OBSERVATIONS
ON THE
EFFECT OF COFFEE ON THE UREA AND
CHLORIDES IN HEALTH.

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I WAS induced to make these observations from a discussion which occurred, whilst I was doing duty at the Fever Hospital, as to the effect of coffee in the treatment of typhus fever, and in which doubts were expressed as to the truth of the observations of Lehmann and Böcker.

My observations were made whilst I was living at University College Hospital as physician's assistant, so that I had great opportunities for making them carefully.

To Dr. Russell Reynolds my best thanks are due for his kindness in permitting me to carry them out on patients admitted under his charge.

The experiments were made on three cases: two were patients, the third was myself.

The urine was collected every morning at 8 a.m., and
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examined the same day, for urea, and latterly for chlorides. Both analyses were made by Liebig's volumetric method. In analysing the urea the chlorides were not separated, but two cubic centimètres of the test solution used for urea were subtracted, the same as is usually allowed.

During the time the analyses were being made, the patients were kept on a stated diet, the ordinary diet of hospitals, consisting of bread, 16 oz.; mutton (roast), 12 oz.; potatoes every other day; milk, $\frac{1}{2}$ pint; beer, 1 pint; with occasionally some beef-tea. My own diet was kept as much the same as possible—beefsteaks and mutton chops being the only meat taken. No stimulants of any kind were used during the whole experiments, milk and water being the chief drinks when not taking the coffee.

The same exercise as nearly as possible was taken both by the patients and myself.

The coffee was taken three times daily, at first in $\frac{1}{4}$ -oz. doses, and then increased, till at one time I was taking from 4 to 6 oz. daily. Above each table the amount of coffee, and how it was taken, are placed.

The temperature in the cases of the two patients was taken night and morning, and the ranges will be noted when reviewing the state of the patient during each week of coffee and non-coffee taking.

CASE 1.—George Plater, æt. 19, by occupation a wheelwright, was admitted into University College Hospital, January 29th, 1864, with symptoms of slight consolidation at the apex of the lung. For four months before admission he had been suffering from hæmoptysis, but it was never at any time copious; at present he coughs little, and the expectoration consists of about six little pellets, of faint yellow or pinkish colour, here and there streaked with blood.

At the commencement of the observations (Feb. 14th) the hæmoptysis had ceased; his weight was 105 lb., or 48 kilogrammes.

The lung symptoms were the same as on admission; there was no sign of any fresh deposition of tubercle.

Throughout the whole course of the observations the patient's health has continued good; he has, in fact, expressed himself as getting better and stronger every day. His temperature noted night and morning has been normal throughout, ranging between 97° and 99° Fahr.

During the first week, from February 14th to February 22nd, no coffee was taken.

2nd week.—On February 22nd, a decoction of coffee was made, by boiling 2 oz. of the powdered bean in 8 oz. of water, and allowed to cool in a stoppered bottle: 1 oz. of this, with the dregs, was taken three times daily from the 22nd to the 28th inclusive. His weight on the 28th was 110 lb., or 50 kilogrammes.

During the third week, from February 29th to March 6th inclusive, no coffee was taken.

4th and 5th weeks.—On March 7th, the patient began to take coffee again, and continued doing so till the 21st: $\frac{1}{4}$ -oz. doses were taken three times daily; but this time the freshly powdered bean was made into an infusion with boiling water, and milk and sugar being added *ad libitum*, dregs and all were swallowed hot. His weight on the 17th was 114 lb., or 52 kilogrammes.

During the 6th week, from March 21st to March 28th inclusive, no coffee was taken.

On the 30th, the patient left the hospital, feeling quite well.

CASE 2.—John Taylor, æt. 17, was admitted into University College Hospital, March 17th, 1864, suffering from an attack of subacute rheumatism. The temperature only once rose to 100° Fahr. throughout the attack; there was no pericarditis, but some old endocardial murmurs.

The observations in this case only last one week, owing to an attack of tonsillitis supervening, and the patient leaving the hospital immediately on recovery.

The observations were commenced on April 4th, and continued till April 11th. Throughout the week his health was good; he had no pain or stiffness in any of his joints, and his appetite was very good.

The coffee was taken three times a day in $\frac{1}{2}$ -oz. doses, an infusion being made as in the last case, and dregs and all swallowed hot with milk and sugar. The temperature noted night and morning ranged between 97° and 99° Fahr. Patient's weight on the 12th was 115 lb., or rather more than 52 kilogrammes.

