mater and the third through the internal auditory meatus, and probably the fourth also. Thrombosis is, therefore, a very fatal lesion, but there is some evidence that patients with the typical symptoms appear to recover, at any rate for a time; and among these cases are 3 which showed that the patients had recovered—only, however, to succumb to the secondary effects after intervals of a year, six and two months.

In the first a man, aged 23, with old otorrhoea, had been ill, giddy, and had had occipital headaches a year previously, his left leg had dragged in walking, and for the last six months he had rigors. He sweated profusely. He died with a cerebellar abscess, which was secondary to an old thrombus, which was adherent and decolourised, occupying the inner part of the sinus. A second clot of more recent date was in the outer part of the sinus.

The second was a girl, aged 8, who six months previously had sickness, vomiting, headache, and inflammation of the brain, following a blow on the head. Mastoid suppuration followed. She died with three cerebral abscesses in the centrum ovale on the opposite side. The lateral and the posterior half of the longitudinal sinus contained old organised clot.

In the third a child, two years old, caught cold, became ill, emaciated, and was drowsy, finally dying two months later, without otorrhoea. A thin veneer of old clot was found lining the wall of the longitudinal and the lateral sinus on one side, where the tympanic cavity was filled with pus.

As with cerebral abscess we found that the otorrhoea had always lasted for months or years, the same is usually true for thrombosis. In only five had the otorrhoea lasted less than seven weeks. The shortest duration was three weeks, which occurred three times. The duration of life after the first symptoms of thrombosis was six to eight weeks in six cases, three to six weeks in three, less than three weeks in ten. The most acute cases lasted a week and a week and a half respectively. The most constant symptom was pyrexia (16), of which only one report fails to make mention. Headache (11), and rigors (10) were also very frequent. (Only sixteen of the cases have full clinical reports.)

In no other complication are erratic pyrexia and rigors so constantly present, and it will always be justifiable to assume that they probably indicate thrombosis in any patient in whom freely opening the deeper mastoid cells and draining the ear has not been followed by their subsidence. In such a case prompt action is necessary, remembering that in half of the cases death occurs within three weeks from the onset of the symptoms. Earache (9), as distinct from headache, is more common than with meningitis or abscess. The other symptoms which were noted were vomiting (7), coma (5), listlessness, giddiness, delirium, and convulsions, each twice; diarrhoea, emaciation, acute nephritis, and paraplegia, each once.

The patient often passes into a typhoid state, and may waste considerably; the tongue may be dry and the pulse rapid, the symptoms being essentially those of septicaemia. Locally subcutaneous oedema over the mastoid, and in some mastoid tenderness, were noticed, but these were only occasionally present. Some patients complained that their pain was at the back of the head, ran down the neck, and was made much worse by movement, so that the neck was kept stiff and the head as still as possible. When the clotting extended into the internal jugular vein it was frequently associated with a local fulness, a diffused inflammatory exudation, or an abscess along its course.

Only once were the optic discs stated to be normal. In six instances there was optic neuritis. In two the thrombosis was of two weeks', and in two of three weeks' date. In these there was no other complication, and the neuritis was secondary to the condition of the vein and the petrous bone. In the two remaining cases the thrombosis was of old date, and was, at the time of observation, associated with suppuration in the brain and cerebellum respectively. Neuritis is not common with abscess, having occurred in only two other instances, and it is probable that in all the six above mentioned the neuritis was due to the thrombosis.

We may conclude that, on the whole, optic neuritis is more suggestive of sinus thrombosis than of the other lesions. As a further example we may give this case of Mr. Lane's, which recovered:

Thrombosis of the Lateral Sinus; Optic Neuritis; Removal of the Clot; Recovery.—G. S., aged 10, under Mr. Lane and Dr. Perry, in August, 1888. He had had otorrhoea for years. Admitted with earache, tenderness, and oedema; temperature 102.2°. A week later inattentive, rigor, optic neuritis on the right side. The mastoid was explored without result. The rigors and pyrexia con-

tinued. Two days later, the lateral sinus was explored, a mass of foul clot was removed, and the jugular vein was tied. The boy made an uninterrupted recovery, and is now well.

As in three-quarters of the cases death ensues from pulmonary pyæmia, and in more than a third there are no other lesions, even at the time of death, it is clear that if thrombosis ensue in a case of otitis media, more especially if the discharge be foul, the only treatment that is of any value must be directed to the prevention of the pyæmia. When such a danger has to be combated we must be willing to run great risks in order to save some of the patients.

