian with the England of the Elizabethan age with its 4,000,000. I might remind you of the frightful epidemics which had devastated the land, in the forms of black death, sweating sickness, plague, petechial typhus, eruptive fevers, small-pox, influenza, and other diseases, such as leprosy, scurvy, malarial fever, dysentery, &c., of the wretched mode of living, bad and insufficient food, filthy dwellings, and ill-built towns and villages, with a country uncultivated and covered with marshes and stagnant water (according to Defoe, one-fifteenth part of England consisted of standing lakes, stagnant water, and moist places, the land unreclaimed, and with the chill damp of marsh fever pervading all). The homes of the people were wooden or mud houses, small and dirty, without drainage or ventilation, the floors of earth covered with straw or rushes, which remained saturated with filth and emitting noxious miasmata. The streets were narrow and unpaved, with no drains but stagnant gutters and open cesspools, while the food was principally salted meat with little or no vegetable. To this may be added a large amount of intemperance and debauchery. As it is, I can only just allude to them. In such conditions disease found a congenial nidus, and by a process of evolution assumed the various epidemic forms which proved so destructive to life. Some of these have gone, let us hope never to return, and the conditions which fostered if they did not cause them have gone also. Can we venture to hope that it will be the same with those that remain? Our immunity during the last diffusion of cholera gives some ground for thinking it may be so, if, indeed, the Legislature and popular intelligence should be of accord on the subject.

If we turn to the present, we find that great improvements have gradually been made in the mode of living; the houses are better constructed, the drainage and ventilation are more complete, the land is better cultivated, and the subsoil better drained; marsh fever and dysentery, at one period so rife, are unknown, and leprosy has long since disappeared. The death-rate is considerably reduced, and the expectancy of life enhanced. Water is purer, food is more varied and nutritious, clothing is better adapted to the climate, the noxious character of many occupations has been mitigated, and the mental, moral, and physical aspects of the people altogether improved; education is general, a better form of government prevails, and the social conditions are far in advance of what they have been; but still the state of our cities shows that improvement is demanded, and one object of this Congress is to point out why and how this may be effected, not only in this country but throughout the world.

If we inquire into the effects of certain well-known diseases, we find that they are less severe in their incidence, if not less frequent in their recurrence. With regard to small-pox, since the passing of the first Vaccination Act in 1840, the death-rate has diminished from 57·2 to 6·5 per 100,000 for 1880–84, though for the five years 1870–74 it was 42·7, thus showing that there was still much to be learnt about vaccination. Enteric fever was not separated from typhus fever before 1869, but since then the death-rate has decreased from 0·39 to 0·17 per 1000, and it has been shown that this improvement was synchronous in different parts of England with the construction of proper drains. The diminution in the death-rate from typhus fever is quite as striking, and this also is shown to have run parallel with improved sanitation in more than one large town. The death-rate from scarlatina fluctuated between 97 and 72 per 100,000 between the years 1851 and 1880, and though it has diminished considerably of late years (17 per 100,000 in 1886), a corresponding increase in the death-rate from diphtheria has taken place; this may be due in part to a better differentiation of the two diseases. In 1858 it was reported that phtbisis killed annually more than 50,000 people; the death-rate from this disease has not decreased very much for England and Wales, but it has done so in some large towns, notably in Liverpool; and Dr. Buchanan and Dr. Bowditch of Massachusetts both showed a striking parallelism between the diminution of the death-rate from this cause and the drying of the soil resulting from the construction of sewerage works. Cholera first appeared in England in 1831, and there were epidemics of it in 1848–49, 1853–54, and 1865–66, but the number of deaths diminished each time it appeared, and though it has been present since, it has never reached the height of an epidemic. This is fairly attributable to local sanitary rather than to coercive measures. Preventable disease still kills yearly about 125,000, and, considering the large number of cases for every death, it has been calculated that 78¼ millions of days of labour are lost annually, which means £7,750,000 per annum; this does not include the days lost by the exhaustion so often induced by the still too numerous unhealthy houses of the poor. Towns, villages, and houses are still built in an insanitary way; the death-rate is still higher and the expectancy of life lower than it should be, and though we have got rid of the terrible plagues of the middle ages, yet in this century, now closing, other epidemics have made their appearance: cholera has four times visited us; fevers, eruptive diseases, and diphtheria have prevailed; influenza has appeared several times, even recently, and after leaving us last year, only to return with renewed virulence, caused in the United States a mortality almost equa to that of the plague. Much has been done, and a great deal of it in what is called the pre-sanitary age, but much remains to be effected. Let us hope that the future may be more prolific of improvement than the past; international philanthropy seems to say it shall be so. That we can exterminate zymotic disease altogether is not to be expected, but there cannot be a doubt that we may diminish its incidence, and though we may never be able to reach the "fons et origo mali," yet we can make the soil upon which its seed is sown so inhospitable as to render it sterile. The scope and objects of preventive medicine are not limited to the removing of conditions which give rise to zymotic disease, nor even of those which compromise otherwise the physical welfare of mankind, but should extend as well to a consideration of the best means of controlling or obviating those which, attending the strain and struggle for existence, involve over-competition in various occupations, whether political, professional, or mercantile, by which wealth or fame is acquired or even a bare livelihood is obtained, and under the pressure of which so many succumb, if not from complete mental alienation, from breakdown and exhaustion of the nervous system, which give rise to many forms of neurotic disease and add largely to the numbers of those laid aside and rendered unfitted to take their due share in the natural and inevitable struggle for existence. Or I might point to the recrudescence of those psychical phenomena manifested by the so-called hypnotism or Braidism, morbid conditions arising out of the influence of one mind upon another; this is a subject which demands not only further investigation, but great precaution as to its application, and claims the watchful notice of preventive medicine on account of the dangerous consequences which may ensue from it.

Again, the abuse of alcohol, opium, chloral, and other stimulants and narcotics, and the evil consequences which may result therefrom, is also a subject worthy of consideration, and will, no doubt, receive it in a communication which is to be brought before this Section.

The possible deleterious influence of mistaken notions of education, as evinced in the over-pressure which is exercised upon the young, the predominance of examinations, their increasing multiplication and severity, and the encouragement of the idea that they are the best test of knowledge, whilst true mental culture is in danger of being neglected, and physical training, if not ignored, left so much to individual inclination—this is another subject which demands the jealous scrutiny of preventive medicine, whose duty it is to safeguard the human race from all avoidable causes of either physical or mental disease.