CASE 3.—The third series of observations were made on myself, and extended over a longer period than either of the others. At the time of making them my health was good in every respect; weight was 140 lb., or 64 kilogrammes.

The observations commenced on February 15th; during the first week, from February 15th to February 22nd, no coffee was taken.

Diet.—Breakfast, 8 a.m., eggs, bread and butter, milk. Lunch, 1 p.m., bread and butter, water. Dinner, 5 p.m., beefsteaks, vegetables, pastry, and water; and generally, about 8 p.m., some milk, with some bread and butter.

2nd week.—From 22nd to 28th of February, coffee was taken three times a day—at breakfast, lunch, and dinner; three breakfast-cups of a strong infusion at each meal, with milk and sugar. The diet was the same; health good.

3rd week.—From February 29th to March 6th inclusive, no coffee was taken; mutton chops were substituted for beefsteaks at dinner—otherwise the diet was the same; health good.

4th and 5th weeks.—From March 7th to March 20th inclusive, coffee was taken three times daily in $\frac{1}{4}$ -oz. doses. It was made into an infusion as in the first case, and milk and sugar being added, the dregs and all were swallowed. The diet was the same as in the last week; the stools were of a rather dark colour from the coffee-grains swallowed; health good.

6th week.—From March 21st to March 27th inclusive, no coffee was taken; beefsteaks were substituted for chops at dinner—the diet was otherwise the same.

7th and 8th weeks.—From March 28th to March 31st, $\frac{1}{4}$ -oz. doses of coffee were taken twice daily, an infusion being

made and taken in the same way as in previous weeks. Not feeling very well on April 1st, I left off taking coffee till the 4th, when I again took $\frac{1}{4}$ -oz. doses of coffee three times a day. An infusion was made, and the dregs swallowed as before; the diet was the same as in the last week; stools were very costive and dark-coloured; the urine of April 10th was lost; no coffee was taken.

9th week.—On the 11th and 12th of April, $\frac{1}{4}$ -oz. doses of coffee were taken three times daily; on the 13th and 14th, 1-oz. doses were taken twice daily; on the 15th and 16th, 2-oz. doses were taken three times daily; but finding that the large amount of coffee-grains swallowed very much impaired my appetite, the coffee was the last four-days boiled in water, strained, and then taken with milk and water. Health was pretty good; urine of 16th and 17th of April was lost.

10th week.—On the 18th the coffee was left off, and none taken since. The urine was examined till the 25th of April; health this week better; appetite improved.

Conclusions.—In the first case, the patient, G. Plater, was throughout the observations gaining strength and weight, and the analyses show a regular increase in the amount of urea excreted.

On comparing corresponding coffee and non-coffee weeks, no appreciable difference is to be found. The greatest is in the first (non-coffee) week and the second (coffee) week; the daily average in the second week, when $\frac{1}{4}$ -oz. doses of coffee were being taken three times daily, being 2·198 grammes more than in the first week, when no coffee was taken.

In the third (non-coffee) and fourth (coffee) weeks, the daily average was slightly less in the latter, when $\frac{1}{4}$ -oz. doses were taken three times a day. The difference, however, was only ·424 of a gramme; and, again, in the fifth week, when the coffee was taken the same as in the fourth week, the average per day was more by ·515 of a gramme than in the sixth week, when no coffee was taken.

Daily average of Urea excreted per kilogramme of Body-weight.

NON-COFFEE WEEKS.	COFFEE WEEKS.
In the first week = '355 grammes.	In the second week = '385 grammes.
third week = '450 "	fourth week = '440 "
sixth week = '460 "	fifth week = '470 "

In the second case, John Taylor, æt. 17, weight 115 lb., or 52 kilogrammes, owing to an attack of tonsillitis supervening in the middle of the observations, and the patient leaving immediately on recovery, the effect of coffee on the urea can only be estimated by comparing the amount passed per kilogramme of body-weight during the observations with the normal amount in health. Patient passed on the average '428 of a gramme of urea per kilogramme; he was taking $\frac{1}{2}$ -oz. doses of coffee three times daily.

In the third series of observations, made on myself, we find, on comparing the analyses of corresponding weeks, that in the first (non-coffee) and in the second (coffee) weeks, the daily average was rather greater in the latter, when three cups of a strong infusion of coffee were taken three times a day; it being 34'080 grammes in the second week, to 33'699 grammes in the first week.

