

OPERATION STATISTICS OF THE GLASGOW ROYAL INFIRMARY.

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As the statistics of operations given by Sir James Simpson are oftener quoted than those of any other authority, it occurred to me, after finishing the paper which appeared in THE LANCET of July 1st, to make an exact comparison, and on the same lines, of the operations performed here from 1868 to the present time. This is a continuation of

the statistics of this hospital, as given by Sir James, of the previous eighteen years. The subjoined table shows the very satisfactory results.
The decrease in the fatality of the operations during the last thirteen years ranges from 16·8 to 4·6 per cent. There is an increase of 13 per cent. in only one set of amputations—viz., secondary for disease of the forearm.
The total number of cases for the thirteen years was 822; deaths, 212; or 25·5 in every 100, against 39·1 as given by Sir James.
The total number of amputations for injury was 397; deaths, 126; or 31·7 per cent., against 43·6 per cent.
The total number of amputations for disease was 425; deaths, 86; or 20·2 per cent., against 33·8 per cent.

RESULTS OF THE FOUR AMPUTATIONS OF THE THIGH, LEG, AND FOREARM, IN THE GLASGOW ROYAL INFIRMARY, IN THE SAME MANNER AS GIVEN BY SIR JAMES SIMPSON IN HIS PAPER ON HOSPITALISM.

Year.	PRIMARY.								SECONDARY, FOR DISEASE.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of cases.	Deaths.	No. of cases.	Deaths.	No. of cases.	Deaths.	No. of cases.	Deaths.	No. of cases.	Deaths.	No. of cases.	Deaths.	No. of cases.	Deaths.	No. of cases.	Deaths.
1869	7	3	7	4	8	3	5	1	18	5	6	3	3	0	2	0
1870	5	1	13	5	8	2	6	0	19	3	12	2	4	0	4	0
1871	9	4	6	5	13	1	10	2	3	0	2	1	8	1	1	0
1872	11	3	12	5	7	2	5	0	31	9	9	1	5	2	7	2
1873	21	6	7	2	4	0	0	0	16	3	9	0	6	1	3	0
1874	15	9	8	5	14	5	4	1	31	12	11	3	9	3	4	2
1875	12	9	6	2	13	4	4	0	23	5	5	0	4	0	6	2
1876	9	3	7	3	6	0	2	0	22	5	3	1	3	0	1	0
1877	9	6	9	3	3	1	3	0	16	2	8	1	6	0	1	0
1878	9	1	8	1	7	2	5	1	19	3	6	1	2	0	2	1
1879	8	4	4	3	8	1	1	0	16	2	2	0	2	1	4	0
1880	9	5	4	0	7	0	6	0	20	1	4	1	1	0	1	0
1881	10	5	7	1	12	2	4	0	12	4	7	1	4	2	2	0
	134	59	98	39	110	23	55	5	246	54	84	15	57	10	38	7
	44·0		39·8		20·8		9·0		21·9		17·6		17·5		18·4*	
	60·0		53·7		37·6		13·6		38·4		32·9		26·0		5·2†	

* Mortality per cent.
† Mortality per cent. of the previous eighteen years, as given by Sir James Simpson in his paper on Hospitalism.

Mortality of the Four Major Amputations, combining together Operations for Injuries and Operations for Disease.

	Per cent.			
Thigh	cases, 380;	deaths, 113;	mort., 29·7,	agst. 46·2
Leg	„ 182;	„ 54;	„ 29·6,	„ 44·0
Arm	„ 167;	„ 33;	„ 19·7,	„ 35·4
Forearm	„ 93;	„ 12;	„ 12·9,	„ 11·7

In addition to the decreased mortality, which I attribute chiefly to the use of antiseptics, another noticeable feature in these statistics is the increase in the number of operations. In eighteen years the number was 661; for

the last thirteen years the number was 822; an increase of 19 per cent. It is to be hoped the mortality will continue to decrease, but I fear it will never reach the low percentage of country operations, as cases of the worst description are occasionally sent to us from some of the very districts mentioned by Sir James as places where success had been achieved, such as Motherwell, Airdrie, &c. It is impossible that cases coming so far can have the same chance as those treated at home; but there can be no doubt it is the discomfort of their homes which forces the country practitioner to send them into the infirmary. Small hospitals in such localities would be an immense boon to the poor sufferers, and their erection is only a question of time.

