The fact has been assumed—and quite correctly, as the analysis I now submit shows.

I happened to be called to a lingering labour, in which I delivered the child with forceps (low operation). The child was a healthy full-time male and was born head first. Immediately the breech was expelled, and before any attempt to breathe was made, the child began to micturate. I seized the penis with one hand and a clean cup with the other, and then caught the remainder of the urine—just over half an ounce. This urine was carefully preserved and analysed. For comparison I obtained another specimen of urine from the same child—6 drachms, passed eight and a half hours later.

TABLE I.—Qualitative Analysis.

Specimen I.— $\frac{1}{2}$ ounce. Passed immediately after birth, and before inspiration.	Specimen II.—6 drachms. Eight and a-half hours after birth.
Examination showed— No sugar. No albumen. No phosphates. No sulphates. Chlorides present. Urea " Kreatinin "	Examination showed— No sugar. No albumen. No phosphates. Sulphates present. Chlorides " Urea " Kreatinin " (in larger amount.)

TABLE II.—Quantitative Estimation of Urea (by the Hypobromite of Soda Method).

Specimen I.—Before child breathed.	Specimen II.—After child breathed.
Urea 0.15 per cent., that is, 0.66 grains per ounce.	Urea, 0.3 per cent., that is, 1.32 grains per ounce.

These analyses show that urea is present in considerable quantity in the urine of the normal living foetus. It follows, therefore, that this urine is a possible source of the urea found in the liquor amnii, and that the foetal renal secretion is a possible source of the liquor amnii itself. Kreatinin is known to be present in small amount in the amniotic fluid, but its presence in the foetal urine is especially interesting. Speaking of the presence of this substance in the normal urine of the adult Von Jaksch⁵ says:

The formation of kreatinin has been shown to be intimately associated with the decomposition of muscle substance, and the quantity produced is in direct relation to the amount of flesh meat consumed as food, and, under certain circumstances, to the muscle waste within the body. Under these circumstances muscle contains kreatin, which is changed into kreatinin as it passes through the body. This is to be borne in mind when a clinical inference is drawn from the observation of an increase or diminution of the quantity of kreatinin secreted. According to Neubauer, the quantity excreted by a healthy man is about 1 gramme. According to Pouchet, it is 1 gramme in the case of the male, 0.75 gramme in that of the female, while kreatinin is altogether absent from the urine of sucklings. This point, however, is contested by Grocco.

Its presence was quite evident in both the analyses here recorded—in the specimen before the child breathed the quantity was just enough to give the colour reaction, while in the second the colour obtained was very rich—showing that the quantity of kreatinin was larger: this increase, no doubt, being the result of increased tissue waste by the action of the muscles of respiration now superadded to those which acted while the foetus was still *in utero*. Further observations on the urine of the newborn child enable me to state, in contradiction of Pouchet's statement and in support of Grocco's, that kreatinin is normally present in the urine of sucklings. I have found it in the urine expressed from the child's bladder five minutes after birth, during the first, second, and third days, and at various stages during suckling. I make this as a preliminary statement. It depends on qualitative colour tests—Weyl's nitroprusside of soda with caustic potash, and Jaffe's picric acid and caustic potash. I have not yet isolated the substance.

To sum up:

1. The foetal kidneys secrete actively during intrauterine life.
2. The urine of the normal living foetus contains urea.

⁵ *Clinical Diagnosis*, translated by J. Cagney, M.D., 1890.

3. The urine of the normal living foetus contains kreatinin.
4. The foetal renal excretion is a possible source of origin of the liquor amnii; this is shown by the presence of urea and kreatinin in both these fluids.

5. The presence of sulphates and phosphates in the liquor amnii,⁶ and their absence from the foetal urine, would point to there being an additional source of origin of the liquor amnii.

6. The amount of urea and kreatinin excreted in the urine undergoes a marked increase during the first few hours after birth.

7. Kreatinin is normally present in the urine of the newborn child and suckling.

Lastly, I wish to express my best thanks to Professor Stirling for his courtesy in allowing me to make use of the Physiological Laboratory of Owens College for part of the above analyses.

THE PROBABLE DESTRUCTION OF BACTERIA IN POLLUTED RIVER WATER BY INFUSORIA.

By D. HARVEY ATTFIELD, M.A., M.B.CANTAB., D.P.H.