The internal jugular vein should be ligatured in the neck, the lateral sinus should be opened, and, if the clot be very foul and septic, if it may be scraped out, rendered aseptic as soon as possible, and, if be thought desirable, the sinus may be irrigated. It may, in some instances, be desirable to ligature the jugular vein low down in the neck, and to seal the wound; then, higher up, the vein may be again ligatured and divided, and the upper end brought out, so that if septic material passes down it may escape externally. This line of treatment, which may seem too heroic, has been recommended by some surgeons, and some such can alone avert the pulmonary infection which carries off these patients.

This same treatment deals with the dura mater over the posterior surface of the petrous bone, which also, if neglected, is a source of danger to nearly half its victims. If the lateral sinus, after it has been punctured, whether purposely or accidentally, be found to be healthy, thrombosis need not necessarily ensue. I have seen this happen three times, and no evil results followed, the patients dying from other causes.

The deductions to be drawn from the cases of lateral sinus thrombosis are that: 1. The disease more often spreads from the posterior wall of the middle ear than from the mastoid cells. 2. The otorrhoea is generally of some standing, but not always. 3. The onset is sudden, the chief symptoms being pyrexia, rigors, pain in the occipital region and in the neck, associated with a septicæmic condition. 4. Well-marked optic neuritis may be present. 5. The appearance of acute local pulmonary mischief, or of distant suppuration, is almost conclusive of thrombosis. 6. The average duration is about three weeks, and death is generally from pulmonary pyæmia.

EXTRACTS FROM

THE MILROY LECTURES ON THE ETIOLOGY AND PREVENTION OF PHTHISIS.

Delivered before the Royal College of Physicians of London.

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Physician to the Manchester Hospital for Consumption and Diseases of the Throat.

LECTURE IV.—THE PREVENTION OF PHTHISIS.

Preventable Causes: a. Inherited; b. Acquired; c. Sources of Infection: d. Favouring Conditions.—Deterrent Measures against Marriage.—Treatment of Children of Phthisical Parents: Hygienic, Educational, Medicinal.—Choice of Work.—Ventilation and Warming of Schools.—Selection of Subjects of Acquired Predisposition from Chest Diseases.—Prevention of Dusts from Work.—Change of Climate.—Legislative Enactments respecting Tubercular Cattle, Flesh Meat, and Milk.—Combination of Sanitary Authorities.—Measures respecting Buildings; Compulsory Clauses.—Measures against Atmospheric Impurities.—Healthy Homes Societies.—Treatment of Excreta, Sputum.—Disinfectants.—Combustion.—Measures after Death.—Notification of Phthisis.—Isolation or Supervision.—Special Hospitals.—Principles of Treatment of Incipient Phthisis.

We are now in a position to consider what is possible to be done, and what should be attempted, to prevent the disease from attacking both human beings and animals associated in some relation or another with human beings.

With regard to inherited tuberculosis or inherited vulnerability by the virus, if we were to accept Professor Baumgarten's theory of the chief mode of origin of the disease, namely, by spores, that, like the pangenetic "gemmules" of Darwin, are implanted in us by our ancestors, and that may or may not remain latent all our lives, we should, indeed, despair of ever casting out this plague from our midst; for, even supposing that it were possible either to prevent all consumptives from marrying, or to keep their offspring under such conditions that the disease could not develop, it might still be transmitted through the second or third generation, and might break out at some subsequent period. But it is quite otherwise with regard to inherited predisposition, if this consists, as we believe it does, mainly in a vulnerability only.

A father or a mother whose partner has died of phthisis, and who has been left with children to bring up, may certainly hope to save them from the fatal inheritance, especially if the children have not been suckled by a consumptive mother; a well drained, high, and airy site for the dwelling; entire cleanliness of house, clothing, and person; fresh air and light; abundance of good food; due exercise and rest; care during illness, and so on. I would, however, especially emphasise certain details of the hygienic code: thus, that milk and easily digested fats should form an adequate part of the dietary, and that the milk in every case where there is a tendency to tubercle should be scrupulously boiled, and in some cases peptonised or used as koumiss or junket. Free ventilation is especially needed in apartments occupied by persons, whether children or adults, with a tendency to consumption.

Exercise should be such as to develop the chest as much as possible, not only by games—though this is the best method—but also by carefully graduated and adapted gymnastic exercises. It should also, as much as possible, be carried on in the open air, and with as little dust in the atmosphere as practicable.

Special care must be taken during and after the illnesses to which childhood is liable. After measles and whooping-cough thorough examinations should be made to see that there is no lingering affection of the lungs, and that the chest is not left deformed in any way. The attendants should not rest satisfied with anything short of complete recovery, if this can by any means be attained, either by medicinal agents or gymnastic exercise, or by change of climate, and equal care must be exercised after any of the exanthemata. Where enlarged lymphatic glands are left they must be regarded as a possible source of danger, especially when they are the sequel to some external eruption or sore.

