right hand, a sling alone will not be enough to keep the hand quiet. The man will be often taking it out to give a greeting, to write a letter, or to button a collar. And three or four times a day he has it out for washing. Half-measures of this sort will not be of much avail, and I am sure that no other joint in the body would be so carelessly treated. If it is said that it is so awkward to lose the use of the right hand, and even of the fingers, that it is wanted for hundreds of little services, many of which can be done without the least effort or force, I shall reply that for this very reason the hand and fingers should be placed beyond the reach of temptation, and this can be done only by fixing the hand in a splint as well as by carrying it in a sling.

A wooden splint is not the best sort to use as it shifts its place, and the bandages get loose, dirty and untidy. Nor does plaster-of-Paris serve well, as it is hard and uncomfortable, and is apt to become cracked, soft and soiled. Nothing does so well as a moulded splint of undressed leather. It can be made to fit as close as a glove, and if it is covered with black kid it may be made to look quite smart. A proper splint for the wrist should be long enough to reach from halfway up to the elbow down to the middle of the fingers, for if the fingers and thumb are left free the hand cannot get its full measure of rest, and unless this is secured the trouble may be never-ending.

In bringing these somewhat desultory remarks to a close, the fear comes home to me that you will think I have not made the best use of my time, that I have said nothing new, and that the old things which I have brought before you might have been brightened up a little, somewhat better clothed, and set before you in a more orderly and pleasing manner. And in this criticism I would be the last to join issue with you. Still, if they should by chance have the effect of making any one see more clearly the importance of giving his very best care and his highest skill to a troubled joint in the earliest days of its trouble, the time will not have been altogether wasted.

The Milroy Lectures

ON

INDUSTRIAL ANTHRAX.

Delivered before the Royal College of Physicians of London.

By T. M. LEGGE, M.D. OXON.,
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LECTURE III.

[ABSTRACT.]

ANTHRAX IN RELATION TO THE WOOL AND WORSTED TRADES.

THERE is interest in comparing the facts now known of the incidence of anthrax in wool and worsted as regards type of the disease, class of persons attacked, supposed dangerous material, and other circumstances, with those brought to light a quarter of a century ago, when the disease was first brought prominently into notice by the report of Mr. John Spear in 1881.¹ Internal anthrax, he wrote at that time, "is the form of the disease which is the much more common one—at all events the more commonly recorded one amongst wool sorters." During the six years 1899-1904 only six cases of the internal form have been reported, and there would thus appear to have occurred a remarkable change in the type of the disease prevalent in Bradford, the external and internal forms having changed places as regards frequency of appearance. As to the diminution of internal anthrax there is no doubt. Dr. Bell, who supplied Mr. Spear with much information as to the clinical symptoms of this type, and has had under observation hundreds of cases of anthrax since then, is sure of it. Some explanation of the change may be found in the more frequent diagnosis of external anthrax now, but this is insufficient to explain the very great reduction in cases of true wool-sorters' disease. Moreover, mild or rudimentary attacks of the constitutional form of the disease are never reported now.

Several of the cases investigated by Mr. Spear followed on manipulation of seriously infected van mohair. More recent cases of internal anthrax in 1898 and 1899 similarly followed one another quickly on manipulation of gravely infected Persian wool. With our knowledge of the greater virulence of the bacillus under certain conditions it is not unreasonable to assume that variations in type may be due to this cause,

and that at some future time there may be recrudescence of the severer form.

The principal circumstance, however, which has altered since the time when Mr. Spear wrote, is that under which the manipulation of the wool takes place. Now, in addition to regulations requiring care in the opening of the bales and removal of the damaged wool or hair, fallen fleeces, and pieces of skin, none of the dangerous specified wools—alpaca, pelitan, cashmere, Persian, camel hair, and mohair—may be opened or sorted except at a place where a constant draught of air maintained by a fan carries the dust away downwards. Instances could be cited in which occurrence of anthrax seems to have followed as cause and effect on cessation or impairment of action of this fan exhaust. Changes in type of the disease, therefore, may be due to these altered conditions of working.

Twenty-five years ago Mr. Spear insisted also on the fact that "with rare exceptions only those suffered who were employed in the first manipulation—in the sorting process,"² qualified, however, by the statement that "the power of the wool for mischief cannot be said to be exhausted here, for in the combing room the material may possibly prove infective."