TOWARDS the end of June, 1892, Professor Dr. Emmerich, of the Hygienic Institute of the Royal University of Munich, suggested that possibly infusoria had something to do with that self-purification of impure water which is well known to occur in many circumstances. With the object of investigating this matter I carried on the following series of experiments in the laboratories of the Institute:

On July 1st two 1-litre flasks, which may be designated A and B, were sterilised. Into each of these was introduced about 500 c.c. of water drawn from a certain disused well. This water contained 10,000 bacteria per c.c., as estimated by counting the colonies on gelatine plates in the usual manner, but was almost free from infusoria. To A was added 10 c.c. of River Isar water. The latter was collected about 150 metres below the influx of one of the main Munich sewers. The Isar water contained much *beggiatox alba* and swarmed with infusoria. The latter were for the most part *paramoecia aurelia* and *P. caudatum*. After diluting a portion of A with sterilised water, three gelatine plates were made containing respectively:

- (1) 0.008 c.c. of A
- (2) 0.016 " "
- (3) 0.024 " "

Three plates were also made from the contents of B—that is, the well water without Isar water:

- (1) 0.01 c.c. of B
- (2) 0.02 " "
- (3) 0.05 " "

The plates and the two flasks were then placed in the cellar of the Institute, because the temperature there resembled that of the well from which the water was drawn.

July 2nd. No colonies were as yet found on the plates. The infusoria in A were observed to be in active movement. More plates were prepared from A and B.

July 4th. From the counting of the colonies on the plates prepared on July 1st,

A had 259,000 bacteria per c.c.
B had 10,000

Additional plates were made from A and B. The plates prepared from A on July 22nd showed that A had on that day 364,000 per c.c.

July 5th. The plates made on July 4th had not developed sufficiently for counting the colonies. Further plates were prepared from A and B.

July 6th. The plates made from A on July 4th showed 48,587 bacteria per c.c.

July 8th. The plates made on July 5th from A showed a bacterial contents of 47,500 per c.c.; from B, 5,450.

These results may be thus tabulated:—

A.	B.
July 1st, per c.c., 259,000 bacteria	July 1st, per c.c., 10,000 bacteria
" 2nd " 364,000 "	" 2nd " "
" 4th " 48,587 "	" 4th " "
" 5th " 47,500 "	" 5th " 5,450

It thus appears that in the water (A) swarming with infusoria the bacteria had decreased to less than one-fifth of their original number in six days, whereas in the water (B) containing very few, if any, infusoria, the decrease of the bacteria in six days was only one-half of their original number.

The suggestion was here made that in the foregoing experiments perhaps light had something to do with the destruction of the bacteria, for a certain amount of direct sunlight had access to the cellar. In the next series of experiments, therefore, similarly-prepared vessels were protected from light by means of covers of black cardboard.

The contents of the two bottles were kept in constant movement by blowing a slow current of air through each bottle by means of a forcing air pump, the air being filtered through plugs of sterilised cotton wool.

⁶ *Landois and Stirling's Physiology*.

The water used in these experiments was, for A, collected 150 metres below the influx of the main Munich sewer into the Isar. It contained some *beggiatoa alba* and infusoria. For B, the water was collected from the Isar above Munich. The methods of procedure, namely, making plate cultures and counting the colonies, were carried out as in the previous series of experiments.

The figures obtained from these results may be tabulated as follows:—

A, Isar water from below Munich with a little *beggiatoa alba* and many paramoecia.

B, Isar water from above Munich containing no apparent infusoria.

A. Bacteria per c.c.			B. Bacteria per c.c.		
Plates of July 11th	...	637,000	Plates of July 11th	...	5,900
" " 13th	...	482,000	" " 13th	...	23,800
" " 14th	...	3,300	" " 14th	...	33,320
" " 15th	...	11,000	" " 15th	...	26,418
" " 16th	...	1,200	" " 16th	...	2,100

In all these cases with one exception, the plates were counted after from thirty-six to forty-eight hours. The exception is that of the plates dated July 15th, when, owing to unavoidable absence, the counting was not done till about seventy-two hours after preparation; hence, perhaps, the increase noted.

Here again the proportional amount of decrease of bacteria between the water with infusoria, and that without them will be observed to be very marked. In A the decrease is as from 500 to 1, while in B it is not quite as from 17 to 1.

On July 19th a fresh series of experiments was started. As before, samples of water from below Munich with infusoria and from above the town without them were collected in sterilised bottles.

In this series, however, each water, A and B, was divided into two equal portions, which may be designated as A₁ and A₂, and B₁ and B₂; the two former being from below and the two latter from above Munich, as before. At the time of taking these samples the Isar was in flood, and in consequence the water was very turbid from suspended matter. Through A₁ and B₁ air was blown, while A₂ and B₂ were not so treated.

From these samples six sets of plate cultures were prepared in the course of fourteen days, and from the data thus afforded the following table is compiled.