Though preventive medicine in some form has been practised since the days of Moses, yet it has received but little recognition until a comparatively recent period; when science developed and observation extended, medical men and others became impressed with the influence of certain conditions in producing disease, and thus it was forced upon the public conscience that something must be done; and when philanthropists like John Howard devoted life and property to the amelioration of such awful conditions as existed—*e.g.* in our gaols, where the prisoners not only died of putrid fever, the result of ochletic causes, but actually infected the judges before whom they came reeking with the contagion of the prisons—rude sanitary measures gradually came into operation and partially obviated these evil conditions, but it was not before the middle of this century that any scientific progress was made; it was when Chadwick, Parkes, and others initiated the work by which they have earned the lasting gratitude of the

human race that preventive medicine became a distinct branch of medical science. The sanitary condition of towns and communities is not dependent on the views or exertions of individuals alone, for they are and have been for the last fifty years largely cared for by the Legislature, and a variety of Acts have been passed which deal with questions concerning the public health; indeed, were all the provisions enforced, little would remain to be desired on the part of the executive Government, but as many of them are permissive, not compulsory, the benefit is less complete than it might be. The old difficulty of prejudice combined with ignorance still too often stands in the way, and, despite evidence which on any other subject would be conclusive, the most obvious sanitary requirements are often ignored or neglected. Many thousands of lives have been saved by the Sanitary Acts now in force; but there is little doubt that more thorough organization under State control, as under a Minister of Public Health, would have most beneficial results, and would save a great many more. We must acknowledge, however, that we are much indebted to the action of the Local Government Board, under whose able administration the most crying evils are gradually being rectified. Through the wise precautions enacted by it against the importation and diffusion of epidemic disease, when other parts of Europe were affected by cholera, this country escaped, or so nearly so as to suggest that it was to sanitary measures we owed our immunity. That there is something in the nature of epidemics which brings them under the dominion of a common law as to their extension seems certain; that there is much about them we do not yet grasp is equally true, but it is as surely the case that local sanitation is the preventive remedy as it is that coercive measures to arrest their progress are unavailing.

Under the improved system of sanitary administration which now obtains, and is gradually developing to a greater state of perfection, the sanitary administration of every district in the country is intrusted to the care of duly qualified health officers—a system from which excellent results have already accrued, and from which better still may be anticipated. The records of the past fifty years prove the influence exerted by sanitary measures on vital statistics. The first reliable tables from which the expectancy of life may be derived show that in 1838 to 1854 it was for males 39·91 years, for females 41·85 years; by the tables of 1871 to 1880 it had increased to 41·35 for males and 44·66 for females. It is shown also that the expectation of life increases every year up to the fourth year, and decreases after that age. For males up to nineteen years it is higher by the last tables, but after that age it is higher by the old table; for females it is greater by the new table up to forty-five, but after that age it is less. The improved sanitation saves more children's lives, but the conditions of gaining a living are harder than they were at the time of the first table, which accounts for the expectancy of life for adult men being less. Women remain more at home, where the better sanitation tells, and are not subject to quite the same conditions as men, so that their expectancy of life is greater than by the old tables up to the age of forty-five. A further proof of the effects of sanitary work is a decreased death-rate. Let us compare the death-rates of England during past times with the present; whether they be equally significant for other countries I cannot say, but these, at all events, sufficiently prove the point in question:—

DEATH-RATE.

1660–79	...	80	per 1000	1870–75	...	20 9	per 1000
1681–90	...	42·1	,,	1875–80	...	20·0	,,
1746–55	...	35·5	,,	1880–85	...	19·3	,,
1846–55	...	24·9	,,	1885–88	...	18·7	,,
1866–70	...	22·4	,,	1889	...	17·85	,,

In some parts of England, where the main object is the recovery or maintenance of health, the death-rate is down to 9 per 1000, while in others, where the main object is manufacture and money-making, it is as high as 30 per 1000. Nowhere, I think, have the beneficial results of sanitary work been better illustrated than in India during the past thirty years. A Royal Commission was appointed after the Crimean war to inquire into the sanitary condition of the British Army, and this in 1859 was extended to India. The European army was the special subject of it, but the native troops were referred to incidentally. Here the inquiry had to deal with a large body of men, concerning whom, their conditions of existence being well known, reliable information was accessible. It was ascertained that up to that time the annual death-rate over a long period had stood at 69 per 1000. The inquiry resulted in certain changes and improvements in the housing, clothing, food, and occupation of the soldier. Since those have been carried out there has been a steady decline in the death-rate, and the annual reports of the Sanitary Commissioners to the Government of India give the rates as: in 1886, 15·18 per 1000; 1887, 14·20 per 1000; 1888, 14·84 per 1000. During some years it has been even lower, down to 10 per 1000, whilst the general efficiency of the troops has increased. It is not easy to estimate the money equivalent of this, but if we take the rough standard which values each soldier at £100, a simple calculation will show how great is the gain, and who can estimate the value of lives saved and suffering avoided? As to native soldiers with whom the European troops may be compared, I find that the death-rate was: in 1886, 13·27 per 1000; 1887, 11·68 per 1000; 1888, 12·84 per 1000. Famine, cholera, and other epidemic visitations in some years disturb the regularity of the death-rate; under less favourable conditions of living, as in the case of prisoners in the gaols, it is somewhat higher. In the Indian gaols, for example, it was: in 1886, 31·85 per 1000; 1887, 34·15 per 1000; 1888, 35·57 per 1000.