Now, cases are more frequent in the rooms where the carding and combing processes are carried on. I say rooms advisedly, because personally I believe some, perhaps most, of the cases are due to infection from unwashed wool, because though combing and carding and spinning are the principal, they are not the exclusive operations carried on in these rooms. The wash bowl occupies a portion of it, or is connected with it by a passage, and along this a current of air may pass from where the unwashed material is being treated. This explanation is insufficient, however, to account for all the later process cases. In the year 1904, for instance, two persons at least were attacked in factories where no raw material, but only finished noils tops (probably of Persian wool) were used. These tops must have passed through all the various stages of cleaning, washing, and the minute separation of one fibre from another in the combing machines at one factory before they were conveyed to the other where infection occurred.

Although the disease was first noticed after the introduction of alpaca and mohair as textile materials in 1837, and occasional sudden deaths occurred in later years (1867, 1868, and 1874) from alpaca,³ the danger from mohair (introduced about 1863) seems to have overshadowed that from other material—such as Persian wool—at the time of Mr. Spear's inquiry. He gives the following list of foreign wools in the order of their apparent noxiousness as it was at that time considered to be: (1) Van mohair, (2) Persian, (3) camel hair, (4) alpaca, (5) Turkey mohair, (6) pelitan, (7) Cape mohair, (8) cashmere. Now the order would be: (1) Persian, (2) Turkey mohair, (3) van mohair, (4) East Indian, (5) camel hair, (6) alpaca, (7) pelitan and cashmere. Possibly the disappearance of van mohair from the position of greatest noxiousness is due to the fact that van mohair alone is required by the regulations to be washed and sorted while damp, if at all. The explanation why Persian wool is so largely in demand arises from the fact that this breed of sheep is one of the few in which the wool is naturally of a black, brown, or fawn colour.

The absence of anthrax from manipulation of the immense supplies of Australian and New Zealand wool I attribute to comparatively small incidence of the disease in animals in those countries, and to the precautions taken to prevent its spread and to proper disposal of the carcass. To the existence of similar precautions may also be attributed the rarity of cases in connexion with wools from the Argentine, where anthrax amongst animals is common.

To make manipulation of wool and horsehair from Asia safer, washing the sheep prior to shearing, willowing the wool free from dirt and dust, and discarding the fallen fleeces in the country of origin would be the next best thing to disinfection of the material, were that possible, by means of steam. This is what some manufacturers would wish to see done, and in March, 1903, the Chambers of Commerce of Bradford, Halifax, and Kidderminster addressed a circular letter urging that persons consigning Persian wool should endeavour, first, to keep out of the bales extraneous matter, and, secondly, to pack locks, fallen wool, and skin in separate bales. Any loss on locks sold at lower prices would be more than recouped by higher prices obtained for honestly-packed bales.

All the evidence shows, however, that wool is washed less

frequently before shipment than it used to be. In the anthrax report of 1897 the Committee express the wish that it were possible for His Majesty's Consuls to report anthrax-infected districts, so that by the ear-marking of the bales from such localities it might be possible to trace and arrest the mischief of imported infection.

Mr. Spear⁴ was informed that it would not be difficult in Constantinople, where the classification of wools from Asia Minor was made, to secure that fallen fleeces should be classed apart. Pressure in this direction by combined action on the part of manufacturers or of the Legislature might have the effect on dealers and native growers abroad of making them take steps to keep apart these fallen fleeces or to separate them in Constantinople. This would, of course, merely shift the risk from the workers at home to those in Constantinople. The difficulties in the way of carrying out such proposals are many. In the absence of official records based on veterinary reports knowledge of anthrax-infected districts would be unreliable, and such evidence might tend to grow less when it became realized that knowledge of the incidence of anthrax was followed by stigma attaching to the wool or other material. Other diseases besides anthrax are rife among animals in Asia, and it is unlikely that, in the absence of discriminating veterinary reports, the consuls would be in a position to say what bales were infected. The practice, too, of storing wool, dependent on the needs of the market or on fluctuation in price, would equally tend to make such protection illusory. That the matter, however, has not escaped the attention of some of the consuls is apparent from the following quotation from the consular report from Kermanshah in Persia⁵: "In reply to an inquiry as to why more care was not taken in washing and sorting the wool, the Kermanshah wool merchants declared that no skins, cotton rags, or pieces of string were contained in the wool exported by them. They did not wash the wool so well for export as for spinning in the country, as well-washed wool scarcely fetched a better price in Bagdad than the usual wool exported there." If in this country, with all the precautions which are taken to check the spread of the disease and to prevent the flesh of anthrax-infected animals from coming into the market, illicit dealing is still practised, and every year carcasses thus infected are found in the meat markets and butchers' shops exposed for sale, what hope is there that in other countries where there are no regulations, where cupidity is not less marked than at home, and where the disease is probably a hundredfold more rife, material good could be achieved by the branding of bales or by reliance on the exclusion of fallen fleeces in the sorting carried on in Constantinople?