MODERN STUDY OF MICRO-ORGANISMS, AND ITS INFLUENCE ON MEDICAL THOUGHT.¹

By SOLOMON CHARLES SMITH, M.D.,
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I WISH to draw attention to the position to which recent researches on bacteria have brought us in regard to the interesting question of the relation between micro-organisms and disease, partly because the subject is a most thought-producing one, partly because it is one in the investigation of which great strides have lately been made, and especially since in its elucidation we have now arrived at a point from

which research may advance along two separate lines, each useful when checked by the other, but liable to lead to error if prosecuted alone, and because there is great temptation to us all, in consequence of the brilliancy of the results lately obtained, to rush into the microscopic line of inquiry as to the nature of the germs of disease, to the exclusion of that other line of research, which I think is so important, as to the nature of those conditions which make man's body a fit nidus for the hatching of those germs, and the development of the diseases to which they are related. All our knowledge on this subject is new: the discovery of the yeast plant only took place in 1835, the trichophyton of ringworm ten years later, and the relation between living germs and suppuration only fifteen years ago; but the demonstration of the spirillum of relapsing fever, the bacilli of anthrax, of enteric fever, and now of tubercle, are things of the very present. And it seems probable that the widening of the circle of diseases which must be considered infect veresulting from this new knowledge will lead to some modification of

¹ Read before the Yorkshire Branch of the British Medical Association held at Leeds, July 26th, 1882.

our ideas as to the nature of the infective process, and make us look not so exclusively to the germ as the all-powerful principle, but take greater cognisance of the preparedness of the individual to become a fit breeding ground for its growth and development. Even in what may be called laboratory experiments, attention to these two factors is found necessary in the cultivation of certain bacteria outside the body. The nature, the composition, and the moisture of the material upon which they are grown, and the temperature at which the experiment is conducted, are points upon which success or failure hinges—that is, these organisms develop readily enough if the conditions are suitable, but not otherwise. This did not escape the observation of Professor Tyndall, for in his researches he found that although the ordinary bacteria of decomposition were able to grow in every organic solution, still there was a considerable difference in the readiness with which they developed in the various kinds of infusion experimented on, the tubes containing some being far gone before those containing others were sensibly affected. “Two bacteria germs of equal vital vigour dropping from the atmosphere, the one into a neutral or slightly alkaline, the other into an acid, infusion, soon cease to be equal in vigour; the life of the one is promoted, the life of the other only tolerated, by its environment.” “A germ brought close to the death point in a neutral or in an alkaline infusion may revive, while in an acid one it may perish; just as proper nutriment may rescue a dying man, while improper nutriment would fail to do so.”²

Now, just as in these experiments fitness of soil was essential for growth of bacteria, I think we must look upon that rapid growth of micro-organisms which occurs in infectious disease as due not merely to an infection with certain germs, but to the existence of such a state of body as shall supply fit and proper food for their development. The list of diseases in which micro-organisms have been found is a long one, but till quite recently, although their constant association with these ailments was undoubted, the proof was wanting that they were actually their cause; but now we are told that in phthisis, which has long been known to be infective within the individual, and suspected to be contagious from one person to another, the contagium does actually reside in the bacterium, which has lately been discovered in that disease.

