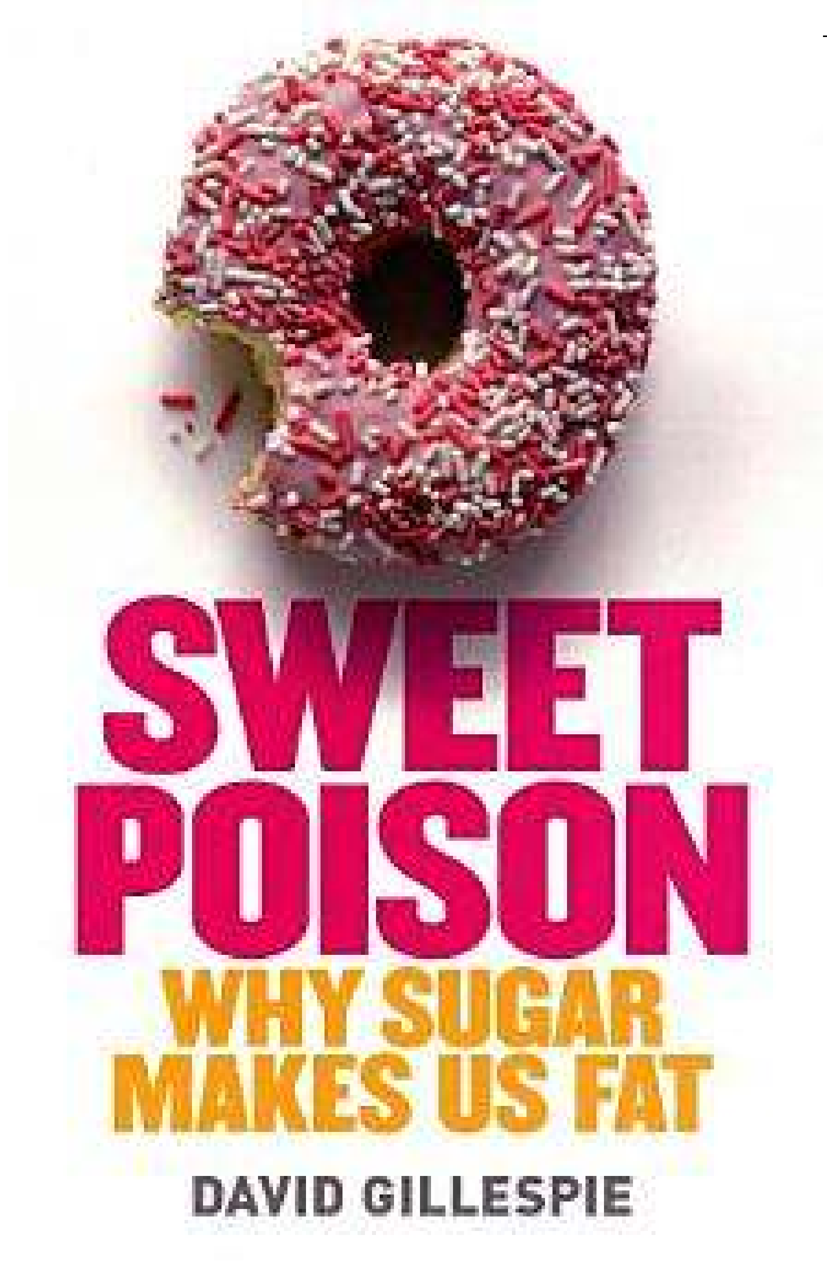
SWEET
POISON
WHY SUGAR