ANTHRAX IN RELATION TO HIDES AND SKINS.

The history of anthrax in this country in relation to hides and skins can be best traced from the reports of Mr. Spear⁶ and of Dr. Hamer⁷ on the occurrence of cases in London. Mr. Spear's report dealt mainly with an outbreak in a Bermondsey tanyard which occurred in 1882-3, due to a consignment of bales shipped from Shanghai, and Dr. Hamer with a total of 90 cases which had occurred between the years 1873 and 1893. In 86 the occupation was ascertained, of these 63 handled the hides while in the possession of the hide broker, and 23 (of whom 15 were tanners) after removal to other industrial premises.

Infection was believed to have been conveyed from China hides in 26 cases, from East Indian in 12, from other specified kinds in 9, and in 34 the source could not be ascertained. The later records which have been obtained since 1899 show that although the area from which infected hides may arrive has been widened, material from China and East India is now, as it was a quarter of a century ago, the principal source of danger. Nor does the later information disagree with the conclusion arrived at by Dr. Hamer that infection from wet hides is very rare.

The cutaneous type of the disease has remained the same, evidence of pulmonary anthrax being as absent now as it was in previous investigations. Dr. Hamer found some ground for the hope that substitution of wet for dry hides, which the trade appeared to encourage, would, if continued, lessen the risk of anthrax to those manipulating foreign hides in London.

Examination of his figures bearing on the imports of wet and dry hides and of those which I myself have added for later years shows that there is great fluctuation in the dry hide importations, and it may be shown that this depends largely on conditions existing in the countries of origin.

China hides are recognized in the trade as particularly

dangerous, and assurance is freely given that this risk has diminished the trade in them, but actual figures do not altogether tend to support this view.

The hide and skin industry of Germany appears to be greater than that of this country. Thus the number of hides imported into Hamburg in 1903 is stated in the Consular report⁸ to have exceeded that of Antwerp, Havre, and the United Kingdom combined. Reports of the factory inspectors give no account of incidence of anthrax on dock laborers, or on those manipulating the material in warehouses prior to tanning processes. They have contained every year from 1891 to 1902 references to cases in tanneries, but without attempt at complete returns.

In France information is still scantier than that obtainable in Germany, but in 57 cases recorded in tanyards by Le Roy des Barries⁹ all but 1 occurred in factories using foreign material only, while Chauveau¹⁰ has described 10 outbreaks in tanyards near Morlaix which coincided with the first use of China hides.

There seems no reason for doubt that anthrax can be conveyed by completely tanned material. Apart from the cases ascribed to tanned hides, where possibly infection may have been conveyed from raw hides present on the premises, anthrax has been conveyed to horses apparently through the harness. Thus two horses contracted anthrax, the lesion in both cases being on the flank where a quite new pair of reins came in contact with the body.¹¹ Ravenal found spores still virulent after immersion for 224 days in the seven tanning fluids ordinarily used. Houston's¹² experiments demonstrating the presence of anthrax spores in the effluent from the catch-pit of a hide factory show that they must be able to survive also the arsenicating, liming, and other processes.

It is doubtful if there is any way in which hides to be afterwards tanned could be effectively disinfected, and obviously to be of real benefit disinfection of hides, if practicable, should be done before the material is opened in the warehouse where most of the cases occur. To secure this would be impossible, and in this country, consequently, the precautions adopted in handling hides and skins coming from China and East India are slight, and directed solely to protection of the workers by such means as overalls, of prohibition of meals in rooms where the above dangerous hides are manipulated, etc.

ANTHRAX IN RELATION TO HORSEHAIR.