On the whole, all this indicates improvement,[1] and as regards the civil population progress also is being made; but here, from so many disturbing causes, the figures are neither so easily obtained nor so reliable. The comparatively large mortality is due to neglect of the common sanitary laws added to extremes of climate, which favour the incidence and diffusion of epidemic disease, and intensify it when it has once appeared. A Sanitary Department has existed in India since 1866, and every effort is made by Government, at no small cost, to give effect to sanitary laws; there can be little doubt that the results, so far, are good, that disease generally is diminishing, and that life is of longer duration. An important result of the observations of the able medical officers of the Sanitary Service of India has been to show that cholera is to be prevented or diminished by sanitary proceedings alone, and that all coercive measures of quarantine or forcible isolation are futile and hurtful. Here I may say that, large as may appear the death-rate from cholera in India (*i.e.* in 1888, 1·99 per 1000 for the European army and 1·35 for the civil population), it is small compared with that of fevers, which caused in 1889 4·48 per 1000 in the European army and 17·09 in the civil population; but there is every reason to believe that these also are becoming less fatal under the influence of sanitary measures. In preventive as in curative medicine, knowledge of causation is essential. It is obvious that any rational system of proceeding must have this for its basis. A certain empirical knowledge may be useful as a guide, but no real advance can be expected without the exactitude which results from careful scientific observation and induction; the spirit of experimental research, however, is now dominant, and progress is inevitable. How much we owe to it is already well known, whilst under its guidance the reproach of uncertainty which attaches to medicine as a science is disappearing. Recent advances in physiology, chemistry, histology, and pharmacology, have done much to throw light on the nature and causes of, and also on the means of preventing or of dealing with, disease. It is impossible to exaggerate the value of the scientific researches which have led to antiseptic methods of preventing the morbific action of micro-organic life, whether the toxic effects produced by them, or those induced autogenetically in the individual. Theory has here been closely followed by its practical application in prevention and treatment of disease, whilst the study of bacteriology, which is of such remarkable pre-eminence at the present time, is opening out sources from which may flow results of incalculable importance in their bearing on life and health. That the conclusions arrived at are always to be depended on I doubt, and it seems that scientific zeal may perhaps sometimes outrun discretion. That it might be wiser to postpone generalization has, I think, been more than once apparent, whilst the expediency of further investigation before arriving at conclusions which may subsequently prove to be erroneous should not be lost sight of; but it has probably

[1] "It is to be noticed with regret that during the last five years there has been a tendency to revert to a higher death-rate and percentage of sickness. Let us hope this will prove only transitory; the attention of sanitary authorities both at home and in India is anxiously directed towards the removal of whatever may be the cause of it. It is shown both by the vital statistics and the history of the chief diseases that there is in India an enormous amount of preventable sickness and death," but "that the local insanitary conditions or local disease causes are well known and widespread." —A. S. C.'s Reports for 1889.

ever been so in the course of scientific progress, that in the enthusiasm of research, which is rewarded by such brilliant results, early generalization has too often been followed by disappointment, and it may be by temporary discouragement of hopes which seemed so promising.

It would be well to bear in mind a caution recently given by the Duke of Argyll, "that we should be awake to the retarding effect of a superstitious dependence on the authority of great men, and to the constant liability of even the greatest observers to found fallacious generalizations on a few selected facts" (*Nineteenth Century*, April 1891). Still, it is in the region of scientific research by experiment that we look for real progress, and we can only deplore the mistaken sentiment, the false estimate, and the misconstruction of its aspirations and purposes, which have placed an embargo on experiment on living animals, rendering the pursuit of knowledge in this direction well nigh impossible, if not criminal; whilst for any other purpose, whether of food, clothing, ornament, or sport, a thousandfold the pain may be inflicted without question. The inconsistency of the sentiment which finds unwarrantable suffering in an operation performed on a rabbit, when the object is to preserve human or animal life or prevent suffering, but which raises no objection to the same animal being slowly tortured to death in a trap, or hunted or worried by a dog, needs no comment; whilst the spirit which withholds from the man of science what it readily concedes to the hunter is, to say the least, as much to be regretted as it is to be deprecated.

It must be remembered that, important as are the researches into microbiology, there are other factors to reckon with before we can hope to gain a knowledge of the ultimate causation of disease. It is not by any one path, however closely or carefully it may be followed, that we shall arrive at a full comprehension of all that is concerned in its etiology and prevention, for there are many conditions, dynamical and material, around and within us which have to be considered in their mutual relations and bearings before we can hope to do so; still, I believe we may feel satisfied that the causes of disease are now being more thoroughly sought out than they ever have been—all honour to those who are prosecuting the research so vigorously—and that though individual predilection may seem sometimes to dwell too exclusively on specific objects, yet the tendency is to investigate everything that bears upon the subject, and to emphasize all that is implied in the aphorism, *Salus populi, suprema lex.*

The morning sitting of the Section and most of the afternoon sitting was devoted to papers and a discussion on "The Mode of preventing the Spread of Epidemic Disease from one Country to another."

The chair was occupied successively by the President, Professeur Brouardel of Paris, and Prof. da Silva Amado of Lisbon.

Surgeon-General Cuningham, of London, opened the discussion, and said the modes of prevention of spread of disease from one country to another were three in number, (1) quarantine, (2) medical inspection, (3) sanitary improvements. In his remarks he dealt chiefly with cholera, and he held that the chief factor of cholera, being carried by atmospheric currents, cannot be excluded from any country, and where it has been distributed over any area it excites the disease directly in many persons who are predisposed to it, and forms foci of it whenever it finds localities suitable for its increase; these are often very limited in extent, not embracing more than a single house, or even a portion of a house, or ship; the mortality among the steerage passengers in the latter is often very great, while the cabin passengers and all the crew have scarcely a case. Such foci are always badly ventilated, and the emanations arising in them acquire much greater density than in the open air; as a natural consequence the clothing of those who reside in them absorbs an amount of the emanation sufficient to produce cholera in susceptible persons outside until it has been dissipated by exposure; those so affected, however, and the others who have contracted the complaint apart from such foci, do not seem to have any such influence, it being not the body but the emanations from the locality which generate the disease. Cholera, therefore, cannot be excluded from any country by general quarantine. All that can be done is by hygienic measures to improve the health of the population, and to remove the conditions which favour the formation of foci. The placing ships which arrive with cholera on board under observation, removing their crews and passengers to suitable localities on shore until the disease ceases among them, are very proper precautions, and may prevent a small amount of the disease among the surrounding population, but can never prevent an epidemic if the necessary factors be in progress.

Inspector-General Lawson then followed with a paper on "The Communicability of Cholera from one Country to another."

To draw up a plan to prevent the extension of a disease, say cholera, from one country to another, with any prospect of success, it is necessary to have a general acquaintance at least with the different factors which contribute to the result, and of their mode of operation. The existing information on these points falls far short of these requirements, and its increase has been enormously impeded by the belief that man himself is the chief agent in diffusing the disease; and by interpreting the evidence obtained from various sources with an undue bias in favour of the theory. There has been, in short, and still remains, a most serious error in assuming that personal communication is the principal factor; and a no less extensive error in the methods and reasoning by which the central idea of diffusion by man was advocated.