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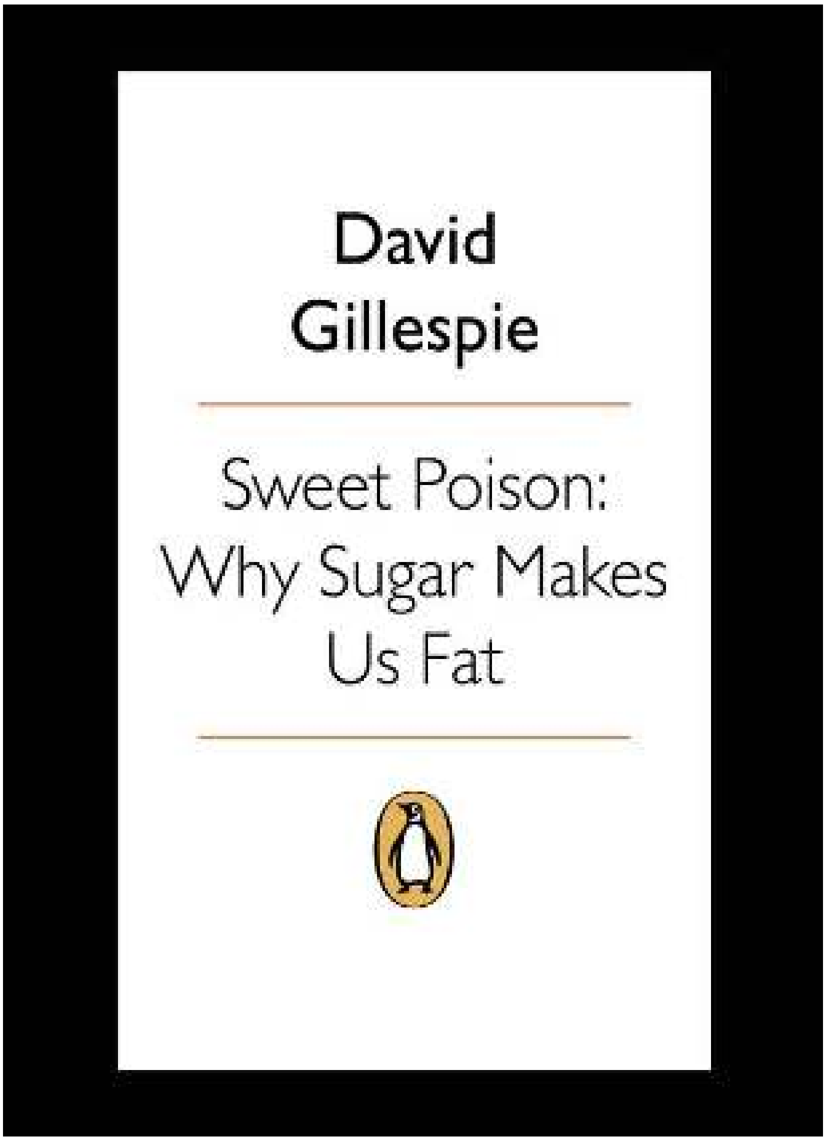
DAVID GILLESPIE