In the older methods of investigation by inoculation with morbid fluids, it was always difficult to prove that the bacteria which they undoubtedly contained were themselves the real producers of disease, and that the virulence did not lie in the fluids themselves; but Dr. Koch's researches carry us a long way out of this stage of doubt. In his investigations into the origin of tubercle he has not only demonstrated the existence of bacteria of special form, but has been able to cultivate them outside the body. This he did on soft gelatinous plates, upon which he found they would grow, which he inoculated successively one from another, so as to eliminate all chance of carrying forward any of the original morbid material; he then introduced these bacteria of the tenth generation into healthy animals with this result, that in their development and multiplication they again produced in these animals the same tubercular disease as their predecessors had caused in those from which they had originally been taken.

The interest of this discovery is enormous, since it not only puts phthisis among infectious diseases, but it proves that the living bacteria are themselves the actual infective particles. Everyone who has watched medical and even non-professional literature during the last few months, must have been struck with the great influence this has had upon medical thought, leading physicians to increased advocacy of isolation, separation, and antiseptics, and urging pathologists on, even in the face of the Vivisection Acts, to still greater efforts to trace out the life-history of a multitude of new micro-organisms. The journals are filled with descriptions of antiseptics, inhalations, and respirators, and other means of bringing parasiticide remedies into action against diseases which have not hitherto been looked upon as parasitic, and it would be difficult to say how many earnest microscopists are not now at work cultivating and classifying micro-organisms, with such effect that already the list of bacteria, bacilli, and micrococci found in different diseases is both long and intricate. Now, in all this good work knowledge is gained, but what I wish to point out is that these microscopic researches on bacteria will be practically useless

unless embodied with investigation into the causes which make the living body a fit breeding ground for them; and as these two lines of inquiry are fairly distinct, are likely to be undertaken by different men, and are in harmony with different modes of thought, I urge that we ought not to wait for more knowledge of bacteria, nor ought we all to enter the same field of minute microscopic research which has lately been so fruitful, nor especially ought we, because we do not all possess high objectives, to stand aside and consider ourselves out of the running, but should all do what we can to discover this other factor in the production of disease, convinced that there is full scope for ordinary clinical observation in the search for those conditions of health and surroundings which make man fit food for bacteria, fit soil for the growth of those micro-organisms which in their different modes of development produce the various forms of infectious disease. The researches on bacteria which have recently been made tell us plainly that they produce diseases which carry men off, but they do not give the reason why one is taken and the other left, and till we discover this other factor the germ theory does not cover the whole ground, does not explain all the phenomena. So long as germs were thought only to be concerned with what were then looked upon as infectious diseases, it was always possible to imagine that such individuals as had escaped illness had really escaped germs, but now that bacteria are held to be causative of other diseases which we always have in our midst, and which we obviously escape much more often than we catch, it becomes necessary to add to the bare and naked germ theory the hypothesis that there is a varying resisting power in living tissue, and that germs do not always find it a fit nidus for their development and multiplication. This is a necessary addendum to the germ theory, for without it too much is proved, and we ought all to be long since dead. What, then, are the conditions of health and of surroundings which so degrade the vitality of man's tissues as to render them a fit breeding ground for bacteria? This is a question as difficult as it is important, and one the answer to which is only to be found by patient observation of cases in the new light thrown upon them by the theory of specific germs. It is worth while bearing in mind, however, that there is a great variation in the comparative importance of the two elements in the etiology of different diseases, in some the contagium, in others the fitness of soil or the receptivity of the patient, being the predominating influence; and it would seem probable that the direction of investigation should be influenced by these peculiarities. Thus, in acute and obviously infectious diseases, such as small-pox, more is likely to be gained by observing the condition of those who escape infection, although exposed to it, than by records of the multitude who are attacked; whereas, in phthisis to the contagion of which, if it exists, we must all be constantly exposed, and in the production of which, therefore, the fitness of the individual for its development must be the main element, information is most likely to be gained by inquiry into the surroundings of certain groups of cases, where, as sometimes happens, a series of individuals successively occupying the same position one after the other succumb to tuberculosis—where, in fact, without exposure to any special risk of infection, the disease has appeared in great excess of the ordinary rate. I would suggest, however, that, as infectious diseases form a distinct group, they are likely to be influenced by some common cause, that there is probably some agency common to them all by which that lowering of vital resistance is produced which allows bacteria to develop within the body and involve it in disease.

