shell-like noise in the ears after exposure to the slightest draught either in room, omnibus, or train; that a similar noise was heard if he chanced to open his mouth on a hill; but that now these symptoms were entirely gone. On July 3rd the patient voluntarily told me that his general health was now much better. He no longer felt dull and low-spirited as he had done for years. The tinnitus also was much improved. The next day he reported further improvement, and stated that the previous night he had been much impressed by hearing footsteps behind him in a quiet street. He turned round, and the nearest person was a lady about twenty yards away.

He was seen by Dr. McBride on July 7th, and on that date there was an increase in the figures, as shown in Table III. In order to test the reliability of that objective improvement, faradism was applied for two minutes or so round the ear, after which the record was found to be increased rather than reduced.

TABLE III.

		June 16th.	June 23rd.	June 30th.	July 7th.
		Contact	Inches.	Contact	Inches.
Watch	R. ...	Contact	$\frac{1}{4}$	Contact	$2\frac{1}{4}$
	L. ...	1 in.	$\frac{3}{4}$	Pressure contact	$\frac{1}{2}$
Low ordinary	R. ...	14 in.	14	14	$15\frac{1}{2}$ - $21\frac{1}{2}$
	L. ...	16 in.	16	16	$20\frac{1}{2}$ - 21

Treatment for the next three days produced no further subjective improvement, nor did I on examination find any further improvement for the ordinary voice. The treatment was then discontinued.

When seen on January 22nd, 1902, fully six months after cessation of treatment, Mr. S. expressed the opinion that the improvement had been maintained, and in this he is supported by his wife, his family, and his employers. I found confirmatory evidence of this on my objective examination. He also reports that in the course of these six months, the occasional colds to which he is subject have given him only very slight inconvenience, whereas formerly a cold was accompanied by a marked increase in his deafness and considerable general discomfort.

SUMMARY OF RESULTS.

Of the 20 cases treated, 4 were of a mixed type, the tuning-fork conduction being greater by air than by bone. One case was of post-suppurative origin. The results may be summarized as follows:

Of the 15 cases of apparently pure dry middle-ear disease, 11 showed a record of improvement fairly comparable to those already detailed, due allowance being made for the different degrees of deafness when the patients first came under observation. Two showed a marked improvement in one ear only, but as this improvement took place in the deaf ear, the practical benefit was slight; 2 cases, male patients aged 46 and 60 respectively, were quite uninfluenced by the treatment.

Of the mixed cases 3 showed a practical improvement and one did not. The post-suppurative case improved.

In some cases the improvement has been fully maintained, as in Case 11, in others deterioration has set in slowly, and has progressed, as in Case 1. Observations are at present being made on means of maintaining the improvement in the hearing power.

MYELOCENE.

It is advisable to give a brief note on the manner of preparing the substance which is the basis of the treatment. It is derived from bone marrow, and I have given the name of myelocene to the preparation, partly because it suggests the origin of the substance, and partly because the name will be suitable to any active principle which may yet be isolated.

Perfectly fresh bones are obtained from the butcher. In these bones the epiphyses are present, for the custom of that trade is to kill feeding stock when about two years old.

The first task is to select bones in which the marrow will be suitable for the internal treatment of the ear. When examined with the naked eye the marrow is found to vary in appearance and consistence within wide limits. I have examined hundreds of bones and, in the majority of instances,

I found it presented a faintly yellow appearance, fairly vascular throughout, and of a fair consistence both on inspection and on handling. (There is no differentiation into red and yellow marrow.) In other instances the marrow was very pale, even lard-like in appearance and consistence; while yet again in others it presented a dull, sodden appearance quite unlike healthy marrow. As regards the epiphyses, too, I frequently found bones that were strikingly different from the normal—not only in the vascularity and general appearance of the epiphyseal line and the tissue in its immediate neighbourhood, but also in the epiphysis itself. It is hardly necessary to say that those bones must be selected in which both marrow and epiphyses are normal.

