neck are, in my judgement, a grave danger. In a great many instances the infection through the fauces and tonsils by infected milk is limited by the glands which either suppurate or are removed by the surgeon. If the infection is allowed to spread downwards, the apex of the lung may be directly attacked and an extensive bovine infection of the lungs may result. Although this is rare, I have seen several instances in which I have watched the process extend from the glands to the lung. For this reason, it is of the highest importance that all tuberculous glands should be excised as quickly as they appear.

From my own observation I would say that human tubercle bacilli do not attack the ordinary lymphatic glands of the body.

I have just completed a series of 100 carefully-conducted autopsies on children dying of tuberculosis, many of them ordinary phthisis, and several of them abdominal and meningeal tuberculosis. Of this number, 38 showed tuberculous intestinal ulcers with caseating mesenteric glands, and 23 showed caseating mesenteric glands without intestinal ulcers.

From the nature of the pulmonary lesions, I am inclined to think that the tuberculous ulcers were caused by human bacilli, and that in those cases where the mesenteric glands were infected without ulceration of the intestine, the bacilli were of bovine origin.

In short, human bacilli, whether primarily swallowed or as a secondary infection in phthisis, will cause intestinal ulceration, whilst bovine bacilli ingested with milk, etc., will readily pass through the intestine, leaving no trace behind, attack the mesenteric glands, and thence spread to the lungs and all over the body.

It is possible that this may be a means in future of distinguishing the origin of an infection.

I am at present engaged in collecting information from all parts of the world as to the distribution of the various forms of tubercle and its association with tuberculosis in cattle.

Some results already received are most interesting, and tend generally to show that in those countries where tuberculous cattle are absent, or where milk is not drunk by children, the surgical forms of tuberculosis are absent, whilst phthisis pulmonalis is rife. One letter of great interest is from Siam, and is from the Government medical officer, of which the following is an extract:

As our experience in Siam would seem to support your contention that tabes mesenterica and other tuberculous affections of the serous membranes in children are probably bovine tuberculosis conveyed by milk and are not true human tuberculosis, I send you the following notes, hoping they may be of interest to you:

During eight years' practice in Bangkok I do not remember having even seen or ever having heard of any case of strumous joints, lupus, or tabes mesenterica, or, in fact, of tuberculous affections of such nature in children. I have often spoken of this to my colleagues, but could formulate no reason until I read your paper in the BRITISH MEDICAL JOURNAL. The Siamese practically never drink cow's milk, either children or adults. Ordinary pulmonary tuberculosis, however, in adolescents or their elders is *very rife* in Bangkok. The same seems to hold good for China.

I have received similar confirmation from Jersey, Guernsey, Egypt, Malay, India, and Persia. When the inquiry is complete I will publish it.

A very valuable contribution to this question has just been made by Dr. Mayo, of Rochester, Minn. He says, speaking of abdominal tuberculosis:

Practising as my brother and I do in an agricultural community, we have long noticed the relative infrequency of pulmonary tuberculosis, while abdominal, bone, joint and lymphatic diseases of tuberculous origin are common. One cannot help believing that much of the extra-pulmonary tuberculosis had to do with uncooked milk, which is a common article of diet in this country.

This testimony is of great importance, and I feel sure that until tuberculosis is reduced in dairy cattle, where it at present prevails to the extent of between 20 and 25 per cent., there will not be much reduction in the mortality from tuberculosis in children.

The suppression of tuberculosis must, in my judgement, be accomplished by attacking two sides of the question—first, phthisis pulmonalis; secondly, bovine tuberculosis. Phthisis pulmonalis is essentially a "house" disease, and is most rife amongst the poor and where people live in

insanitary and crowded rooms, by which infection is easily conveyed to different members of a family.

Owing to improvements in hygiene and the sanitary conditions in which the poor live, it is gratifying to find that the death-rate from phthisis is steadily diminishing, but the same cannot be said of tuberculosis in children, and I feel convinced that until milk free from tubercle bacilli can be supplied to children, we must not expect a marked diminution in the surgical forms of tuberculosis.

In my original paper I expressed the opinion that these two varieties of tubercle were antagonistic to each other in the human body, and that children who have suffered from bovine tuberculosis in the form of strumous glands, spinal caries, strumous joints, etc., did not develop true phthisis in later life. In fact, I argued that this mild infection conferred a certain immunity against phthisis in the same way as vaccination and small-pox.