A ₁ with Infusoria.			B ₁ without Infusoria.		
July 19.	3,000,000 bacteria per c.c.		July 19.	700 bacteria per c.c.	
	A ₁ and Air.	A ₂ without Air.		B ₁ with Air.	B ₂ without Air.
July 21	215,000	567,000 ?	July 21	1,470,000	354,900
" 23	101,250	196,000	" 23	1,235,000	797,550 ?
" 25	35,552	58,000	" 25	504,000	228,150
" 28	42,920	97,000	" 27	250,500	80,800
Aug. 1	13,200	not counted	Aug. 1	121,500	not counted

Examining this table we find there is very little difference in the proportional decrease of bacteria, whether air be driven through the fluid or not.

In this series of experiments very interesting ocular evidence of the purification that was going on was noticed, namely, the water in the A bottles became quite bright and clear, while the water in the B bottles became thicker and more turbid. Professor von Pettenkofer, to whom I showed these bottles, was particularly struck by this point. In this series the presence of infusoria seemed to have a more marked effect than in the foregoing experiments. For, in ten days, a water containing 3,000,000 bacteria per cubic centimetre decreased in bacterial contents to a little over 13,000, while the water containing no infusoria not only gave no decrease in numbers, but rose in bacterial contents from 700 per c.c. to 121,500 in the same time, namely, ten days.

From these experiments it would seem that infusoria have some powerful influence in the getting rid of bacteria, and possibly so aiding in the "self purification" of water.

PRESENTATION.—The members of the Dowlais Railway Servants Ambulance Class recently at a public meeting presented Dr. H. Lewis-Hughes with an aneroid barometer in recognition of his services as lecturer. All the candidates who presented themselves for examination were successful.

NOTE ON A SPECIMEN OF CHLOROFORM AFTER THE INHALATION OF WHICH DEATH OCCURRED.

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SOME short time ago a death occurred after the administration of chloroform in the Manchester district, and the surgeon under whose care the patient was handed us the chloroform for examination. Briefly the history of the case was: "The patient, a lad of 10, had suffered from strumous disease of the wrist, for which excision was performed. He took the anæsthetic well, and showed signs of returning consciousness a minute or two after completion of the operation, and the case appeared to be quite normal, when suddenly the pulse and respiration stopped, and all efforts to resuscitate failed. About 4½ fluid drachms were used on the lint, the administration extending over 25 or 30 minutes. No examination of the body was obtained."

Chloroform from the same bottle had been previously administered on one occasion, and earlier in the day, without untoward symptoms. It had been recently obtained, was kept in a dark place, and was only opened on the day of the fatality. It was of Scotch manufacture, and the label stated it to be of the official specific gravity, and prepared from pure alcohol. At the outset we may state all adulteration from the luting around the stopper was avoided. In appearance the chloroform was all that could be desired, but when carefully inhaled it irritated perceptibly the nasal mucous membrane, even after a sample of pure chloroform by the same makers had been inhaled, which caused no irritation. This may have been due to the presence of chloro-carbonic oxide (or carbonyl chloride) CO Cl₂, but, strange to say, the presence of this body could not, after repeated trials, be demonstrated by the baryta-water (Ramsay's) or the zinc iodide and starch pastetests. We thus believe the trained nose to be a better guide than any chemical one we at present possess. It was very faintly acid to litmus. No precipitate was got by barium chloride (absence of sulphuric acid) nor by silver nitrate (absence of chlorine).

When digested with warm dilute caustic potass solution only a very faint dark colour was obtained (absence of aldehyde). Shaken with an equal volume of colourless sulphuric acid (specific gravity 1.843) a dark purple colour was at once obtained, and this changed to black on standing for one hour, showing a large amount of organic impurity. A sample of pure chloroform by the same makers imparted nothing to sulphuric acid when similarly treated. Compared with a sample of chloroform which caused death in Manchester over twelve months ago, the black colour was not so intense. With sulphuric acid no characteristic odour was perceived. Four fluid ounces were then evaporated down at ordinary temperature by means of an air current. When evaporation was nearly completed a peculiar benzole odour was very distinctly perceptible, but entirely disappeared on the dissipation of all the fluid, leaving behind a light yellowish film covering the bottom of a round capsule having a diameter of about 4 inches. This film was amorphous when viewed microscopically, had an odour like buchu, and when kept in the mouth for a time had a bitter acrid taste. It was too small in quantity to be weighed. It was not soluble in water, but was evidently sparingly soluble in normal saline solution, with 2 fluid drachms of which it was rubbed up. A large healthy male frog was pithed, and the cord destroyed; the heart was laid bare, the pericardium opened, and a light lever balanced on the apex of the heart, and the pulsations recorded on a slowly revolving cylinder covered by blackened paper. Fig. 1 shows the heart under normal saline. Fig. 2 shows the condition for some seconds after the saline and deposit mixture had been dropped on the heart, the heart being stimulated to beat more firmly but rather more slowly. Fig. 3 was taken about two minutes later. Fig. 4 two minutes later than Fig. 3. The substance had evidently thus a toxic effect, but