David
Gillespie
Sweet Poison:
Why Sugar Makes
Us Fat

SWEET POISON

DAVID GILLESPIE is a recovering corporate lawyer, co-founder of a successful software company and consultant to the IT industry. He is also a father of six young children (including one set of twins). With such a lot of extra time on his hands, and 40 extra kilos on his waistline, he set out to investigate why he, like so many in his generation, was fat. He deciphered the latest medical findings on diet and weight gain and what he found was chilling. Being fat was the least of his problems. He needed to stop poisoning himself.

Praise for *Sweet Poison*

‘What’s impressive about *Sweet Poison* is that Gillespie turns complex research on what happens to food inside our body and its relation to weight gain into a good read.’

Sydney Morning Herald

‘Comprehensive, thought provoking and highly readable.’

The Age

‘Eye-opening.’

Woman’s Day

‘David Gillespie’s groundbreaking book on the dangers of a high sugar intake could well revolutionise the way you diet.’

A Current Affair

‘*Sweet Poison* is a worthy and impassioned effort by an Australian dad to share his surprising discoveries with struggling dieters and provoke further debate about the obesity epidemic.’

Australian Bookseller & Publisher

‘I’ve lost 11kg without being on a diet. It’s good to know this book is non-fiction.’

Steve Irons MP, Member of the Parliamentary Inquiry into Obesity

SWEET POISON

WHY SUGAR MAKES US FAT

DAVID GILLESPIE

VIKING
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For Lizzie, Anthony, James, Gwendolen, Adam, Elizabeth and Finlayson.

VIKING

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Introduction

I still remember the day Lizzie told me. She had a stunned, almost fearful expression on her face and was unsure of herself in a way I had rarely seen in my wife of 13 years. Our fifth and assumedly last child had just been turned into twins with a wave of the ultrasound wand. In about eight months, we were to become parents of six children under nine years of age. I was about 40kg overweight, and had struggled with my weight for as long as I could remember (except for a brief period during university when I managed to snare Lizzie). I had tried most things, from reducing fat in my diet to not eating to regularly attending the gym and walking the dog. Sometimes I had had limited success (a few kilograms here and there), but it was mostly small backward steps on my ever-accelerating journey to obesity and beyond.

With the weight came lethargy and sleeping problems. As any parent could attest, getting enough sleep and having the energy to get through the day is difficult at the best of times, let alone when you're starting out in the red. I was going to have to be a dad to twin babies and four other young children and I couldn't see myself managing it carrying 40 extra kilos, feeling lethargic and not sleeping.

At the time, the Atkins diet was beginning to take off, with all manner of people touting it as a miracle diet. My uncle had recently undergone heart surgery and was now on Atkins. He had lost a vast amount of weight and was tucking into bacon and eggs every morning for breakfast. This looked like a diet I could really enjoy. I immediately cut out all carbs and, lo and behold, I started losing weight like never before (although I suspect it was because I found it almost impossible to find any food I wanted to eat that did not contain carbohydrates). I spent a couple of weeks feeling like I was starving to death. The weight was coming off but the willpower required to stay on the diet was overwhelming (not to mention the nasty side effects that eliminating fibre from my diet was having). I started to look for alternatives. At first low-GI diets seemed appealing, because they at least allowed you to eat some carbohydrates, but almost no foods were labelled with GI indicators and the maths involved in calculating it myself was beyond me. When chocolate spreads advertised their low-GI levels, I knew that if a food that was half sugar and half fat could earn a low-GI label, the GI calculation was probably almost meaningless for dieters.

I had been reading a lot about Charles Darwin's life and his works on evolution. Darwin's theories held that all characteristics of modern animals were survival responses developed slowly over millennia. As a result, we (and all animals) are woefully inadequate at dealing with sudden changes in the environment. After reading about these theories, it had occurred to me that my weight gain, and that of most other people in our society, could not possibly be down to a lack of willpower alone (since willpower, or the lack of it, would be an evolved characteristic that could not suddenly have changed in just a few hundred years). In a desperate attempt to find a way to keep up the weight loss without having to stay on the carb-free diet, I started to read up on human metabolism. I quickly came to the conclusion that I would have to learn a whole new vocabulary to understand most of what was being written. However, I was beginning to get the vague feeling that many in the medical profession took for granted a fact that was a complete mystery to the rest of us.

Study after study seemed to be pointing to the inescapable conclusion that the fructose part of sugar was fat-inducing in animals, and probably in humans as well. Worse still, it seemed to be complicit in making us want to eat more food in general.

Although I found many studies within the medical fraternity backing this line of thought, documents written for the rest of us were almost impossible to find. Those that did exist were, more often than not, rants against sugar in general without any explanation as to why it was bad for us. I immediately changed from eliminating carbs to just eliminating foods with added sugar – at last I could eat bread again. It was impossible to remove all sugar because everything seems to contain it, so I set myself a limit of no more than 10g of sugar in a meal (about the amount of fructose in an apple). This simply meant I no longer ate sweets and biscuits or drank juice and soft drink. The weight loss continued, but the diet was a lot easier to stick to. After a few months, I was so used to not having sugar that it took no willpower at all to refuse it. In fact, on the few occasions I did try chocolates, they tasted unbearably sweet.