Where the parents are rich care should be taken with regard to education; that it should not be overpressed, and that it should be carried on in well ventilated rooms; and if a boarding school has to be selected, it should be one on a high and dry site, and not only the schoolrooms, but the dormitories, should be inspected to see that there is sufficient cubic space.

If it should be necessary to choose a business or profession, let it be one in which there will be but little office work, and as much outdoor employment as possible.

Something more needs to be done for children of the poor by various public bodies, especially in the direction of securing better methods for the warming and efficient ventilation of schools.

With regard to chest affections, however, I think we may use some discrimination in selecting cases that must be submitted to the restrictions it is needful to impose upon those most prone to phthisis. Thus, it is necessary that, during attacks of acute bronchitis, pleurisy, broncho-pneumonia, and other inflammatory complaints, care must be taken to secure the complete resolution of the disease.

After all these complaints, and especially after pleurisy, there is undoubtedly danger so long as there remains any contraction of the chest and want of full expansive power. It is well known how frequently phthisis follows pleurisy, and although this may in some cases be due to the fact that the pleurisy itself is of tubercular origin, in others the tubercular infection is grafted upon the injured organ at a period too remote from the original disease for it to have been its immediate precursor.

I have been in the habit of testing the movements of the chest with the stethometer in most forms of pleurisy, and in all cases where these movements are impaired by the attack I have formed an unfavourable prognosis, an opinion that has only too often been confirmed by the result, though in several cases the supervening phthisis has been some years before it has made its appearance.

There seems to be less reason to dread the occurrence of phthisis in chronic bronchitis, asthma, emphysema; but I cannot altogether share the opinion of Rokitanaky as to the immunity enjoyed by sufferers from the latter complaints, as I have several times seen their association with phthisis. I should imagine also that in the partial emphysema that arises from atelectasis or impairment of certain portions only of the lung a deposit of tubercle is only too likely to take place in the portions thus injured.

Still greater danger is also acknowledged to arise from accidental hæmorrhages into the lung tissue. Although hæmoptysis is frequently only a sign of incipient tubercular disease, I am convinced that it is also sometimes simply its precursor, and the resulting phthisis has in my experience been more acute in its course. In this class of cases the stethometer has been of no assistance in prognosis. I may remark here that as an additional precaution against infection in this class of cases, and in all in whom there is a predisposition to phthisis, and when its subjects are obliged to attend crowded assemblies of any kind, I have been in the habit of recommending the temporary use of respirators charged with eucalyptol so as to minimise the danger of inhaling tuberculous material.

I need not linger over the precautions that should be taken in the case of dusty work, especially such as involves the production of sharp irritating particles. It is probably still hopeless to expect that workpeople will use respirators to catch the dust on its way to the mouth, but fans are now almost universally employed to sweep it away from the worker. It would, however, be a good thing if these people could be more frequently warned of the necessity of attending to the first beginnings of lung trouble, as we know that in their first inception many of these cases are not tuberculous.

With regard to the ingestion of tuberculous food, it is probable that too great laxity prevails in the inspection of butchers' meat, and that its sale should be subject to more stringent regulation than it now has in our large towns. In France, by a decree passed in July, 1888, it is provided that "wherever the tubercular process affects the lining membrane of the chest or abdomen the entire carcass shall be condemned." But in most other countries it is considered sufficient, when the disease is entirely local, and not generalised, to cut out the diseased parts and suffer the meat to be sold if otherwise sound and the beast well nourished. Professor Koch himself thinks there is no danger in this practice, and this opinion is shared by Cornil and Dujardin-Beaumetz in France, by Nosotti in Italy, and by von Wesener in Germany. But most of these opinions are based upon the idea that the meat in question should be well cooked; and it seems to me desirable that the Prussian practice should be followed of plainly labelling meat that is regarded as in the least degree suspicious by the inspector, who should not suffer it to be sold without a caution to the buyer. Still more decided precautions should be taken with regard to milk from tuberculous cows. Its power of conveying tubercle is fully proved, and its sale should be prohibited. Probably many more cases of infection from this source would occur in towns if it were not for the fact pointed out by Bollinger, that the mixing of the milk of many cows diminishes by dilution the risk of conveying the disease.