The character and causes of cholera must be derived from a critical examination of all the evidence Nature presents, and from a study of the methods she herself adopts, instead of from our *a priori* deductions. Cholera occurs in two different forms: simple cholera or cholera nostras, of little severity, and attributed to local causes; and Asiatic epidemic, or malignant cholera, always a serious disease, and by many attributed to a poison given off by those labouring under it to others, and so diffused until it becomes epidemic.

Since 1832, when cholera visited Europe in the epidemic form, cholera nostras has been observed to fluctuate every few years, and with the milder cases occur a certain number presenting all the characters of the malignant disease; these cases occur singly or in small groups, but in every instance they accompany epidemics of varying severity, at no very great distance off, and are under the same "epidemic influence."

Those who support the theory that man diffuses cholera are, necessarily, required to show that persons under the disease must arrive at points where it has not yet appeared, before it commences in these latter, and that the first attacks in the new locality have been in persons exposed to the imported cases: but there are now a good many instances of epidemics springing up in localities at a distance from where the disease was already prevailing, and without any trace of importation, and where those first attacked had resided in the country for many months in succession without communication with any previous case. Such were the outbreaks at Southampton in 1865, at New Orleans in 1873, and at Toulon and the south of France in 1884, all of which were most carefully investigated on the spot. The only other conclusion open was that the necessary factors were supplied by epidemic influence; and if supplied in one instance, supplied in all: where there appeared to have been importation at the commencement of the outbreak, it must not be assumed that the disease was communicated by man unless the epidemic influence could be excluded, as at present it could not. It seemed probable that the exciting factors were conveyed by the air, whether fully or only partially developed, and consequently it was not in our power to exclude them; but much might be done by hygienic and other local means to limit their development in the localities they reached, and so to avoid excessive mortality.

Dr. Ashburton Thompson, official delegate of the Government of New South Wales, followed with a paper entitled "Quarantine in Australasia: Theory and Practice." He said that the amount of traffic which had to be dealt with was an important consideration in all questions of practical quarantine. The Australasian Sanitary Conference of Sydney, N.S.W., 1884, was attended by delegates of each of the six Governments, and by the speaker. Their resolutions were unanimous, accepted by each Government, and presented to each Parliament. They had not been modified since 1884, and were therefore those received in Australasia at the present day. Limited quarantine, medical inspection, the outcome of England's local conditions, was exactly suited to them, but not necessarily suitable, therefore, where local conditions differed from England's. The *first* proposition of the Conference was that *the degree of protection which quarantine measures can afford varies inversely with the ease of communication between the infected country and the country to be defended.* The difference between English and

Australasian conditions was described. The Conference rejected ancient quarantine as a principle of action, and on account of easy and daily interchange of population between the six territories decided to regard Australasia as constituting one epidemiological tract, and consequently to relinquish all quarantine as against each other. Then, before adopting resolutions which would affect others, they put themselves in order by declaring in a *second* proposition that *quarantine can yield protection commensurate with its costs only to countries whose internal sanitation is good*; and they recognized defects inherent in all quarantine measures by declaring, in a *third* proposition, that *the function of quarantine is not to exclude infection, but to lessen the entering number of foci of infection*, and thus made it clear that exclusive reliance was not placed by them on quarantine as a defence against imported disease. Having thus indicated what should be refrained from, it proceeded to say what should be done. *Nations whose internal sanitary organization was not perfect cannot afford to refer the observation of suspects to the country at large.* It was decided consequently that limited quarantine should be employed against ships actually carrying cases of exotic disease—that was, that vessels and equipment should be cleansed forthwith and held for delivery to owners at earliest possible date, but that the ship's company should be detained in isolation for periods slightly in excess of recognized clinical incubation periods. Medical inspection was thus rejected as a principle of action not less than ancient quarantine, but still not inconsiderately; when imported disease was one already familiar ashore, the circumstances were seen to resemble England's, and then medical inspection must (not might or could) be used. Accordingly, in case of scarlatina or the like, patients were removed to ordinary isolation hospital (not quarantine), the quarters cleansed, and the ship discharged in the usual way after five or six hours' detention. These principles were strictly adhered to by the Government of New South Wales since 1884. If not quite so closely by the other five Governments, the reason was probably political rather than commercial or scientific.

Dr. Rochard, of Paris (whose communication was read by Dr. Jules Bergeron), said that the means of preventing the transmission of epidemic diseases, such as the plague, yellow fever, and cholera, were threefold—namely, isolation, disinfection—and sanitation. The first was the simplest and the most radical. It was also the most difficult to use, because it required the intervention of public enactments, and the existence of an *entente internationale*. It was the system of quarantine and of the sanitary cordons. The second was more modern, and was the result of the development of contemporary science. The third rested on the progress of urban hygiene. It was probable that when we had sanitary towns we could brave epidemics. England had spent five millions since the commencement of the century, and it did not fear cholera during the last epidemic. Some of England's resistance to the cholera must be ascribed to its great distance from the source of cholera. M. Rochard next proceeded to detail the means taken at the frontier by the French authorities during the last cholera epidemic in Spain, and expressed the belief that it was necessary to persevere in the employment of those measures which responded to the necessities of the moment and to our present knowledge, until the future developed some better remedy.

Dr. Stékoulis, of Constantinople, after mentioning the methods quarantine and inspection, detailed by previous speakers, said that Turkey was like numerous other countries, one in which sanitary organization had yet to be carried out. If cholera has entered Turkey in these last years by Basjorah (Persian Gulf) and by Camaran (Red Sea) it was that the lazarets are not in accord with the progress of sanitary science. The pilgrimage of the Mussulmans to Mecca is also a great source of danger to the country. The lazarets of Turkey ought to be made sanitary, and there would be a great danger removed.

Dr. Hewitt, of Minnesota, U.S.A., said they had very little to do in his State with disease properly called epidemic except that of small-pox. Cholera had but once obtained something of a lodgment, and then it came directly from the port of New York. Small-pox came to them directly through emigration from the ports of England, and most of it came through the Gulf of St. Lawrence. Only the other day cases came from Liverpool to Minnesota. He mentioned one case in which infection was carried in the clothing of a woman who did not have the disease herself, but had been exposed on shipboard to it. The epidemic resulted in 300 deaths. For interior States like Minnesota the demand was that there should be complete sanitary central organization, with local organization in direct relation thereto, and that this organization should stand in direct relation to the quarantine service, which should be bound to give notice to the interior authorities of the presence of disease or infection, and that they should all co-operate for its control.