The occurrence of cases in a hair factory at Glasgow in 1878,¹³ described by Dr. Russell, first drew prominent attention to the danger of anthrax to the workers with this material, and in France and Germany its use appears to have contributed by far the largest share of cases of anthrax. The outbreak in Glasgow in 1878 was due to virulent infection from Russian horsehair, and one reported in 1893 by Chauveau¹⁴ was believed to be due to China horsehair. Since 1878 no case of anthrax was known to have occurred in Glasgow until an outbreak of five cases in 1900. During this second outbreak the particular factory in which all the early cases had occurred escaped, the firm having since 1878 discarded use of Siberian hair altogether.

The possibility of steam disinfection suggests itself as the only effective means of removing the danger from manipulation of dangerous wool and horsehair. In the case of wool thorough and minute inquiry as to whether this method is practicable has ever been undertaken, but its possibility with hair has been thoroughly tested in this country and in Germany. The problem of steam disinfection when applied to horsehair and bristles is presented perhaps in its most difficult form. The natural resistance of the spores is increased by the dirt and grease of the material in which they are embedded. The hair is tied tightly together, and in the case of mane hair or combings the bales weighing about 5 cwt. are hydraulically packed. Recent experiments by Proskauer and Elsner¹⁵ have shown, too, that anthrax spores artificially placed on horsehair are killed with greater difficulty than when on silk.

The experiments in this country by Webb and Duncan¹⁶ have been carried out with known infected material, that is, with horsehair in its natural condition in which the presence of anthrax had been demonstrated. The experiments were made in a Washington Lyons apparatus. They found that dust shaken from China hair subjected to a temperature of about 245°F. for twenty minutes appeared sterilized. When, however, the horsehair thus treated had been subjected to the process of carding and one horsehair fibre separated from another, anthrax was cultivated from the dust so produced. From this the conclusion was drawn that the process of carding liberated the spores which had escaped the first dis-

infection owing to its environment of grease and dirt. Nevertheless numerous experiments with dust from combing machines showed that the disinfecting process had killed the great bulk of the bacilli and lowered the vitality of those which had survived. Hair could not be disinfected in bulk by exposure to steam at about 24 lb. pressure (253° F.) even for forty minutes.

When the results of the German experiments became known, Mr. Webb reduced the pressure at which he worked and found that equally satisfactory results were obtained with temperatures of 226° F. and 230° F. The German experiments conducted in the Imperial Health Office extended from 1894 to 1900.¹⁷ They have been very thorough, owing to statements made by manufacturers that the hair made to undergo the preliminary steam disinfection was reduced in quality, and therefore a source of loss. Current saturated steam, and not superheated steam, was used. The temperature recorded in these experiments in the centre has been from 99° to 101° C.

Leaving out of consideration hair white or light grey in colour, which would be turned yellow, the general conclusion arrived at by these experiments is that, provided the pressure does not exceed 2½ lb., equivalent to a temperature of 218° F., and due precaution is exercised in the management and regulation of the apparatus during the time of disinfection, no injurious effect is produced in the hair which could be considered as diminishing its value or causing it to be a source of loss. Success, however, is only to be attained by minute care in detail—(1) In the construction of the apparatus designed so as to allow the steam to enter from above and find its exit at the lowest part of the apparatus; (2) provision of pressure gauges marking clearly the point when the pressure of 2½ lb. has been reached, and provision of thermometers to control the temperature indicated by the pressure gauge, and (3) constant attention to the apparatus during the time disinfection is in progress.

Frequent occurrence of cutaneous anthrax among brush-workers in Belgium has recently caused inquiry to be made there, also as to the possibility of removing danger in manipulation of the material. Satisfied of the impracticability of making steam disinfection obligatory in the numerous small workshops throughout the country (a feature of the industry which everywhere adds to the difficulty of controlling the danger), Dr. Gilbert, Principal Medical Inspector, directed his attention mainly to experiments to determine how far simple boiling might be regarded as efficient. He satisfied himself that this was the case.

To secure certain destruction, however, of all anthrax spores in horsehair absolute reliance cannot be placed on either steam disinfection or simple boiling. Adoption of one or the other is a very material safeguard, and steam disinfection is practicable for all kinds of hair, except that which is of white colour, provided due care is observed. Risk, however, must always be run by those persons who prepare the hair for disinfection.