In the third and fourth weeks, the excess was in the non-coffee week, the daily average in the third week, when no coffee was taken, being 36'281 grammes, and in the fourth week, when $\frac{1}{4}$ -oz. doses of coffee were taken three times a day, only 31'182 grammes; thus less in the coffee-taking week by 5'099 grammes: yet in the next (fifth) week, the same amount of coffee being taken, the daily average rose to 33'705 grammes; and, again, in the following (sixth) week, no coffee being taken, the daily average fell to 32'962 grammes, less by '743 of a gramme than in the previous coffee-taking week.

During the seventh week, the amount of coffee was increased to $\frac{1}{2}$ oz. twice daily; in the three days during which

the urine was examined, the daily average was 34·210 grammes.

In the eighth week, $\frac{1}{2}$ -oz. doses of coffee were taken three times daily; yet there was rather an increase than a diminution in the amount of urea excreted, 34·375 being the daily average.

Up to this time the coffee-grains had been swallowed in the infusion at each dose; but the large amount of solid matter thus introduced into the stomach materially affected the appetite, which now was not so good as it had previously been, and the effect on the stools was to render them very costive and almost black, so that in the next (ninth) week on increasing the dose to 1 oz. the grains were strained off.

9th week.—On the 11th and 12th of April, $\frac{1}{2}$ -oz. doses were taken three times daily; on the 13th and 14th of April, 1-oz. doses were taken three times daily; on the 15th and 16th of April, 2-oz. doses were taken three times daily. The result was that the daily average of urea fell to 32·291 grammes, which, however, was not less than in the sixth week, when no coffee was taken.

During the tenth week no coffee was taken, at the same time the diet was not so strict,—meat being taken as well as eggs for breakfast, and varied daily at dinner; and on referring to the notes, I find “felt much better—appetite better,” entered daily. This week the average rose to 37·086 grammes per day, greater by 4·161 grammes than in the previous week.

Daily average of Urea excreted per kilogramme of Body-weight in each week.

NON-COFFEE WEEKS.		COFFEE WEEKS.	
In the first week	=·535 grammes.	In the second week	=·541 grammes.
second week	=·576 "	fourth week	=·495 "
third week	=·523 "	fifth week	=·535 "
tenth week	=·588 "	seventh week	=·543 "
		eighth week	=·545 "
		ninth week	=·524 "

These results, I think, show that coffee does not diminish

the excretion of urea in health by any appreciable amount when taken in the above doses. In fact, only in my own case has there been any diminution at all; whilst in the first case, G. Plater, there was an actual increase throughout the observations; and in the second case, John Taylor, the average was by no means below the normal amount.

It is very questionable whether the diminution in my own case was due to the coffee—firstly, because it did not recur regularly during each period of coffee-taking, and, secondly, it was not beyond the limits frequently noted in health.

The diminution only occurred twice, in the fourth week, when it was less by 5·099 grammes than in the preceding week, and in the ninth, when it was less by 4·161 grammes than in the tenth week; but it is hardly fair to take the latter into consideration, as during the ninth week I was not feeling well, and my appetite was not good, owing, no doubt, to the large amount of coffee that had been taken, and to the strictness of the diet, which, from February 15th till April 16th, had only been varied by substituting beefsteaks for mutton chops for dinner in alternate fortnights. In the tenth week, the diet being varied, my appetite improved, and, naturally, the daily excretion of urea increased.

2nd. The diminution is not beyond the limits frequently noted in health; for I find that Dr. Parkes, in his book on the Urine, says that “the maximum and minimum amounts passed in any one day by an individual are usually about $\pm$ th above and below his mean amount;” so that in my own case, passing on the average about 34 grammes daily, the diminution or increase of 6 grammes would in no way be abnormal. And again I find, on examination, that the difference between the maximum and minimum amounts in each week of coffee and non-coffee taking is, in the coffee weeks 6·883 grammes, and in the non-coffee weeks about 10·911 grammes, the former amount being even a greater difference than between any two weeks throughout the observations.

3rd. Throughout the whole course of the observations, the amount of urea excreted per kilogramme of body-weight was

only once below the normal amount, and then only by '005 of a gramme.

Chlorides.—In the first case, G. Plater, during the two weeks that coffee was taken in $\frac{1}{4}$ -oz. doses three times daily, the average was as nearly the same as possible as in the two corresponding weeks, when no coffee was taken; no increase or diminution worthy of remark, one way or the other.