I've now lost the 40kg and, more importantly, no longer worry about weight gain at all. I know that I can eat when I feel hungry and stop eating when I feel full and I will not put on weight. I can eat whatever I like whenever I feel like eating, as long as it does not include sugar. I have no urge to eat when I'm not hungry, I no longer feel lethargic or sleep deprived (other than as would be expected for a father of six), and no unnecessary exercise was involved at all. By far the greatest benefit has been the ability to trust my own body to let me know when to eat and when not to. It's a feeling I've never experienced before.

People obviously noticed the change in my appearance and energy levels, and asked me what I had done. 'I stopped eating sugar' seemed too trite and forwarding them medical journal articles just a little bit over the top, so I decided the story of the sweet poison had to be written in language we all could understand.

PART 1
WHY IS SUGAR MAKING YOU FAT?

1. STARTING OUT

One of the first articles I came across during my ‘net-education’ was a book written over 40 years ago with the catchy title *The Saccharine Disease*. This quaintly written 129-page book, authored by Surgeon-Captain Cleave of Her Majesty’s Navy in 1966, caught my eye because it contained a theory that there was a strong link between evolution and diet. This matched up with some of the thoughts I had been having after reading about Charles Darwin’s theories on evolution.

The good doctor was saying that the human body, having evolved in an environment of a largely wholegrain, vegetable and (occasional) meat diet, was ill-equipped to deal with the highly processed sugar and refined flour diet of the twentieth century. Dr Cleave had decided, after a lifetime of treating sick sailors (he was 60 when he wrote the book), that a huge number of modern diseases were directly caused by the over-consumption of sugar and refined flour. He blamed sugar and flour for the headline diseases like obesity, coronary disease and diabetes. But he also threw in peptic ulcer, constipation, haemorrhoids and varicose veins, as well as appendicitis, gallstones, urinary tract infection, inflammation of the large intestine and, of course, dental cavities, among others.

This book was clearly written with a medically trained audience in mind, so I don't recommend it for a relaxing read in front of the fire. I'm certainly no doctor and I came across this book at the very beginning of my reading, so most of its analysis went straight over my head. There was, however, one graph – that's right, I went straight for the pictures – that really got me interested in the theory behind Dr Cleave's 'saccharine disease'. Chapter 2 contained a graph that showed that sugar consumption in England had risen eightfold between 1815 and 1955. The average inhabitant of the British Isles was consuming just 15lb (about 7kg) of sugar in 1817. By 1955, their intake was almost 110lb (50kg). The steady upward march had only been briefly interrupted by the intervention of the two world wars.

The Surgeon-Captain was convinced that this rise in sugar consumption, along with a similar trend in the consumption of refined white flour, was entirely responsible for the raft of illnesses that he collectively dubbed 'the saccharine disease'. Dr Cleave had noticed that all of the diseases he was including were virtually nonexistent prior to 1900 and he simply put two and two together. The diseases were increasing at about the same rate as the consumption of sugar and refined flour. According to him, it was the concentration (by refinement) that was the problem with both sugar and flour. When sugar is refined from cane or sugar beet, 99 per cent of the original food (mostly the fibre) is removed, leaving only the sugar syrup. Similarly, by the time white flour is created, 90 per cent of the bran has been removed. The thinking was that by removing the fibre, we were making food much easier to digest. Sugar and flour would be reduced to glucose by the body and, without the fibre to slow things down, the glucose would hit our bloodstream very quickly. Dr Cleave felt this would 'upset the evolutionary adaptation in the pancreas [where it] is held … to cause the disease'.