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PAN-AMERICAN MEDICAL CONGRESS.—The proceedings of the Pan-American Medical Congress, held at Panama in January, closed with a meeting of the Executive Committee at which the following resolutions, proposed by Guatemala and seconded by Peru, were carried: (1) That the next Pan-American Medical Congress arrange (a) for an international American pharmacopoeia; (b) for an international code of sanitation; (c) for an international code on temperance; and (d), as a sequel to the above, for the establishment of sanatoriums for the treatment of alcoholism; (e) for the formation of lectureships on medicine in the required studies of jurisprudence. (2) That there be formed at the next Congress a Section on Tropical Diseases. (3) That there be created Red Cross Branches, both Civil and Military. (4) Finally, it was resolved that encouragement be given to those engaged in the campaign against tuberculosis.

A SHORT NOTE ON THE NOSE AND NASO-PHARYNX.*

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It seems to me impossible to be definite or exact about the common affections of the upper air passages. Take, for example, these three phrases, chronic hypertrophic rhinitis, ozaena, and post-nasal catarrh. These troubles do not lend themselves to any sort of accurate description or classification; they give no opportunity for the language of dogmatic pathology.

I venture to suggest to you that the causes of these troubles lie a long way back in the history of our race. Surely it is not too much to assume that the inside of the nose and the back of the throat are in many of us naturally imperfect and feeble. Civilization is beginning to tell upon them as upon the teeth; and, of course, the word civilization includes all that we inherit from generations of sedentary or unwholesome life. Just as we are fated, many of us, to lose our teeth early, so many of us are fated to be troubled by the narrowness and feebleness of our upper air passages, fated to catch colds easily and get rid of them with difficulty, and to keep our mouths open by day, and to snore at night, and to have ear-aches in childhood and a relaxed membrana tympani in later life. One seldom sees a perfect set of teeth, and one seldom sees a perfect set of air passages. There is a crooked septum, or a spur on the septum, or an enlarged inferior turbinate, or a pinched, shallow naso-pharynx, so small that it will only just admit the tip of your finger, and the roof of the mouth, which ought to be low and broad like a Norman arch, is narrow and high like a Gothic arch, and the mucous membrane is thick, and clots of retained mucus slide down the back of the throat. It is unlikely, from all that we know of life, that the decay of our teeth should be an isolated fault of the body; it is likely enough that, as our teeth are coming to be crowded, irregular, and weak, so our air passages should come to have the same faults, and to be, like them, crowded, irregular, and weak.

Some of us may have had adenoids; but all these troubles are found in young people who have no adenoids and are not old enough to have had them and then outgrown them; and I think it more reasonable to believe that the inside of the nose and the back of the throat are tending, in the natural order of things, to become ill-developed and enfeebled, like their neighbours the teeth, especially among the poorer inhabitants of our great cities, who are the result of many generations of lives more or less unhealthy and sedentary. Which may make us impatient of all attempts at an exact classification of the maladies of this region of the body: for we know that organs in course of involution are variable and aberrant in their structure and in their action. Still, we must take things as we find them; we must, somehow or other, arrange these common diseases of the nose and the naso-pharynx. Perhaps, for practical purposes, we might make a sort of working arrangement of them as follows:

1. General obstruction. Under this head are included post-nasal catarrh, chronic hypertrophic catarrh, and those cases which have the look of adenoids, and the symptoms of adenoids, without adenoids.
2. General atrophy of the mucous membrane. Under this head are included ozaena and pharyngitis sicca.
3. Enlarged tonsils and adenoids.
4. Polypl. and other forms of new growth.
5. Specific infective diseases—tubercle, syphilis, etc.

Certainly it would take too long to consider all these diseases, and we may begin by setting aside the new growths and all the specific infective diseases. I would only recall that not only syphilis and tubercle, but also typhoid, may set up trouble within the nose. Typhoid, as it sometimes picks out the cartilages of the ribs or the cartilages of the larynx, so it sometimes picks out the cartilage of the nasal septum. I have seen 3 cases in which typhoid brought about some absorption of this cartilage. There was no ulceration or perforation or necrosis, only the skin of the nose fell in just below the nasal arch, leaving an ugly depression, just suited for the subcutaneous injection of paraffin. It is to be noted that one of these patients ascribed the deformity to her nurse, and was positive that the nose had been broken by rough nursing during the delirium of her fever.

* From a paper read at a meeting of the St. Pancras and Islington Division, Metropolitan Counties Branch.