Amount per kilogramme of Body-weight in each week.

COFFEE-TAKING WEEKS.	NON-COFFEE WEEKS.
In the fourth week = '14 grammes.	In the third week = '14 grammes.
fifth week = '152 „	sixth week = '15 „

This, according to Dr. Parkes, would be at the normal rate.

As a last observation on the patient, I gave him, on March 28th, three $\frac{1}{2}$ -oz. doses of coffee, dregs swallowed: this gave him violent abdominal pains in the night, which, however, were soon relieved by hot fomentations. On the 29th he did not take any coffee.

Analysis of Urine for the two days.

	Amount of water.				Urea.	Chlorides.
	C. C.	Sp. gr	React.	Alb.	Grammes	Grammes.
March 29. Coffee	2860	1006	Acid	None	22·880	31·460
30. Non-Coffee ...	475	1027	„	„	21·285	1·485

Here it will be seen that the water and the chlorides were largely increased, the chlorides amounting to '617 per kilogramme of body-weight; the urea remained normal.

On the next day, no coffee having been taken, the water was much lessened; the urea still remained normal, but the chlorides were reduced to '029 of a gramme per kilogramme of body-weight. Unfortunately, the patient left the hospital

the next day, so that this interesting point could not be followed up.

In the second case, J. Taylor, $\frac{1}{4}$ -oz. doses of coffee were given at once, with the hope that the same interesting result would follow as in the first case; but on referring to the table his daily average will be found to be not more than 8·444 grammes, or ·162 gramme per kilogramme of body-weight—a rather large but certainly not abnormal amount for a boy of his age and weight.

In the third set of observations, as in the second, no definite result has been arrived at. The average is above the normal rate throughout.

Daily average per kilogramme of Body-weight in each week.

NON-COFFEE WEEKS.		COFFEE WEEKS.	
In the third week	= ·226 grammes.	In the fourth week	= ·203 grammes.
sixth week	= ·221 "	fifth week	= ·251 "
tenth week	= ·202 "	seventh week	= ·272 "
		eighth week	= ·168 "
		ninth week	= ·181 "

It was lowest in the eighth week, when $\frac{1}{4}$ -oz. doses were being taken three times daily, and highest in the seventh week, when $\frac{1}{4}$ -oz. doses of coffee were being taken twice daily.

In conclusion, I may say that neither the patients nor myself suffered in any way any ill effects from the coffee; not even when taking 1 and 2-oz. doses at a time did I suffer from any headache, giddiness, or unsteadiness of the hands: on the contrary, I always felt when taking it more lively and fit for work after meals.

The pulse, examined two or three times in the case of the patients, was found to be generally increased a few beats for about an hour after taking the coffee.

Analysis of Urine in First Case (G. PLATER).

First week.—Non-Coffee.

Date.	Amount of water.					Urea.		Chlorides.	
Feb.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
15	725	25½	...	Acid	None	15·765	240·20	...	...
16	735	26	...	"	"	15·162	231·97	...	...
17	Lost	...	...	"	"	...	...	...	...
18	1240	43½	...	"	"	16·977	258·74	...	...
19	1290	45¼	...	"	"	16·845	257·72	...	...
20	1095	38½	...	"	"	19·217	294·02	...	...
21	1350	47½	...	"	"	17·350	265·45	...	...
22	1150	40½	...	"	"	16·425	251·32	...	...
						Grammes.		Grains.	
Average per diem of urea						16·820		or 259·02	
Amount per kilogramme of body-weight . . .						·355			

Second week.—Coffee taken (¼-ounce doses three times daily).

Date.	Amount of water.					Urea.		Chlorides.	
Feb.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
23	1560	55	...	Acid	None	22·975	341·51	...	...
24	1750	61½	...	"	"	18·230	278·51	...	...
25	1565	55	...	"	"	15·987	244·60	...	...
26	1065	37½	...	"	"	18·032	275·88	...	...
27	655	23¼	...	"	"	21·417	327·68	...	...
28	1370	48	...	"	"	19·320	295·59	...	...
29	1165	41	...	"	"	17·167	262·65	...	...
						Grammes.		Grains.	
Average per diem of urea						19·018		or 292·87	
Amount per kilogramme of body-weight . . .						·385			

Third week.—Non-Coffee.