By Section 9 of the Contagious Diseases (Animals) Act of 1886 (amending the Act of 1878), the powers of the Privy Council respecting the inspection of cattle and sanitary precautions relating to milk are transferred to the Local Government Board, and local authorities are empowered to make regulations respecting these points. Unfortunately, tuberculosis is not included in the definition of disease in the Act, and the Departmental Committee on Pleuro-pneumonia and Tuberculosis report in 1888 that, "although in England and Ireland, under the provisions of the Nuisance Removal Act (as embodied in the Public Health Act, 1885), the medical officer of health or inspector of nuisances may seize tuberculous animals, yet such seizure is rarely performed." The case with regard to milk is even more unsatisfactory. It is doubtless now the duty of rural sanitary authorities to supervise all dairies and cowsheds, and to prevent the export of possibly tainted milk; but again, there is no direct provision against the supply of the milk of tuberculous cows; moreover, the local boards of places where milk is produced are not necessarily in union with the authorities of the places where it is consumed, and the members of the rural local boards are often unwilling to offend the farmers and others by whom they are elected, and are not likely to take much care in the matter.

It is urgently necessary, therefore, that the laws relating to the sale of the flesh of tuberculous cattle, and the milk supplied from them, should be amended without delay, and also that some concerted action should be taken by health authorities with reference to the sale of milk in towns.¹

The next, and I believe the most important, media for propagating consumption, are the houses people dwell in and the rooms in which they congregate together. Architects and builders of all classes of dwellings have been in the past, and are still, largely responsible for a very large proportion of preventable mortality. It is only right that we should look to them in the future to rectify the mischievous modes of construction, both of mansions and cottages and public buildings of all kinds, that have proved such a fertile source of disease, and especially of consumption. They must see to the exclusion of noxious ground air from houses, to the prevention of the harbourage of dust, to giving sufficient copious streams of air without draughts, to the extraction of foul air as soon as it is produced, and to the provision of abundance of light. They are not left without help in this regard. In Sir D. Galton's excellent work on *Healthy Houses*, there are ample and detailed instructions as to how these several objects may be accomplished.

Local authorities, also, cannot plead ignorance in excuse for neglect. The model by-laws of the Local Government Board, if fully carried out, would, to a great extent, do away with the merely structural causes of phthisis. The whole of these by-laws are useful, but those relating to the width of streets (4-8); height of buildings (19); space round houses (53-55); concreting of cellars and foundation (9-10); damp proof courses (17); quality of materials and fireplaces (11) (58); drainage (60), are of especial value in relation to our subject.

Much greater care should be exercised in respect to the warming and ventilation of public buildings. The openings for the latter purpose are, for the most part, quite inadequate, and the means of extracting foul air are often futile. It is a question also whether the methods used for introducing warm air do not generally devalue it, and make it unfit for healthy respiration.

Numerous Acts of Parliament have been passed since the first Labouring Classes Lodging Houses Act of 1851; one in 1866 and another in 1867, and in 1868 a very stringent measure was passed, commonly called Torrens's Act, but unfortunately it proved unworkable, owing to the absence of clauses giving sufficient compensation to owners of property. Then, in 1875, came the most important effort in this direction in Sir Richard Cross's Improvement Act, and it must be a source of no small satisfaction to the members of this College to know that this and other subsequent measures are mainly due to the representations made by them to the Legislature as to the need for such improvement.

Thorough as this Act was, however, it also was not found to work well in practice, and several large towns, notably Edinburgh and Glasgow and Manchester, preferred to obtain private Acts of their own to using the rather cumbrous machinery provided for them in it. Accordingly, amending Acts were passed in 1879, remedying defects both in Torrens's and Sir R. Cross's Acts, and in 1881 further efforts were made in this direction. Finally, in 1885, after a Royal Commission had sat upon the subject, and had reported that local authorities really possessed now ample powers, which, for the most part, they did not use, for improving cottage dwellings, a most important clause was introduced into the Housing of the Working Classes Act, 1885, which made compulsory all that was only left permissive before in previous Acts.

This clause runs as follows: "Section 7. It shall be the duty of every local authority entrusted with the execution of laws relating to public health and local government to put in force from time to time, as occasion may arise, the powers with which they are intrusted, so as to secure the proper sanitary condition of all premises within the area under the control of such authority."

If the local authority does not carry out this law, then any complainant may apply directly for a *mandamus* to compel them to do so, without the necessity of appealing to the Local Government Board.

In the matter of atmospheric impurities, cleanliness, light, and ventilation must be our chief resources.

¹ I am informed that several towns have obtained private Acts by which it is provided that their medical officers of health may inspect any dairies, etc., beyond their boroughs from which milk is supplied to them, and these provisions are included amongst the "model clauses" which may hereafter be the subject of general legislation; but it is not apparent from these clauses that any power is given to inspect the cows themselves, in order to judge whether they are tuberculous or not.

