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1	Thursday, 12 April 2018	1	converted to histamine if the bacteria are present if
2	(10.00 am)	2	the temperature is not kept low enough, in other words
3	MR SKELTON: Sir, may I call Dr Wilmshurst back to give	3	if the fish is not kept at near zero degrees Centigrade.
4	evidence.	4	Q. Histamine is a naturally occurring chemical in the human
5	THE CORONER: Yes.	5	body as well?
6	DR PETER WILMSHURST (affirmed)	6	A. It is.
7 8	Questions from MR SKELTON MR SKELTON: Dr Wilmskurgt thould you for returning to the	7 8	Q. But at certain levels it becomes toxic?
9	MR SKELTON: Dr Wilmshurst, thank you for returning to the court to give evidence. You have provided	8 9	A. Yes, it is present in small amounts as a transmitter. Q. You provide a number of papers appended to your
10	a supplementary report for the court, which I think you	10	
11	have in front of you open by the looks of it, tab 25 in	11	supplementary opinion. Can I just take you to one of
12	bundle 1 of the supplementary bundle.	12	them first, which is the WHO report. This is the joint report under tab 27 from the Food and Agricultural
13	A. Yes.	13	Organisation of the United Nations and the World Health
14	Q. Thank you.	14	Organisation.
15	Can I start by just reminding all those present what	15	A. Yes.
16	your expertise is, you are a cardiologist by profession?	16	Q. It is from July 2012 and, within that report, page 380
17	A. Yes.	17	of our internal referencing, you can see described
18	Q. And, by definition, a physician as well?	18	scombrotoxin fish poisoning, SFP, and it gives
19	A. Yes, well not all cardiologists are accredited in	19	an introduction to it and says it is also known as
20	general medicine but I am, yes.	20	histamine fish poisoning, which ties in with what you
21	Q. Yes.	21	have been saying about the cause of the toxicity.
22	You are not a toxicologist?	22	A. That is what is thought to be the case, because there
23	A. No.	23	are certain other toxins present which may also
24	Q. Ultimately on a question of toxicological expertise you	24	contribute.
25	will defer to those with that expertise?	25	Q. Yes.
	····· •····	20	Q. 180.
	Page 1		Page 3
1	A. Yes.	1	A. Yes.
2	Q. Your report deals with an issue of potential food	2	Q. Under paragraph 2.3.1 on page 380 you see "Symptoms" and
3	poisoning in Paris on the night of 9 November 2012, the	3	the first thing it says is:
4	night before Mr Perepilichnyy died?	4	"A variety of symptoms have been observed among
5	A. Yes.	5	humans, poisoned individuals may show one or more of the
6	Q. You describe a certain type of fish called the scombroid	6	symptoms and the severity of the response to the
7	family of fish, which include tuna and mackerel and the	7	contaminated fish may vary."
8	like, which can cause a particular type of reaction from	8	You don't have to show the whole panoply of symptoms
9	bacterial infection?	9	that we are going to come on to, you need one or two
10	A. Yes.	10	that may be diagnostic or indicative of a possibility of
11	Q. Can you just explain from a medical perspective what the	11	scombroid fish poisoning, presumably with a history of
12	bacteria produce that causes the potentially toxic	12	having eaten scombroid fish by definition?
13	reaction?	13	A. Or salmon
14	A. What the bacteria?	14	Q. Or salmon?
15	Q. Sorry, what the bacteria on the fish produce, the rotten	15	A. — which is not a scombroid fish.
16	fish, which causes the reaction?	16	Q. As you say, although the focus seems to be more on the
17	A. Certain fish, pelagic fish of the scombroid type, so	17	scombroid?
18	that is mackerel and tuna and a few other fish, and also	18	A. Yes.
19	salmon which is a different class of fish, they have	19	Q. Salmon does produce at the same level?
20	pelagic fish are ones that swim long distances as	20	A. I don't know.
21	opposed to reef fish. The pelagic fish have in place of	21	Q. Thank you.
22	lactate when we exercise and build up an oxygen debt	22	THE CORONER: Can I ask this, you told us about mackerel,
23	we produce lactate, they use histidine to buffer that	23 24	tuna and salmon, I know this is a different category but
24 25	and histidine is converted to histamine by bacteria that	25	do prawns come into this all? A. I don't know, but I suspect not because it is you
23	are naturally occurring on the fish, so histidine is	23	A. 1 don't know, but I suspect not because it is you
	Page 2		Page 4

1	don't get it off reef fish which swim in a small area,	1	A. That, yes, it can be, or it can be just swelling.
2	it is the fish that swim long distances that	2	I mean if you get it on the vocal chords of course you
3	THE CORONER: Thank you.	3	have problems breathing or your tongue can swell or you
4	MR SKELTON: To read on, they say in several reports	4	can just get patches of swelling on the skin.
5	exacerbation of asthma and more serious cardiac	5	Q. Hypotension, that is low blood pressure?
6	manifestations were reported, and you can see the	6	A. Yes.
7	references there. We will come to the cardiac issue in	7	Q. Headache, tachycardia, an abnormally high cardiac heart
8	due course, because that obviously is getting into	8	rate?
9	an area where you are certainly highly qualified to	9	A. Yes.
10	discuss cardiac consequences.	10	Q. Gastrointestinal symptoms, abdominal cramps, diarrhoea
11	The symptoms typically develop rapidly, from five	11	vomiting. Neurological symptoms, pain, itching, which
12	minutes to two hours after ingestion of the spoiled	12	I think is something you recall when you suffered this?
13	fish, with a usual duration of 8 to 12 hours and with	13	A. Yes, I am not sure that itching is neurological, I think
14	symptoms usually no longer observed after 24 hours.	14	it is cutaneous if you see what I mean, it is part of if
15	It is a rapid onset and rapid resolution poisoning	15	you get hives, they are itchy, if you get urticaria, it
16	ordinarily?	16	is often itchy.
17	A. Yes.	17	Q. It is not part of the central nervous system, it is
18	Q. "Although symptoms may persist for up to several days	18	a skin related symptom you would say?
19	there are no known long term sequelae, and it is	19	A. Yes.
20	considered to be rarely if ever fatal."	20	Q. And other symptoms or potential symptoms, oral burning
21	A. Yes, I mean it is rarely fatal but it is not not when	21	sensation, peppery test, nausea and swelling of the
22	you say rarely, if ever, I mean there are cases of	22	tongue?
23	people who died of it, so	23	A. Yes, the peppery taste though I think is when you eat
24	Q. I will take you on to some of your other reports,	24	the fish, that is I mean it is not as from my
25	because I just wanted to see some of the cases where it	25	personal experience, it doesn't linger, it is when you
	Page 5		Page 7
1	has arisen as being of a fatal consequence and your	1	eat the fish that it tastes peppery or metallic, it is
2	views on that. For present purposes, are you happy with	2	not you retain a peppery taste.
3	that as a generalisation about	3	Q. That is not what it says here, but that is what you
4	A. As generalisation, yes.	4	think from your own personal experience?
5	Q. Diagnosis under paragraph 2.3.2 is said to be largely	5	A. Yes, and also from reading I think.
6	dependent on the symptomatology, time of onset, history	6	Q. I think it is fair to say, but you can correct me if
7	of food allergy and the consumption of contaminated	7	I am wrong, that some of the other papers that you
8	fish. It can be confirmed by detecting high levels of	8	include within your supplementary material mention the
9	histamine in the implicated food, meal remnants or	9	same sorts of symptoms broadly speaking?
10	a similar product obtained from the same source.	10	A. Yes.
11	I think you would add to that, would you, that if	11	Q. So the rash, the vomiting, diarrhoea in some cases,
12	you checked the patient, you would ordinarily expect to	12	a feeling of nausea and other matters
13	find high levels of histamine as well?	13	A. Yes.
14	A. And histamine metabolised, yes.	14	Q that are listed here?
15	Q. The metabolised because the body, as again we will	15	A. Yes.
16	come to on, rapidly metabolises histamine down into	16	Q. Histamine is the primary cause of those symptoms,
17	metabolites and then away through the excretion?	17	an abnormally high level of histamine?
18	A. Yes.	18	A. Yes.
19	Q. The common symptoms are listed in a table 2.1 on that	19	Q. Can I ask you just to explain your view as to the effect
20	same page, first cardiovascular, so flushing, a rash and	20	of high levels of histamine on the heart which is
21	urticaria, if I am pronouncing that correctly.	21	something that you talk about by reference to a paper by
22	A. Urticaria, yes.	22	Wolff and Levi, which is to be found under tab 26,
23	Q. That is a certain type of rash, isn't it?	23	please.
24	A. Yes, it is a slightly raised sort of fleshy boggy rash.	24	A. Well, I think, essentially, it can do all sorts of
25	Q. Sometimes called hives?	25	things to the heart. It often causes a tachycardia, the
	n		D 0
	Page 6		Page 8
			2 (Pages 5 to 8)

1	heart rate to go fast but part of that may be because of	1	rapid automatic depolarisation rate, so that will
2	the vasodilatation you get and the drop in blood	2	depolarise and trigger a heartbeat. Then it spreads
3	pressure, so you sometimes get a reflex tachycardia	3	through the atria and when it reaches the AV node it is
4	because your blood pressure is low your heart rate	4	transmitted through the atrioventricular node to the
5	speeds up. But histamine has direct effects on the	5	ventricles, because there is a fibrous band separating
6	heart, it can cause the atria to go fast, increase	6	the atria and the ventricles, so normally contraction
7	automatic rhythmicity of the heart of the atria or the	7	only gets to the ventricles via the AV node through
8	ventricle, so it can make them go fast but it also has	8	a small part. That has the function of stopping the
9	an effect on the AV node where it can slow conduction	9	ventricles going at 600 per minute if the atria go
10	through the AV node so that although the atria are going	10	haywire, which they do quite commonly in atrial
11	fast the ventricles are going slow, because the purpose	11	fibrillation which is a common rhythm disturbance which
12	of the AV node is to regulate the heart rate so that if	12	increases with age and at the age of 70 1 in 20 of us
13	the atria go berserk so to speak, as happens in atrial	13	have it, by the age of 80 1 in 10 of us have it.
14	fibrillation when they are depolarising all the time,	14	If you didn't have the AV node you would die
15	that doesn't get transmitted to the ventricles and the	15	a minute after you went into atrial fibrillation.
16	ventricles continue at a more life-sustaining rate.	16	Q. How is the fibrillation related to atrial flutter?
17	THE CORONER: AV standing for?	17	A. They are both fast rhythms. Atrial flutter can
18	A. Sorry, atrioventricular node.	18	deteriorate into atrial fibrillation but essentially the
19	MR SKELTON: It is probably helpful first to go back to what	19	rate in atrial flutter is about 300 per minute and it is
20	you just said and just to break it down into the various	20	a circuit, it is semi-organised in the sense that it is
21	concepts, but also as we are going along it would be	21	a circuit around the atria at about 300 per minute.
22	helpful for you to explain probably some of the basics	22	Atrial fibrillation is a disorganised rhythm, but if
23	of the cardiological terms you are talking about.	23	you wanted to know how fast it was, it would be about
24	A. Okay.	24	600 per minute, which of course is incompatible with
25	Q. Can I go back first of all because we looked at the WHO	25	life if that goes to the ventricles and you get
	Page 9	-	Page 11
1	report which said about hypotension and tachycardia, you	1	ventricular fibrillation, which of course you die from.
2	dealt with tachycardia, but the hypotension, would that	2	Q. Yes.
3	be a cardiac-related cause or is that a systemic	3	You were beginning to talk about the effect of
4	consequence of the histamine, through example through	4	histamine on the AV node, can I just take you to the bit
5	vasodilatation and so on?	5	of the paper that starts to talk about that and see if
6	A. Vasodilatation is a systemic affect. But it also can be	6	it is enlightening or you may feel that you would like
7	localised, and quite strange in a sense, so when I had	7	to explain it in your own words, given that I think the
8	scombrotoxin poisoning I was bright red from the head	8	paper is fairly abstruse for the layman.
9	down to my waist, but the rest of my body was the normal	9	Page 352, "Arrhythmogenic effects of histamine on
10	sort of pasty colour.	10	the AV node", is that broadly speaking what you are
11	Q. Healthy pasty?	11	talking about? There are other effects?
12	A. Yes, but it was not a sort of line it was a line of	12	A. Yes. Yes.
13	demarcation but irregularly round the body, it was quite	13	Q. Could you explain what that is.
14	bizarre but that vasodilatation drops your blood	14	A. Essentially what they are saying is that its effect on
15	pressure and the heart rate may respond to that.	15	the AV node is to slow conduction through the AV node so
16	Would it help if I explained the conduction normally	16	that you can although histamine can cause the heart
17	in the heart? In that, I mean, heart cells have they	17	to go fast by direct effects on the atria and on the
18	are joined to each other so that when one contracts, or	18	ventricles, it actually slows conduction through the AV
19	one depolarises, that causes it to contract but it also	19	node, so it tends to slow the ventricular rate.
20	passes on the depolarisation to the neighbouring heart	20	Unless you have a direct effect on the ventricles,
21	muscle cells, which then depolarise and then contract,	21	you may get slowing of the heart rate. What I am trying
22	so they transmit, but the rhythmicity of the heart	22	to say is that the effects of histamine will vary from
23	starts in a small part of the heart normally called the	23	time to time. In some people it may increase the heart
24	sinoatrial node which is, we like to think of, as the	24	rate, in others it may slow it right down and it is not
25	top right-hand corner of the heart, which has the most	25	really predictable.
	D 10		D 12

Page 10

Page 12

		_	
1	Q. This paper is effectively reviewing a lot of the	1	A. No, I was aware of those cases.
2	literature, isn't it?	2	Q. You were aware of those cases?
3	A. Yes.	3	A. I was aware of those cases, the two deaths in Bali and
4	Q. It is collating a vast amount of previously done	4	the two Australians. Yes, I was aware of it before
5	research into an analysis of the effect of histamine,	5	I read
	•	1	
6	broadly speaking, on cardiac function.	6	Q. The paper that you refer to which I think is by
7	A. That's right.	7	Borysiewicz, which is under tab 42, again deals with
8	Q. Do the underlying paper, if you are in any way familiar	8	this atrial flutter issue, scombrotoxic atrial flutter?
9	with them, actually explain that histamine can be fatal	9	A. Yes.
10	in terms of cardiac function? I hadn't appreciated that	10	Q. I think what you say in your report is it provides
11	being a conclusion from the paper itself, from this	11	a mechanism by which scombrotoxic poison may cause
12	paper?	12	a lethal cardiac arrhythmia?
13	A. Well, no. Well, I don't know if it actually says that	13	A. Yes.
14	but the I mean to a cardiologist, if you slow AV	14	Q. Again you are raising it as a theoretical possibility,
15	conduction, then it is clear that you can slow the heart	15	although in fact in that case the patient I don't think
16	rate right down and people can die. I mean when that	16	died, did he?
17	happens in life, in extreme circumstances, we call that	17	A. No, but he had the arrhythmia for four days.
18	heart block and that requires a pacemaker if you are	18	Q. They had found it and they monitored him and then he
19	going to survive.	19	recovered and was discharged?
20	Q. I understand that theoretically of course if you have	20	A. Yes. That's right.
21	a cardiac dysfunction, a dysfunction of the atria or the	21	Q. He could have died from it you are saying but he didn't?
22	ventricles, that can be fatal but I wondered from the	22	A. Yes, I mean people don't usually die of atrial flutter.
23	literature that you have seen, whether it has been	23	But there is the potential. The point I think I was
24	fatal?	24	trying to make in my report was that although it would
25	A. I don't know if anyone no, I don't know that I have	25	seem that the effect of histamine had worn off, because
	•		,
	Page 13		Page 15
1	seen that.	1	it doesn't usually, you know the reports say it doesn't
2	Q. No, I haven't seen it in the papers that you have given,	2	last for four days, the arrhythmia persisted and atrial
	Q. No, I haven't seen it in the papers that you have given, as far as I am aware but it may be that the underlying	2 3	last for four days, the arrhythmia persisted and atrial arrhythmias are self perpetuating, we often have to put
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2 3 4 5	Q. No, I haven't seen it in the papers that you have given, as far as I am aware but it may be that the underlying literature that feeds into those papers does demonstrate that. I don't know whether you can assist on that?	2 3 4 5	last for four days, the arrhythmia persisted and atrial arrhythmias are self perpetuating, we often have to put people to sleep and shock them out of the arrhythmia or give them a drug to get them out of it because it self perpetuates. Q. Are you clear that the ongoing cause of that flutter
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1	triggers the atrial fibrillation and even though the	1	increases in a normal manner to whatever is, you know,
2	alcohol level has gone down hours later or the next day,	2	the maximum they can achieve, perhaps 180, I don't know,
3	you stay in atrial fibrillation because atrial	3	but with flutter, you would get great sudden changes in
4	arrhythmias are self perpetuating.	4	heart rate variability you could imagine, and quite significant increases in the heart rate. Doubling
5	In fact well, perhaps I shouldn't say that	5	
6 7	someone else has given me another thing they plan to	7	instantly or Q. You raise that there is a possible interaction if food
8	adduce of another case of atrial tachycardia triggered by scombrotoxin.	8	poisoning did occur here
9	Q. Can I just be clear about your scientific degree of	9	A. Yes.
10	confidence when you make the conclusion	10	Q with exercise, which could be potentially fatal, but
11	A. Yes.	11	you don't raise that probability, do you, as
12	Q this is obviously a single paper about a single	12	I understand it?
13	patient and the authors of the paper say:	13	A. No, I am just trying to think of a mechanism that might
14	"In our patient the histamine like toxin may have	14	account for it, that is all.
15	induced atrial flutter which persisted after the other	15	Q. The papers that we have all seen indicated that
16	effects of the toxin had disappeared."	16	histamine testing is the primary means of clinical
17	A. Yes.	17	diagnosis in the patient. The history is obviously
18	Q. That "may" doesn't imply, certainly to my reading,	18	relevant but definitive diagnosis of what is actually
19	certainty but they are raising it as a possibility?	19	causing the symptoms is a histamine test of some kind.
20	A. That's right.	20	Can I just ask you about how that works. Histamine
21	Q. And it is no more than that?	21	is a rapidly metabolised product.
22	A. No, that's right.	22	A. Hmm?
23	Q. But	23	Q. Its half life there has been some discussion I know
24	A. Sorry, I would say, it is consistent with also the work	24	in your further letter about the half life of histamine.
25	that we know experimentally, if you see what I mean,	25	Is there a definitive recognition of the half life or
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	Page 17		Page 19
1	because in the other paper, the experimental paper, it	1	does one simply recognise it is short, a matter of
1 2	because in the other paper, the experimental paper, it produced those sort of arrhythmias, experimentally.	1 2	does one simply recognise it is short, a matter of minutes?
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1	Q. What was it for?	1	remember precisely, but about half an hour or an hour
2	A. N-methylhistamine and one of the other metabolites.	2	later I started to feel a bit dizzy and hot, in fact
3	Q. You are looking for the metabolites in order to infer	3	I went to the toilet then but just to pass water and
4	the histamine had been there?	4	I thought, you know, this isn't right so I went home.
5	A. Yes. Yes.	5	When I arrived home my wife said, "Look in the mirror,
6	The point about the metabolites is that they persist	6	you are all red" and I was red from my top to my waist
7	longer than the histamine itself. If you label	7	roughly and I thought, well, this some sort of
8	histamine with a radioactive isotope, you can find that	8	allergic reaction so I took an antihistamine and I sat
9	still in the body 24 hours later but it is presumably in	9	around for a bit and a bit later I went to bed so
10	the metabolite not the histamine.	10	I passed urine again, so that would be the meal at 8.00,
11	Q. Can I just look at where you discuss your own samples	11	symptoms around 9.00ish, these are approximate, midnight
12	which you submitted in a or at least you relied on in	12	I go to bed, I have had the antihistamine so I am
13	a paper in the BMJ.	13	already feeling somewhat better.
14	Is paper putting it a bit highly, it is more	14	
15	an article of	15	But next morning I thought this is a bit odd and I will collect urine so I collected my first urine
		16	•
16	A. It is what they call "a filler". It was I mean they	17	sample in a pot. The collection was from about midnight
17	just put little things in that are pithy really, but	18	to about 7.00 or 8.00 am wherever I got up, I can't
18	they are often yes.	19	remember precisely, so the urine I collected was for the
19	Q. Under tab 37 you will see your report entitled "Comment	20	period 4 hours to say 12 hours after eating the tuna and
20	on the email from Professor Egner". To be clear,	21	then it had in that sample so it wasn't immediately,
21 22	Professor Egner had made a comment about the possibility	22	I didn't start the urine sample until four hours after. Q. And then 36 hours?
23	of testing for it in Mr Perepilichnyy's body, given the	23	
23	half life of histamine. You are commenting on this very	24	A. Sorry. Q. Then 36 hours?
25	issue which is whether or not this testing can be meaningful and within what window?	25	A. Yes, I took another sample at 36 hours. You can see on
23	meaningful and within what window:	23	A. 105, 1 took another sample at 30 hours. Tou can see on
	Page 21		Page 23
			<u> </u>
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2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	A. Yes, I think one of the main points I tried to make was that half life, when you have injected the drug, has no relevance in a sense to what the concentrations that are present when you have taken the substance orally and it takes a long time to get in the body because, you know, if I gave you victim B12 now, you wouldn't absorb it for several hours because it is right at the bottom end of your gut that you absorb that, so, you know, it — if it takes hours to get in and you know histamine, I don't know how long it takes to get in but clearly the symptoms go on for hours, so it cannot be like an IV injection where you get a peak and then it is gone in a few minutes, because the symptoms are going on for hours. In fact they don't start immediately, you know, 30 minutes, two hours before the onset, so there is obviously an uptake curve as well as the disappearance curve so they are superimposed, a curve of uptake and	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	those that my N-methylhistamine level was over 5,000. Q. That, to be clear, is a metabolite of histamine? A. Yes, that is the main metabolite of histamine. Q. You tested that and the initial results were? A. 5,167. Q. Grossly abnormal? A. Yes, and the normal is up to 150. Q. Yes. That is within the 4 to 12 hours and after 36 hours it is down within? A. Within the normal range. Q. Normal 107, the normal range being 0 to 150? A. Yes. Of the other metabolite which is produced by a different enzyme, I think monoamine oxidase produces this other variant, you can see that was also raised more than ten fold. Q. The normal range being 0.9 to 1.9. The abnormal result in your first sample being 24.3?
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	A. Yes, I think one of the main points I tried to make was that half life, when you have injected the drug, has no relevance in a sense to what the concentrations that are present when you have taken the substance orally and it takes a long time to get in the body because, you know, if I gave you victim B12 now, you wouldn't absorb it for several hours because it is right at the bottom end of your gut that you absorb that, so, you know, it — if it takes hours to get in and you know histamine, I don't know how long it takes to get in but clearly the symptoms go on for hours, so it cannot be like an IV injection where you get a peak and then it is gone in a few minutes, because the symptoms are going on for hours. In fact they don't start immediately, you know, 30 minutes, two hours before the onset, so there is obviously an uptake curve as well as the disappearance curve so they are superimposed, a curve of uptake and a curve of disappearance.	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	those that my N-methylhistamine level was over 5,000. Q. That, to be clear, is a metabolite of histamine? A. Yes, that is the main metabolite of histamine. Q. You tested that and the initial results were? A. 5,167. Q. Grossly abnormal? A. Yes, and the normal is up to 150. Q. Yes. That is within the 4 to 12 hours and after 36 hours it is down within? A. Within the normal range. Q. Normal 107, the normal range being 0 to 150? A. Yes. Of the other metabolite which is produced by a different enzyme, I think monoamine oxidase produces this other variant, you can see that was also raised more than ten fold. Q. The normal range being 0.9 to 1.9. The abnormal result in your first sample being 24.3? A. Yes.
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	A. Yes, I think one of the main points I tried to make was that half life, when you have injected the drug, has no relevance in a sense to what the concentrations that are present when you have taken the substance orally and it takes a long time to get in the body because, you know, if I gave you victim B12 now, you wouldn't absorb it for several hours because it is right at the bottom end of your gut that you absorb that, so, you know, it — if it takes hours to get in and you know histamine, I don't know how long it takes to get in but clearly the symptoms go on for hours, so it cannot be like an IV injection where you get a peak and then it is gone in a few minutes, because the symptoms are going on for hours. In fact they don't start immediately, you know, 30 minutes, two hours before the onset, so there is obviously an uptake curve as well as the disappearance curve so they are superimposed, a curve of uptake and a curve of disappearance. Q. Looking at your own curve of disappearance on page 538,	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	those that my N-methylhistamine level was over 5,000. Q. That, to be clear, is a metabolite of histamine? A. Yes, that is the main metabolite of histamine. Q. You tested that and the initial results were? A. 5,167. Q. Grossly abnormal? A. Yes, and the normal is up to 150. Q. Yes. That is within the 4 to 12 hours and after 36 hours it is down within? A. Within the normal range. Q. Normal 107, the normal range being 0 to 150? A. Yes. Of the other metabolite which is produced by a different enzyme, I think monoamine oxidase produces this other variant, you can see that was also raised more than ten fold. Q. The normal range being 0.9 to 1.9. The abnormal result in your first sample being 24.3? A. Yes. Q. Then the second sample being just above
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	A. Yes, I think one of the main points I tried to make was that half life, when you have injected the drug, has no relevance in a sense to what the concentrations that are present when you have taken the substance orally and it takes a long time to get in the body because, you know, if I gave you victim B12 now, you wouldn't absorb it for several hours because it is right at the bottom end of your gut that you absorb that, so, you know, it — if it takes hours to get in and you know histamine, I don't know how long it takes to get in but clearly the symptoms go on for hours, so it cannot be like an IV injection where you get a peak and then it is gone in a few minutes, because the symptoms are going on for hours. In fact they don't start immediately, you know, 30 minutes, two hours before the onset, so there is obviously an uptake curve as well as the disappearance curve so they are superimposed, a curve of uptake and a curve of disappearance. Q. Looking at your own curve of disappearance on page 538, can you just explain the results there. First of all,	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	those that my N-methylhistamine level was over 5,000. Q. That, to be clear, is a metabolite of histamine? A. Yes, that is the main metabolite of histamine. Q. You tested that and the initial results were? A. 5,167. Q. Grossly abnormal? A. Yes, and the normal is up to 150. Q. Yes. That is within the 4 to 12 hours and after 36 hours it is down within? A. Within the normal range. Q. Normal 107, the normal range being 0 to 150? A. Yes. Of the other metabolite which is produced by a different enzyme, I think monoamine oxidase produces this other variant, you can see that was also raised more than ten fold. Q. The normal range being 0.9 to 1.9. The abnormal result in your first sample being 24.3? A. Yes. Q. Then the second sample being just above A. Normal range, 2.5.
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	A. Yes, I think one of the main points I tried to make was that half life, when you have injected the drug, has no relevance in a sense to what the concentrations that are present when you have taken the substance orally and it takes a long time to get in the body because, you know, if I gave you victim B12 now, you wouldn't absorb it for several hours because it is right at the bottom end of your gut that you absorb that, so, you know, it — if it takes hours to get in and you know histamine, I don't know how long it takes to get in but clearly the symptoms go on for hours, so it cannot be like an IV injection where you get a peak and then it is gone in a few minutes, because the symptoms are going on for hours. In fact they don't start immediately, you know, 30 minutes, two hours before the onset, so there is obviously an uptake curve as well as the disappearance curve so they are superimposed, a curve of uptake and a curve of disappearance. Q. Looking at your own curve of disappearance on page 538, can you just explain the results there. First of all, the timing of the tests that you conducted on yourself	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	those that my N-methylhistamine level was over 5,000. Q. That, to be clear, is a metabolite of histamine? A. Yes, that is the main metabolite of histamine. Q. You tested that and the initial results were? A. 5,167. Q. Grossly abnormal? A. Yes, and the normal is up to 150. Q. Yes. That is within the 4 to 12 hours and after 36 hours it is down within? A. Within the normal range. Q. Normal 107, the normal range being 0 to 150? A. Yes. Of the other metabolite which is produced by a different enzyme, I think monoamine oxidase produces this other variant, you can see that was also raised more than ten fold. Q. The normal range being 0.9 to 1.9. The abnormal result in your first sample being 24.3? A. Yes. Q. Then the second sample being just above A. Normal range, 2.5. Q. Yes, so there had been actually a rather rapid change
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	A. Yes, I think one of the main points I tried to make was that half life, when you have injected the drug, has no relevance in a sense to what the concentrations that are present when you have taken the substance orally and it takes a long time to get in the body because, you know, if I gave you victim B12 now, you wouldn't absorb it for several hours because it is right at the bottom end of your gut that you absorb that, so, you know, it — if it takes hours to get in and you know histamine, I don't know how long it takes to get in but clearly the symptoms go on for hours, so it cannot be like an IV injection where you get a peak and then it is gone in a few minutes, because the symptoms are going on for hours. In fact they don't start immediately, you know, 30 minutes, two hours before the onset, so there is obviously an uptake curve as well as the disappearance curve so they are superimposed, a curve of uptake and a curve of disappearance. Q. Looking at your own curve of disappearance on page 538, can you just explain the results there. First of all,	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	those that my N-methylhistamine level was over 5,000. Q. That, to be clear, is a metabolite of histamine? A. Yes, that is the main metabolite of histamine. Q. You tested that and the initial results were? A. 5,167. Q. Grossly abnormal? A. Yes, and the normal is up to 150. Q. Yes. That is within the 4 to 12 hours and after 36 hours it is down within? A. Within the normal range. Q. Normal 107, the normal range being 0 to 150? A. Yes. Of the other metabolite which is produced by a different enzyme, I think monoamine oxidase produces this other variant, you can see that was also raised more than ten fold. Q. The normal range being 0.9 to 1.9. The abnormal result in your first sample being 24.3? A. Yes. Q. Then the second sample being just above A. Normal range, 2.5.