The mode of preparation is as follows: The marrow is extracted with ether, and the ethereal solution is evaporated down at first in the open, and later over the warm bath. The fat is then rubbed up with 1 per cent. chloretone for preservative purposes. It now appears as a whitish or faintly yellow fat with a strong odour, partly of ether, partly of chloretone. The melting point of the fat so obtained varies very widely. For example, one yield of fat would never become perfectly clear even when submitted for a long time to a very high temperature; another would only become clear at a melting point of 120° or 130° F., while yet another lot would rapidly clear at from 70° to 90° F. The same supply of bones has sometimes yielded samples of fat with different melting points; in the first 130°, in the second 110°, and in the third 90°. This order, again, has sometimes been reversed. The fat with the low melting point is the only one that has proved satisfactory in use; the others I have found to be unsuitable, and in some instances prejudicial.

This paper has been restricted to a statement of facts from which I draw the conclusion that in this treatment we have a means of increasing the hearing power in many cases of deafness of middle-ear origin (non-suppurative type), to a degree considerably beyond that obtainable by present methods.

It will be convenient to discuss the *rationale* of this treatment at a later date, after further facts have been presented from a different field of medicine, indicating the existence of a therapeutic agent in this substance, myelocene.

I have much pleasure in expressing my indebtedness to Drs. M'Bride and Logan Turner for kindly observing the cases referred to, and also to Miss Watson, L.R.C.P. Edin., for invaluable assistance in these investigations and other work bearing on them.

HAY'S REACTION FOR BILE SALTS.

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In the second edition of Landois and Stirling's *Textbook of Human Physiology*, 1886, Professor Matthew Hay published in a short note the fact that, when powdered sulphur is sprinkled on a fluid containing bile, it gradually sinks. He further showed that this reaction depends upon the presence of bile salts alone, and that when 1 part of pure bile salt is dissolved in 120,000 parts of water the reaction is still given; he also stated that this reaction depends upon the power of bile salts to reduce surface tension. Professor Hay published no further account of his extensive experiments, which he informs us began in 1882, and his useful discovery escaped general recognition.

Recently two papers dealing with this reaction have been published by Frenkel and Cluzet,¹ and another by Chauffard and Gouraud,² in all of which the test is ascribed to "Haycraft" instead of to Hay. And we, in ignorance of the previous work and only knowing the test as the "sulphur test" have again covered some of the ground for the third time.

Our object in writing this note is to correct the partial misunderstanding as to the name of the investigator who discovered the test, and further to draw more general attention to its clinical value.

The fluids in which a delicate test for bile salts would be most useful are vomit, faeces, and urine. Hay's test, however, is less reliable in the case of vomit and faeces than in that of

urine. For it has been shown that substances other than bile salts, which also have the power of reducing surface tension, may occur in vomit and faeces, and might under special circumstances be present in sufficient quantity to introduce a serious fallacy. The most important of such substances are alcohol, ether, chloroform, acetic acid, acetone, turpentine, phenol, skatol, and soaps. In the majority of these the power of reducing surface tension is small as compared with that of bile salts.

With urine the case is different, for none of the normal constituents give the reaction. None of the substances other than bile salts, which do give the reaction, have ever been found to occur in urine in sufficient quantity to introduce a fallacy, and there is no drug at present known which, when taken, invalidates this test.

The simplest method of carrying out the test is to place the urine in a test tube with a diameter of about 1 in., and to throw some sublimed or finely powdered sulphur upon it. If any begins at once to fall in the urine there is at least 1 part of bile salts per 10,000. If none falls at once, then, after waiting one minute, the test tube is given a very gentle shake; if sulphur now begins to fall, there is at least 1 part of bile salts per 40,000, and so on for further dilutions.

Few precautions are necessary. The urine must be free from air bubbles, it must be clear, and, if it is necessary to clear it, this must be done by filtration and not by heat. For all specimens of urine at the temperature of the body give the reaction at the end of one minute, owing to the effect that heat has in lowering the surface tension of a fluid; therefore in every case before the test is applied the urine must be cooled to about 17° C. The reaction of the urine and its specific gravity do not in any way affect the accuracy or delicacy of the test.

The delicacy of Hay's reaction as compared with that of Pettenkofer is very great; for, apart from the fact that in applying Pettenkofer's test to urine there are so many fallacies as to render it almost useless; 1 part of bile salts per 1,000 gives only a doubtful Pettenkofer's reaction.