Date.	Amount of water.					Urea.		Chlorides.	
March.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
1	965	34	...	Acid	None	23·170	356·81	6·082	93·66
2	Lost	...	...	"	"	...	...	...	...
3	1400	49½	...	"	"	21·940	337·87	7·060	108·72
4	860	30½	...	"	"	23·479	361·57	6·630	102·10
5	1195	42	...	"	"	23·160	356·63	7·103	109·46
6	1820	64	...	"	"	23·977	369·24	9·279	142·89
7	1195	42	...	"	"	17·742	273·22	6·875	105·87
						Grammes.		Grains.	
Average per diem of urea						22·244		or 342·5	
Amount per kilogramme of body-weight						·45			
Average per diem of chlorides						7·172			
Amount per kilogramme of body-weight						·14			

Fourth week.—Coffee taken (¼-ounce doses three times daily, hot).

Date.	Amount of water.					Urea.		Chlorides.	
March.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
8	1495	52½	...	Acid	None	21·712	334·35	...	...
9	1355	47½	...	"	"	20·590	317·08	7·585	116·8
10	950	33½	...	"	"	18·039	277·80	6·407	98·6
11	1890	68½	...	"	"	26·730	391·64	10·260	158·0
12	1030	36½	...	"	"	23·535	362·43	6·355	97·8
13	1280	45	...	"	"	21·905	337·33	7·255	111·7
14	1300	45½	...	"	"	20·235	311·61	5·103	78·5
						Grammes.		Grains.	
Average per diem of urea						21·820		or 336·02	
Amount per kilogramme of body-weight						·444			
Average per diem of chlorides						7·162		or 110·29	
Amount per kilogramme of body-weight						·14			

Fifth week.—Coffee taken, same as last week.

Date.	Amount of water.					Urea.		Chlorides.	
March.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
15	1690	59½	...	Acid	None	24·340	374·8	8·055	124·0
16	1185	41½	...	"	"	22·097	340·2	6·698	103·1
17	1575	55½	...	"	"	25·145	387·2	7·986	122·9
18	1585	55½	...	"	"	24·707	380·4	7·097	109·2
19	1360	48	1015	"	"	24·480	376·9	6·463	99·5
20	2020	71	1011	"	"	28·280	435·5	11·110	171·0
21	1010	35½	1016	"	"	19·695	303·3	7·070	108·8
						Grammes.		Grains.	
Average per diem of urea						24·106		or 371·2	
Amount per kilogramme of body-weight						·472			
Average per diem of chlorides						7·782		or 119·8	
Amount per kilogramme of body-weight						·152			

Sixth week.—Non-Coffee.

Date.	Amount of water.					Urea.		Chlorides.	
March.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
22	1325	46½	1015	Acid	None	21·862	336·67	6·625	102·02
23	1295	45½	1010	"	"	16·835	259·25	6·475	98·91
24	1515	53½	1014	"	"	25·785	396·62	8·322	127·35
25	Lost	...	1015	"	"	...	...	...	...
26	1280	45	1016	"	"	24·960	384·38	7·680	118·27
27	1400	49½	1016	"	"	27·300	420·42	9·100	140·14
28	1155	40½	1017	"	"	24·832	382·41	6·352	97·82
						Grammes.		Grains.	
Average per diem of urea						23·591		or 363·3	
Amount per kilogramme of body-weight						·463			
Average per diem of chlorides						7·426		or 114·36	
Amount per kilogramme of body-weight						·15			

*Analysis of Urine in Second Case (J. TAYLOR).*Coffee taken three times daily, in $\frac{1}{2}$ -ounce doses.

Date.	Amount of water.					Urea.		Chlorides.	
April.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
5	1320	46½	1015	Acid	None	21·120	325·3	7·260	111·8
6	1410	49	1015	”	”	21·855	336·5	9·870	151·9
7	Lost	...	1025	”	”	...	...	...	...
8	1680	59	1015	”	”	26·040	401·0	9·000	138·5
9*	500?	17½	1024	”	”	13·250	...	3·250	...
10	Lost	...	...	”	”	...	...	...	...
11	1005	35	1016	”	”	20·602	317·2	8·040	123·8
12	1150	40½	1016	”	”	21·850	336·5	8·050	123·9
						Grammes.	Grains.		
Average per diem of urea						22·293	or	343·3	
Amount per kilogramme of body-weight						·428			
Average per diem of chlorides						8·444	or	130	
Amount per kilogramme of body-weight						·162			
* Man declared he had lost none, but still it is doubtful.									