6 (Pages 21 to 24)

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steak, with I can't remember, salad and, I can't

Page 22

25

25

A. Yes.

1	Q. In both cases of the metabolites?	1	Q. Yes.
2	A. Absolutely.	2	A they you will see the first voiding, so that is
3	Q. They were close to normal one was normal and the	3	the first sample of urine after people, I presume,
4	second one was close to normal after 36 hours?	4	arrived at hospital. Their first urine sample had
5	A. Yes.	5	grossly elevated levels of both N-methylhistamine and
6	But I also supplied some other papers in the	6	histamine, but the next samples are not at 24 hours,
7	a paper in the New England Journal.	7	I think that is important to point out, they are 24-hour
8	Q. Yes, there is a paper that I would like to you look at	8	collections started after that first voiding.
9	because it may deal with the same subject but it may be	9	Q. Yes.
10	that you need to explain it, if you would. That is the	10	A. So they are the collection of urine from the first
11	Morrow paper under tab 38, because that has some	11	voiding for the next
12	tabulated results in.	12	Q. Periodic testing over each 24 hours for
13	A. Yes.	13	A. No, they collect the whole urine for 24 hours, I think
14	Q. It explains in the abstract that the highest morbidity	14	that is what they did, they preserved the whole urine so
15	world wide from fish poisoning results from the	15	it is the average of what was in the urine over
16	ingestion from the ingestion of spoiled scombroid fish,	16	24 hours, because they collected every drop of urine for
17	such as tuna and mackerel and its cause is not clear.	17	24 hours.
18	The purpose of this paper well it speculates:	18	You would expect, had you collected them say at
19	"Histamine could be responsible because spoiled	19	hourly intervals, you would find a high level which
20	scombroid fish contained large quantities of histamine,	20	would gradually decrease, I anticipate, over that
21	whether histamine is the causative toxin however has	21	period, although that may not entirely be true, because
22	remained in question. To address this issue we	22	the first samples may actually be before the peak levels
23	investigated whether histamine homeostasis is altered in	23	had arisen because you are still absorbing histamine
24	poisoned people."	24	from your gut.
25	The methods by which they did that were that the	25	So you may in the first couple of hours get it rise
	Page 25		Page 27
1	i	1	a hit and then fell heat this is an earletism heat I mean
1	urinary excretion of histamine and its metabolite	1	a bit and then fall, but this is speculation but I mean
2	N-methylhistamine was measured in three persons who had	2	I would expect that is what has happened. It isn't at
2 3	N-methylhistamine was measured in three persons who had scombroid fish poisoning after the ingestion of marlin.	2 3	I would expect that is what has happened. It isn't at 24 hours, it is the whole urine.
2 3 4	N-methylhistamine was measured in three persons who had scombroid fish poisoning after the ingestion of marlin. That is what they are testing.	2 3 4	I would expect that is what has happened. It isn't at 24 hours, it is the whole urine. Q. The collection over the 24-hour period averaged in terms
2 3 4 5	N-methylhistamine was measured in three persons who had scombroid fish poisoning after the ingestion of marlin. That is what they are testing. Just on page 544, there may be other aspects of this	2 3 4 5	I would expect that is what has happened. It isn't at 24 hours, it is the whole urine. Q. The collection over the 24-hour period averaged in terms of its results?
2 3 4 5 6	N-methylhistamine was measured in three persons who had scombroid fish poisoning after the ingestion of marlin. That is what they are testing. Just on page 544, there may be other aspects of this paper you feel are pertinent but I wanted to ask you	2 3 4 5 6	I would expect that is what has happened. It isn't at 24 hours, it is the whole urine. Q. The collection over the 24-hour period averaged in terms of its results? A. Yes.
2 3 4 5 6 7	N-methylhistamine was measured in three persons who had scombroid fish poisoning after the ingestion of marlin. That is what they are testing. Just on page 544, there may be other aspects of this paper you feel are pertinent but I wanted to ask you about the tabulated results they are in graph form in	2 3 4 5 6 7	I would expect that is what has happened. It isn't at 24 hours, it is the whole urine. Q. The collection over the 24-hour period averaged in terms of its results? A. Yes. Q. In terms of allowing us to understand the window within
2 3 4 5 6 7 8	N-methylhistamine was measured in three persons who had scombroid fish poisoning after the ingestion of marlin. That is what they are testing. Just on page 544, there may be other aspects of this paper you feel are pertinent but I wanted to ask you about the tabulated results they are in graph form in fact within those tables.	2 3 4 5 6 7 8	I would expect that is what has happened. It isn't at 24 hours, it is the whole urine. Q. The collection over the 24-hour period averaged in terms of its results? A. Yes. Q. In terms of allowing us to understand the window within which one is likely to find an abnormal result, does
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2 express a view about whether or not, if 3 Mr Pereptilichnyy's urine had been tested for histamine 4 or metabolites four days after he died, which is when it 5 was collected, it would have been abnormal? 5 A. Welt, if the urine is in the bladder, it wasn't – no, 7 I think the answer is I can't but I would say that if 8 feet me is in the hladder, he hasaft been producing it 9 four days after, you know, three days after he died, he 10 stopped producing urine when he died. 10 A they point of death, bys. 11 Q. At they point of death, bys. 12 A. What was in the bladder was what was there at the time, 13 what he had exerted at the time of death, but— 14 Q. Are you able—sonry, carry on. 15 A. But I was going to say, whether other factors would 16 affect that, whether bacterial action would affect that, 17 I cannot say. When I suggested it was tested, I just 18 thought that maybe it frew was a phenomenally high 19 kevel if may give you some indication but I don't know, 20 I mean other people would have dropped to normal by 18 hours in 21 his case anyway. 22 Q. It could have done. So an abnormal result may not 23 necessarily have ruled out the possibility that he had 24 death? 25 auffered if, even if it had been tested at the time of 26 death? 26 death? 27 death of the day of the factor will be a the could have changed the results in a way you cannot 11 say? 18 though the could have deap wash of the importance of time, 19 the country of the sample is taken four days 29 after each when the body is afrandy starting to go 20 the country of the could have changed the results in a way you cannot 21 death? 22 death? 23 A. Either way it may not have. 34 Q. Can I ask you in that context, I think you mean the 35 far as a far as she can recall. 36 the country of the country of the could have changed the results in a way you cannot 29 death? 20 La No, I can't say. It would depend on whether there was 30 his case anyway. 31 the country of the				
Me Perepilichays)s urine had been tested for histamine or metabolities four days after he died, which is when it so we collected, it would have been admarma? A. Well, if the urine is in the bladder, it wasn't = no, I think the answer is 1 can't but I would say that if the urine is in the bladder, it wasn't been producing it four days after, when the held deer, he haven't been producing it four days after, when when he died, he stopped producing urine when he died, he stopped producing urine when he died, he control is stopped producing urine when he died, he control is death. A. But I was going to say, whether other factors would affect that, whether bacteria action would affect that, I cannot say. When I suggested it was tested, I just thought that maybe if there was a phenomenally high level it may give you some indication but I don't know, I mean other people would have to provide an answer. I mean other people would have to provide an answer. I mean other people would have to provide an answer. I may be vent if he had scombroid poisoning, then the level would have dropped to normal by 18 hours in his case anyway. Q. It may be vent if he had scombroid poisoning, then the level would have dropped to normal by 18 hours in his case anyway. A. Either way it may not have. Dage 29 I may be vent for he dade, he so when he died, he so was that he may have eaten some kind of the was the provide an answer. I doubt it? A. Either way it may not have. Dage 29 I suffered it, even if it had been tested at the time of death? A. Either way it may not have. The vent of the context, I hink you mentioned when you said bacterial action would be affect, it was that the time of death? A. Fitch was a substitute to the possibility has be had been seed at the time of death? A. Fitch was a substitute to the possibility has be had been tested at the time of death? A. Fitch was a substitute to the possibility has been the say of the sample is taken four days after was the producing the producing the producing the purch	1	In light of that answer, I presume you are unable to	1	storage?
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25 point they cannot be tested after a certain period of 25 course he went on a run.	25	point they cannot be tested after a certain period of	25	course he went on a run.
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1	That is a short summary of the factual evidence.	1	much later.
2	Some of it may be more complicated and you are familiar	2	Q. You don't need the panoply of symptoms to draw
3	with the evidence on the day of his death from lots of	3	an inference that the diagnosis is made out? As the WHO
4	different people but broadly speaking that is a summary	4	report made clear, one or more of the symptoms can be
5	of the evidence focusing on her testimony yesterday.	5	consistent with the diagnosis?
6	In terms of the possibility of food poisoning, it is	6	A. Yes, I mean and the other thing is the redness which she
7	fair to say that complaining of food tasting bad,	7	describes.
8	sending food back and then vomiting would ordinarily	8	Q. Yes, although retching into a toilet bowl for an hour
9	lead to an inference, fairly powerful inference, that	9	presumably can lead to a degree of redness of the face
10	food poisoning had occurred?	10	and possibly red eyes as well, can't it?
11	A. Yes. Possibly, yes. That is right.	11	A. I think in some of the reports she described redness,
12	I mean often with food poisoning the food doesn't	12	the upper part of the body I think.
13	taste bad, of course. You know, most people who get	13	Q. She did, I think it is fair to say, I will be corrected,
14	most types of food poisoning don't think the food tastes	14	that she didn't describe that in any detail in her
15	bad, they just eat it but the thing about scombroid	15	evidence yesterday, she was careful in fact to pull back
16	poisoning is people commonly think the food is bad and	16	from giving a description about the body. But she
17	they specifically complain that it either tastes peppery	17	certainly said he was red in the face and certainly some
18	or metallic.	18	redness to his eyes?
19	When I had it I thought there was a lot of pepper on	19	A. I suppose it depends how long it lasted, is the other
20	it but I ate it because I quite like pepper. Someone	20	thing. If you vomit of course you can be red in the
21	with me in my party also had it and thought it was too	21	face but I wouldn't expect that to last for necessarily
22	peppery and didn't eat it and didn't get the same	22	for very long, whereas if it was scombroid poisoning, it
23	severity of symptoms as me, so we both thought it was	23	might last, you know, for hours or longer.
24	the only other person in the party who had tuna and it	24	Q. She said he looked well the next day?
25	was a departmental meal, so the other person who had the	25	A. Yes, but that is eight hours later or something.
	Page 33		Page 35
		1	
1	tuna also felt it tasted peppery but many times people	1	Q. Yes.
1 2	tuna also felt it tasted peppery but many times people get food poisoning they don't complain that it tastes	1 2	•
	get food poisoning they don't complain that it tastes		But he didn't complain of some of the other signs
2	get food poisoning they don't complain that it tastes of other types of food poisoning, they don't complain	2	But he didn't complain of some of the other signs and symptoms which I took you to earlier which was for
2 3	get food poisoning they don't complain that it tastes of other types of food poisoning, they don't complain that the food tastes bad.	2 3	But he didn't complain of some of the other signs and symptoms which I took you to earlier which was for example diarrhoea, although he may have had that but she
2 3 4	get food poisoning they don't complain that it tastes of other types of food poisoning, they don't complain that the food tastes bad. Q. You are not qualified to give a view about the	2 3 4	But he didn't complain of some of the other signs and symptoms which I took you to earlier which was for
2 3 4 5	get food poisoning they don't complain that it tastes of other types of food poisoning, they don't complain that the food tastes bad.	2 3 4 5	But he didn't complain of some of the other signs and symptoms which I took you to earlier which was for example diarrhoea, although he may have had that but she certainly wasn't aware of that as a possibility,
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1	no, no, you know most of the bacterial forms of	1	Q. If one posits that he did have it, did have that
2	gastroenteritis. I am not saying it couldn't have been	2	poisoning, are you able to say whether it is more than
3	a meal earlier but I don't think it is a meal 30 minutes	3	possible, ie probable, that that caused his death?
4	before that gives you staphylococcal vomiting and, yes.	4	A. No, I can't say that.
5	Q. I mean in fact he could have had food poisoning that had	5	Q. Are you able to say that it is likely that it made
6	a delayed reaction, as many other poisonous bacterial	6	a contribution to his death in any form?
7	A. Yes, but I think it unlikely, I mean he could have had	7	A. Well, if one accepted that he had scombroid fish
8	salmonella from a meal the day before, but then he	8	poisoning that night, then it becomes a real you know
9	wouldn't have been well the next day.	9	if someone dies the next day, after having a condition
10	Q. He wouldn't have resolved as rapidly as he did?	10	18 hours earlier which can occasionally be fatal, then
11	A. No.	11	I think if you cannot find any other reason I think that
12	Q. That tends towards the scombroid diagnosis from your	12	becomes the number one suspect so to speak. Unless you
13	perspective, does it?	13	can find some other reason.
14	A. Yes.	14	You know, it become as bit tenuous to say you have
15	Q. The rapid resolution?	15	two illnesses, one of which might be fatal, and then you
16	A. Yes, because most of these other things would make you	16	are trying to find something else that actually caused
17	very unwell, E. coli or a viral gastroenteritis, they	17	death 18 hours later.
18	would make you very unwell and you wouldn't be very well	18	Q. There is a danger again there that you are not just
19	and attempting to go jogging the next day with most of	19	straying outside of medical territory but into forensic
20	them, I imagine.	20	territory?
21	Q. Is it fair to say that you conclude it is probable that	21	A. Yes, absolutely.
22	he suffered food poisoning or are you simply raising it	22	Q. Or indeed when you referred to Occam's razor in your
23	as a possibility?	23	original supplementary report, which I think is almost
24	A. I am just raising it as a possibility. You know, other	24	a metaphysical dictum that one looks for the simplest
25	people can comment on.	25	explanation as most likely in circumstances where the
	Page 37		Page 39
1	It is just when I read the description from the	1	more compley evaluations are inherently less probable?
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1	unknown, isn't there, it seems to me.	1	somebody deliberately setting out to poison somebody or
2	Q. Likewise the diners having symptoms themselves would not	2	something, but incidental or natural food poisoning, can
3	necessarily explain or make it inherently likely that he	3	you simply eat something, other possibilities we heard
4	died of scombroid poisoning?	4	as to what he was eating, it was maybe something
5	A. No, no, that is true.	5	vegetable or prawns or something. To use the
6	Q. They might go to the fact of him having this poisoning	6	vernacular, people talk about something disagreeing with
7	but not the death?	7	them, is there another category of food poisoning which
8	A. Absolutely.	8	for whatever reason disagrees with you, an hour later
9	Q. Can I just recap in terms of where you are in your	9	you might be sick and then before long you are
10	conclusions?	10	A. Yes, I mean you can eat something that is a sort of
11	A. Yes.	11	chemical irritant to your stomach and I guess the
12	Q. If he ate fish that night, which is a question of fact,	12	commonest example is alcohol. People often drink
13	not for you, you think it is likely that he appears to	13	alcohol, get a bit of indigestion and are sick, aren't
14	have suffered some form of food poisoning of the	14	they, that sort of thing.
15	scombroid variety?	15	Yes, you could have a sort of chemical irritant of
16	A. Yes.	16	the stomach I guess and get over that.
17	Q. It is possible, but you cannot say it is probable, that	17	Q. Could that be caused, if for example, I mean there is
18	that had an effect afterwards which contributed towards	18	something the matter with the prawns or the vegetable,
19	his death?	19	if they are just off or not clean or
20	A. Yes. It is possible.	20	A. Well, usually if prawns are off, you get, you know,
21	Q. Possible, but you cannot say probable?	21	an infection, which would persist I think, and you would
22	A. No, no. No, no. No, that is right.	22	probably get diarrhoea as well as vomiting I guess and
23	Q. That applies not simply to as it were the binary	23	it may be still there the next day, I would have
24	question of whether or not it was the cause of his death	24	thought.
25	but also to whether or not it was contributive or	25	THE CORONER: Anyway, irritant of some kind?
	Page 41		Page 43
1	acutailinitami ta hia daatha	1	A I
1	contributory to his death?	1	A. I guess so, yes.
2	A X7	١ ،	
2	A. Yes.	2	THE CORONER: Yes.
3	Q. In other words, one of a number of factors, it is	3	THE CORONER: Yes. Questions from MR MOXON BROWNE
3 4	Q. In other words, one of a number of factors, it is possible it was one of a number of factors but not	3 4	THE CORONER: Yes. Questions from MR MOXON BROWNE MR MOXON BROWNE: Dr Wilmshurst, you may remember
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3 4 5 6	Q. In other words, one of a number of factors, it is possible it was one of a number of factors but not probable?A. Hmm, yes.	3 4 5 6	THE CORONER: Yes. Questions from MR MOXON BROWNE MR MOXON BROWNE: Dr Wilmshurst, you may remember I represent one of Mr Perepilichnyy's life insurers in this case.
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1	Q. Those, I am suggesting, are the three.	1	I pointed out, because there are cases that I know of,
2	You didn't attend Ms Medynska's evidence yesterday,	2	because I looked up on the internet, the two cases in
3	I don't think?	3	Bali, so a mother and daughter who died. I think it is
4	A. No, but I was sent the transcripts.	4	sometimes fatal.
5	Q. You had a look at that, yes?	5	Q. I appreciate that.
6	A. Yes.	6	A. I think the other point they make is that people often
7	Q. Good.	7	confuse scombroid fish poisoning with allergic
8	Just on a point of detail, I recall that Ms Medynska	8	reactions, which can be fatal.
9	told us that Mr Perepilichnyy, when he came out of the	9	Q. That is what happened to the ladies in Bali, didn't it,
10	bathroom having been sick, was wearing a dressing gown	10	they had an allergic reaction, they didn't die from
11	which concealed his chest?	11	a cardiac arrhythmia, did they?
12	A. Right.	12	A. I don't know. When you say allergic reaction, scombroid
13	Q. I recall that she didn't readily find the English word	13	fish poisoning is not an allergic reaction.
14	for dressing gown and that the translator had to help	14	Q. No, I know.
15	her, I remember that.	15	A. Yes.
16	A. Right.	16	Q. We will look at the report of how they came to die in
17	Q. I think the oral evidence in this case, at least, would	17	a minute.
18	indicate that she didn't see his chest. Just bear that	18	A. Yes.
19	in mind.	19	Q. The paper goes on to give support for the proposition
20	One of the papers that you refer to in your report	20	that people rarely if ever die from scombrotoxin fish
21	is this very long, I think it is called a final report	21	poisoning. Did you look at that material in order to
22	from the World Health Organisation, that you have	22	find out what the quality of the evidence was?
23	already been taken to.	23	A. No, I didn't look at all the evidence, no.
24	A. Yes.	24	Q. You have said in your report that scombrotoxic fish
25	Q. I want to pick it up on page 14, internal pagination, it	25	poisoning can be fatal and indeed you also specifically
	Page 45		Page 47
	rage 43		Page 47
1	is at page 380 I think in bundle 3.	1	say that it can cause lethal, which I think means the
2	A. Yes.	2	same as fatal, cardiac arrhythmias. Your expressed view
3	Q. Sorry, in bundle 1.	3	in your report was perhaps a little bit inconsistent
4	A. Yes.	4	with what is said here, that it is rarely if ever fatal.
5	Q. You have already been taken by Mr Skelton to a passage	5	I would have thought that given that inconsistency,
6	at the foot of page 380 about symptoms, which I think	6	that you might have wanted to look at the background
7	you rehearse in your report, in the particular context	7	evidence, see if you were right or not?
8	that the symptoms although usually having a duration of	8	A. Yes, I think
9	no more than 8 to 12 hours do sometimes persist for	9	I don't actually I am trying to think of
10	longer. That was the point you were drawing from the	10	an example but the fact that not many people win the
11	material you quoted?	11	National Lottery, you know, if you have someone win the
12	A. Yes, I mean I was just quoting what they said, yes.	12	National Lottery, the fact that any one individual has
13	Q. Yes.	13	a very low chance of winning the National Lottery,
14	Then over the page it goes on:	14	doesn't mean that no one will win the National Lottery,
15	"There are no known long term sequelae, SFP [which	15	if you see what I mean.
16	is of course scombrotoxin fish poisoning] is considered	16	If there are people who have died from it, then
17	to be rarely if ever fatal."	17	there are people who have died from it. If you are
18	Then it gives the data that supports that	18	thinking that maybe someone died from it, then the
19	contention.	19	question about it being rare doesn't apply in that
20	A. Hmm.	20	instance, if you see what I mean.
21	Q. You did quote from the immediately preceding material	21	Q. Have you since writing your report, had an opportunity
22	under that paragraph but you didn't actually quote that	22	to consider that data, both from America and Japan
23	observation, but I assume that you did read it?	23	A. Sorry?
24	A. Yes. But I also knew that yes. Well, it is rarely	24	Q. Have you had an opportunity to consider the data that is
25	fatal but it isn't entirely it is not never fatal, as	25	referred to, page 381, at the top, that is to say the
	D 44		D 40
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1	data from the Centre for Disease Control in relation to	1	Q. If you look, please, at page 271, we will see this is
2	America and the data from Japan, the Japanese Ministry	2	a similar report which in fact covers the period 1998 to
3	of Health, have you had an opportunity to look at those	3	2002, so it is the next four-year period. We will see
4	papers?	4	the data at page 281. Again, it is more or less exactly
5	A. No, I haven't.	5	in the middle of the page this time. Scombrotoxin, 118
6	Q. Sorry about that, because I did make some effort to make	6	outbreaks, 463 cases, fatalities 0. We haven't come
7	that available for you but you didn't look at it?	7	across a fatality yet?
8	A. Sorry, I haven't been sent it.	8	A. No, no.
9	Q. You haven't been? I'm sorry that	9	Q. As far as that particular series of data goes, that runs
10	A. I mean yes, sorry, is that the thing you sent me this	10	out at that point, so we have got to 2002, we will come
11	morning?	11	back to that. While we are in the bundle, can we just
12	Q. No.	12	look at the situation in Japan, that is at page 321.
13	A. When I came in at 9.30 someone gave me a document.	13	Japan is of course I think we may agree at least
14	Q. No, I am not referring to that.	14	anecdotally a country where a great deal of fish is
15	A. That is the only document I have seen.	15	eaten?
16	Q. I am sorry about that.	16	A. Yes.
17	Can we just have a quick look at some of the	17	Q. The abstract from an article by Toga Yamamota and others
18	material, can I take to you bundle 3. Perhaps we can	18	says this:
19	pick it up at page 239.	19	"Histamine food poisonings are allergy like food
20	This is a paper which is referred to in the paper	20	poisonings caused by the ingestion of spoiled fish,
21	that you exhibited to your report showing some of the	21	containing markedly elevated histamine levels. We
22	statistics from the American experience of scombrotoxin	22	examined histamine food poisonings in Japan from 1998 to
23	poisoning. It is put out by people who are called	23	2008 [so that is a 10-year period] in average 8 food
24	I think it is CDC, Centre for	24	poisonings and 150 cases were reported annually and
25	A. Disease Control.	25	there was no fatality."
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1	Q Disease Control, and I think MMWR stands for	1	As far as the data goes, and going at least over
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1 "Cases of histamine fish poisoning are still vastly 2 underreported due to misdiagnosis and inherent barriers 3 more recently between 2009 and 2012" 4 We are coming up now into the more recent past: 5 " 40 outbreaks involving 136 people in 6 California, Hawaii and New York. Of note, there has 7 never been a death due to histamine fish poisoning 8 reported in the USA." 9 That is a generalised remark but you have no reason 10 to doubt that, have you? 11 A. No. 12 Q. Then it goes on to deal with the worldwide experience: 13 "Outside the US histamine fish poisoning is most 14 frequently reported in Japan and the UK. In fact the 15 largest outbreak ever recorded involving 2,656 people 16 was recorded in Japan and then cases have been 17 documented in Australia, Bermuda, Canada, China, 18 Czech Republic" 19 I am still only at C, there must be at least a dozen 20 if not 20 different countries and it says: 21 " only one death has been noted worldwide." 22 That is the broad summary of the position, actually 23 as far as the data goes, people don't die as a result of 2 Casea lethal or potentially lethal causes lethal or potentially lethal cause lethal or potentially lethal causes of the A. Okay. A. Okay. A. Okay. A. Ves. Q. Which is an instance or an event widely experience: 10 A. It was unique in that two of ther unique if someone else has died p 11 In has been lots and lots written about lethat tw	the two ladies from which has been very ss. I would nique event. There it. In died. It cannot be reviously technically, to something that is oner findings of at page 322. you haven't had re?
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23 as far as the data goes, people don't die as a result of 23 A. No, no.	
24 scombroid fish poisoning. 24 Q. That is not something which I am	going to put my hands
25 A. Mostly. I mean only one death, so you cannot say they 25 up to, because I did try.	
Page 53 Page 55	
1 doubt die Theo die neuele Leners van earld au	41
don't die. They die rarely I guess, you could say. 1 This is not in fact an Inquest, be	
2 Q. Hmm. 2 jurisdictional problems, as I under 3 If we, with that in mind, can go back to your 3 deaths occurred in Bali	stand it, because the
3 If we, with that in mind, can go back to your 3 deaths occurred in Bali 4 report, which is at page 347 arrive it, of bundle 1. 4 A. Yes.	
5 You say on the last paragraph on the second page: 5 Q but as I understand it it was the	navt bast thing it
6 "Scombrotoxin poisoning can be fatal and can cause 6 was an investigation by a coroner	•
7 lethal cardiac arrhythmias." 7 deaths of people called Bischoff at	
8 You have made the point that "can be fatal" is 8 Mrs Bischoff and her daughter Ms	
9 pretty accurate, because apparently there has been one 9 investigation was apparently held	
10 case worldwide in the last 20 years or so, but how about 10 relates the story of these two ladies	
11 "can cause lethal cardiac arrhythmias", what is the data 11 a fish supper in December 2013 ar	
for that proposition? 12 for that proposition? 12 from which both, sadly, died.	id developed symptoms
A. Well the paper by Wolff and Levi showed arrhythmias that 13 The first point you will have no	ted is that both
are potentially lethal. 14 ladies suffered from asthma, didn'	
15 Q. Yes, but scombrotoxin poisoning is not considered at all 15 right, isn't it?	, mey: 1 mat 15
16 in the paper? 16 A. Hang on, no if you say so, I v	vill just look. They
17 A. Oh, no, sorry, okay. Yes. Sorry, I beg your pardon. 17 had a history of asthma did they	
18 Okay, histamine poisoning can cause arrhythmias that 18 Q. Yes.	
19 are lethal. 19 If we look on page 325 there	is no internal
20 Q. Yes, I don't think there is any doubt about that, it is pagination, but if we look at page 325 didn't be a pagination and the same and the sam	
21 a question of whether people who suffer scombrotoxin 21 up, I think at the third paragraph,	=
fish poisoning can develop cardiac arrhythmias, you 22 examination of the lungs showed r	-
23 state as a fact that they can but there doesn't seem to 23 changes of asthma and examination	
be any evidence for that at all? 24 be any evidence for that at all? 24 aerodigestive tract showed change	
25 A. No, I take your point. I should have said: 25 an acute anaphylactic reaction".	
Page 54 Page 56	

1	An anaphylactic reaction is an allergic reaction to	1	death, is there?
2	histamine, isn't it, it is not a result of histamine	2	If there is, point it out to me.
3	poisoning in the sense that we have been using that word	3	A. No, but how would anyone know, in the sense that
4	here?	4	unless the first lady, as I recall, had CPR, she went
5	A. Well, histamine an anaphylactic reaction is not	5	into a cardiac arrest, so that is a cardiac arrhythmia.
6	histamine is part of the anaphylactic reaction, so	6	Q. If the heart stops that, is certainly an arrhythmia,
7	an allergic reaction is anaphylaxis is an allergic	7	yes.
8	reaction, of which histamine is a component part. Yes.	8	A. As someone who is also accredited in intensive care,
9	Q. Yes.	9	I am not quite sure what point you are trying to make
10	A. But all the literature points, as far as I can see, that	10	because yes, everyone's heart stops terminally, of
11	the difficulty is distinguishing the difference between	11	course, that is right. But I what I don't know, and
12	an allergic reaction from endogenous and exogenous	12	I don't know from this, is exactly what it seems
13	histamine.	13	rather illogical. They talk about the changes of asthma
14	Q. Yes, I understand that. We are admonished at intervals	14	in the airways or the lungs but it doesn't say what
15	throughout the literature not to get in a muddle between	15	changes.
16	on the one hand an allergic reaction to histamine and on	16	If you have an acute asthmatic attack, you don't
17	the other hand poisoning by histamine which is brought	17	necessarily see very much in the airways but you see
18	into the body.	18	more chronic changes from people who have got chronic
19	A. Yes, yes.	19	asthma and it is conceivable, in fact the literature
20	Q. In the fourth paragraph, the 4 February, Dr Olumbe,	20	suggests that people who have a history of asthma have
21	chief forensic pathologist, met with family members and	21	worse reactions with scombroid toxins.
22	advised that they had formed the opinion that the cause	22	In fact, although I have a history of asthma,
23	of Noelene and Yvana's deaths was an allergic-type	23	I didn't have any respiratory effects whatsoever when
24	reaction caused by food they had eaten, especially fish	24	I had scombroid poisoning.
25	or by the so-called scombroid syndrome, also called	25	Q. It sounds as though you had quite a bad go?
	Page 57		Page 59
1	histamine fish poisoning, or a combination of these	1	A. Yes, well the levels were quite high but what is
2	causes. This was confirmed in subsequent	2	remarkable, if you are saying these are two women who
3	correspondence, Dr Olumbe's report noted that the	3	for the very first time both had an allergic reaction to
4	allergic reaction present is likely to have been	4	fish, that would be remarkable, wouldn't it? Are they
5	anaphylaxis, which occurs when the body's own cells	5	both eating fish knowing they have an allergy?
6	[this is the endogenous histamine] release histamine and	6	Q. I don't think they are allergic to fish, with respect,
7	other chemicals in response to an external allergic	7	Dr Wilmshurst. I think what the report shows is that
8	trigger. The autopsy showed clear evidence of allergy	8	they are allergic because of their asthmatic
9	or asthma, anaphylaxis can be resistant to treatment."	9	condition they are allergic to histamine, and if
10	Then at the foot of the page, penultimate paragraph:	10	histamine comes into the body from pelagic
11	"On 28 February, Dr Olumbe issued a certificate	11	A. No, you cannot be allergic to histamine. You cannot be
12	listing the cause of death for Noelene as an allergic	12	allergic to histamine. Histamine is a naturally
13	type reaction with underlying conditions of asthma and	13	occurring substance, it is in everyone's body. You
14	obesity. Dr Olumbe issued a certificate for Yvana	14	cannot be allergic to it. It is not the is the right
15	listing the cause of death as an allergic-type	15	sort of molecule, you can be allergic to large molecules
16	reaction."	16	like proteins and some polysaccharides, but you cannot
17	There is no suggestion anywhere, is there, that	17	be allergic to histamine.
18	either lady died as a result of a cardiac arrhythmia?	18	Q. Can you help us with what you think Dr Olumbe was
19	A. Well, you don't know the terminal events, you don't	19	referring to when he said in his death certificate that
20	know what the terminal event is. I mean in asthma, if	20	the cause of death was "an allergic-type reaction with
21	you say people have asthma, the terminal event is often	21	the underlying condition of asthma". Allergic to what?
22	cardiac arrhythmia.	22	A. I have no idea. He said an allergic-type reaction, if
23	Q. Dr Wilmshurst, it is a trite observation isn't it that	23	it was an allergy or an allergic reaction, it would be
24	everybody's heart stops when they die but there is	24	"an allergic reaction". He said an "allergic-type
25	nothing here about cardiac arrhythmia being the cause of	25	reaction", I don't know if that is his shorthand for the
	Page 58		Page 60

