is furnished by the loss on ignition, which was carefully determined by Frankland in 1865, and is, in mean, 0.7 grain per gallon. The loss on ignition consists mainly of exchange of 2 (NO³) for CO³; and, as will be perceived, on making the requisite calculation, one grain per gallon of nitric acid would require a loss on ignition of about 0.5 grain; wherefore the loss on ignition is an additional confirmation of the determination of nitric acid.

A further point to be determined is the following. Is the "soluble part" of the total solids alkaline, and to what extent? We are now in possession of materials for arriving at a tolerably certain knowledge of the mineral constituents of the New River water. The 15.2 grains of insoluble portion contains 14 grains of carbonate of lime, the difference being made up of a little silica (according to some published analyses this amounts to 0.5 grain per gallon) and to a trace of iron, and possibly of alumina and phosphoric acid, and to a trace of organic matter retained by the carbonate of lime. Magnesia is all but absent. The 5.5 grains of soluble salts contain no lime, and consist entirely of salts of the alkalis. They contain:

Chlorine	1.1 grains.
Nitric acid (NO ³)	1.0 "
Sulphuric acid (SO ³)	0.19 "

The Thames Water, supplied by the London Water Companies.—The highest amount of total solids found by Frankland in the water of the Thames companies during the year 1865 was 22.8 grains per gallon, and the lowest 13.2 grains, the mean being 18.7 grains per gallon. In an experiment in my own laboratory, I found, on March 2nd, 1874, 22.9 grains of solids per gallon; and on the 27th of March of the same year I found 21.7 grains per gallon: as in the case of the New River, these solids consist chiefly of carbonate of lime. The 22.9 grains of solids was treated with a little boiling water, and yielded up 7.8 grains. The 21.7 grains also yielded up to boiling water 7.42 grains. And here the remark may be made, that in the latter case double as much water was employed as in the former, showing the efficiency of this process. We have, therefore:

	2nd March.	27th March.
Soluble	7.8	7.4 grains per gallon.
Insoluble	15.1	14.3 "
	22.9	21.7 "

The hardness taken on March 27th was found to be 16.5 degrees, signifying 15.5 grains of carbonate of lime per gallon. I have no determination of the hardness of the water-supply on March 2nd, and so we must confine our attention to March 27th. On this day, at any rate, the carbonate of lime, as measured by the soap-test, was larger than the insoluble residue. The meaning of this circumstance is, that the soluble portion of the solid residue contains lime-salts. We have, therefore:

Soluble salts (including lime-salts equivalent to about 1.2 grains of CaOCO ²)	7.4 grains per gallon.
Insoluble salts (mainly CaOCO ²)	14.3 "
	21.7 "

And here attention may be called to the confirmation which is afforded by the "permanent hardness". In 1865, Frankland found the permanent hardness of Thames water always sensibly greater than that of New River; the mean "permanent hardness" of Thames water being 4.3 degrees, that of New River was found to be 3.6 degrees. The explanation why waters sometimes exhibit a degree of hardness in advance of that which can be due to the solubility of carbonate of lime in boiled water, is that such waters contain more permanent acid than is enough to saturate the alkalis proper (*i.e.*, more hydrochloric, nitric, or sulphuric acid than will saturate the potash, soda, etc., in the water). Further determination in Thames water shows 1.2 grains of chlorine and about one grain of nitric acid per gallon. A recent determination of sulphuric acid showed 1.6 grains (SO²) per gallon.

Guildford New Water-Supply.—According to an analysis of my own in 1871, this water contains 19.7 grains per gallon of solids, whereof 14.7 grains are carbonate of lime, and magnesia is almost entirely absent. In this water, therefore, there are four or five grains of salts of the alkalis per gallon.

Determination of Lime in Drinking-Water.—The usual manner in which the lime in drinking-water is determined is faulty in detail, and is not calculated to yield the most accurate results. The manner of proceeding, as is well known, is as follows. A considerable volume of the water, having been measured or weighed out, is evaporated to dryness in a platinum dish, a little hydrochloric acid having been added, so as to impart a distinctly acid reaction. The residue is then moistened with a few drops of acid, treated with distilled water, and passed through a filter. To the filtrate excess of ammonia is added, and then the liquid is boiled and passed through a second filter. In this way silica, alumina,

oxide of iron, and phosphoric acid, are got rid of as precipitates, and the filtrate is next mixed with oxalate of ammonia, which throws down the oxalate of lime; this is then washed, etc.