Dr. Simpson, of Calcutta, stated that the real source of cholera epidemics in Europe was, in his opinion, from emigrants and pilgrims coming over land and in ships to Mecca, where there was a focus 2000 miles nearer Europe than any Indian port.

Dr. Leduc, of Nantes, agreed with Dr. Cuningham as to the need of improved sanitary conditions in our towns, but he strongly disagreed with him when he proposed the suppression of quarantine. Modern science teaches us that contagious diseases are spread by wandering germs: isolation must therefore be a preventive to the spread of the disease, and quarantine presents us with the best means of isolation, so that to propose the suppression of quarantine was to propose a measure at once irrational and contrary to the principles of modern science.

Dr. Thorne Thorne, of London, spoke of the need of sanitary reform in towns, and deprecated the so-called protection of a country by means of cordons, quarantine, &c. The sixteen days' quarantine decided at Constantinople in 1866 failed, the ten days' quarantine decided at Vienna failed, and yet the five days' suggested at Rome is to succeed. The contention is altogether illogical.

Prof. Stokvis, of Amsterdam, said that at the International Medical Congress at Amsterdam there was a discussion on quarantine, in which the same arguments for and against were used as now. He then had no steadfast conviction. Now he had, and it was, that the only way to prevent the spread of epidemic diseases, and especially of cholera, was to make sanitary improvements. He had arrived at this conclusion by the study of the history of cholera in India, where cholera diminishes as sanitation improves. In the Dutch Indian Archipelago, where quarantine is of no consequence, the following figures show the great diminution in the death-rate which ensued on sanitary improvement. From 1864–78 the death-rate in the European army was 15 per 1000. In 1878 artesian wells, &c., were made. In 1879–83 the death-rate fell to 6·4 per 1000; and in 1884–88 to 3·5 per 1000. These figures are very striking, and lead one to hope that the saying of the late Prof. De Chaumont will come true, that the time will arrive when cholera will only be an historical curiosity.

The following gentlemen also took part in the discussion: Dr. Felkin of Edinburgh, Prof. Brouardel of Paris, Sir Joseph Fayrer, Surgeon Major Pringle, Surgeon-General Cook, Dr. Robert Grieve of British Guiana, Dr. Ruijsch of the Hague, Brigade-Surgeon Staples, Surgeon-Generals Cayley, Ewart, and Beatson, Señor Vicente Cabello, and Brigade-Surgeon McGann.

In the afternoon, Sir John Banks, K.C.B., in the chair, Dr. Manson read an elaborate paper on "The Geographical Distribution, Pathological Relations, and Life-history of *Filaria sanguinis hominis diurna* and *Filaria sanguinis hominis perstans* in connection with Preventive Medicine." The paper was illustrated by numerous microscopical specimens.

Dr. Manson said that the discovery of the blood-worms herein named *Filaria sanguinis hominis diurna* and *Filaria sanguinis hominis perstans* suggests an investigation into their possible pathological relations, and into their life-histories, with the view to intervention in respect to them of preventive medicine.

The facts that these parasites and the disease known as negro lethargy, or sleeping sickness of the Congo, are endemic in the same region, the West Coast of Africa; that neither can be acquired unless in this particular region; and that sleeping sickness may declare itself many years after the endemic region has been quitted, and that these filariæ continue to live for many years after the negro has left Africa; suggest a possible relationship between these parasites and this disease.

A papulo-vesicular skin disease called craw-craw is endemic in the sleeping sickness region, and sleeping sickness is often accompanied by a similar papulo-vesicular skin disease, probably the same. O'Neil found a filaria-like parasite in the vesicles of craw-craw. Nielly considers a disease he calls *dermatose parasitaire*, which he found in a lad in France, the same as the African craw-craw; he discovered in the vesicles of the skin in this case the same or a similar parasite to O'Neil's. Nielly, at the same time, found an embryo filaria in his patient's blood which was undoubtedly an earlier form of the skin worm. From

this the inference may be drawn that, in certain cases, at all events, of sleeping sickness a filaria embryo is present in the blood.

Filaria s. h. diurna and *Filaria s. h. perstans* have both been found in a case of sleeping sickness.

These facts taken together amount to a presumptive case against one or other of these parasites as the cause of sleeping sickness.

The probable life-histories of these worms is then indicated, the *Filaria loa* being considered the parental form, and an insect, called the mangrove fly, the intermediary host of *Filaria s. h. diurna*. The parental form of *Filaria s. h. perstans* is not known, but, assuming that the worm of craw-craw, sleeping sickness, and *dermatose parasitaire* is the same, and that the skin form is an advanced stage of the embryo filaria found in the blood, then, arguing from the analogy to what happens in the case of the embryo of *Filaria medinensis*, which closely resembles this skin parasite, the probable intermediary host of *Filaria s. h. perstans* is a freshwater animal, possibly a cyclops.

Provided the hypotheses as regards these parasites and the diseases they produce are correct, both disease and parasites may be avoided by securing a pure water supply to which the intermediary hosts of the parasites do not get access.

Travellers, missionaries, and others in Africa are appealed to for assistance in clearing up the subject, and for further information.

An appendix to the paper contains directions for demonstrating in the surest, most rapid, and most effective way the presence or absence of filaria embryos in blood, and of making collections of slides of blood for storage and future examination.

Dr. Sonsino, of Pisa, made a few remarks on Dr. Manson's paper. The meeting then adjourned.

On Wednesday, August 12, the chair was occupied successively by Sir Joseph Fayrer, Dr. Pistor of Berlin, and Surgeon-General Roth of the Saxon Army.

Discussion on Diphtheria.

Dr. Edward Seaton, of London, opened a discussion on "Diphtheria, with special reference to its distribution and to the need for comprehensive and systematic inquiry into the causes of its prevalence in certain countries and parts of countries, with a view to its prevention."