The solution was obvious to Cleave. Just add bran to everything you eat. Legend has it that while serving as the ship's doctor aboard the battleship *King George V* during World War II, he would have large sacks of bran brought on board to 'prescribe' to the crew. I think he could have counted himself lucky that the worst nickname he acquired as a result was 'the bran man'.

I was intrigued by the enormous growth in sugar consumption shown in the graph. Sugar consumption was clearly growing at an extraordinary rate and some of Dr Cleave's other graphs showed that diabetes and other diseases were growing at similar rates. But I was less convinced by his argument that adding bran to your diet to counteract the excess sugar and flour was the secret to avoiding so many diseases. I needed to understand more about the chemistry involved in digestion before I was prepared to start pouring bran on my chocolate ice-cream. This, unfortunately, would involve my getting very close to some subjects that I had avoided since I almost failed Biology and Chemistry in high school. But I am one of those people who can't leave a problem alone until I am convinced I have worked out a logically consistent argument for how the whole system works. And Dr Cleave's clogged-up pancreas wasn't doing it for me.

By the time you get to the end of this book, you'll figure out (as I did) that Dr Cleave wasn't too far from the mark. All right, it's called 'metabolic syndrome' rather than 'the saccharine disease', and it's a part of sugar that's the problem, not refined flour and sugar. But the pancreas does play a role and fibre is part of the prevention. He got close to the right answer from his observations, but (as with most things in life) the details were significantly more complex than I am sure he ever imagined.

There is no shortage of 'educational' resources about human digestion on the internet. After reading a few of the more 'interesting' theories about digestion and how it works, I decided to stick to sites that doctors seemed to regard as authoritative: mostly medical journals, or sites run by people who publish articles in medical journals. Unfortunately, all of these articles appeared to have been written on the presumption that I had completed six years of medical school and practised gastroenterology (the study of the human digestive system) and endocrinology (the study of the human hormone-producing organs) for at least 20 years. I had a steep learning curve ahead of me and it took me a long time to get up to speed, looking up every second word on Wikipedia along the way. I won't bore you with the detail of all the false starts and blind alleys, but here is what I discovered (in English rather than Latin and Greek).

The sugar that Dr Cleave was talking about is common table sugar, the white (or brown) stuff some of us add to our cup of tea in the morning to make it a bit more pleasurable to drink. It's the same sugar that, in Australia and the United Kingdom, is added to most foods that require sweetening. In the United States they use a cheaper substance called high-fructose corn syrup (HFCS) for sweetening processed food. HFCS is, for all practical purposes, identical to sugar, despite what some of the more excitable websites would have you believe. But more on that later …

It seems cocoa, tea and coffee merchants were in fact almost single-handedly responsible for introducing sugar into the English (and hence the western) diet. As anyone who has tried even '80 per cent cocoa' dark chocolate will attest, cocoa is a pretty bitter pill to swallow without sugar. But add some of the sweet stuff and suddenly you have a product that flies off the shelves. The same goes for tea and coffee, so the only way the merchants bringing these new foods into the western world could convince people to drink their newly introduced bitter beverages in the sixteenth century was to suggest the addition of the newly discovered sweetener, cane sugar.

Sometimes it's called caster sugar or raw sugar or brown sugar or white sugar, but it's all the same stuff. It's what most of us think of when asked to describe sugar. Scientists call table sugar (and all its variants) 'sucrose'. The group of compounds with chemical properties like table sugar are generically called 'sugars' by chemists and nutritionists. This makes it all pretty confusing since what ordinary people call sugar and what scientists and nutritionists call sugar are in fact two different (but overlapping) things.

Sucrose (table sugar) is a double sugar (disaccharide – Latin for two sugars). This simply means that it is made up of two 'simple sugars' – glucose and fructose – joined together at the molecular level. Just as this is starting to sound confusing, it turns out that our digestive system doesn't bother remembering complex names either. To your digestive system there is no such thing as sucrose. When you eat a teaspoon (5g) of sucrose, your body 'sees' 2.5g of glucose and 2.5g of fructose.