Now, the two precipitations to remove traces, before the precipitation of the main ingredient of the water-residue, are very objectionable, and involve a sacrifice of accuracy in more ways than one. The plan which I recommend is this: I take 700 c. c. of the water, and, having ascertained that it is quite bright, I add about half a gramme of crystals of oxalic acid, and some two or three c. c. of strong ammonia, taking care to have excess of both reagents. Then I stir up and filter through a small filter, and when the filtrate has run through, I wash with a very little distilled water. The filtrate is meanwhile set to evaporate down in a large platinum dish, and is evaporated to 10 c. c. in bulk. If necessary, a drop or two of hydrochloric acid is added, and the liquid is put into a small beaker and mixed with a little ammonia, which will throw down a fresh quantity of oxalate of lime, which is put on a very little filter and washed, and the filtrate and wash-water sent through this filter should not much exceed 30 c. c. altogether.

By this manner of operation we gain several advantages. We precipitate most of the oxalate of lime in very dilute solution, and ensure the completest washing. At the same time, by making the second minute precipitation, we avoid the great disadvantage of complete washing—*viz.*, loss of some of the precipitate in virtue of its solubility. Inasmuch as the second precipitate is very small in quantity, and in very little bulk of liquid, we can make a very minute filter serve to retain it, and can make a very little wash-water serve to wash it several times.

The question of the carrying down of silica, etc., along with the oxalate of lime, is best reserved; and after the oxalate has been converted into carbonate of lime, or into sulphate of lime, and weighed, a correction may be made, if necessary, for traces of these substances.

Magnesia.—There can be little doubt that the magnesia in drinking-water is, as a rule, very badly determined. The second precipitate of oxalate of lime is, in the ordinary way of analysis, very apt to be confounded with the magnesia. The only special directions which I have to give are, that, having separated the second precipitate of oxalate of lime, the filtrate, which is small in volume, is to be mixed with a slight excess of phosphate of soda and a considerable quantity of strong liquor ammoniac, left to stand, and the resulting ammonia-phosphate washed, dried, ignited, and weighed.

Alkalies.—Evaporate a considerable bulk of water down to dryness in platinum in the water-bath; treat the residue with a little boiling water, filter and wash; treat the filtrate with a slight excess of baryta-water (to precipitate magnesia), filter, concentrate in platinum, and then precipitate with a little carbonate of ammonia (to remove baryta and lime), filter and evaporate the filtrate to dryness, ignite gently, and weigh. Notice whether the weighed residue is sensibly alkaline, and if it be so, acidify with a drop of hydrochloric acid and water, dry down in the water-bath, heat to low redness, and weigh. The alkalis will be in a state of chlorides, and may be further investigated in various obvious ways.

NOTE ON HÆMATOMA OF THE EXTERNAL EAR.

By WILLIAM P. PHILLIMORE, M.B.,

Superintendent of County and Borough Asylum, Snettton, Nottingham.

SINCE the name of this disease, hæmatoma auris, with its synonyms, has been placed second on the list of diseases of ear in the official nomenclature now in use, the attention of the profession has been more prominently directed to it. Hitherto the notices and descriptions of the affection have more frequently emanated from medical men engaged in the treatment of the insane than others, but its study is of equal importance and interest to those employed amongst the general public. The papers upon this subject, published in the BRITISH MEDICAL JOURNAL, are calculated to revive inquiry, which is the more needed from the circumstance that, while some pathologists hold that it is a morbid condition observed as an intercurrent phenomenon of cerebral disorders, others contend that its presence is due to physical injury, and as such preventable.