Much has been learned lately about the nature of dust, and it has been shown that the floating particles in the air of our towns consist chiefly of living matter, micro-organisms, germs, not necessarily germs of disease, but of fermentation and decomposition, that decomposition which comes to all when they die. But these germs, like vultures, do not always wait for death, but gradually pervade our bodies while alive, and as our vital resistance grows weaker ultimately, by sheer numbers, gain the mastery. After any slow death bacteria are found so universally throughout the body that it is obvious that their germs must have spread themselves through the tissues during life, and I have repeatedly been able to demonstrate the existence of bacteria in the blood of persons seriously enfeebled by various diseases. If thus we are being constantly assailed by organisms to which we must ultimately succumb, and if we only keep them off by virtue of that power which all healthy living

² Tyndall: Floating Matter in the Air.

tissue possesses of resisting the growth of other living tissue within it, which is, in fact, one of the chief signs of its vitality, it is obvious that the more this vital resisting power is used up against ordinary germs of decomposition, the less will be left to withstand the development of the more special micro-organisms which are concerned in the production of disease. It seems fair, then, to believe that if we so arrange our lives that we shall commonly eat partly decomposing food, drink bacterial water, and breathe germ-laden air, even although neither the food, nor the water, nor the air contain anything which is capable of producing disease, we shall so exhaust and use up, if I may so say, the vital resistance of our tissues that, although we may still appear in good health, but little power may be left to us of resisting the development and multiplication within our bodies of any disease germs which may come across our path. These views as to the importance of the preceding condition in permitting the development of germs into disease are strengthened by the recent discovery of the bacterial origin of tubercle; for here we have an instance in which the contagion habitually passes over the strong to attack those who are fitted for it either by constitution or by preceding disease, or by reducing surroundings, and even when it has picked out a feeble member of the flock and attacked such an organ as the lung, is usually impotent against those portions whose functional activity is greatest, and is prone to affect those in which renewal of air and removal of exfoliated epithelium are least perfectly performed, such as parts which have been inflamed or tied down by previous thickening of the pleura, and especially the comparatively unused apices of the lungs. When we see the chest of a phthisical patient covered with patches of cloasma, the thickened and unremoved epithelium infiltrated by the spores and mycelium of the micro-*sporion furfur*, we carry the mind's eye inwards and think of the apices of the lungs and the similar processes going on within them, their air cells, little moved by the feeble respiratory efforts of the patient, gradually plugging up with exfoliated epithelium matted together by the growth of tubercular bacilli, which, although carried in far greater number into those portions of the lung whose functional activity is greater, have only been able to take root in the half-dead epithelium of the stagnant apical air cells. All these thoughts put one more in sympathy with those who aim at warding off infectious disease by general improved sanitation, rather than with those who try to keep it at bay by isolation and quarantine. One cannot help seeing that if these latter do not combine with their efforts to stamp out disease by isolation of the germ-producing patient, such measures as shall in the meantime diminish the receptivity of the people, their fitness for breeding within them these germs of disease, the only result will be that some time or other the contagion will break through the quarantine, and run riot in a universally susceptible population. Let us, therefore, while earnestly studying the micro-organisms, which are the essential causes of the whole class of infectious diseases, also investigate and search out the conditions of body under which they are capable of developing within the animal frame, trusting that we may so be enabled to find some means of rendering ourselves unfit breeding grounds, at any rate for those which are least virulent, and hoping that the same measures which do this may so far diminish our receptivity for the others as to make their attacks less frequent and less fatal.

Halifax.

ACUTE CONJUNCTIVITIS CAUSED BY THE ELECTRIC LIGHT.

By W. C. ROCKLIFFE, M.A., M.D.