It is interesting to note, as a result of Professor Carnelley's experiments,² that the influence of dirt as a fosterer of micro-organisms in the air has now been placed on a scientific basis. His conclusions are shown in the following table:—

Effect of Cleanliness.

		Space per Person.	Carbonic Acid.	Organic Matter.	Micro-organisms.
		Cubic feet.			
One-roomed houses	{ Clean ...	295	7.89	2.34	18
	{ Dirty ...	20.0	9.87	3.23	41
	{ Dirtier ...	221	10.06	2.42	49
	{ Very dirty ...	220	10.01	2.09	93
Two-roomed houses	{ Very clean ...	273	12.20	1.93	10
	{ Clean ...	264	9.34	1.37	22
	{ Dirty ...	233	9.40	2.03	69
Unventilated Board Schools	{ Clean ...	167	19.68	3.25	91
	{ Average ...	169	14.17	2.90	125
	{ Dirtier ...	191	22.47	2.73	198
Ventilated schools	{ Very clean ...	194	12.50	2.26	3
	{ Clean ...	155	12.81	1.49	16
	{ Less clean ...	152	10.73	1.76	30

It will be seen that cleanliness produced a difference of 18 to 93 in the one-roomed houses, 10 to 69 in two-roomed houses, 91 to 198 in unventilated, and 3 to 30 in ventilated schools. And yet want of cleanliness is not solely responsible for the presence of organised germs. In badly ventilated schools micro-organisms increase up to a certain point with increase of wall and door space, whereas in mechanically ventilated schools where the air is quickly renewed the micro-organisms decrease with increase of cubic space. The total effect of scrubbing also was found to be *nil*. The scrubbing would remove the loose dirt but not the dirt ingrained into the wood of the floor. Another reason against the loose dirt being a main source of contamination is the fact that the infection of a school with micro-organisms takes place very gradually, new schools having much fewer than old ones, and similar results have been obtained by Miquel in new and old houses in Paris. Probably nothing short of total destruction would clear some of the older buildings from micro-organisms. Even if we suppose that all the precautions so far mentioned could be strictly carried out, much still remains to be done before we can exorcise the demon of tuberculosis. People must be educated to take advantage of the arrangements that we may hope will be made for their comfort and well-being.

Hitherto we have been mainly occupied with the external precautions to be taken against absorbing the tubercular virus. We must turn now to those relating to the sufferer from consumption himself. Both the urine and feces have been found to contain bacilli, and should, therefore, be disinfected, or otherwise safely disposed of. But we have seen that the most fertile source of infection in phthisis is probably the sputum of such patients expectorated on to the ground, on to floors, or into handkerchiefs, allowed to dry up, and in the form of dust permitted to lodge on the walls or in nooks and corners of dwellings, or to float about in the air of all kinds of public assembling rooms. Englishmen are rather inclined to sneer at the abundant provision made on the Continent for the reception of expectorated matter, but it might be well for us if we were more cleanly in this respect in this country.

But all such receptacles should be filled preferably with some liquid disinfectant or with sawdust that has previously been charged with some efficient disinfectant, and their contents, like those of the dustbins, should be scrupulously burnt, either on kitchen fires or in a furnace provided for the purpose by town authorities.

It would be well also if all phthisical patients would carry with them and use small portable spittoons that could be worn in the pocket. They can be made for a few pence, and can be lined with paper charged with disinfecting substances, and their contents could readily be consigned to the fire at convenient intervals.

Disinfectants.—Numerous experiments have been made to determine the best means of disinfecting tuberculous material. In Verneuil's *Etudes sur la Tuberculose*, Dr. P. Villemin gives the results obtained with a prodigious number of different chemical substances. It would be useless to name the hundred and one of

² Sir H. Roescoe's *Lecture on Ventilation in Schools*, p. 12.

these bodies that have either given negative results, or that have only somewhat retarded the development of the bacillus. He found, however, that the following ingredients mixed with the cultivating medium completely sterilised it in the proportions which he employed; they are: hydrofluoric and silicic acids, fluosilicates of potassium, sodium, and iron; ammonia, naphthol (α and β), polysulphuret of potassium, tartar emetic, and sulphate of copper.

Dr. de Souza found that the following substances prevented all development: mercuric ethyl in the proportion of 1 in 35,000; benzoate of ethyl, 1 in 3,000; benzoate of methyl, 1 in 12,000; but menthol and iodoform had only a retarding influence. Schill and Fischer¹ found corrosive sublimate most efficient; Somani and Brugnattelli² brom-ethyl, palladium, and mercuric chlorides, carbolic acid, creasote, naphthol, and saturated solutions of camphor in alcohol; lactic acid and turpentine.