Dr. Seaton said that he should confine himself in introducing this subject to leading statements, showing the necessity for comprehensive and systematic inquiry to be promoted by Government into the causes of the prevalence of diphtheria in certain countries and parts of countries, with a view to its prevention. He first of all pointed to the special prevalence of the disease, as shown by Dr. Longstaff, in Norfolk and Wales, and the comparative freedom of Devonshire, Cornwall, and the Midlands. He then dwelt on the facts that the disease prevailed more in rural than urban districts, although it has shown of late years an increasing preference for urban populations, especially that of London. He showed the independence of the disease of what are ordinarily called sanitary conditions, and illustrated this by a table taken from Dr. Thorne Thorne's recent lectures at the Royal College of Physicians, showing the fall in enteric fever mortality in England and Wales which had synchronized with a rise in the mortality from diphtheria. He further illustrated the independence of diphtheria prevalence of what are usually termed sanitary conditions by experiences gathered from a large manufacturing town in the Midlands, and from certain parts of the metropolis in which he had special opportunities for observation as a medical officer of health, as well as in connection with the work of the Metropolitan Asylums Board, into whose hospitals cases of diphtheria had been received during the last three years. He also gave a recent experience of a Surrey village, in which the disease had prevailed in an epidemic form, shortly after the replacement of the old insanitary cesspool system by a new and elaborately constructed sewerage system. The occurrence of the disease under these circumstances gave rise to the suspicion that there might be a connection between diphtheria and conditions of soil, which needed to be investigated in a comprehensive and systematic manner. In conclusion, he pointed out the importance of these main considerations, viz.: (1) the prevalence of the disease in strikingly different degree in countries in the same latitude and with similar climatic conditions and also in parts of countries close to each other, (2) the fact that it has not apparently been influenced favourably by the adoption of sanitary measures which have been generally found effective in reducing the death-rate, prove the necessity for a comprehensive inquiry by our own Government as well as those of other countries, into the causes which determine the prevalence of diphtheria. Such an inquiry should take into account what has already been ascertained with regard to the occasional causation and spread of the disease by milk, and the influence which schools have on its production and spread, and also the subsidiary influence of dampness, dirt, overcrowding, &c.; but its main object would be to ascertain the local conditions and circumstances which account for the growth of the disease. To ascertain these the inquiries must, of course, be made in countries marked by freedom from the disease as well as in those which suffer from it specially.

Dr. Schrevens, of Tournai, followed with a paper entitled "Contribution à l'étude des causes favorisant les endemies diphthéritiques," of which the following is an abstract.

By investigating carefully how the ravages committed by diphtheria are distributed over the different districts, one can attain more easily to a precise knowledge of the external conditions which favour the harbouring of diphtheritic germs, and which result in such germs being brought into a locality. Investigations were made by the author in Belgium with this object. Thanks to the figures kindly furnished by Dr. Kuborn, the distribution of diphtheria throughout the different provinces of Belgium for the ten years from 1871 to 1880 has been determined. The same having been done for typhoid fever, it was noticed that where this latter disease committed the greatest ravages the same fact was observable in the case of diphtheria; and that where diphtheria secured its smallest number of victims the number of deaths caused by typhoid fever diminished equally. This parallel rise and fall of the mortality caused by typhoid fever and diphtheria is shown in two diagrams placed near each other on the same sheet; in the first, the parallelism is less evident, because one province, East Flanders, forms an exception to the rule I have just laid down; in the second diagram this province is omitted, and the parallel march of diphtheria and typhoid fever stands out clearly. On what does this relation, this agreement rest? On this fact, that these two diseases must be considered as fœcal diseases, as B. Russell, of Glasgow, has remarked. The bacilli of Löffler, like the bacilli of Eberth, develop admirably, prosper, and extend wherever filth and rubbish of all kinds are stored up or spread out; there exists, however, this slight difference between the conditions which are severally favourable to them: impurities on the *surface* of the soil suit the bacilli of Löffler in a special degree, while impurities of the *subsoil* please the bacilli of Eberth better.

Even the exception formed by East Flanders tends to confirm this rule, inasmuch as it is perfectly clear that its surface ought to be more easily cleared of all impurities by reason of the numerous watercourses which furrow it. A further proof that it is, in a special degree, impurities of the surface which serve to harbour diphtheritic germs in certain localities, is the exaggeration of mortality from diphtheria in country districts compared to what obtains in towns; density of the population is not of the least influence on the increase of the mortality due to diphtheria; but the surface of the soil is much better protected in towns against impurities of all kinds.

Another circumstance which may foster diphtheria in a locality is the breeding of certain species of animals presenting a great receptivity for diphtherogenic germs: for example, Italian fowls and game-cocks. The transmission of diphtheria to man by these animals is so well established by the observations collected by the author for several years past that he feels persuaded of the need of further attention being paid to this subject. Finally, a third condition which necessarily fosters diphtheria in a locality is the negligence exercised in the application of measures of disinfection and isolation.

Every case of diphtheria must be notified to the local authority, who will see to it immediately that all the children of the sick person's family be kept away from school as long as any danger of contagion exists. In every case disinfection must be rigorously attended to and performed by special agents. Notification and disinfection ought to be obligatory.

The altitude of the locality does not probably exercise any very great influence. One would suppose that diphtheria would be specially prevalent in low, damp places. Recent observations by the author on the progress of diphtheria in three contiguous parishes of the district of Ath (Œudeghien, Ostiches, and Mainvault), show that in each of these parishes there was a

principal seat of the malady, and that in the three parishes this seat was in precisely the most elevated hamlet of all, a fact which from the first appears somewhat strange. One may, perhaps, conclude that Löffler's bacillus does not like too much damp, and that it is in this respect that its character differs from the bacillus of Eberth.

Dr. Hewitt, Secretary and Executive Officer of the State Board of Health of Minnesota, U.S.A., said that his experience covered eighteen years of sanitary service with the disease in an interior State of the American Union with a very complete public health service, consisting of 1575 local boards of health, with a State Board. Notification of infectious disease by physicians, householders, hotel and inn keepers, has been obligatory since 1883 with penalty, as is also isolation and disinfection by the local boards of health. The facts believed to be proven in Minnesota were that the disease is very infectious, that it is communicable by persons and things, that the infection lives and grows outside the body and below the body temperature, that it is very tenacious of life as against measures of disinfection, and lives for long periods in clothing and bedding and on floors and walls. Isolation and systematic disinfection, with the most perfect sanitary regulation, are most efficient at present in the control of the disease. Since these had been in efficient use the prevalence had assumed a family character, limiting itself to one or more associated families, and rarely going beyond, except by evasion of the law on the part of an infected person. What was needed now was more careful collection of the facts of each outbreak with a view to a more accurate knowledge of the disease, not neglecting the preventive and controlling measures now found to be most efficient, as above.

Dr. Jules Bergeron, of Paris, followed with a paper entitled "Note sur la Prophylaxie de la Diphthérie." Dr. Bergeron said that the measures to be taken against diphtheria were disinfection and isolation: disinfection of all clothing, &c., contaminated with secretions from the affected parts; isolation of all cases and of all doubtful cases, such as those of a herpetic character, which are difficult to distinguish from diphtheria in the early stage of the disease. An important question to be answered is, How long ought isolation to continue; how long, in fact, does contagion last? Dr. Bergeron says that he adopts six weeks' isolation as the maximum, and that he has never observed a case of transmission of the disease when a case has been isolated for this period.