So far as I am acquainted with our English literature and periodicals, I am not aware that the effect of the electric light on the eye as producing acute conjunctivitis has been mentioned. The following case being the first I have met with, may therefore be of interest to the readers of THE LANCET.

A. B—, aged twenty-eight, was recently engaged in placing Siemens' electric light in the old part of the town, and, together with his fellow-workman, adjusting the carbon points of a lamp with 3000 candle power without coloured

glasses, which he informs me are always supposed to be worn during this portion of his business. As an almost daily occurrence the brilliancy of the spark causes more or less paralysis of the retina, or, to quote his own words, "he rarely is able to perceive the people walking on the footpath when descending the ladder from adjusting." Although this effect soon passes off, on this particular occasion, as he regained his power of vision (in about fifteen minutes), it was followed by rapidly increasing lachrymation, photophobia, pain and swelling of the lids, the whole symptoms being developed in thirty minutes. Having suffered from many slight attacks of a similar nature, he applied cold water, which previously had relieved him; but the pain and swelling increasing, I saw him the following day, apparently having suffered intense agony during the night. The lids of both eyes were very hot, red, swollen, and brawny, and level with the superciliary ridge, the swelling extending some little distance upwards over the forehead. The pain was most acute in and around the eye. On raising the lids (which was a very difficult operation, the photophobia being so very intense) a considerable amount of lacrymal fluid gushed out. The conjunctival vessels were exceedingly large, and the eyeball a brilliant scarlet; cornea clear. All these symptoms yielded to a brisk purge and lead lotion in forty-eight hours. His fellow-workman was similarly affected, but to a less extent.

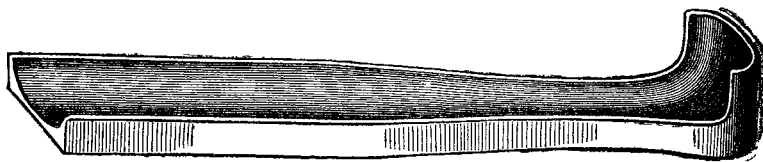
As a considerable heat is thrown out from the lamp, it would be interesting to know whether these symptoms were caused by the brilliancy or radiant heat.

Hull.

NEW SPLINT-REST FOR SYME'S AMPUTATION.

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THE accompanying woodcut represents a splint-rest which has been made for me by the infirmity joiner under the direction of Mr. A. Proffitt, our house-surgeon at present. I have remarked that the ordinary straight back splint, although most valuable in many amputations, fails to give support, if necessary, to the heel-flap in Syme's amputation. I allude to cases where the stitches are subjected to strain, and to cases where union of the flaps is delayed from some cause, and where adhesive plaster is employed after the stitches have been taken out. Again, in the usual dorsal position of the body after Syme's amputation, the cut end of the tibia tends to project somewhat from the drooping of the heel-flap, which is sometimes more bulky and heavy than at others, according to the nutrition of the patient and amount of tissue



available. I have lately tried the effect of a wooden splint so shaped as to fit the end of the stump and support its side and end. In order to promote drainage and to relieve tension, my old master, the late lamented Professor Spence, was in the habit of placing his Syme's amputations upon their sides and bending the knee. The discharge would thus drain through the outer angle of the flap, near where the tip of the external malleolus had been. This is an excellent method in some instances, if the lateral posture is tolerated, but the stump has occasionally a tendency to slew round, and to require readjusting with plaster. I consider, then, that the splint-rest figured will afford another step towards that rest and freedom from pain so essential in the treatment of wounds, which Hinton and Callender both taught and practised.

There are some Syme's amputations which do not require a thought from the moment of the completion of the operation, even strapping after removal of the stitches being wholly unnecessary; but it is not so in all, and whether the latter are treated with Listerism or the open method, I think that in a few cases my splint will be found serviceable. It will be observed that the splint is hollowed for the calf, as well as shaped for the stump end.

Carlisle.