This theory has also received great support by the work of von Behring and Römer. The only strain of tubercle bacilli which they find produces complete immunity is the human strain, and by using human bacilli they have been able to immunize thousands of cattle against bovine tuberculosis, not one of which has contracted tubercle, although repeatedly exposed to infection by living in the same stalls with infected cattle. If human bacilli will protect cattle, it is natural to suppose the converse—that bovine tubercle in children will protect them against human tubercle or phthisis.

I am at present engaged in collecting the blood of animals killed for tuberculosis, the serum of which, after careful preparation, I propose to use in vaccinating children whose parents have died of phthisis, with a view to protecting them against phthisis.

The brilliant results obtained by Professor Wright and other workers in the treatment of non-pulmonary forms of tubercle—such as glands, bones, genito-urinary, and lupus—with tuberculin may be explained, I venture to submit, by the fact that the tuberculin, being prepared from human bacilli, has an antagonistic effect on bovine forms of tubercle but has no effect on phthisis.

I conclude by expressing the opinion, based almost exclusively on clinical and pathological evidence, that human and bovine tuberculosis are distinct varieties of disease, but that the human body is susceptible to both, and especially to bovine tuberculosis in the milk-drinking period of life.

A CASE OF SUDDEN DEATH POSSIBLY DUE TO VAGUS INHIBITION.

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THE features of the following case suggest that the sudden fatal ending may have been due to the damaged condition of the right vagus. A lesion in the position described would involve the thoracic cardiac branches of the right pneumogastric:

History.

E. J., a pale, undersized girl of 11 years, was admitted to the Manchester Royal Infirmary on December 7th, 1903, suffering from chronic tuberculous cervical adenitis. The previous history of illness was negative, and there was no evidence of her ever having suffered from diphtheria. Glandular enlargement in the neck had existed for two years, and during the few weeks before admission the glands on the right side of the neck had discharged through two sinuses. The deep cervical glands on both sides were enlarged, forming a diffuse indurated mass, reaching from the angle of the jaw to the inner end of the clavicle. The skin of the left side was intact, but on the right side it was much puckered and scarred. Below the angle of the jaw were two small sinuses with thin watery discharge. There was no other superficial glandular enlargement, and no sign of disease in the chest or abdomen. The pulse and temperature were normal. The source of the tuberculous infection may have been the tonsils, which were slightly enlarged.

Operation.

On December 11th the child was anaesthetized with chloroform, and the glands on the right side of the neck were widely removed through a free V-shaped incision. The operation proved difficult and tedious, and occupied one hour. A deep dissection was necessary, and the large vessels were laid bare for some distance, but the right vagus nerve was not seen. The wound was sutured and drainage provided by two gauze wicks. On two occasions the child's behaviour under the anaesthetic

caused temporary anxiety, owing to pallor and great rapidity of the pulse.

After-history.

Recovery from the anaesthetic was prompt and complete, and in the evening her condition was satisfactory. The only unusual feature was a pulse-rate of 120. Throughout the following day the course of the case was uneventful. There was no vomiting, the temperature was normal, and the mental condition quite bright. The pulse, however, continued at 120, both in the morning and evening. Next morning (December 13th) nothing unusual was seen till 9 a.m., when the child suddenly sat up in bed and cried out "Sister" in terror-stricken tones. The Sister had scarcely reached the bedside when the child fell back dead. There was, however, time to note that the pulse was feeble and quite beyond count in the moment before death.

Necropsy.

On the following day a very exhaustive *post-mortem* examination was made by Dr. Anderton. A trace of pus was found on the gauze drains; this was no more than might be expected in a wound involving two septic sinuses. The aspect of the wound both in its superficial and deeper parts was quite satisfactory. All the deep structures of the neck, including the cervical portion of the vagus nerve, were normal in appearance. The whole of the thoracic and abdominal viscera were closely examined with negative result. There was no indication of any acute septic infection, nor was there anything to suggest that the fatal issue was due to the delayed action of chloroform. The brain and its vessels were in a perfectly healthy condition on naked-eye examination.

On tracing the right vagus nerve into the chest a very suggestive condition was found. At the level of the first dorsal vertebra the nerve disappeared into an elongated mass the size of a large filbert, formed by the fusion of several enlarged and tuberculous glands. The nerve was distinctly swollen for 1 in. before its entry into the mass, whilst at the point of entry it was actually constricted as definitely and sharply as if it had been encircled by a ligature. The interior of the mass contained soft caseous debris, and the fibres of the nerve were frayed out in their course through it. At the point of exit and throughout its subsequent course the nerve was normal.

Brouardel quotes a case of sudden death in which the *post-mortem* findings offer a striking parallel to those observed in the present instance.