1	fact that it is scombrotoxin poisoning because, as	1	histamine can cause lethal arrhythmias.
2	people have said, scombrotoxin poisoning looks exactly	2	Q. But not scombrotoxic poisoning?
3	like, or can look exactly like an allergic reaction,	3	A. No, okay, but since scombrotoxin poisoning is caused by
4	because the mechanism is the same.	4	histamine, we are just talking about so histamine
5	Q. If we can just stand back from this, the point I am	5	injections, so if you inject enough histamine you could
6	putting to you is that as far as the literature goes,	6	presumably kill someone or if you took it by mouth you
7	and I accept it may well be incomplete, there haven't	7	could presumably kill someone.
8	really been any deaths recorded as a result of eating	8	Q. Not apparently if you come by it by eating bad fish, it
9	scombroid fish, save for these Bischoff ladies. In	9	has never happened?
10	their case it is not at all clear that the cause of	10	A. There are three people who have died from scombrotoxin
11	death was anything to do with a cardiac arrhythmia, as	11	poisoning, aren't there? Now we have said, the one
12	opposed to the fact that they had asthma and were in one	12	previously and two in this case.
13	way or another vulnerable to this poison or to this	13	MR MOXON BROWNE: Sir, I am told by Mr Skelton that we need
14	substance?	14	a break and I am happy to sheath my rapier at this
15	A. Well, I would have to have a look at this a bit more	15	point.
16	carefully.	16	THE CORONER: Let's just see, does anybody else have any
17	Q. Yes.	17	questions for the doctor?
18	A. I don't really know. I mean the first lady is found, we	18	We are just going to have a break now for the
19	don't know what the ECG showed when they arrived, which	19	benefit of the stenographers.
20	is something like four hours, five hours after she has	20	A. Sure.
21	eaten, it seems, we don't know but she unconscious, we	21	THE CORONER: Is that all right?
22	don't know what rhythm it says, she had various	22	A. Sure.
23	seizures, we don't know what caused the seizures. Is	23	THE CORONER: Thank you very much.
24	that because she is anoxic, hypoxic, because she has	24	(11.35 am)
25	airways obstruction that is causing her gases, you know	25	(A short adjournment)
	D (1		D /2
	Page 61		Page 63
1	amount of oxygen and CO2 in her blood to be abnormal.	1	(11.57 am)
2	Is it because she has arrhythmias? She has a cardiac	2	THE CORONER: We obviously have a lot to get through today
3	arrest and CPR, unless you know you cannot say that she	3	and I have certainly taken the point about the deaths or
4	hasn't had an arrhythmia.	4	lack of them some while ago. I am on that.
5	Q. No, I appreciate there are many uncertainties and I am	5	Anyway, who is next?
6	not seeking to make more than a general point that it	6	Questions from MR STRAW
7	appears that the only recorded case of people dying	7	MR STRAW: Dr Wilmshurst, with no disrespect to your
8	after eating scombroid fish is by no means clear that	8	expertise as a cardiologist, I need to be clear about
9	that was as a result of a cardiac arrhythmia, it may	9	scombroid food poisoning, is it right that the question
10	have been but it is not evidence for it, this case	10	of whether scombroid food poison something contributed
11	A. No, no, no, I accept that.	11	to Mr Perepilichnyy's death is outside your expertise?
12	Q. I go back to your report and I am afraid there is to	12	A. Yes.
13	really no way round this but your statement that	13	Q. I think you have no particular expertise in the symptoms
14	scombrotoxin fish poisoning causes fatal cardiac	14	or pathology of toxins; is that correct?
15	arrhythmias was way overstated, it is not something you	15	A. Yes.
16	should have said.	16	Q. You are reliant on the opinions of other experts in
17	A. Where was that?	17	respect of the toxicological causes of cardiac
18	Q. It is on the second page of your report.	18	arrhythmia?
19	A. No, I said it can be fatal. No, I think I just	19	A. Sorry?
20	corrected it, I have said, "Scombroid poisoning can be	20	Q. You are reliant on the opinions of other experts in
21	fatal [stop]. And it can cause lethal or potentially	21	respect of the toxicological causes of cardiac
22	lethal arrhythmias".	22	arrhythmia?
23	Q. Yes, well where is the evidence that it can cause lethal	23	A. Not entirely. I mean it depends which toxin you are
24	cardiac arrhythmias?	24	talking about, I mean I deal with toxicological, some
25	A. The evidence from Wolff, in that it causes sorry,	25	toxins causing cardiac arrhythmias and that is part of
	D (2		P (1
	Page 62		Page 64

1	my job, digoxin, I deal with that, beta blockers, drugs	1	rely on is itchiness?
2	causing cardiac arrhythmias.	2	A. Well, that was not no, it was just a little it was
3	Q. The reason I ask is from your first report at	3	just a little filler we put in. The point about
4	paragraph 30, you say, "I am reliant on the opinions of	4	itchiness was that I saw subsequently, as I did on my
5	other experts for the exclusion of toxicology causes of	5	medical takes, often people who were admitted with
6	cardiac arrhythmias and pulmonary oedema".	6	allergic reactions, urticaria. They said:
7	A. Sorry, I was thinking more of on many toxins I am	7	"The first symptom I noticed, actually, when I got
8	reliant on but there are some toxins like medical toxins	8	this, was my palms and the soles of my feet were very
9	I have knowledge of. I would, in fact, deal with many	9	itchy."
10	of those like digoxin or beta blockers, yes, but if you	10	That was the very first symptom. I thought this was
11	are talking about	11	really strange and I looked at them and my palms were
12	Q. Scombroid in particular.	12	bright red and when I got home I took my socks off, the
13	A. Yes, I am reliant on the literature, really, there, yes.	13	soles of my feet, my feet, were bright red. When I next
14	I mean if I had someone with an arrhythmia who had	14	saw people come in with allergic reactions, urticaria,
15	scombroid poisoning I would check the literature, that	15	I just said to them, I think it was four or five, I said
16	what anyone would do in that situation.	16	which, you know, and people with urticaria are itchy and
17	Q. The conclusion in your joint expert report with	17	they are itchy because they are excreting endogenous
18	Professor Sheppard, you have already been taken to one	18	histamine not exogenous histamine, which has been taken
19	of them, which was that in order to come to a diagnosis	19	in.
20	of SADS, other possible explanations have to be totally	20	I said: which was the bit that was most itchy? And
21	excluded?	21	they said palms, soles or both palms and soles. It was
22	A. Correct.	22	just an interesting little point that we were trying to
23	Q. The last question of your report	23	make. In fact it shows that histamine, however you have
24	A. To the satisfaction of the court, excluded.	24	it, whether it is taken in or internally produced,
25	Q. Yes.	25	produces the same sorts of symptoms and can be very
25	Q. 165.	20	produces the same sorts or symptoms and that be very
	Page 65		Page 67
1	The last answer of your report, which is	1	difficult to distinguish. That is the point we are
1 2	The last answer of your report, which is question 54, you say:	1 2	difficult to distinguish. That is the point we are making.
_		l .	•
2	question 54, you say:	2	making.
2 3	question 54, you say: "We are unwilling to speculate about causes of death	2 3	making. In fact if you go to — the point I made I think in
2 3 4	question 54, you say: "We are unwilling to speculate about causes of death when the possibility of undetected poisons is raised,	2 3 4	making. In fact if you go to — the point I made I think in the report was that if you go to patient literature,
2 3 4 5	question 54, you say: "We are unwilling to speculate about causes of death when the possibility of undetected poisons is raised, because it is outside our expertise."	2 3 4 5	making. In fact if you go to — the point I made I think in the report was that if you go to patient literature, people who have had urticaria and get recurrent
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1	A. Yes.	1	A. I also note that I was also given another report that
2	Q. It is right, is it not, that in that section it puts	2	also mentions atrial arrhythmias or atrial tachycardia,
3	forward a number of theories as to the relationship	3	I was given it today, this Feng et al paper, which also
4	between histamine poisoning on the one hand and	4	talks about atrial arrhythmias.
5	scombroid fish poisoning on the other?	5	Q. If we can stick with the Borysiewicz one for the moment.
6	A. Hmm.	6	A. Sure.
7	Q. Correct? For example there may be potentiators or	7	Q. That is the one you rely on in your report, Borysiewicz
8	enzymes involved between the two of them?	8	and Krikler. That was the case, wasn't it, with the man
9	A. Yes.	9	who came with a history of four days of palpitations
10	Q. The other articles that you put forward explain other	10	after eating the mackerel?
11	theories about the relationship between them?	11	A. Yes.
12	A. Yes, but I think I mentioned before when earlier on,	12	Q. And his heart rate was around 150 a minute?
13	I said that there may be other substances in fish and	13	A. Yes.
14	two of them are named here, that may play a part, yes,	14	Q. You explained earlier that that is a self perpetuating
15	that's right.	15 16	mechanism probably? A. Yes.
16	Q. Would it be fair to say that the relationship between	17	Q. So his heart rate would have continued at that fairly
17 18	scombroid on the one hand and histamine on the other, and the differences between the symptoms caused by the	18	high rate throughout the four-day period?
19	two of them, is a complex issue which is really a matter	19	
20	for a toxicologist, it is outside your expertise?	20	A. Not necessarily, because the atria are going in a cycle at 300 a minute. If you have 2 to 1 block, it is
21	A. Yes.	21	transmitted as 150 but the block in the atrioventricular
22	Q. Just turning to your more recent report, the one dated	22	node can vary, so when you are asleep you often get
23	9 April, please.	23	a higher block, so everyone's heart rate slows down, so
24	A. Where is that?	24	his may have gone to 4 to 1 block when he was asleep and
25	Q. I will hopefully be able to ask you these questions	25	it may have slowed to 75, I don't know. But if he had
23	Q. 1 will hoperarily be unto to usik you these questions		to many make storied to res, I don't maiori. Due in he mad
	Page 69		Page 71
1	without referring to the report but if you would like	1	been anxious and adrenaline had, you know, kicked in, it
1 2	without referring to the report but if you would like it, please let me know and I will give you the page	1 2	been anxious and adrenaline had, you know, kicked in, it could have conceivably have gone higher.
2	it, please let me know and I will give you the page	2	could have conceivably have gone higher.
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2 3	it, please let me know and I will give you the page number. You put forward what might be a mechanism as to how	2 3	could have conceivably have gone higher. Q. Right. But you would expect that during the day, when he was awake, that he would have — focusing on the word
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2 3 4 5 6	it, please let me know and I will give you the page number. You put forward what might be a mechanism as to how scombroid fish poisoning may lead to cardiac arrhythmias; is that correct?	2 3 4 5 6	could have conceivably have gone higher. Q. Right. But you would expect that during the day, when he was awake, that he would have — focusing on the word self perpetuating, I am trying to understand how that would work, you would expect when he was awake, he would
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1	A. Yes. I mean I was trying to work out when he seemed	1	account that we have from Ms Medynska last July I say
2	to drink more than I drink, so that is too much really,	2	best because it is perhaps nearest in time she
3	isn't it.	3	describes that she ate sashimi, which we know on any
4	Q. I can tell you exactly what she said, how much she said	4	definition online includes salmon, tuna, mackerel and
5	he drank. She said on 8 November, between 3.00 and	5	maki, which likewise can wrap those self same fish and
6	4.00 pm he had just under one bottle of wine. For	6	perhaps the learned coroner will take it from me that if
7	dinner they shared a bottle. The next day, on	7	you look at the Buddha-Bar's website, it is quite clear
8	9 November, between 3.00 and 4.00 pm he had about one	8	that tuna is the predominant fish, which is not unusual
9	glass and for dinner they shared a bottle again.	9	for such bars but also this, she describes in a non-led
10	A. Okay. So on the 8th, he had 12 units and on the next	10	way, it is her spontaneous evidence, that he didn't like
11	day they shared a bottle and he had one glass, so six	11	the taste and she makes the perhaps important nuanced
12	units, something.	12	point that he was someone that did a lot of fine dining
13	Q. Can I understand, are you suggesting in this section	13	and he knew about food, if it wasn't right.
14	that his use of alcohol during that period could have	14	A. Hmm.
15	caused his death?	15	Q. This is beginning to sound like the sort of scenario
16	A. No. No, I am not. But alcohol actually I wasn't	16	that you describe happening to yourself, isn't it, he
17	quite I mean he seemed I mean he was having	17	didn't like the taste?
18	a weekend break, so people often drink more alcohol	18	A. That is what sprung to my mind.
19	don't they on those sort of occasions. I am just saying	19	Q. Exactly.
20	that it was when you drink alcohol you increase your	20	A. Why I raised the issue.
21	catecholamine release, so you increase adrenaline. I am	21	Q. Indeed, because of his high standards he sent some of
22	not saying that that was enough to cause his death. No,	22	the food back and complained?
23	I am not saying that. I am saying that I don't know	23	A. Yes.
24	what effect the amount of alcohol he had might interact	24	Q. Then, just to take it a bit further, she also describes
25	with the histamine but it actually sounds as if he	25	him as a short time later when they returned to the
	Page 73		Page 75
1	didn't actually have that much alcohol at the time he	1	hotel room as vomiting noisily three times. That again
2	had the fish sorry, when I say histamine, assuming	2	seems to be at least consistent with the sort of
3	for the moment that he did have scombroid fish	3	poisoning you are positing?
4	poisoning. With that merely it sounds like he had half	4	A. Yes.
5	a bottle, which is four units, so earlier I wasn't	5	Q. This perhaps importantly, that when he came out of the
6	sure how much it was, so — or the timing of the amounts	6	toilet, last year, she said, he came out with a red
7	of alcohol.	7	face.
8	Q. Because please do say if I have this wrong but as far as	8	Pausing there, it is important to note that no one
9	I can see there is nothing in the literature which says	9	led her into saying that. Do you see?
10	that that sort of intake of alcohol combined with	10	A. Hmm.
11	scombroid poisoning can cause death?	11	Q. We can perhaps assume that she is not an expert in this
12	A. No, it is speculation.	12	form of rare poisoning, and indeed last month she went
13	MR STRAW: Yes.	13	further, un-led, and said that he came out with a red
14	That is everything, thanks very much.	14	upper body, which seems to me quite similar to the
15	Questions from MR BEGGS	15	experience you had?
16	MR BEGGS: Dr Wilmshurst, if we go back to basics, for the	16	A. Yes, that is why I thought this sounds very familiar to
17	scombrotoxin theory to have purchase in this case, we	17	me. That is why I raised the issue for the court.
18	first have to establish that Mr Perepilichnyy, excuse	18	Q. For what it is worth, she also described that they
19	me, ate the relevant fish?	19	didn't participate in any, as she put it, making love
20	A. Correct.	20	that evening, which may also be consistent with having
21	Q. The relevant fish include, as I understand it, tuna,	21	eaten disagreeable food, for otherwise he might well
22	mackerel and did you say salmon?	22	have been so inclined. Do you see?
23	A. Salmon, and a few other things like mahi-mahi and	23	A. Yes.
24	various other things.	24	Q. Looking at all those things together, she seems to be
25	Q. Just to deal with that, if we go back to the best	25	describing almost exactly the factual circumstances you
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1	describe with your experience, is that fair?	1	oxidase?
2	A. Well, it is sufficiently like it that I thought I ought	2	A. Monoamine oxidase inhibitors, that's correct.
3	to raise it as a possibility for the court to consider.	3	Q. Which are antidepressants?
4	Q. All that you were doing by raising this potential	4	A. They are antidepressants, old fashioned antidepressants,
5	causative factor was merely indicating that it may be	5	yes.
6	synergistic to the arrhythmia caused by running?	6	Q. You additionally, as I understand it, said that some
7	A. Yes.	7	medication can be formulated to have a delayed reaction?
8	Q. I wonder if there is one other potential factor that may	8	A. That's correct.
9	have contributed and that is the small amounts of	9	Q. That may apply to some form of poison, a medication
10	sildenafil which were found in his system on death.	10	A. The pharmaceutical preparation could be made to have
11	Pausing there, that particular medicine can affect the	11	a delayed action in the same way that medicines are made
12	heart, can't it?	12	to have a delayed action.
13	A. Yes. It can affect the heart, although there is	13	Q. Thank you.
14	contradictory perhaps the toxicologists should say	14	The critical issue for today is whether or not
15	more about that, but my reading is that it can affect	15	Mr Perepilichnyy was poisoned in Paris, either
16	the heart but more importantly it affects your blood	16	deliberately or accidentally. You will have heard and
17	vessels and dilates them, so it could have a synergistic	17	sat through this morning's evidence about the potential
18	effect with any other substance, whether it was	18	for accidental poisoning via the ingestion of fish.
19	a vasodilator like alcohol, like histamine. Of course	19	A. Correct.
20	the low level at the time of death, one presumes would	20	Q. In circumstances where the poison had some form of
21	have been a higher level 18 hours earlier.	21	delayed effect, in that it manifested it itself fatally
22	MR BEGGS: Yes, thank you very much.	22	the next day when Mr Perepilichnyy was out jogging in
23	MR SKELTON: No further questions from me, sir.	23	the afternoon. That is the critical issue we are
24	THE CORONER: Thank you very much indeed.	24	investigating today in your evidence.
25	A. Thanks very much.	25	A. I understand.
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1	MR SKELTON: Sir, the next witness is Professor Ferner.	1	Q. I will not take you, unless I need to, through the
2	The witnesses have been previously sworn in this	2	summary I gave to Dr Wilmshurst a short while ago about
3	court, as you will appreciate, so for the most part we	3	the evidence of Ms Medynska and the additional evidence
4	are not reswearing them.	4	about Mr Perepilichnyy's appearance, signs and symptoms
5	THE CORONER: Let's do it just for the avoidance of doubt.	5	over the period from his dinner on the night of the 9th
6	PROFESSOR ROBIN FERNER (sworn)	6	to his fatal collapse on the afternoon. You heard that
7	Questions from MR SKELTON	7	summary I think today. It included in particular
8	MR SKELTON: Professor Ferner, you have given evidence	8	a history of vomiting on, it seems, three occasions
9	previously on a variety of matters relevant to	9	after eating, and having complained about food and other
10	Mr Perepilichnyy's death. You have also produced	10	matters.
11	a supplementary piece of evidence, a report dated	11	Would you like me to summarise that for you?
12	27 March this year, which you can find in the bundle,	12	A. No, as you may know, sir, I was here yesterday, so
13	I hope it is in front of you, at tab 29.	13	I heard the evidence. I had one or two difficulties
14	A. I have, yes.	14	with the evidence.
15	Q. Just to summarise at least some of the evidence that you	15	Firstly, I think I am right in saying that
16	gave previously if I may, please correct me if I am not	16	Ms Medynska heard a sound that she attributed to
17	summarising it correctly, you said in your evidence last	17	vomiting.
18	year that some poisons can be intrinsically delayed in	18	Q. Correct, she didn't see it.
19	their effect, such as paracetamol?	19	A. She didn't see vomiting and she didn't enquire as to
20	A. Correct.	20	whether vomiting had taken place
21	Q. You also said some may be state dependent, in that they	21	Q. Correct.
22	require something else to happen for them to become	22	A but I am sure that is well known.
23	toxic?	23	The second is that in answer to your question, she
24	A. Correct.	24	said he was looked clean and a little bit red,
25	Q. An example of that I think you gave is monoamine	25	a little bit red eyes and red face.
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1	Q. Yes.	1	infection.
2	A. That was at one point, when he came out of the lavatory,	2	On page 483, paragraphs 24 and 25, you mentioned
3	the bathroom as she called it, but the next morning she	3	possibility of bacterial contamination in the form of
4	says his eyes were very red, if I have understood the	4	staphylococcal toxin?
5	evidence from yesterday. I'm sorry, I haven't made	5	A. Absolutely. I stand by that. I think there may have
6	a note of the page on which that evidence was recorded.	6	been some confusion, infection by staphylococci takes
7	THE CORONER: We can check but are you saying your	7	time to happen, but if food is contaminated with
8	understanding is she is saying when he wakes up at	8	staphylococci bugs, then they can produce a toxin which
9	5.00/6.00, that he has got very red eyes then.	9	is not degraded by heat and which causes within a short
10	A. I think that is what she said and I found that difficult	10	period vomiting, which subsides quite quickly. So
11	to fit in with the previous evidence. For one obvious	11	staphylococcal food poisoning, which I have seen on the
12	reason, sir that one would expect the symptoms to be	12	general medical take is not caused by staphylococci but
13	abating rather than being exacerbated.	13	by the toxin that they elaborate.
14	MR SKELTON: "The next day when I saw him he was still very	14	Q. As you say, the toxin can remain in the food
15	red eyes."	15	notwithstanding the cooking process?
16	A. Yes. His eyes were a little bit red at one point.	16	A. Correct. The same is true, incidentally, of histamine.
17	Q. A little bit red when he came out of the bathroom, it	17	Q. It is a rapid onset poison, food poison?
18	seems and the next day she says he was still very red	18	A. Correct and the same is true of bacillus cereus, which
19	eyes you will appreciate a tension to some extent	19	classically occurs in reheated rice which is not
20	between the two of those, because the "still" implies it	20	synonymous with but sounds as if it might be relevant to
21	is at the same level and the "very red eyes" would imply	21	Chinese and Japanese meals.
22	it was worse, it would seem but that may be a problem	22	Q. Again, you heard the evidence of the food which
23	with the language?	23	Mr Perepilichnyy consumed. It was not clear whether he
24	A. I just call attention to the fact that I heard the	24	consumed fish, although he may have done, it is fair to
25	evidence and I was not absolutely clear.	25	say, and he may have consumed prawns as well and he may
	Page 81		Page 83
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1	Q. Can I just, unless you need to be taken to the theories	1	have consumed rice.
2	first, can I just ask you off the bat, the significance	2	A. Correct.
2 3	first, can I just ask you off the bat, the significance of the very red eyes the next morning is what from your	2 3	A. Correct. Q. Is it your view then that the staphylococcal toxin could
2 3 4	first, can I just ask you off the bat, the significance of the very red eyes the next morning is what from your perspective?	2 3 4	A. Correct.Q. Is it your view then that the staphylococcal toxin could have arisen in respect of the fish or the prawns?
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1			
_	A. Yes, absolutely. Correct.	1	as a consequence.
2	MR SKELTON: The other infection, the bacillus cereus?	2	Q. As far as scombroid fish is concerned, we obviously
3	A. I am not sure that this is not a relatively common	3	don't know whether he consumed that form of fish, it
4	bacterium but which thrives in particular circumstances	4	would appear?
5	of temperature, so that if you heated the rice and then	5	A. No. I take the point that Japanese restaurants commonly
6	it cools down, the bacillus has an opportunity to	6	serve tuna, mackerel, and, for all I know, mahi-mahi.
7	multiply.	7	Q. Yes likewise we don't have the benefit of histamine or
8	Q. Taking those two forms of food poisoning, is it your	8	histamine metabolite testing prior to his death or
9	view that the signs and symptoms which he displayed,	9	indeed in the post mortem period of time?
10	which is the rapid onset vomiting and the rapid	10	A. No, although that would not distinguish between
11	resolution, apparent resolution, leaving aside the red	11	scombrotoxic fish poisoning and an allergic reaction.
12	eyes for the moment which persisted, are consistent with	12	Q. An allergic reaction to?
13	those two forms of poisoning?	13	A. Well, something he was allergic to. Now, we don't know
14	A. Yes.	14	what he was allergic to but you may recall when I gave
15	Q. Are there any signs or symptoms which you would view as	15	evidence previously there was some discussion of him
16	being inconsistent with those symptoms when you are	16	perhaps being allergic to penicillin or to procaine, and
17	weighing them in the balance?	17	he may have been allergic therefore to other things.
18	A. Well it comes back to this question of how red	18	Q. I asked Dr Wilmshurst about the post mortem testing, and
19	Mr Perepilichnyy was and how extensive the redness was,	19	the opportunity to test for histamine or metabolites.
20	because certainly the clinical diagnosis depends on	20	He gave the evidence to the best of his knowledge it was
21	those features you have mentioned and which	21	a relatively stable chemical, they were stable chemicals
22	Dr Wilmshurst suffered, the pounding headache, the	22	but there may be other factors in the post mortem period
23	flushing from vasodilation, sometimes light	23	which could impact on the validity of testing when it
24	headedness I don't need to rehearse the symptoms	24	comes to a diagnostic tool.
25	which you have read out and nausea and vomiting are	25	A. Yes, I agree with Dr Wilmshurst. I am not an expert on
	Page 85		Page 87
1	less common.	1	the stability of methylhistamine in urine. I think he
2	Q. I think you would accept the redness, at least the	2	said if it is present in large quantities, that is not
3	redness that manifested itself just after	3	necessarily diagnostic but I think it would help the
4	Mr Perepilichnyy came out of the bathroom, could also be	4	court actually if it was present in large quantities,
5	consistent with retching for a protracted period of	5	high concentrations.
6	time?	6	Q. The question I think is the reliability of that result
7	A. Consistent with him having washed his hair under a hot	7	in terms of proving or disproving a theory of poisoning,
8	shower.	8	if the sample itself is taken four days post mortem and
9	Q. Presumably the redness of his eyes could have been		if the sample user is taken four days post mortem and
		9	• • • • • • • • • • • • • • • • • • • •
10	a response to putting him under that pressure?	9 10	has since been stored for a protracted period of time. A. There are two questions.
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1	there was in his bladder but let us say that there was	1	described not all of them are in fact particularly
2	some and it showed a high concentration of	2	toxic.
3	methylhistamine. That would support a diagnosis of	3	A. Correct.
4	scombrotoxic fish poisoning or of allergy, and I will	4	Q. Can I just ask you to explain, take us through those
5	come back to that.	5	chemicals, you will find them on page 506 of your report
6	If the concentration is low, it doesn't exclude it,	6	and try and apply the possibility of their usage in the
7	it just makes it less likely. That is my view.	7	context of Mr Perepilichnyy's case.
8	THE CORONER: I think you said there were two questions, one	8	Are you in this case presenting them as the
9	is whether at the moment he died he had a raised level.	9	possibilities of delayed action poisons that could have
10	A. I did, sir.	10	administered in Paris and become symptomatic in London.
11	THE CORONER: Were you just going to make a point about	11	Also bearing in mind the initial presentation, they are
12	whether testing of what we have would be reliable in	12	consistent with an initial reaction or are you leaving
13	telling us I just didn't want.	13	that aside as a separate issue?
14	A. That was exactly the point I was going to make	14	A. No, the problem that I sought to solve was a poison
15	THE CORONER: I would like to know	15	which initially causes vomiting, where there is then
16	A and I am not in a position to answer it.	16	an asymptomatic period of a period without symptoms and
17	THE CORONER: You are not in a position?	17	where there is then cardiac arrhythmia. That is
18	A. No, I think that is a question for Dr Perry or one of	18	a difficult question and only one substance came to my
19	the laboratory doctors to see what the post mortem	19	mind immediately and that was colchicine, which we will
20	stability of methylhistamine in urine will be, because	20	have to come back.
21	there are two delays. There is the delay before the	21	I then looked through TOXBASE, which is the UK
22	sample was taken and after Mr Perepilichnyy died and	22	national poisons information services database
23	then there was the storage.	23	Q. Yes.
24	Sorry, if I have	24	A looking for those compounds which are said to cause
25	THE CORONER: No, no, I wanted your view.	25	vomiting and then for those which cause arrhythmia and
	Page 89		Dago 01
	1 age 07		Page 91
1	MR SKELTON: Yes, that may be something we will have to pick	1	making an assessment of whether the arrhythmia was
2	up at another time but as we understood it, Dr Perry	2	delayed after vomiting.
3	referred to Professor Egner and Professor Egner's views	3	This is a database exercise but the database is
4	were disputed by Dr Wilmshurst, so we have a certain	4	searched by words, so if the correct word is not chosen
5	circularity of expert view.	5	in the search, then the substance will not be
6	A. I think if I may I will stand aside.	6	identified, so it is limited to that degree.
7	Q. A wise decision.	7	Q. Can I seek to clarify your view as to whether or not
8	Other possibilities, just before we leave that,	8	they are a likely candidate for Mr Perepilichnyy's
9	could you describe any other possibilities that may be	9	death.
10	the cause of sudden onset vomiting over a short-lived	10	So first of all, taking the first one, chlorophenoxy
11	period?	11	herbicides?
12	A. Well, a large number of substances commonly cause	12	A. I think I can take this shortly, that I don't think any
13	vomiting and overdoses of many substances like	13	of these that I have identified is likely for two
14	paracetamol, which you mentioned earlier, will or may	14	reasons.
15	cause vomiting early on.	15	I think there would probably be other features or
16	Q. What about Viagra?	16	a large dose would have to be given, which is the case
17	A. I don't know. I don't believe it is a major adverse	17	with chlorophenoxy herbicide.
18	effect of Viagra/sildenafil.	18	Q. None of them is likely, just to be clear, that includes:
19	Q. Turning then to the possibility of deliberate poisoning.	19	chlorophenoxy herbicides; colchicine; MAOI, which is the
20	A. Thank you.	20	monoamine oxidase inhibitors that we have already
21	Q. In your report you refer to a number of chemicals in	21	touched upon.
22	appendix 3.	22	A. Yes, I qualify that by saying of course if he did have
23	A. Yes.	23	tyramine-containing foods at lunchtime, then that
24	Q. Which you go through and analyse or at least present	24	becomes more of a possibility. There is one piece of
25	their symptoms prior to fatality. Although I think you	25	evidence which I reminded myself of which was that
	Page 90		Page 92