Dr. Gibert, of Havre, spoke of diphtheria in Havre. He said that diphtheria appeared in Havre about 1860, and was limited to the Graville Quartier. In 1864, there was an epidemic close to Eryonville. From this date the number of deaths constantly increased, and the disease, which at first was confined to only a few localities, spread throughout the town. The severity of the disease increased until 1885, when a *brigade de salubrité* was formed as an annexe to the Bureau d'Hygiène. The dwellings occupied by diphtheritic patients having been regularly disinfected, the mortality curve has since decreased to such an extent as to justify the hope of its total extinction, provided all the medical men of the town furnish accurate information to the Bureau d'Hygiène.

Dr. S. W. Abbott, of Boston, U.S.A., read a paper on "Diphtheria in Massachusetts from 1871–88." From his observations he concludes that diphtheria is an eminently contagious disease, that it is infectious, not only by direct exposure of the sick to the well, but also through indirect media, such as clothing and other articles that have come in contact with the sick; that the infection is not so great as in the case of some of the other infectious diseases, notably small-pox and scarlet fever. Dr. Abbott also concludes that overcrowding, &c., favours the spread of the disease; but that its transmission through the water supply is not proved. Its transmission is favoured by soil-moisture and damp houses; and the poison may remain infective in houses for a long period.

Mr. Matthew A. Adams, of Maidstone, read a paper on "The Relationship between the Occurrence of Diphtheria and the Movement of the Subsoil Water." The conclusions he arrived at were that the organism of diphtheria inhabits organically polluted surface-soil, and that, subject to suitable conditions of environment, especially as respects moisture, temperature, and food, it thrives and multiplies in the soil, the micro-organism thus produced being liable to displacement from the interstices of the polluted surface-soil, and to dispersal into the superincumbent air; in this manner determining outbreaks of the disease. So that, given the existence of the pathogenic organism, two sets of factors at least are engaged in the production of a state of affairs that culminate in an outbreak of diphtheria. First, those that promote and support the growth of the germ in the soil, such, for instance, as moisture, temperature, air, food, and so on. Secondly, agents of dispersal, by which the germs already existing in the soil are driven out and distributed into the atmosphere, and so come to be breathed by man and animals; for example, sudden rainfall, rise of subsoil water, lowering of barometric pressure.

Mr. Charles E. Paget, of Salford, followed with a paper on "A Local Examination of the Difference in Susceptibility between Old and New Residents."

The general conclusion at which he arrived as the result of an examination of the statistics of Salford was, that a shorter average period of residence before an attack of diphtheria was observed where the general mortality rate was highest and *vice versâ*; that, in fact, the relative incidence of diphtheria during an epidemic period, in respect of length of residence, was dependent to no small extent on general sanitary circumstances.

Prof. D'Espine, of Geneva, followed in the discussion. He drew attention to the great value in the prophylaxis of diphtheria in the systematic washing out of the mouth and pharynx by antiseptic solutions, corrosive sublimate (1 in 10,000), salicylic acid (1 in 2000), and lime-juice. In his practice he used salicylic acid in the strength of 1½ to 2 per 1000.

Dr. Tripe, of Hackney, who followed, said he had had large experience of this disease, as he had been 35 years Medical Officer of Health in Hackney. During that time all deaths had been investigated, and lately all cases, with the result that there was no evidence that insanitary conditions of houses caused the disease, although they might predispose to it. He believed that closing playgrounds in schools is as effectual in checking the disease as closing the schools; that prompt removal to hospital and disinfection of clothing and rooms, burning of infected rags, &c., are the best methods for checking the disease.

Dr. Thursfield, of Shrewsbury, agreed with Dr. Hewitt that dampness had a great deal to do with the etiology of diphtheria; he had himself stated so thirteen years ago in a series of papers on the subject. He thought Dr. Adams's conclusion regarding the connection of the rise and fall of the subsoil water with outbreaks of diphtheria a somewhat hasty generalization.

Dr. Günther of Dresden, Dr. Janssens of Brussels, Dr. Hubert of Louvain, Dr. Escherich of Graz, Dr. Jules Felix of Brussels, and Dr. P. Sonsino of Pisa, also took part in the discussion; many of the speakers emphasizing the need of local antiseptic measures in the prophylaxis of diphtheria.

At the end of the discussion, the following recommendation was unanimously adopted by the Section:—

"That this Section urges the European Governments to make a comprehensive and systematic inquiry into the causes of diphtheria."

On Tuesday afternoon, Sir John Banks, K.C.B., and Overlaege Bentzen, Christiania, occupied the chair.

Discussion of the Preventability of Phthisis.

Dr. Arthur Ransome, F.R.S., read a paper "On the Need of Special Measures for the Prevention of Consumption." He said, that consumption is both curable and preventable will be acknowledged at once by all medical men who have had any experience of modern methods of dealing with the disease.

Its curability is attested (1) by the reports of many pathologists as to the presence of evidence of healed phthisis in a large proportion of bodies examined in public institutions. Many thousands of such examinations have now been made, and the results show that from 25 to 50 per cent. of persons dying from other diseases than phthisis give signs of spontaneous cure of tubercular disease. (2) The testimony of all the most eminent modern physicians is to the same effect, that consumption is distinctly curable.

With regard to the preventability of the disease we have also a strong basis for our faith.

(1) In the marvellous results that followed the improved drainage and ventilation of the barracks of the British army in all parts of the world. Before the year 1854, the mortality from lung disease amongst the picked population of these dwellings was a scandal to the nation, and was enormously greater than that of the ordinary inhabitants of our towns, especially in the battalions sent to warm climates, such as those of India, Ceylon, the West Indies, the Mediterranean, &c.

Thanks to the above-mentioned measures, it now stands at from one-third to one-tenth of its former rates.

(2) The influence of improved drainage has been shown by Dr. Buchanan, in his table of towns, contrasting the mortality by phthisis and other diseases before and after the introduction of improvements in this direction; and lastly, by the reduction of the general phthisis rate of the country from 2500 per 1,000,000 in 1867, to 1500 per 1,000,000 in 1889.