There are only three important simple sugars: glucose, fructose and galactose. All of the other 'sugars' you are likely to encounter in daily life are simply combinations of these three. For example, the 'sugar' you see on the label of a carton of milk is lactose. Lactose is half glucose and half galactose. Maltose, the sugar in beer, is two molecules of glucose joined together in an unusual way.

Simple sugars like glucose and fructose can also be present in nature in their uncombined form. Most fruit, for example, contains some sucrose, some fructose and some glucose. To our digestive system, however, the sucrose is just a bundle of more fructose and glucose.

This food …	Contains …	Which breaks down to …
Milk and dairy foods	Lactose	Galactose + glucose
Beer	Maltose	Glucose + glucose
Table sugar, brown sugar, caster sugar, etc.	Sucrose	Glucose + fructose

Figure 1.1: All those different 'oses' break down to one of three important sugars.

Glucose is by far the most plentiful of the simple sugars. Pretty much every food (except meat) contains significant quantities of glucose. Even meat (protein) is eventually converted to glucose by our digestive system. It's a pretty important sugar to humans. Pure glucose tastes slightly sweet, but would be barely noticeable to the sugar-saturated palate of the modern human. Australian readers who have recently been to the pharmacist will insist this is not true, citing a brand of jelly bean stocked only by chemists as evidence to the contrary. Unfortunately, a quick look at the label reveals that the primary ingredient is in fact sugar. The sweetness comes from the fructose part of the molecule.

Galactose is present in our environment in only very small quantities and is found mainly in dairy products in the form of lactose. Most baby mammals, including humans, are adapted to survive on lactose when they are young, but about 70 per cent of the world's adult human population are lactose intolerant and cannot digest lactose or use it for energy production.

People with ancestry in northern Europe, the Middle East and India (the places where people have the longest association with domesticated cattle), however, have a version of the lactose digestion gene that is not disabled when they grow up. Those people (most of the Australian population) are able to continue to drink and eat milk products comfortably into adulthood. Those of us who can digest galactose convert it to glucose and treat it as glucose for all important digestive purposes. Everybody else lets it pass straight through the digestive system, which is why a primary symptom of lactose intolerance is diarrhoea. Galactose is slightly less sweet than glucose, but it's still on the sweet side of the palate. If you are not lactose intolerant, pay close attention to the next glass of milk you consume. You will notice an ever so slight sweet tinge to the flavour – it is certainly not sour (at least if you drink it before the use-by date).

Fructose is also relatively rare in nature. It is found primarily in ripe fruits, which is why it is sometimes call fruit sugar. It is usually found together with glucose and sometimes sucrose. Fructose tastes about 60 per cent sweeter than glucose or galactose. In practical terms this means you would need to consume 2 teaspoons of glucose to get the same sweetness hit that you would from 1 teaspoon of fructose. Table sugar, being a combination of the two, is halfway between in terms of sweetness. As with lactose, consumption of a large amount of pure fructose can result in exceeding the capacity of our intestines to absorb it, resulting in diarrhoea. If, however, fructose is eaten in combination with glucose, for example by eating sugar, then it seems we can absorb virtually unlimited quantities (more on this later).

These three 'sugars' make up the vast majority of the food group we call carbohydrates (they are made up of *carbon*, hydrogen and oxygen – the 'ate' in carbohydrate indicates the presence of oxygen). The only other significant carbohydrate is cellulose, or what we commonly call fibre (the hard stringy bits of plants). If you've ever eaten a lot of baked beans in a sitting, you'll know that humans can't fully digest fibre. And over-consumption leads to exactly the same result as when a lactose-intolerant person eats too much dairy food – diarrhoea and flatulence. This doesn't mean fibre has no purpose in our digestive system; it's just that we don't use it for energy.