Unquestionably tuberculous material cannot be left to take care of itself. The various natural disinfecting agents, with, perhaps, the sole exceptions of fresh air and light, seem to be wholly inadequate to deal with it.

M. Galtier³ has succeeded in inoculating tubercle with the juice of muscle from tuberculous animals after it has been raised for twenty minutes to a temperature of 60° C., and for ten minutes to a temperature of 71°, temperatures which, he says, are not exceeded in the centre of a large piece of meat cooked on the grid-iron.

Desiccation, putrefaction (for ten to twenty days), freezing at temperatures from 3° to 8° below zero, C., alternate freezing and thawing—none of these conditions destroy the infective power of tuberculous matter. He found, also, the urine of tuberculous animals was virulent, and he draws the conclusion "that it is indispensable to insist upon the disinfection of all objects soiled by tuberculous animals, of their excretions, of places they have occupied, of the dunghoops, etc., in order to prevent the dissemination of the disease, and its transmission to man."

At the Manchester Hospital for Consumption we have been in the habit of using for the spitcups a solution of mercuric chloride, 1 in 500, and I have also used "salufer," a fluosilicate introduced by Mr. W. Thomson, of Manchester.

If the stools and urine of the phthical patients have to be disinfected, probably the best agents would be sulphate of copper, or sulphate of iron, or carbolic acid, but where water-closets are used there is probably not much danger from this source.

It is recommended by Dr. Cornet and others that after the death of a phthical patient, the rooms and bedding and clothes should be thoroughly disinfected, as after a death from a contagious disease, and a thorough cleansing of the whole premises. There can be no doubt that this practice—at present, so far as I know, limited to Italy and Spain—ought to be universal.

It becomes a serious question for the public and for the State, whether persons suffering from consumption, if they are "without proper lodging and accommodation" for preventing infection, should not be provided with asylums and hospital accommodation until the disease is either cured or ends in death.

Enormous sums have been spent in the past in the isolation of persons suffering from leprosy, a disease strictly analogous to phthisis, only still more chronic and less easy to control by such a method. It would certainly be far easier to cleanse away and destroy phthical sputum than to prevent contamination from leprosy sores.

If a poor country like Norway can provide asylums for a large proportion of its lepers it is not too much to ask Great Britain to make the attempt to segregate those consumptives who are likely to be a source of danger to the community.

At the present time the accommodation for cases of phthisis is very small. They are entirely shut out from most general hospitals, although they are admitted as out-patients to all dispensaries, and are thus free to scatter abroad the infective material in places

where many persons peculiarly prone to the disease are seen to congregate.

The special hospitals for consumption are very few in number; they may almost be counted upon one's fingers. Thus there are in the metropolis four such institutions, including the great Brompton Hospital, and together containing 615 beds. At Bournemouth also there is the Ancillary Sanatorium with 62 beds. At Torquay (48), Ventnor (140), and St. Leonards (18) there are special hospitals with an aggregate of 206 beds. Possibly, also, at some of the numerous cottage hospitals cases may occasionally be taken in. The only manufacturing towns in England to which such hospitals are attached are Liverpool (with 50 beds) and Manchester (with 37). The workhouse hospitals are the chief refuges for destitute consumptives, but Dr. Bridges informs me that there are no data from which to ascertain how many of them are thus accommodated.

I would ask that phthisis should be placed in the same list with other diseases requiring special measures to protect their spread. Although, as before said, phthisis is not directly contagious, I venture to contend that there would be nothing unreasonable in thus classing the disease.

My proposition briefly would be this—that phthisis should be classed with other infective disorders; that every case as soon as it is discovered should be notified to the medical officer of health. If necessary, it should be visited to ascertain whether proper care is, or can be, taken to prevent injury to the public health. Where the case is that of a poor person, the local authority should see to the regular cleansing and whitewashing of the premises, to the disposal of excreta, including especially the expectorated material. They should also inquire into, and rectify if necessary, the drainage and ventilation of the dwelling; and after death, special measures should be taken for the cleansing and disinfecting of house, bedding, and clothes. After all this had been done for the safety of the non-phthical portions of the family, 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 to him, and should be made as little humiliating and as free from ignominy as possible. When such a hospital is efficiently administered—as it should be, and often is now; when the nursing is performed in a kindly fashion, on Miss Nightingale's principles, and the patient is not left to the ministrations of any able-bodied pauper, as is sometimes the case; and when appropriate care is taken for the cleanly disposal of excreta of all kinds, then there could probably be no better fate in store for the poor invalid, and he might even soon be restored to his family, and be able to return to his work.