Mr. Cobbold, in his concise account of a dissection, published in the BRITISH MEDICAL JOURNAL, 18th October, 1873, says, "I do not find in the essay by Dr. Stiff any account of the *post mortem* examination of hæmatomatous ears". He refers to an article published by myself in the *British and Foreign Medico-Chirurgical Review* for January, 1858, p. 223, which was illustrated by engravings of the several stages of the lesion in living subjects, and he has doubtless overlooked a second and supplementary essay of mine in the BRITISH MEDICAL JOURNAL of August 1st, 1863. In this number the *post mortem* results are given,

and coincide substantially with Mr. Cobbold's investigation, namely, ossification with presence of Haversian canals. Of this there can be no doubt, as the dissection was most carefully conducted by the late Mr. Toynbee of Savile Row, a great authority on aural diseases. That gentleman wrote to me in October 1859, stating that he was working at a book, to be brought out in parts, entitled *Illustrations of the Pathology of the Ear*, and asking for drawings and specimens of hæmatoma. In December of the same year, I had an opportunity of obliging him, and did so upon the occasion of the death of a patient, whose ear is engraved at page 223 of the *Review*, in the paper first referred to. The lunatic was the subject of acute dementia, admitted into the asylum August 1856. The alleged cause of insanity was the fall of a weight on his head two years previously, but it was subsequently ascertained that he had been intemperate in spirit-drinking. In June 1857, hæmatoma of the right ear supervened without the occurrence of violence. Three months afterwards, it began to subside, and ultimately the fluid became absorbed, leaving the ear shortened, narrowed, thickened, and inelastic. Two months prior to his death, in December 1859, from general paralysis, the left ear also showed signs of congestion and induration. The following is Mr. Toynbee's description of the dissected specimens, which he produced to the Pathological Society on 17th January, 1860.

"The right ear was so very much thickened as to have lost its normal appearance; the only portions of cartilage which were not greatly thickened, were the tragus and the thin narrow slip at the posterior margin forming the helix. Upon making a section of the cartilage, it was found in some places half an inch in thickness, but not harder than natural. This thick part of the cartilage did not present any appearance of a cyst, and under the microscope was observed to consist of hypertrophied cartilage-cells and intercellular matter. In some parts, this cartilage was converted into true bone, containing Haversian canals and well defined cells. This ossific matter was also found in the left ear, which was scarcely at all deformed, and had not passed through the cystic stage of the disease."

I may remark that I have never observed hæmatoma unless accompanied by disease of the brain or its membranes, and in no case upon the posterior surface of the pinna or in the lobule. Dr. Brown-Séquard has found that injuries to the corpora testiformia cause hæmorrhages of the external ear in guinea-pigs.

OBSCURER CASES OF SPINAL AND THORACIC DISEASE.

By WILLIAM JELLY, M.D., Madrid.

I WISH to place the two following cases before my medical brethren in Great Britain, in the hope of obtaining other opinions in reference to diagnosis and treatment.

CASE I.—There was brought to my "Consulta Publica", on September 1st, 1872, Elisa Catalá, aged 22, who stated that, during the Revolution of 1868, she was walking with her mother hurriedly through the Calle Arenal (one of the principal central streets of this city), when an artilleryman fired his gun or cannon close to them quite unexpectedly, their backs being towards the butt-end of the gun. She felt herself pinned to the spot in an erect position, not able to move one inch. She was carried to a cab and driven home. She felt no pain or discomfort in any way, only the lower limbs were rigid. Next day she got up all right and went about her duties as usual, feeling only a slight weakness in the left knee and leg. This went on gradually increasing, and the right knee and leg became similarly affected, so that, when her mother brought her to me, at the above date, her acts of progression were performed by a heavy awkward rolling or semicircular movement from side to side, she using all her energy and power to get ahead at all, but without pain in any part. When told to sit down, she dropped heavily on the bench. After some time, I told her to stand up, when she gave a most sarcastic laugh, and said "I can neither get up without help, or stand up without support". I found her utterly helpless in attempting to stand, or to be erect a moment without support. At the same time, I found she could get up with the smallest aid, viz., the tip of the little finger, and could remain erect some time with only the same little aid, and with it she rolled or ambled into the inner room. I had her stripped, and examined her most carefully. I found her well nourished, plump, and round in every part. Sensibility to touch was perfect in every part, from the soles of the feet up to the head on both sides of the body; there was no paresis of the bowels or bladder. The catamenia were most regular; the appetite was excellent; and she was bright, cheerful, and most lively in spirits at all times. On percussing the whole length of the spine rather severely, she said she felt a dullish obscure pain from the eighth dorsal as far as the third lumbar vertebra on each

side of the column. Both legs, from the knees downwards, and especially the ankles and feet, were intensely cold. These are the only two abnormal symptoms I can detect in her system up to the present day. Having seen, in various parts of the world, on land and board ship, numbers of gunners and artillerymen with lacerated tympana from atmospheric concussion, I diagnosed this case as rupture of the spinal meninges between the two points above stated from atmospheric concussion. I have treated it accordingly.