Many urines in various pathological conditions have been tested, but no case giving the reaction has yet been found in which the clinical condition was not such as to make the presence of bile salts in the urine possible. Thus it has been found that Hay's reaction is frequently given by the urine from cases of backward pressure in cardiac and pulmonary disease, and in cases of suspected cirrhosis of the liver; even when bile pigments were shown by the iodine test³ to be absent. In two cases of suspected cirrhosis of the liver the reaction was given only intermittently, being present on one day and absent on the next. In a case of gall stones with jaundice which was operated upon and the obstruction removed bile salts were found present in the urine for a fortnight after the bile pigments had disappeared, and when the patient in appearance was quite free from jaundice.

It has further been noticed that jaundiced patients differ greatly in the relative amounts of bile salts and bile pigments which their urine contains. For instance, the urine from a case of cirrhosis of the liver, which was scarcely darker in colour than the normal, was found to contain large quantities of bile salts; on the other hand, in two cases of secondary growths in the liver and in one case of gall stones, in all of which the jaundice was very intense and of some months' duration, the urine, although almost black with bile pigment, was found to contain but little bile salts.

Hay's test is so simple that it certainly deserves more extended use in clinical work, especially in investigations upon the relative excretion of bile salts and bile pigments.

NOTE AND REFERENCES.

¹ *Journal de Physiologie et de Pathologie Générale*, 1901, tome iii., pp. 99 and 151. ² *Ibid.*, p. 461. ³ This test has a delicacy of about the same as that of Gmelin's test but is free from the latter's fallacies in the urine.

ANTIVIVISECTIONISM IN THE UNITED STATES.—The Gallinger Bill for the regulation of animal experimentation in the District of Columbia has again been introduced into the United States Congress. While professing to be aimed only against experiments performed in the District of Columbia, it is really intended by its promoters to obstruct scientific investigation and medical instruction throughout the United States.

THE ISOLATION OF THE TYPHOID BACILLUS.

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It is obvious that the results obtained by the methods in vogue at present for separating the typhoid bacillus from infected material are most unsatisfactory; the number of cases, indeed, in which bacteriological tests have indicated the source of infection in epidemics of typhoid fever is extremely limited, whilst every practical bacteriologist must admit having failed over and over again to demonstrate the presence of the specific bacillus in material, known, or at least strongly suspected, to contain the organism in question. Even in the discharges from typhoid patients which must contain the bacillus typhosus in large numbers the difficulties attending its isolation are so considerable that it has never been found practicable to adopt this as a means of clinical diagnosis. Fortunately, thanks to the discovery of the agglutination reaction by Grüber and Durham, and its practical application by Widal, we are independent of such means for clinical purposes; but, having regard to the fact that very widespread and fatal epidemics are so frequently caused by contamination of the food and water supplies, the detection and isolation of the typhoid bacillus still continues to be one of the most urgent of bacteriological problems, and consequently the following experiments directed towards its solution may perhaps be worth recording.

The main difficulty attending such examinations consists in the fact that the bacillus coli communis is almost universally present in overwhelming numbers in any material likely to be contaminated with the bacillus typhosus. The first experiments I made were therefore designed with a view to effecting the separation of these two closely analogous microbes. These were carried out as follows:

A rabbit was injected subcutaneously at repeated intervals with gradually-increasing doses of the ordinary non-virulent stock of the colon bacillus, until after a few weeks' time its serum was found to have a powerfully-agglutinating action on this bacillus; a reaction at a dilution of about 1 in 1,000 is quite sufficient for the purpose in hand. To test tubes containing 10 c.cm. of ordinary gelatine 0.1 c.cm. of Parietti's solution was added, and then 2 or 3 drops of the specific coli serum, obtained by bleeding the above rabbit from the marginal vein of the ear. Next, a piece of ordinary glass tubing, plugged at each end with cotton wool and sterilized, was bent in three places by means of the blowpipe so as to form a W-shaped tube, and was then filled up to the level indicated with the previously-prepared Parietti serum gelatine, as illustrated in the accompanying diagram.

To employ this apparatus all that was necessary was to sow the limb A with a mixture of cultures of the *B. coli communis* and the *B. typhosus*, and to place the tube in an upright position in the blood-heat incubator, where, of course, rapid growth took place in the liquefied gelatine. The mode of growth in such a tube is peculiarly characteristic and deserves careful attention. In the limb A we have a mixture of the naturally sluggish colon bacillus with the actively motile typhoid bacillus, and this natural difference between the two microbes is developed to the full by the fact that the liquid gelatine contains the specific coli-agglutinating serum, and