And I would also put in a plea for those who are not reduced to pauperism, but who could be removed to hospital to receive appropriate treatment in its wards. But there would still remain a wide field open to private benevolence, in the provision of sanatoriums or homes for those unfortunates.

I can conceive few objects better calculated to excite the compassion of all humane people than the condition of many of these poor sufferers who are shut out from the benefits of general hospitals. I can scarcely think that there would be much difficulty in raising the funds necessary for the care of such cases as are not yet reduced to pauperism, but who are really destitute of the appliances and comforts so necessary to a slowly fading life.

I do not hesitate to say that at present the hospital accommodation for cases of phthisis is most inadequate, and that in place of the half-dozen of such institutions outside the metropolis, there ought to be hundreds of them scattered about the country in suitable localities, and attached to all the chief centres of the population. The map of the distribution of leper houses in England shows what large provision was made for leprosy at a time when the population was not much more than one-tenth of its present amount, and it is possible that advantage might be taken of some of the funds left for that purpose, to apply them in the treatment of a strictly analogous and closely allied form of disease.

In conclusion, perhaps I may be allowed to say a few words as to the principles that should guide us in endeavouring to check the disease at its onset.

1. May I point out the unsatisfactory results that have arisen so

¹ Amongst the class of substances that greatly retard the development of the bacillus, he places arsenious, boric, picric, pyrogallie, and sulphurous acids; benzoin, chloroform, creasote, hyposulphite of soda, iodoform, menthol, phenate of soda, salol, and toluene; and he places in a third category those substances in which growth took place, but with some difficulty. Amongst these we find acetone, aldehyde, biniodide of mercury, bromides of potassium, sodium, and ammonium, caffeine, camphor, chlorhydrate of ammonia, turpentine, eucalyptol, iodide of potassium, naphthalin, resorcin; sulphates of soda, magnesin, quinine, and zinc; thymol, and tungstate of soda.

² *Mitt. aus dem k. Gesundheitsamte*, Band 11.

³ *Ann. Univ. di Med. e Chir.*, xxvii.

⁴ *Comptes Rendus*, 106, p. 231, July, 1867.

far from the various researches that have been made for the purpose of killing the bacillus *in situ*? Of late years, the efforts of many physicians have been directed to this object, and the treatment, whether by inhalations, by sulphuretted hydrogen injections, or by germicide medicines, has had the one principle of endeavouring to destroy the bacillus after its entrance into the lungs. I was myself at one time beguiled into making attempts in this direction, but I have long been convinced of the extreme improbability of our ever reaching the organisms in their hiding places in the lung.

Let us have "war to the bacillus," by all means, but it must be war carried on outside the body, and not within it. When once it is entrenched behind its barrier of exudative material, its individual existence, so far as we know, is safe against all our attacks.

2. What we have to do, after preventing reinforcements from being poured in from the outside, is to combat the irritation and inflammation caused by its presence by ordinary antiphlogistic measures, and then by all the means in our power so to strengthen the bodily forces as to enable them to deal with the invaders. If these receive no accession from without, and if they can be prevented from generating poisonous matters more powerful for evil than themselves, they will generally succumb, either by starvation or by being dried up, or got rid of by ordinary necrosis and suppuration.

3. At the same time I would by no means discourage attempts to preserve adjacent structures and the rest of the body from attack. Certain of the inhalations most commonly used, such as carbolic acid, creasote, eucalyptus, oil of pine, menthol, iodine, etc., are probably of service in this direction, and some of them serve to control excessive secretion, and to render the mucous surfaces generally more healthy.

At the Manchester Hospital for Consumption a series of observations have been carried on for some years upon the action of different drugs, such as iodoform, the hypophosphites, guaiacol, creasote, tannin, and latterly upon the inhalation of pure ozonised oxygen; but it has been somewhat difficult to discriminate between the action of these substances and the general good influence of the hospital itself. Other workers in this field have also contributed evidence on this subject, but it is scarcely within the scope of this inquiry to attempt to sum up the results of these observations.