Before stating the treatment and results, I would ask whether my diagnosis is correct? If so, is the lesion of all the meninges, or of only one or two of them? If only of one or two, which of them? The family history is excellent. The patient is the youngest twin daughter of eight of a family. The father and mother were still alive, active, and healthy. The treatment consisted of five-grain doses of iodide of potassium with aromatic spirits of ammonia three times a day, with blisters over the suspected lesion, a fresh one being applied after the first had healed. With this she began to improve, and in four or five months lost the heavy rolling gait; her progress was somewhat more direct, but still she had no power to stand alone or trust herself to walk a single step. I then gave her iron and quinine, accompanied with faradisation. In a month she was as bad, if not worse than ever. I discontinued faradisation and gave iron and strychnia with shampooing, when she again plucked up somewhat, lost her ambling, and, when supported, could point her toes a little, but still the want of power and coldness in the legs remained. I sent her to the country, with arsenic and quinine to take, and to continue shampooing. She there fell into the hands of a horrible so-called magnetiser, and returned worse than ever, broken down in health and spirits. I ordered rest and quiet, and gave her solution of phosphorus for a month, without the least impression. I then empirically tried Dr. Harley's doses of succus conii without benefit, and then bromide of potassium in ten-grain doses three times a day for some time without result. I now fully began to feel my absolute impotence in this most interesting case. Every time she comes to see me, when I make the inquiry "How are you?" she, as all Spaniards do, shrugs up the shoulders, and, with a most courteous ironical grin, replies "Lo mismo" (Just the same); at this moment she is sitting before me smilingly happy. About two months ago, I drove her out a little way, and got her out of the carriage to try to walk her over a rough cobble-stone path. She fell twice in a peculiar way; she seemed to twist round on the heel of the left foot, making half a turn of the body, and falling on the right side. To get her again into the carriage was a great trouble; it took myself, coachman, and another, to place her in; she could not get in her right leg. I had to use all my strength to put her leg safely in; she felt no pain whatever, and rather seemed to enjoy the whole affair. Her sleep has never been disturbed a single night; and, with the aid of the tip of a finger and her eyes closed, she can stand or hobble along as if her eyes were open. If she sews a long time, her arms feel weak and her eyes fail, so that she cannot thread her needle. To sum all, I must express my deep regret at being able to do so little for this most interesting case. After twenty-eight months' constant care and supervision, the only improvement noticed is the loss of the heavy rolling side-to-side movement; when walking, she points her toes, but the exertion required in walking is all she possesses. Her health is now all that can be desired, but she has no power to stand or walk alone. I shall feel deeply grateful if some of my brethren in England could throw some light on this stubbornly obscure disease, and devise some plan or remedial measure that I could adopt for her relief or recovery.

CASE II.—On March 5th, Don Angel Muñoz, a student in pharmacy from Navarre, aged 23, came to my "Consulta" with the following statement. He had slight short cough. He said he had pneumonia six years ago, but felt otherwise quite well. His appearance was typically healthy for a Spaniard; he was fair, ruddy, tall, and stout, quick in movement, and in high spirits. He could walk eight or ten miles without fatigue, walk up hill, or take a day's shooting without inconvenience; but for the last four years, every day at 11 A.M., and during the hot weather at 5 P.M. also, he spat up, without coughing or vomiting, in one great mouthful, something which he said was sweet. Unless the same fluid came away every day, or if it should be retained an hour longer than the above periods, he felt rather uncomfortable, and could not eat his full meal. I examined his chest most carefully, and found it well developed in every point; there was a little bulging over the base of the heart; on measurement, I found the left side of the thorax an inch and a half wider than the right. The percussion-sound was normal in the back and front; breathing was perfect. The apex-beat of the heart was four and a half inches below the nipple, and a little to the right; the heart-sounds were normal. Nothing was revealed by auscultation. I told him to come to me the following day at 10.30 A.M., so that I might see him discharge his "sweet stuff". He