Analysis of Urine in Third Case (C. E. S.).

First week.—Non-Coffee.

Date.	Amount of water.					Urea.		Chlorides.	
Feb.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
16	885	31	...	Acid	None	28·860	444·4	...	...
17	Lost	...	...	"	"	...	...	...	...
18	920	32 $\frac{1}{2}$	...	"	"	31·855	490·5	...	...
19	1055	37	...	"	"	32·102	494·3	...	...
20	1055	37	...	"	"	37·105	571·4	...	...
21	1340	47	...	"	"	40·155	618·3	...	...
22	1120	39 $\frac{1}{2}$	...	"	"	32·120	494·6	...	...
						Grammes.		Grains.	
Average per diem of urea						33·699		or 519·9	
Amount per kilogramme of body-weight						·535			

Second week.—Coffee taken (3 breakfast-cups of a strong infusion three times a day).

Date.	Amount of water.					Urea.		Chlorides.	
Feb.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
23	1075	37½	...	Acid	None	35·647	548·9	...	...
24	1445	50½	...	"	"	37·127	571·7	...	...
25	1515	53	...	"	"	32·982	507·9	...	...
26	1080	37½	...	"	"	33·685	518·1	...	...
27	870	31	...	"	"	29·812	459·1	...	...
28	740	26	...	"	"	31·547	485·8	...	...
29	1085	37½	...	"	"	37·765	581·5	...	...
						Grammes.		Grains.	
Average per diem of urea						34·080		or 524·8	
Amount per kilogramme of body-weight . . .						·541			

Third week.—Non-Coffee.

Date.	Amount of water.					Urea.		Chlorides.	
March.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
1	Lost	...	...	...	...	...	...	...	...
2	1060	37	...	Acid	None	44·454	685·0	13·283	204·5
3	Lost	...	...	"	"	...	...	...	...
4	855	30½	...	"	"	33·155	510·5	13·775	212·1
5	880	31	...	"	"	34·160	526·0	13·960	214·9
6	965	34	...	"	"	34·935	572·9	14·255	219·5
7	1100	38½	...	"	"	34·700	534·0	15·880	244·5
						Grammes.		Grains.	
Average per diem of urea						36·281		or 558·7	
Amount per kilogramme of body-weight . . .						·576			
Average per diem of chlorides						14·230		or 219·1	
Amount per kilogramme of body-weight . . .						·226			

Fourth week.—Coffee taken ($\frac{1}{4}$ -ounce doses three times daily—grains swallowed).

Date.	Amount of water.					Urea.		Chlorides.	
March.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
8	815	28 $\frac{1}{2}$	...	Acid	None	30·560	470·6	...	...
9	995	35	...	"	"	34·140	525·7	13·637	210·0
10	875	31	...	"	"	29·137	448·7	12·425	191·3
11	1420	50	...	"	"	31·400	483·5	16·540	254·7
12	765	27	...	"	"	26·340	385·6	10·402	160·1
13	1045	37	...	"	"	34·917	537·7	14·297	220·1
14	940	33	...	"	"	29·780	458·6	9·580	147·5
						Grammes.		Grains.	
Average per diem of urea						31·182		or 480·2	
Amount per kilogramme of body-weight . . .						·495			
Average per diem of chlorides						12·813		or 197·3	
Amount per kilogramme of body-weight . . .						·203			

Fifth week.—Coffee taken (same way as in last week).

Date.	Amount of water.					Urea.		Chlorides.	
March.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
15	1080	37 $\frac{1}{2}$	1031	Acid	None	36·270	558·3	15·470	238·2
16	955	33 $\frac{1}{2}$	1030	"	"	35·647	548·9	14·207	218·7
17	1045	37	1028	"	"	32·555	501·3	15·252	234·8
18	1020	36	1030	"	"	33·812	520·7	16·087	248·7
19	885	31	1029	"	"	29·647	456·5	13·717	211·2
20	1225	43	1020	"	"	34·300	528·3	20·217	311·3
21	Lost	...	...	...	...	...	...	...	...
						Grammes.		Grains.	
Average per diem of urea						33·705		or 519	
Amount per kilogramme of body-weight . . .						·535			
Average per diem of chlorides						15·826		or 243·7	
Amount per kilogramme of body-weight . . .						·251			

Sixth week.—Non-Coffee.