1	Mrs Perepilichnyy had at one time said that he was fond	1	would be possible. I am not saying it is likely, I am
2	of chocolate.	2	just saying
3	Q. Yes?	3	Q. Phosphorous I think you said was unlikely?
4	A. Dark chocolate is a food rich in tyramine.	4	A. I think it is unlikely.
5	So that is at least in theory the circumstance in	5	Q. Sodium fluoride poisoning, which is on page 509.
6	which monoamine oxidase inhibitors could cause serious	6	A. Again, unlikely, not impossible.
7	arrhythmias.	7	Q. Why?
8	Q. Presumably death from the consumption of dark chocolate	8	A. Why is it unlikely? Because I think again you would
9	is a very rare occurrence indeed?	9	have little in the way of an asymptomatic period. It is
10	A. Unless you are taking a monoamine oxidase inhibitor.	10	possible, it is recorded, but it is not what I would
11	Q. In which taste it is an interactive?	11	expect of a fatal dose of sodium fluoride.
12	A. It is an interaction and it is less common than blue	12	Q. And the
13	cheese or chianti, both of which contain tyramine.	13	THE CORONER: It is that period that we know about without
14	Q. That is MAOI.	14	symptoms, that is what causes you that is a problem
15	Phosphorous in white	15	there?
16	A. Again, I think that is unlikely. It would be quite	16	A. That worries me.
17	difficult to administer phosphorous in someone, though	17	MR SKELTON: Yes, the symptoms that are listed there, after
18	I suppose it is not impossible.	18	ingestion include: nausea; dysphagia, so a problem
19	Q. Just to be clear, I think we need to be clear on what	19	eating; hypersalivation, so too much saliva; vomiting;
20	you can say with some confidence about the probabilities	20	abdominal pain; diarrhoea; and then it says headache,
21	and what you can say about the possibilities.	21	shortness of breath and fatigue may occur.
22	Chlorophenoxy herbicides, are you able to say	22	Leukocytosis, what is that?
23	whether that is a likely or unlikely?	23	A. An increase in white cell count in the blood.
24	A. Unlikely, but not impossible.	24	Q. Presumably that is something that needs to be found on
25	Q. Thank you.	25	investigation rather than
	Page 93		Page 95
1	Likewise MAOI?	1	A. Correct.
1 2	Likewise MAOI? A. Colchicine I think	1 2	A. Correct. O. Liver dysfunction, fever, haemorrhagic gastroenteritis.
2	A. Colchicine I think	2	Q. Liver dysfunction, fever, haemorrhagic gastroenteritis,
2	A. Colchicine I think Q. I am coming back to colchicine, if I may.		Q. Liver dysfunction, fever, haemorrhagic gastroenteritis, hypotension, respiratory failure, pulmonary oedema and
2 3 4	 A. Colchicine I think — Q. I am coming back to colchicine, if I may. A. MAOI, possible, dependent on the last meal or snack. 	2 3	Q. Liver dysfunction, fever, haemorrhagic gastroenteritis, hypotension, respiratory failure, pulmonary oedema and coma may rarely occur, it says?
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2 3 4 5	 A. Colchicine I think — Q. I am coming back to colchicine, if I may. A. MAOI, possible, dependent on the last meal or snack. 	2 3 4 5	 Q. Liver dysfunction, fever, haemorrhagic gastroenteritis, hypotension, respiratory failure, pulmonary oedema and coma may rarely occur, it says? A. Correct. Q. That goes on the category of unlikely but it remains
2 3 4 5 6	 A. Colchicine I think Q. I am coming back to colchicine, if I may. A. MAOI, possible, dependent on the last meal or snack. THE CORONER: Possible but just herbicides you said unlikely but not impossible. MAOI you say possible in terms of likely or unlikely. 	2 3 4 5 6	 Q. Liver dysfunction, fever, haemorrhagic gastroenteritis, hypotension, respiratory failure, pulmonary oedema and coma may rarely occur, it says? A. Correct. Q. That goes on the category of unlikely but it remains a possibility and in terms of administration, just to
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1	hospital."	1	symptoms make it a possibility but it is unlikely?
2	Then you list the toxicity phases, 1, 2, and 3, the	2	A. Correct.
3	first being the first 24 hours, the second two to seven	3	THE CORONER: It is another one where you say cannot rule it
4	days and the third seven days onwards.	4	out. Possible but unlikely?
5	A. Correct.	5	A. Sir, that is exactly what I say and I think there
6	Q. Looking at those in respect of Mr Perepilichnyy, he	6	a lesson to be drawn, which I had tried to point, is at
7	obviously satisfies certainly one of the symptoms within	7	paragraph 33, that agents like this exist. In other
8	the 24-hour period, which is vomiting?	8	words, amongst the agents whose toxic properties we
9	A. Yes.	9	know, there are some which cause vomiting, where there
10	Q. We don't know or have any information to the effect of	10	is a quiet period, if I can call it that, and which may
11	his satisfying any of the others, save that he clearly	11	then cause cardiac arrhythmia and death.
12	was not anorexic in the sense that he ate it seems	12	MR SKELTON: Can I ask you just to look at Dr Kite's letter
13	a normal breakfast the next day?	13	dated 29 March, which you will find under tab 34,
14	A. Yes, I don't think that excludes it actually.	14	please.
15	Q. But had he been anorexic, it would have tended to	15	A. Thank you.
16	support?	16	Q. As you mentioned, it is a naturally occurring alkaloid
17	A. He seemed to be anorexic on the night he developed the	17	and therefore enquiries were made again of Kew to see if
18	vomiting, because he didn't eat very much at the	18	any matches had been found in the existing samples. The
19	Buddha-Bar if I have understood it.	19	answer to that is I will read out the substance of
20	Q. He ordered several dishes, it is not clear exactly how	20	the letter:
21	much he consumed and he sent one or two of them back and	21	"Further to your email of 27 March 2008 [that is
22	he said it tasted bad.	22	back to the solicitor to the inquest] requesting that
23	A. Yes.	23	the LCMS analyses of samples be examined manually for
24	Q. But he certainly ate breakfast the next day, it seems,	24	the presence of colchicine. I can confirm that I have
25	on Ms Medynska's evidence?	25	undertaken such manual inspection of the original LCMS
	Page 97		Page 99
1	A. Yes, he was not anorexic for 24 hours, I accept that.	1	analyses of AWF/32, 33, 34, 35, 39 and found no trace of
2	Q. The more severe symptoms it seems develop over the	2	this compound."
3	subsequent days, manifesting by some quite serious	3	Does that definitively rule it out?
4	systemic derangement, so renal failure?	4	A. It makes colchicine poisoning per se very unlikely.
5	A. Yes.	5	What it doesn't do, because this was based on the mass
6	Q. Rhabdomyolysis?	6	spectrometry, it doesn't rule out the possibility of
7	A. Rhabdomyolysis is breakdown of muscle.	7	related compounds whose mass spectre were not in the
8	Q. How will that appear, a generalised weakness?	8	library of Kew or were not known to Dr Kite, but that is
9	A. Generalised weakness is possible, muscle pain is	9	for him to discuss.
10	possible, a common manifestation is darkening of the	10	Q. Yes, but as far as you were concerned?
11	urine because myoglobin in the urine, myoglobin is the	11	A. This means that colchicine of the sort we give to
12	compound released from the muscles, is a dark colour, it	12	patients was not in Mr Perepilichnyy's blood at the time
13	is related to haemoglobin.	13	it was analysed at Kew. My understanding is that
14	But, sorry, this is an exhaustive list of symptoms	14	alkaloids are relatively stable. Dr Kite will have to
15	and signs, it is not necessary to have any or all of	15	answer the question you put to me, whether it is
16	these other than cardiac arrhythmia.	16	impossible that he was given colchicine.
17	Q. The earlier one, cardiac arrhythmia and cardiovascular	17	Q. Thank you.
18	collapse, that is after 24 hours or is the timeframe	18	May I go back to the issue of scombroid fish
19	itself subject to some flexibility?	19	poisoning, you mentioned earlier that his symptoms were
20	A. I am sure it is. I said in theory because I haven't	20	consistent with it, save for the persistence of red eyes
21	myself treated a patient with colchicine poisoning but	21	the next day.
22	the cardiac arrhythmia is due to reaction of the	22	A. Correct.
23	alkaloid and I would expect it to be possible at any	23	Q. On the basis that that doesn't appear to have been
24	time after ingestion.	24	reported in the various literature, various records and
25	Q. What you say on page 486-paragraph 40 is that his	25	reports that we have seen.
	7		75
	Page 98		Page 100
			25 (D 07 t- 100)

1	A. Correct.	1	There were others action for example organophosphate
2	Q. But that doesn't necessarily rule it out?	2	poisons which may act very swiftly and cannot be ruled
3	A. No, as I said in my report and it is still true, I think	3	out?
4	it is quite likely that he had scombroid fish poisoning,	4	A. And cyanide for example.
5	scombrotoxic fish poisoning. We don't have, as in	5	Q. Likewise with a delayed-action poison, again except for
6	Dr Wilmshurst's case, anyone else who appears to have	6	the ones that were ruled out, for example paracetamol?
7	been affected but that too is unclear.	7	A. Yes.
8	If he did have scombroid fish poisoning, it seems to	8	Q. From a medical perspective and a toxicological
9	have abated quite quickly so that the next morning he is	9	perspective two possibilities remained, death from
10	well.	10	a cardiac cause or deliberate poisoning?
11	Q. Can I start to draw your conclusions from the various	11	A. I think I said in my original report that those two
12	threads that you have discussed?	12	possibilities are not mutually exclusive.
13	A. Please.	13	Q. You did raise the possibility of an allergic reaction to
14	THE CORONER: Just before you do, but you have said there	14	penicillin for example?
15	are some possible things but you think, having looked at	15	A. Yes, leaving that aside
16	them, that they are unlikely as to, in terms of	16	Q. Yes.
17	deliberate substances that have poisoned him, looking at	17	A as we have discussed in the case of colchicine, there
18	the chronology of the thing, but you say you think	18	are poisons that predispose you to heart rhythm
19	scombroid food poisoning quite likely.	19	disturbance. I think Dr Wilmshurst confirmed that this
20	Is what you are saying that in your view the	20	morning when he was talking about digoxin for example.
21	likelihood is that actually the Paris thing, episode, is	21	Q. That is in one of the categories I have just given you,
22	an innocent episode of food poisoning?	22	isn't it, there is a cardiac cause, an independent
23	A. I think that is the most likely explanation, whether it	23	cardiac cause from a structural abnormality which has
24	was due to scombrotoxin or to another toxin.	24	not been picked up on post mortem or some form of
25	THE CORONER: Sorry, Mr Skelton.	25	poisoning are the primary possibilities?
	Page 101		Page 103
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1	MR SKELTON: Thank you, sir, and I will come back to the	1	A. I don't wish to quibble. I don't think you interpolated
2	overall conclusions as well to make sure we fully	2	the word "independent" in your first question.
2 3	overall conclusions as well to make sure we fully understand them and to give the professor an opportunity	2 3	the word "independent" in your first question. Q. You gave the view that the determination of which was
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26 (Pages 101 to 104)

1	understanding of how it might affect the heart and his	1	your question.
2	understanding of how that effect can be fatal, albeit	2	Q. It is not a trap.
3	without necessarily the full support of the recorded	3	THE CORONER: I think it was a genuine offer.
4	literature, as we have seen. He posited a theory that	4	A. No, there is nothing I wish to add, thank you.
5	that food poisoning could lead to cardiac arrhythmia and	5	MR SKELTON: I had summarised your previous conclusions
6	could cause death.	6	giving you an opportunity to endorse them.
7	Do you agree with that as a possibility?	7	A. I endorse them.
8	A. I am not sure that I do. For the reasons that have been	8	MR SKELTON: Thank you.
9	rehearsed. As far as I understand it, there is only one	9	THE CORONER: I am just wondering whether we might.
10	case in the literature, which was Borysiewicz and	10	Is that the end of your questions, I am only
11	Krikler, which points to an arrhythmia as a direct	11	wondering Mr Skelton whether we might just if we did
12	consequence of scombrotoxic fish poisoning. That was	12	press on a bit we might just then when we did break off
13	an arrhythmia which in spite of what Dr Wilmshurst sees	13	have a better idea just of quite how we are going to
14	as a cardiologist, from the point of view of a general	14	structure the rest of the day. That is slightly it
15	physician atrial flutter or atrial fibrillation, these	15	depends.
16	are very common heart rhythm disturbances, I think	16	MR SKELTON: Yes, sir.
17	Dr Wilmshurst quoted some numbers, and they don't	17	THE CORONER: Mr Moxon Browne, any idea how long you are
18	generally cause sudden death.	18	likely to be.
19	Firstly, they commonly make you feel unwell, and we	19	MR MOXON BROWNE: I have no questions.
20	don't believe that Mr Perepilichnyy felt unwell.	20	MR SKELTON: Sir, I have been given I am sure a very
21	Secondly, the link with scombrotoxic fish poisoning	21	reliable indication that questions will last about
22	is tenuous.	22	15 minutes for this witness.
23	Thirdly, even if he did, even if Mr Perepilichnyy	23	THE CORONER: Shall we see if that is true?
24	did develop scombrotoxic fish poisoning and did develop	24	
25	atrial flutter as a consequence, it would be extremely	25	
	Page 105	-	Page 107
1	surprising that he died suddenly while running from that	1	Questions from MS HILL
2	arrhythmia.	2	
	ai i nytiima.		
	O Are you actually ruling it out as a possibility or		MS HILL: Professor Ferner, just a very few questions from
3 4	Q. Are you actually ruling it out as a possibility or	3	me, if I may.
4	rather diminishing it to a vanishingly small	3 4	me, if I may. Is the net result of your evidence that as far as
4 5	rather diminishing it to a vanishingly small possibility?	3 4 5	me, if I may. Is the net result of your evidence that as far as your previous evidence is concerned, where you were
4 5 6	rather diminishing it to a vanishingly small possibility? A. I don't think anything can be ruled out on the data that	3 4 5 6	me, if I may. Is the net result of your evidence that as far as your previous evidence is concerned, where you were taken through on the last occasion a series of possible
4 5 6 7	rather diminishing it to a vanishingly small possibility? A. I don't think anything can be ruled out on the data that we have about the circumstances and nature of	3 4 5 6 7	me, if I may. Is the net result of your evidence that as far as your previous evidence is concerned, where you were taken through on the last occasion a series of possible poisons, they all remain, to put it in layman's terms,
4 5 6 7 8	rather diminishing it to a vanishingly small possibility? A. I don't think anything can be ruled out on the data that we have about the circumstances and nature of Mr Perepilichnyy's illness.	3 4 5 6 7 8	me, if I may. Is the net result of your evidence that as far as your previous evidence is concerned, where you were taken through on the last occasion a series of possible poisons, they all remain, to put it in layman's terms, still in play?
4 5 6 7 8 9	rather diminishing it to a vanishingly small possibility? A. I don't think anything can be ruled out on the data that we have about the circumstances and nature of Mr Perepilichnyy's illness. Q. So it is possible but highly unlikely, is that a fair	3 4 5 6 7 8 9	me, if I may. Is the net result of your evidence that as far as your previous evidence is concerned, where you were taken through on the last occasion a series of possible poisons, they all remain, to put it in layman's terms, still in play? A. Correct.
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3 A. I would aboutletly defer to Dr Rice. 4 Q. Is there anything generally lust you have heard in light 5 of the most recent material that would change your 6 evidence that you gave on the last occasion about that 7 group? 8 A. There is nothing that would change my evidence and as 9 far as I show nothing new has emerged about the Korean 10 murder attributed to a nerve agent called VX. 11 Perhaps I should say nothing in the public domain 12 has energed. 13 MS BILLI. Thank you. 14 THE CORONER: Thank you. 15 Questions from MS BARTON 15 Questions from MS BARTON 16 MS BARTON: I am anking questions on behalf of Surrey Police 17 and J just went to clarify one or two issues with you if 18 I Irray. 19 In the course of the hearing last year, 20 De Fegan-Earl, the publicologist, described the series of 21 tests carried out in this case on the samples as being 22 one of the most evaluative toxicological analyses he has 23 ever seen, would you agree with that? 24 A. I didn't hear him say that, but if that is what he said 25 then I am happy to accept it. 26 Q. Do you agree that an far as you are concerned, there has 27 been exhaustive toxicological analysis but, 28 as we have discussed. It is not exhaustive and cyanide 29 is a case in point. 20 Q. No was agree that as far as you are concerned, there has 21 been exhaustive toxicological analysis but, 22 as we have discussed that too, I think, and the 23 analysis that is case? 24 A. Vell, we have discussed that too, I think, and the 25 answer is it has been very extensive. 26 Q. You have posted a number of possibilities which arise 27 from the evidence that is available and the clinical 28 revidence and training that the concerned, there has 29 from the evidence that is available and the clinical 29 from the evidence that is available and the clinical 20 group of the most evaluation of the clinical 21 from the evidence that is available and the clinical 22 from the evidence that is available and the clinical 23 from the evidence that is available and the clinical 24 from the e	1	you could give further evidence about today or would you	1	A sorry, as independent cardiac cause, I think.
4 A. That is not my view. Lam not able to express a view, group? 5 of the most recent material that would change your certain flight of the most recent material that would change your group? 6 evidence that you give on the list occasion about that group? 7 group? 7 June 1 June 1 June 2 June 1 June 2 Ju	2	defer to Dr Rice on that issue?	2	Q. Your view is that they are not more likely than the
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Page 110 Page 112	25	Q. Yes.	25	very much indeed.
1 agt 110		Page 110		Page 112
		1 agc 110		1 agc 112

1	(1.10 pm)	1	correct?
2	(The Luncheon Adjournment)	2	A. Yes.
3	(2.15 pm)	3	Q. Then behind tab 34, a final letter dated 29 March this
4	THE CORONER: Mr Wastell I was going to say whoever out of	4	year?
5	you or Mr Skelton is dealing with the witnesses I am	5	A. That's correct, yes.
6	very content and indeed I think it is helpful, I am	6	Q. As a matter of generality, do you stand by the
7	happy for people to do a summary of where we are so far	7	professional opinions you have expressed in those
8	before going into new material, I find it helpful but	8	documents subject to any clarification today?
9	you take your own course.	9	A. Yes, I do.
10	MR WASTELL: Thank you, sir.	10	Q. Before I turn to the matters you have covered in those
11	DR GEOFFREY KITE (sworn)	11	reports, can I set them in some context, please.
12	Questions from MR WASTELL	12	A. Hmm.
13	MR WASTELL: Dr Kite, as you know I ask questions on behalf	13	Q. I am going to deal first of all with the headlines of
14	of the coroner. If you could remember as far as	14	your conclusions and then delve into the detail a little
15	possible to keep your voice up, that would be helpful,	15	bit.
16	we will let you know if it drops.	16	It was your testing at Kew, indeed you, who first
17	THE CORONER: I think it is an even it has a higher	17	raised the possibility of a toxic alkaloid in
18	ceiling probably than where we were and there is a	18	Mr Perepilichnyy's stomach being gelsemicine or having
19	background hum.	19	the same molecular formula as alkaloids from that
20	Is that switched on that? Maybe.	20	species. Is that right?
21	Anyway, we will see how we get on. Yes.	21	A. That's correct.
22	MR WASTELL: Dr Kite in terms of your position at Kew, can	22	Q. Following your testing and analysis at Kew, can you just
23	you remind the court, are you still a laboratory manager	23	please confirm your overall conclusions to the best of
24	responsible for operating the liquid chromatography mass	24	your professional opinion.
25	spectrometer.	25	First, as far as you are concerned, have you, or to
	Page 113		Page 115
		.	
1	A. Yes, I am.	1	the best of your knowledge has anyone else, found a rare
2	Q. By way of your qualifications, you are a botanist by	2	and deadly toxic alkaloid, namely gelsemicine, in
3	background, that is your degree and PhD, is that right? A. Correct, yes.	3	Mr Perepilichnyy's stomach or indeed traces of such
4			49
_	• •	4	a compound?
5	Q. I think as you say last time you were funnelled into	5	A. No.
6	Q. I think as you say last time you were funnelled into chemical analysis since joining Kew?	5 6	A. No. Q. To what standard of proof do you reach that conclusion?
6	Q. I think as you say last time you were funnelled into chemical analysis since joining Kew?A. In 1986, yes.	5 6 7	A. No.Q. To what standard of proof do you reach that conclusion?A. Beyond reasonable doubt.
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6 7 8 9	 Q. I think as you say last time you were funnelled into chemical analysis since joining Kew? A. In 1986, yes. Q. How long are the worked with the mass spectrometer? A. That would be 32 years. 	5 6 7 8 9	 A. No. Q. To what standard of proof do you reach that conclusion? A. Beyond reasonable doubt. Q. Second, as far as you are concerned THE CORONER: Hold on, sorry, just a minute.
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1	stomach?	1	the Dictionary of Natural Products as having the formula
2	A. No, because in the original report I eliminated that	2	C20H26N2O4?
3	possibility.	3	A. No.
4	Q. Say that again, in the original report?	4	Q. And of course nothing to do with scotanamine A?
5	A. In the original report I eliminated that possibility.	5	A. No.
6	Q. You eliminated that possibility?	6	Q. To be clear, to what standard of proof do you reach that
7	A. In the first report that was written.	7	conclusion?
8	Q. That was in 2013?	8	A. Beyond reasonable doubt.
9	A. Yes.	9	Q. Do you consider it unusual or surprising to have
10	Q. Third, as far as you are concerned, have you, or to the	10	a compound in the stomach sample that you haven't gone
11	best of your knowledge has anyone else, found traces of	11	on to identify?
12	any plant toxin identifiable in databases or the	12	A. No.
13	spectral library at Kew in Mr Perepilichnyy's stomach?	13	Q. How many other unidentified compounds are there likely
14	A. No, we haven't found any trace of the toxins that we	14	to have been in the stomach sample?
15	have looked for in the lists provided.	15	A. The computerised data extraction identified over 300.
16	Q. To what standard of proof do you reach that conclusion?	16	Q. Over 300?
17	A. That is beyond reasonable doubt.	17	A. Yes.
18	Q. Fourthly, as far as you are concerned, have you or to	18	Q. Thank you, Dr Kite.
19	the best of your knowledge has anyone else, found traces	19	Having dealt with the headline conclusions, I am now
20	of a plant toxin identifiable in databases or the	20	going to just delve into the detail as to how you
21	separately library at Kew, in any of the other samples	21	reached them, if I may, before coming to the further
22	from Mr Perepilichnyy, namely the duodenum, jejunum,	22	work that you have done since the last hearing.
23	ileum, blood or urine?	23	It is right, isn't it, that originally in May 2013,
24	A. No, we haven't.	24	you came to analyse samples from Mr Perepilichnyy's
25	Q. To what standard do you reach that conclusion?	25	blood, and his stomach and higher intestinal tract and
	Page 117		Page 119
1	A. Same, beyond reasonable doubt.	1	later his urine using LCMS, liquid chromatography mass
	, ,		later ins arme using Ectvis, inquia emoniatography mass
2	Q. Fifthly, following testing of a compound that has become	2	spectrometry, to see whether any plant toxins were
2 3	· · · · · ·		
	Q. Fifthly, following testing of a compound that has become	2	spectrometry, to see whether any plant toxins were
3	Q. Fifthly, following testing of a compound that has become the focus of some considerable attention over the years,	2 3	spectrometry, to see whether any plant toxins were present when compared to your own database and spectral
3 4	Q. Fifthly, following testing of a compound that has become the focus of some considerable attention over the years, do you consider that that compound has the molecular	2 3 4	spectrometry, to see whether any plant toxins were present when compared to your own database and spectral library, yes?
3 4 5	Q. Fifthly, following testing of a compound that has become the focus of some considerable attention over the years, do you consider that that compound has the molecular formula C20H26N2O4?	2 3 4 5	spectrometry, to see whether any plant toxins were present when compared to your own database and spectral library, yes? A. Yes.
3 4 5 6	 Q. Fifthly, following testing of a compound that has become the focus of some considerable attention over the years, do you consider that that compound has the molecular formula C20H26N2O4? A. Are you referring to what has been called the unknown? 	2 3 4 5 6	spectrometry, to see whether any plant toxins were present when compared to your own database and spectral library, yes? A. Yes. Q. You did detect a compound in that sample from what was
3 4 5 6 7	 Q. Fifthly, following testing of a compound that has become the focus of some considerable attention over the years, do you consider that that compound has the molecular formula C20H26N2O4? A. Are you referring to what has been called the unknown? Is that what you are referring to, that compound? 	2 3 4 5 6 7	spectrometry, to see whether any plant toxins were present when compared to your own database and spectral library, yes? A. Yes. Q. You did detect a compound in that sample from what was left of Mr Perepilichnyy's stomach, AWF/32, that
3 4 5 6 7 8	 Q. Fifthly, following testing of a compound that has become the focus of some considerable attention over the years, do you consider that that compound has the molecular formula C20H26N2O4? A. Are you referring to what has been called the unknown? Is that what you are referring to, that compound? Q. Yes, what has been referred to as the unknown compound 	2 3 4 5 6 7 8	spectrometry, to see whether any plant toxins were present when compared to your own database and spectral library, yes? A. Yes. Q. You did detect a compound in that sample from what was left of Mr Perepilichnyy's stomach, AWF/32, that appeared to you to have the same mass within five parts
3 4 5 6 7 8 9	 Q. Fifthly, following testing of a compound that has become the focus of some considerable attention over the years, do you consider that that compound has the molecular formula C20H26N2O4? A. Are you referring to what has been called the unknown? Is that what you are referring to, that compound? Q. Yes, what has been referred to as the unknown compound that you have done a series of tests on over the years? 	2 3 4 5 6 7 8 9	spectrometry, to see whether any plant toxins were present when compared to your own database and spectral library, yes? A. Yes. Q. You did detect a compound in that sample from what was left of Mr Perepilichnyy's stomach, AWF/32, that appeared to you to have the same mass within five parts per million, and so the same molecular formula as
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3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	 Q. Fifthly, following testing of a compound that has become the focus of some considerable attention over the years, do you consider that that compound has the molecular formula C20H26N2O4? A. Are you referring to what has been called the unknown? Is that what you are referring to, that compound? Q. Yes, what has been referred to as the unknown compound that you have done a series of tests on over the years? A. No, I believe the molecular form of that is half of that, basically. Q. Being C10H13NO2? A. I will just check that. (Pause) C10H13NO2. Q. Just to be clear, your conclusion is that the unknown, unidentified compound has that molecular formula? A. Yes. Q. To what standard of proof do you reach that conclusion? A. Beyond reasonable doubt. Q. Does it therefore follow that, if you are right that the formula is C10H13NO2, then that compound, which has been the focus of an assertive link to gelsemium, in fact has 	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	spectrometry, to see whether any plant toxins were present when compared to your own database and spectral library, yes? A. Yes. Q. You did detect a compound in that sample from what was left of Mr Perepilichnyy's stomach, AWF/32, that appeared to you to have the same mass within five parts per million, and so the same molecular formula as gelsemicine, do I have that right? A. Yes. Q. That was on the basis of an assumption, wasn't it? A. It was done by data mining, which was literally looking for any ions produced in the analysis which mathematically matched the ions predicted that the compound on the list of toxins would have produced. Q. On the last occasion you explained to us that you made an assumption in equating that ion with the molecular formula, C20H26N2O4, that you have now told us beyond doubt it was not? A. Yes, I originally assigned that ion to a protonated ion. Q. To be clear, that means charged with hydrogen?
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	 Q. Fifthly, following testing of a compound that has become the focus of some considerable attention over the years, do you consider that that compound has the molecular formula C20H26N2O4? A. Are you referring to what has been called the unknown? Is that what you are referring to, that compound? Q. Yes, what has been referred to as the unknown compound that you have done a series of tests on over the years? A. No, I believe the molecular form of that is half of that, basically. Q. Being C10H13NO2? A. I will just check that. (Pause) C10H13NO2. Q. Just to be clear, your conclusion is that the unknown, unidentified compound has that molecular formula? A. Yes. Q. To what standard of proof do you reach that conclusion? A. Beyond reasonable doubt. Q. Does it therefore follow that, if you are right that the formula is C10H13NO2, then that compound, which has been the focus of an assertive link to gelsemium, in fact has nothing to do with gelsemicine? 	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	spectrometry, to see whether any plant toxins were present when compared to your own database and spectral library, yes? A. Yes. Q. You did detect a compound in that sample from what was left of Mr Perepilichnyy's stomach, AWF/32, that appeared to you to have the same mass within five parts per million, and so the same molecular formula as gelsemicine, do I have that right? A. Yes. Q. That was on the basis of an assumption, wasn't it? A. It was done by data mining, which was literally looking for any ions produced in the analysis which mathematically matched the ions predicted that the compound on the list of toxins would have produced. Q. On the last occasion you explained to us that you made an assumption in equating that ion with the molecular formula, C20H26N2O4, that you have now told us beyond doubt it was not? A. Yes, I originally assigned that ion to a protonated ion. Q. To be clear, that means charged with hydrogen? A. Hydrogen ion, yes.
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3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	 Q. Fifthly, following testing of a compound that has become the focus of some considerable attention over the years, do you consider that that compound has the molecular formula C20H26N2O4? A. Are you referring to what has been called the unknown? Is that what you are referring to, that compound? Q. Yes, what has been referred to as the unknown compound that you have done a series of tests on over the years? A. No, I believe the molecular form of that is half of that, basically. Q. Being C10H13NO2? A. I will just check that. (Pause) C10H13NO2. Q. Just to be clear, your conclusion is that the unknown, unidentified compound has that molecular formula? A. Yes. Q. To what standard of proof do you reach that conclusion? A. Beyond reasonable doubt. Q. Does it therefore follow that, if you are right that the formula is C10H13NO2, then that compound, which has been the focus of an assertive link to gelsemium, in fact has nothing to do with gelsemicine? A. Yes, it has nothing to do with it. 	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	spectrometry, to see whether any plant toxins were present when compared to your own database and spectral library, yes? A. Yes. Q. You did detect a compound in that sample from what was left of Mr Perepilichnyy's stomach, AWF/32, that appeared to you to have the same mass within five parts per million, and so the same molecular formula as gelsemicine, do I have that right? A. Yes. Q. That was on the basis of an assumption, wasn't it? A. It was done by data mining, which was literally looking for any ions produced in the analysis which mathematically matched the ions predicted that the compound on the list of toxins would have produced. Q. On the last occasion you explained to us that you made an assumption in equating that ion with the molecular formula, C20H26N2O4, that you have now told us beyond doubt it was not? A. Yes, I originally assigned that ion to a protonated ion. Q. To be clear, that means charged with hydrogen? A. Hydrogen ion, yes. Q. Also that it was one compound, is that right?