My own observation in Manchester and Salford, and those of Dr. Irwin in Oldham, and of Dr. Flick in Philadelphia, point to the existence in towns of tubercular areas and infected houses.

Under these circumstances it seems to me that the duty of sanitary authorities is clear. They should regard phthisis as a disease to be dealt with on precisely the same lines as the analogous diseases, typhoid fever, cholera, and leprosy—diseases, namely, which are slightly, if at all, directly contagious, but which spread by material thrown off from the bodies of the patients. The means to be employed to this end would also be very similar: (1) notification of cases; (2) disinfection; (3) hospital accommodation; and (4) general sanitary measures, such as ventilation, drainage, and reconstruction of unhealthy areas.

(1) *Notification.*—At first it may sound somewhat novel to demand that a slowly progressing ailment like phthisis should be notified as if it were liable to become an epidemic disease; but, after all, we may fairly inquire whether the purpose of notification is not the prevention of any disease that could be arrested by early intelligence of its existence being sent to the health officer, nor would there be much difficulty in obtaining the notification of phthisis. Although phthisis is not directly contagious, there would be nothing unreasonable in classing it with other diseases that need special measures to prevent its spread.

(2) *Disinfection.*—After receiving notice of a case of tuberculosis, the next step to be taken by a local authority would be to ascertain whether proper care is or can be taken to prevent injury to the public health. In the case of well-to-do persons the information given by the medical attendant would be sufficient, but where the case is that of a poor person it should be visited, and the local authority should see to the regular cleansing and whitewashing of the premises, and to the disposal of excretions, especially of the expectorated matter. If necessary, disinfection by sulphur and the steaming of clothes should be carried out. Paper spittoons that can be burnt should be insisted upon. After death, also, measures should be taken for the cleansing and disinfection of house, bedding, and clothes.

(3) *Hospital Accommodation.*—There would next come the question of the propriety or possibility of removing the sick person to hospital. So long as he (or she) could work, and so long as he would consent to use the necessary means for destroying the infective material, it would be unnecessary to do more than I have already indicated; but when the patient becomes unable to follow his employment, and the family are obliged to seek for assistance from the parish, he has a claim to be received into the workhouse hospital, and such an asylum should be offered him, and should be made as little humiliating and as free from ignominy as possible.

(4) But it is probably to general sanitary measures that we must look for any large reduction in the rate of mortality from tubercle. It has been found that deep and thorough drainage of the subsoil will greatly diminish this mortality. In the case of Salisbury, as you are probably aware, it was reduced by one-half, and similar reports have come from other towns; and though the same result has not always been obtained elsewhere, there can be no doubt as to the importance both of draining and concreting the foundations of dwelling-houses, so as to prevent organic vapours from rising along with the ground air into living-rooms.

It is for this reason that I have ventured to suggest that where consumption is prevalent there must exist some special nutriment which either (1) serves to prolong the life of the bacillus of tubercle, or (2) which may even increase its virulent properties, this special element in foul air being either the organic matter exhaled from human bodies, or the emanations from polluted ground air from badly drained subsoils. I should imagine that either of these hypotheses might account for the result, and certainly in the few experiments which I have carried out to find the conditions that modify the virulence of the bacillus it was proved that foul air caused the organism to retain its power for evil much longer than when it was exposed to some fresh air and light.

It is possible that these may be regarded as somewhat strong proposals, but at least they have the merit that they may all be put in force without any material increase in the powers now possessed by local authorities. The only thing needed to enable them to be carried out in their entirety is a powerful public opinion to back them up. When people generally, and especially the working classes, realize that a large part of their sickness and consequent loss of time and money is due to their neglect, they will unquestionably be on our side. The undertaking possesses, moreover, the further merit that not only will all this sanitary improvement prevent consumption and other tubercular diseases by doing away with the sources of infection, but it will also prevent them by raising the general standard of health amongst town dwellers. It will so strengthen those who are already predisposed to the disease that they will more readily throw off any stray germs of tubercle that may find an entrance into their bodies. It will conduce to spontaneous cure, will prevent recurrence of the disease, and will ward off attacks from those who are now healthy.

Prof. Finkelnburg, of Bonn, read a paper "On the Influence of Soil on the Spread of Tuberculous Diseases."

He showed on a large map of Germany that the localities where phthisis was most prevalent were those in which there was a moory soil with stagnating and high-standing ground water; such as some districts in the north-western provinces, in the Rhenish province, in Upper Bavaria, and in some parts of Silesia. These facts agree with the conclusions of Bowditch and Buchanan. Overcrowding did not appear to have much influence on the spread of phthisis.

Dr. J. Edward Squire, of London, read a paper entitled, "To what extent can Legislation assist in diminishing the Prevalence of Consumption and other Tubercular Diseases."

Dr. Squire considered that the danger of infection increased with the close crowding of the sick and healthy, and with deficient ventilation; and that by sanitary improvements this danger might be obviated. There ought also to be a proper supervision of food (meat and milk) obtained from tuberculous cattle. Trades in relation to phthisis were also discussed.

Dr. Gibert, of Havre, followed with a paper entitled "De la distribution géographique de la Phthisie pulmonaire dans la ville de Havre: Rapports de la Phthisie avec la densité de la population, avec l'alcoolisme, et avec la misère." Dr. Gibert thought from his observations that overcrowding was a great factor in the etiology of phthisis: but that alcoholism played a much greater part, and poverty was also a factor. He showed on a map the distribution of phthisis in Havre.

Sir John Banks, of Dublin, who spoke in the discussion, mentioned that the sanitary improvements undertaken in Dublin had produced a great diminution of disease. Practice both in hospital and private had demonstrated this to him.

Mr. Weaver, of London, and Dr. B. O'Connor also took part in the discussion.

LETTERS TO THE EDITOR.

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Aërial Roots of the Mangrove.

IN your note on a recent meeting of the Royal Botanic Society (July 30, p. 304), it is stated that the only explanation yet offered of the erect aërial roots of *Avicennia nivea* is that of detaining the *débris* and preventing the soil from being washed away. Without in any way detracting from the ingenuity and probability of Mr. Sowerby's explanation, it can hardly be admitted that this is the only explanation that has as yet been proposed. The peculiarities, both structural and physiological, of the mangrove-vegetation of the swamps of the Malayan Archipelago have been, during recent years, a special subject of investigation by botanists located at the Botanical Laboratory at Buitenzorg; the most recent and most important addition to its literature being comprised in the 22nd Heft of Luerssen and Haenlein's