On the other hand, the vagus has frequently been injured or divided in surgical work on the human subject, and such division does not appear to have produced any noteworthy results either immediate or remote. I have notes of one case in which 2 in. of the left vagus were deliberately excised during the removal of a mass of secondary epitheliomatous glands from the neck. Attention was specially directed to the pulse-rate and respiration rhythm at the moment of section, but no effect was found. The patient was alive and well six months after the operation. One of the conclusions reached by Roy and Adami in their classical research on the mammalian heart is "that the influence of the nerve on the heart is limited, so that the economy as a whole is not endangered even by the most powerful functional activity of the vagus mechanism."

At the meeting of the German Ophthalmological Society held at Heidelberg on August 6th, the Graefe Medal was awarded to Professor Hering, of Leipzig.

THE twenty-sixth annual meeting of the Caledonian Medical Society was held at Stirling on July 13th, under the presidency of Dr. W. A. Mackintosh of Stirling. There was a representative attendance from both sides of the Border. The honorary secretary (Dr. Macphail of Derby) gave his report, which showed the membership to be 232, or double what it was ten years ago. Financially also the society was stronger than it ever had been, and the *Journal* published quarterly by the society had increased its circulation. Dr. Andrew Little of Bradford was elected president for the ensuing year. In his presidential address, Dr. Mackintosh spoke of the present position and prospects of the Gaelic language, and his address was an able and forcible plea for the teaching and study of Gaelic. The annual dinner was held the same evening. The menu card, designed and beautifully illustrated with local views by Mr. J. G. Murray, was entirely in Gaelic. A motto from Galen in the original Latin with an old Gaelic translation from a curious and valuable MS. in the president's possession appeared on the frontispiece, which also showed the crest of the society—an armed Highlander battling with the skeleton Death, and the motto "Is Rìgh Gach Slàn." The toast of the evening was proposed in a racy and witty speech by the Rev. Lachlan Maclean Watt, Alloa, a well-known Celt and poet.

British Medical Association.

REPORT

TO THE

THERAPEUTIC COMMITTEE.

THE BACTERICIDAL ACTION OF COMPOUNDS OF SILVER.

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THIS research was undertaken at the request of the Therapeutic Committee of the British Medical Association. Owing to the extensive use of silver compounds as bactericidal agents in certain diseases, it seemed to the Committee desirable that a comparison of the value of these compounds should be made by disinterested observers. For this purpose all the silver compounds in common use were bought from a retail pharmacist. The percentage of silver in each was determined in most cases by incinerating, heating with nitric acid, dissolving in water, and titrating with centinormal ammonium sulphocyanide solution, with the following results:

	Percentage of Ag.
Collargol	86.6
Silver fluoride	81.7
Silver nitrate	63.6
Itrol	60.8
Actol	51.5
Argentol	31.2
Ichthargan	27.1
Argyrol... ..	20.0
Albargin	13.4
Nargol	9.6
Largin	9.4
Novargan	7.9
Protargol	7.4
Argentamine	6.4
Argonin	3.8

These results were used in preparing the various solutions. Each solution was made to contain a definite percentage of silver. This appeared to be the only method available for comparison, as equimolecular solutions could not be employed owing to the composition of many of the substances being unknown. It is only necessary to draw attention to the fact that a 25 per cent. solution of argyrol practically corresponds to an argyrol solution containing 5 per cent. silver; a half per cent. solution of protargol to one containing 0.04 per cent. silver, etc.

BACTERICIDAL ACTION.

The bactericidal effect was determined both on a mixed culture and on a pure culture of *Staphylococcus pyogenes aureus*. In every experiment a control was made, and this invariably showed growth after remaining twenty hours in the incubator.

Experiments with a Mixed Culture.

The fluid for these experiments was obtained by allowing uncooked beef to stand in water in an open vessel for four to six weeks. It was strained just previous to use. To 5 c.cm. of this fluid sufficient sterilized water and solution of a silver compound were added to make the whole 10 c.cm. A loopful of this mixture was transferred to 10 c.cm. of sterilized broth at intervals of five, ten, and twenty minutes, and the inoculated broth was incubated at a temperature of 38° C. This method approaches somewhat the conditions actually met with in therapeutics, since the meat fluid contained both albumins and chlorides; 5 c.cm. of meat infusion when treated with excess of silver nitrate solution gave a precipitate which when dried contained 0.0256 Ag. Of this 0.0236 g. Ag appeared to be combined with albumins and 0.0021 g. Ag with chlorides.

The following results were obtained: + indicates growth; 0 indicates no growth. The experiments indicating limit of action are alone given.