1 Q. You lodd the court list time that that assumption was 2 probably wrong. You have done some further work to look at that, which we will turn to shortly. Is that right? 3 A. Yes. 5 Q. The consequence of not challenging that assumption at the time, of adopting that assumption was that you continued down the path of the assumption that this ion was one molecule, didn't you? 3 A. Yes. 6 Q. The meant that gelsemiene and potentially other allowed from the glober in many species became relevant? 10 Q. That meant that gelsemiene and potentially other allowed from the glober on the request of the control of the first was not gelsemious species became relevant? 11 alloaded from the glober on the request of the control of the first was not gelsemious species became relevant? 12 A. I think we did the further work on the request of the control of the first was not gelsemious species became relevant? 13 courts. I was still astified right from the fleghning that it was not gebenicine; we were responding to request from the court. 14 that it was not gebenicine; we were responding to request from the court. 15 courts from the court. 16 Q. Just before we focus on that, you also I think found an ion with a similar mass to gebenicine in the unine sample, didn't you? 16 A. That was a very, very frace ion. 17 alloaded from the glober of the court of the				
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the time, of adopting that assumption, was that you continued down the path of the assumption that this ion was no molecule, dirity you? A. Y. Yes. Q. That meant that gelsemicine and potentially other alkaloids from the gelsemicine and potentially other alkaloids from the gelsemicine and potentially other alkaloids from the gelsemicine; we were responding to request from the court. G. Just before we focus on that, you also I think found an ion with a similar mass to gelsemicine in the urine sample, didn't you? A. That was a very, very trace ion. Q. Just before we focus on that, you also I think found an ion with a similar mass to gelsemicine in the urine evidence to us before? A. We could get no further evidence on that, it is at such you levels we cannot even prove what type of ion it is. Q. Could you assign a molecular formula to it? A. No. Page 121 Q. Can we ignore that ion in the urine, Dr Kite? A. Ny belief is you can ignore it, yes. Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked air? A. It was about just under ten times less than the most abundant compound. I should clarify that, that is the ion which I now belief the post post post in the sample of that the half of the ion is ten times more provalent than the putative single larger ion? A. Yes. Q. The compound that became the focus of so much attention, the unknown compound to be, if you refer to the actual ion 359, that is about 100 times less — Q. The should clarify that, that is the ion which I now belief to the post statement that the half of the ion is ten times more provalent That the half of the ion is ten times more provalent That the half of the ion is ten times more provalent That the half of the ion is ten times more provalent That the half of the ion is ten times more provalent That the half of the ion is ten times more provalent That the half of the ion is ten times more provalent That the half of the ion is ten times more provalent That				
7 C. You look at biological material as I understand it in was one molecule, didn't you? 9 A. Yes. 10 Q. That mean that gelsemicine and potentially other all alloads from the gelsemium species became relevant? 21 A. I think we did the further work on the request of the court. 22 C. I have still satisfied right from the beginning that it was not gelsemicine; we were responding to requests from the court. 23 C. Just before we focus on that, you also I think found an ion with a similar mass to gelsemicine in the urine sample, didn't you? 24 A. That was a very, very trace ion. 25 Q. Just explain again why you have discounted that in your evidence to us before? 26 Q. Just explain again why you have discounted that in your evidence to us before? 27 A. We could get on further evidence on that, it is at such loss the work of the court. 28 Q. Could you assign a molecular formula to it? 29 Q. To did you assign a molecular formula to it? 29 A. No. 20 Page 121 1 Q. Can we ignore that ion in the urine, Dr Kite? 2 A. My belief is you can ignore it, yes. 3 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? 4 A. It was about just under ten times less than the most abundant compound. 5 I should clarify that, that is the ion which I now believe the compound to be. If you refer to the actual ion 359, that is about 100 times less — 100 that is not into its to times more prevalent than the putative single larger ion? 4 A. Yes. 4 A. Yes. 5 Q. The ion that you have now identified as a cluster of the that has been referred to as the unidentified compound? 5 A. Yes. 6 Q. The ion that you have now identified as a cluster of the that a spoule of the uniform of the levels of the most abundant compound? 6 A. Yes. 7 Q. Dose "unidentified" here mean incapable of the compound of the unknown compound but at a unidentified? 8 A. Yes. 9 Q. Dose "unidentified" here mean incapable of declarity that that you have not gone on to				
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4. Yes. 9 A. Yes. 10 Q. That meant that gelsemicine and potentially other allacloids from the gelsemium species became relevant? 11 allacloids from the gelsemium species became relevant? 12 A. I think we did the further work on the request of the court. 13 courts. I was still satisfied right from the beginning that it was not gelsemicine; we were responding to requests from the court. 14 courts. I was still satisfied right from the beginning that it was not gelsemicine; we were responding to requests from the court. 15 courts. I was still satisfied right from the beginning that it was not gelsemicine; we were responding to an in with a similar mass to gelsemicine in the urine sample, didn't you? 16 A. That was a very, very trace ion. 17 evidence to us before; 18 2 A. We could get no further evidence on that, it is at such low levels we cannot even prove what type of ion it is. 29 Q. Could you assign a molecular formula to it? 20 Q. Could you assign a molecular formula to it? 21 Q. Can we ignore that ion in the urine, Dr Kite? 22 A. My oblief is you can ignore it, yes. 23 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? 24 A. I have looked at? 25 A. I was about just under ten times less than the most abundant compound. 26 A. I twas about just under ten times less than the most abundant compound. 27 a boundant compound. 28 I should charfly that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less— 29 Q. Now, it has been referred to as the unidentified compound? 20 Q. The ion that you have now identified as a cluster of two was present as I understand your vidence just now, in 100th of the kevels of the most abundant compound? 29 A. Yes. 20 Q. Does 'unidentified' here mean incapable of compound to the unknown compound. 20 G. We, we present as I understand your vidence just now, in 100th of the kevels of the most abundant compound? 20 G. We,				
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that it was not gelsemicine; we were responding to requests from the court. Q. Just before we focus on that, you also I think found an ion with a similar mass to gelsemicine in the urine sample, didn't you? A. That was a very, very trace ion. Q. Just explain again why you have discounted that in your evidence to us before? A. We could get no further evidence on that, it is at such low levels we cannot even prove what type of ion it is. A. No. Page 121 Q. Could you assign a molecular formula to it? A. No. Page 121 Q. Can we ignore that ion in the urine, Dr Kite? A. My belief is you can ignore it, yes. Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? A. It was about just under ten times less than the most abundant compound. B. T should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less — 10 Q. Yes, because it is your evidence in the joint statement than the putative single larger ion? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Do you have any experience before this case of looking at stomach contents? A. I have looked at livestock stomach contents and some human, so not a great deal. Q. Given that experience, on a great deal. Page 123 Lypically, a large number of — A. Yes. Jo Did you identify the third most dominant compound in immediate the compound of the wash of the count of the curs of the count of the curs of the count of the curs of th				
15 requests from the court. 16 Q. Just before we focus on that, you also I think found an ion with a similar mass to gelsemicine in the urine sample, didn't you? 19 A. That was a very, very trace ion. 20 Q. Just explain again why you have discounted that in your evidence to us before? 21 A. We could get no further evidence on that, it is at such low levels we cannot even prove what type of ion it is. 22 Q. Could you assign a molecular formula to it? 23 Jo well before what it is at such low levels we cannot even prove what type of ion it is. 24 Q. Could you assign a molecular formula to it? 25 A. No. 26 Page 121 1 Q. Can we ignore that ion in the urine, Dr Kite? 2 A. My belief is you can ignore it, yes. 3 Q. The compound that became the focus of soo much attention, the unknown compound, how abundant was it in the sample you looked at? 4 A. It was about just under ten times less than the most abundant compound. 5 A. It was about just under ten times less than the most abundant compound to be, if you refer to the actual ion 359, that is about 100 times less				
16 Q. Just before we focus on that, you also I think found an ion with a similar mass to gelsemicine in the urine sage and in with a similar mass to gelsemicine in the urine sage and in with a similar mass to gelsemicine in the urine sage and in with a similar mass to gelsemicine in the urine sage and in with a similar mass to gelsemicine in the urine of the work of the most and some human, so not a great deal. Q. Just explain again why you have discounted that in your evidence to us before? A. We could get no further evidence on that, it is at such low levels we cannot even prove what type of ion it is. Q. Could you assign a molecular formula to it? A. No. Page 121 Q. Can we ignore that ion in the urine, Dr Kite? A. My belief is you can ignore it, yes. Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? A. It was about just under ten times less than the most abundant compound. I should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less— Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence in the joint statement than the pattive single larger ion? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Now, it has been referred to as the unidentified compound? But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. Q. Does "unidentified" here mean incapable of identification or just that you have not widence in the joint statement than the pattive single larger ion? A. Yes. Q. Does "unidentified" here mean incapable of identification or just that you have not widence in the joint statement than the pattive single larger ion? A. Yes. Q. Does "unidentified" here mean incapable of identification or just that you have not ween the focus of some meaning acids the formulation of the most of the most domina				
17 Q. Do you have any experience before this case of looking at stomach contents? 28 A. Hat was a very, very trace ion. 29 Q. Just explain again why you have discounted that in your evidence to us before? 20 A. We could get no further evidence on that, it is at such low levels we cannot even prove what type of ion it is. 24 Q. Could you assign a molecular formula to it? 25 A. No. Page 121 1 Q. Can we ignore that ion in the urine, Dr Kite? A. My belief is you can ignore it, yes. 3 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked ar? A. It was about just under ten times less than the most abundant compound to be, if you refer to the actual ion 359, that is about 100 times less — Q. The compound to be, if you refer to the actual ion 359, that is about 100 times less — Q. The jour evidence in the joint statement that the half of the ion is ten times more prevalent in than the putative single larger ion? A. Yes. 15 Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence in the joint statement in 100 th of the levels of the most abundant compound? A. Yes. 15 Q. Now, it has been referred to as the unidentified compound? A. Yes. 16 But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. 20 Dos you have any experience before this case of looking at stomach contents? A. I have looked at livestock stomach contents and some humans, so not a great deal of experience, but given that experience, again, would you find. Page 121 1 typically, a large number of — A. Yes. 2 Q. To take an example, of a hitherto unidentified compounds? 4 A. Yes. 9 Q. To take an example, of a hitherto unidentified compound in that sample? 4 A. Yes. 10 Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent 110 (1) Q. Yes, because it is your evidence in the joint statement than the putative				
18 sample, didn't you? 19 A. That was a very, very trace ion. 20 Q. Just explain again why you have discounted that in your evidence to us before? 21 A. We could get no further evidence on that, it is at such low levels we cannot even prove what type of ion it is. 22 Q. Could you assign a molecular formula to it? 23 A. No. Page 121 1 Q. Can we ignore that ion in the urine, Dr Kite? 2 A. My belief is you can ignore it, yes. 3 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? 4 A. It was about just under ten times less than the most abundant compound. 5 I should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less — 11 Q. Yes, because it is your evidence in the joint statement than the putative single larger ion? 14 A. Yes. 15 Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in has been referred to as the unidentified? 21 A. Thave looked at livestock stomach contents and some humans, so not a great deal. 22 D. Go you have any experience before this case of looking at stomach contents? 23 A. I have looked at livestock stomach contents and some humans, so not a great deal. 24 Q. Given that experience, not a great deal of experience, but given that experience, not a great deal. 25 A. Yes. 26 Q. To take an example, of a hitherto unidentified compound in the sample? 27 A. Yes. 28 A. Yes. 29 Q. Dod you identify the third most dominant compound in that sample? 29 Live that experience, not a great deal. 29 Q. To take an example, of a hitherto unidentified compound in the sample with the sample? 20 P. Journal of the times less than the most and the most abundant compound in the sample? 20 P. Journal of the times less than the most and the sample? 21 P. Journal of the times deal of experience, not a great deal of experience, not a great deal. 24 Q. Go iven that experience, not a great deal of exper				•
19 A. That was a very, very trace ion. 20 Q. Just explain again why you have discounted that in your evidence to us before? 21 A. We could get no further evidence on that, it is at such low levels we cannot even prove what type of ion it is. 22 Q. Could you assign a molecular formula to it? 23 A. No. Page 121 10 Q. Can we ignore that ion in the urine, Dr Kite? 21 A. My belief is you can ignore it, yes. 32 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? 33 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? 4 A. It was about just under ten times less than the most abundant compound. 4 Tabould clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less— 4 Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent that the half of the ion i				
20 Q. Just explain again why you have discounted that in your evidence to us before? 21 A. We could get no further evidence on that, it is at such low levels we cannot even prove what type of ion it is. 22 A. No. 23 low levels we cannot even prove what type of ion it is. 24 Q. Could you assign a molecular formula to it? 25 A. No. 26 Page 121 1 Q. Can we ignore that ion in the urine, Dr Kite? 2 A. My belief is you can ignore it, yes. 3 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? 4 A. It was about just under ten times less than the most abundant compound. 5 A. It was about just under ten times less than the most abundant compound. 6 A. It was about just under ten times less than the most abundant compound. 7 A. Yes. 9 Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent that the half of the ion is ten times more prevalent that the half of the ion is ten times more prevalent than the putative single larger ion? 14 A. Yes. 15 Q. Now, it has been referred to as the unidentified compound? 16 two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? 17 in 100th of the levels of the most abundant compound? 18 A. Yes. 19 Q. Now, it has been referred to as the unidentified compound or the unknown compound. 10 Given that experience, not a great deal of experience, but given that experience, not a great deal. 20 G. Given that experience, not a great deal of experience, but given that experience, not a great deal. 21 Typically, a large number of — 22 A. Yes. 23 A. Yes. 24 D. Judically, a large number of — 24 A. Yes. 25 Use an example, of a hitherto unidentified compounds? 26 A. Yes. 27 Did take an example, of a hitherto unidentified compound in the Percipility by 50 ioligical samples, did you look at AWF33 this year again, the duodenum sample? 26 Did you identify the third most dominant compound in that sample? 27 Did you ident			1	
21 evidence to us before? 22 A. We could get no further evidence on that, it is at such low levels we cannot even prove what type of ion it is. 23 Q. Could you assign a molecular formula to it? 24 A. No. Page 121 1 Q. Can we ignore that ion in the urine, Dr Kite? 2 A. My belief is you can ignore it, yes. 3 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? 4 A. It was about just under ten times less than the most abundant compound. 8 I should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less—12 than the putative single larger ion? 4 A. Yes. Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Now, it has been referred to as the unidentified? Q. Now, it has been referred to as the unidentified? 20 Now, it has been referred to us, there were approximately 300 other compounds. 21 But as you have just explained to us, there were approximately 300 other compounds that are unidentified? 22 A. Yes. 24 Q. Does 'unidentified' here mean incapable of identification or just that you have not gone on to				
22 A. We could get no further evidence on that, it is at such 23 low levels we cannot even prove what type of ion it is. 24 Q. Could you assign a molecular formula to it? 25 A. No. Page 121 1 Q. Can we ignore that ion in the urine, Dr Kite? 2 A. My belief is you can ignore it, yes. 3 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? 4 A. Yes. 5 Q. To take an example, of a hitherto unidentified compound in the falf of the ion is ten times more prevalent that the half of the ion is ten times more prevalent than the putative single larger ion? 1 Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent in 100th of the levels of the most abundant compound? A. Yes. 1 Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? A. Yes. 1 Q. Now, it has been referred to as the unidentified compound or the unknown compound. But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. 2 A. Yes. 3 A. I have looked at livestock stomach contents and some human, so not a great deal. 2 Q. Given that experience, again, would you find. Page 123 1 typically, a large number of 2 A. Yes. 5 Q. To take an example, of a hitherto unidentified compounds? 4 A. Yes. 6 Q. Did you identified compounds? 8 A. Yes. 9 Q. Did you identified third most dominant compound in that sample? 1 If you need your notes 1 If you need your notes 1 If you need your notes 1 A. Are we referring to phenylalanine? 1 A. Yes. 1 Q. Paragraph 4 on page 527. 1 A. Yes. 1 Q. How common is phenylalanine? 1 A. Yes. 1 Q. How common is phenylalanine? 1 A. Yes. 1 Q. How common is phenylalanine? 2 Q. Give us some context to that? 2 A. Very common. 2 Q. Give us some context to that? 3 A. It is in every living organism, I should imagine, it is an amino acid in protein. 2				
23 low levels we cannot even prove what type of ion it is. Q. Could you assign a molecular formula to it? 24 Q. Given that experience, not a great deal of experience, but given that experience, again, would you find, 25 Dage 123 1			1	
24 Q. Could you assign a molecular formula to it? 25 A. No. Page 121 1 Q. Can we ignore that ion in the urine, Dr Kite? 2 A. My belief is you can ignore it, yes. 3 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? 4 A. It was about just under ten times less than the most abundant compound. 5 I should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion ion 359, that is about 100 times less 11 Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent than the putative single larger ion? 14 A. Yes. 15 Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? 16 A. Yes. 17 Q. Now, it has been referred to as the unidentified compound? 18 A. Yes. 19 Q. Now, it has been referred to as the unidentified compound? 20 C. To take an example, of a hitherto unidentified compound in Mr Pereplitichnyy's biological samples, did you look at AWF/33 this year again, the duodenum sample? 28 A. Yes. 29 Q. Did you identify the third most dominant compound in that sample? 20 If you need your notes 21 A. Yes. 21 A. Yes. 22 Q. Peragraph 4 on page 527. 23 A. Yes. 24 Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to 29 Q. Give us some context to that? 20 Q. Give us some context to that? 21 A. Yes. 22 Q. Give us some context to that? 23 A. It is in every living organism, I should imagine, it is an amino acid in protein. 25 Q. Up to that point had you identified phenylalanine in			1	
Page 121 Page 123 Q. Can we ignore that ion in the urine, Dr Kite? A. My belief is you can ignore it, yes. Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? A. It was about just under ten times less than the most abundant compound. I should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less — Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent than the putative single larger ion? A. Yes. Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Now, it has been referred to as the unidentified compound? A. Yes. Q. Now, it has been referred to as the unidentified compound in the that are unidentified? A. Yes, most of the major components in the sample were amino acids. For reasons we might go on to we confirmed unambiguously that the third most dominant component was the amino acid phenylalanine? A. Very common. Q. Give us some context to that? A. It is in every living organism, I should imagine, it is an amino acid in protein.			24	
1 Q. Can we ignore that ion in the urine, Dr Kite? 2 A. My belief is you can ignore it, yes. 3 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? 4 A. It was about just under ten times less than the most abundant compound. 5 A. It was about just under ten times less than the most abundant compound. 6 A. It was about just under ten times less than the most abundant compound. 7 I should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less — 11 Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent than the putative single larger ion? 14 A. Yes. 15 Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? 16 A. Yes. 17 in 100th of the levels of the most abundant compound? 18 A. Yes. 19 Q. Now, it has been referred to as the unidentified compound in that sample? 20 compound or the unknown compound. 21 But as you have just explained to us, there were approximately 300 other compounds that are unidentified? 22 A. Yes. 23 A. Yes. 24 Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to	25		25	
1 Q. Can we ignore that ion in the urine, Dr Kite? 2 A. My belief is you can ignore it, yes. 3 Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? 4 A. It was about just under ten times less than the most abundant compound. 5 A. It was about just under ten times less than the most abundant compound. 6 A. It was about just under ten times less than the most abundant compound. 7 I should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less — 11 Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent than the putative single larger ion? 14 A. Yes. 15 Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? 16 A. Yes. 17 in 100th of the levels of the most abundant compound? 18 A. Yes. 19 Q. Now, it has been referred to as the unidentified compound in that sample? 20 compound or the unknown compound. 21 But as you have just explained to us, there were approximately 300 other compounds that are unidentified? 22 A. Yes. 23 A. Yes. 24 Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to				
A. My belief is you can ignore it, yes. Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? A. It was about just under ten times less than the most abundant compound. I should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less — Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent than the putative single larger ion? A. Yes. Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? A. Yes. Q. Now, it has been referred to as the unidentified compound shat are unidentified? A. Yes. Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to		Page 121		Page 123
Q. The compound that became the focus of so much attention, the unknown compound, how abundant was it in the sample you looked at? A. It was about just under ten times less than the most abundant compound. I should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less 10 Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent than the putative single larger ion? A. Yes. Q. The ion that you have now identified as a cluster of in 100th of the levels of the most abundant compound? A. Yes. Q. Now, it has been referred to as the unidentified compounds? A. Yes. Q. Now, it has been referred to as the unidentified compound in the remain acids. For reasons we might go on to we confirmed unambiguously that the third most dominant compound in that sample? A. Yes. Q. Now, it has been referred to as the unidentified? A. Yes. Q. Now, it has been referred to as the unidentified? A. Yes. Q. Now, it has been referred to as the unidentified? A. Yes. Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to	1	Q. Can we ignore that ion in the urine, Dr Kite?	1	typically, a large number of
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5 you looked at? 6 A. It was about just under ten times less than the most 7 abundant compound. 8 I should clarify that, that is the ion which I now 9 believe the compound to be, if you refer to the actual 10 ion 359, that is about 100 times less 11 Q. Yes, because it is your evidence in the joint statement 12 that the half of the ion is ten times more prevalent 13 than the putative single larger ion? 14 A. Yes. 15 Q. To take an example, of a hitherto unidentified ompound in fmr Perepilichnyy's biological samples, did you look 17 at AWF/33 this year again, the duodenum sample? 18 A. Yes. 19 Q. Did you identify the third most dominant compound in that sample? 10 that sample? 11 If you need your notes 12 A. Are we referring to phenylalanine? 13 Q. Yes, it is behind tab 32, your report of 12 March. 14 A. Yes. 15 Q. To take an example, of a hitherto unidentified compound 16 in Mr Perepilichnyy's biological samples, did you look 20 A. Yes. 21 If you need your notes 22 A. Yes. 23 A. Yes. 24 Q. Does "unidentified to as a cluster of that you have not gone on to 25 Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to	3	Q. The compound that became the focus of so much attention,	3	Q unidentified compounds?
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abundant compound. I should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent than the putative single larger ion? A. Yes. Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? A. Yes. Q. Now, it has been referred to as the unidentified compound or the unknown compound. But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. A. Yes. A. Yes. A. Yes, most of the major components in the sample were amino acids. For reasons we might go on to we confirmed unambiguously that the third most dominant component was the amino acid phenylalanine? A. Very common. A. Very common. A. Yes. A. Yes. A. Very common. C. Give us some context to that? A. It is in every living organism, I should imagine, it is an amino acid in protein. D. Up to that point had you identified phenylalanine in	5	you looked at?	5	Q. To take an example, of a hitherto unidentified compound
1 I should clarify that, that is the ion which I now believe the compound to be, if you refer to the actual ion 359, that is about 100 times less 1 Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent than the putative single larger ion? 1 A. Yes. 1 Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? 1 A. Yes. 1 Q. Now, it has been referred to as the unidentified compound or the unknown compound. 2 D. Now, it has been referred to as the unidentified compound or the unknown compound. 3 D. Now, it has been referred to as the unidentified? 4 D. Does "unidentified" here mean incapable of identification or just that you have not gone on to	6	A. It was about just under ten times less than the most	6	in Mr Perepilichnyy's biological samples, did you look
believe the compound to be, if you refer to the actual ion 359, that is about 100 times less 11 Q. Yes, because it is your evidence in the joint statement that the half of the ion is ten times more prevalent than the putative single larger ion? 14 A. Yes. 15 Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? 18 A. Yes. 19 Q. Now, it has been referred to as the unidentified compound or the unknown compound. 20 Q. Now, it has been referred to as the unidentified? 21 But as you have just explained to us, there were approximately 300 other compounds that are unidentified? 22 A. Yes. 23 A. Yes. 24 Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to believe the compound to the actual ion 359, that is about 100 times less 10 that sample? 11 If you need your notes 12 A. Are we referring to phenylalanine? 13 Q. Yes, it is behind tab 32, your report of 12 March. 14 A. Yes. 15 Q. Paragraph 4 on page 527. 16 A. Yes, most of the major components in the sample were amino acids. For reasons we might go on to we confirmed unambiguously that the third most dominant component was the amino acid phenylalanine. 26 Q. How common is phenylalanine? 27 Q. Give us some context to that? 28 A. It is in every living organism, I should imagine, it is an amino acid in protein. 29 Q. Up to that point had you identified phenylalanine in	7	abundant compound.	7	at AWF/33 this year again, the duodenum sample?
that the half of the ion is ten times more prevalent than the putative single larger ion? 14	8	I should clarify that, that is the ion which I now	8	A. Yes.
that the half of the ion is ten times more prevalent than the putative single larger ion? 1 A. Yes. 1 Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? 1 A. Yes. 1 Q. Now, it has been referred to as the unidentified compound or the unknown compound. 2 But as you have just explained to us, there were approximately 300 other compounds that are unidentified? 3 A. Yes. 4 Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to 1 If you need your notes — 1 A. Are we referring to phenylalanine? 1 A. Yes, it is behind tab 32, your report of 12 March. 1 A. Yes. 1 Q. Paragraph 4 on page 527. A. Yes, most of the major components in the sample were amino acids. For reasons we might go on to we confirmed unambiguously that the third most dominant component was the amino acid phenylalanine? 2 Q. How common is phenylalanine? 2 A. Very common. 2 Q. Give us some context to that? 2 A. It is in every living organism, I should imagine, it is an amino acid in protein. 2 Q. Up to that point had you identified phenylalanine in		believe the compound to be, if you refer to the actual	9	Q. Did you identify the third most dominant compound in
that the half of the ion is ten times more prevalent than the putative single larger ion? 14 A. Yes. 15 Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? 18 A. Yes. 19 Q. Now, it has been referred to as the unidentified compound or the unknown compound. 20 Compound or the unknown compound. 21 But as you have just explained to us, there were approximately 300 other compounds that are unidentified? 23 A. Yes. 24 Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to 12 A. Are we referring to phenylalanine? 13 Q. Yes, it is behind tab 32, your report of 12 March. 14 A. Yes. 15 Q. Paragraph 4 on page 527. 16 A. Yes, most of the major components in the sample were amino acids. For reasons we might go on to we confirmed unambiguously that the third most dominant component was the amino acid phenylalanine? 20 Q. How common is phenylalanine? 21 A. Very common. 22 Q. Give us some context to that? 23 A. It is in every living organism, I should imagine, it is 24 an amino acid in protein. 25 Q. Up to that point had you identified phenylalanine in	10	ion 359, that is about 100 times less	10	•
than the putative single larger ion? 14 A. Yes. 15 Q. The ion that you have now identified as a cluster of 16 two, was present as I understand your evidence just now, 17 in 100th of the levels of the most abundant compound? 18 A. Yes. 19 Q. Now, it has been referred to as the unidentified 20 compound or the unknown compound. 21 But as you have just explained to us, there were 22 approximately 300 other compounds that are unidentified? 23 A. Yes. 24 Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to 25 Up to that point had you identified phenylalanine in				
A. Yes. Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? A. Yes. Q. Now, it has been referred to as the unidentified compound or the unknown compound. But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. A. Yes. A. Yes. A. Very common. Q. Give us some context to that? A. Yes. Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to D. Does "unidentified" here mean incapable of identification or just that you have not gone on to D. A. Yes. A. Yes. A. Yes. D. Does "unidentified" here mean incapable of identification or just that you have not gone on to D. A. Yes. A. Yes. D. Paragraph 4 on page 527. A. Yes, most of the major components in the sample were amino acids. For reasons we might go on to we confirmed unambiguously that the third most dominant component was the amino acid phenylalanine. D. How common is phenylalanine? A. Very common. D. Give us some context to that? A. It is in every living organism, I should imagine, it is an amino acid in protein. D. Up to that point had you identified phenylalanine in		-		
Q. The ion that you have now identified as a cluster of two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? A. Yes. Q. Now, it has been referred to as the unidentified compound or the unknown compound. But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. Q. Paragraph 4 on page 527. A. Yes, most of the major components in the sample were amino acids. For reasons we might go on to we confirmed unambiguously that the third most dominant component was the amino acid phenylalanine. Q. How common is phenylalanine? A. Very common. Q. Give us some context to that? A. Yes. Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to D. Does "unidentified" here mean incapable of identification or just that you have not gone on to D. Very common. 22 Q. Give us some context to that? A. It is in every living organism, I should imagine, it is an amino acid in protein. Q. Up to that point had you identified phenylalanine in				, , , , , , , , , , , , , , , , , , , ,
two, was present as I understand your evidence just now, in 100th of the levels of the most abundant compound? A. Yes. Q. Now, it has been referred to as the unidentified compound or the unknown compound. But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. A. Yes. A. Yes. A. Yes. A. Yes. A. Yes. C. Give us some context to that? A. It is in every living organism, I should imagine, it is an amino acid in protein. C. Up to that point had you identified phenylalanine in				
in 100th of the levels of the most abundant compound? A. Yes. Q. Now, it has been referred to as the unidentified compound or the unknown compound. But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to amino acids. For reasons we might go on to we confirmed unambiguously that the third most dominant component was the amino acid phenylalanine. Q. How common is phenylalanine? A. Very common. Q. Give us some context to that? A. It is in every living organism, I should imagine, it is an amino acid in protein. Q. Up to that point had you identified phenylalanine in		•		
A. Yes. 18 unambiguously that the third most dominant component was 19 Q. Now, it has been referred to as the unidentified 20 compound or the unknown compound. 21 But as you have just explained to us, there were 22 approximately 300 other compounds that are unidentified? 23 A. Yes. 24 Q. Does "unidentified" here mean incapable of 25 identification or just that you have not gone on to 28 unambiguously that the third most dominant component was 29 the amino acid phenylalanine? 20 Q. How common is phenylalanine? 21 A. Very common. 22 Q. Give us some context to that? 23 A. It is in every living organism, I should imagine, it is 24 an amino acid in protein. 25 Q. Up to that point had you identified phenylalanine in		, ,		
Q. Now, it has been referred to as the unidentified compound or the unknown compound. But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to 19 the amino acid phenylalanine. Q. How common is phenylalanine? A. Very common. 22 Q. Give us some context to that? 23 A. It is in every living organism, I should imagine, it is 24 an amino acid in protein. 25 Q. Up to that point had you identified phenylalanine in	17	in 100th of the levels of the most abundant compound?	17	0 0
20 compound or the unknown compound. 21 But as you have just explained to us, there were 22 approximately 300 other compounds that are unidentified? 23 A. Yes. 24 Q. Does "unidentified" here mean incapable of 25 identification or just that you have not gone on to 20 Q. How common is phenylalanine? 21 A. Very common. 22 Q. Give us some context to that? 23 A. It is in every living organism, I should imagine, it is 24 an amino acid in protein. 25 Q. Up to that point had you identified phenylalanine in	4.0		4.0	
But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. Q. Does "unidentified" here mean incapable of identification or just that you have not gone on to 21 A. Very common. 22 Q. Give us some context to that? A. It is in every living organism, I should imagine, it is an amino acid in protein. 23 Q. Up to that point had you identified phenylalanine in				
22 approximately 300 other compounds that are unidentified? 23 A. Yes. 24 Q. Does "unidentified" here mean incapable of 25 identification or just that you have not gone on to 26 Q. Give us some context to that? 27 A. It is in every living organism, I should imagine, it is 28 an amino acid in protein. 29 Q. Give us some context to that? 20 Q. Give us some context to that? 21 A. It is in every living organism, I should imagine, it is 22 Q. Give us some context to that? 23 A. It is in every living organism, I should imagine, it is 24 an amino acid in protein. 25 Q. Up to that point had you identified phenylalanine in	19	Q. Now, it has been referred to as the unidentified	19	the amino acid phenylalanine.
23 A. Yes. 24 Q. Does "unidentified" here mean incapable of 25 identification or just that you have not gone on to 20 A. It is in every living organism, I should imagine, it is 21 an amino acid in protein. 22 Q. Up to that point had you identified phenylalanine in	19 20	Q. Now, it has been referred to as the unidentified compound or the unknown compound.	19 20	the amino acid phenylalanine. Q. How common is phenylalanine?
Q. Does "unidentified" here mean incapable of 24 an amino acid in protein. 25 identification or just that you have not gone on to 26 Q. Up to that point had you identified phenylalanine in	19 20 21	Q. Now, it has been referred to as the unidentified compound or the unknown compound.But as you have just explained to us, there were	19 20 21	the amino acid phenylalanine. Q. How common is phenylalanine? A. Very common.
25 identification or just that you have not gone on to 25 Q. Up to that point had you identified phenylalanine in	19 20 21 22	Q. Now, it has been referred to as the unidentified compound or the unknown compound.But as you have just explained to us, there were approximately 300 other compounds that are unidentified?	19 20 21 22	the amino acid phenylalanine. Q. How common is phenylalanine? A. Very common. Q. Give us some context to that?
	19 20 21 22 23	 Q. Now, it has been referred to as the unidentified compound or the unknown compound. But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. 	19 20 21 22 23	the amino acid phenylalanine. Q. How common is phenylalanine? A. Very common. Q. Give us some context to that? A. It is in every living organism, I should imagine, it is
Page 122 Page 124	19 20 21 22 23 24	 Q. Now, it has been referred to as the unidentified compound or the unknown compound. But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. Q. Does "unidentified" here mean incapable of 	19 20 21 22 23 24	the amino acid phenylalanine. Q. How common is phenylalanine? A. Very common. Q. Give us some context to that? A. It is in every living organism, I should imagine, it is an amino acid in protein.
	19 20 21 22 23 24	 Q. Now, it has been referred to as the unidentified compound or the unknown compound. But as you have just explained to us, there were approximately 300 other compounds that are unidentified? A. Yes. Q. Does "unidentified" here mean incapable of 	19 20 21 22 23 24	the amino acid phenylalanine. Q. How common is phenylalanine? A. Very common. Q. Give us some context to that? A. It is in every living organism, I should imagine, it is an amino acid in protein.