Only about half the western diet is carbohydrate based. In a normal diet, a further one-sixth of our energy needs are supplied by protein (predominantly from meat, but also from nuts). Protein is broken down into amino acids by our digestive system, some of which are used to build up our tissues and some to assist in hormone production. Leftover amino acids are converted to glucose and used for energy in exactly the same manner as with carbohydrate digestion. The remaining third of our food is fat. Fat is broken down into fatty acids by our digestive system. Most fatty acids are used to make all the chemicals we use to digest everything else, and some are used for energy.

This food …	**Contains (mostly) …**	**Which breaks down to …**
Bread	Carbohydrate	Glucose + fibre
Milk	Carbohydrate + fat	Glucose + galactose + fatty acids
Meat (or nuts)	Protein + fat	Glucose + amino acids + fatty acids
Fruit	Carbohydrate	Glucose +

		fructose + fibre
Vegetables	Carbohydrate	Glucose + fibre

Figure 1.2: The whole world looks like glucose to our digestive system.

If you think of your body as being like an automobile (mine started out as a minibus), then think of it as being designed to run on a fuel of pure glucose. Our preferred source is carbohydrates, which can be broken down easily into glucose, but we have some well-designed coping mechanisms to convert other foods to glucose as well.

As far as our body is concerned, everything we eat is just glucose in disguise; sometimes it's wrapped in a bit of fat or a bit of fibre, sometimes with some 'additives' (vitamins) that we can use for running repairs and maintenance, but in the end it's really just glucose. Most carbohydrates are broken down into glucose, with a few throwaway molecules of fructose and galactose. Even the galactose is either converted to glucose or expelled from the body. Protein is similarly largely reduced to glucose before being used as fuel.

Most experts seem to agree that we have existed as a separate species for about 130 000 years. This makes our current urban environment and diet (which even with the most optimistic definition has existed for only the last 10 000 years) almost completely irrelevant in determining the evolved characteristics of our digestive system. We are probably genetically identical to the people who first settled in villages in the Niger delta. And 120 000 years before that, as our forebears started roaming the African savanna, they had to select things that would provide them with energy from the available food sources and at the same time avoid things that could poison them. People who couldn't tell the difference generally didn't last long enough to reproduce. Our distant forebears had evolved a handy little energy detector. Food that contains glucose tastes slightly sweet to us so, in nature, that taste we describe as sweetness is generally a reliable indicator of the presence of an edible high-energy food. Our forebears learned that the sweeter the food, the more energy it was likely to contain. Millennia of evolution have ensured that we are programmed to seek out sweet sources of food and reject sour substances as being probably poisonous or at least to be treated with caution (meaning wait for your neighbour to give it a go first).

For all but the last few hundred years (a heartbeat on the genetic evolution time scale), really sweet foods have been difficult to find. The sweetest food we encountered in nature, fruit, had been an occasional and, depending on where you lived, relatively rare bonus in our diet. The only other way to get a sugar hit in nature involved discussing the matter with a large swarm of disgruntled bees. Honey is 40 per cent fructose, which is why, even despite the difficulty in obtaining it, it was very popular as a food additive before the discovery of sugar.

Once we figured out, towards the end of the nineteenth century, how to make any food artificially sweet by adding sugar, sugar became a pretty popular ‘condiment’, as the good Dr Cleave’s graph clearly showed. Food manufacturers were happy to accommodate our preference for sweet foods as soon as it became commercially viable to produce sugar in large quantities. But more on the commercial side of things later – back to biology …

As far as I could tell, there was nothing controversial in any of the processes I have described above. How food is broken down and what supplies us with energy seems well settled (if somewhat opaquely explained by most sources). Understanding that all food is essentially glucose was an important foundation for me. (Why doesn't anybody tell us this in school? Maybe they did and I just wasn't listening.) But I hadn't figured out how the pancreas was involved (or even what the pancreas was) and why Dr Cleave would think that sugar consumption would clog it up, with all sorts of disastrous consequences. Or, for that matter, why putting bran on my food would fix it. Clearly further research was required.