Date.	Amount of water.					Urea.		Chlorides.	
March.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
22	890	31	1030	Acid	None	30.260	466.0	13.795	212.4
23	1240	44	1025	"	"	37.820	582.4	14.260	219.6
24	885	31	1030	"	"	29.205	449.7	12.390	190.8
25	770	27	1029	"	"	29.260	450.6	9.635	148.2
26	1165	37½	1027	"	"	36.115	556.1	15.727	242.2
27	1305	46	1022	"	"	32.235	496.4	...	...
28	1280	45	1025	"	"	35.840	551.9	17.920	275.9
						Grammes.		Grains.	
Average per diem of urea						32.962		or 507.6	
Amount per kilogramme of body-weight						.523			
Average per diem of chlorides						13.953		or 214.8	
Amount per kilogramme of body-weight						.221			

Seventh week.—Coffee taken ($\frac{1}{8}$ -ounce doses twice daily—grains swallowed).

Date.	Amount of water.					Urea.		Chlorides.			
March.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.		
29	1420	49½	1025	Acid	None	35.500	546.7	19.800	304.9		
30	1035	36	1029	"	"	31.567	486.1	14.490	223.1		
31	950	37	1030	"	"	35.575	547.8	...	...		
April 1 2 3	}		No coffee taken.			Not well.					
						Grammes.		Grains.			
Average per diem of urea						34.210		or 526.8			
Amount per kilogramme of body-weight						.543					
Average per diem of chlorides						17.145		or 264.0			
Amount per kilogramme of body-weight						.272					

Eighth week.—Coffee taken ($\frac{1}{2}$ -ounce doses three times daily, as in last week).

Date.	Amount of water.					Urea.		Chlorides.	
April.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
5	890	31 $\frac{1}{2}$	1033	Acid	None	36·045	555·0	12·015	185·0
6	720	26	1033	"	"	30·960	476·7	6·840	105·3
7	705	24 $\frac{1}{2}$	1032	"	"	34·897	537·4	6·345	97·7
8	1300	44	1023	"	"	37·700	580·5	14·950	228·1
9	890	31 $\frac{1}{2}$	1029	"	"	34·710	534·3	12·905	198·7
10	875	31	1027	"	"	31·937	491·8	10·500	161·7
						Grammes.		Grains.	
Average per diem of urea						34·375		or 529·3	
Amount per kilogramme of body-weight						. 545			
Average per diem of chlorides						10·592		or 162·3	
Amount per kilogramme of body-weight						. 168			

Ninth week.—Coffee taken daily. (For quantity taken at each dose, see note of Case 3, ninth week.)

Date.	Amount of water.					Urea.		Chlorides.	
April.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
12	765	27	1030	Acid	None	31·305	482·0	...	...
13	890	31 $\frac{1}{2}$	1031	"	"	34·265	527·6	...	...
14	920	32 $\frac{1}{2}$	1028	"	"	33·580	517·1	11·960	184·1
15	1000	35	1026	"	"	34·000	523·6	13·000	200·2
16	805	27	1030	"	"	31·395	383·4	9·257	142·7
						Grammes.		Grains.	
Average per diem of urea						32·921		or 537·1	
Amount per kilogramme of body-weight						. 524			
Average per diem of chlorides						11·405		or 175·6	
Amount per kilogramme of body-weight						. 181			

Tenth week.—Non-Coffee.

Date.	Amount of water.					Urea.		Chlorides.	
April.	C. C.	Oz.	Sp. gr.	React.	Alb.	Grms.	Grains.	Grms.	Grains.
19	775	27½	1027	Acid	None	30·225	465·5	8·912	137·2
20	1165	41	1027	"	"	40·775	627·9	16·310	251·1
21	1135	39½	1025	"	"	36·320	559·3	17·025	262·1
22	1025	36	1027	"	"	34·850	536·6	16·360	251·9
23	1170	41	1030	"	"	44·660	687·7	16·380	252·2
24	860	30½	1031	"	"	35·690	549·6	20·210	311·2
25	Lost	...	...	"	"	...	...	...	...
						Grammes.		Grains.	
Average per diem of urea						37·086	or	571·1	
Amount per kilogramme of body-weight						·588			
Average per diem of chlorides						15·866	or	244·3	
Amount per kilogramme of body-weight						·588			