1	AWE/229	1	O. The conduction that are made of a community of the
1 2	A Lind what we in our business cell appetate it metabod	1 2	Q. The conclusion that you reached, as you expressed last time, was that the ion in the stomach, assuming it to be
3	A. I had what we in our business call annotate it, matched our database of phenylalanine but we hadn't run it	3	one, not two, was not present in any of the extracts
4	against the standard.	4	from the gelsemium species that you looked at. Do
5	Q. Turning back then to the compound that you did decide to	5	I have that right?
6	focus on at the request of the court, on the basis of	6	A. Yes, I did actually look for m/z 180 in the gelsemium
7	the assumption that it was a single molecule, not	7	species and it wasn't present.
8	a combination of two, you told us last time that you	8	Q. M/z 180, that is the half?
9	used extracts taken from the gelsemium species to look	9	A. That is the half, yes.
10	at whether an ion observed at m/z 359 could be due to	10	Q. In terms of your conclusion as to whether it came from
11	the ion, sorry, the ion you were assuming was one, could	11	the gelsemium species more generally, so not just the
12	be due to protonated gelsemicine or any alkaloid you	12	extracts you looked at, what was your conclusion?
13	could find in those samples. That is the way you went	13	A. Sorry, can you rephrase that?
14	about trying to analyse whether or not it was	14	Q. Yes. You compared the ion in the stomach, assuming it
15	gelsemicine?	15	was one not two, with the extracts from the gelsemium
16	A. Yes.	16	species and you reached the conclusions you have told
17	Q. Is that right?	17	us, you couldn't find it in the gelsemium species?
18	A. Yes.	18	A. No.
19	Q. You looked ultimately at samples from the gelsemium	19	Q. The questions were put to you last time, what if it was
20	species from elegans and sempervirens; is that right?	20	from gelsemium rankinii or from a mutation of the
21	A. Yes.	21	gelsemium species that you didn't look at. My question
22	Q. You looked at samples of the root, fruit and leaves from	22	to you was, did you reach a conclusion about whether,
23	both species?	23	assuming the ion was one not two, it was likely to have
24	A. Yes.	24	come from the gelsemium species, full stop?
25	Q. Comparing those samples to the ion in Mr Perepilichnyy's	25	A. It is unlikely.
	Page 125		Page 127
	1 age 123		1 age 127
1	stomach or the compound that you were assuming was	1	Q. Out of interest, again assuming it was one not two, you
2	a single compound, what in broad terms was the result of	2	matched it to six compounds in the Dictionary of Natural
3	that analysis?	3	Products, didn't you?
4	A. Well there was no isomer, no alkaloid with the same	4	A. I believe so.
5	molecular weight as gelsemicine that had the same	5	Q. Five from the gelsemium species and one from
6	elution time as the unknown that was in the stomach	6	scotanamine A, which was added latterly?
7	contents.	7	A. That's correct, yes.
8	Q. You explained last time that you obviously didn't just	8	Q. Does the Dictionary of Natural Products contain all
9	look at elution times?	9	natural compounds?
10	A. Also it didn't match the fragmentation pattern either.	10	A. It probably doesn't. Because natural compounds have
11	Q. The fragmentation pattern is what you call the MS/MS?	11	been discovered all the time and there is a delay in
12	A. Yes, how it fragments.	12	which they appear in Dictionary of Natural Products.
13	Q. You described last time that is the fingerprint of	13	Q. The example you gave us last time was cholic acid,
14	a compound; is that right?	14	I don't know if you recall giving that evidence, cholic
15	A. Yes. Yes.	15	acid found in bile was something that you had discovered
16 17	Q. In broad terms you looked at samples from both the stomach and the gelsemium species to see whether you	16 17	wasn't in the Dictionary of Natural Products?
18	could match ions of similar masses?	18	A. Not as a plant compound, no. No.Q. By the time of the last hearing you had swept all of
19	A. Yes.	19	that to one side, hadn't you, because you had reached
20	Q. And broadly, could you?	20	the view that you were confident that it was a cluster
21	A. No. Having looked at all the gelsemium species, we	21	of molecules and not a whole molecule?
22	extracted all the masses of compounds that we found in	22	A. Yes.
23	those gelsemium species, so it is all compounds, and	23	Q. Just remind the coroner, the court and the media the
24	tried to find any of them in the gut contents and we	24	reasons for reaching that conclusion as of June last
25	could not find any.	25	year?
	·		
	Page 126		Page 128

1	A. As we looked into this in more detail we noticed the ion	1	A. The results were the elution times were always
2	at 180 and the mathematical relationship between that	2	identical.
3	ion and the ion at 359 suggested the 359 could be	3	Q. The elution time between the ion at 180 and the putative
4	a cluster of the 180. How an ion at 359 fragments, it	4	ion at 359?
5	fragments exactly in half, suggesting it was a cluster	5	A. Yes.
6	with no intermediate fragments between 359 and 180,	6	Q. What did that enable you to conclude?
7	ie a cluster of two molecules just falling apart.	7	A. I concluded from that that we are dealing with two
8	Q. In summary, if I understand your evidence correctly,	8	ionisation products and one compound.
9	mathematically it splits into two?	9	Q. You, in your report, suggest that you took some you
10	A. Yes, more or less.	10	also saw that amino acids present in the stomach
11	Q. More or less?	11	exhibited similar ionisation behaviour?
12	A. For a proton it is not mathematically in two, you have	12	A. Yes.
13	to take away a proton, half it and add a proton. Yes.	13	Q. Why is that relevant, can you just help me?
14	Q. If you are looking at the molecules one is half of the	14	A. Just to show it was not unusual on our system that
15	other.	15	cluster ions form.
16	Secondly, looking at the putative fragment. There	16	Q. You say unequivocal proof that m/z 359 is a cluster ion,
17	was no ions in between the smaller one and the larger	17	can only come from identifying compound, but earlier you
18	one?	18	told me you reached the conclusion to the standard of
19	A. No.	19	being sure, so beyond reasonable doubt.
20	Q. Thirdly, that it co-eluted, the 180 co-eluted with the	20	What are you referring to there when you refer to
21	larger 359?	21	unequivocal proof?
22	A. That is what we had to look into after the last Inquest.	22	A. My understanding of beyond reasonable doubt is there is
23	Q. You already had evidence that it co-eluted?	23	still a little bit of doubt
24	A. We had evidence that it co-eluted in the solvent system,	24	Q. Unreasonable doubt I think we would say.
25	the one solvent system that we had used, yes.	25	A. I mean if you run a standard there would be no doubt at
	Page 129		Page 131
1	O. You went on in your report, we will turn to that now	1	all if you saw the cluster being formed there is no
1 2	Q. You went on in your report, we will turn to that now,	1 2	all, if you saw the cluster being formed there is no O. Would it be fair to say that would be categorical
2	your more recent report, to run an experiment to see if	2	Q. Would it be fair to say that would be categorical,
2 3	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory	2 3	Q. Would it be fair to say that would be categorical, certain scientific identification?
2 3 4	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further?	2 3 4	Q. Would it be fair to say that would be categorical, certain scientific identification?A. Yes.
2 3 4 5	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes.	2 3 4 5	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this
2 3 4 5 6	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind	2 3 4 5 6	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on
2 3 4 5 6 7	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind tab 30, and section 1, what the experiment you ran was?	2 3 4 5 6 7	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on that compound any more in your opinion?
2 3 4 5 6 7 8	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind tab 30, and section 1, what the experiment you ran was? Before telling us the results, what was the test, what	2 3 4 5 6 7 8	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on that compound any more in your opinion? A. No. It is another unknown.
2 3 4 5 6 7 8 9	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind tab 30, and section 1, what the experiment you ran was? Before telling us the results, what was the test, what was the experiment to test the hypothesis?	2 3 4 5 6 7 8 9	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on that compound any more in your opinion? A. No. It is another unknown. Q. Have you examined it to see whether or not it matches
2 3 4 5 6 7 8 9	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind tab 30, and section 1, what the experiment you ran was? Before telling us the results, what was the test, what was the experiment to test the hypothesis? A. The hypothesis was that could these be two compounds,	2 3 4 5 6 7 8 9	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on that compound any more in your opinion? A. No. It is another unknown. Q. Have you examined it to see whether or not it matches any plant toxins in the database or spectral library?
2 3 4 5 6 7 8 9 10	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind tab 30, and section 1, what the experiment you ran was? Before telling us the results, what was the test, what was the experiment to test the hypothesis? A. The hypothesis was that could these be two compounds, the 180 and the 359, could they be two compounds?	2 3 4 5 6 7 8 9 10	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on that compound any more in your opinion? A. No. It is another unknown. Q. Have you examined it to see whether or not it matches any plant toxins in the database or spectral library? A. Yes.
2 3 4 5 6 7 8 9 10 11	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind tab 30, and section 1, what the experiment you ran was? Before telling us the results, what was the test, what was the experiment to test the hypothesis? A. The hypothesis was that could these be two compounds, the 180 and the 359, could they be two compounds? We just changed the chromatography conditions in	2 3 4 5 6 7 8 9 10 11 12	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on that compound any more in your opinion? A. No. It is another unknown. Q. Have you examined it to see whether or not it matches any plant toxins in the database or spectral library? A. Yes. Q. Does it?
2 3 4 5 6 7 8 9 10 11 12 13	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind tab 30, and section 1, what the experiment you ran was? Before telling us the results, what was the test, what was the experiment to test the hypothesis? A. The hypothesis was that could these be two compounds, the 180 and the 359, could they be two compounds? We just changed the chromatography conditions in five different conditions and it is highly unlikely the	2 3 4 5 6 7 8 9 10 11 12 13	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on that compound any more in your opinion? A. No. It is another unknown. Q. Have you examined it to see whether or not it matches any plant toxins in the database or spectral library? A. Yes. Q. Does it? A. No.
2 3 4 5 6 7 8 9 10 11 12 13 14	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind tab 30, and section 1, what the experiment you ran was? Before telling us the results, what was the test, what was the experiment to test the hypothesis? A. The hypothesis was that could these be two compounds, the 180 and the 359, could they be two compounds? We just changed the chromatography conditions in five different conditions and it is highly unlikely the two compounds would have exactly the same elution time	2 3 4 5 6 7 8 9 10 11 12 13 14	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on that compound any more in your opinion? A. No. It is another unknown. Q. Have you examined it to see whether or not it matches any plant toxins in the database or spectral library? A. Yes. Q. Does it? A. No. Q. Professor Cowan, who we will hear from in a moment, has
2 3 4 5 6 7 8 9 10 11 12 13 14 15	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind tab 30, and section 1, what the experiment you ran was? Before telling us the results, what was the test, what was the experiment to test the hypothesis? A. The hypothesis was that could these be two compounds, the 180 and the 359, could they be two compounds? We just changed the chromatography conditions in five different conditions and it is highly unlikely the two compounds would have exactly the same elution time under five different chromatography conditions — not	2 3 4 5 6 7 8 9 10 11 12 13 14 15	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on that compound any more in your opinion? A. No. It is another unknown. Q. Have you examined it to see whether or not it matches any plant toxins in the database or spectral library? A. Yes. Q. Does it? A. No. Q. Professor Cowan, who we will hear from in a moment, has found that there are 89 compounds in the Dictionary of
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind tab 30, and section 1, what the experiment you ran was? Before telling us the results, what was the test, what was the experiment to test the hypothesis? A. The hypothesis was that could these be two compounds, the 180 and the 359, could they be two compounds? We just changed the chromatography conditions in five different conditions and it is highly unlikely the two compounds would have exactly the same elution time under five different chromatography conditions — not impossible but highly unlikely.	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on that compound any more in your opinion? A. No. It is another unknown. Q. Have you examined it to see whether or not it matches any plant toxins in the database or spectral library? A. Yes. Q. Does it? A. No. Q. Professor Cowan, who we will hear from in a moment, has found that there are 89 compounds in the Dictionary of Natural Products with that molecular formula and 11 in
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	your more recent report, to run an experiment to see if you could take your probable or confident cluster theory any further? A. Yes. Q. Just explain to the coroner, this is your report behind tab 30, and section 1, what the experiment you ran was? Before telling us the results, what was the test, what was the experiment to test the hypothesis? A. The hypothesis was that could these be two compounds, the 180 and the 359, could they be two compounds? We just changed the chromatography conditions in five different conditions and it is highly unlikely the two compounds would have exactly the same elution time under five different chromatography conditions — not impossible but highly unlikely. Q. Yes.	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	 Q. Would it be fair to say that would be categorical, certain scientific identification? A. Yes. Q. Is there any reason, now that you have identified this compound as C10H13NO2, is there any reason to focus on that compound any more in your opinion? A. No. It is another unknown. Q. Have you examined it to see whether or not it matches any plant toxins in the database or spectral library? A. Yes. Q. Does it? A. No. Q. Professor Cowan, who we will hear from in a moment, has found that there are 89 compounds in the Dictionary of Natural Products with that molecular formula and 11 in the Human Metabolome Database but 3,346 in ChemSpider.
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		1	
1	A. I was looking at the fragmentation spectrum reproduced	1	and NATOG on the right?
2	in the Human Metabolome Database.	2	A. That's correct, yes.
3	Q. Against?	3	Q. We see for example 180.1027 is the whole ion, is that
4	A. Against the fragments that we observed.	4	right?
5	Q. Did any of them match?	5	A. No, NATOG is the ion at 365, because that is the sugar
6	A. No. I mean most the only caveat on that is most of	6	attachment.
7	the spectra of those compounds are computer generated,	7	Q. Sorry, 356.
8	not like observed in real life and generally computer	8	A. 356.
9	generated spectra predict more fragments than you	9	Q. That fragments into 180.1027?
10	observe in real life. The important thing is are they	10	A. Yes so the immediate fragmentation is the sugar being
11	the same. If you are seeing a fragment at a different	11	removed to leave a fragment of 180.1027.
12	mass that the computer has not predicted, then it is	12	Q. That has fragments at 138.0918 and 121.0647?
13	more likely than not not that compound.	13	A. Yes, and a couple more as well.
14	Q. Is that the standard to which you reached the conclusion	14	Q. If we look to the left, taking figure 5, the high
15	that it is not one of the 11, the balance of	15	resolution collision cell MS/MS of the unidentified
16	probabilities?	16	compound, the top graph below figure 5, we see there, do
17	A. Also from the fact that I had uncovered a compound that	17	we, a fragment at 138.0913?
18	it could be.	18	A. Yes.
19	Q. Let's leave that to one side for the moment.	19	Q. And a fragment at 121.0647?
20	The standard to which you have reached the	20	A. Yes.
21	conclusion that it is not one of the 11 in the Human	21	Q. What are the other two numbers on that graph?
22	Metabolome Database is what, balance of probabilities?	22	A. 103.0541, 93.0698. They all matched exactly, within the
23	A. Balance of probabilities.	23	error of the machine.
24	Q. Balance of probabilities?	24	Q. Yes, I see.
25	A. Yes.	25	A. Yes.
	Page 133		Page 135
	1 450 155		1 4ge 155
1	Q. Thank you.	1	Q. That, to a layman, would look like it is a very good
1 2	Q. Thank you. Have you identified that compound to your	1 2	Q. That, to a layman, would look like it is a very good identification. Why are you putting as a candidate not
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2	Have you identified that compound to your	2	identification. Why are you putting as a candidate not
2 3	Have you identified that compound to your satisfaction on the balance of probabilities?	2 3	identification. Why are you putting as a candidate not a likely candidate?
2 3 4	Have you identified that compound to your satisfaction on the balance of probabilities? A. Not to my satisfaction. I have identified a candidate	2 3 4	identification. Why are you putting as a candidate not a likely candidate? A. Well a candidate is N-acetyltyramine, it could also be
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34 (Pages 133 to 136)

1	conclusion that the ion is a derivative of tyramine?	1	A. You have to examine manually each match and come to the
2	A. I think that is beyond reasonable doubt.	2	conclusion whether or not it is meaningful for or not.
3	Q. Beyond reasonable doubt.	3	I believe
4	Can I just turn then to your more recent letters,	4	Q. You say
5	finally.	5	A five of the matches were due to mismatches. You
6	Behind tab 32 is your letter of 12 March 2018. You	6	could assign what the ion was and it was a mismatch
7	were asked to look at data mining on the duodenal	7	between the list ie one was a protonated molecular,
8	contents sample AWF/33, can you just summarise for the	8	one was an ammoniated molecule and so you are comparing
9	coroner what you did and what the results were?	9	apples with pears, they both have to be the same.
10	A. Yes, so this, again, is this mathematical matching	10	Q. Just to be clear, the way that the spectrometer is
11	between ions detected by the mass spectrometer and ions	11	assigned or the data mining is assigned a protonated ion
12	predicted by a presented list. I used two lists this	12	or an ion to the compound doesn't match to the database,
13	time, the previously used list, which was the list	13	one has assigned ammonia the other has assigned hydrogen
14	derived of the most poisonous compound from plants and	14	for example?
15	fungi according to Wink and van Wyk, that is where the	15	A. It has just matched numbers, one number is protonated
16	original list was derived from.	16	and the other number is ammoniated, therefore they
17	Q. In descending order of toxicity, as I recall.	17	cannot be the same molecule.
18	A. No, it is just a list. That book categorised plant	18	Q. Of the nine, five you push to one side because it has
19	compounds into levels of toxicity, 1, 2, 3 and 4, 1	19	the wrong ion added?
20	being the one that could potentially kill you and the	20	A. The other four had the correct ion, but I was able to
21	others causing illness. The list comprised of all the	21	find published fragmentation spectra of all of those and
22	number 1s.	22	they didn't match, so I eliminated those ones as well.
23	Q. The fatal toxins?	23	Q. Four you identified as passing the correct ion test?
24	A. Yes.	24	A. Passing the correct ion test.
25	Q. Sorry, I interrupted you, you looked at the Wink and	25	Q. Then you looked at the MS/MS, ie the fingerprint of the
	72 405		D 400
	Page 137		Page 139
1	van Wyk database?	1	compound, against some standard reference tools and they
2	A. I used that list. Additionally, I extracted from the	2	didn't match. Have I understood that correctly?
3	Dictionary of Natural Products, because they have	3	A. Yes.
4	a field saying "Hazard of toxicity" and the comment	4	Q. You rule those out?
5	would be like, "Toxin, poison" and I did a search term	5	A. I ruled those out.
6	of "poison* wildcard toxic* wildcard" but not	6	Q. To what standard of proof?
7	"non-toxic" and that extracted I think over 350	7	A. Beyond reasonable doubt.
8	compounds from the Dictionary of Natural Products.	8	Q. One of them I think if we look at your paragraph 4, you
9	Q. Yes.	9	looked at in slightly more detail which was the
10	A. So we used those as a search list as well in addition to	10	potential that it was anesthezin?
11	the Wink list and then did this mathematical matching	11	A. Yes.
12	and I believe there were five mathematical matches	12	Q. In fact what was it?
13	no, sorry, nine was it.	13	A. That was a phenylalanine.
14	Q. Nine, I think you say, middle of 526. Let's be clear,	14	Q. You did that by looking at the MS/MS fingerprint of the
15	you are looking at the duodenal contents now, not the	15	compound, did you.
16	stomach and you have been asked to rerun the data	16	A. I mean phenylalanine is a common compound, so it is on
17	mining?	17	the shelf. It seemed reasonable to run it as a standard
18	A. Yes.	18	to prove the phenylalanine was phenylalanine and not
19	Q. You do your looking at the mass and compare it with the	19	this compound.
20	most toxic, fatally toxic plant toxins from Wink and	20	Q. Can I then just deal with the last topic in your report
21	van Wyk plus a search of the Dictionary of Natural	21	of 12 March.
22	Products toxic but not non-toxic?	22	Further mass spectrometry testing on AWF/33, I think
23	A. Yes.	23	the proposition that was being tested with you is
24	Q. You come up with nine matches, just explain what happens	24	whether further testing on the duodenum for plant
25	with those?	25	compounds or compounds found in plants would be
	Page 138		Page 140
			35 (Pages 137 to 140)

		_	
1	worthwhile. You say:	1	Q. That tells you the inability to identify what is in the
2	"The chromatographic profile of components in	2	stomach, duodenum, ileum et cetera. That doesn't tell
3	an unknown plant or plant extract revealed by LCMS	3	you whether or not you can say whether or not sorrel is
4	analysis can be compared with an extract of an authentic	4	in the stomach or the other parts of the gut, does it?
5	sample of the plant that the unknown is suspected to be.	5	A. No. We analysed what we presume is sorrel in the first
6	But such an approach can only show the chromatic profile	6	report from the jar and sorrel seems to contain very
7	is or is not in accordance with the authentic sample,	7	common compounds that are in lots of different plants.
8	unless the plant in question contains a compound only	8	Q. Did it have one of these markers that you describe?
9		9	
-	found in that species, in which case the detection of	10	A. No. Q. No.
10	that compound is strong evidence for identification."	11	
11	Just breaking that down, if you have a plant extract		A. I am not aware of a marker in sorrel that would
12	that you are trying to identify, do I understand you to	12	identify
13	be saying that unless it has a particular marker,	13	Q. You did find didn't you, I am going to ham this, but
14	running it against an authentic sample only takes you	14	quercetin 3-0 rhamonosyl galactoside?
15	some of the way?	15	A. That was a major component.
16	A. Yes.	16	Q. That was the major component
17	Q. If it has a marker then you have strong evidence that	17	A. Yes.
18	the two are the same?	18	Q of sorrel both in the Kew library and the jar that
19	A. Yes.	19	you were looking at?
20	Q. Here we are not talking about plant extracts being	20	A. Yes, we had previously analysed sorrel as part of some
21	compared with plant reference material, are we, we are	21	investigation or other, so it was on our archive and
22	talking about samples from intestine, stomach, blood or	22	that was also the major component in our archived file
23	urine?	23	as well.
24	A. Yes, it would be complicated by all the digestive	24	Q. Am I right that you didn't find that in any of the
25	products of whatever else had been eaten. This	25	biological samples?
	D 444		D 442
	Page 141		Page 143
1	technique would only even have a chance of working if	1	A. Yes, we didnt find it.
2	the plant, one plant, was the predominant component of	2	Q. Yes you didn't find it?
3	the stomach contents.	3	A. We did not find it.
4	Q. What do you mean "predominant component"?	4	Q. As I understand the explanation you gave on the last
5	A. The most abundant.	5	occasion, you said, I think, that it was unsurprising to
6	Q. The most abundant?	6	you, is that right, that you didn't find it in the
7	A. Yes.	7	A. Yes, it would have hydrolised in the acid conditions in
8	Q. Am I right in recalling your evidence from 2013 that the	8	the stomach, the sugar would have been cleaved off to
9	most abundant compounds you found in the stomach,	9	
10	duodenum, ileum, and jejunum were amino acids?	10	leave quercetin. Q. If that is right, you would be left with quercetin,
11	A. Yes.	11	
12	Q. Two problems as I understand your evidence.		wouldn't you?
13	1 is it not being the dominant compound.	12 13	A. Yes.
14	2 being the digestive process on the compounds in	13	Q. Does quercetin break down further?
15		15	A. Unlikely, under acidic conditions. It is more likely to
	the gut.		be absorbed into the body.
16	Is that right?	16	Q. Well, if somebody has eaten sorrel recently, within two
17	A. Yes. More or less it would have to be, if there was no	17	to three hours, caeteris paribus all other conditions
18	unique compound, it would have to be a single plant	18	equal would you expect to find quercetin in samples
19	being eaten, not a mixture like a salad, because	19	from the stomach?
20	therefore you would have all the compounds mixed	20	A. Yes, if they had eaten a reasonable amount to make it
21	together and you would	21	detectable.
22	Q. You would find a melange of compounds with the compounds	22	Q. You didn't find it in this case. Logically I think the
23	from the biology, from the body, and they would all be	23	reasons for that would be firstly because it was never
24	mixed in together?	24	there, do you agree with that?
25	A. Yes.	25	A. That is one possibility, yes.
	Page 142		Page 144
1	1 450 1 12		1 450 111