It may, however, be of some service if I remark again upon the inhalation of ozonised oxygen, which, so far as I know, has only been used as yet in the Manchester Hospital, so far with encouraging results. It was first tried in consequence of the well-known beneficial action of pure mountain and sea air, and it was thought possible that some of this benefit might be due to the ozone contained in such air. After ascertaining that pure oxygen, when ozonised up to 9 or 11 per cent., might be inhaled in considerable quantities without exciting inflammatory action, it was administered regularly to fifteen patients in all stages of the complaint, and results were very marked in procuring improvement in general health, better appetite, sounder sleep, freedom from fever, and consequent gain in weight.⁷ And yet it certainly had no obvious germicidal action in many of the cases; though the amount of expectoration was diminished, there was but little difference to be noted in the number of bacilli on the microscopic slides.

4. So far as I know all the attempts that have been made hitherto, chiefly in France,⁸ to discover an antibacillary vaccine, with which to render the tissues antagonistic to the bacillus, have signally failed, and although I would not object to further researches in this direction, it appears to be hardly likely that they will be successful against a complaint in which one attack confers no immunity against a second.

5. Hitherto the best results that have been obtained in the case of consumption have been due to abundant supplies of fresh air and light,—to good food with a large allowance of fat in an easily assimilated condition, and to medicines that have assisted the general nutrition of the body.

But if the question were to be addressed to medical men as to what single measure has done most towards the cure of consumption, I believe the answer would be almost unanimous in favour of change of residence. In many instances, no doubt, the improvement would be ascribed to change of climate, and sometimes

Egypt or Algiers, sometimes Davos or Canada, or the Riviera would receive the praise. Much good must undoubtedly arise from the favourable conditions to be found in these places, but I venture to ascribe a large proportion of the cures to the simple fact of removal from an infected area to places where the air is free from active virus; and hence I am at one with those who believe that healthy homes for consumptives may be found in this country.

From a review of the course of the complaint in the past, and of its affinities with other preventable disorders; from our knowledge of its pathology, and of the influences most favourable to its spread; from our experience of its steady diminution in the last thirty years, and from the brief summary of the measures that may be taken to arrest its course—from all these points we may surely learn to regard it as a preventable disease, and may look forward to its further diminution, if not to its ultimate extinction as a cause of death.

NOTES

ON

LEPROSY IN VARIOUS COUNTRIES.

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THE following fragments on the subject of leprosy are notes of conversations or extracts from letters (to myself) or in one or two instances from books. Most of them are of value, as proceeding from skilled observers who spoke or wrote from personal knowledge. In many instances information bearing upon the fish hypothesis had been especially asked for and is given. Important statements will also be found as to the real extent of the influence of caste rules as to diet upon the conduct of the different races inhabiting India. I have found it exceedingly difficult to get at the truth on this matter. Thus some non-believers in the fish hypothesis think it sufficient to assert that the disease prevails amongst those who are by their religion forbidden to eat flesh of any kind.¹ Others of equal experience have assured me that it does not necessarily follow that because fish is forbidden therefore none is eaten. I have not been careful either on this point or on others to conceal discrepancies in the statements of those who have kindly assisted me to obtain facts. It seems, indeed, most desirable to enforce caution in the reception of evidence on this matter. It is only when confirmed by the independent testimony of two or three witnesses that any statement contrary to ordinary experience should be received. Nothing is easier than to make mistakes, especially when, as must often be the case, we speak from memory, and with but imperfect information in the first instance. The love of being definite often leads minds of a certain class to credit their impressions far too implicitly, and to state them much too confidently.

An intelligent man, who had been giving me a good deal of information respecting a certain out-of-the-way district in which he had lived, and whom I had rather closely cross-questioned, concluded his answers by saying with emphasis: "And now the next man you talk to from — will very likely tell you something quite different from what I have done. Don't believe him." I replied that he might make himself easy, for that I had long ago adopted the rule to believe only what I thought likely to be true. It is more or less in this spirit that I venture to commend to the attention of the reader the following items of evidence.

I give the extracts for the present without comment. In some instances it will be seen that they seem to bear strongly against the fish hypothesis; more especially the last in my list is, if trustworthy, subversive of it. I reserve for another occasion my criticisms on this and other opposed statements, and still avow my firm conviction that in some way fish food, and especially

¹ I quote the following from a recent book of travel by Mr. W. S. Caine, M.P.: "Fish have a poor chance in this Buddhist country. A Cingalese won't take life so he never tastes butcher's meat; he has, however, no scruple to help a fish on to dry land and let him die if he can't get back to his native element, and by this amiable quibble he is able to add fish to his mess of rice without any breach of conscience. Your Buddhist is a true Pharisee."—Caine, p. 375.

⁷ See Reports in *Med. Chron.*, May, 1889.

See especially papers by Gosselin, Jeannel, Lavalanée, and Martin, in Verneuil's series of *Études Expérimentales sur la Tuberculose*.