1 Q. Secondly, because it was there but it had been removed 2 somehow? 3 A. That is a possibility. 4 Q. Thirdly, that it was there but it was not found by you, 5 is that a possibility. 5 (A. If that means the same as it was below the level of 6 which we could detect it, then yes. 8 Q. You couldn't detect it? 9 A. Things can drop to a level below which you can no longer 6 deterthem, but they are still there. 11 Q. Finally, is this a possibility. It was before but it 12 bad been absorbed in some way out of the biological 13 samples? 14 A. It is possibility. It was detected in AWE/35, at low 15 level. 16 Q. Higher up the gut I think? 17 A. Yes. 18 Q. Let's just focus on the stormach or the duodenum. 19 Are you able to help us with in circumstances where 20 somehody at some, but then vonuted and had their 21 stormach contents or a large portion of their stormach 22 contents crowed by a puthologist, as to whether you 23 would be likely to find quescratin in what remained of 24 the stormach sample, is that within your experience? 25 A. It then could be doubtful whether you would detect it 26 Page 145 1 given if he has vomited and removed the contents and 2 they have also been removed. 2 yes in the contents of a large portion of their stormach 2 the contents or a large portion of their stormach 2 the contents or a large portion of their stormach 2 the contents or a large portion of their stormach 3 Q. Is that within your expertise? 4 A. It then could be doubtful whether you would detect it 4 page 145 1 given if he has vomited and removed the contents and 4 they have also been removed. 3 Q. Is that within your expertise? 4 A. It then could be doubtful whether you would detect it 4 page 145 1 given if he has vomited and removed the contents and 4 they have also been removed. 4 A. Yes. 4 We would need to know With the same it time, the contents or a large portion of their stormach c			Г	
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4 Q. Thirdly, that it was there but it was not found by you, 5 is that a possibility? 6 A. If that means the same as it was below the level of 7 which we could detect it, then yes. 9 Q. You couldn't detect if, 9 A. Things can drop to a level below which you can no longer 10 detect them, but they are still there. 11 Q. Finally, is this a possibility. It was detected in AWF/35, at low 12 had been absorbed in some way out of the biological 13 samples? 14 A. It is a possibility. It was detected in AWF/35, at low 15 level. 16 Q. Higher up the gut I think? 17 A. Yes. 18 Q. Let's just focus on the stomach or the duodenum. 19 Are you able to help us with in circumstances where 20 somebody at sorrel, but the wornted and had their 21 stomach contents or a large portion of their stomach 22 would be likely to find querectin in what remained of 23 would be likely to find querectin in what remained of 24 the stomach sample, is that within your expertise? 25 A. It then could be doubtful whether you would detect it 26 MR WASTIEL: Thank you. I have no firther questions. 27 Questions from MR MOXON BROWNE 28 MR MOXON BROWNE: Dr kite, you may recall that I represent on whe wave spoken before. 29 Q. If iff may say so, I can on this occasion hear you very 30 much better than I could on the lists occasion whether 31 question of sorrel. You ovide his consistion from the coroner? 32 Q. If iff may say so, I can on this occasion hear you very 33 much better than I could on the lists occasion whether 34 question of sorrel. You ovide his consisting in a list of the kink in the action of sorrel. You found very common consistients, both 39 question of sorrel. You ovide yearnined of jar marked 39 Sorrel whether you would detect it 30 Q. Is that within your expertise or is that something for 30 the coroner? 40 A. It is not the something for the coroner. 41 A. Yes. 41 A. Yes. 42 A. Yes. 43 A. It think that is something for the coroner. 44 A. We have alone consisting that needs to be explained? 45 A. It think that is something for the coroner. 4	2	somehow?	2	and if you in some test don't find either quercetin or
but absence is something that needs to be explained? A. If that means the same as it was below the level of which we could detect it, then yes. Q. You couldn't detect it? A. Timps can drop to a level below which you can no longer detect them, but they are still there. D. Finally, is this a possibility, that it was there but it all but absence is something that needs to be explained? Q. You agree with that? A. Yes. Q. You have proviously made the point that in the acid conditions of the stomach, the querectin and the glycoside, which is sugar I think, decouple and leave you had been a possibility. It was detected in AWF/35, at low level. A. Yes. Q. Higher up the gut I think? A. Yes. Q. Ust's just focus on the stomach or the duodenum. A. Yes and the possibility. It was detected in AWF/35, at low level. D. Let's just focus on the stomach or the duodenum. A. Yes and the possibility. It was detected in AWF/35, at low level. D. Let's just focus on the stomach or the duodenum. A. Yes and the possibility. It was detected in AWF/35, at low level. D. Let's just focus on the stomach or the duodenum. A. Yes and the possibility. It was detected in AWF/35, at low level. D. Let's just focus on the stomach or the duodenum. A. Yes and the possibility of the same should and their stomach contents or a large portion of their stomach and their stomach contents or a large portion of their stomach and their would be likely to find quercetin in what remained of the some should be likely to find quercetin in what remained of the file illumer is something that needs to be explained? A. A. Yes and the file illumer is something that needs to be explained? A. A. Yes and the file illumer is something that needs to be explained? A. A. Yes and the file illumer is something that needs to be explained? A. A. Yes and the file illumer is something that needs to be explained? A. A. Yes and the file illumer is something that needs to be explained? A. A. Yes and the point that in the acid and their push in the file illumer	3	A. That is a possibility.	3	the galactoside, then that is inconsistent with the
but absorned is something that needs to be explained? A. If that means the same as it was below the level of which we could detect it, then yes. Q. You couldn't detect it? A. Titings can drop to a level below which you can no longer detect them, but they are still there. D. Finally, is this a possibility, that it was there but it had been absorbed in some way out of the biological samples? A. Titings can drop to a level below which you can no longer detect them, but they are still there. D. Finally, is this a possibility, that it was there but it had been absorbed in some way out of the biological samples? A. Yes. A. Yes. A. Yes. A. Yes. D. Higher up the gart 1 think? A. Yes. D. Let's just ficus on the stomach or the duodenum. A. Yes to somebody at sorrel, but then vomited and had their stornach contents or a large portion of their stornach and their stornach contents or a large portion of their stornach and they would be likely to find quercettin in what remained of they have also been removed. D. S. A. It then could be doubtful whether you would detect it they would be likely to find quercettin in what remained of the coroner? A. A. I think that is something for the coroner. M. M. MOXON BROWNE: D. Kirk, you may recall that I represent one of Mr Pereplichnyy's life insurers in this case and we have spoken before. D. G. If Imay say so, I can on this occasion hear you very much better than I could on the last occasion whether accusing heart of the view of the plant material. D. A. Yes. D. It would need to know whether he at sorrel leaves that had not been processed in any way or may be they had been accusting short of some way which ought as constituents before he at the plant material. D. A. Yes. D. It would need to know whether he at sorrel leaves that had not been processed in any way or may be they had been accusting heart of the view of the some heart fine it was in a soup, so everial made a lunderstand it, whether it was sound by one would open the were took it was in a soup, so evert	4	Q. Thirdly, that it was there but it was not found by you,	4	presence of sorrel. Presence doesn't prove it is there,
6 A. If that means the same as it was below the level of 7 which we could detect it, then yes. 9 Q. You couldn't detect it? 9 A. Things can drop to a level below which you can no longer of detect them, but they are still there. 11 Q. Finally, is this a possibility, that it was there but it 12 had been absorbed in some way out of the biological 13 samples? 14 A. It is a possibility. It was detected in AWF/35, at low 15 level. 16 Q. Higher up the gut I think? 17 A. Yes. 18 Q. Let's just focus on the stomach or the duodenum. 19 Are you able to help us with in circumstances where 20 sourcebody at sourcel, but then vomited and had their 21 stomach contents or a large portion of their stomach 22 contents removed by a pathologist, as to whether you 23 would be likely to find quercetin in what remained of 24 the stomach sample, is that within your expertise? 25 A. It then could be doubtful whether you would detect it 26 A. It within your expertise? 27 A. It has years, let not know. Been removed. 28 given if he has vomited and removed the contents and they when we have spoken before. 29 G. So the presence of the glycoside, it having been subjected to acid in the stomach is not in any way odd or significant but you would agree that the absence of quercetin in any part of the system—leaving aside the explained? 20 sourded be likely to find quercetin in what remained of the leum— is something that needs to be explained? 21 stomach orients or a large portion of their stomach 22 the stomach sample, is that within your expertise? 23 would be likely to find quercetin in what remained of the stomach sample, is that within your expertise? 24 the stomach sample, is that within your expertise? 25 A. I think that is something for the coroner. 26 MR WASTELL: Thank you. I have no further questions. 27 Questions from MR WOXON BROWNE. 28 MR MOXON BROWNE. Drike, you may recall that I represent one of MP Pereplichnyy's life insurers in this case and we have spoken before. 29 G. If I may say o, I can on this occasion hear you very one wha	5	is that a possibility?	5	-
which we could detect if, then yes. 8 Q. You couldn't detect if, then yes. 9 A. Things can drop to a level below which you can no longer detect them, but they are still three. 10 Q. Firally, is this a possibility, that it was there but it 11 glocoside, which say a possibility. It is was detected in AWF/35, at low level. 13 sumples? 14 A. It is a possibility. It was detected in AWF/35, at low level. 15 Q. Let's just focus on the stomach or the duodenum. 18 Q. Let's just focus on the stomach or the duodenum. 19 A. Yes. 10 Q. Let's just focus on the stomach or the duodenum. 11 d. Yes wou able to help us with in circumstances where somebody at sorrel, but then vomited and had their stomach contents or a large portion of their stomach 22 contents removed by a pathologist, as to whether you would be likely to find quercetin in what remained of 24 the stomach sample, is that within your expertise? 10 A. It then could be doubtful whether you would detect it 25 dwarf which you expertise or is that something for the coroner. 11 given if he has vomited and removed the contents and they have also been removed. 12 Q. Is finally sou. I have no further questions. 13 Questions from MR MOXON BROWNE 14 MR MNOXON ROWNE. Pick, you may recall that I represent one of Mr Pereplitichnyy's life insurers in this case and we have spoken before. 15 A. It would need to know if the sorrel he at the plant material. 16 Q. If I may say so, I can on this occasion hear you very a guestion for sorrel. You obviously examined a jar marked and puercein and also a quercein glocosite, which was a spin fire and provided the level. The plant material. 19 You would greet the whole jar, which was so where removed. 20 I fill may say so, I can on this occasion hear you very a good of the sorrel has strengthened or whether there are better accustises her I do not know. But do try to keep your soic has strengthened or whether there are better accustises her I do not know. But do try to keep your of the source of sorrel. You obviously examin	6		6	-
8 A. Ves. 9 A. Things can drop to a level below which you can no longer 10 detect them, but they are still there. 11 Q. Finally, is this a possibility, that it was there but it 11 habe an absorbed in some way out of the biological 13 samples? 14 A. It is a possibility. It was detected in AWF/35, at low 15 level. 16 Q. Higher up the gut I think? 17 A. Yes. 18 Q. Lefs just focus on the stomach or the duodenum. 19 Are you able to help us with in circumstances where 20 somebody ate sorrel, but then vomited and had their 21 stomach contents or a large portion of their stomach 22 sounded by likely to find queretin in what remained of the stomach sample, is that within your expertise? 23 would be likely to find queretin in what remained of the stomach ample, is that within your expertise? 24 the stomach ample, is that within your expertise or is that something for the cortoner? 25 A. I think that is something for the cortoner? 26 MR WASTELL: Thank you. Have no further questions. 27 Q. If I may say so, I can on this occasion hear you very one what strengthened or whether there are better and way strengthened or whether there are better your voice has strengthened or whether there are better your voice has strengthened or whether there are better your voice has strengthened or whether there are better your voice has strengthened or whether there are better your voice has strengthened or whether there are better a cousties here I do not know. But do try to keep your feel feel to whether there are better your voice has strengthened or whether there are better a good to have prepribentyly si fic insurers in this case and you would a gove with had to be compressed in any way or maybe they had be boiled or something which might have removed a lot of the constituents before he at the plant material. 9 Q. I'll may say so, I can on this occasion hear you very your voice has strengthened or whether there are better your voice has strengthened or whether there are better a cousties here I do not know. But do try to keep your fe	7	which we could detect it, then ves.		
9 A. Things can drop to a level below which you can no longer detect them, but they are still there. 10 Q. Findly, is this a possibility, that it was there but it had been absorbed in some way out of the biological samples? 13 samples? 14 A. It is a possibility. It was detected in AWF/35, at low level. 15 Level. 16 Q. Higher up the gur I think? 17 A. Yes. 18 Q. Let's just focus on the stomach or the duodenum. 19 Are you able to help us with in circumstances where somebody at a sorrel, but then vomited and had their somebody at a sorrel, but then vomited and had their somebody at a sorrel, but then vomited and had their somebody at a sorrel, but then vomited and had their somebody at a sorrel, but then vomited and had their somebody at a sorrel, but then vomited and had their somebody at a sorrel, but then vomited and had their somebody at a sorrel, but then vomited and had their somebody at a sorrel, but then vomited and had their somebody at a sorrel, but then vomited and had their somebody at a sorrel, but then vomited and had their somebody at a sorrel, but then vomited and removed the contents and the stomach sample, is that within your expertise? 24 the stomach sample, is that within your expertise? 25 A. It then could be doubtful whether you would detect it given if he has vomited and removed the contents and the shade of the stomach is a something for the coroner? 3 Q. Is that within your expertise? 4 A. Visa. 4 B. Q. So the presence of the glycoside, it having been subjected to acid in the stomach is not in any way odd or significant but you would agree that the absence of quercetin in any part of the system – leaving aside the tail end of the leum – is something that tail end of the leum – is something that tail end of the leum – is something that tail end of the leum – is something that tail end of the leum – is something that tail end of the leum – is something that tail end of the leum – is something that tail end of the leum – is something that tail end of the leum – is something that tail end of	8			
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11 Q. Finally, is this a possibility, that it was there but it 12 had been absorbed in some way out of the biological 12 you just with quercetin? 13 samples? 13 A. Yes. 14 A. Yes. 15 A. It is a possibility. It was detected in AWF/35, at low 15 level. 15 level. 16 Q. Higher up the gut I think? 16 O. Higher up the gut I think? 16 Or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or significant but you would agree that the absence of or subjected to acid in the stomach is not in any way od or significant but you would agree that the absence of quercetin in any part of the system - leaving aside the tail end of the ileum - is something asset that the all of the ileum - is something asset that all end of the ileum - is something asset that that how contents and all of the ileum - is something asset that the all end of the ileum - is something assignificant amount of the plan material there to begin with.				
had been absorbed in some way out of the biological samples? A. It is a possibility. It was detected in AWE/35, at low level. Q. Higher up the gut I think? A. Yes. 16 Q. Ligher up the gut I think? A. Yes. 17 A. Yes. 18 Q. Let's just focus on the stomach or the duodenum. 19 Are you able to help us with in circumstances where 20 somebody ate sorrel, but then vomited and had their 21 stomach contents or a large portion of their stomach 22 contents removed by a pathologist, as to whether you 23 would be likely to find quercetin in what remained of 24 the stomach sample, is that within your expertise? 25 A. It then could be doubtful whether you would detect it 26 That while you expertise or is that something for 27 the coroner? A. It that that is something for the coroner. MR WASTELL: Thank you. I have no further questions. MR MOXON BROWNE: Dr Kite, you may recall that I represent one of MF Pereplitchnyy's life insurers in this case and we have spoken before. MR MASTELL: Thank you. I have no further questions. MR MOXON BROWNE: Dr Kite, you may recall that I represent one of MF Pereplitchnys's life insurers in this case and we have spoken before. MR WASTELL: Thank you. I have no further questions. A. Yes. MR MOXON BROWNE: Dr Kite, you may recall that I represent one of MF Pereplitchnys's life insurers in this case and we have spoken before. MR WASTELL: Thank you. I have no further questions. A. Yes. MR MOXON BROWNE: Dr Kite, you may recall that I represent one of MF Pereplitchnys's life insurers in this case and we have spoken before. MR WASTELL: Thank you. I have no further questions. A. Yes. MR MOXON BROWNE: Or Kite, you may recall that I represent one of MF Pereplitchnys's life insurers in this case and we have spoken before. MR WASTELL: Thank you they where we left off which is on this accounted the levels. Q. If I may say so, I can on this occasion whether are better accounted the levels. Q. I fill may say so, I can on this occasion whether are better as obtained the manual part of the s				
13 A. Yes. 14 A. It is a possibility. It was detected in AWF/35, at low 15 level. 16 Q. Higher up the gut I think? 17 A. Yes. 18 Q. Left's just focus on the stomach or the duodenum. 19 Are you able to help us with in circumstances where 19 Are you able to help us with in circumstances where 20 somebody ate sorrel, but then vomited and had their 21 stomach contents or a large portion of their stomach 22 contents removed by a pathologist, as to whether you 23 would be likely to find quercetin in what remained of 24 the stomach sample, is that within your expertise? 25 A. I then could be doubtful whether you would detect it 26 they have also been removed. 27 given if he has vomited and removed the contents and 28 they have also been removed. 29 Q. Is that within your expertise or is that something for 29 the corner? 20 A. J. Hink that is something for the coroner. 30 Q. Is that within your expertise or is that something for 40 the coroner? 41 distribution of either sorrel or at least something that 42 consumption of either sorrel or at least something that 43 came out of a jar marked "sorrel". 44 A. We would need to know if the sorrel he ate was like raw 45 sorrel or had it been cooked in some way which could 46 have removed the constituents before he ate the plant 47 material. 48 MR MOXON BROWNE. Dr Kite, you may recall that I represent 49 one of Mr Pereplitichnyly is life insurers in this case and 49 we have spoken before. 40 Lift may say so, I can on this occasion whether 41 socusties here I do not know. But do try to keep your 42 voice up, because I am struggling a little bit. 43 C. But at sho he has eaten the soup as well, yes. 44 C. But also he has eaten the soup as well, yes. 45 C. But certainly to a layrnan, if the sorrel as the main constituent of 46 accusties here I do not know. But do try to keep your 47 voice up, because I am struggling a little bit. 48 C. O. Set meet a little with professor Simmonds told us and you 49 word one has very led of which is on this				
14 A. It is a possibility. It was detected in AWF/35, at low level. 15 16 17 18 18 18 18 19 19 19 19				
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16 Q. Higher up the gut I think? 17 A. Yes. 18 Q. Let's just focus on the stomach or the duodenum. 19 Are you able to help us with in circumstances where 20 somebody ate sorrel, but then vomited and had their 21 stomach contents or a large portion of their stomach 22 contents removed by a pathologist, as to whether you 23 would be likely to find quercetin in what remained of 24 the stomach sample, is that within your expertise? 25 A. It then could be doubtful whether you would detect it 26 page 145 1 given if he has vomited and removed the contents and 2 they have also been removed. 3 Q. Is that within your expertise or is that something for 4 the coroner? 4 A. We would need to know if the sorrel he ate was like raw 5 and I think that is something for the coroner. 6 MR WASTELL: Thank you. I have no further questions. 7 Questions from MR MOXON BROWNE 8 MR MOXON BROWNE: Dr Kire, you may recall that I represent one of Mr Pereplitichnyy's life insurers in this case and 10 we have spoken before. 11 A. Yes. 12 Qi If I may say so, I can on this occasion hear you very voice up, because I am struggling a little bit. 15 Can we pick up where we left off which is on this question of sorrel. You obviously examined a jar marked "sorrel" which was said to be the same as that which was feed to Mr Pereplitichnyy on the last lunchtime of his life. You found very common constituents, both quercetin and part of the stoaden would are that the absence of the intained of the lite. Hand not be doubtful whether you would agree that the absence of the intained of the late was significant amount of the plant material. 10 Think that it all but I think the evidence as a significant amount of the plant material. 11 that he is said to have eaten most of it, so a good old that he is said to know if the sorrel he ate was like raw sorrel or a late is all but I think the evidence on something that the sorrel he ate was like raw sorrel or a late it all but I think the evidence on something that the econstituents and there				
17 A. Yes. 18 Q. Let's just focus on the stomach or the duodenum. 19 Are you able to help us with in circumstances where 20 somebody ate sorrel, but then vomited and had their 21 stomach contents or a large portion of their stomach 22 contents removed by a pathologist, as to whether you 23 would be likely to find quercetin in what remained of 24 the stomach sample, is that within your expertise? 25 A. It then could be doubtful whether you would detect it 26 page 145 1 given if he has vomited and removed the contents and 2 they have also been removed. 3 Q. Is that within your expertise or is that something for 4 the coroner? 5 A. I think that is something for the coroner. 6 MR WASTELL: Thank you. I have no further questions. 7 Questions from MR MOXON BROWNE 8 MR MOXON BROWNE: Dr Kite, you may recall that I represent 9 one of Mr Perepilichnyy's life insurers in this case and 10 we have spoken before. 11 A. Yes. 12 Q. If I may say so, I can on this occasion hear you very 13 much better than I could on the last occasion whether 14 your voice has strengthened or whether there are better 15 acoustics here I do not know. But do try to keep your 16 voice up, because I am struggling a little bit. 17 Can we pick up where we left off which is on this 18 question of sorrel. Voic obviously examined a jar marked 19 "sorrel" which was said to be the same as that which was 19 fed to Mr Perepilichnyy on the last lunchtime of his 20 fed to Mr Perepilichnyon on the last lunchtime of his 21 life. You found very common constituents, both 22 quercetin and also a quercetin glycoside, which has also 23 got the name rhamonosyl in it, I think? 24 A. Yes. 25 A. I to do the iteum is something that needs to be 26 verplained? 27 A. Assuming there was a significant amount of the plan 28 material there to begin with. 29 Q. I down think as is a third of a kilo. 20 I don't think as is all the sorrel he ate was like raw 21 that he is said to have eaten most of it, so a good old 22 consumption of eithe				
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24 A. Yes. 24 would agree with that?				•
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25 Q. They are not markers for softer occause they are so				-
·	23	Q. They are not markers for softer because they are so	23	A. 10S.
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1	Q. But there was none in the stomach, there was none in the	1	the initial report referred to the ion which had mapped
2	duodenum, and there was none in the jejunum?	2	and I said that that was not gelsemicine.
3	A. No.	3	Q. Could you say that again?
4	Q. Nor was there any in the blood or in the urine?	4	A. In the original report we examined the peak that was
5	A. No.	5	generating this ion and in my original report I said
6	Q. I think it is an everyday experience that the	6	I eliminated the possibility of that being gelsemicine.
7	consumption of asparagus in let's say a soup, maybe	7	Q. Yes, you did and you have given the reason for that and
8	a third of a kilo of asparagus in a soup, will show up	8	that is, I don't think that has ever been challenged.
9	in the urine within an hour or two, it is a common	9	The point I am making is that at that time you had not
10	experience, it has a distinctive smell. Is asparagus	10	eliminated, either with any certainty or indeed with any
11	something that moves very rapidly through the system in	11	degree of consideration, that it might be one of the
12	that way?	12	isomers of gelsemicine?
13	A. I wouldn't know.	13	A. That is true, yes.
14	Q. You wouldn't know, okay, but that at least helps us to	14	Q. That is right. It was only after you did a number of
15	picture the way in which food moves around the body.	15	further tests that you came to the conclusion that it
16	Here we have a body without any trace of quercetin just	16	was at least unlikely that it was one of the known
17	two or three hours after consumption.	17	isomers, because again you couldn't match the
18	Can you provide any explanation for that, apart from	18	fragmentation pattern?
19	the fact that what he ate was not in fact sorrel?	19	A. Yes, that's correct.
20	A. No, all I can say is what I found in the extract, it is	20	Q. But, here I am assuming for the moment, and I hope you
21	not I don't think it is my job to surmise why it	21	will come along with me in the assumption, that what we
22	wasn't there.	22	are talking about, is a monomer and not a dimer, that
23	Q. All you can say is it wasn't?	23	did not preclude the possibility that there was in fact
24	A. It wasn't there.	24	an isomer out there that had not found its way into the
25	Q. Well that is I am sure an entirely proper scientific	25	Dictionary of Natural Products?
	Q. Went that is I am out an entirely proper secondarie	20	Dividinary of Financial Frontiers.
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	on crear	1	A Vos that is wight it didn't
1	answer.	1	A. Yes, that is right, it didn't. O. That was always a possibility?
2	Very well, can we turn to the question of I am	2	Q. That was always a possibility?
2 3	Very well, can we turn to the question of I am going to call it, if you will forgive me, the unknown	2 3	Q. That was always a possibility?A. Always a possibility, yes.
2 3 4	Very well, can we turn to the question of I am going to call it, if you will forgive me, the unknown ion, I know that you feel very close to in fact being	2 3 4	Q. That was always a possibility?A. Always a possibility, yes.Q. Just as a point of detail, I think you said to
2 3 4 5	Very well, can we turn to the question of I am going to call it, if you will forgive me, the unknown ion, I know that you feel very close to in fact being able to identify it but for ease of reference I am going	2 3 4 5	 Q. That was always a possibility? A. Always a possibility, yes. Q. Just as a point of detail, I think you said to Mr Wastell a moment ago that there were six substances
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38 (Pages 149 to 152)

1	can say is, on the one hand its atomic weight exactly	1	I think that is the point you were making before,
2	matches the isomers of gelsemium, but of those	2	because it always happens in the different solvents that
3	identified in the Dictionary of Natural Products it is	3	is what it looks like.
4	not there?	4	Then it goes on:
5	A. That's correct, yes.	5	"However, as he acknowledges, he cannot be certain
6	Q. Right.	6	whether m/z 180.1019 is the protonated compound and
7	Just moving forward to the question of whether and	7	m/z 359.1865 is the protonated dimer of that same
8	how sure one can be that it is dimer and not a monomer,	8	compound or whether m/z 180.1019 is a fragment ion from
9	I would like to take you to a comment on your report	9	a different protonated compound at m/z 359.1965.
10	from Professor Cowan and see whether or not you agree	10	I am suggesting that making all due allowance for
11	with it. I think you probably will.	11	the coarseness of my analogy, what he is saying is you
12	It is in bundle 1 at page 340. If we can just set	12	cannot be sure whether you have a big toffee broken in
13	the scene	13	two or whether you have two toffees stuck together.
14	Tab 22, I am told.	14	What you can be sure of is that they all come from the
15	A. I have found it, yes.	15	same factory?
16	Q. Just if we can set the scene for this, the basis upon	16	A. Yes, you cannot be 100 per cent, as I was explaining
17	which you have come to the conclusion with increasing	17	just now, you cannot be 100 per cent certain but you
18	confidence that what we are looking at is a dimer and	18	have a very high based on my experience and the
19	not a monomer, is that under a range of matrix	19	evidence, a very high certainty.
20	conditions and solvent conditions you get a repeated	20	Q. We can explore this and if I am allowed to I propose to
21	co-elution of the two ions, whether you use this	21	do so very briefly with Professor Cowan. He seemed to
22	solvent, that solvent or another solvent, always they	22	be slightly more doubtful, that is why I am drawing your
23	come up together. That is really the basis upon which	23	attention to this and he says at the bottom of that
24	you have become increasingly confident that what we have	24	paragraph:
25	here is a dimer?	25	"In my opinion, Dr Kite correctly explains
	Page 153		Page 155
1	A. N. d	,	250 1005 in a large fall of 250 1005 in a large in a second
1	A. No, that was to show that it was one compound, these	1	unequivocal proof that 359.1965 is a cluster ion can
2	ions were coming from one compound.	3	only come from identifying the compound. I would wish,
3	Q. Yes.	4	as it appears does Dr Kite, to obtain authentic reference material to obtain such proof of identity."
5	A. It doesn't prove there is a dimer.	5	I don't know whether you would agree with that or do
	Q. If we can take my much derided toffee analogy for the moment, we have a jar of toffees. Some of them weigh	6	you think he has been a bit cautious?
6 7	exactly 100 grams and some of them weigh exactly	7	A. I would agree with that, yes.
8		8	Q. You would agree, good?
	50 grams. The problem we have to address is whether the	9	A. I agree that eliminates all uncertainty.
9	bigger toffees are two smaller toffees stuck together or	10	THE CORONER: I think you said without it there is very high
	whether the bigger toffees have a tendency to crack in a certain way producing two smaller toffees. That is	11	certainty is the phrase you just used, is that right?
11 12	what we have to address?	12	A. Yes.
1 12	what we have to address?	1 12	
	A Vos		
13	A. Yes.	13	MR MOXON BROWNE: I think, probably finally, just looking at
13 14	Q. You know that it has to be one or the other, if the two	13 14	MR MOXON BROWNE: I think, probably finally, just looking at the history of this, it did take quite a long time to
13 14 15	Q. You know that it has to be one or the other, if the two different types of toffee, the two different ions, are	13 14 15	MR MOXON BROWNE: I think, probably finally, just looking at the history of this, it did take quite a long time to explore the possibility that what we have called the
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2	she thought that further testing about gelsemium and	2	quantity of one plant had been consumed. Furthermore
3	gelsemicine was justified. Do you remember that?	3	the chromatographic profile of the compounds can be
4	A. Yes, I remember seeing her report, yes.	4	changed by the digestive process. If the plants
5	Q. She drew attention to some factors which were very	5	suspected of being consumed contained a compound unique
6	widely reported in the press at the time, perhaps	6	to that species, then a targeted analysis of this
7	understandable, she said that gelsemium was a known	7	compound could be undertaken. In the LCMS analysis of
8	poison used by Russian and Chinese assassins and she	8	AWF/33 the chromatographic profile major peaks is mainly
9	also said that she thought it was well worth exploring	9	due to amino acids, most of the numerous other
10	further that possibility because of the extreme toxicity	10	components being minor in comparison. Thus I confirm
11	of this compound.	11	that there is little merit in this approach. Regarding
12	THE CORONER: It has gone on being reported,	12	the suspected plant fragments removed from AWF/33, not
13	notwithstanding	13	only will these be contaminated with general gut
14	MR MOXON BROWNE: Yes, it has.	14	contents but they will have been subjected to the
15	THE CORONER: the further work that has been done and the	15	digestive process which could have removed or broken
16	old stuff keeps being reported, not where we are now.	16	down some of the chemical components. Considering both
17	MR MOXON BROWNE: No, I just thought it might be helpful to	17	this and the above, any LCMS analysis of the fragments
18	remind ourselves what the genesis of that was.	18	removed from AWF/33 is highly unlikely to identify the
19	THE CORONER: It has been made plain today where we are now.	19	fragments."
20	MR MOXON BROWNE: I was on a different point	20	You were addressing there mass spectrometry on the
21	THE CORONER: I know, I am on that point.	21	top of the intestine, AWF/33, but presumably the same
22	MR MOXON BROWNE: which is why it was that that those	22	sort of thing would apply to the stomach and the lower
23	reports emerged.	23	down of the intestine as well and to the urine?
24	I don't think it is the case I don't think you	24	A. Yes.
25	are suggesting it was the case that back in 2013	25	Q. Going back to where I started:
	Page 157		Page 159
1	matters appeared as clear as they do today to yourself	1	"This approach is unlikely to be of value in the
2	and to Professor Simmonds?	2	analysis of the gut contents unless a considerable
3	A. Certainly they are clearer now, yes, because we have	3	quantity of one plant had been consumed."
4	done so much work on gelsemicine and gelsemium.	4	Does it follow then that if Mr Perepilichnyy had
5	Q. For example you were proceeding in 2013 until	5	consumed only a small quantity of a highly toxic plant,
6	comparatively recently on the basis that what we were	6	then it is unlikely that that would have been detected
7	looking at was a monomer and not a dimer?	7	on this analysis?
8	A. Yes.	8	A. This analysis refers to looking at what we call the
9	MR MOXON BROWNE: Yes, thank you.	9	chromatographic profile, you will see these in various
10	Questions from MR STRAW	10	reports, the peaks, so it is looking at that profile of
11	MR STRAW: Dr Kite, could you please have a look at	11	peaks. Obviously if that profile of peaks submerges
12	bundle 1, which should be in front of you, at page 527.	12	into a very complex matrix, you can no longer see it
13	A. Yes.	13	unless you somehow try to extract it. It all becomes
14	Q. The top of that page, point 2, is a section where you	14	very dubious.
15	describe why you think there is little merit in	15	That is a different process to looking for
16	performing mass spectrometry tests on AWF/33, which is	16	a targeted one compound, that is a different process.
17	the top of the intestine, is that correct?	17	What is referring to here is just looking at that
18	A. Yes.	18	profile of peaks and saying: does that profile of peaks
19	Q. We have seen the first part of that paragraph was read	19	look the same as in this plant?
20	out to you. I would like to read the rest of it before	20	Q. Yes.
21	coming back and just asking a few questions on that.	21	A. You have to be able to see that profile of peaks and we
22	Starting from about eight lines down, I think is	22	cannot see the profile of peaks in any of these samples
23	where we got to, you say:	23	because they are dominated by amino acids and there are
24	"Thus this approach [in other words mass	24	so many peaks there, they have all just merged into
25	spectrometry tests on AWF/33] is unlikely to be of value	25	a wobbly line.
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	Page 158		Page 160
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1	Q. That process would be unlikely to identify a toxic plant	1	(3.28 pm)
2	of which Mr Perepilichnyy had only consumed a small	2	(A short adjournment)
3	amount, a very small amount?	3	(3.40 pm)
4	A. We would use a different approach of looking for the	4	PROFESSOR DAVID COWAN (affirmed)
5	toxic compound, which is basically what we have been	5	Questions from MR WASTELL
6	doing in here under a number of analyses.	6	MR WASTELL: Professor Cowan can you remind the court of
7	Q. You explain, don't you, that for your conclusion at the	7	your expertise? I think you are an expert in
8	end of it that any LCMS analysis of the fragments	8	pharmaceutical toxicology, is that right?
9	removed is highly unlikely to identify the fragments.	9	A. That's correct, yes.
10	Am I right in saying that you give two reasons for that,	10	Q. You have particular expertise in mass spectrometry?
11	the first is that the compounds may have been	11	A. My career has been largely involved in identifying
12	contaminated by other gut contents?	12	components in bodily fluids, particularly urine samples,
13	A. Well, it would almost certainly be contaminated by gut	13	using mass spectrometry as the analytical technique.
14	contents and I would be reluctant in the (Inaudible)	14	Q. Since the last hearing you have produced a number of
15	case I had it, I would be reluctant to wash off the gut	15	short reports, can I just identify those?
16	contents because you wouldn't know what you would be	16	A. Yes.
17	washing off, so you would have to live with the	17	Q. In the bundle in front of you, behind tab 21, you should
18	contamination.	18	see there a report of yours from 13 July 2017, do you
19	Q. The second reason why it is highly unlikely to identify	19	see that?
20	the fragment is that the digestive process may have	20	A. Yes, I have that.
21	removed or broken down some of the components?	21	Q. Then behind tab 22, a report from you dated
22	A. Yes, so the profile of peaks would have changed.	22	25 August 2017?
23	Q. Again, the facts that no toxic plant was identified in	23	A. Yes.
24	his samples doesn't show, does it, that he didn't ingest	24	Q. Lastly, behind tab 36, I hope, some detail about 11
25	that compound?	25	compounds from the Human Metabolome Database, is that
	uni compound.		
	Page 161		Page 163
1	A. Could you rephrase that question? I mean we have looked	1	produced by you?
1 2	A. Could you rephrase that question? I mean we have looked for specific toxic compounds, we haven't actually done	1 2	produced by you? A. Yes, it is.
1 2 3	for specific toxic compounds, we haven't actually done	2	A. Yes, it is.
2	for specific toxic compounds, we haven't actually done this chromatographic profiling thing, all our tests have	2 3	A. Yes, it is.Q. Do you stand by the professional opinions you have
2 3	for specific toxic compounds, we haven't actually done this chromatographic profiling thing, all our tests have been looking for single compounds. It doesn't matter if	2 3 4	A. Yes, it is. Q. Do you stand by the professional opinions you have expressed in those documents, subject to any
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41 (Pages 161 to 164)

1	A. Yes.	1	splitting of the compound in two and the lack of ion in
2	Q. And also the observation about dimerisation in the amino	2	between as a reason?
3	acids present in the stomach contents?	3	A. Because one is looking at a large range of unknowns, one
4	A. Yes.	4	has to consider many different possibilities. I think
5	Q. Having reviewed that evidence, you say in your report	5	that is where the discussion has been taking place.
6	that you agree that unequivocal proof that it is	6	I have always been convinced that the evidence was
7	a cluster ion can only come from identifying the	7	not good for gelsemicine, so I have said that
8	compound, but do you agree with the proposition that it	8	consistently in my statements.
9	is likely to be a cluster of two compounds?	9	Q. Yes.
10	A. I reread what I had written during the cross-examination	10	A. But one could consider molecules that could split in the
11	of Dr Kite. I see that what I put, "The results as here	11	middle and give fragments that would be equivalent to
12	stated provide strong evidence that the ions at m/z 180	12	the 179, that is given the 180 ion. That is why
13	and m/z 359 come from one compound".	13	I didn't want to go 100 per cent and I believe that is
14	Q. Yes.	14	why Dr Kite does not want to go 100 per cent.
15	A. Perhaps I should have clarified that point and that is	15	But it is unlikely to get compounds like that and as
16	that it is a monomer, so I think I can say that there is	16	he has shown with the change in the chromatographic
17	strong evidence that it is a monomer and that is more	17	conditions, the fact that you constantly get the two
18	likely than not. I have also done some work on	18	ions coming at exactly the same time is persuasive
19	phenylalanine in my laboratory and shown that it can	19	evidence that the molecule is the same and that it is
20	indeed dimerise, the smaller molecular can go into	20	that monomer structure.
21	a bigger molecular when subjected to these conditions.	21	Q. Yes, now, Dr Kite put it I will be corrected if I am
22	Q. Yes. Critical point here, when you say "it is	22	wrong that, as I understood his evidence, that he was
23	a monomer", what are you referring to by "it"?	23	reaching that conclusion beyond reasonable doubt but not
24	A. Sorry, in this case, a molecule of mass 179, which will	24	unequivocal scientific proof?
25	give an ion at 180.	25	A. Okay.
	Page 165		Page 167
1	Q. To be clear, you conclude that it is indeed a cluster of	1	Q. Do you agree with that or are you somewhere different on
2	two smaller molecules?	2	the scale of probability?
3	A. That there is a greater likelihood that it is a cluster	3	A. I believe we are both more comfortable if we had the
4	of two molecules.	4	authentic material. The reason we say that is it is not
5	Q. Just explain to the coroner why you reach that view?	5	only the mass spectrometry, it is also the
6	A. Sir, I think one of the most persuading factors for me	6	chromatography, the separation. We have some separation
7	was when I was able to do an independent experiment in	7	
8	my laboratory using phenylalanine, so looking back on		evidence but the higher standard of separation evidence
		8	is when you know you have an authentic standard and you
9	that data which I hadn't previously been able to do, and	9	is when you know you have an authentic standard and you run it through and you get the same time as well as the
10	that data which I hadn't previously been able to do, and seeing that in the mass spectrometry conditions that we	9 10	is when you know you have an authentic standard and you run it through and you get the same time as well as the same spectrum. I would not go quite so far as Dr Kite
10 11	that data which I hadn't previously been able to do, and seeing that in the mass spectrometry conditions that we use and Dr Kite also uses, we do indeed see this higher	9 10 11	is when you know you have an authentic standard and you run it through and you get the same time as well as the same spectrum. I would not go quite so far as Dr Kite on that.
10 11 12	that data which I hadn't previously been able to do, and seeing that in the mass spectrometry conditions that we use and Dr Kite also uses, we do indeed see this higher mass ion. Since I knew I had the authentic compound,	9 10 11 12	is when you know you have an authentic standard and you run it through and you get the same time as well as the same spectrum. I would not go quite so far as Dr Kite on that. Q. You heard Dr Kite say that he was sure that he had
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10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	that data which I hadn't previously been able to do, and seeing that in the mass spectrometry conditions that we use and Dr Kite also uses, we do indeed see this higher mass ion. Since I knew I had the authentic compound, the fact that that gave the dimer persuaded me that that was indeed what we were seeing in this case as well. Q. Yes, and although it was put to Dr Kite, by counsel for Legal & General that the elution, the co-elution, was the reason for reaching the conclusion that it is a cluster, in fact there is quite a few more limbs or premises in the argument, aren't there? A. Yes, exactly that. Q. There is the dimerisation of amino acids in the stomach, as you have just identified that your own experiments determined? A. Yes.	9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	is when you know you have an authentic standard and you run it through and you get the same time as well as the same spectrum. I would not go quite so far as Dr Kite on that. Q. You heard Dr Kite say that he was sure that he had identified it as a derivative of tyramine, I hope I am getting that right. Have you done any analysis of that? A. No, because there he actually matched the retention time as well as the mass spectrum. Q. Have you assessed that conclusion and the experiment A. Because he had the tyramine compound as authentic standard and ran it on chromatographic conditions, he could then match it as I have understood it. Q. Do you agree with his conclusion that it is? A. Yes. Q. That it is beyond doubt if I could A. Because running the standard and the unknown at the same

1	compounds.	1	the fragmentation pattern?
2	Q. You agree beyond doubt it is a derivative of tyramine?	2	A. No, I don't think I am saying that.
3	A. Yes. Yes.	3	Q. I think you say that would be something easy to do?
4	MR WASTELL: Thank you, I have no further questions.	4	A. If I have understood you correctly, to get a certainty,
5	Questions from MR MOXON BROWNE	5	I would wish to have the pure compound
6	MR MOXON BROWNE: Professor Cowan, you have helped explain	6	Q. Yes.
7	the degree of probability or certainty that you	7	A and then match it with retention time as well as the
8	entertain that what we are looking at here is a cluster	8	mass spectrum, but I can deduce that it is different by
9	ion, or what I have called two toffees stuck together,	9	some mass spectral properties.
10	rather than a monomer, one big toffee.	10	Q. I think you say that is not something that is
11	A. Yes.	11	particularly difficult to do and in fact we have now
12	Q. I appreciate and accept the way in which you have	12	heard from Dr Kite that he has done that very thing, as
13	expressed that, but if we can just for a moment	13	far as he can
14	assume against your pretty strong conviction that	14	A. Yes.
15	in fact what we are looking at is a single large toffee,	15	Q because he has looked at some fragmentation data
16	it would be accurate to describe it as it has I think	16	A. Yes.
17	always been described as an unknown. We don't know what	17	Q and he has made the caveat that some of it is
18	it is, if it is a monomer?	18	computer derived rather than empirically derived, as
19	A. I'm just trying to work through the logic.	19	I understand it, but he has concluded that none of these
20	Q. Sorry.	20	jumps to the eye as a match when you consider the
21	A. I am just trying to work through the logic of what you	21	fragmentation data?
22	have told me. We have the two pieces stuck together so	22	A. Yes.
23	that is what you are describing at the monomer?	23	Q. He has done the very thing you said could be done and he
24	Q. No, I am not.	24	has said, "Well, we haven't got a match here".
25	A. You are not?	25	A. Let me clarify.
			·
	Page 169		Page 171
,	Q. I am assuming that 359.1965 is a single ion.	,	
1	O. Tani assuming mai 559.1905 is a single ion.		
2		1 2	One can look at not just the database but often mass
2	A. Okay.	2	spectral libraries, which he has done, and from that see
3	A. Okay.Q. I know you don't think is that is the case and I am not	2 3	spectral libraries, which he has done, and from that see how the molecules fragment and say it is not one of
3 4	A. Okay.Q. I know you don't think is that is the case and I am not going to argue with you but just assuming that for	2 3 4	spectral libraries, which he has done, and from that see how the molecules fragment and say it is not one of those. So I agree with him.
3 4 5	A. Okay.Q. I know you don't think is that is the case and I am not going to argue with you but just assuming that for a moment, then we don't know what it is?	2 3 4 5	spectral libraries, which he has done, and from that see how the molecules fragment and say it is not one of those. So I agree with him. Q. Yes. I think that there are not any matches at all,
3 4 5 6	A. Okay.Q. I know you don't think is that is the case and I am not going to argue with you but just assuming that for a moment, then we don't know what it is?A. True.	2 3 4 5 6	spectral libraries, which he has done, and from that see how the molecules fragment and say it is not one of those. So I agree with him. Q. Yes. I think that there are not any matches at all, there are 89 matches in the Dictionary of Natural
3 4 5 6 7	 A. Okay. Q. I know you don't think is that is the case and I am not going to argue with you but just assuming that for a moment, then we don't know what it is? A. True. Q. Let's move from there to some proposition that you are 	2 3 4 5 6 7	spectral libraries, which he has done, and from that see how the molecules fragment and say it is not one of those. So I agree with him. Q. Yes. I think that there are not any matches at all, there are 89 matches in the Dictionary of Natural Products. Is that right?
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1	Q. I don't think he has suggested that the answer is to be	1	retrieved from the upper part of the gut and therefore
2	found in the Dictionary of Natural Products.	2	may relate to Mr
3	A. If it is of help to the court, I think we are both of	3	A. I think that goes beyond my expertise, it is on drugs,
4	the view that we have some unknown components in the	4	not on DNA analysis.
5	stomach and other body contents.	5	Q. I was not really talking about DNA testing, I was
6	Q. Yes.	6	talking about any testing on that material.
7	A. Yes.	7	A. Right.
8	Q. A candidate has been put forward, which is I think	8	Q. Do you know what at that material was? Have you seen
9	a metabolite of a substance that we have called NATOG,	9	any evidence?
10	which might be called NAT, but I don't think that, as	10	A. I do not know what that material was.
11	I understood it, that Dr Kite is very emphatic in that	11	Q. So we have an unknown there as well?
12	identification. Is that your understanding?	12	A. Yes.
13	A. That is my understanding, yes.	13	MR MOXON BROWNE: Thank you.
14	Q. Would it be fair to say that whether this is a monomer	14	Questions from MR STRAW
15	or a dimer, whether it is a one big toffee or two small	15	MR STRAW: Professor Cowan, just one very minor area. The
16	ones, we don't know what it is?	16	ChemSpider database
17	A. But that is a different question.	17	A. Yes.
18	Whether it is a monomer, which I think is more	18	Q you mentioned last time you gave evidence that if
19	likely, we don't know what the monomer is, we haven't	19	this, what we have been calling an unidentified ion, was
20	proved that and if it were to be a dimer, which I think	20	a monomer with mass 359.1165 and so on, you noted that
21	is unlikely but possible, again, we don't know what it	21	that matches 4,979 different items on the ChemSpider
22	is.	22	database and I think you said we don't know whether they
23	Q. I think the answer to my question is probably yes?	23	are toxic or not. Do you recall that?
24	A. Yes, fine, good.	24	A. Sorry, did you say whether they are toxic or not?
25	Q. I think you were following the questioning of Dr Kite	25	Q. Yes, we don't have information about their toxicity?
	Page 173		Page 175
1	about the vegetable material that was retrieved from the	1	A. I had not gone through all of those compounds and looked
2	digestive tract?		
		I 2	un their toxicity, that is correct.
3	_	2 3	up their toxicity, that is correct. O. Thank vou.
3 4	A. Yes.	$\begin{bmatrix} 2\\3\\4 \end{bmatrix}$	Q. Thank you.
4	A. Yes. Q. Which was subjected, under Professor Simmonds's	3	Q. Thank you. I would like to look, please, at if the unidentified
	A. Yes.	3 4	Q. Thank you. I would like to look, please, at if the unidentified ion is a monomer with mass 180, you mentioned last time
4 5 6	A. Yes. Q. Which was subjected, under Professor Simmonds's supervision, to DNA testing. We don't know what that is either?	3 4 5	Q. Thank you. I would like to look, please, at if the unidentified ion is a monomer with mass 180, you mentioned last time that there were some 3,346 items on the ChemSpider
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1	May I, as we have done with the other witnesses,	1	A. Yes, I did.
2	just re-establish for the benefit of those here your	2	Q. Can I just remind you of what you said in that regard,
3	expertise.	3	please?
4	You are a toxicologist whose specialist area I think	4	A. Of course.
5	is chemical and biological agents?	5	Q. You described it in these terms, and I am looking at
6	A. Correct.	6	page 171 of the transcript dated 19 June 2017.
7	Q. As far as the identification of poisonous plant	7	You said:
8	alkaloids goes I think you would defer, is it right, to	8	"The classic features that you see are basically
9	the expertise of Dr Kite and Professor Simmonds?	9	an overstimulation of the nervous system initially, so
10	A. Most definitely.	10	your eyes would start running, your nose would start
11	Q. May I just recap some of the evidence you gave to us	11	running, you would start coughing up secretions. You
12	in June 2017, please.	12	would lose the ability to control your bladder and your
13	In respect of the principal categories of chemical	13	bowels and then eventually as the nervous system becomes
14	agents, you describe three such categories, toxic gases,	14	more exhausted because of this hyperactivity initially,
15	blister agents and nerve agents.	15	you then get a blockade of various nerve functions, so
16	A. That's correct, yes.	16	you would eventually see a slowing of the heart,
17	Q. Some of those categories or some agents within those	17	a reduction of the blood pressure, the overstimulation
18	categories can now be ruled out by the testing that has	18	of the brain may cause the patient to actually seize, so
19	been done and you have seen some of the tests?	19	as have epileptic seizures but eventually all neural
20	A. That's correct, yes.	20	activity would be blocked and most importantly the brain
21	Q. Some of those chemicals cannot now be ruled out, because	21	stem, which controls your respiration so classically
22	the window for testing has been closed?	22	death from organophosphates, and particularly the nerve
23	A. Indeed.	23	agents, occurs because you stop breathing."
24	Q. For example, cyanides and azides?	24	A. That is entirely correct.
25	A. That's correct, yes.	25	Q. Is there anything you want to add to that evidence in
	Page 177		Page 179
1	Q. I think you also said in your evidence that it is	1	terms of a description of the classic cholinergic crisis
2	unlikely that you would now be able to do any scientific	2	that results from nerve agent poisoning?
3	testing to detect nerve agents?	3	A. No, I think that is a good summary of the mechanism and
4	A. That's correct, because the key enzyme that is inhibited	4	it also explains the signs and symptoms of poisoning
5	by those materials would have broken down by now, so	5	that one would see.
6	yes.	6	Q. Turning then to your views in respect of
7	Q. In respect of nerve agents, your evidence, I think, was	7	Mr Perepilichnyy, I think you have been here all day and
8	that they are organophosphates as a category?	8	heard the evidence of Dr Wilmshurst and
9	A. Yes.	9	Professor Ferner.
10	Q. They include VX and Novichok, for example?	10	A. Yes, I have.
11	A. For example, yes.	11	Q. You will have heard, I think, the summary of the
12	Q. You also indicated to the court that there is open	12	relevant factual evidence which was being examined by
13	source material available to the effect that the Russian	13	them with a view to taking or drawing conclusions about
14	state has access to nerve agents?	14	whether or not he suffered some form of delayed action
15	A. Correct.	15	poison or food poisoning.
16	Q. You also said in your evidence that there are some	16	Professor Ferner's view was that it was likely that
17	poisons that are going to be impossible to detect?	17	Mr Perepilichnyy suffered some form of food poisoning,
18	A. Yes.	18	although it was not possible to say what, but he was
19	Q. And they include nerve agents?	19	unable to say that this was likely to have caused his
20	A. That's correct.	20	death.
21	Q. You also gave evidence that there may be some foreign	21	From your perspective, do you accept that view?
22	states that may seek to make such poisons?	22	A. I think that is a reasonable view based on the evidence
23	A. That is also correct.	23	I have heard, yes.
24	Q. In your evidence, you described what was called I think	24	Q. As far as the delayed action poison is concerned,
25	a cholinergic crisis?	25	Professor Ferner said it was possible that that could
	Page 178		Page 180
		1	

lawe been administered to Mr Pereplichnyy, but cannot asy that it was likely to have occurred? A. I would also agree with that. Q. May I now turn to your specific area of expertise and in particular the use of new agents, if I may. As I have established, and as you have agreed, the setentific window for testing definitively for the use of newe agents is now definitively closed? A. I would suggest on, yes, because of the reasons I have already suggested. A. I would suggest on, yes, because of the reasons I have already suggested. Mr Pereplichnyy's case? Mr Pereplichnyy's case? Mr Pereplichnyy's case? A. No, I don't believe it can. Q. You and last time in the context of the cholinergic crisis, which you describe as the classic presentation of the factual evidence green to this court, which was already and in the case approximately and the factual evidence green to this court, which you describe as the classic presentation of the factual evidence green to this court, which you describe as the classic presentation of the factual evidence green to this court, which you describe as the classic presentation of the factual evidence green to this court, which you describe as the classic presentation of the factual evidence green to this court, which you describe as the classic presentation of the factual evidence green to this court, which you describe as the classic presentation of the factual evidence green to this court, which you describe as the classic presentation of the factual evidence green to this court, which you describe as the classic presentation of the factual evidence green to this court, which you describe a story to do all the part of the factual evidence green to this court, which you describe a story to do all the part of the factual evidence green to this court, which you do not have a present of the factual evidence green to this court, which you do not have a present of the part of the factual evidence green to this court. A That what I said yes, and I would stand by that. Q. Desc but c				
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4 A. Thank you very much indeed. 5 particular the use of nerve agents, if Imay. As I have established, and as you have agented, the estentific window for testing definitively for the use of nerve agents is now definitively closed? 9 A. I would suggest so, yes, because of the reasons I have already suggested. 11 Q. In those circumstances, the use of such an agent cannot 100 per cent be ruled out scientifically in 10 You have forwarded copies of articles which I think 11 Q. In those circumstances, the use of such an agent cannot 11 or of nerve agent poisoning, that on your understanding of the factual evidence given to this court, 12 Q. You said last time in the context of the cholinergic crisis, which you describe as the classic presentation of the factual evidence given to this court, 12 Q. They include the secretions and the like – 13 Q. They include the secretions and the like – 14 Q. They include the secretions and the like – 15 Q. You stherefore concluded that in your view it was 15 Q. You therefore concluded that in your view it was 16 Q. Widening year view, not simply to include nerve agent 90. Widening for example, Novichok? 19 Q. Widening year view, not simply to include nerve agent 90. Widening for example, Novichok? 19 Q. Widening year view, not simply to include nerve agent 90. Widening for example, Novichok? 19 Q. Widening year view, not simply to include nerve agent 90. Widening year view, not simply to include nerve agent 90. Widening given year, not simply to include nerve agent 90. Widening year view, not simply to include nerve agent 90. Widening year view, not simply to include nerve agent 90. Widening year view, not simply to include nerve agent 90. Widening year view, not simply to include nerve agent 90. Widening year view, not simply to include nerve agent 90. Widening year view, not simply to include nerve agent 90. Widening year view, not simply to include nerve agent 90. Widening year view, not simply to include nerve agent 90. Widening year view, not simply to include nerve agent 90	3		3	All right, thank you very much.
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the view that it was more likely that he died of natural causes than was poisoned? A. Yes, because of the lack of evidence of a poisoning. Q. Do you stand by that conclusion? A. I do. Q. Do you have anything to add to the evidence you have given today? A. No, I don't believe I do. 18 MS HILL: If you don't mind, sir, I would rather roll up 19 that up with some further issues for tomorrow. It is 20 a related matter, so I would rather do that tomorrow. 21 THE CORONER: Absolutely, but not forgotten and all 22 understood. 23 MR SKELTON: Sir, we have some live evidence tomorrow, we have some evidence to read and then we have a general 25 sweep up of where we are up to with our other	16	cardiac cause, arrhythmic cardiac cause, or poisoning,	16	deal with that tomorrow.
causes than was poisoned? 19 that up with some further issues for tomorrow. It is 20 A. Yes, because of the lack of evidence of a poisoning. 21 Q. Do you stand by that conclusion? 22 A. I do. 23 Q. Do you have anything to add to the evidence you have 24 given today? 25 A. No, I don't believe I do. 29 that up with some further issues for tomorrow. It is 20 a related matter, so I would rather do that tomorrow. 21 THE CORONER: Absolutely, but not forgotten and all 22 understood. 23 MR SKELTON: Sir, we have some live evidence tomorrow, we 24 have some evidence to read and then we have a general 25 sweep up of where we are up to with our other	17	based on your analysis of the factual evidence, you took	17	MR SKELTON: We have some live.
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21 THE CORONER: Absolutely, but not forgotten and all 22 A. I do. 23 Q. Do you have anything to add to the evidence you have 24 given today? 25 A. No, I don't believe I do. 21 THE CORONER: Absolutely, but not forgotten and all 22 understood. 23 MR SKELTON: Sir, we have some live evidence tomorrow, we 24 have some evidence to read and then we have a general 25 sweep up of where we are up to with our other	19	causes than was poisoned?	19	that up with some further issues for tomorrow. It is
22 understood. 23 Q. Do you have anything to add to the evidence you have 24 given today? 25 A. No, I don't believe I do. 20 understood. 23 MR SKELTON: Sir, we have some live evidence tomorrow, we have some evidence to read and then we have a general sweep up of where we are up to with our other	20	A. Yes, because of the lack of evidence of a poisoning.	20	a related matter, so I would rather do that tomorrow.
22 understood. 23 Q. Do you have anything to add to the evidence you have 24 given today? 25 A. No, I don't believe I do. 20 understood. 23 MR SKELTON: Sir, we have some live evidence tomorrow, we have some evidence to read and then we have a general sweep up of where we are up to with our other	21	Q. Do you stand by that conclusion?	21	·
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24 given today? 24 have some evidence to read and then we have a general 25 A. No, I don't believe I do. 25 sweep up of where we are up to with our other		Q. Do you have anything to add to the evidence you have	23	
25 A. No, I don't believe I do. 25 sweep up of where we are up to with our other	24		24	
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        investigations, some of which are drawing to
 2
        a conclusion.
 3
      THE CORONER: Yes, all right.
 4
          Thank you all very much. 10.00 tomorrow.
 5
      (4.11 pm)
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       (The Inquest adjourned until 10.00 am the following day)
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